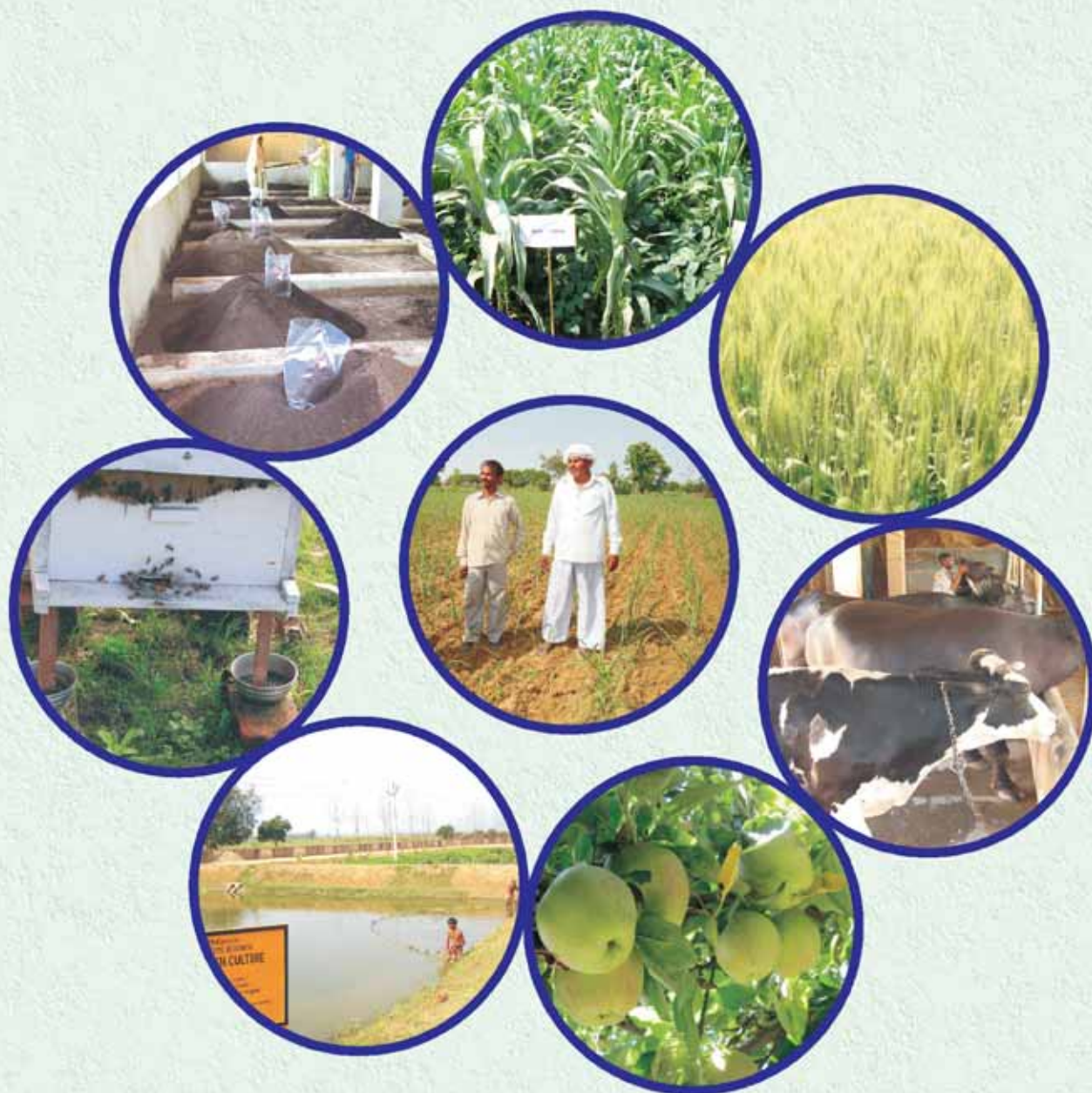




AICRP on IFS

Annual Report

2010-11



**कृषि प्रणाली अनुसंधान परियोजना निदेशालय
मोदीपुरम, मेरठ-250 110 (उ.प्र.), भारत**

**Project Directorate for Farming Systems Research
Modipuram, Meerut - 250 110 (U.P.), India**



ABOUT PDFSR

Project Directorate for Farming Systems Research (PDFSR) (formerly Project Directorate for Cropping Systems Research -PDCSR), was established by Indian Council of Agricultural Research, New Delhi in April, 1989 at Modipuram, Meerut (Uttar Pradesh). The specific (revised) mandate of PDFSR is, i) to characterize existing farming systems to know the productivity, viability and constraints, ii) to develop resource efficient, economically viable and sustainable integrated farming system modules and models for different farming situations, iii) to undertake basic and strategic research on production technologies for improving agricultural resource use efficiencies in farming system mode, iv) to develop and standardize package of production practices for emerging cropping/ farming concepts and evaluate their long-term sustainability, v) to act as repository of information on all aspects of farming systems by creating appropriate databases, vi) to develop on-farm agro-processing and value addition techniques to enhance farm income and quality of finished products, vii) to undertake on-farm testing, verification and refinement of system-based farm production technologies and viii) to develop capacity building of stakeholders in Integrated Farming Systems through training. All India Coordinated Research Project on Integrated Farming Systems is an integral part of PDFSR with 31 on-station IFSR centers, 11 on station CSR centers and 25 'on-farm' research centers; spread throughout the country in five ecosystems, i.e., arid, semi-arid, sub-humid, humid and coastal; to develop location specific system based technologies. In addition, a net work Project on Organic Farming was initiated during 2004 with 13 cooperating centers.

**ALL INDIA CO-ORDINATED RESEARCH PROJECT ON
INTEGRATED FARMING SYSTEMS**

Annual Progress Report 2010–11



Project Directorate for Farming Systems Research
(Indian Council of Agricultural Research)
Modipuram, Meerut- 250 110, India

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- This compilation is a joint contribution of all the associated scientists and technical staff of 69 AICRP-IFS centers (data generation), IASRI New Delhi (statistical analysis) and PDFSR Modipuram (report writing, compilation, editing and printing).
- The report is based on experimental data generated during *kharif*, *rabi* and summer seasons of 2009-10 (period ending June 2010), under 'on-station' and 'on-farm' research programmes of AICRP on Cropping Systems. The other details are relevant to 31st March 2011.
- The report includes both processed and semi-processed data, generated in different sub-projects under AICRP on Cropping Systems, and as such no material/ data should be reproduced in any form without prior written permission of the Project Director, Project Directorate for Farming Systems Research and due credit to the concerned scientist.

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(B. Gangwar)
Project Director, PDFSR

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1. INTRODUCTION

The Genesis of the “**All India Coordinated Research Project on Integrated Farming Systems**” may be traced back to the visit of Dr A.B. Stewart of Macaulay Institute of Soil Research, Aberdeen U.K., somewhere in mid-forties. He was invited by the then ‘Imperial Council of Agricultural Research’ to (i) review the position in respect of soil fertility investigations, in general and manuring in particular, and (ii) suggest steps which might be taken in order to obtain, in shortest possible time, adequate information under different conditions of soil and climate to enable agricultural departments to give some advice to cultivators for increasing crops yields. His review reports, published in 1947, significantly affected philosophy and practices of fertilizers experimentation in the country, He stressed upon the need of conducting simple fertilizer trials on cultivators’ fields and complex experiments at selected research centre. Prompted by these suggestions, “Simple Fertilizer Trial at cultivators’ Fields” was initiated in 1953 under the Indo-American Technology Cooperation Agreement under “Soil Fertility and Fertilizer Use Project” with the following objectives:

- i. To study crop responses to nitrogen, phosphorus and potassium when applied separately and in different combinations under the cultivators’ field conditions.
- ii. To investigate the relative response of different fertilizers in various broad soil groups and to work out the optimum fertilizer combinations for different agro-climate regions.
- iii. To study the relative performance of different nitrogen and phosphatic fertilizers for indigenous production.
- iv. To demonstrate to the farmers the value of fertilizer use for the production of crops

Subsequently in 1956, experiments on carefully selected centers called ‘Model Agronomic Experiments’ were added to the project and started

as all India Coordinated Agronomic Experiments Scheme (AICAES). The objectives of Model Agronomic Experiments were:

- i. To study the interaction of amounts of fertilizer application with intensity and frequency of irrigation, sowing date and plant density.
- ii. To work out the manurial requirement of important crop rotations and their effect on soil fertility.
- iii. To Evaluate the relative efficiency of various sources of nitrogen and phosphorus for different crops and areas, and of different methods of application of nitrogenous and phosphatic materials.

As Knowledge progressed, new technology developed and the rate of growth in agriculture increased, the scheme went through various stages of evolution during which its scope expanded and its focus sharpened in accordance with newly acquired scientific knowledge. The scope of experimentation was therefore, expanded to include agronomic research embracing cultural practices, irrigation and nutritional requirements, chemical weed control and multiple cropping. But the emphasis continued on soil fertility and fertilizer use as influenced by soil and climatic factors and management,

In 1968-69, the scheme was sanctioned as All India Coordinated Agronomic Research Project (AICARP) with two components, viz.; ‘Model Agronomic Experiments’ and ‘Simple Fertilizer Trials’. The main objectives of the experiments conducted at the research centres under the scheme were:

- i. To obtain information of the response of high yielding varieties of cereal to different agronomic factors such as fertilizer (including micronutrients), irrigation ,weed control ,liming etc.;

- ii. To study the manurial requirements of important crop rotations and their effect on soil fertility;
- iii. To evaluate various sources of nitrogen and phosphorus for different crops and areas;
- iv. To work out the production potential per unit area, per unit time for different agro-climate condition of the country; and
- v. to determine the most suitable cropping patterns and fertilizer responses under rainfed condition.

Under the revised scheme, the main objectives of the simple fertilizer trial were:

- i. To study the responses of introduced high yielding and locally improved varieties to nitrogen and phosphorus applied alone and in combination and to potassium in the presence of nitrogen and phosphorus under irrigated as well as dry land condition;
- ii. To compare different methods of application of nitrogen on cereals under dry-farming conditions;
- iii. To study the contribution of package of soil and moisture conservation practices to increase crop production in dry farming areas;
- iv. To study the relationship between crop response to fertilizer and soil test values; and
- v. To formulate fertilizer recommendations for different soils and agro-climatic regions of the country.

But, during 1979 aforementioned objectives were further reviewed and redefined as under:

- i. To develop, continuously update and test on cultivators' fields the technology for various crop based farming systems. For this patterns best suited for different agro-climatic zones may be identified, evolved for various emerging farming situations and package of practices developed to realize their production potential.
- ii. To define/delineate all aspects of the use of fertilizers (recognizing that fertilizer is an

important component of modern agricultural technology), including choice of materials maximize its use through recycling of agricultural wastes or employment of microbial aids,

- iii. To provide facilities for testing new varieties at their pre-release stage.

In mid-eighties, the policy planners duly recognized the importance of cropping systems approach of research to enhance resource use efficiencies for improved and sustainable crop productivity. Therefore, to strengthen all aspects of cropping systems research the 'Project Directorate for Cropping Systems Research' was established at Modipuram (Meerut) with effect from March 1989, with 'AICRP on Cropping Systems' as one of the constituent schemes of the Directorate with both the components, namely; 'On-Station Research' and 'On-Farm Research' remaining intact. The objectives of the scheme for 'on-station' and 'on-farm' research were as follows:

On-Station Research

- i. To identify profitable and efficient cropping systems for different agro-climatic regions with special emphasis on diversification / intensification through inclusion of oilseed, pulses and fodder crops.
- ii. To develop integrated nutrient management technique for major cropping systems with emphasis on locally available resources.
- iii. To improve fertilizer use efficiency in cropping systems through the use of efficient carriers, amendments and residues.
- iv. To develop system-based crop management practices for maximizing yield in each ecosystem.

On-Farm Research

- i. To undertake socio-economic and agronomic surveys for identification of production constraints and problem prioritization.

- ii. To develop and /or refine system-based agronomic practices, to increase cropping intensity, in farmers' participatory mode.
 - iii. To develop farm system/prototypes for enhancing crop productivity through optimizing farm inputs.
 - iv. To integrate farm enterprises to maximize the land use system and increase income and employment opportunities.
- However, within two decades of existence of PDCSR, the mandate of the Directorate was broadened during 2009-10 to undertake research in integrated farming system mode and the Directorate was renamed as '**Project Directorate for Farming Systems Research (PDFSR)**' and mandate redefined as:
- i. To characterize existing farming systems to know the productivity, viability and constraints.
 - ii. To develop resource efficient, economically viable and sustainable integrated farming system modules and models for different farming situations.
 - iii. To undertake basic and strategic research on production technologies for improving agricultural resource use efficiencies in farming system mode.
 - iv. To develop and standardize package of production practices for emerging cropping/ farming concepts and evaluate their long-term sustainability.
 - v. To act as repository of information on all aspects of farming systems by creating appropriate databases.
 - vi. To develop on-farm agro-processing and value addition techniques to enhance farm income and quality of finished products.
 - vii. To undertake on-farm testing, verification and refinement of system-based farm production technologies.
 - viii. To develop capacity building of stakeholders in Integrated Farming Systems through training.

Accordingly, the name of AICRP on Cropping Systems was changed as '**AICRP on Integrated Farming Systems**' and objectives modified as given hereunder.

2. OBJECTIVES

On-Station Research

- i. To identify profitable and efficient cropping/ Farming systems for different Agro-climatic regions.
- ii. To develop integrated nutrient management techniques for major cropping systems with emphasis on locally available resources.
- iii. To develop system-based crop establishment and tillage management techniques for each ecosystem.
- ii. To develop and / or refine system-based agronomic practices to increase cropping intensity.
- iii. To develop farm system/ proto-types for enhancing crop productivity through optimizing farm inputs.
- iv. To integrate farm enterprises to maximize the land use system and increase income and employment opportunities.

On-Farm Research

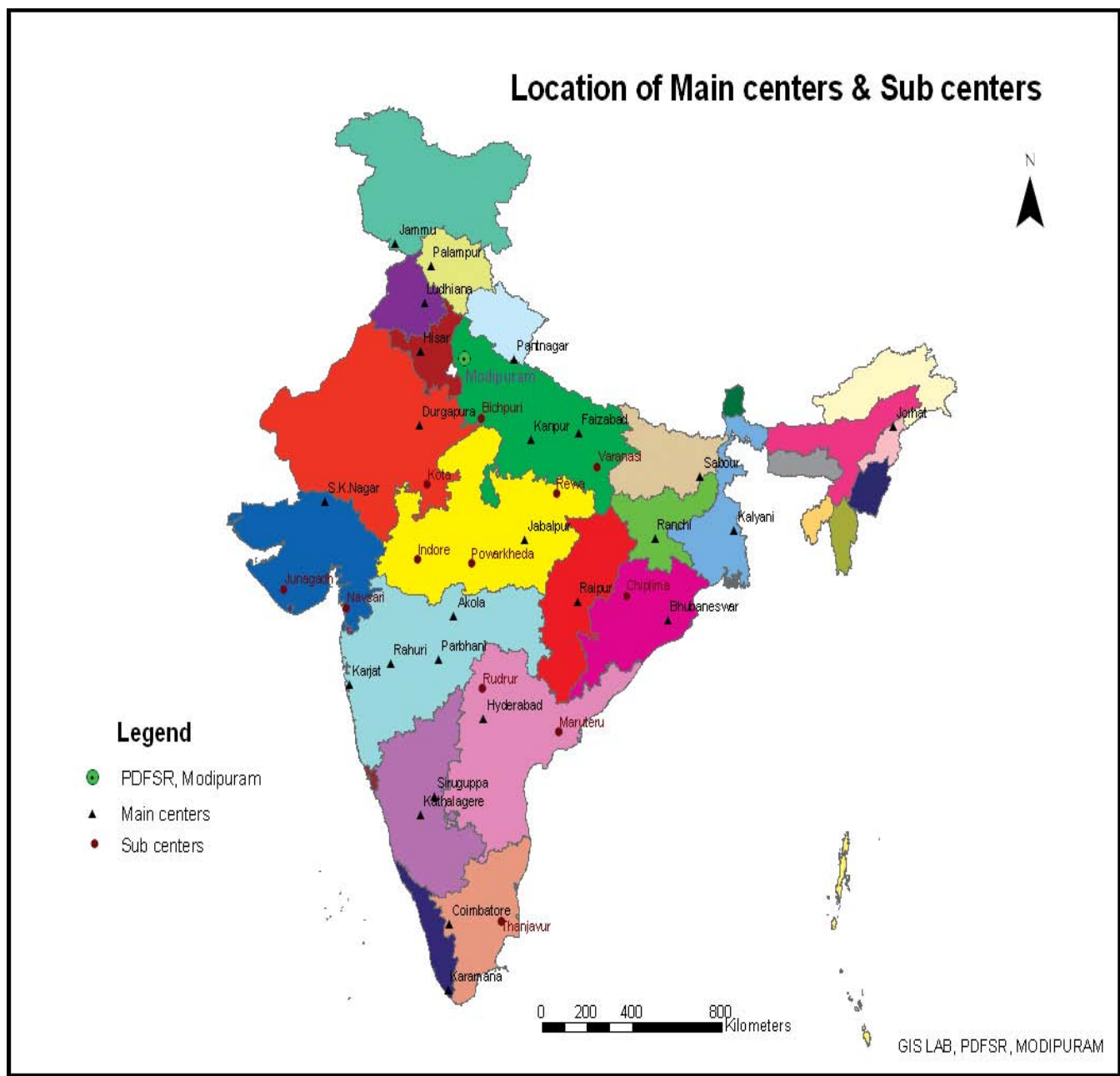
- i. To undertake socio-economic and agronomic surveys for identification of production constraints and problem prioritization.

However, component of Integrated Farming Systems Research (On-Station) could be taken up only during financial year 2010-11, in accordance with the recommendations of 'Brain Storming Session – cum – Launching Workshop of Integrated Farming Systems Programme', organized at KAU Cropping Systems Research Centre, Karamana, Thiruvananthapuram (Kerala) on 6-7 March, 2010.

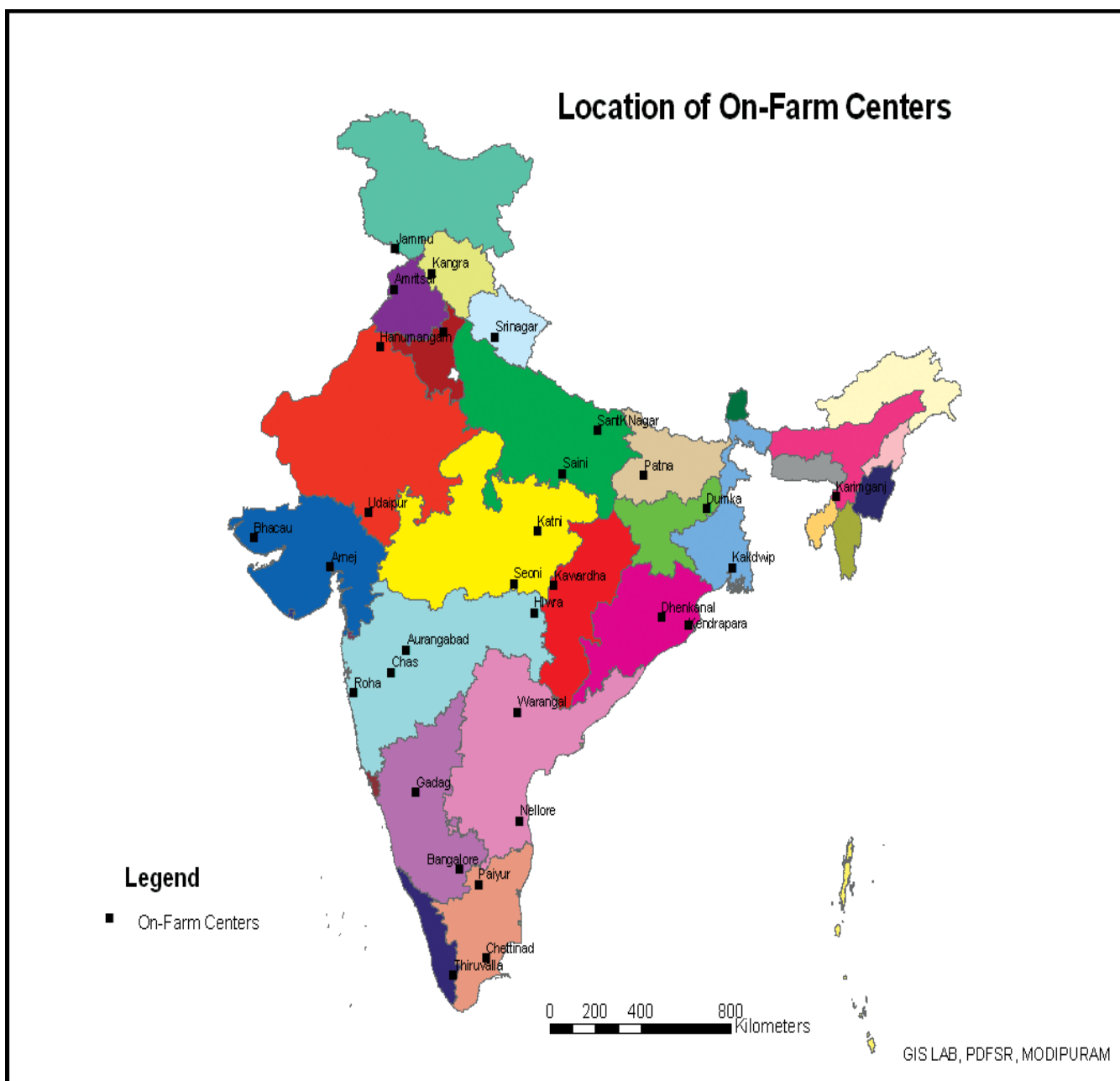
3. LOCATION

During the year 2009-10 the research under AICRP-IFS continued in cropping system mode only at 25 main centers, 12 sub centers and 32 on-farm research centres. All main and sub centres are engaged in basic and applied research and are necessarily located at SAUs or their Regional Research Stations or Agricultural colleges of those general universities, where strong agricultural research base is available. Whereas, on-farm research centers (earlier known as

Experiments on Cultivators' Field, ECF Centers) are engaged in farmers' participatory research and are located in different agro-climatic zones. These OFR centers remain shifted from one zone / farming situation to another, every 3-4 years. The location of different CSR centers during the year under report (2009-10) are depicted in Map 1 and 2 and details are given in Table-3/1. Agro-climatic zone-wise location of different centres is given in Table-3/2.



Map 1. Locations of on-station research centres of AICRP-IFS during 2009-10



Map 2. Locations of on-farm research centres of AICRP-IFS during 2009-10

Table-3/1: Location of different AICRP-IFS centres during the year under report (2009-10)

State	University/ Institute	On-Station Research		On-Farm Research	
		Main Centre	Sub-Centre	Headquarters	Operational District(s)
A.P.	ANGRAU, Hyderabad	Rajendranagar, (Dist.Rangareddy)	Maruteru (Dist. W. Godavari) Rudrur (Dist. Nizamabad)	Warangal Nellore	Nalgonda Nellore
Assam	AAU, Jorhat	Jorhat		Karimganj	Golaghat, Jorhat, Sibsagar, Dibrugarh & Tinsukia
Bihar	BAU, Sabour	Sabour (Dist. Bhagalpur)		Patna	Patna & Nalanda

State	University/ Institute	On-Station Research		On-Farm Research	
		Main Centre	Sub-Centre	Headquarters	Operational District(s)
Chhattisgarh	IGKV, Raipur	Raipur		Kawardha (Dist. Kabirdham)	Kabirdham
Gujarat	SDAU, S.K. Nagar AAU, Anand NAU, Navasari JAU, Junagadh	S.K. Nagar (Dist. Banaskantha)	Navasari Junagadh	Bhachau (Dist. Kutch) Arnej (Dist. Ahmedabad)	Kutch Ahmedabad and Anand
Haryana	CCS HAU Hisar	Hisar		Kurukshetra	Kurukshetra, Kaithal
H.P.	CSK HPKV, Palampur	Palampur		Kangra	Una, Kangra, Hamirpur
J & K	SKUAST, Jammu	Chatha (Dist. Jammu)		Dhiansar (Dist. Jammu)	Jammu, Kathua, Poonch, Udhampur, Rajori, Doda
Jharkhand	BAU, Ranchi	Kanke (Ranchi)		Dumka	Jamtara
Karnataka	UAS, Bangalore UAS, Dharwad UAS, Raichur	Kathalgere (Dist. Davangere) Siruguppa, (Dist. Bellary)		Bangalore Gadag	Ramanagara Gadag
Kerala	KAU, Thrissur	Karamana (Dist. Thiruvananthapuram)		Thiruvalla, (Dist. Pathanamthitta)	Pathanamthitta
M.P.	JNKVV, Jabalpur RVS KVV, Gwalior	Jabalpur Indore	Powarkheda (Dist. Hoshangabad) Rewa	Seoni Katni	Seoni Katni
Maharashtra	MPKV, Rahuri MAU, Parbhani DPDKV, Akola DBS KKV, Dapoli	Rahuri Parbhani Akola Karjat (Dist. Raigadh)		Chas, Ahemadnagar Aurangabad Hiwra (Dist. Gondia) Roha (Dist. Raigadh)	Ahemadnagar Usmanabad, Beed and Latur Gondia Raigadh
Orissa	OUAT, Bhubaneswar	Bhubaneswar	Chiplima (Dist. Sambalpur)	Mahisapat (Dist. Dhenkanal) Jajanga (Dist. Kendrapara)	Dhenkanal and Angul Kendrapara
Punjab	PAU, Ludhiana	Ludhiana		Amritsar	Amritsar & Tarantaran
Rajasthan	SK RAU, Bikaner MPUAT, Udaipur	Durgapura (Jaipur)	Kota	Hanumangarh Udaipur	Hanumangarh Bhilwara, Dungarpur, and part of Chittortgarh, Udaipur and Sirohi
Tamil Nadu	TNAU, Coimbatore	Coimbatore	Thanjavur	Paiyur (Dist. Krishnagiri) Chettinad (Dist. Sivaganga)	Krishnagiri Kanyakumari and thiruniveli
Uttar Pradesh	CSAUAT, Kanpur NDUAT, Kumarganj (Dist. Faizabad) BHU, Varanasi RBS College, Bichpuri SVPUAT, Meerut	Kanpur Faizabad	Kumarganj (Dist. Faizabad) Varanasi Bichpuri (Agra)	Banda (Dist. Kaushambi) Sant Kabirnagar Varanasi	Banda Santkabirnagar Varanasi, Mirzapur and Sant Ravidasnagar
Uttarakhand	GBPUAT, Pantnagar	Pantnagar (Dist. U.S. Nagar)		Srinagar (Dist. Pauri)	Pauri Garhwal & Dehradun
West Bengal	BCKV, Kalyani	Kalyani (Dist. Nadia)		Kakdwip (Dist. 24-Parganas, South)	24-Parganas (South)
TOTAL		25	12	32	

Table-3/2: State-wise/ Agro-Climatic Region-wise location of different centres of AICRP-IFS during the year 2009-10

S.No.	State	Centre	Status	Ecosystem	Agro-Climatic Region/Sub-Region of Planning	NARP Zone
1.	Andhra Pradesh	Rajendranagar (Dist. Rangareddy)	Main centre	Semi-Arid	Southern Plateau and Hills Region/ South Telangana Sub-Region	Southern Telangana Zone (AP-5)
2.		Maruteru (Dist. W. Godavari)	Sub centre	Coastal	East Coast Plains and Hills Region/ South Coastal Andhra Sub-Region	Krishna Godavari Delta Zone (AP-1)
3.		Rudrur (Dist. Nizamabad)	Sub centre	Semi-Arid	Southern Plateau and Hills Region/ North Telangana Sub-Region	Northern Telangana Zone (AP-4)
4.		Kampasagar (Dist. Nalgonda)	OFR Centre	Coastal	Southern Plateau and Hills Region/ South Telangana Sub-Region	Southern Telangana Zone (AP-5)
5.		Nellore	OFR Centre	Sub-Humid	East Coast Plains and Hills Region/ North Coastal Sub-Region	Southern Zone (AP-3)
6.	Assam	Jorhat	Main centre	Humid	Eastern Himalayan Region/ Upper Brahmaputra Valley Sub-Region	Upper Brahmaputra Valley Zone (AS-2)
7.		Tinsukia	OFR Centre	Humid	Eastern Himalayan Region/ Upper Brahmaputra Valley Sub-Region	Upper Brahmaputra Valley Zone (AS-2)
8.	Bihar	Sabour (Dist. Bhagalpur)	Main centre	Sub-Humid	Middle Gangetic Plains Region/ South Bihar Plains Sub-Region	South Bihar Alluvial Plain Zone (BI-3)
9.		Patna	OFR Centre	Sub-Humid	Middle Gangetic Plains Region/ South Bihar Plains	South Bihar Alluvial Plain Zone (BI-3)
10.	Chhattisgarh	Raipur	Main centre	Sub-Humid	Eastern Plateau & Hills Region/ Wainganga Sub-Region	Chhattisgarh Plain Zone (MP-1)
11.		Ambikapur (Dist. Sarguja)	OFR Centre	Sub-Humid	Eastern Plateau & Hills Region/Orissa Northern Hills & Plateau & MP. Hills	North Hill Zone of Chhatisgarh (MP-3)
12.	Gujarat	S.K. Nagar (Dist. Banaskantha)	Main centre	Arid	Gujarat Plains and Hills Region/ North Gujarat Sub-Region	North Gujarat Zone (GJ-4)
13.		Junagadh	Sub centre	Semi-Arid	Gujarat Plains and Hills Region/ South Saurashtra Sub-Region	South Saurashtra Zone (GJ-7)
14.		Navsari	Sub centre	Coastal	Gujarat Plains and Hills Region/ Southern Hills Sub-Region	South Gujarat Heavy Rainfall Zone (GJ-1)

S.No.	State	Centre	Status	Ecosystem	Agro-Climatic Region/Sub-Region of Planning	NARP Zone
15.		Arnej (Dist. Ahmedabad)	OFR Centre	Semi-Arid	Gujarat Plains and Hills Region/ North Gujarat Sub-Region	Bhal and Coastal Zone (GJ-8)
16.		Bachau (Dist. Kutch)	OFR Centre	Arid	Gujarat Plains and Hills Region/ North-West Arid Sub-Region	North West Zone (GJ-5)
17.	Haryana	Hisar	Main centre	Arid	Trans-Gangetic Plains Region/ Arid Sub-Region	Western Zone (HR-2)
18.		Kurukshetra	OFR Centre	Semi-Arid	Trans-Gangetic Plains Region/ Plains Sub-Region	Eastern Zone (HR-1)
19.	Himachal Pradesh	Palampur (Dist. Kangra)	Main centre	Humid	Western Himalayan Region/High Altitude Temperate sub-Region	Mid-Hill Sub-Humid Zone (HP-2)
20.		Arkot (Dist. Una)	OFR Centre	Humid	Western Himalayan Region/ High Altitude Temperate sub-Region	Low-Hills Sub-Tropical Zone (HP-1)
21.	J& K	Chatha (Jammu)	Main centre	Humid	Western Himalayan Region/ High Altitude Temperate sub-Region	Mid to High Altitude Plain Zone
22.		Kathua (Jammu)	OFR Centre	Humid	Western Himalayan Region/ High Altitude Temperate sub-Region	Mid to High Altitude Plain Zone
23.	Jharkhand	Kanke (Ranchi)	Main centre	Sub-Humid	Eastern Plateau & Hills Region/ Chhota Nagpur, South & West Bengal Hills & Plateau Sub-Region	Western Plateau Zone (BI-5)
24.		Dumka	OFR Centre	Sub-Humid	Eastern Plateau & Hills Region/ Chhota Nagpur, North & Eastern Hills & Plateau Sub-Region	Central and North Eastern Plateau Zone (BI-4)
25.	Karnataka	Kathalgera (Dist. Davangere)	Main centre	Semi-Arid	Southern Plateau and Hills Region	Southern Transition Zone (KA-7)
26.		Bangalore	OFR Centre	Semi-Arid	Southern Plateau and Hills Region/ Central Region of Karnataka and Rayalseema	Eastern Dry Zone (KA-5)
27.		Siruguppa (Dist. Bellary)	Main centre	Arid	Southern Plateau and Hills Region/ Northern Dry Region of Karnataka	Northern Dry Zone (KA-3)
28.		Nipani (Dist. Belgaum)	OFR Centre	Arid	Southern Plateau and Hills Region/ Northern Dry Region of Karnataka	Northern Transition Zone (KA-8)

S.No.	State	Centre	Status	Ecosystem	Agro-Climatic Region/Sub-Region of Planning	NARP Zone
29.	Kerala	Karamana (Dist. Thiruvanthapuram)	Main centre	Coastal	Western Plains & Ghat Regions/ Midland Sub-Region	Coastal Southern Zone (KE-2)
30.		Thiruvalla (Dist. Pathanamthitta)	OFR Centre	Coastal	Western Plains & Ghat Regions/ Midland Sub-Region	Coastal Southern Zone (KE-2) & Problem Area Zone (KE-5)
31.	Madhya Pradesh	Jabalpur	Main centre	Sub-Humid	Central Plateau & Hills Region/ Kymore Plateau and Satpura Hills Sub-Region	Kymore Plateau and Satpura Hills Zone (MP-4)
32.		Indore	Sub centre	Semi-Arid	Western Plateau & Hills Region/ Central Plateau Sub-Region	Malwa Plateau Zone (MP-10)
33.		Powerkheda (Dist. Hoshangabad)	Sub centre	Sub-Humid	Central Plateau & Hills Region/ Central Narmada Valley Sub-Region	Central Narmada Valley Zone (MP-6)
34.		Rewa	Sub centre	Sub-Humid	Central Plateau & Hills Region/ Kymore Plateau and Satpura Hills Sub-Region	Kymore Plateau and Satpura Hills Zone (MP-4)
35.		Seoni	OFR Centre	Semi-Arid	Central Plateau & Hills Region/ Kymore Plateau and Satpura Hills Sub-Region	Satpura Plateau Zone (MP-9)
36.		Tikamgarh	OFR Centre	Semi-Arid	Central Plateau & Hills Region/ Bundelkhand Sub-Region	Bundelkhand Zone (MP-8)
37.	Maharashtra	Akola	Main centre	Semi-Arid	Western Plateau & Hills Region/ Plateau Sub-Region	Central Western Vidarbha Zone (MH-8)
38.		Sindewahi (Dist. Chandrapur)	OFR Centre	Semi-Arid	Eastern Plateau & Hills Region Wainganga Sub-Region	Eastern Vidarbha Zone (MH-9)
39.		Karjat (Dist. Raigadh)	Main centre	Coastal	Western Plains and Ghats Region/ Coastal Hilly Sub-Region	North Konkan Coastal Zone (MH-2)
40.		Mulde (Dist. Sindhudurg)	OFR Centre	Coastal	Western Plains and Ghats Region/ Coastal Hilly Sub-Region	South Konkan Coastal Zone (MH-1)
41.		Parbhani	Main centre	Semi-Arid	Western Plateau & Hills Region/ Central Plateau Sub-Region	Central Maharashtra Plateau Zone (MH-7)
42.		Ambajogai (Dist. Beed)	OFR Centre	Semi-Arid	Western Plateau & Hills Region/ Central Plateau Sub-Region	Central Maharashtra Plateau Zone (MH-7)
43.		Rahuri (Dist. Ahemadnagar)	Main centre	Semi-Arid	Western Plateau & Hills Region/ Scarcity Sub-Region	Scarcity Zone (MH-6)

Contd...

S.No.	State	Centre	Status	Ecosystem	Agro-Climatic Region/Sub-Region of Planning	NARP Zone
44.		Chas (Dist. Ahemadnagar)	OFR Centre	Semi-Arid	Western Plateau & Hills Region/ Scarcity Sub-Region	Scarcity Zone (MI-6)
45.	Orissa	Bhubaneshwar	Main centre	Sub-Humid	East Coast Plains and Hills Region/ Orissa Coastal Sub-Region	East and South-Eastern Coastal Zone (OR-4)
46.		Chiplima (Dist. Sambalpur)	Sub centre	Sub-Humid	Eastern Plateau & Hills Region/ Wainganga Sub-Region	West-Central Table Land Zone (OR-9)
47.		Mahisapat (Dist. Dhenkanal)	OFR Centre	Sub-Humid	Eastern Plateau & Hills Region/ Wainganga Sub-Region	Mid-Central Table Land Zone (OR-10)
48.		Panipoila (Dist. Nayagarh)	OFR Centre	Coastal	East Coast Plains and Hills Region/ Orissa Coastal Sub-Region	East and South-Eastern Coastal Zone (OR-4)
49.	Punjab	Ludhiana	Main centre	Semi-Arid	Trans-Gangetic Plains Region/ Plains Sub-Region	Central Plain Zone (PB-3)
50.		Fatehgarh Sahib	OFR Centre	Semi-Arid	Trans-Gangetic Plains Region/ Plains Sub-Region	Central Plain Zone (PB-3)
51.	Rajasthan	Durgapura (Jaipur)	Main centre	Semi-Arid	Central Plateau & Hills Region/ Eastern Plains of Rajasthan	Semi-Arid Eastern Plain Zone (RJ-5)
52.		Sri Ganganagar	OFR Centre	Arid	Trans-Gangetic Plains Region/ Arid Sub-Region	Irrigated North-Western Plain Zone (RJ-2)
53.		Kota	Sub centre	Semi-Arid	Central Plateau & Hills Region/ Eastern Plains of Rajasthan	Humid South-Eastern Plain Zone (South- Eastern Humid Plain Zone (RJ-9)
54.		Udaipur	OFR Centre	Semi-Arid	Central Plateau & Hills Region/ Southern Plains of Rajasthan	Sub-Humid Southern Plain & Aravali Hills Zone (RJ-7)
55.	Tamil Nadu	Coimbatore	Main centre	Semi-Arid	Southern Plateau and Hills Region/ Central Plateau of Tamil Nadu Sub- Region	Western Zone (TN-3)
56.		Thanjavur	Sub centre	Coastal	East Coast Plains and Hills Region/ Thanjavur Sub-Region	Cauvery Delta Zone (TN-4)
57.		Thirupatsaram (Dist. Tirunelveli)	OFR Centre	Semi-Arid	East Coast Plains and Hills Region/ South Coastal Tamil Nadu Sub-Region	Southern Zone (TN-5)
58.		Tindivanam (Dist. Villupuram)	OFR Centre	Semi-Arid	East Coast Plains and Hills Region/ North Eastern Sub-Region	North Eastern Zone (TN-1)

S.No.	State	Centre	Status	Ecosystem	Agro-Climatic Region/Sub-Region of Planning	NARP Zone
59.	Uttar Pradesh	Kanpur	Main Centre	Semi-Arid	Upper Gangetic Plains Region/ South Western Plains Sub-Region	Central Plain Zone (UP-6)
60.		Banda	OFR Centre	Semi-Arid	Central Plateau and Hills Region/ Bundelkhand Sub-Region	Bundelkhand Zone (UP-7)
61.		Faizabad	Main Centre	Sub-Humid	Middle Gangetic Plains Region/ Eastern Plains Sub-Region	Eastern Plain Zone (UP-9)
62.		Baharaich	OFR Centre	Sub-Humid	Middle Gangetic Plains Region/ North Eastern Plains Sub-Region	North Eastern Plain Zone (UP-8)
63.		Varanasi	OFR Centre	Sub-Humid	Middle Gangetic Plains Region/ Eastern Plains Sub-Region	Eastern Plain Zone (UP-9)
64.		Bichpuri (Agra)	Sub Centre	Semi-Arid	Upper Gangetic Plains Region/ South Western Plains Sub-Region	South-Western Semi-Arid Zone (UP-5)
65.		Varanasi	Sub Centre	Sub-Humid	Middle Gangetic Plains Region/ Eastern Plains	Eastern Plain Zone (UP-9)
66.	Uttarakhand	Pantnagar (Dist. US Nagar)	Main Centre	Sub-Humid	Western Himalayan Region/ Valley Temperate Sub-Region	Bhawar and Tarai Zone (UP-2)
67.		Srinagar (Dist. Pauri Garhwal)	OFR Centre	Sub-Humid	Western Himalayan Region/ High Hill Temperate Sub-Region	Hill Zone (UP-1)
68.	West Bengal	Kalyani (Dist. Nadia)	Main Centre	Humid	Lower Gangetic Plains Region/ Central Alluvial Plains Sub-Region	New Alluvial Zone (WB-3)
69.		Gayespur (Dist. Nadia)	OFR Centre	Humid	Lower Gangetic Plains Region/ Central Alluvial Plains Sub-Region	New Alluvial Zone (WB-3)

4. SOIL AND CLIMATE

The major group of soils (centre-wise), on which on-station experiments of CSR were conducted during the year 2009-10, and geographical coordinates (Latitude and Longitude)

of the different research locations are given in table-4/1. The general climatic conditions for the experimental locations are described below in brief.

Table-4/1: Soil type and geographical coordinates of different on-station CSR centres

S.No.	Centre	Soil Type	Latitude	Longitude
1.	Rajendranagar	Udic Ustochrepts, black soils	18°59'N	78°55'E
2.	Maruteru	Chrmusterts clayey, medium black soils	16°38'N	81°44'E
3.	Rudrur	Chrmusterts clayey, deep (90 cm depth), deep black soils	18°30'N	77°51'E
4.	Jorhat	Fluaquents/Udicaquents association, very deep (90 cm depth), alluvial sandy clay loam soils	26°47'N	94°12'E
5.	Sabour	Eutrochrepts (Very deep), low land clay soils	25°23'N	87°07'E
6.	Raipur	Ochraquals association, deep black soils	21°16'N	81°36'E
7.	S.K. Nagar	Haplaquepts, deep medium black soils	24°19'N	72°19'E
8.	Junagadh	Ustochrepts, deep medium black soils	21°30'N	70°30'E
9.	Navsari	Vertic Ustochrepts, deep black soils	20°57'N	72°54'E
10.	Hisar	Ustochrepts, very deep silty alluvial soils	29°08'55"N	74°41'16"E
11.	Palampur	Udic Haplustalfs, red soils	32°06'N	76°03'E
12.	Chatha (Jammu)	Eutrochrepts, very deep clay soils	32°05'N	74°04'E
13.	Ranchi	Ultic Paleustalfs, very deep (90 cm) red soils	23°17'N	85° 19'E
14.	Kathalagere	Alfisols, dark reddish brown sandy clay loam	13°02'N	76° 15'E
15.	Siruguppa	Typic Chromusterts, very deep (90 cm) black soils	15°0'38"N	76°0'54"E
16.	Karamana	Typic Tropofluvents, very deep (90 cm depth) alluvial soils	11°N	77°E
17.	Jabalpur	Chromusterts, very deep (90 cm depth), medium to deep black soils	23° 10' N	79° 57' E
18.	Indore	–	22° 04' N	76°00'H
19.	Powerkheda	–	23°25'N	73°98'E
20.	Rewa	Ustochrepts-Vertic Ustochrepts association, fine loamy soils	24°41'N	81°15'E
21.	Akola	–	20°42'N	77°02'E
22.	Karjat	Haplustults Udic-Fluvents, red soils	18°33'N	75°03'E
23.	Parbhani	Chromusterts, deep (90 cm depth), deep black soils	19°08'N	76°05'E
24.	Rahuri	Chromusterts, fine clayey soils	19°47'N	74°18'E
25.	Bhubaneshwar	Haplustalfs, very deep (90 cm depth), medium textured lateritic soils	20°15'N	85°52'E

S.No.	Centre	Soil Type	Latitude	Longitude
26.	Chiplima	Haplaquents, very deep (90 cm depth), clay, ill-drained soils	20°21'N	80°55'E
27.	Ludhiana	Ustochrepts-Ustic Psamments Association, very deep (90 cm depth), alluvial, sandy and sandy-loam soils	30°56'N	75°52'E
28	Durgapura (Jaipur)	Torrid-Psamments/Torrid-Fluents Association, sandy loam soils	26°55' N	75°49' E
29	Kota	Chromsterts-Paleusterts Association, very deep (90 cm depth) clay loam soils	25°26' N	75°30'E
30.	Coimbatore	Udic Rhodustalfs, fine loamy red sandy soils	11°59'N	78°55'E
31.	Thanjavur	Typic Pellusterts, clayey very deep (90 cm depth) deep black soils of deltaic origin	10°47' N	79°10'E
32	Kanpur	Udic Ustochrepts, alluvial soils	26°28'N	80°21' E
33.	Faizabad	Udic Fluents-Fluaquents Association, lowland clayey soils	26°47'N	82° 12'E
34.	Bichpuri	Ustochrepts, very deep (90 cm depth) alluvial soils	27°02'N	77° 09'E
35.	Varanasi	Aeric Chraquals very deep (90 cm depth) alluvial clayey soils	25°18'N	83° 03'E
36.	Pantnagar	Hapludolls, very deep (90 em depth) alluvium coarse loamy soils	29°08' N	79°05'E
37.	Kalyani	Fluentic Eutrochrepts, very deep (90 cm depth) alluvial soils	23°40' N	88° 52'E

Weather Conditions at different Cropping System Research Centers during (2009-10)

Rajendra Nagar: Total rainfall during the year 2009-10 recorded was 668.7 mm out of which 482.3 mm (72.0%) rain was recorded in South West monsoon. The distribution of rain was almost even during the *kharif* season. The maximum temperature recorded was 40.3°C during April whereas minimum temperature was 13.8°C during January.

Maruteru: The total rainfall received during this crop year was 769.0 out of which 482.3 mm (54.7%) was received from South West Monsoon. Though, onset of monsoon was late but rain was evenly distributed throughout the *kharif* season. In the last of crop season, May month received a good rain (203.7 mm). Highest average monthly maximum temperature (37.3°C) was recorded during the month of June while minimum temperature (18.4 °C) was recorded during the month of December.

Rudrur: The mean annual rainfall of this region ranges from 900-1200 mm in normal monsoon years. The total rain fall (813.7 mm) during the crop season 2009-10 recorded was lower than normal rainfall. The distribution of rainfall was good and 85.6 % of total rainfall was precipitated during *kharif* season. The highest average monthly maximum temperature (42.8°C) was recorded during May 2010 where as lowest minimum temperature (14.5°C) was recorded during December.

Jorhat: During the crop years 2009-10, the total rainfall received was 1951.1 mm. South West monsoon added 60.5% (1181.0 mm) to the total annual rainfall. The distribution of rain was good throughout the crop year. The monthly mean minimum and maximum temperature recorded during the crop year was 9.8°C and 33.0°C respectively.

Sabour: During the crop years 2009-10, the total rainfall received was 1065.2 mm out of which 829.5 mm (77.9%) rain was from the South West

monsoon. The distribution of rain was good throughout the *kharif* season. May was observed as hottest (38.5°C) during the year where as January was very cool (6.8°C) and dry.

Raipur: The crop season 2009-10 received 1234.1 mm rainfall during whole season. But the distribution of rainfall was good during the *kharif* season but July was observed as very wet month and 636.3 mm rain was precipitated in this month where as 87.5% rain was added by the South West monsoon to the annual rainfall. The highest monthly mean maximum temperature (42.7°C) was observed during April whereas lowest minimum temperature (10.5°C) was recorded during January.

S.K.Nagar: Total rainfall recorded during the year 2009-10 was 497.1 mm out of which 789.7 mm (98.5%) rain was received from South West monsoon. The highest average monthly maximum temperature (42.4°C) was observed during May 2009 where as lowest minimum temperature (6.7°C) was recorded during January.

Navsari: The rainfall received during this crop year was 1841.4 mm and 95.4% rain was added to it by South West monsoon. *Rabi* crop did not receive any rain. July was observed as wettest month and 1057.2 mm rain was precipitated in this month. The highest monthly average maximum temperature (35.8°C) was observed during April whereas lowest minimum temperature (15.7°C) was recorded during January.

Hisar: The total rainfall recorded during the crop season 2009-10 was 369.8 mm out of which 346.3 mm (93.6%) rain was contributed by the South West monsoon. The distribution of the rainfall was very erratic and nearly 64% rain was occurred during the month of September. Summer season was very hot and maximum temperature increased up to 42.9°C during the May and winter was severe during which average monthly minimum temperature dropped below 4.9°C.

Palampur: Total rainfall during the year 2009-10 recorded was 1739.1 mm. August was found as wettest month of the crop season and 612.3 mm rain was precipitated during this month. Total contribution of the South West monsoon was 77.2%. June, 2009 was the warmest month where

maximum temperature recorded was 32.1°C where as December, 2010 was observed as coolest and monthly mean minimum temperature dropped to 1.5°C.

Jammu: Total rainfall during the year 2009-10 recorded was 767.1 mm. August was found as wettest month of the crop season and 395.5 mm rain was precipitated during this month. Total contribution of the South West monsoon was 88.2%. June, 2009 was the warmest month where maximum temperature recorded was 40.7°C where as January, 2010 was observed as coolest and monthly mean minimum temperature dropped to 4.8°C.

Ranchi: Agro-climatic sub-zone of Jharkhand received 877.5 mm rainfall during the year 2009-10. The annual average rainfall of this zone varied between 1304 to 1409 mm, out of which 80% is received from the South West monsoon. Total contribution of the South West monsoon for the reporting period was 85.9% to the total annual rainfall. The highest monthly average maximum temperature (36.2°C) was observed during June 2009 whereas lowest minimum temperature (5.1°C) was recorded during January, 2010.

Kathalagere: Total rainfall received was 991.1 mm out of which 576.2 mm (58.1%) rain was contributed by the South West monsoon. The distribution of the rainfall was found good throughout the *kharif* season. The monthly mean minimum and maximum temperature recorded during the crop year was 16.6°C and 33.9°C respectively.

Sirugappa: The rainfall received during the year 2009-10 was 848.8 mm and South West monsoon was contributed up to 76.1% to it. September was reported as the wettest month of this crop season during which 328.8 mm rainfall was precipitated. The distribution of rain was good throughout the *kharif* season. The highest monthly average maximum temperature (34.4°C) was recorded during May and lowest minimum temperature (16.9°C) was during December.

Karmana: During the crop years 2009-10, the total rainfall (512.3 mm) received was fairly good over the previous year but contribution of the South West monsoon was very poor (15.5%). The distribution of rain was fairly good throughout the

kharif season. The monthly mean minimum and maximum temperature recorded during the crop year was 23.0°C and 34.3°C respectively.

Jabalpur: The total rainfall recorded during the crop season 2009-10 was 1514.1 out of which 1360.4 mm rain was contributed by the South West monsoon. The distribution of the rainfall was all most smooth throughout the *kharif* season. Summer season was moderate and maximum temperature reached up to 41.7°C during May-2010 whereas winter was severe and monthly mean minimum temperature was dropped to 8.

Powarkheda: The total rainfall received during the crop year 2009-10 was very high over the previous year. The South West monsoon was contributed up to 80% to the total rainfall (1181.9 mm) and August was reported as the wettest month of this crop season. The distribution of the rainfall during the *kharif* season was good. The highest average monthly maximum temperature (41.2°C) was recorded during June 2009 where as lowest minimum temperature (6.9°C) was recorded during January 2010.

Rewa: The rainfall received during the year 2009-10 was 756.3 mm out of which 78.6% rainfall was contributed by the South West monsoon. The mean monthly maximum temperature (42.7°C) was recorded during June 2009 whereas minimum temperature (3.9°C) was during the January 2010.

Akola: During crop year 2009-10, rainfall of 698.2 mm was received which was only 83.2% of the normal annual rainfall (804.1 mm). The July 2009 received a heavy rain i.e. 357.9 mm out of 698.2 mm however onset of monsoon was late. The distribution of rainfall was fairly good and 66.7 % of total rain was reported during *kharif* season of 2009. The monthly average maximum temperature (41.0°C) was recorded during June 2009 where as January 2010 was observed as coldest (11.8 °C) month of the year.

Rahuri: During the crop years 2009-10, the total rainfall received was 669.6 mm out of which 451.0 mm (67.4%) rain was from the South West monsoon. The distribution of rain was good throughout the *kharif* season. April was observed as hottest (38.7°C) during the year where as January was very cool (10.9°C) and dry.

Karjat: The rainfall occurred during crop season 2009-10 was below normal and it was 2582.1 mm. The South West monsoon was contributed up to 77.3% to it. The last rainy days were reported in the month of November and thereafter no rainfall was observed till the end of crop season. The highest monthly average maximum temperature (40.4°C) was recorded in the month of April 2010 however minimum night temperature (15.8°C) was observed during the month of January 2010.

Ludhiana: The total rainfall recorded during the crop season 200910 was 857.4 mm. The distribution of the rainfall was fairly good during *kharif* season and South West monsoon was contributed up to 90.1% to the annual rainfall for the report period. Summer season was moderately hot and maximum temperature reached up to 39.6°C during the May 2010 while winter was severely cool and monthly mean minimum temperature dropped to 6.4 °C during December.

Durgapur: The rainfall received during the year 2009-10 was 447.0 mm out of which 88.3% (394.6 mm) was occurred during the South West monsoon. The distribution of rain was also good during *kharif* season. Highest monthly average maximum temperature (40.6°C) was recorded during May and minimum temperature (8.6°C) was during January 2010.

Kota: The rainfall received during the year 2009-10 was 369.9 mm out of which 86.2% (318.8 mm) was contributed by the South West monsoon. The distribution of rain was erratic during *kharif* season and nearly 60% of the total rainfall was added in the month of July. Highest monthly average maximum temperature (41.6°C) was recorded during June, 2009 and minimum temperature (5.6°C) was during January 2010.

Coimbatore: The rainfall received during the year 2009-10 was 526.1 mm out of which 26.1% (137.4 mm) was occurred during the South West monsoon. The distribution of rain was highly erratic and 68.4% of total rain was precipitated in only October-November month of the crop year. The summer season was hot and dry where maximum temperature (36.3 °C) was recorded in April. The winter season was also moderately warm where minimum temperature remained above 19.4°C.

Thanjavur: The total rainfall received during this crop year was 1200.5 mm but South West monsoon contributed only 16.8% to the total rainfall for reporting period. A good rain (263.7 mm) was reported during the month of March. The lowest monthly average minimum and maximum temperature recorded during the crop year was 22.3°C and 3.8°C respectively.

Faizabad: The total rainfall (1080.7 mm) received during 2009-10 was 10.0% higher than the annual average rainfall. The distribution of rainfall was good and during the South West monsoon this region received 839.1 mm rain which was higher than the total annual average rainfall i.e. 966.1 mm. Only March month was found free from rain. The summer season was hot and dry, the maximum temperature increased up to 40.2°C during June 2009 whereas winter was cool and dry, and lowest minimum temperature (7.1°C) was recorded during January 2010.

Kanpur: The total rainfall of 763.3 mm was recorded during the crop season 2009-10 out of which 606.7 mm (79.5%) was recorded South west monsoon season. The rainfall was evenly distributed during the *kharif* season. The highest monthly average maximum temperature (40.0°C) was observed during April 2010 and minimum temperature (7.8°C) was recorded during January 2009.

Varanasi: The rainfall precipitated during this crop year was 772.5 mm and the rain received from the South West monsoon was less than 57.0% of total rain received during the crop year 2009-10. The highest average monthly maximum temperature (41.0°C) was observed during April 2010 where as lowest minimum temperature (8.1°C) was recorded during January.

Bichpuri: During the crop years 2009-10, the total rainfall received was 594.7 mm. The distribution of rain was good throughout the South-West monsoon season and 63.5% of total rainfall was precipitated during June-September. The monthly average minimum and maximum temperature recorded during the crop year was 5.9°C and 41.6 °C, respectively.

Kalyani: The crop season 2009-10 received 974.9 mm rainfall during whole season. But the distribution of rainfall was good during the *kharif* season but August was observed as very wet month and 387.3 mm rain was precipitated in this month where as 89.5% rain was added by the South West monsoon to the annual rainfall. The highest monthly mean maximum temperature (35.8°C) was observed during March whereas lowest minimum temperature (9.3°C) was recorded during January.

5. STAFF POSITION

Out of 618 total staff sanctioned for different centers, 503 staff were actually in position as on 31st

March 2011, suggesting that 18.6 per cent of total posts were vacant (Table 5/1 and Appendix V).

Table-5/1: Staff position under AICRP-IFS (University-wise) as on 31.03.2011

S.No.	Name of the University	Scientific		Technical		Administrative		Supporting	
		Sanctioned	Filled	Sanctioned	Filled	Sanctioned	Filled	Sanctioned	Filled
1.	ANGRAU, Hyderabad	8	8	24	17	5	0	3	1
2.	AAU, Jorhat	5	5	11	10	2	2	2	2
3.	BAU, Sabour	4	4	11	8	2	1	2	0
4.	IGKV, Raipur	5	5	11	6	2	2	2	1
5.	SDAU, S.K. Nagar	5	5	11	11	2	2	2	2
6.	JAU, Junagadh	1	1	3	3	1	1	-	
7.	NAU, Navsari	1	1	3	3	1	1	-	
8.	AAU, Anand	1	1	7	6	1	1	1	1
9.	CCSSHAU, Hisar	5	5	11	10	2	2	2	2
10.	CSKHPKV, Palampur	4	4	11	11	2	2	2	2
11.	SKUAST, Jammu	4	4	11	11	2	1	2	2
12.	BAU, Ranchi	4	4	11	11	2	2	2	2
13.	UAS, Bangalore	5	5	11	3*8 SRF	2	2	2	2
14.	UAS, Dharwad	1	1	7	7	1	1	1	1
15.	UAS, Raichur	3	3	4	4	1	1	1	1
16.	KAU, Thrissur	5	5	11	10	2	2	2	2
17.	JNKVV, Jabalpur	8	8	24	18	5	5	3	1
18.	RVSKV, Gwalior	1	1	3	3	1	1	-	
19.	MPKV, Rahuri	5	4	11	10	2	1	2	1
20.	MAU, Parbhani	4	4	11	11	2	2	2	1
21.	PDKV, Akola	4	4	11	8	2	1	2	2
22.	DBSKKV, Dapoli	4	4	11	11	2	2	2	2
23.	OUAT, Bhubaneswar	7	7	21	21	4	4	3	3
24.	PAU, Ludhiana	4	4	11	10	2	1	2	2
25.	RAU, Bikaner	4	2	11	8	2	2	2	2
26.	MPUA&T, Udaipur	3	3	10	9	2	2	1	1
27.	TNAU, Coimbatore	7	7	21	21	4	4	3	2
28.	CSAUAT, Kanpur	4	4	11	7 V*3	2		2	
29.	NDUA&T, Faizabad	5	5	18*	12	3	3	3	3
30.	BHU, Varanasi	1	1	3	3	1	1	-	
31.	RBS, College, Bichpuri	1	1	3	3	1	1	-	
32.	GBPUAT, Pantnagar	5	5	11	9	2	2	2	2
33.	BCKVV, Kalyani	4	3	11*	10	2	2	2	
TOTAL		132	128	360	305	69	57	57	43

6. BUDGET

During the year under report (2009-10) a total budget of Rs. 350.00 lakh was released as ICAR

share to different centres. Sub-head wise allocation for different centres is given in Table 6/1.

Table-6/1: Funds (Rs. in lakhs) released during financial year 2009-10 under AICRP on Integrated Farming Systems (ICAR share only)

S.No	Name of the university/ ICAR Institute	Pay & Allowances	T.A.	Other Contingencies	Vehicle hiring/POL	Total
1	ANGRAU, Hyderabad	34.33	1.00	5.70	1.70	42.73
2	HPKVV, Palampur	22.62	0.50	3.22	0.75	27.09
3	GBPUAT, Pantnagar	20.62	0.80	4.67	0.75	26.84
4	CSAUT, Kanpur	23.50	0.75	3.30	0.38	27.93
5	NDUAT, Faizabad	30.57	0.75	4.62	1.13	37.07
6	BHU, Varanasi	6.00	0.20	3.44	0.00	09.64
7	BAU, Ranchi	22.04	0.50	3.80	0.75	27.09
8	RAU, Samastipur	22.04	0.50	4.56	0.75	27.85
9	BCKVV, Kalyani	22.62	0.70	4.10	0.75	28.17
10	AAU, Jorhat	48.48	1.10	5.80	0.58	55.96
11	PAU, Ludhiana	22.04	0.60	4.00	0.75	27.39
12	HAU, Hisar	24.04	0.50	4.05	0.75	29.34
13	RAU, Bikaner	18.75	0.50	4.77	0.38	24.40
14	SDAU, S.K. Nagar	36.90	1.40	9.02	1.75	49.07
15	JNKVV, Jabalpur	34.00	1.20	7.50	1.50	44.20
16	RVSKVV, Gwalior	6.00	0.15	1.50	0.00	07.65
17	IGKV, Raipur	20.04	0.50	4.70	0.75	25.99
18	OUAT, Bhubaneswar	37.32	0.95	7.44	1.45	47.16
19	PDKV, Akola	20.92	0.70	3.70	0.38	25.70
20	MAU, Parbhani	20.92	1.00	4.00	0.38	26.30
21	MPKV, Rahuri	20.92	0.65	4.00	0.48	26.05
22	KKV, Dapoli	21.03	1.50	3.00	0.75	26.28
23	UAS, Raichur	7.92	0.40	2.25	0.00	10.57
24	UAS, Dharwad	8.42	0.90	2.60	0.38	12.30
25	UAS, Bangalore	17.86	0.65	3.83	0.75	23.09
26	TNAU, Coimbatore	34.00	0.95	7.72	1.50	44.17
27	SKUAST, Jammu	18.86	0.60	3.95	0.75	24.16
28	KAU, Thrissur	18.76	0.50	3.25	0.38	22.89
29	MPUAT, Udaipur	15.84	0.50	3.20	0.38	19.92
30	RBS College, Bichpuri	6.64	0.20	2.86	0.00	09.70
31	PDFSR, Modipuram	0.00	0.65	2.00	0.00	02.65
32	ICAR Res. Complex, Patna	0.00	0.50	3.00	0.00	03.50
33	ICAR Res. Complex, Umiam	0.00	0.55	2.00	0.00	02.55
34	ICAR Res. Complex,, Goa	0.00	0.35	2.00	0.00	02.35
35	CARI, Port Blair	0.00	0.25	2.00	0.00	02.25
Total		664.00	23.45	141.55	21.00	850.00

7. RESEARCH RESULTS

7.1 CROPPING SYSTEMS MANAGEMENT

7.1.1 CROPPING SYSTEMS DIVERSIFICATION/ INTENSIFICATION

Title of the Experiment: Identification of need based cropping systems for different agro-ecosystems (Expt. No. 1a).

Objectives: To identify appropriate cropping systems with high productivity and profitability to suit the specific needs of different agro-ecosystems.

Year of start: 1990-91, treatments modified during 1996-97, 2001-02 and 2006-07.

Treatments: There are no common treatments for all the centres but they vary from location to location. The number of cropping systems – tested at each location – also ranges from 6 to 15. The details of treatments are given in table-7.1/1, along with experimental results.

Locations:

Ecosystem	Centre (State)
Arid	Hisar (Haryana), S.K. Nagar (Gujarat) and Siruguppa (Karnataka).
Semi-Arid	Ludhiana (Punjab), Kanpur (U.P.), Bichpuri (U.P.), Junagadh (Gujarat), Durgapura (Rajasthan), Rajendranagar (A.P.), Kota (Rajasthan), Indore (M.P.), Akola (Maharashtra), Rudrur (A.P.), Rahuri (Maharashtra), Parbhani (Maharashtra) and Coimbatore (T.N.).
Sub-humid	Pantnagar (Uttarakhand), Varanasi (U.P.), Masodha (U.P.), Sabour (Bihar), Ranchi (Jharkhand), Raipur (Chhattisgarh), Jabalpur (M.P.), Rewa (M.P.), Powarkheda (M.P.), Chiplima (Odisha) and Kathalgere (Karnataka).
Humid	Jammu (J & K), Palampur (H.P.), Jorhat (Assam) and Kalyani (W.B.).
Coastal.	Bhubaneshwar (Odisha), Maruteru (A.P.), Thanjavur (T.N.), Karmana (Kerala), Karjat (Maharashtra) and Navsari (Gujarat).

Results:

The details of inputs used, crop sequences evaluated, crop yields, annual gross returns and annual energy output have been presented in table 7.1/1. A brief description of centre-wise results is given below.

Arid Ecosystem

At Hisar, among the seven cropping systems evaluated, cotton-wheat system was identified to



Chief Agronomist (AICRP-IFS) explaining to PDFSR scientists, visiting Hisar centre, about chicory - a potential and remunerative crop for diversification of pearl millet-wheat cropping system

be distinctly better than other systems with highest gross returns of Rs. 2,19,518/ha/year. But, in terms of energy production, existing pearl millet-wheat system was better which gave highest energy production of 51.28×10^6 K cal./ha/year. The other sequences were at par with existing pearl millet-wheat system.

At **S.K. Nagar**, among 10 cropping systems evaluated, the cropping system of castor-green gram was noted to be more remunerative with highest gross returns of Rs. 1,23,168/ha/year. It was closely followed by hybrid cotton+green gram-pearl millet sequence with gross returns of Rs. 1,21,993/ha/year. In terms of energy production, green gram-mustard- pearl millet sequence was better which gave highest energy output of 25.69×10^6 K cal./ha/year. The other sequences were also slightly better in the order of merit than existing pearl millet-mustard system.

At **Sriguppa**, ten cropping systems were evaluated. Among those, rice-fenugreek was identified to be more profitable and distinctly better than other systems with significantly higher gross returns of Rs. 1,24,170/ha/year and energy production of 33.62×10^6 K cal./ha/year. The other sequences were at par or inferior than existing rice-rice system.

Semi-Arid Ecosystem

At **Ludhiana**, among the 12 crop sequences evaluated, cotton+sesbania-radish+rapeseed sequence was identified to be the most suited with highest gross returns of Rs. 3,57,495/ha/year and energy production of 100.10×10^6 K cal./ha/year. The next best sequences in order of merit was maize+turmeric-wheat+linseed and maize+turmeric-barley+linseed, which gave respective gross returns of Rs. 3,30,819 and Rs.3,18,891/ha/year. The other sequences were also slightly better in the order of merit than existing rice-wheat system.

At **Kanpur**, among the nine cropping systems evaluated, maize-garlic-green gram system was identified to be distinctly better than other systems, with significantly highest gross returns of Rs. 3,21,326/ha/year and energy production of 28.53×10^6 K cal./ha/year. Some other sequences like; maize+black gram-potato-onion, hybrid rice-wheat-green gram, and maize+ green gram-potato-wheat were also better than existing rice-wheat system, clearly showing the scope for

improving the system-profitability with gross returns ranging from Rs.1,99,199 to Rs. 1,46,155/ha/year.

At **Bichpuri (Agra)**, among the 10 cropping systems studied, the sequence of pearl millet-potato was found to be highly remunerative and recorded the highest gross returns (Rs. 97,290/ha/year) and energy production (33.50×10^6 K cal./ha/year). It was followed by sesbania (green manure)-potato and pigeon pea-wheat with respective gross returns of Rs. 88,586/ha/year and Rs. 85,635/ha/year and energy output of 28.64×10^6 and 20.06×10^6 K cal./ha/year. The other sequences were also found to be slightly better than existing pearl millet-wheat system in respect of profitability.

At **Junagadh**, among 10 crop sequences evaluated, groundnut-onion-sorghum (F) sequence was found to be distinctly better than others with highest gross returns (Rs. 1,80,170/ha/year) and energy production (28.01×10^6 K cal./ha/year). Other better sequences in order of merit were onion-wheat- green gram and onion-chickpea-maize+cowpea (F) which gave gross returns of Rs. 1,03,907 and 96,112/ha/year and energy production of 19.79 and 14.48×10^6 K cal./ha/year, respectively. The other sequences were at par or inferior than existing groundnut-wheat system.

At **Durgapura (Jaipur)**, among the nine cropping systems evaluated, the system of groundnut-isabgol-sesbania (green manure) was found to be distinctly better with annual gross returns of Rs. 1,10,084/ha/year and energy production of 24.70×10^6 K cal./ha/year. The next best sequence in the order of merit was green gram-mustard which gave gross returns of Rs. 83,474/ha/year and energy production of 18.85×10^6 K cal./ha/year. The other sequences were at par or inferior than existing pearl millet-wheat system.

At **Kota**, among the eight cropping systems evaluated, maize-garlic system gave the highest gross returns of Rs. 3,90,953/ha/year with energy production of 29.26×10^6 K cal./ha/year. It was followed by soybean-garlic with gross returns of Rs. 2, 56,632/ha/year. The remaining systems were at par or inferior to existing system.



T2 : Soybean (BB) +Maize (F) - Garlic (BB) + Lucern (F)



T2 : Soybean (BB) + Maize (F) - Garlic (BB) + Lucern (F)

Cropping system of soybean+maize during *kharif* (left) and garlic+lucern during *rabi* (right) has been found promising at Kota (Rajasthan)

At **Indore**, among the 12 cropping systems evaluated, the sequence of soybean-onion-ladys'finger was found to be distinctly better than other systems tried and gave highest gross returns of Rs. 1,83,197/ha/year with energy production of 26.92×10^6 K cal./ha/year. The remaining systems were at par with existing system of soybean-wheat.

At **Akola**, 10 cropping systems were evaluated. Among these, soybean-coriander+wheat was identified to be more profitable than other systems and gave the highest gross returns of Rs. 2,06,130/ha/year and energy production of 36.72×10^6 K cal./ha/year. Other sequences, viz.; soybean-sorghum-groundnut, soybean-mustard-groundnut and soybean-isabgol-groundnut were also found superior than existing sorghum-wheat system, with gross returns ranging from Rs.1,01,054 to Rs. 1,72,624/ha/year.

At **Rajendranagar**, eight cropping systems were evaluated and compared with existing maize-groundnut system. The performance of maize-sunflower system was recorded to be distinctly better than other systems with gross returns of Rs. 65,233/ha/year and energy production of 22.06×10^6 K cal./ha/year. Other systems were at par or inferior than the existing system.

At **Rudrur**, among the 10 cropping systems evaluated, the existing rice-rice system was better in terms of gross returns (Rs. 1,13,476/ha/year) but the system of rice-maize gave the highest energy production (38.27×10^6 K cal./ha/year).

Other systems were comparatively inferior. However, under limited water availability conditions, other systems like rice-maize, rice-sunflower and sunflower-maize also appeared promising with respective gross returns of Rs. 1,03,839, 93,818 and Rs.84,563/ha/year.

At **Rahuri**, among 15 crop sequences evaluated, soybean-onion was found to be significantly better and gave highest gross returns (Rs. 1,41,369/ha/year) and energy production (23.83×10^6 K cal./ha/year) as compared to other cropping systems. Some other systems like; Pearl millet+soybean-onion, soybean-cabbage Pearl millet-onion and Pearl millet +soybean-cabbage were also significantly better than the existing pearl millet-wheat system in the order of merit with gross returns ranging from Rs. 1,27,409 to 1,07,349 /ha/year.

At **Parbhani**, among the 12 sequences evaluated, turmeric+castor-fallow system proved to be significantly better than other systems tried, by giving highest gross returns (Rs. 4,76,003/ha/year) and energy production (53.82×10^6 K cal./ha/year). Other cropping systems, namely; Bt. cotton-wheat-coriander, soybean-chickpea-coriander, Bt. cotton-groundnut and Bt. cotton-chickpea were also better than existing sorghum-wheat system with gross returns ranging from Rs. 2,43,108 to 1,20,140 /ha/year. The other sequences were at par or inferior than the existing system.

At **Coimbatore**, among nine crop sequences evaluated, sugar beet-maize-groundnut sequence

was noted to be more profitable, as compared to other systems and recorded gross returns of Rs.1,83,822/ha/year and energy production of 37.96×10^6 K cal./ha/year. The next best sequences in the order of merit were cotton+green gram-maize- sunflower and sugar beet-green gram-maize+cowpea (vegetable) which gave gross returns of Rs. 1,45,458 and 1,13,230/ha/year and energy production of 36.79 and 27.12×10^6 K cal./ha/year, respectively. The other sequences were at par or inferior than existing cotton-finger millet-sorghum system.

Sub-Humid Ecosystem

At **Pantnagar**, among eight crop sequences evaluated, rice (direct seeded)-potato-green gram sequence was found to be distinctly better than other systems tried, and recorded the highest gross returns (Rs. 1,43,243/ha/year) and energy production (40.23×10^6 K cal./ha/year). Other systems, namely; rice (direct seeded)-mustard-green gram, rice (direct seeded)-rapeseed-green gram and rice (direct seeded)-pea (veg.)-wheat were also significantly better than existing rice-wheat system, in that order of merit, and gave gross returns ranging from Rs. 1,12,623 to 1,05,883/ha/year. The remaining systems were at par or inferior to existing rice (transplanted)-wheat system.

At **Varanasi**, 10 crop sequences were evaluated. Among them sequence of rice-potato-green gram gave the highest gross returns (Rs. 1,52,236/ha/year) and energy production (41.77×10^6 K cal./ha/year). Three other sequences, namely; rice-toria-lady's finger, rice-wheat-green gram and rice-mustard-green gram were also found to be equally good or better than existing rice-wheat system, in that order of merit, and recorded gross returns ranging from Rs. 1,27,883 to 1,20,941/ha/year. The remaining systems were at par or inferior to existing rice-wheat system.

At **Masodha (Faizabad)**, eight cropping systems were evaluated and the performance of rice-potato-green gram was found to be distinctly better than others with highest returns of Rs. 1,56,333/ha/year and energy production of 45.67×10^6 K cal./ha/year. Two other sequences, namely; rice-lentil-sorghum (fodder) and rice-mustard-black gram; were also found better, in that

order of merit, and recorded gross returns of Rs. 1,51,560 to 1,33,104 /ha/year while remaining systems were at par to existing rice-wheat system.

At **Sabour**, 12 crop sequences were evaluated. Among them, sequence of rice-cabbage+radish-lady's finger+green gram was observed to be distinctly better than other systems which gave gross returns of Rs. 2,89,130/ha/year and energy output of 34.89×10^6 K cal./ha/year. Three other sequences, namely; rice-potato+radish-onion+maize, rice-garlic+coriander (green leaf)-maize and rice-maize+potato-sorghum+cowpea(fodder) were also equally good or better than existing rice-wheat system, in that order of merit, and produced gross returns ranging from Rs. 2,35,744 to 1,75,133/ha/year.

At **Ranchi**, seven crop sequences were evaluated. Among them, rice-wheat+potato-green gram sequence outperformed other systems with significantly highest gross returns of Rs. 1,60,195/ha/year and energy production of 46.79×10^6 K cal./ha/year. It was followed by the cropping system of rice-potato-green gram with gross returns of Rs.1,47,225/ha/year and energy output of 42.37×10^6 K cal./ha/year) while other systems were at par or inferior to existing rice-wheat system.

At **Raipur**, eight crop sequences were compared. Among them, the sequence of rice-wheat+fenugreeek-cowpea (fodder) was found distinctly better than others with gross returns of Rs. 1,35,414/ha/year and energy production of 29.81×10^6 K cal./ha/year. Three other systems, namely; rice-wheat-green gram, rice-onion+coriander-cowpea (Veg.) and rice-sunflower+lentil-cowpea (Veg.) were also identified to be remunerative with gross returns ranging between Rs.1,21,816 and Rs. 1,09,410/ha/year. Other systems were at par with or inferior to existing systems of rice-wheat.

At **Jabalpur**, 12 cropping sequences were evaluated. The sequence involving rice-garlic –maize(F)+cowpea was identified significantly better than others with highest gross returns of Rs 2,11,722/ha/year and energy production of 52.89×10^6 K cal./ha/year. Other cropping systems, namely; rice-gobhi sarson-groundnut+maize, rice-marigold-maize (fodder),



Growing sunflower (left) and intercropping fenugreek (for seed) in wheat (right) during *rabi* season are promising in Chhattisgarh region

rice-potato-groundnut, rice- gobhi sarson-lady's finger were also found to be significantly better than existing rice-wheat system, in that order of merit with gross returns ranging from Rs. 2,05,936 to 1,52,177/ha/year. However, in terms of energy production, rice-gobhi sarson-lady's finger sequence was the best that produced highest energy of 68.13×10^6 K cal./ha/year. The other systems were at par or inferior than existing rice-wheat system.

At **Rewa**, 10 crop sequences were evaluated. Among them, rice-garlic system performed distinctly better than others by giving highest gross returns (Rs. 3,31,991/ha/year) and energy yield (40.03×10^6 K cal./ha/year). The rice-mustard and rice- chickpea+linseed systems were also significantly better than other systems with respective gross returns of Rs. 1,46,832/ha/year and Rs. 1,34,026/ha/year. The other systems were at par or inferior than existing rice-wheat system.

At **Powarkheda**, also ten sequences were evaluated and the system of soybean-field pea was found to be distinctly better than others with gross returns of Rs. 3,04,971/ha/year and energy production of 72.95×10^6 K cal./ha/year. Three other systems, namely; soybean-potato-lady's finger, soybean-potato-sesame and rice-wheat-green gram were also found better than existing soybean-wheat system with gross returns ranging from Rs. 1,71,534 to Rs. 1,18,572/ha/year. The remaining systems were at par with or inferior than existing soybean-wheat system.

At **Chiplima**, also ten cropping systems were evaluated. The performance of rice- groundnut-vegetable cowpea was found to be distinctly better than others with annual gross returns of Rs. 1,63,592/ha and energy production of 43.64×10^6 K cal./ha. Three other systems, namely; rice-groundnut-green gram, rice-maize (green cobs)-cowpea and rice-radish-cowpea were also found better than existing system with gross returns ranging from Rs. 1,29,258 and Rs.1,23,447/ha/year. The other systems were at par with or inferior than existing rice-groundnut system.

At **Kathalagere**, among the twelve crop sequences evaluated, system of rice-groundnut performed distinctly better than others with gross returns of Rs. 1,39,996/ha/year and energy yield of 43.21×10^6 K cal./ha/year. The rice-lady's finger and rice-tomato systems were also found equally good and significantly better than other systems with respective gross returns of Rs. 1,30,448/ha/year and Rs. 1,11,633/ha/year. The other systems were at par or inferior than existing rice-rice system.

Humid Ecosystem

At **Chatha (Jammu)**, ten crop sequences were evaluated. Among these, rice-garlic-cowpea system performed distinctly better than others by giving highest gross returns (Rs. 5,47,856/ha/year) and energy yield (39.48×10^6 K cal./ha/year). Cropping systems of rice-potato-maize (green cobs)-green gram, rice-potato-onion and rice-

marigold-french bean were also found to be better than existing rice-wheat system with gross returns ranging from Rs. 2,33,331 to 2,10,017/ha/year, and energy production ranging from 13.40 to 60.86x10⁶ K cal./ha/year. The remaining sequences were inferior to or at par with existing rice-wheat system.

At **Palampur**, nine cropping systems were evaluated. Among those brinjal-garlic system was found to be significantly better than others with gross returns of Rs. 3,26,710/ha/year and energy production of 16.17x10⁶ K cal./ha/year. The performance of maize+french bean-pea-summer squash, maize+asparagus-pea-summer squash, lady's finger-cauliflower-french bean and lady's finger-radish-onion was also superior than the control with gross returns ranging from Rs. 2,52,927 and 1,80,367/ha/year, while remaining sequences were at par with or inferior to existing maize-wheat system.

At **Jorhat**, eight rice-based cropping systems were evaluated. Among them rice-cabbage-green gram system was significantly superior to all other systems with gross returns of Rs. 94,104/ha/year and energy production of 15.53x10⁶ K cal./ha/year. However, rice-radish+french bean-blackgram, rice-khol+french bean-black gram and rice-cauliflower-black gram system were also better than control in terms of economics with gross returns ranging from Rs. 88,871 to Rs. 72,071/ha/year and remaining systems were at par among themselves but inferior to existing rice-rice system.



At **Kalyani**, total ten cropping systems were evaluated. Among them, amaranths-brinjal+coriander-bitter gourd sequence was significantly better than others with gross returns of Rs. 1,77,663/ha/year and energy yields of 14.08x10⁶ K cal./ha/year. It was followed by cauliflower-raddish+amaranths-lady's finger, rice-wheat-maize+groundnut and rice-lentil+ mustard-sesame sequences with gross returns ranging from Rs. 1,39,760 to 88,724/ha/year and energy yields ranging from 32.49 to 8.63x10⁶ K cal./ha/year. The remaining systems were at par with or inferior to existing rice-rice system.

Coastal Ecosystem

At **Bhubaneshwar**, also ten rice-based cropping systems were evaluated. Among them, rice-radish-sesame was found to be distinctly better than others with highest gross returns (Rs. 1,34,643/ha/year) and energy production (28.79x10⁶ K cal./ha/year). It was followed by rice-tomato-cowpea (veg.) and rice-groundnut-cucumber with respective gross returns of Rs. 1,31,824 and Rs. 1,18,476/ha/year and energy production of 21.44 and 29.67x10⁶ K cal./ha/year. Other systems were at par with existing rice-groundnut or inferior to it.

At **Maruteru**, only six cropping systems were evaluated. However, data for *rabi* crops were not reported by the centre and as such, no meaningful conclusions could be drawn.



Transplanting of winter rice in progress (left) and successful crop of potato (right) using sunken/ raised beds technique at Jorhat centre

At **Karamana**, eight crop sequences were evaluated. On comparison, the system of rice-rice-pumpkin was found to be better than all other systems with the highest gross returns (Rs. 1,94,867/ha/year) and energy production (30.63×10^6 K cal./ha/year). Cropping systems of rice-rice-amaranths, rice-rice-cowpea (veg.) and rice-coleus-sesbania (green manure) were found equally good and significantly better than existing rice-rice system with gross returns ranging from Rs. 1,89,734 to 1,09,354/ha/year. Other systems were either at par with or inferior to existing rice-rice system.

At **Karjat**, 11 rice-based cropping systems were compared. The cropping system of rice-brinjal was found to be more remunerative with highest gross returns of Rs. 1,13,583/ha/year. However, in terms of energy production, rice-rice

was the highest producer (25.21×10^6 K cal./ha/year). The existing sequence of rice-rice performed reasonably well with gross returns of Rs. 83,100/ha/year, while other systems were inferior to it.

At **Navsari**, nine alternative crop sequences were compared with existing rice-wheat system. Among them, the sequence of rice-fenugreek-green gram was found to be significantly and distinctly better than all others with gross returns of Rs. 1,12,620/ha/year and energy production of 20.97×10^6 K cal./ha/year. The other systems, which performed better than existing rice-wheat system were; rice-green gram-groundnut, rice-green gram-sorghum+blackgram, rice-sorghum-sorghum (ratoon) with gross returns of Rs. 97,053 to 85,104/ha/year. The remaining systems were at par with or inferior to rice-wheat.

Table-7.1/1: Crop productivity, energy yield and gross returns under different crop sequences (2007-08).

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
ARID ECOSYSTEM							
HISAR (Haryana)							
Pearl millet (HHB-197; 72)/ 125:62:0	Wheat (PBW-343; NR)/ 150:60:0	-	5775	8778	-	1,45,856	51.28
Cotton (H-1226; NR)/ 80:30:0	Wheat (PBW-343; NR)/ 150:60:0	-	4216	8551	-	2,19,518	43.37
Pearl millet (HHB-197; 72)/ 125:62:0	Barley (BG-75; NR)/ 60:30:0	Green gram (Asha; NR)/ 20:40:0	5878	5493	833	1,12,330	42.68
Cluster bean (HG-365; 93)/ 20:40:0	Broccoli (CBH-343; NR)/ 100:50:0	Onion (Hisar-2; NR) 60:50:0	2461	2627	9013	64,248	6.38
Green gram (Asha; NR)/ 20:40:0	Mustard (RH-30; NR)/ 80:30:0	-	1757	3578	-	1,13,335	24.99
Pearl millet (HHB-197; 72)/ 125:62:0	Wheat (C 306; NR)/ 60:30:0	Veg. Cowpea (P. Komal; NR)/ NR	5965	4166	793	99,560	36.17
Pearl millet (HHB-197; 72)/ 125:62:0	Wheat (PBW-343; NR)/ 150:60:0	-	4139	7621	-	1,16,580	40.95
+			+				
Green gram (Asha; NR)/ 20:40:0			172				
					S.Em±	3,656	0.97
					CD at 5%	7,791	2.07
S.K. NAGAR (Gujarat)							
Pearl millet (GHB-558; 95)/ 80:40:0	Mustard (GM-3; 115)/ 50:50:0	-	1317	1637	-	41,026	13.61

Contd.../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Green gram (GM-4; 74)/ 20:40:0	Mustard (GM-3; 115)/ 50:50:0	Pearl millet (GHB-558; 82)/ 80:40:0	1083	1779	3447	91,419	25.69
Castor (GCH-7; 207)/ 120:25:0	Castor (contd.)	Pearl millet (GHB-558; 82) 80:40:0	4722	-	3901	1,03,606	14.08
Castor (GCH-7; 207) 120:25:0	Castor (contd.)	Green gram (GM-4; 72) 20:40:0	5154	-	1661	1,23,168	5.55
Green gram (GM-4; 74) 20:40:0 + Castor (GCH-7; 207) 120:25:0	Castor (contd.)	Pearl millet (GHB-558; 82) 80:40:0	951	4059	4119	1,21,739	18.05
Green gram (GM-4; 74) 20:40:0	Castor (GCH-7;207) 120:25:0	Castor (contd.)	1311	-	3534	89,203	4.38
Groundnut (GG-2; 95) 25:50:0	Amaranths (GA-2; 104) 60:40:0	Cowpea (GC-4; 75) 25:40:0	1465	1611	1863	84,458	19.47
Hy. Cotton (NR;222) 160:00:00	Cotton (contd.)	Pearl millet (GHB-558; 82) 80:40:0	-	1634	4224	84,499	20.67
Hy. Cotton (NR; 222) 160:00:00	Cotton (contd.)	Groundnut (GG-2;101) 25:50:0	-	2716	1792	1,19,105	19.18
Hy. Cotton (Bt; 222) 160:00:00 + Green gram (GM-4; 74)	Cotton (contd.)	Pearl millet (GHB-558;82) 80:40:0	746	2157	4368	1,21,993	25.42
						S.Em±	0.62
						CD at 5%	1.29
SIRUGUPPA (Karnataka)							
Rice (BPT-5204;166)/ 150:75:75	-	Rice (NR; NR)/ 150:75:75	5285	-	1215	66,958	22.49
Rice (SIRI-1253;166)/ 150:75:75	-	Ridge gourd (J. Long; NR)/ 50:50:00	5208	-	5614	76,103	18.98
Rice (SIRI-1253;166)/ 150:75:75	-	Mustard (Varuna; NR)/ 100:60:40	5170	-	188	56,690	18.91

Contd..../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
Kharif	Rabi	Summer	Kharif	Rabi	Summer		
Rice (SIRI-1253;166)/ 150:75:75	-	French Bean (Local; NR)/ 12.5:25:00	5105	-	1056	56,811	17.94
Rice (SIRI-1253;166)/ 150:75:75	-	Siya zeera (Local; NR)/ 50:20:20	5414	-	304	64,272	19.81
Rice (SIRI-1253;166)/ 150:75:75	-	Ashwagandha (Jawahar; NR)/ 75:30:30	4900	-	369	79,981	17.12
Rice (Amrut; 166)/ 150:75:75	Spinach (NR; NR) 25-00-00	-	5916	3663	-	73,018	22.26
Rice (Amrut; 166)/ 150:75:75	Fenugreek (Veg.) (NR; NR) 100:00:00	-	6199	3656	-	1,24,170	33.62
Rice (Amrut; 166)/ 150:75:75	-	Rice (IET-16933; 151) 150:75:75	6250	-	1910	84,045	28.23
Rice (Amrut; 166)/ 150:75:75	-	Rice (Amrut; 151) 150:75:75	6070	-	1845	81,528	27.39
						S.Em±	0.82
						CD at 5%	1.73
SEMIARID ECOSYSTEM							
LUDHIANA (Punjab)							
Rice (PR-116; 118)/ 120:30:30	Wheat (PBW-509;155)/ 120:60:30	-	6166	5427	-	1,23,205	40.11
Basmati Rice (Super; 110)/ 0:0:0	Gobhi sarson (PAC-401;141)/ 100:30:15	Green gram (SML-668; 63)/ 15:40:0	4458	1773	1191	1,45,539	28.99
Basmati Rice (Super; 110)/ 0:0:0	Radish (P. Chetki; 103)/ 0:0:0	Maize (PMH-1; 105)/ NR	4376	17917	6353	1,59,003	39.91
Maize (PMH-1; 104)/ 120:60:30	Potato (C. Mukhi;111)/ 120:60:120	Maize (PMH-1; 105)/ NR	4200	22500	6538	1,57,695	58.55
Maize (PMH-1; 104)/ 120:60:30	Barley (DWRUB-52; 148)/ 62.5:30:15	-	4205	3695	-	3,18,891	57.52
+	+		+	+			
Turmeric (Local; 189)/ 0:0:0	Linseed (LC-2063; NR)/ 0:0:0		8250	363			

Contd..../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Maize (PMH-1; 104)/ 120:60:30 +	Wheat (PBW-509;155)/ 120:60:30 +	-	4203	3688	-	3,30,819	57.92
Turmeric (Local; 189)/ 0:0:0	Linseed (LC-2063; NR)/ 0:0:0		8170	428			
Maize (PMH-1; 104)/ 120:60:30 +	Wheat (PBW-509; 155)/ 120:60:30 +	Green gram (SML-668; 63)/ 15:40:0	3895	3814	1173	1,35,463	34.93
Radish (P. Himani;75)/ 0:0:0	Linseed (LC-2063; NR)/ 0:0:0		11695	472			
Groundnut (SG-99; 130)/ 15:20:25 +	Wheat (PBW-509; 155)/ 120:60:30 +	-	2897	4623	-	1,30,793	35.85
Pigeon pea (AL-15; 140)/ 0:0:0	Mustard (GSL-1; NR)/ 0:0:0		644	235			
Cotton (Bt-134; 173)/ 75:30:0 +	Gobhi sarson (PAC-401;141)/ 100:30:15 +	-	1275	1450	-	3,57,495	100.10
Sesbenia	Radish (P. Himani; 75)/ 0:0:0			17675			
Cotton (Bt-134; 173)/ 75:30:0 +	Wheat (PBW-509; 155)/ 120:60:30 +		1520	3580	-		
Sesbenia	Linseed (LC-2063; NR)/ 0:0:0			418			
Maize (Cobs) (PMH-1; NR)/ 120:60:30 +	Mustard (GSL-1; NR)/ NR +	Green gram (SML-668; 63)/ 15:40:0	20574	235	1081	76,689	36.59
Cowpea (Veg.) (C.-263; 75) 0:0:0	Chickpea (GPF-2, 155) 15:20:0		4280	1473			

Contd..../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
Kharif	Rabi	Summer	Kharif	Rabi	Summer		
Sorghum + Cowpea (Fodder)(PBW-509; 155)/ (NR; NR)/ NR	Wheat 120:60:30 + Mustard (GSL-1; NR) 0:0:0	Cowpea (Veg.) (C.-263; 75)/ 0:0:0	NR	4628 + 225	6288	77,035	20.25
					S.Em±	11,700	1.78
					CD at 5%	23,752	3.61
KANPUR (Uttar Pradesh)							
Rice (P. Dhan-12;108)/(NR)	Wheat (PBW-343; 137)/ (NR)	-	5400	4524	-	1,05,378	34.34
Rice (P. Dhan-12;108)/(NR)	Wheat (PBW-343; 137)/ (NR)	-	9014	4745	-	,145,034	47.60
Rice (P. Dhan-12;108)/(NR)	Wheat (PBW-343; 137)/ (NR)	Green gram (K-851; 72)/ (NR)	9422	4881	1003	1,78,429	52.84
Maize (Azad Uttam; 84)/ NR	Wheat (PBW-343; 137)/ (NR)	-	3231	5136	-	83,639	28.82
Maize (Azad Uttam; 84)/ NR	Mustard (P. Kranti; 131)/ (NR)	Onion (N. Red;114)/ (NR)	3274	2075	14872	1,24,959	29.86
Maize (Azad Uttam; 84)/ NR	Mustard (P. Kranti; 131)/ (NR)	Green gram (K-851; 72)/ (NR)	3367	2211	1122	99,724	27.23
Maize (Azad Uttam; 84)/ NR	Potato (K. Bahar; 90)/ (NR)	Wheat (PBW-343;137)/ (NR)	3214	23299	3656	1,46,155	47.34
+ Green gram (K-851; 87) NR			+ 327				
Maize (Azad Uttam; 84)/ NR	Potato (K. Bahar; 90)/ (NR)	Onion (Nasik Red;114)/ (NR)	3282	24558	21837	1,99,199	47.43
+ Black gram (Azad-1; 87) NR			+ 421				
Maize (Azad Uttam; 84)/ NR	Garlic (Local;170)/ (NR)	Green gram (K-851; 72) (NR)	3452	8554	1293	3,21,306	28.53
					S.Em±	4,020	0.97
					CD at 5%	8,282	2.01

Contd..../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	Summer	<i>Kharif</i>	<i>Rabi</i>	Summer		
BICHPURI (Uttar Pradesh)							
Pearl millet (Shakti-7173, NR)/ 80:40:40	Wheat (HD-2687, NR)/ 120:60:40	-	2440	4512	-	70,130	24.42
Pearl millet (Shakti-7173, NR)/ 80:40:40	Wheat (HD-2687, NR)/ 120:60:40	-	2309	4228	-	65,905	22.96
Pearl millet (Shakti-7173, NR)/ 80:40:40	Lentil (DPL-15, NR)/ 25:50:00	-	2275	1549	-	50,862	13.53
Soybean (PK-1092, NR)/ 20:80:40	Wheat (HD-2687, NR)/ 120:60:40 + Mustard (Rohini, NR)/ NR	-	1014	3599 + 487	-	62,586	19.47
Pigeon pea (UPAS-120, NR)/ 30:60:30	Wheat (HD-2687, NR)/ 120:60:40	-	1770	4085	-	85,635	20.06
Green gram (K851, NR)/ 25:50:0	Mustard (Rohini, NR)/ NR	-	1511	2261	-	83,073	17.28
Sesbania (GM) (Local, NR)/ NR	Potato (K. Bahar; NR)/ NR	-	-	29529	-	88,586	28.64
Pearl millet (Shakti-7173, NR)/ 80:40:40	Potato (K. Bahar; NR)/ NR	-	2284	26035	-	97,290	33.50
Sesame (Guj-1, NR)/ 30-15-15	Barley (PL-172, NR)/ NR	-	685	4113	-	50,365	17.68
Sorghum (Fodder) (Samrat, NR)/ 30-30-0	Oat (F) (Local, NR)/ NR	-	23080	20366	-	43,445	6.95
					S.Em±	3,799	1.06
					CD at 5%	7,788	2.19
JUNAGADH (Gujrat)							
Groundnut (GG-20; 120)/ 12.5:25:0	Wheat (GW-366; 100)/ 120:60:0	-	1542	3210	-	67,684	19.85

Contd.../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Groundnut (GG-20; 120)/(A. Dark Red; 94)/(Gundari; 64)/ 12.5:25:0	Onion 75:60:50	Sorghum (Fodder) 80:40:0	1502	30617	26152	1,80,170	28.01
Groundnut (GG-20; 120)/(K. Badshah; 89)/ 12.5:25:0	Potato NR	Sesame (GT-2; 88)/ 25:25:0	1690	6019	765	75,356	19.73
Sorghum (Grain) (Gundari; 108)/ 80:40:0	Cumin (G-4; 103)/ 30:15:0	Green gram (GM-4; 69)/ 20:40:0	1481	669	597	50,008	9.54
Sorghum (Grain) (Gundari; 108)/ 80:40:0	Castor (GCH-7; 206)/ 75:50:0	Castor Contd.	22407	2455	-	59,237	3.59
Onion (A. Dark Red; 77)/(GW-366; 100)/ 75:60:50	Wheat 120:60:0	Green gram (GM-4; 69)/ 20:40:0	12834	3292	593	1,03,907	19.79
Onion (A. Dark Red; 77)/ 75:60:50	Chickpea (GG-1; 104)/ 25:50:0	Maize + Cowpea (Fodder)	12217	1037	28992	96,112	14.48
Sesame (G-2; 91)/ 25:25:0	Potato (K. Badshah; 89)/ NR	Maize (Fodder) (Ganga Safed; 61)/ NR	1174	5432	27140	76,884	16.22
Bt Cotton (NR; 174)/ 160:0:0	Cotton Contd.	Groundnut (GG-20; 120)/ 12.5:25:0	2390	-	1023	81,230	13.74
Pigeon pea (BDN-2; 212)/ 25:50:0	Pigeon pea Contd.	Pearl millet (GHB-558; 82)/ 80:40:0	2150	-	2662	71,804	16.81
						S.Em±	1.06
						CD at 5%	2.23
DURGAPURA (Rajasthan)							
Pearl millet (Raj-171; 92)/ 45:30:0	Wheat (Raj-3077; 119)/ 45:30:0	-	2245	2737	-	48,971	17.58
Pearl millet (Raj-171; 92)/ 45:30:0	Fenugreek (RMT-305; NR)/ 40:40:0	Lady's finger (Pusa Sawni; 59)/ 90:30:0	2419	1429	503	79,308	13.67
Cluster bean (RGC-1003; 97)/ 20:40:0	Onion (RO-1; 135)/ 50:50:0	-	1406	13767	-	60,694	7.11
Dew gram (RMO-40; 71)/ 10:30:0	Wheat (Raj-3077; 119)/ 45:30:0	-	480	2205	-	33,380	9.23

Contd..../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Cowpea (RC-19; 72)/ 15:40:0	Ajwain (NRC-1; 172)/ 20:30:0	-	613	567	-	37,865	4.04
Cluster bean (RGC-1003; 97)/ 20:40:0	Garden cress (Local; 117)/ 30:40:0	Green gram (RMG-268; 52)/ 20:30:0	1464	1539	370	36,090	6.09
Green gram (SML-668; 70)/ 15:40:0	Mustard (Bio-902;129)/ 30:30:0	-	1209	2737	-	83,474	18.85
Groundnut (RG-382; 130)/ 15:60:0	Isabgol (GI-1;129)/ 22.5-45-0	Green manure	1487	1325	-	1,10,084	24.70
Pearl millet (Raj-171; 92)/ 45:30:0	Barley (RD-2552;119)/ 30:30:0	Cluster bean (veg) (M-83; 59)/ 90:30:0	2436	2691	2552	50,856	18.25
					S.Em±	4,631	0.89
					CD at 5%	9,540	1.83
RAJENDERANAGAR (Andhra Pradesh)							
Maize (DHM-117; 110)/ 180:60:40	Groundnut (K-6; 128) 30:40:50	-	3359	1250	-	54,469	18.58
Maize (DHM-117; 110)/ 180:60:40	Sunflower (Agsun; 106) 90:60:30	-	3552	1598	-	65,233	22.06
Maize (DHM-117; 110)/ 180:60:40	Castor (PCH-111; 141)/ 90:40:30	-	3318	1511	-	50,534	11.35
Maize (DHM-117; 110)/ 180:60:40	Wheat (Local; 100)/ 120:60:40	-	3186	2630	-	55,694	19.70
Soybean (JS-335; 90)/ 80:60:40	Maize (DHM-117; 110)/ 180:60:40	-	467	3090	-	32,450	12.59
Soybean (JS-335; 90)/ 80:60:40	Wheat (TMV-2; 110)/ 30:40:50	-	464	3321	-	42,977	13.49
Soybean (JS-335; 90)/ 80:60:40	Castor (P. Jwala; 150) /120:60:60	-	458	1357	-	26,722	19.77
Soybean (JS-335; 90)/ 80:60:40	Sunflower (Local; 100) 20:40:60	-	458	1331	-	35,844	10.23
					S.Em±	2,643	1.13
					CD at 5%	5,656	2.42

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Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
Kharif	Rabi	Summer	Kharif	Rabi	Summer		
KOTA (Rajasthan)							
Soybean (RKS-24; 105)/ 40:40:0	Wheat (Raj-3765;139)/ 120:40:0	-	2386	5397	-	92,527	28.98
Soybean (RKS-24; 105)/ 40:40:0	Garlic (Local; 141)/ 120:40:100	-	1551	7000	-	2,56,632	20.86
+	+		+	+			
Maize (F) PEHM-2;110)/ 90-30-0	Lucern (F)/ (Local; 135) 120:40:100		737	24338			
Maize PEHM-2; 110)/ 90:30:0	Mustard (Pusa Bold; 121)/ 80:40:0	Green gram (AKM-8802; 65)/ 20:40:0	3404	2110	415	78,668	24.44
Maize PEHM-2; 110)/ 90:30:0	Mustard (Pusa Bold; 121)/ 80:40:0	Green gram (AKM-8802; 65)/ 20:40:0	2667	1034	405	78,179	20.38
+	+		+	+			
Black gram (KU-96-3; 82)/ 20:40:0	Chickpea (Samrat; 136)/ 20:40:0		561	655			
Maize PEHM-2; 110)/ 90:30:0	Chickpea (Samrat; 136)/ 20:40:0	Cowpea (veg.) (NR; 54)/ 20-40-0	3614	1586	6000	1,11,294	26.28
+	+		+	+			
Black gram (KU-96-3; 82)/ 20:40:0	Linseed (Meera; 132)/ 20:40:0		877	431			
Maize PEHM-2; 110)/ 90:30:0	Garlic (Local; 141)/ 120:40:100	-	3439	12069	-	3,90,953	29.26
Cotton (H-8; 210)/ 100:50:0	Cotton contd.	Green gram (AKM-8802; 65)/ 20:40:0	912	2421	825	1,06,274	13.96
+							
Black gram (KU-96-3; 82)/ 20:40:0							
Cotton (H-8; 210)/ 100:50:0	Cotton contd.	Green gram (AKM-8802; 65)/ 20:40:0	1544	2491	850	91,924	11.36
+							
Cluster bean (Pusa Bahar; 42)/ 20:40:0							
					S.Em±	4,241	0.71
					CD at 5%	9,076	1.52

Contd..../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
INDORE (Madhya Pradesh)							
Soybean (JS-335; 99)/ 20:60:20	Wheat (HI-1418; 115)/ 120:60:40	-	1925	4407	-	75,234	23.56
Maize (JM-216; 104)/ 90:50:30	Wheat (HI-1418; 115)/ 120:60:40	-	2983	4286	-	72,207	25.03
Soybean (JS-335; 99)/ 20:60:20	Wheat (HI-1418; 115)/ 120:60:40	Maize (JM-216; 65)/ 120:60:40	1669	2151	1192	62,002	20.25
	+	Mustard (Pusa Bold; 106)/ 60:30:20		+	280		
Soybean (JS-335; 99)/ 20:60:20	Onion (AFLR; 107)/ 100:50:100	Lady's finger (Vaisali; 61)/ 80:60:60	1724	35972	4264	1,83,197	26.92
Maize (JM-216; 104)/ 90:50:30	Potato (K. Loukar; 87)/ 120:100:100	Ladys' finger (Vaisali; 61)/ 80:60:60	2949	8191	4278	64,742	19.53
Soybean (JS-335; 99)/ 20:60:20	Potato (K. Loukar; 87)/ 120:100:100	Groundnut (JGN; 73)/ 20:60:20	728	7250	2138	92,919	28.88
	+	Maize (JM-216; 104)/ 90:50:30	+	1922			
Soybean (JS-335; 99)/ 20:60:20	Potato (K. Loukar; 87)/ 120:100:100	Onion (AFLR; 92)/ 100:50:100	810	10379	1968	66,050	20.98
	+	Maize (JM-216; 104)/ 90:50:30	+	1879			
Soybean (JS-335; 99)/ 20:60:20	Chickpea (JG-315; 108)/ 20-60-20	Green gram (JM-721; 68)/ 20-50-0	781	376	238	69,243	22.26
Soybean (JS-335; 99)/ 20:60:20	Wheat (HI-1418; 108)/ 120:60:40	Green gram (JM-721; 68)/ 20:50:0	844	2231	76688	67,483	20.59
	+	Maize (JM-216; 104)/ 90:50:30	+	1925			
	+	Mustard (Pusa Bold; 117)/ 60:30:20		+	256		

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Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)	
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>			
Soybean (JS-335; 99)/ 20:60:20 + Maize (JM-216; 104)/ 90:50:30	Chickpea (JG-315; 117)/ 20:60:20 + Mustard (Pusa Bold; 106)/ 60:30:20	Maize (Fodder) (JM-216; 65)/ 120:60:40	742 + 1962	83 + 447	1392	48,129	17.39	
Soybean (JS-335; 99)/ 20:60:20 + Pigeon pea (JKM-189; 173)/ 20:60:20	Wheat (HI-1418; 115)/ 120:60:40	Maize (Fodder) (JM-216; 68)/ 120:60:40	1450 + 209	2913	7958	64,955	18.31	
Soybean (JS-335; 99)/ 20:60:20 + Sorghum (CSH-16; 120)/ 80:40:40	Chickpea (JG-315; 117)/ 20:60:20 + Mustard (Pusa Bold; 106)/ 60:30:20	Maize (Fodder) (JM-216; 65)/ 120:60:40	765 + 2101	84 + 694	1493	58,360	19.80	
						S.Em±	4,381	1.11
						CD at 5%	8,893	2.26
AKOLA (Maharashtra)								
Sorghum (CSH-9; 107)/ 80:40:40	Wheat (HDM-2189; 98)/ 120:60:60	-	3475	2186	-	58,796	19.69	
Soybean (TAMS 38; 107)/ 30:75:0	Chickpea (AKG 46; 103)/ 20:40:0	-	2220	2019	-	66,388	16.86	
Soybean (TAMS 38; 107)/ 30:75:0	Mustard (Pusa Bold; 98)/ 50:40:0	-	2284	1242	-	54,481	16.59	
Soybean (TAMS 38; 107)/ 30:75:0	Safflower (AKS 207; 134)/ 40:40:0	-	2184	1993	-	63,840	16.53	
Soybean (TAMS 38; 107)/ 30:75:0	Sorghum (PKV Kranti; NR)/ 50:25:25	Groundnut (TAG-24; 116)/ 25:50:0	2320	2819	1934	1,01,054	30.83	
Soybean (TAMS 38; 107)/ 30:75:0	Mustard (Pusa Bold; 98)/ 50:40:0	Groundnut (TAG-24; 116)/ 25:50:0	2379	1337	2145	1,02,591	29.68	
Soybean (TAMS 38; 107)/ 30:75:0	Isabgol (GI-1; 119)/ 50:25:0	Groundnut (TAG-24; 116)/ 25:50:0	2330	1754	1708	1,72,624	21.93	

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Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)	
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>			
Soybean (TAMS 38; 107)/ 30:75:0	Coriander (CG-2;50) 25:50:0 + Wheat (HDM-2189; 98)/ 120:60:60	-	2307	6430 + 2379	-	2,06,130	36.72	
Soybean (TAMS 38; 107)/ 30:75:0 + Pigeon pea (AKT-811; 176)/ 25:50:0	Wheat (HDM-2189; 98)/ 120:60:60	-	1466	1826 + 1250	-	69,216	16.84	
Pigeon pea (AKT-811; 176)/ 25:50:0	Chickpea (AKG 46; 103)/ 20:40:0 + Mustard (Pusa Bold; 98) 50:40:0	-	1638	970 + 525	-	59,435	11.82	
						S.Em±	7,442	1.80
						CD at 5%	15,256	3.68
RUDRUR (Andhra Pradesh)								
Rice (MTU-1010;135) NR	Rice (MTU-1010; 135) NR	-	5383	5634	-	1,13,476	38.12	
Rice (MTU-1010;135) NR	Maize (Kaveri; 105) NR	-	5467	5659	-	1,03,839	38.27	
Rice (MTU-1010;135) NR	Sunflower (DRSF-108; 105) NR	-	5394	1727	-	93,818	29.37	
Rice (MTU-1010;135) NR	Mustard (Kranthi; 98) NR	-	5479	927	-	73,395	23.97	
Soybean (JS-335; 95) NR	Sunflower (DRSF-108; 105) NR	-	2024	1697	-	65,723	19.27	
Soybean (JS-335; 95) NR	Sesame (Sweta-T-11; 85) NR	-	2029	708	-	48,379	12.75	
Maize (Kaveri; 105) NR	Sunflower (DRSF-108; 105) NR	-	2800	1718	-	61,570	20.23	

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Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	Summer	<i>Kharif</i>	<i>Rabi</i>	Summer		
Soybean (JS-335; 95) NR	Maize (Kaveri; 105) NR	-	2004	5578	-	74,714	27.74
Maize (Kaveri; 105) NR	Chickpea (J-9-11; 105) NR	-	3198	1731	-	57,326	16.72
Sunflower (DRSF-108;105) NR	Maize (Kaveri; 105) NR	-	1617	5804	-	84,563	29.87
					S.Em±	1,086	0.35
					CD at 5%	2,280	0.74
RAHURI (Maharashtra)							
Pearl millet (NR; NR) NR	Wheat (Trimbak; 117) NR	-	2258	2889	-	50,746	18.15
Pearl millet (NR; NR) NR	Onion (N-2-4-1; 115) NR	-	2190	24094	-	1,14,771	19.95
Pearl millet (NR; NR) NR	Potato (NR; NR) NR	-	2375	20316	-	80,898	28.28
Pearl millet (NR; NR) NR	Chickpea (NR; NR) NR	-	2321	2234	-	58,818	15.08
Pearl millet (NR; NR) NR	Cabbage (NR; NR) NR	-	2358	21059	-	1,04,043	14.20
Soybean (NR; NR) NR	Wheat (NR; NR) NR	-	2247	3254	-	67,023	20.96
Soybean (NR; NR) NR	Onion (NR; NR) NR	-	2390	27037	-	1,41,369	23.84
Soybean (NR; NR) NR	Potato (NR; NR) NR	-	2328	21637	-	97,275	31.05
Soybean (NR; NR) NR	Chickpea (NR; NR) NR	-	2380	2296	-	73,496	17.17
Soybean (NR; NR) NR	Cabbage (NR; NR) NR	-	2376	22271	-	1,22,107	16.28

Contd..../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	Summer	<i>Kharif</i>	<i>Rabi</i>	Summer		
Pearl millet (NR; NR) NR +	Wheat (NR; NR) NR	-	1684	3126	-	59,724	20.37
Soybean (NR; NR)			805				
Pearl millet (NR; NR) NR +	Onion (NR; NR) NR	-	1640	25620		1,27,409	22.20
Soybean (NR; NR)			803				
Pearl millet (NR; NR) NR +	Potato (NR; NR) NR	-	1645	20889	-	87,806	29.72
Soybean (NR; NR)			815				
Pearl millet (NR; NR) NR +	Chickpea (NR; NR) NR	-	1684	2464	-	68,540	16.89
Soybean (NR; NR)			790				
Pearl millet (NR; NR) NR +	Cabbage (NR; NR) NR	-	1642	20489		1,07,349	15.07
Soybean (NR; NR)			835				
					S.Em±	4,191	0.89
					CD at 5%	8,591	1.83
PARBHANI (Maharashtra)							
Sorghum (CSH-9; 112)/ 80:40:40	Wheat (HD-2189; 110) 100:50:50	-	3879	3889	-	81,564	26.99
Bt. Cotton (NCS-207; 142)/ 125:62.5:62.5	Cotton contd.	Groundnut (TAG-26;116) 25-50-0	-	2881	2004	1,28,506	20.93
Soybean (MAUS-71; 106)/ 30:60:30	Onion (AFLR; 131) 100:50:50	-	1996	21039	-	1,11,899	19.14
Soybean (MAUS-71; 106)/ 30:60:30	Wheat (HD-2189; 110) 100:50:50	Cowpea (fodder) (NR ;56) 25-50-0	2037	4475	16705	94,248	26.96

Contd..../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Pigeon pea (BSMR-853; 179)/ 25:50:0	Pigeon pea contd.	Groundnut (TAG-26;116) 25-50-0	-	2449	2075	99894	19.97
Maize (PMH-19; 103)/ 100:50:50	Wheat (HD-2189; 110)/ 100:50:50	Green gram (BPMR-145; 64)/ 25-50-0	6070	4362	1569	94,928	27.92
Bt. Cotton (NCS-207; 142)/ 125:62.5:62.5	Wheat (HD-2189; 110)/ 100:50:50	Coriander (leaves) (Lavender; 46)/ 50:50:50	3241	4342	4266	2,43,108	38.07
Maize (Fodder) (Maharaja; 120)/ 100:50:50	Chickpea (NR; 116)/ NR	Lady's finger (A. Anamika; 77)/ 50:50:50	5617	1800	4174	50,084	14.96
Soybean (MAUS-71; 106)/ 30:60:30	Chickpea (NR; 116)/ NR	Coriander (leaves) (Lavender; 46)/ 50:50:50	2335	1739	4596	1,68,763	29.58
Turmeric (Salem; 267)/ 100-50-50 + Castor (DCH-9; 167)/ 60:40:30	Turmeric contd.	Turmeric contd.	890	-	15422	4,76,003	53.82
Bt. Cotton (NCS-207; 142)/ 125:62.5:62.5	Chickpea (NR; 116)/ NR	-	2942	1811	-	1,20,140	16.29
Soybean (MAUS-71; 106)/ 30:60:30	Safflower (NR; NR)/ NR	Maize (Fodder) (African tall; 61)/ 100:50:50	2078	1507	18598	72,806	36.82
					S.Em±	6,663	1.35
					CD at 5%	13,792	2.80
COIMBATORE (Tamil Nadu)							
Cotton (MCU-112; 150)/ 120:60:60	Ragi (Co-11; 100)/ 60:30:30	Sorghum (Co-28; 100)/ 90:45:45	1903	2834	2445	1,00,360	24.15
Beetroot (Ooty-1; 120)/ 60:160:100	Green gram (Co-5; 85)/ 25:50:25	Maize (Co 135; 100)/ 135:62:50 + Cowpea (Veg.) (Co CP-6; 100)	9937	1035	5593 + 546	1,13,230	27.12
Cowpea (Veg.) (Co-6; 85)/ 25:50:25	Sesame (SVPR 1;90) 35-23-23	Maize (Co 135; 100)/ 135:62:50	962	761	5216	68,874	22.59

Contd.../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Cotton (MCU-112; 150)/ 120:60:60 +	Green manure (NR; 45) NR	Sunflower (Co-4; 90)/ 40:20:20	1656	12054	1623	90,272	19.07
Soybean (Co 3; 90)			+				
			367				
Chilli (K-2; 120)/ 120:60:30 +	Green manure (NR; 45)/ NR	Lady's finger (A. Anamica; 90)/ 40:50:30 +	8877	12691	9419	88,013	9.20
Onion (Local; 120)/		Coriander (Co 4; 90)	+		+		
			469		368		
Cotton (MCU-112; 150)/ 120:60:60 +	Maize (Co-1; 100)/ 135:60:50	Sunflower (Co-4; 90)/ 40:20:20	1868	5208	1737	1,45,458	36.79
Green Gram (Co 6; 85)			+				
			599				
Indian bean (Co 13; 120)/ 25:50:25	Sesame (Co-1; 90)/ 35:23:23	Brinjal (Co-2; 90)/ 100:50:30	9671	785	10340	1,02,430	11.55
Sugar beet (Cauvery; 120)/ 150:75:75	Maize (Co-1; 100)/ 135:60:50	Groundnut (Co-2; 105)/ 17:34:54	35043	4833	813	1,83,822	37.96
Maize (Co 4; 100)/ 135:60:50	Cowpea (Veg.)/ (Co-6; 85) 25:50:25	Tomato (PKM-1; 90)/ 150:100:50	5398	1047	11571	95,291	21.62
						S.Em±	0.91
						CD at 5%	1.93
SUB-HUMID ECOSYSTEM							
VARANSI (Uttar Pradesh)							
Rice (NDR-359; 133)/ 150:75:75	Wheat (HUW-468; 141)/ 150:75:75	-	4896	3750	-	91,677	29.92
Rice (NDR-359; 133)/ 150:75:75	Wheat (HUW-468; 141)/ 150:75:75	Green gram (P. Vishal; NR)/ 25:60:25	5278	3981	984	1,25,310	35.32
Rice (NDR-359; 133)/ 150:75:75	Wheat (HUW-468; 141)/ 150:75:75	Dhaincha	5463	4074	-	1,01,083	33.00
Rice (NDR-359; 133)/ 150:75:75	Wheat (HUW-468; 141)/ 150:75:75	Black gram (Azad-1; NR) 25-60-25	5208	2569	694	1,15,353	34.03
	+			+			
	Mustard (5:1) (S. Asesh; 109)			871			

Contd..../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Rice (NDR-359; 133)/ 150:75:75	Wheat (HUW-468; 141)/ 150:75:75 + Mustard (5:1) (S. Asesh; 109)	Cowpea (Fodder) (CP-4; NR) NR	5394	2685 + 884	2836	1,04,100	33.19
Rice (NDR-359; 133)/ 150:75:75	Mustard (PRO-4001; 118)	Green gram (P. Vishal; NR)/ 25:60:25	5428	2008	1123	1,20,941	33.39
Rice (NDR-359; 133)/ 150:75:75	Toria (PT-303; 96) 90:45:0	Lady's finger (Mahyco-10; NR)/ 120:60:60	4757	1713	13657	1,27,883	30.51
Rice (NDR-359; 133)/ 150:75:75	Veg. Pea (E. Apoorva; 82)/ 25:60:25	Lady's finger (Mahyco-10; NR)/ 120:60:60	4792	3634	14745	1,16,975	25.12
Rice (NDR-359; 133)/ 150:75:75	Maize (gr. cobs) (Bio-9681; 158)/ 120:60:40 + Veg. pea (1:2) (E. Apoorva; 82)/ 15:40:20	Cowpea (Fodder) (Local; NR) 25:60:25	5394	12296 + 2836	23588	96,727	40.44
Rice (NDR-359; 133)/ 150:75:75	Potato (K. Sinduri; 121)/ 160:80:80	Green gram (Jyoti; NR)/ 25:60:25	5301	19129	1458	1,52,236	41.77
						S.Em± 3,383	1.05
						CD at 5% 7,104	2.20
FAIZABAD (Uttar Pradesh)							
Rice (S-52; 102)/ NR	Wheat (PBW-343; 137)/ NR	-	5187	4053	-	98,009	31.97
Rice (S-52; 102)/ NR	Wheat (PBW-343; 137)/ NR	Green manure (Sesbania)	5413	4437	-	1,04,561	34.08
Hybrid Rice (ProAgro-6444; 107)/ NR	Wheat (PBW-343; 137)/ NR	Green manure (Sesbania)	7287	4351	-	1,22,917	40.27
Hybrid Rice (ProAgro-6444; 107)/ NR	Potato (K. Ashoka; 103)/ NR	Green gram (NDM-1; 64)/ NR	7427	16983	1047	1,56,333	45.67
Hybrid Rice (ProAgro-6444; 107)/ NR	Mustard (NDR-8501; 113)/ NR	Black gram (NDU-1; 87)/ NR	7307	1977	860	1,33,104	38.96

Contd..../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)	
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>			
Rice (PB-1; 105)/ NR	Wheat (PBW-343; 137)/ NR	Green manure (Sesbania)	4280	4150	-	1,22,690	29.17	
Rice (PB-1; 105)/ NR	Berseem (NR; NR)/ NR	Berseem contd. for seed	4085	61333	140	1,37,937	14.62	
Rice (PB-1; 105)/ NR	Lentil (NDL-1; 120)/ NR	Fodder Sorghum (NR; 49) NR	4063	1740	42750	1,51,560	26.87	
						S.Em±	10,551	3.45
						CD at 5%	22,579	7.38
SABOUR (Bihar)								
Rice (Sita; 136)/ 100:40:20	Wheat (HP-2733; 138)/ NR	Fallow	4886	4658	-	1,01,561	33.02	
Rice (Sita; 136)/ 100:40:20	Maize (Shaktiman-3; 159)/ NR + Potato (K. Ashoka; 79)	Maize (Fodder) (Suwan; 79) NR + Cowpea (P. Komal)	5052	7345 + 16409	33773	1,62,956	58.52	
Rice (Sita; 136) 100:40:20	Wheat (HP-2733; 138)/ NR + Fenugreek (R. Kranti; 136)	Green gram (SML-668; 76) NR	4710	4699 + 321	748	1,33,688	36.12	
Rice (Sita; 136) 100:40:20	Potato (K. Ashoka; 79) NR + Radish (P. Chetki; 71)	Onion (N. Red; 97) NR + Maize (Suwan; 79)	4679	21780 + 7307	11390 + 7820	2,35,744	71.00	
Rice (Sita; 136) 100:40:20	Cabbage (P. Mukta; 101) NR + Radish (P. Chetki; 71)	Lady's finger (P. Kranti; 124) NR + Green gram (SML-668; 76)	4762	44716 + 7407	11483 + 318	2,89,130	34.89	
Rice (Sita; 136) 100:40:20	Maize (Shaktiman-3; 159)/ NR + Potato (K. Ashoka; 79)	Fodder Sorghum (SSG-99; 48)/ NR + Cowpea (P. Komal; 48)	6253	7464 + 16012	37967	1,75,133	62.69	

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Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Rice (Sita; 136) 100:40:20	Maize (Shaktiman-3; 159) NR + French bean (PDR-14; 129)	Maize (Fodder) (Suwan; 79) NR + Cowpea (P. Komal)	6346	8337 + 397	34227	1,41,943	51.84
Rice (Sita; 136) 100:40:20	Garlic (Y. Safed; 136) NR + Coriander (Leaf) (Pant Haritima; 49)	Maize (Suwan; 79) NR	6253	4403 + 2231	3853	2,41,132	42.29
Rice (Sita; 136) 100:40:20	Wheat (HP-2733; 138) NR	Green gram (SML-668; 76) NR	5983	3840	782	1,25,453	36.60
Rice (Sita; 136) 100:40:20	Maize (Shaktiman-3; 159) NR	Cluster bean (F) (G. Early-36; 60) NR	6004	7146	25840	1,21,869	45.21
Rice (Sita; 136) 100:40:20	Oats (Fodder) (JHO-822; NR) 80:40:20	Pearl millet (F) (GFB-1; 67) 60:30:20 + Rice bean (Bidhan-1, 67)	6014	47196	41027	61,949	20.81
Rice (Sita; 136) 100:40:20	Chickpea (Vaibhav; 140) NR + Coriander (R. Swati; 134) NR	Maize (Suwan; 79) NR	5963	1641 + 318	3695	1,28,633	40.09
						S.Em±	0.90
						CD at 5%	1.86
RAIPUR (Chhattisgarh)							
Rice (MTU-1010, 112) 80:60:40	Wheat (NR, NR) 100:60:40	Cowpea (Veg.) (NR, NR) 20:50:0	3922	3061	5707	94,045	26.90
Rice (MTU-1010, 112) 80:60:40	Castor (NR, NR) 80:50:30 + Lentil (NR, NR) 30:50:30	Cowpea (Veg.) (NR, NR) 20:50:0	4075	497 + 912	6034	88,494	20.12

Contd..../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Rice (MTU-1010, 112)/ 80:60:40	Mustard (Pusa Bold, 115) 80:50:30 + Lentil (NR, NR)/	Cowpea (Veg.) (NR, NR)/ 20:50:0	4132	1345 + 448	6518	99,174	26.24
Rice (MTU-1010, 112)/ 80:60:40	Wheat (NR, NR)/ 100:60:40	Green gram (NR; NR)/ NR	4063	2877	1751	1,21,816	29.86
Rice (Mahamaya, 125)/ 100:60:40	Sunflower (NR, NR) 80:50:30 + Lentil (NR, NR) 30:50:30	Cowpea (Veg.) (NR, NR)/ 20:50:0	4537	1664 + 225	6061	1,09,410	29.70
Rice (Mahamaya, 125)/ 100:60:40	Wheat (NR, NR)/ 100:60:40 + Fenugreek (NR, NR) 40:30:30	Cowpea (Veg.) (NR, NR)/ 20:50:0	4368	1670 + 851	38004	1,35,414	29.81
Rice (Indira Sona, 125)/ 120:60:40	Wheat (NR, NR)/ 100:60:40 + Lentil (NR, NR)/ 30:50:30	Cowpea (Veg.) (NR, NR)/ 20:50:0	4470	1907 + 380	5854	95,301	26.18
Rice (Indira Sona, 125)/ 120:60:40	Onion (NR, NR)/ 80:60:100 + Coriander (NR, NR) 60:40:30	Cowpea (Veg.) (NR, NR)/ 20:50:0	4379	9777 + 292	5922	1,11,653	23.14
						S.Em± 2,614	0.55
						CD at 5% 5,594	1.18
REWA (Madhya Pradesh)							
Rice (Kranti; 107) 120:60:40	Wheat (Kanchan; 128)/ 120:60:40	-	5866	5603	-	1,22,057	39.68
Rice (Kranti; 107) 120:60:40	Chickpea (JG-322; 124)/ 20:60:20	-	6465	2730	-	1,14,641	32.20

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Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	Summer	<i>Kharif</i>	<i>Rabi</i>	Summer		
Hybrid Rice (ProAgro-6444; 107)/(NR; 143)/ 120:60:40	Berseem 120:60:20	-	7011	279	-	72,493	24.30
Hybrid Rice (ProAgro-6444; 107)/(K. Chandramukhi; 101)/ 120:60:40	Potato 120:100:100	-	6919	14205	-	1,13,881	37.72
Hybrid Rice (ProAgro-6444; 107)/(NR; 136)/ 120:60:40	Garlic 100:75:50	-	8098	8286	-	3,31,991	40.03
Rice (PB-1; 107)/ 120:60:40	Linseed (JM-232; 136)/ 20:60:20	-	5420	560	-	1,10,443	21.72
Rice (PB-1; 107)/ 120:60:40	Maize (Green cobs) (JP-18; 136)/ 100:50:30	-	5256	3235	-	96,558	22.23
Hybrid Rice (ProAgro-6444; 107)/(Arkel; 93) 120:60:40	Veg. pea 30:60:20	-	6727	8112	-	1,01,734	30.82
Hybrid Rice (ProAgro-6444; 107)/(NR; 124) 120:60:40	Chickpea 20:60:20 + Linseed (JC-232; 136) 20:60:20	-	6599	3441 + 239	-	1,34,026	36.49
Rice (PB-1; 107)/ 120:60:40	Mustard (P. Bold; 111)/ 60:30:20	-	5799	2320	-	1,46,832	32.62
					S.Em±	16,188	3.42
					CD at 5%	33,186	7.01
JABALPUR (Madhya Pradesh)							
Rice (Kranti; 132)/ 120:60:40	Wheat (GW-273; 130)/ 120:60:40	-	5604	4193	-	1,38,478	45.53
Rice (Kranti; 132)/ 120:60:40	Chickpea (JG-322; 80)/ 20:60:20	-	5762	1875	-	1,27,956	38.65
Hybrid Rice (ProAgro-6444; 120)/(P. Red; 144)/(P. Vishal; 84)/ 120:60:40	Onion 100:60:20	Green gram 20:60:20	4315	7328	583	1,44,962	43.67
Rice (P. Sugandha-5; 132)/(JB-5; 191)/ 120:60:40	Berseem (seed) 20:60:20	Berseem contd. for seed	4231	10937	519	81,140	25.21

Contd.../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Hybrid Rice (JRH-5; 110)/ 120:60:40	Potato (K. Sinduri;120)/ 120:60:40	Fodder maize (JM-12; 96)/ 100:80:60	5650	10713	23064	1,48,320	45.36
Hybrid Rice (JRH-5; 110)/ 120:60:40	Gobhi sarson (Terri Uttam; NR)/ 60:30:30	Fodder maize (JM-12; 96)/ 100:80:60	5741	1070	20014	1,36,032	40.78
Hybrid Rice (JRH-5; 110)/ 120:60:40	Veg pea (Arkel; NR)/ 20:60:20	Sesame (TKG-55; NR) 80:60:20	5818	2796	768	1,28,823	39.09
Hybrid Rice (JRH-5; 110)/ 120:60:40	Potato (K. Sinduri;120)/ 120:60:40	Groundnut (Jyoti; NR)/ 20:60:20	5923	9713	1523	1,58,731	50.85
Hybrid Rice (JRH-5; 110)/ 120:60:40	Gobhi sarson (Terri Uttam; NR)/ 60:30:30	Groundnut (Jyoti; NR)/ 20:60:20	5734	1115	526	2,05,936	52.61
		+ Maize (Green cobs) (NR; NR)			+ 9150		
Hybrid Rice (JRH-5; 110)/ 120:60:40	Gobhi sarson (Terri Uttam; NR)/ 60:30:30	Lady's finger (P. Kranti; NR)/ 80:60:40	5884	1130	9060	1,52,177	68.13
Hybrid Rice (JRH-5; 110)/ 120:60:40	Garlic (G-41; NR) 100:75:50	Fodder Sorghum (MP Chari) + Cowpea	5899	833	26338 + 4538	2,11,722	52.49
Hybrid Rice (ProAgro-6444; 122)/ 120:60:40	Marigold (A. Giant; NR)/ 100:80:40	Maize + Cowpea (Fodder)	7147	2785	19583	1,68,012	64.99
					S.Em±	5,167	1.33
					CD at 5%	10,490	2.69
POWARKHEDA (Madhya Pradesh)							
Soybean (JS-9-52; 110) 20:60:20	Wheat (NR; 118) 120:60:40	-	1104	5333	-	74,015	23.22
Soybean (JS-9-52; 110) 20:60:20	Chickpea (NR; 114) 20:60:20	-	1201	1451	-	42,244	10.42
Soybean (JS-9-52; 110) 20:60:20	Garlic (NR; NR) NR	-	1118	1528	-	61,374	9.01
Soybean (JS-9-52; 110) 20:60:20	Pea (NR; NR) NR	-	1125	18083	-	3,04,971	72.95

Contd.../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)	
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>			
Rice (P. Sugandha-5; 120) 100:40:25	Wheat (NR; 118) 120:60:40	Green gram (NR; 67) 20:60:20	4028	4847	861	1,18,572	33.58	
Soybean (JS-9-52; 110) 20:60:20	Potato (NR; 104) 120:100:75	Lady's finger (NR; NR) 80-60-20	1215	32931	15514	1,71,534	42.62	
Soybean (JS-9-52; 110) 20:60:20	Fodder maize (NR; NR) 120:60:40	-	868	36806	-	98,705	12.30	
+ Pigeon pea (IPCL-87119; 190) 20:60:20			+ 2167					
Rice (P. Sugandha-5; 120) 100:40:25	Linseed (NR; 114) 75:50:25	Green gram (NR; 67) 20:60:20	4090	1021	875	89,759	22.49	
Rice (P. Sugandha-5; 120) 100:40:25	Linseed (NR; 114) 75:50:25	Sesame (NR; NR) 50:30:20	4028	1306	653	90,118	24.53	
Soybean (JS-9-52; 110) 20:60:20	Potato (NR; 104) 120:100:75	Sesame (NR; NR) 50:30:20	1222	34097	653	1,37,885	42.03	
						S.Em±	6,987	2.37
						CD at 5%	14,323	4.86
CHIPLIMA (Orissa)								
Rice (Khandagiri; 104)/ 80:40:40	Groundnut (Smruti; 125)/ 20:40:40	-	4108	2598	-	96,859	28.94	
Rice (Khandagiri; 104)/ 80:40:40	Mustard (Keshari; 133)/ 60:30:30	-	3828	1049	-	58,632	18.92	
Rice (Khandagiri; 104)/ 80:40:40	Groundnut (Smruti; 125)/ 20:40:40	Green gram (K-851; 61)/ 20:40:40	4441	2391	1207	1,29,258	32.95	
Rice (Khandagiri; 104)/ 80:40:40	Groundnut (Smruti; 125)/ 20:40:40	Cowpea (Ankur; 107) 25:50:50	4516	2793	3769	1,63,592	43.64	
Rice (Khandagiri; 104)/ 80:40:40	Groundnut (Smruti; 125)/ 20:40:40	Bottle gourd (US-15; 107) 50:30:50	4140	2540	8909	1,13,803	29.80	
Rice (Khandagiri; 104)/ 80:40:40	Mustard (Kesari; 133)/ 60:30:30	Green gram (K-851; 61)/ 20:40:40	4022	1218	1092	93,856	24.15	

Contd.../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Rice (Khandagiri; 104)/ 80:40:40	Radish (Pusa Chetki; 57)/ 50:50:75	Cowpea (YB-7; 107)/ 25:50:50	3989	21115	3441	1,26,095	28.51
Rice (Khandagiri; 104)/ 80:40:40	Radish (Pusa Chetki; 57)/ 50:50:75	Green gram (K-851; 61)/ 20:40:40	4312	13701	1013	92,924	20.63
Rice (Lalata; 130)/ 80:40:40	Rajmash (Chitcobra; 72)/ 50:80:80	Green gram (K-851; 61)/ 20:40:40	4398	1977	1138	1,09,325	25.86
Rice (Khandagiri; 104)/ 80:40:40	Maize (green cobs) (Makka-55; 107)/ 120:60:60	Cowpea (YB-7; 107)/ 25:50:50	4054	46667	3464	1,23,447	83.55
					S.Em±	6,187	1.32
					CD at 5%	12,998	2.76
KATHALGERE (Karnataka)							
Rice (MTU-1010; 120)/ NR	-	Rice (NR; NR)/ NR	4875	-	4404	95,575	32.11
Maize (NR; NR)/ NR	Veg. Cowpea (NR; NR)/ NR	Rice (NR; NR)/ NR	3750	-	4104	73,773	27.03
Rice (MTU-1010; 120)/ NR	Green gram (KKM-3; 60)/ NR	Rice (NR; NR)/ NR	5813	-	4165	1,02,764	34.52
Rice (MTU-1010; 120)/ NR	-	Rice (NR; NR)/ NR	5583	-	4054	99,266	33.35
Rice (MTU-1010; 120)/ NR	-	Tomato (NR; NR)/ NR	6417	-	11385	1,11,633	24.82
Rice (MTU-1010; 120)/ NR	-	Lady's finger (NR; NR)/ NR	6583	-	17400	1,30,448	28.87
Rice (MTU-1010; 120)/ NR	-	Rice (NR; NR)/ NR	6583	-	3838	1,07,335	36.06
Rice (MTU-1010; 120)/ NR	Green gram (KKM-3; 60)/ NR	Rice (NR; NR)/ NR	5896	-	4523	1,07,313	36.05
Maize (NR; NR)	Sesbania (green manure)	Rice (NR; NR)/ NR	3356	-	4071	70,122	25.56
Rice (MTU-1010; 120)/ NR	-	Hybrid Maize (NR; NR)/ NR	6750	-	3527	99,153	35.42

Contd.../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Rice (MTU-1010; 120)/ NR	-	Groundnut (TMV-2; 120)/ NR	7021	-	3223	1,39,996	43.21
Maize (NR; NR)/	Sorghum (NR; NR)/	Green gram (KKM-3; 60)/ NR	4025	-	981	60,893	17.04
					S.Em±	6,212	1.97
					CD at 5%	12,859	4.07
HUMID ECOSYSTEM							
JAMMU (Jammu & Kashmir)							
Rice (Jaya; 139)/ NR	Wheat (PBW-343; 146)/ 100:50:25	-	5146	6042	-	1,19,460	38.71
Rice (IET-1410; 119)/ NR	Berseem (Fodder) (Mascavi; 220)/ 50-50-0	Berseem contd. (for seed)	4188	84167	438	1,36,923	29.46
Rice (IET-1410; 119)/ NR	Potato (K. Badshah; 94)/ 120:60:120	Onion (N-53; 120)/ 100:50:50	3375	42917	15104	2,23,929	60.86
Rice (PC19;129)/ NR	Fenugreek (Kasuri Methi;180)/ 60:20:20	Radish (P. Chetki; 66)/ 80:30:50	4688	229	10167	72,698	18.71
Rice (IET-1410; 119)/ NR	Garlic (Local; 194)/ 100:50:50	Cowpea (P. Komal; 63)/ 50:60:50	4000	16458	3688	5,47,856	39.48
Rice (PC19; 129)/ NR	Marigold (P. Narangi; 120)/ 120:100:100	French bean (Contender; 81)/ 50:100:50	4500	7729	14396	2,10,017	19.31
Rice (PC19; 129)/ NR	Veg. Pea (Arkel; 116)/ 50:60:50	Lady's finger (P. Sawani; 128)/ 60:30:30	4396	18188	13917	1,68,127	37.00
Rice (IET-1410; 119)/ NR	Coriander (leaves) (Local; 190)/ 75:0:0	Coriander contd. (for seed)	3938	20229	1042	1,75,775	26.54
Rice (IET-1410; 119)/ NR	Cabbage (Golden Acre; 86)/ 120:60:60	Onion (N-53; 117)/ 100:50:50	4083	15625	15208	1,65,392	25.95
Rice (PC19; 129)/ NR	Potato (K. Sinduri; 109)/ 120:60:120	Maize (green cobs) (NR; NR)/ 90:60:30 + Green gram (818; 114)/	4438	23250	9518	-	-
					+		
					0.63		
					S.Em±	24,233	5.42
					CD at 5%	49,677	11.11

Contd..../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)	
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>			
PALAMPUR (Himachal Pradesh)								
Maize (Composite) (Girja; 111)/ 120:60:40	Wheat (HPW-155; 168)/ 120:60:30	-	4074	6070	-	1,00,995	34.94	
Hybrid Maize (VL-78; 99)/ 150:60:40	Veg. Pea (Palam Priya; 158)/ 46:60:60	Summer Squash (Aus. green; 78)/ 92:50.4:54	3537	8037	18653	2,46,051	32.86	
+			+					
French bean (pole) (Laxmi; 99)/ 46-100-51			540					
Baby corn (VL-78; 99)/ 150:60:40	Veg. Pea (Palam Priya; 158)/ 46:60:60	Summer Squash (Aus. green; 78)/ 92:50.4:54	2778	8519	19138	2,52,927	33.37	
Brinjal (Arka Nidhi; 86)/ 46:60:45	Wheat (HPW-155; 168)/ 120:60:30	-	8083	6495	-	1,03,779	24.41	
Brinjal (Arka Nidhi; 86)/ 46:60:45	Garlic (GHC-1; 237)/ 115:76:60	-	8148	9804	-	3,26,710	16.17	
Brinjal (Arka Nidhi; 86)/ 46:60:45	Broccoli (P. Samridhi; 114)/ 115:76:51	Potato (K. Jyoti; 114)/ 100:100:50	8907	4377	20185	1,39,956	23.69	
Lady's finger (P-8; 70)/ 69:50.4:54	Wheat (HPW-155; 168)/ 120:60:30	-	1717	6471	-	77,358	22.99	
Lady's finger (P-8; 70)/ 69:50.4:54	Cauliflower (Pusa Upahar; 116)/ 115:76:72	French bean (Cotender; 71)/ 40:60:30	1818	14983	6902	1,80,367	34.41	
Lady's finger (P-8; 70)/ 69:50.4:54	Radish (Early Menu; 83)/ 92:48:36	Onion (P. Red; 146)/ 115:80:60	1726	35185	30864	1,82,447	22.02	
						S.Em±	11,818	1.51
						CD at 5%	24,345	3.11
JORHAT (Assam)								
Rice (Suwasini; 139)/ 80:40:40	-	Autumn rice (Disang; 119) 80:40:40	2700	-	2125	49,698	16.70	
Rice (Suwasini; 139)/ 80:40:40	Toria (TS-38; 95)/ 60-40-40	-	2850	950	-	45,838	15.00	

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Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
Kharif	Rabi	Summer	Kharif	Rabi	Summer		
Rice (Suwasini; 139)/ 80:40:40	Cabbage (Golden Acre; 113)/ NR	Green gram (Pratap; 77)/ 15:35:10	3113	12838	388	94,104	15.53
Rice (Suwasini; 139)/ 80:40:40	Cauliflower (Snowball; 109)/ NR	Black gram (PU-31; 77)/ 15:35:10	2688	8263	450	72,071	16.31
Rice (Suwasini; 139)/ 80:40:40	Knol khol (White Viena; 95)/ NR	Black gram (PU-31; 77)/ 15:35:10	2725	5900	638	86,533	15.50
	+			+			
	French bean (Annapurna; 63)/ NR			5100			
Rice (Suwasini; 139)/ 80:40:40	Capsicum (S. Wonder; 141)/ NR	Fodder Cowpea (EC-4216; 51)/ 20:40:20	2825	1550	NR	35,298	10.15
Rice (Suwasini; 139)/ 80:40:40	Chilli (Local; 141)/ NR	Fodder Cowpea (EC-4216; 51)/ 20:40:20	2800	2550	NR	39,040	10.43
Rice (Suwasini; 139)/ 80:40:40	Radish (P. Chetki; 45)/ NR	Black gram (PU-31; 77)/ 15:35:10	2588	5900	475	88,871	13.40
	+			+			
	French bean (Annapurna; 63)/			6900			
					S.Em±	4,716	1.14
					CD at 5%	9,762	2.36
KALYANI (West Bengal)							
Rice (IET-4786; 94)/ NR	-	Rice (IET4786; 121)/ NR	2248	-	2277	46,615	15.66
Rice (BCKV-1; 96)/ NR	Potato (Kufri Jyoti; 90)/ NR	Jute (JRO-524; 108)/ NR	3177	8834	1670	82,181	25.40
Rice (BCKV-1; 96)/ NR	Wheat (UP-262; 128)/ NR	Maize (Datta; 87)/ NR	3738	2340	2725	95,073	32.49
		+			+		
		Groundnut (TAG-24; 87)/ NR			378		

Contd..../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Rice (IET-4786; 94)/ NR	Rapeseed (B-9; 89)/ NR	Green gram (sonali; 75)/ NR	3317	719	431	59,215	16.80
Rice (BCKV-1; 96)/ NR	Lentil (B-67; 100)/ NR + Mustard (B-9; 89)/ NR	Sesame (B-76; 93)/ NR	3538	749 + 758	809	88,724	23.47
Amaranthus (NR; NR)/ NR	Brinjal (Muktakeshi; 122)/ NR + Coriander (Leaves) (Hybrid; 53)/ NR	Bitter gourd (Meghna-2; 108)/ NR	3928	14258 + 2131	855	1,77,663	14.08
Rice (BCKV-1; 96)/ NR	Wheat (UP-262; 128)/ NR	Green gram (Sonali; 75) NR	2806	2622	627	75,057	20.88
						S.Em±	2.74
						CD at 5%	5.75
COASTAL ECOSYSTEM							
BHUBANESWAR (Orissa)							
Rice (RGL-2538; 124)/ 80:40:40	Groundnut (Smruti; 118)/ 20:40:40	-	4046	2195	-	87,768	26.45
Rice (RGL-2538; 124)/ 80:40:40	Maize (gr. cobs) (Navjyoti; 79)/ 80:40:40	Cowpea (veg.) (U. Manika; 58)/ 30:30:30	4210	70598	5347	1,04,439	105.38
Rice (RGL-2538; 124)/ 80:40:40	Maize (gr. cobs) (Navjyoti; 79)/ 80:40:40	Lady's finger (BO-2; 75)/ 80:40:40	3853	70769	7091	1,07,674	104.28
Rice (RGL-2538; 124)/ 80:40:40	Mustard (Parbati; 75)/ 60:30:30	Lady's finger (BO-2; 75)/ 80:40:40	4415	1272	7142	94,463	24.66
Rice (RGL-2538; 124)/ 80:40:40	Mustard (Parbati; 75)/ 60:30:30	Cowpea (veg.) (U. Manika; 58)/ 30:30:30	4467	1231	5610	88,166	24.81
Rice (RGL-2538; 124)/ 80:40:40	French bean (Selection-9;70)/ 80:40:40	Bitter gourd (N. Improved;65)/ 80:40:40	4275	6634	4506	88,595	17.27
Rice (RGL-2538; 124)/ 80:40:40	Groundnut (Smruti; 118)/ 20:40:40	Cucumber (S. Queen; 65)/ 80-40-40	4617	2284	5740	1,18,476	29.67

Contd..../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Rice (RGL-2538; 124)/ 80:40:40	Tomato (BT-10; 101)/ 80:40:40	Cowpea (veg.) (U. Manika; 58)/ 30:30:30	4325	17231	5244	1,31,824	21.44
Rice (RGL-2538; 124)/ 80:40:40	Radish (Chetki; 53)/ 80:40:40	Sesame (Uma; 77)/ 60:30:30	4067	28547	1752	1,34,643	28.79
Rice (RGL-2538; 124)/ 80:40:40	French bean (Selection-9;70)/ 80:40:40	Sesame (Uma; 77)/ 60:30:30	4005	7111	1609	1,15,541	24.76
						S.Em±	1.79
						CD at 5%	3.77
MARUTERU (Andhra Pradesh)							
Rice (MTU-1001; 140)/ 60:40:40	-	Sunhemp (F) (NR; NR)/ NR	6257	-	13541	77,992	23.82
Rice (MTU-1001; 140)/ 60:40:40	-	Black gram(F) (NR; NR)/ NR	6138	-	5038	68,264	22.05
Rice (MTU-1001; 140)/ 60:40:40	-	Green gram(F) (NR; NR)/ NR	6343	-	6244	71,577	22.95
Rice (MTU-1001; 140)/ 60:40:40	-	Cowpea (F) (NR; NR)/ NR	5997	-	8395	70,164	22.09
Rice (MTU-1001; 140)/ 60:40:40	-	Pillipesara (F) (NR; NR)/ NR	6235	-	11724	75,946	23.45
Rice (MTU-1001; 140)/ 60:40:40	-	Sorghum (F) (NR; NR)/ NR	6064	-	7826	70,285	22.23
						S.Em±	1.28
						CD at 5%	2.86
KARAMANA (Kerala)							
Rice (Aiswariya; 125)/(Kanchana; 110)/ 90:45:45	Rice NR	-	2548	2907	-	56,190	18.88
Rice (Aiswariya; 125)/(Kanchana; 110)/ 90:45:45	Rice NR	Sweet potato (NR; NR)/ NR	3776	3005	2917	87,350	26.96
Rice (Aiswariya; 125)/(Kanchana; 110)/ 90:45:45	Rice NR	Pumpkin (NR; NR)/ NR	3717	3561	21801	1,94,867	30.63

Contd..../-

Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Rice (Aiswariya; 125)/(Kanchana; 110)/ 90:45:45	Rice NR	Sesame (NR; NR)/ NR	4835	3397	78	87,022	28.92
Rice (Aiswariya; 125)/(Kanchana; 110)/ 90:45:45	Rice NR	Amaranths (NR; NR)/ NR	5325	3789	23965	1,89,734	43.28
Rice (Aiswariya; 125)/(Kanchana; 110)/ 90:45:45	Rice NR	Veg Cowpea (NR; NR)/ NR	4867	3067	8460	1,15,559	31.51
Rice (Aiswariya; 125)/ 90:45:45	Coleus (NR; NR)/ NR	Sesbania (G.M.) (NR; NR)/ NR	4573	4446	25319	1,09,354	19.65
Rice (Aiswariya; 125)/ 90:45:45	Cassava (NR; NR)/ NR	Sesbania (G.M.) (NR; NR)/ NR	4018	7658	41975	87,335	24.16
						S.Em±	3.72
						CD at 5%	7.97
KARJAT (Maharashtra)							
Rice (Palghar-1; 130)/(Palghar-1; 140)/ 100:50:50	Rice 120:50:50		3738	2838		67,734	22.75
Rice (Palghar-1; 130)/ 100:50:50	Groundnut (SB-XI; 110)/ 12:50:00	-	4087	1953	-	83,100	25.21
Rice (Palghar-1; 130)/ 100:50:50	Mustard (Varuna; 95)/ 90:50:00	-	4007	433	-	49,208	16.21
Rice (Palghar-1; 130)/(NSH-160; 100)/ 100:50:50	Sunflower 60:30:30	-	2928	912	-	50,366	15.79
Rice (Palghar-1; 130)/(M. Gota; 130)/ 100:50:50	Brinjal 150:50:50	-	3824	18550	-	1,13,583	17.68
Rice (Palghar-1; 130)/ 100:50:50	Cabbage (G. Acre; 80)/ 120:60:60	-	3157	4144	-	49,096	11.96
Rice (Palghar-1; 130)/ 100:50:50	Fodder Maize (Af. Tall; 85)/ 120:50:50	-	3379	38249	-	73,048	17.81
Rice (Palghar-1; 130)/(K. Sadabahar;60)/ 100:50:50	Cowpea 25:50:00	-	4390	1051	-	61,509	18.58
Rice (Palghar-1; 130)/(K. Bhusan; 90)/ 100:50:50	Dolichos bean 90:60:30	-	4070	1901	-	49,529	15.00

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Cropping system (variety; duration in days)/ Fertilizer (N:P ₂ O ₅ :K ₂ O, kg/ha)			Yield (kg/ha)			Annual gross returns (Rs/ha)	Energy yield (x10 ⁶ , K Cal)
<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>		
Rice (Palghar-1; 130)/ 100:50:50	Lady's finger (A. Anamika; 80)/ 150:50:00	-	3758	2923	-	49,224	14.02
Rice (Palghar-1; 130)/ 100:50:50	Chilli (Pusa Jwala; 140)/ 60:40:40	-	3675	-	-	37,848	12.71
						S.Em±	0.65
						CD at 5%	1.32
NAVSARI (Gujrat)							
Rice (Jaya; 135)/ 100:30:0	Wheat (NR; 106)/ 120:60:0	-	3281	2664	-	63,091	20.57
Rice (Jaya; 135)/ 100:30:0	Fenugreek (NR; 112)/ NR	Green gram (NR; 90)/ NR	4012	1017	1109	1,12,620	20.97
Rice (Jaya; 135)/ 100:30:0	Green gram (NR; NR)/ NR	Groundnut (NR; 120)/ NR	4001	823	1578	97,053	25.54
Rice (Jaya; 135)/ 100:30:0	Indian bean (NR; 132)/ NR	Fodder Sorghum (NR; 75)/ NR + Cowpea	3635	834	9145 + 5717	42,450	12.80
Rice (Jaya; 135)/ 100:30:0	Fodder Sorghum (NR; 86)/ NR	Groundnut (GG-2; 120)/ NR	3772	21148	1463	69,579	21.35
Rice (Jaya; 135)/ 100:30:0	Sorghum (grain) (NR; 122)/ NR	Sorghum (grain) (NR; 110)/ NR	3532	2526	2378	85,420	29.34
Rice (Jaya; 135)/ 100:30:0	Sweet corn (NR; 89)/ NR	Black gram (NR; 90)/ NR	3864	4664	937	67,148	22.45
Rice (Jaya; 135)/ 100:30:0	Sorghum (grain) (NR; 122)/ NR	Soybean (NR; 110)/ NR	3578	2618	1155	79,082	26.50
Rice (Jaya; 135)/ 100:30:0	Green gram (NR; NR)/ NR	Sorghum (grain) (NR; 110)/ NR + Black gram (NR; 90)/ NR	3772	720	1886 + 298	85,104	23.07
Rice (Jaya; 135)/ 100:30:0	Chickpea (NR; 106)/ NR + Mustard (NR; 106)/ NR	Sweet corn (NR; 80)/ NR	3464	320 + 640	4858	56,906	22.67
						S.Em±	1.65
						CD at 5%	3.47

7.1.2 RESOURCE CONSERVATION TECHNOLOGIES

Title of the Experiment: Tillage and planting management in different cropping systems

Objective: To study the effect of different tillage and planting management techniques in different cropping systems to improve crop productivity and soil health.

Treatments: There are no common cropping systems and treatments for all the centers but they vary from center to center. The details of treatments evaluated are given in table 7.1/2 along with yield data.

Location, Year of Start and Cropping System

	Location	Ecosystem	Year of start	Cropping system
1	Kanpur	Semi-Arid	2003-04	Rice-wheat
2	Varanasi	Sub-Humid	2003-04	Rice-wheat
3	R.S. Pura	Humid	2003-04	Rice-wheat
4	Palampur	Sub-Humid	2008-09	Rice-wheat
5	Kathalagere	Humid	2005-06	Rice-rice
6	Bhubaneswar	Sub-Humid	2006-07	Rice-rice
7	Kalyani	Humid	2007-08	Rice-rice
8	Siruguppa	Arid	2007-08	Rice-sunflower
9	Rudrur	Semi-Arid	2003-04	Soybean-based
10	Rahuri	Semi-Arid	2006-07	Soybean-based
11	Akola	Semi-Arid	2007-08	Soybean-based
12	Hisar	Arid	2008-09	Pearl millet-based
13	Coimbatore	Semi-Arid	2009-10	Cotton-maize

Experimental design: Strip plot / split plot

Results: Centre-wise results are given in Table 7.1/2 and briefly discussed below:

Kanpur

In rice-wheat cropping system at Kanpur, hand transplanting provided highest rice yield (4.47 t

ha⁻¹) that was at par with transplanting by transplanter (4.36 t ha⁻¹) but 35.5 and 64.3% higher than drum seeding and zero-till drilling, respectively. During succeeding *rabi*, the conventional sowing provided maximum wheat yield (3.55 t ha⁻¹) which was at par with strip-till drilling but 9.6 and 14.9% higher than bed planting and zero-till drilling, respectively. Both, rice as well as wheat, planting methods affected yields of wheat and rice. The highest system productivity (8.33 t ha⁻¹) was recorded with treatment combinations of hand/ mechanical transplanting of rice and conventional/ strip-till sowing of wheat.

Varanasi

In rice-wheat cropping system at Varanasi, hand transplanting provided highest rice yield (4.99 t ha⁻¹) that was at par with transplanting with transplanter (4.88 t ha⁻¹) but 13.6 and 72.6% higher than drum seeding and zero-till drilling, respectively. During *rabi*, zero-till drilling provided highest wheat yield (3.68 t ha⁻¹) that was at par with rotavator-till drilling and conventional sowing but 26.4% higher than strip-till drilling. Rice planting methods adopted during preceding *kharif* also affected the yields of wheat and zero-till drilling gave maximum wheat yield (4.69 t ha⁻¹). Hand transplanting of rice and zero-till drilling of wheat was the best treatment combination for maximizing both rice (5.69 t ha⁻¹) and wheat (3.27 t ha⁻¹) yields.

Chatha (Jammu)

In rice-wheat cropping system at R.S. Pura, hand transplanting provided highest rice yield (4.32 t ha⁻¹) that was 6.1, 9.6 and 22% higher than drum seeding, mechanical transplanting and zero-till drilling, respectively. During *rabi*, bed planting provided highest wheat yield (3.58 t ha⁻¹) that was 8.5, 15.5 and 15.8% higher compared to conventional sowing, zero and strip-till drilling, respectively. Drum seeding of rice and bed planting of wheat was found to be the best treatment combination for maximizing both rice (4.20 t ha⁻¹) and wheat (3.43 t ha⁻¹) yields.

Palampur

At Palampur, during *kharif*, rice yields recorded in all the treatments were statistically at par but



Some glimpses of farmers-scientists interaction at FSR Centre, Chatha (Jammu)

multi-crop planter provided numerically highest yield (6.21 t ha⁻¹). During *rabi*, the multi-crop planter provided highest wheat yield (4.49 t ha⁻¹) which was at par with conventional sowing but 19% higher than zero-till drill. Multi crop planter was best for maximizing both rice (6.41 t ha⁻¹) and wheat (4.92 t ha⁻¹) yields.

Kathalgera

At Kathalgera, in rice-rice cropping system, during *kharif* season the system of rice intensification (SRI) gave maximum rice yield (4.41 t ha⁻¹) that was at par with drum seeding, hand transplanting, mechanical transplanting and aerobic method but 77% higher than zero-till drilling. During summer, the treatment effect on grain yield was found non-significant, but system of rice intensification (SRI) gave numerically maximum rice yield (4.81 t ha⁻¹).

Bhubaneswar

In rice-rice cropping system at Bhubaneswar, it was observed that during *kharif*, bed planting gave maximum rice yield (4.36 t ha⁻¹) that was at par with drum seeding (4.12 t ha⁻¹) but 20, 21 and 45% higher than mechanical transplanting, hand transplanting and zero-till drilling, respectively. During *rabi*, differences recorded in yields of different treatments were found to be statistically non-significant but bed planting gave numerically maximum rice yield (4.64 t ha⁻¹) also.

Kalyani

In rice-rice cropping system at Kalyani, during *kharif* methods of SRI and hand transplanting produced equal and maximum rice yield (2.44 t ha⁻¹) that was 12, 89 and 95% higher than drum seeding, zero-till drilling with brown manuring and zero-till drilling, respectively. During summer also, SRI gave maximum rice yield (4.76 t ha⁻¹) that was 5, 16, 340 and 395 % higher than hand transplanting, drum seeding and zero tillage, respectively. The weed control practices hand weeding twice in *kharif* and herbicide application followed by one hand weeding in summer provided maximum yields of 2.11 and 3.21 t ha⁻¹.

Siruguppa

In rice-sunflower cropping system at Siruguppa, tillage practices did not affect rice as well as sunflower yields (2.95 to 3.00 t ha⁻¹) significantly but conventional tillage gave maximum sunflower yield (3.23 t ha⁻¹) that was 4.8% higher than all other methods. The method of integrated weed control gave maximum yields of both rice (3.13 t ha⁻¹) and sunflower (0.32 t ha⁻¹). The tillage treatment of wet cultivating and puddling in *kharif*, conventional tillage in *rabi* and integrated weed control was the best treatment combination to maximize the yield of rice (3.05 t ha⁻¹) and sunflower (0.35 t ha⁻¹) crops.

Rudrur

In soybean-based cropping systems at Rudrur, conventional sowing recorded maximum soybean equivalent system yield (2.21 t ha⁻¹) that was 33 and 74% higher than minimum and zero-tillage sowing, respectively. Among cropping systems, soybean-sunflower system gave maximum soybean equivalent yield (2.11 t ha⁻¹) followed by soybean-mustard (2.00 t ha⁻¹) and soybean-safflower (1.94 t ha⁻¹). Soybean-sunflower system and conventional tillage sowing was found to be the best treatment combination for maximizing yields and net returns.

Rahuri

In soybean-based cropping systems at Rahuri, maximum soybean yield (2.42 t ha⁻¹) was recorded in soybean-onion system that was at par with soybean-wheat and soybean-chick pea but 11.5 to 13.6% higher than pearl millet-wheat, pearl millet-onion and pearl millet-chick pea systems. During *rabi*, soybean-onion system gave onion yield of 25.63 t ha⁻¹ which was at par with that recorded in pearl millet-onion system; whereas, wheat and chick pea yields preceded by soybean and pearl millet as *kharif* crops were at par. On an average, soybean-onion system provided highest soybean equivalent system yield followed by pearl millet-onion. Among different sowing methods, conventional sowing gave maximum soybean yield (2.60 t ha⁻¹) that was 11, 20 and 32% higher than

bed planting, minimum-tillage and zero tillage sowings. During *rabi* also, the similar trend was obtained. Also, the conventional-till sowing gave maximum soybean equivalent system yield. Soybean-onion system and conventional tillage sowing was the best treatment combination for maximizing both the yields of soybean and *rabi* crops.

Akola

In soybean-based cropping systems at Akola, all the treatments were found statistically to be at par during *kharif* but numerically maximum soybean yield (2.11 t ha^{-1}) was recorded in soybean-chick pea system. During *rabi*, soybean-*rabi* sorghum system gave maximum soybean equivalent yield (2.92 t ha^{-1}) that was 48, 52 and 238% higher than soybean-safflower, soybean-chick pea and soybean-mustard systems. Among tillage treatments broad bed – furrow (BBF) method gave maximum soybean yield (2.49 t ha^{-1}) that was 16, 33 and 75% higher than conventional, minimum and zero tillage sowings, respectively, whereas during *rabi* the BBF method gave maximum soybean equivalent yield (2.17 t ha^{-1}) that was at par with conventional tillage but 20 and 28% higher than minimum and zero tillage sowings, respectively. On an average soybean-*rabi* sorghum and broad-bed furrow sowing system was the best treatment combination for maximizing both the yields of soybean and *rabi* crops.

Hisar

In pearl millet-based cropping systems at Hisar, conventional tillage gave maximum yield of pearl millet (3.60 t ha^{-1}) that was at par with minimum and zero tillage but 10% more than bed planting. During *rabi* also, conventional tillage gave maximum wheat equivalent yield (WEY) (7.56 t ha^{-1}) that was at par with minimum and zero tillage but 13% more than bed planting. The cropping systems did not affect yields of pearl millet but pearl millet-mustard system gave 2.0- and 3.0% higher yields. The pearl millet-mustard cropping system and conventional tillage sowing was the best combination for maximizing system yields.

Coimbatore

In cotton-maize cropping system at Coimbatore, during *kharif* a combination of minimum tillage (MT) and planting on permanent FIRBs gave maximum cotton yield (2.23 t ha^{-1}) that was at par with combination of MT-flat and MT-FIRB plantings but 22, 25, 27 and 31% higher than zero tillage, conventional tillage (CT)-FIRB, CT-flat and CT-permanent FIRB, respectively, which were at par among themselves. During *rabi* also, MT-FIRB combination gave maximum maize yield (6.18 t ha^{-1}) that was at par with MT-permanent FIRB, MT-flat, CT-flat and CT-FIRB but 20 and 40% higher than zero tillage and CT-permanent FIRB, respectively. On an average, a combination of minimum tillage and planting on FIRB gave maximum cotton-maize system yield.

Table 7.1/2: Crop yield (kg/ha) as influenced by different tillage and planting treatments at different locations.

Treatment	Kharif					Rabi				
	B ₁	B ₂	B ₃	B ₄	Mean	B ₁	B ₂	B ₃	B ₄	Mean
Kanpur										
Cropping system: Rice (cv. Pant Dhan-12)-wheat (cv. K-7903), Fertilizer (N, P ₂ O ₅ & K ₂ O kg/ha): Rice – 120:60:60, Wheat – 120:60:60										
A ₁	2666	2865	2777	2543	2713	3017	3391	3280	2865	3138
A ₂	3274	3450	3362	3128	3304	3111	3450	3368	2964	3223
A ₃	4473	4590	4561	4286	4478	3467	3742	3684	3333	3557
A ₄	4298	4526	4473	4157	4364	3386	3631	3602	3216	3459
Mean	3678	3858	3793	3529		3245	3554	3483	3095	
S.Em± (CD at 5%)	A means = 50 (123), B means = 41 (100) B within A = 105 (260), A within B = 109 (237)					A means = 55 (135), B means = 72 (176) B within A = 127 (254), A within B = 119(259)				
A ₁ =Direct dry sowing with zero-till drill						B ₁ =Sowing with bed planter				
A ₂ =Direct seeding of sprouted rice in puddle conditions						B ₂ =Conventional sowing				
A ₃ =Manual transplanting						B ₃ =Strip-till drilling				
A ₄ =Transplanting by self-propelled rice transplanter						B ₄ =Zero-till drilling				
Varanasi										
Cropping system: Rice (cv. PHB 71)-wheat (cv. HD 2428), Fertilizer (N, P ₂ O ₅ & K ₂ O kg/ha): Rice – 150:75:75, Wheat – 120:60:60										
A ₁	2949	2436	2981	3190	2889	3671	3398	2981	4152	3551
A ₂	3975	4424	4328	4825	4388	3671	3511	2901	3735	3454
A ₃	4793	4905	4553	5691	4985	3270	3494	2869	3270	3226
A ₄	4921	4857	4713	5034	4881	3318	3286	2885	3559	3262
Mean	4160	4156	4144	4685		3482	3422	2909	3679	
S.Em± (CD at 5%)	A means = 221 (541), B means = 154 (377) B within A = 278 (NS), A within B = 320 (NS)					A means = 130 (NS), B means = 140 (342) B within A = 218 (NS), A within B = 212 (NS)				
A ₁ =Direct dry sowing with zero-till drill						B ₁ =Conventional sowing				
A ₂ =Direct seeding of sprouted rice in puddle conditions						B ₂ =Sowing with bed planter				
A ₃ =Manual transplanting						B ₃ =Strip-till drilling				
A ₄ =Transplanting by self-propelled rice transplanter						B ₄ =Zero-till drilling				
Chatha (Jammu)										
Cropping system: Rice (cv. Jaya)-wheat (cv. Raj 3765), Fertilizer (N, P ₂ O ₅ & K ₂ O kg/ha): Rice – 120:60:30, Wheat – 100:50:25										
A ₁	3429	3796	3643	3287	3539	3561	3241	3100	3193	3274
A ₂	4201	4016	3857	4193	4067	3631	3302	3035	3012	3245
A ₃	4372	4336	4239	4313	4315	3429	3399	3076	3278	3296
A ₄	3917	3788	3936	4215	3941	3714	3263	3144	2925	3262
Mean	3980	3984	3919	3980		3584	3301	3089	3102	
S.Em± (CD at 5%)	A means = 101 (248), B means = 94 (NS) B within A = 215(NS), A within B = 219 (NS)					A means = 74 (NS), B means = 105 (258) B within A = 197 (NS), A within B = 182 (NS)				
A ₁ =Direct dry sowing with zero-till drill						B ₁ =Rotovator-till drilling				
A ₂ =Direct seeding of sprouted rice in puddle conditions						B ₂ =Conventional sowing				
A ₃ =Manual transplanting						B ₃ =Strip-till drilling				
A ₄ =Transplanting by self-propelled rice transplanter						B ₄ =Zero-till drilling				

Treatment	Kharif					Rabi					
	B ₁	B ₂	B ₃	B ₄	Mean	B ₁	B ₂	B ₃	B ₄	Mean	
Palampur											
Cropping system: Rice (cv. Giriza)-wheat (cv. HPW 155), Fertilizer (N, P ₂ O ₅ & K ₂ O kg/ha): Rice – 120:60:40, Wheat – 120:60:30											
A ₁	4790	4581	4290	4498	4540	3809	4357	3520	4098	3946	
A ₂	6164	5831	6581	6258	6209	3867	4665	3771	4021	4081	
A ₃	6081	6414	6039	6248	6196	3934	4915	3434	4348	4158	
A ₄	5081	5310	5748	5248	5347	3472	4011	4367	4232	4021	
Mean	5529	5534	5664	5563		3771	4487	3773	4175		
S.Em± (CD at 5%)	A means = 1362 (NS), B means = 114 (NS) B within A = 370 (NS), A within B = 1407 (NS)					A means = 282 (NS), B means = 269 (659) B within A = 334 (NS), A within B = 345(NS)					
A ₁ /B ₁ = Sowing by power tiller operated zero-till drill, A ₂ /B ₂ = Sowing by power tiller operated multi-crop planter, A ₃ /B ₃ = Sowing by manually operated seed drill, A ₄ /B ₄ = Sowing by conventional method (behind hand plow)											
Kathalgere											
Cropping system: Rice (cv. IR-64)- Rice (cv. JGL-1798), Fertilizer (N, P ₂ O ₅ & K ₂ O kg/ha): Kharif as well as Summer – 100:50:50											
					Kharif						Summer
					Zero till drilling						3929
					Drum seeding						4607
					Hand transplanting						3964
					Mechanical transplanting						4107
					SRI method						4814
					Aerobic method						3986
					CD at 5 %						NS
Bhubaneswar											
Cropping system: Rice (cv. Pratikshya)-Rice (cv. Naveen), Fertilizer (N, P ₂ O ₅ & K ₂ O kg/ha): Rice – 80:40:40											
					Kharif						Summer
					Zero till drilling						3914
					Drum seeding						4171
					Hand transplanting						4386
					Mechanical transplanting						4529
					Bed planting						4643
					CD at 5 %						NS

Treatment	Kharif						Summer					
	M ₁	M ₂	M ₃	M ₄	M ₅	Mean	M ₁	M ₂	M ₃	M ₄	M ₅	Mean
Kalyani												
Cropping system: Rice (cv. IET4094)-rice (cv. IET4094), Fertilizer (N, P ₂ O ₅ & K ₂ O kg/ha): Kharif – 60:30:30, Summer – 120:60:60												
S ₁	998	2298	2013	2246	989	1709	824	4594	3897	4359	905	2916
S ₂	1114	2567	2197	2546	1244	1934	959	4846	4246	4721	1286	3211
S ₃	1635	2459	2290	2513	1649	2109	1097	4851	4194	4530	1038	3142
Mean	1249	2441	2167	2435	1294		960	4763	4112	4537	1076	
S.Em± (CD at 5%)	M means = 113 (261), S means = 34 (71) M within S = 129 (292), S within M = 77 (160)						M means = 50 (114), S means = 23 (48) M within S = 65 (114), S within M = 51 (107)					
Resource Conservation techniques M ₁ =Zero tillage M ₂ =SRI M ₃ =Drum seeding M ₄ =Hand transplanting M ₅ =Zero tillage with brown manuring						Weed control method S ₁ =Herbicide twice S ₂ =Herbicide once plus hand weeding S ₃ =Hand weeding twice						
Siruguppa												
Cropping system: Rice (cv. Siri-1253) - Sunflower (cv. JSSH-135), Fertilizer (N, P ₂ O ₅ & K ₂ O kg/ha): Rice - 150:75:75, Sunflower - 60:75:60												
Treatment	Kharif					Rabi						
	M ₁	M ₂	M ₃	M ₄	Mean	M ₁	M ₂	M ₃	M ₄	Mean		
S ₁	3023	3090	2050	2982	3036	310	297	297	305	302		
S ₂	2955	3036	2753	2982	2932	297	316	305	310	307		
S ₃	2874	2672	2800	2915	2815	306	305	328	323	315		
S ₄	3158	3131	3198	3050	3134	313	314	298	354	320		
Mean	3003	2982	2950	2982		307	308	307	323			
S.Em± (CD at 5%)	M means = 82(NS), S means = 69 (143) M within S = 146 (NS), S within M = 139 (NS)					M means = 2 (6), S means = 3 (7) M within S = 6 (13), S within M = 6 (13)						
Kharif					Summer							
M ₁ =Wet planting and puddling M ₂ =Wet planting and puddling M ₃ =Ploughing, wet cultivation and puddling M ₄ =Ploughing, wet cultivation and puddling S ₁ =Hand weeding twice S ₂ =Mechanical weed control S ₃ =Chemical weed control S ₄ =Integrated weed control					Zero tillage Conventional tillage Zero tillage Conventional tillage Hand weeding twice Mechanical weed control Chemical weed control Integrated weed control							

Treatment	Kharif					Rabi				
	M ₁	M ₂	M ₃	M ₄	Mean	M ₁	M ₂	M ₃	M ₄	Mean
Akola										
Cropping systems: Soybean (cv. TAMS-38)- Chickpea (cv. Jaki-9218), Safflower (cv. AKS/207), Mustard (cv. Pusa Gold), Rabi Sorghum (cv. PKV Kranti);										
Fertilizer (N, P ₂ O ₅ & K ₂ O kg/ha): Soybean - 30:75:0, Chickpea - 25:50:0, Safflower - 40:40:0, Mustard - 50:40:0, Sorghum - 50:25:25										
S ₁	1610	1637	1543	886	1419	1463	1704	778	2818	1691
S ₂	1677	1798	1914	2040	1857	1838	1758	778	2845	1805
S ₃	2040	2322	2187	2067	2154	2160	1986	880	3033	2015
S ₄	2464	2697	2483	2308	2488	2415	2187	1087	2992	2171
Mean	1948	2114	2032	1025		1969	1909	881	2922	
S.Em±	A means = 89 (NS), B means = 117 (241)					A means = 137 (336), B means = 101 (208)				
(CD at 5%)	B within A = 221 (NS), A within B = 233 (NS)					B within A = 222 (NS), A within B = 202(NS)				
Kharif					Rabi					
M ₁ =Soybean-Safflower					S ₁ =No tillage-Direct sowing, chemical weed control					
M ₂ =Soybean-Chickpea					S ₂ =Minimum tillage- one hand weeding					
M ₃ =Soybean-Mustard					S ₃ =Conventional tillage- two hand weeding					
M ₄ =Soybean-rabi Sorghum					S ₄ =BBF sowing-one harrowing and two hand weeding					
Rahuri										
Cropping system: Soybean (cv. JS-335), Pearl millet (cv. Shradha), Wheat (cv. 2189), Chickpea (cv. Digvijay), Onion (cv. N-2-4-1),										
Fertilizer (N, P ₂ O ₅ & K ₂ O kg/ha): NR										
S ₁	2144	2329	2595	2360	2357	3053	3272	3461	3146	3233
S ₂	2148	2230	2617	2502	2374	1759	2031	2360	2006	2039
S ₃	2200	2362	2558	2564	2421	23006	24372	28543	26609	25633
S ₄	1763	2086	2642	2189	2170	2864	3383	3459	3148	3213
S ₅	1796	2002	2527	2195	2130	1576	1868	2276	1926	1912
S ₆	1689	2025	2679	2208	2150	21739	22640	26395	25368	24035
Mean	1957	2172	2603	2336		9000	9594	11082	10367	
S.Em±	M means = 24 (58), S means = 41 (83)					M means = 143 (349), S means = 266 (537)				
(CD at 5%)	M within S = 78 (161), S within M = 82 (165)					M within S = 506 (1039), S within M = 531(1074)				
Main Plot					Sub Plot					
M ₁ =Zero tillage					S ₁ =Soybean - Wheat					
M ₂ =Minimum tillage (50 % of Conventional tillage)					S ₂ =Soybean - chickpea					
M ₃ =Conventional tillage					S ₃ =Soybean - Onion					
M ₄ =Bed planting					S ₄ =Pearl millet - Wheat					
					S ₅ =Pearl millet - chickpea					
					S ₆ =Pearl millet - Onion					

Hisar					
Cropping system: Pearl millet (cv. HHB-197)-wheat (cv. WH-711), Raya (cv. RH-30) Fertilizer (N, P ₂ O ₅ & K ₂ O kg/ha): Pearlmillet- 125:62.5:0, wheat -145:60:0, Raya – 80:30:0					
Tillage	Kharif	Rabi(WEY)	Cropping system	Kharif	Rabi(WEY)
M ₁	3457	7129	S ₁	3434	6056
M ₂	3560	7315	S ₂	3502	6266
M ₃	3598	7561			
M ₄	3257	6664			
CD at 5%	165				
Main plot			Sub plot		
M ₁ =Zero tillage			S ₁ =Pearl millet – wheat		
M ₂ =Minimum tillage			S ₂ =Pearl millet - mustard		
M ₃ =Conventional tillage					
M ₄ =Bed planting					
Coimbatore					
Cropping system: Cotton (cv. MCU-5)-Maize (cv. NK-6240), Fertilizer (N, P ₂ O ₅ & K ₂ O kg/ha): Cotton – 80:40:40, Maize - 35:62.5:50					
Treatment*	Kharif		Rabi		
CT- Flat	1748		5765		
CT- FIRB	1775		5432		
CT- Permanent FIRB	1698		4391		
MT- Flat	2006		5495		
MT- FIRB	2038		6181		
MT- Permanent FIRB	2233		5911		
Zero-till planting	1832		5141		
CD at 5 %	273		838		
*CT = Conventional tillage, FIRB = Furrow Irrigated Raised Bed, MT = Minimum tillage					

7.2 SUSTAINABLE RESOURCE MANAGEMENT

7.2.1 INTEGRATED NUTRIENT MANAGEMENT (INM)

Title of the Experiment: Permanent plot experiment on integrated nutrient management in cereal-based cropping systems (Expt. No. 2a).

Objectives:

1. To develop suitable integrated nutrient supply and management system.
2. To study the long-term effect of conjunctive use of fertilizers and organic manures on the productivity of cereal based crop sequences and on soil health.

Treatments:

	<i>Kharif</i>	<i>Rabi</i>
T ₁	No fertilizer, no organic manure (control)	No fertilizer, no organic manure (control)
T ₂	50% rec. NPK dose through fertilizers	50% rec. NPK dose through fertilizers
T ₃	50% rec. NPK dose through fertilizers	100% rec. NPK dose through fertilizers
T ₄	75% rec. NPK dose through fertilizers	75% rec. NPK dose through fertilizers
T ₅	100% rec. NPK dose through fertilizers	100% rec. NPK dose through fertilizers
T ₆	50% rec. NPK dose through fertilizers + 50% N through FYM	100% rec. NPK dose through fertilizers
T ₇	75% rec. NPK dose through fertilizers + 25% N through FYM	75% rec. NPK dose through fertilizers
T ₈	50% rec. NPK dose through fertilizers + 50% N through straw	100% rec. NPK dose through fertilizers
T ₉	75% rec. NPK dose through fertilizers + 25% N through straw	75% rec. NPK dose through fertilizers.
T ₁₀	50% rec. NPK dose through fertilizers + 50% N through GM	100% rec. NPK dose through fertilizers.
T ₁₁	75% rec. NPK dose through fertilizers + 25% N through GM	75% rec. NPK dose through fertilizers.
T ₁₂	Farmer's conventional practice	Farmer's conventional practice

(FYM=Farm Yard Manure and GM=Green Manure)

Locations:

Cropping System	Ecosystem/ Centre (State)
Rice-rice	Semi-arid: Rajendranagar(A.P.); Sub-humid: Chiplima (Orissa); Humid: Jorhat (Assam); Coastal: Maruteru (A.P.), Bhubaneswar (Orissa), Karjat (Maharashtra), Karamana (Kerala)
Rice-wheat	Semi-arid: Ludhiana (Punjab), Kanpur (U.P.); Sub-humid: Jabalpur (M.P.), R.S. Pura (J & K), Varanasi (U.P.), Pantnagar (Uttarakhand), Faizabad (U.P.), Sabour (Bihar), Raipur (Chhattisgarh), Humid: Kalyani (W.B.), Coastal: Navsari (Gujarat).
Rice-maize	Semi-arid: Kathalgera (Karnataka)
Rice-mustard	Semi-arid: Rudrur (A.P.)
Maize-wheat	Sub-humid: Ranchi (Jharkhand)
Pearl millet-wheat	Arid: S.K. Nagar (Gujarat), Hisar (Haryana), Junagadh (Gujarat), Bichpuri (U.P.)
Sorghum – wheat	Semi-arid: Akola (Maharashtra), Parbhani (Maharashtra), Rahuri (Maharashtra)

Year of start, crop varieties and fertilizer doses:

The centre-wise details in respect of year of start, crop varieties and fertilizer doses are given hereunder

Results:

The centre-wise results are given in table 7.2/ 1 (a-g) and their brief description is given below.

Centre	Year of start	Crop variety		Recommended fertilizer dose (N:P ₂ O ₅ :K ₂ O, kg/ha)		Farmers' practice (N:P ₂ O ₅ :K ₂ O, kg/ha) + FYM, t/ha	
		Kharif	Rabi	Kharif	Rabi	Kharif	Rabi
Rice-Rice Cropping System							
Rajendranagar	1988	PNR-23064	PNR-23064	120:60:60	120:60:60	80:50:20	120:60:40
Chiplima	1983	Pratiksha	Pratiksha	80:40:40	100:50:50	40:20:20 +4.5	50:25:25
Jorhat	1987	Ranjit	Dishang	87:12.5:34	NR	NR	NR
Maruteru	1989	MTU1001	MTU 1010	60:40:40	120:60:40	60:40:0	120:60:0
Bhubaneswar	1983	Pratiksha	MTU 1001	80:0:40	100:50:50	20:0:0+2.0	20:0:0+2.0
Karjat	2007	Palghar-1	Karjat-3	100:50:50	120:50:50	NR	NR
Karamana	1985	Aiswarya	Aiswarya	90:45:45	90:45:45	90:22.5:22.5 +3.0	90:22.5: 22.5
Rice-Wheat Cropping System							
Ludhiana	1983	PR-116	PBW-343	NR	120:60:30	NR	NR
Kanpur	1983	P. Dhan-12	PBW-343	120:60:60	120:60:60	80:30:0	80:30:0
Jabalpur	1985	Kranti	GW 273	160:60:40	120:60:40	40:20:0	40:20:0
R.S. Pura	1985	Jaya	PBW-343	100:60:30	100:50:25	34:25:22	56:25:0
Palampur	1990	HPR-2143	HPW -184	90:40:40	120:90:30	36:16:16 +5.0	48:36:12 +5.0
Varanasi	1985	NDR-359	HUW 234	120:60:60	120:60:60	50:0:0	60:0:0
Pantnagar							
Faizabad	1984	Sarju 52	HUW 234	120:60:60	120:60:60	90:40:0	90:40:0
Sabour	1984	Sita	PBW-343	80:40:20	100:50:25	60:30:15	68:33:0
Raipur	1988	Mahamaya	GW-273	80:60:40	100:50:30	60:40:20	90:40:20
Kalyani	1986	IET 4094	UP 262	80:40:40	100:60:40	50:30:20	60:20:20
Navsari	1987	GR 3	GW 496	100:50:0	100:60:40	50:0:0+2.5	60:30:0
Rice-Maize Cropping System							
Kathalgere	1988	IR 64	Hy. Maize	46:16:60	46:16:60	NR	NR
Rice-Mustard Cropping System							
Rudrur	1984	RDR-763	GM-1	120:60:40	80:40:30	150:40:0	60:0:0
Maize-Wheat Cropping System							
Ranchi	1983	Suwan	K 9107	100:50:25	100:50:25	23:0:0	23:0:0
Pearl millet-Wheat Cropping System							
S.K. Nagar	1986	GHB 558	GW-496	80:40:0	120:60:0	40:0:0	80:0:0
Hisar	1985	HHB 197	PBW 343	125:62.5:0	150:60:0	NR	NR
Junagadh (With K)	1987	GHB 558	GW366	80:40:25	120:60:25	80:40:0	120:60:0
Junagadh (Without K)	1987	GHB 558	GW366	80:40:0	120:60:0	80:40:0	120:60:0
Bichpuri	1990	Bio. 8510	UP 2338	80:40:40	120:60:40	40:0:0	40:0:0
Sorghum-Wheat Cropping System							
Akola	1984	CSH-14	AKW 3722	120:60:60	120:60:60	50:25:0	40:25:12.5
Parbhani	1983	CSH-9	Lok-1	80:40:40	120:60:60	40:20:20	60:30:30
Rahuri	1984	CSH-9	HD-2189	120:60:60	120:60:60	40:20:20	60:30:30

Rice-Rice Cropping System

At **Rajendranagar**, the highest yield of rice was recorded under T_{11} (2.25 t/ha) during *kharif*, and under T_{10} during *rabi* (3.96 t/ha). The increase in crop yield under highest yielding treatment over 100% RDF was 3.24 and 2.10 percent, during *kharif* and *rabi*, respectively. It was statistically at par with $T_4, T_5, T_6, T_7, T_8, T_9$ and T_{12} whereas during *rabi* (i.e., T_{10}) it was at par with T_3, T_5, T_8, T_{11} and T_{12} .

At **Chiplima**, the highest grain yield of rice was achieved under T_{10} during *kharif* (4.89 t/ha) and *rabi* (4.58 t/ha). The increase in crop yield under highest yielding treatment over 100% RDF was 5.36 and 15.23 percent, during *kharif* and *rabi*, respectively. It was statistically at par with $T_4, T_5, T_6, T_7, T_8, T_9$, and T_{11} during *kharif*, but statistically at par with T_2 during *rabi*.

At **Jorhat**, the highest yield of rice was recorded under T_9 (1.52 t/ha) during *kharif*, and under T_{10} during *rabi* (0.78 t/ha). The increase in crop yield under highest yielding treatment over 100% RDF was 5.55 and 8.33 percent, during *kharif* and *rabi*, respectively. During *kharif* yields in $T_5, T_6, T_7, T_8, T_{10}$ and T_{11} were statistically at par, whereas during *rabi* yield differences in all the treatments were not significant.

At **Maruteru**, the highest yield of rice was recorded under T_{11} (6.47 t/ha) during *kharif* and the increase in crop yield under highest yielding treatment over 100% RDF was 7.12 percent. During *kharif* also highest yielding treatment was T_{11} , which was at par with T_5, T_6, T_7, T_8, T_9 , and T_{10} . For *rabi* yield data are not reported.

At **Bhubaneshwar**, also, during both *kharif* (5.41 t/ha) and *rabi* (4.73 t/ha) seasons, the highest grain yield of rice was recorded under treatment T_{10} which was statistically at par with T_4, T_5, T_6, T_7, T_8 and T_9 in *kharif* and at par with all the treatments, except in T_1 (control).

At **Karjat**, during both *kharif* (4.62 t/ha) and *rabi* (5.79 t/ha) seasons the highest grain yield of rice was recorded under treatment T_5 .

At **Karamana**, the highest yield of rice was recorded under T_{10} during *kharif* (5.06 t/ha), and

under T_4 during *rabi* (4.90 t/ha). The increase in crop yield under highest yielding treatment over 100% RDF was 2.84 and 1.97 percent, during *kharif* and *rabi*, respectively. The yield under highest yielding treatment during *kharif*, i.e., T_{10} , was at par with $T_4, T_5, T_6, T_7, T_8, T_9, T_{11}$ and T_{12} whereas during *rabi*, i.e., T_4 , it was at par with $T_5, T_6, T_7, T_8, T_9, T_{10}$, and T_{11} .

Rice-Wheat cropping system

At **Varanasi**, the treatment T_6 gave the maximum yield of rice (4.07 t/ha) and wheat (3.61 t/ha) which was 10.44 and 12.44 per cent higher over recommended dose of fertilizer (T_5).

At **Jammu**, the treatment T_6 gave the maximum yield of rice (4.95 t/ha) and wheat (3.40 t/ha) which was 8.0 and 6.0 per cent higher over recommended dose of fertilizer (T_5).

At **Kanpur**, the highest yield of rice was recorded under T_5 during *kharif* (4.26 t/ha), whereas T_6 gave the maximum yield of wheat (4.45 t/ha), which was slightly higher (1.43 percent) than recommended dose of fertilizer. The yield under highest yielding treatment during *kharif* was at par with T_6 whereas during *rabi* it was at par with T_7 and T_{11} .

At **Kalyani**, the rice recorded maximum yield (4.09 t/ha) under T_6 which was 14.72 % higher over recommended dose of fertilizer and maximum yield of wheat (2.27 t/ha) was under T_{10} which was 13.8% higher than recommended dose of fertilizer. The yield under highest yielding treatment during *kharif* (i.e T_6) was at par with T_5, T_7, T_8 and T_{11} whereas during *rabi* (i.e T_{10}) it was at par with T_5, T_7, T_8, T_9 and T_{11} .

At **Jabalpur**, the highest yield of rice was recorded under T_{10} (5.76 t/ha) during *kharif*, and under T_6 during *rabi* (3.86 t/ha). The increase in crop yield under highest yielding treatment over 100% RDF was 6.51 and 2.41 percent, during *kharif* and *rabi*, respectively. The yield under highest yielding treatment during *kharif* (i.e T_{10}) was at par with T_4, T_5, T_6, T_7, T_8 and T_{11} whereas during *rabi* (i.e T_6) it was at par with T_5 and T_{10} .

At **Kumarganj**, maximum yield of rice (4.90 t/ha) was recorded under T_7 which was 6.67 % higher than recommended dose of fertilizer, while

Table 7.2/1(a): Grain yield (kg/ha) of rice-rice crop sequence under different integrated nutrient management treatments.

Treatment	Rajendranagar		Chiplima		Jorhat		Maruteru		Bhubaneswar		Karjat		Karmana	
	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi
T ₁	1165	1498	2567	2541	800	400	2268		1985	2703	2843	3126	2997	2641
T ₂	1227	2248	3816	4183	1020	475	3997		3488	4366	3685	4038	4223	4190
T ₃	1482	3329	3928	4040	1080	520	4120		3581	4563	3688	4774	4042	4522
T ₄	1676	3041	4535	3932	1160	500	5032		3674	4584	3977	4625	4279	4902
T ₅	2187	3887	4645	3978	1440	720	6048		3873	4607	4622	5799	4920	4807
T ₆	2130	3192	4675	4068	1240	540	6321		3985	4632	4280	5568	4460	4997
T ₇	1976	2814	4474	4145	1360	660	6177		3979	4561	4300	5179	4836	4933
T ₈	1623	3427	4402	4079	1320	600	6035		3760	4513	4178	5244	4446	4759
T ₉	1692	3185	4270	4321	1520	780	5907		3740	4580	4254	5155	4572	4760
T ₁₀	2011	3969	4894	4584	1200	480	6299		4078	4733	4146	5425	5060	4728
T ₁₁	2258	3557	4275	3961	1260	560	6479		4007	4547	4275	5115	5018	4681
T ₁₂	1658	3534	3175	3382	960	440	5083		3397	4383	4126	4726	4822	4396
CD at 5%	699	725	605	425	341	NS	618		407.7	528.3	228.3	269.6	799.5	253.5

Table 7.21(b): Grain yield (kg/ha) of rice-wheat crop sequence under different integrated nutrient management treatments

Treatment	Varanasi		R.S. Pura (Jammu)		Pura Farm (Kanpur)		Kalyani		Jabalpur		Kumarganj		Navsari		Palampur		Sabour		Ludhiana		Raipur		
	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	
T ₁	1390	935	1980	1047	1119	725	1403	388	1121	583	1250	523	1822	1983	2670	1004	962	787	1649	1421	1480	554	
T ₂	2715	2230	4266	3117	3101	3020	2296	1219	3715	2553	2580	1809	2317	3042	3463	1935	2659	1972	3437	3680	3553	1688	
T ₃	3095	3070	4293	3129	3304	3408	2592	1847	4366	2959	2651	2694	2463	3452	3710	2298	2732	3711	3731	4796	3845	2125	
T ₄	3465	2905	4398	2992	3473	3314	2755	1413	4791	2991	3560	2345	2544	3355	3934	1909	3548	2795	4956	4346	4011	1813	
T ₅	3685	3215	4586	3207	4267	4389	3571	2000	5416	3772	4598	2923	2576	3827	3853	2643	4705	4016	6034	5017	4818	2531	
T ₆	4070	3615	4953	3402	4242	4452	4097	2337	5720	3856	4790	3197	3127	4643	4337	2643	5307	4618	6324	5294	4753	2271	
T ₇	3675	3325	4664	3266	4036	4283	3750	1934	5243	3287	4905	2801	3540	4697	3996	2249	4912	4217	6429	5177	4567	1885	
T ₈	3075	3380	4609	3383	3808	4189	3760	2066	5160	3616	3904	2896	3020	4425	3880	2679	5096	4410	5077	4950	4301	2229	
T ₉	3270	3005	4563	3281	3725	4058	3439	1929	5243	3196	4320	2704	3338	4213	3737	2142	4713	4104	5239	4718	4395	2063	
T ₁₀	3630	3110	4613	3332	4095	4314	3332	2276	5769	3863	4588	3215	3269	4415	4135	2168	5234	4542	6823	5093	4934	2640	
T ₁₁	3400	2915	4594	3133	3926	4270	3689	1888	5298	3222	4865	2838	3705	4267	4037	2357	4889	4129	6932	4939	4751	2352	
T ₁₂	3005	2495	3770	2734	2957	2945	3112	1495	3986	2540	3380	2380	2220	3172	3598	1855	3027	2691	6879	5404	3583	1656	
T ₁₃																			6969	5368			
T ₁₄																			6092	5061			
CD at 5% 211.2	402.8	101.6	105.6	112.2	188.6	566.6	421.2	1060.1	197.3	421.1	377.4	369.7	563.6	424.1	425.6	328.1	303	271.9	208.6	602.3	71.3		

maximum wheat yield (3.21 t/ha) was recorded under T₁₀ which was 9.98 % higher than recommended dose of fertilizer. During *kharif* T₇ was statistically at par with T₅ T₆ T₁₀ and T₁₁ while during *rabi* it was statistically at par with T₅ and T₈.

At **Navasari**, the highest yield of rice was recorded under T₁₁ (3.70 t/ha) during *kharif*, and under T₇ during *rabi* (4.69 t/ha). The increase in crop yield under highest yielding treatment over 100% RDF was 43.82 and 21.90 percent, during *kharif* and *rabi*, respectively. The yield under highest yielding treatment during *kharif* (i.e T₁₁) was at par with T₇ and T₉ whereas during *rabi* (i.e T₇) it was at par with T₆ T₈ T₉ T₁₀ and T₁₁.

At **Palampur**, rice yield was maximum (4.13 t/ha) under T₁₀, and 7.3 % higher than recommended dose of fertilizer and maximum yield of wheat (2.67 t/ha) was under T₈ which was slightly 1.36 % higher than recommended dose of fertilizer. During *kharif*, all the IPNS packages were statistically at par but during *rabi* T₃ T₅ T₆ T₇ are at par with highest yielding treatment .

At **Sabour**, the rice recorded maximum yield (5.30 t/ha) under T₆ which was 11.72 % higher over recommended dose of fertilizer and maximum yield of wheat (4.61 t/ha) was under T₆ which was 14.9 % higher than recommended dose of fertilizer. The yield under highest yielding treatment during *kharif* and *rabi* (i.e T₆) was at par with T₈ and T₁₀ respectively

At **Ludhiana**, the highest yield of rice was recorded under T₁₃ (6.96 t/ha) during *kharif*, and under T₁₂



Wheat crop under 'no-fertilizer' treatment at Ludhiana centre

during *rabi* (5.40 t/ha). The increase in crop yield under highest yielding treatment over 100% RDF was 15.49 and 7.71 percent, during *kharif* and *rabi*, respectively. The yield under highest yielding treatment during *kharif* (i.e T₁₃) was at par with T₁₀, T₁₁ and T₁₂ whereas during *rabi* (i.e T₁₂) it was at par with T₆ and T₁₃.

At **Raipur**, the highest yield of rice was recorded under T₁₀ (4.93 t/ha) during *kharif*, and under T₅ during *rabi* (2.53 t/ha). The increase in crop yield during *rabi* under highest yielding treatment over 100% RDF was 2.40 percent. The yield under highest yielding treatment during *kharif* (i.e T₁₀) was at par with T₅ T₆ T₇ and T₁₁ whereas during *rabi* (i.e T₅) it was at par with T₆ T₁₀ and T₁₁.

Rice-maize cropping system

At **Kathalgere**, in rice-maize system the treatment T₁₁ yielded maximum (6.50 t/ha) of rice during *kharif*, which was 7.87 percent higher than RDF while in *rabi* T₉ gave the highest (5.01 t/ha) yield of maize, which was 8.90 percent higher than RDF. The yield under highest yielding treatment during *kharif* (i.e T₁₀) was at par with all the treatment except T₁ control whereas during *rabi* (i.e T₉) it was at par with T₅ and T₈.

Table 7.2/1(c): Grain yield (kg/ha) of rice-maize crop sequence under different integrated nutrient management treatments

Treatment	Kathalgere	
	<i>Kharif</i>	<i>Summer</i>
T ₁	4298	2507
T ₂	5556	3428
T ₃	5848	4335
T ₄	6067	3706
T ₅	6031	4605
T ₆	6184	4357
T ₇	6089	3808
T ₈	6499	4686
T ₉	6338	5015
T ₁₀	5629	4298
T ₁₁	6506	3575
T ₁₂	5855	3640
CD at 5%	951.7	608.7

Table 7.2/1(d): Grain yield (kg/ha) of rice–mustard crop sequence under different integrated nutrient management treatments.

Treatment	Rudrur	
	Kharif	Summer
T ₁	2924	279
T ₂	3687	539
T ₃	3742	606
T ₄	4486	588
T ₅	4986	813
T ₆	4417	791
T ₇	5237	845
T ₈	4482	790
T ₉	5379	790
T ₁₀	4486	806
T ₁₁	5567	841
T ₁₂	4406	638
CD at 5%	73.20	20.10

Rice-Mustard cropping system

At **Rudrur**, in rice-mustard system the treatment T₁₁ yielded maximum (5.56 t/ha) of rice during *kharif*, which was 11.65 percent higher than RDF while in *rabi* also the same treatment gave the highest (0.84 t/ha) yield of wheat, which was 3.44 percent higher than RDF. The yield of rice attained

Table 7.2/1(e): Grain yield (kg/ha) of maize–wheat crop sequence under different integrated nutrient management treatments.

Treatment	Ranchi	
	Kharif	Rabi
T ₁	778	953
T ₂	2573	2353
T ₃	2565	3886
T ₄	2750	3330
T ₅	3083	4082
T ₆	4259	4733
T ₇	3435	4064
T ₈	2963	4020
T ₉	2806	3556
T ₁₀	2825	3984
T ₁₁	2639	3583
T ₁₂	1000	1292
CD at 5%	366.8	627.2

under T₁₁ was statistically at par with the yield achieved under T₅ T₇ and T₉ whereas during *rabi* it was at par with T₅ T₆ T₇ T₈ T₉ and T₁₀.

Maize-wheat cropping system

At **Kanke (Ranchi)**, in maize-wheat system the treatment T₆ yielded maximum (4.25 t/ha) of maize during *kharif*, which was 38.14 percent higher than RDF while in *rabi* also the same treatment gave the highest (4.73 t/ha) yield of wheat, which was 15.94 percent higher than RDF.

Pearl millet-wheat cropping system

At **S.K. Nagar**, the highest yield of pearl millet was recorded under T₇ (1.32 t/ha) during *kharif*, and under T₆ during *rabi* (2.91 t/ha). The increase in crop yield under highest yielding treatment over 100% RDF was 59.58 and 33.54 percent, during *kharif* and *rabi*, respectively. The yield under highest yielding treatment during *kharif* (i.e T₇) was at par with T₁₀ whereas during *rabi* (i.e T₆) it was at par with T₇ T₉ T₁₀ and T₁₁.

At **Hisar**, in pearl millet-wheat system the treatment T₆ gave the maximum yield of pearl millet (3.64 t/ha) and wheat (5.92 t/ha) which was 4.95 and 3.20 per cent higher over recommended dose of fertilizer (T₅). The yield under highest yielding treatment during *kharif* (i.e T₆) was at par with T₅ and T₁₀ whereas during *rabi* (i.e T₆) it was at par with T₅ T₁₀ and T₁₂.

At **Junagadh**, (With Potash) the highest yield of crops were attained under pearl millet T₈ during *kharif* (2.29 t/ha) and during *rabi* wheat in T₆ (2.52 t/ha). The increase in crop yield under highest yielding treatment over 100% RDF was 18.28 and 11.58 percent, during *kharif* and *rabi*, respectively. During *kharif* the crop yield was statistically at par with T₅ T₆ T₇ T₁₀ and T₁₁ while in *rabi* it was statistically at par T₃ T₅ T₇ T₈ and T₁₀.

At **Junagadh**, (Without Potash) the highest yield of crops were attained under pearl millet T₆ during *kharif* (2.02 t/ha) and wheat during *rabi* (1.97 t/ha). The increase in crop yield under highest yielding treatment over 100% RDF was 16.67 and 9.17 percent, during *kharif* and *rabi*, respectively. During *kharif* the crop yield was statistically at par

Table 7.2/1(f): Grain yield (kg/ha) of pearl millet-wheat crop sequence under different integrated nutrient management treatments

Treatment	S K Nagar		Junagadh(P)		Junagadh(WP)		Hisar		Bichpuri	
	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>
T ₁	29	122	961	617	872	567	1018	1106	1092	1415
T ₂	486	801	1767	1852	1481	1285	2348	3812	1583	2710
T ₃	510	1056	1759	2199	1566	1559	2506	5418	1612	4224
T ₄	600	1318	1877	1794	1555	1551	2967	4716	1985	3784
T ₅	829	2182	1941	2261	1733	1809	3472	5738	2310	4534
T ₆	1157	2914	2181	2523	2022	1975	3644	5922	2609	4919
T ₇	1323	2779	2099	2265	1877	1736	3356	4933	2381	4185
T ₈	994	2707	2296	2369	2002	1879	2884	5564	2134	4374
T ₉	1087	2831	1871	1998	1917	1632	3228	4772	2099	4095
T ₁₀	1196	2646	2022	2068	1880	1597	3364	5767	2389	4814
T ₁₁	1204	2804	1929	1763	1910	1508	3482	4784	2320	4410
T ₁₂	620	1289	1563	2164	1590	1497	2993	5256	1310	3050
CD at 5%	158	200	369	483	308	492	208	217	365.7	404.9

with T₇ T₈ T₉ T₁₀ and T₁₁ while in *rabi* it was statistically at par with the treatments T₃ T₄ T₅ T₇ T₈ T₉ T₁₀ T₁₁ and T₁₂.

At **Bichpuri**, in pearl millet-wheat system the treatment T₆ gave the maximum yield of pearl millet (2.60 t/ha) and wheat (4.91 t/ha) which was 12.94 and 8.49 per cent higher over recommended dose of fertilizer (T₅). The yield under highest yielding treatment during *kharif* (i.e T₆) was at par with T₅ T₇ T₁₀ and T₁₁ whereas during *rabi* (i.e T₆) it was at par with T₅ and T₁₀.

Sorghum-wheat cropping system

At **Akola**, in sorghum-wheat system the yield of sorghum in *kharif* was maximum (4.27 t/ha) under recommended dose of fertilizer T₅ while in *rabi* the yield of which was slightly higher (4.17 %) than RDF recorded under the treatment T₆ which yielded highest (2.17 t/ha). During *kharif* T₆ was statistically at par with T₅, T₇, T₁₀ & T₁₁. But during *rabi*, various IPNS packages had significant effect on crop yield.

Table 8.2/1(g): Grain yield (kg/ha) of sorghum-wheat crop sequence under different integrated nutrient management treatments.

Treatment	Akola		Rahuri		Parbhani	
	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>
T ₁	699	394	154	637	118	437
T ₂	3155	1262	2535	2633	1221	1983
T ₃	3282	1675	2629	3196	1325	2158
T ₄	3642	1322	2794	3132	1471	2335
T ₅	4271	2084	3012	3722	1649	2593
T ₆	4022	2171	3079	4008	1893	2706
T ₇	3886	1853	2663	3581	1659	2479
T ₈	3546	1896	2593	3613	1566	2281
T ₉	3717	1683	2773	3414	1808	2333
T ₁₀	3861	1931	2959	3635	1860	2562
T ₁₁	4016	1818	2777	3475	1896	2441
T ₁₂	2546	1002	2102	2609	1175	1955
T ₁₃	-	-	2164	2638	1664	2387
T ₁₄	-	-	-	-	1767	2202
CD at 5%	280.9	267.0	183.1	243.2	330.9	170.7

At **Parbhani**, the yield of sorghum was maximum (1.89 t/ha) under the treatment T_{11} , which was 14.97 % higher than RDF and wheat yield was maximum (2.70 t/ha) under T_6 , 4.35 % higher than RDF. During *kharif* T_{11} was statistically at par with T_5 T_6 T_7 T_8 T_9 and T_{10} . But during *rabi*, various IPNS packages had significant effect on crop yield.

At **Rahuri**, the maximum yield (3.07 t/ha) of sorghum was under T_6 which was only 2.22 % higher than RDF. The same result was also obtained with wheat, maximum (4.00 t/ha) under T_6 which was 7.68 % higher than RDF. During *kharif* T_6 are at par with T_5 and T_{10} and in *rabi* season, various IPNS packages exerted distinct significant effect on crop yield.

7.2.2 LONG-TERM FERTILIZER APPLICATION

Title of the Experiment: Long range effect of continuous cropping and manuring on soil fertility and yield stability (Expt. No. 2b).

Objectives:

- To study the long-range effects of graded fertilizer levels on yield stability and soil fertility under cereal-cereal cropping with high yielding varieties.

Year of start: 1977-78

Treatments:

Eighteen combinations of 3 levels of N (40, 80 and 120 kg ha⁻¹), 3 levels of P₂O₅ (0, 40 and 80 kg ha⁻¹) and 2 levels of K₂O (0 and 40 kg ha⁻¹) with one absolute control plot in each block.

Locations:

Crop Sequence	Ecosystem/Center
Rice-rice	Coastal/ Karamana
Rice-wheat	Semi-Arid/ Faizabad, Rewa
Maize-wheat	Arid/ Siruguppa, Sub-Humid/ Kanke

Results

The centre-wise results are presented in table 7.2/2 and their brief description is given below.

Rice-Rice Cropping System

In a rice-rice system experiment was conducted at Karamana centre and the highest grain yield of rice was recorded at 120 kg N during *kharif* as well as *rabi* seasons with an yield level of 4.88 and 3.01 t/ha. The same was also true with highest dose of P and K in both the seasons. The interaction of N and NP was highly significant in both *kharif* and *rabi* seasons.

Rice-Wheat Cropping System

In rice-wheat system the graded dose of N up to 120 kg/ha gave significantly increased yields, the highest being 2.75 and 5.65 t/ha at Faizabad and Rewa, respectively. The same was also true with the highest dose of P and K where yield levels were 2.85 and 5.30 t/ha with 80 kg P₂O₅ at Faizabad and Rewa, respectively. The yield level with the application of K₂O (40 kg/ha) was 2.43 and 5.09 t/ha at Faizabad and Rewa, respectively. During *rabi* at Faizabad the highest dose of N, P, K gave yield level of wheat at 1.34, 1.32 and 1.59 t/ha, respectively and at Rewa, 2.20, 2.86 and 3.57 t/ha respectively. At Faizabad, the interaction effects of NPK and NP were highly significant in *kharif* and *rabi* both the seasons., whereas at Rewa, the effect of NPK was significant in *kharif* and NPK, PK and NP was significant only during *Rabi*.

Maize-Wheat Cropping System

In maize-wheat systems the graded dose of NPK at the highest level gave the highest yields during both *kharif* and *rabi* at Siruguppa and Kanke. The yield levels were 4.5, 5.1 and 4.6 t/ha, respectively at Siruguppa with NPK at highest level, whereas at Kanke the corresponding yield levels were 2.27, 2.71 and 2.02 t/ha, respectively. At Siruguppa during *kharif* the effects of N, P, K, NP, were highly significant whereas at Kanke the effects of NPK and NP were highly significant and that of PK was not significant. The yield levels during *rabi* were also highest with highest dose of N, P and K at Siruguppa and Kanke. At Siruguppa, the effect of K and P was significant and that of N, P and K, and NP was highly significant.

Table 7.2/2: Average yield (kg/ha) of crops in different crop rotations as affected by different levels of N,P and K fertilizers during 2009-2010.

Crop sequence/ Centre	Crop/Variety	Absolute control (N ₀ P ₀ K ₀)	N levels (kg/ha)			P ₂ O ₅ levels (kg/ha)			K ₂ O levels (kg/ha)			S.E.m± (C.D. at 5%)	General mean	C.V. (%)	Remarks		
			40	80	120	0	40	80	0	40							
Karamana																	
	Aishwarya	5174	4096	4620	4889	377	4391	4536	4678	NS	NS	4471	4600	NS	4626	15.4	(N,P,K)**
	Aishwarya	3314	2577	2912	3017	218	2912	2874	2721	NS	NS	2759	2912	NS	2904	17.3	(N,P,K)**
Faizabad																	
	Sarjoo-52	811	1697	2340	2752	159	1533	2402	2854	159	130	2090	2436	130	2055	12.1	(N,P,K, NP)**
	HUW-234	360	1349	1321	1597	147	240	1822	2205	147	120	1266	1579	120	1271	18.1	(N,P,K, NP)**
Rewa																	
	IR-36	1286	4158	4850	5658	99.5	4395	4970	5301	200	169	4679	5099	169	4374	7.1	(N,P,K,)**
	WH-147	1023	2204	2863	3578	110	2621	2813	3211	110	90	2762	3001	90	2616	7.0	(N,P,K, NK)** , (PK, NP)**
Siruguppa																	
	M-900	1215	3569	4463	4581	177	2792	4687	5134	177	145	3773	4636	145	3777	7.7	(N,P,K, NP)**
	DWR-162	608	782	805	819	NS	785	792	829	38	31	767	837	31	774	8.3	(K** , P)
Kanke (Ranchi)																	
	HQPM-1	428	1237	2095	2237	222	729	2127	2713	222	181	1691	2022	181	1652	20.9	(N,P,K, NP)**
	K-9107	678	1862	2212	2653	151	1020	2574	3132	151	124	2168	2316	124	2019	12.0	(N,P, NP)** , K

7.2.3 DEVELOPMENT OF ORGANIC FARMING PACKAGE

Title of the Experiment: Development of organic farming package in system-based high value crops

Objectives:

- i. To develop organic nutrient management package for system based high value crops.
- ii. To recycle farm waste to value added compost.
- iii. To monitor soil health and crop quality and also to develop holistic approach for nutrient, pest and disease management as well as moisture conservation.

Year of start: 2003-04

Treatments:

- T₁: 50% recommended NPK + 50% N as FYM.
- T₂: Recommended N each equivalent to 1/3 of total N requirement of crop as FYM, vermin-compost and Neem cake.
- T₃: T₂ + inter cropping/Trap cropping.
- T₄: T₂ + agronomic practices for weed and pest control.
- T₅: 50% N as FYM + seed treatment with *Azotobacter* and PSB + rock phosphate.
- T₆: T₂ + *Azotobacter* + PSB.
- T₇: 100% NPK = micronutrients as per soil test.
- T₈: Dummy plot (T2).

Results

The centre-wise results are presented in table 7.2/3 (a-c) and their brief description is given below.

Rice-Based Cropping Systems

Bhubaneswar

Highest grain yield of rice 4.72 (t ha⁻¹) was recorded under T₆ which was 21.2% higher than

recommended dose of fertilizer (T₇). The mean performance of this treatment was also highest (6.02 t ha⁻¹) during last three years and recorded 13.25% higher yield than RDF. During succeeding *rabi* and summer seasons also, the highest yields of potato (11.39 t ha⁻¹) and okra (5.5 t ha⁻¹) were recorded under T₆ treatment and the increase in yield of these crops was 17.5 and 22.52%, respectively. However the mean yield increase during last three years was 2.73 and 30.36% for potato and okra, respectively.

Chiplima

At Chiplima, in rice-tomato-lady's finger cropping system, the highest yields of rice (6.09 t ha⁻¹) were recorded under T₅, whereas for tomato (16.25 t ha⁻¹) and lady's finger (6.76 t ha⁻¹) it was under T₆. The yield increase in respective crops, over RDF, was 10.92, 4.42 and 7.47%, respectively. However, the mean increase in yields, over the years, was noted to be the highest in T₆, which was 10.59, 5.58 and 8.85%, respectively.

Jabalpur

In rice-potato system at Jabalpur, the highest grain yield of rice (3.46 t ha⁻¹), was recorded under T₇ followed by T₁ (IPNS), whereas it ranged between 2.88 and 3.12 t ha⁻¹ under organic nutrient management packages. During *rabi*, the highest yield of potato (19.93 t ha⁻¹) was recorded in T₁.

Jorhat

At Jorhat, in rice-toria-black gram cropping system, highest grain yield of rice was recorded under T₆ (3.20 t ha⁻¹), closely followed by T₄ (3.15 t ha⁻¹), T₁ and T₃ (3.00 t ha⁻¹). During *rabi*, the highest grain yield of toria (0.55 t ha⁻¹) was recorded under T₂ followed by T₅. However, in terms of total yield T₃ was the best with yield of 0.35 t ha⁻¹ toria and 1.38 t ha⁻¹ wheat. Almost the same trend was recorded in black gram during summer.

Kalyani

In rice-potato-groundnut cropping system at Kalyani, the highest grain yield of rice (2.23 t ha⁻¹) was recorded under T₃ but during *rabi*, the highest

Table 7.2/3(a): Development of organic package for high value crops under rice based cropping system during 2009-10.

Treatment	Season	Centre (yield t/ha)							
		Chiplima (Rice-Tomato- Lady's fingers)	Bhubaneshwar (Rice-Cabbage- Lady's fingers)	Jabalpur (Rice-Potato- Fallow)	Navasari (Rice-Fallow- Groundnut)	Jorhat (Rice-Toria- Black gram)	Kalyani (Rice-Potato- Groundnut)	Karmana (Rice - Cucumber - Okra)	
T1: 50%Rec. NPK+50%N as FYM	Kharif	4650	4120	3250	4508	3000	1526	5499	
	Rabi	15000	17800	19993	-	400	4580	21511	
	Summer	5540	7580	-	1929	600	1252	9349	
T2: FYM+Neem oil cake+VC	Kharif	4510	4100	3000	4688	2500	1306	5733	
	Rabi	14120	18200	10693	-	550	3090	13648	
	Summer	4680	7640	-	2052	650	909	9939	
T3: T2+ Inter crop	Kharif	4410	4360	3050	4664	3000	2226	5299	
	Rabi	14310	18400	10012+140	-	350 + 1800	3900+818	13598	
	Summer	4830	8130	-	1817	450+600	778+1245	10565	
T4: T2+ Org. Pract.	Kharif	4270	3820	3120	4513	3150	1648	5000	
	Rabi	15280	18000	10723	-	400	3700	14635	
	Summer	5290	7350	-	1748	500	1405	7607	
T5: 50%N as FYM+R Phos+ BF	Kharif	6090	4160	2190	3733	2600	1444	5332	
	Rabi	14490	17960	10527	-	450	2900	18014	
	Summer	5200	8040	-	1505	550	1459	7605	
T6: T2+BF	Kharif	5860	4720	2880	4649	320	1128	5132	
	Rabi	16280	20680	10580	-	300	2770	13798	
	Summer	6760	8920	-	1871	500	1251	7330	
T7: 100%NPK+ Micronutrients as per soil test	Kharif	5490	3900	3460	4591	2900	1508	5899	
	Rabi	15590	17600	12197	-	450	5460	20396	
	Summer	6290	7280	-	1620	500	1307	8234	

Table 7.2/3(a) contd.: Development of organic package for high value crops under rice based cropping system during 2009-10.

Treatment	Season	Centre (yield t/ha)					
		Karjat (Rice-Maize)	Rewa (Rice - Wheat)	Maruteru (Rice - Rice)	Raipur (Rice - Potato)	Siruguppa (Rice - Fallow - Sesame)	
T1: 50% Rec.NPK+50%N as FYM	Kharif	3723	3523	5509	3073	2813	
	Rabi	9172	3557	NR	10131	-	
	Summer	-	-	-	-	200	
T2:FYM+Neem oil cake+VC	Kharif	2916	3479	4308	2913	2061	
	Rabi	5965	1697	NR	7597	-	
	Summer	-	-	-	-	201	
T3:T2+ Intercrop	Kharif	3042	3644	4193	2940	1480	
	Rabi	6015	1781+256*	NR	7319	-	
	Summer	-	-	-	-	214	
T4:T2+ Org. Pract.	Kharif	3156	3097	4079	2867	1340	
	Rabi	6245	1881	NR	7553	-	
	Summer	-	-	-	-	153	
T5:50%N as FYM+R Phos+ BF	Kharif	2787	3261	4212	2647	1420	
	Rabi	5512	1648	NR	3564	-	
	Summer	-	-	-	-	205	
T6:T2+BF	Kharif	3165	3306	4539	2900	2427	
	Rabi	6175	1522	NR	7783	-	
	Summer	-	-	-	-	212	
T7:100%NPK+Micronutrients as per soil test	Kharif	4263	3445	5214	3127	3951	
	Rabi	11985	4379	NR	10817	-	
	Summer	-	-	-	-	238	

*Mustard as intercrop

Table 7.2/3(b): Development of organic package for high value crops under maize based cropping system during 2009-10.

Treatment	Season	Centre (yield t/ha)									
		Indore [(Maize (cob)- Potato-Onion)]	Kanpur [(Maize (cob)- Potato-Onion)]	Ludhiana (Maize-Potato- Onion)	Akola (Sweet corn- Rajma-Onion)	Rajendranagar (Maize-Onion- Fallow)	Thanjavur (Maize-Rice- Greengram)	Kathalagere (Maize-Fallow- Groundnut)			
T1:50%Rec. NPK+50%N as FYM	Kharif Rabi Summer	6162 4470 2014	79992 27227 Fail	5882 24768 25810	50556 1025 7284	3749 19054	5153 4997 661	5588 2247			
T2:FYM+Neem oil cake+VC	Kharif Rabi Summer	5811 4598 1054	77326 23561 Fail	5645 22965 24525	48056 562 5679	3519 21920	4829 4314 659	5651 1447			
T3:T2+ Inter crop	Kharif Rabi Summer	4342 4342 1031	72536+262 19206+1226 Fail	5340+450 21240+48000 21460+410+150	47500+340* 642+2593 5185+1548	3255+920* 13325+13180	4638 3763 506	4659+851 1620			
T4:T2+ Org. Pract.	Kharif Rabi Summer	5587 3959 894	78159 22604 Fail	5540 22070 24870	48056 605 5741	3151 20880	4638 3883 546	4692 1387			
T5:50%N as FYM+R Phos+ BF	Kharif Rabi Summer	3480 4374 766	79159 34582 Fail	3872 15800 15165	48612 895 6358	2921 17767	4578 3415 426	4519 1486			
T6:T2+BF	Kharif Rabi Summer	4853 4406 1207	78659 25072 Fail	5713 23243 24235	48334 728 6852	3312 21378	4638 3907 541	4908 1900			
T7:100%NPK +Micronutrients as per soil test	Kharif Rabi Summer	6960 4885 1469	81858 28480 Fail	4860 20400 20815	50556 926 7469	4554 25239	2972 2433 303	5878 1500			

Table 7.2/3(c): Development of organic package for high value crops under different cropping system during 2009-10

Treatment	Season	Centre yield (kg/ha)			
		Rudrur (Turmeric-Sesame)	S.K.Nagar (G.M-Potato- Groundnut)	Sabour (Rice-Potato- Onion)	Parbhani (Soybean-Onion)
T1: 50%Rec. NPK+50%N as FYM	<i>Kharif</i> <i>Rabi</i> Summer	19840 542 -	- 22845 2257	5200 24400 12640	2459 21245 -
T2:FYM+Neem oil cake+VC	<i>Kharif</i> <i>Rabi</i> Summer	17920 496 -	- 21108 2138	5040 23800 12100	1842 15257 -
T3:T2+ Inter crop	<i>Kharif</i> <i>Rabi</i> Summer	10200+640 478 -	- 19121+238 1923+104	4940 22400+7600 11860+11400	1924 16039 -
T4:T2+ Org. Pract.	<i>Kharif</i> <i>Rabi</i> Summer	15640 436 -	- 20107 1973	5070 23100 12200	2181 17243 -
T5:50%N as FYM+R Phos+ BF	<i>Kharif</i> <i>Rabi</i> Summer	17226 452 -	- 16537 1607	4710 21400 10300	1584 14640 -
T6:T2+BF	<i>Kharif</i> <i>Rabi</i> Summer	17302 412 -	- 21846 2273	5125 24200 12400	2160 18045 -
T7:100%NPK+ Micronutrients as per soil test	<i>Kharif</i> <i>Rabi</i> Summer	21844 652 -	- 24742 1692	5080 22100 11800	2870 24352 -

yield (5.46 t ha^{-1}) of potato was recorded with RDF, followed by T_1 (4.58 t ha^{-1}). The average yield also of potato for last seven crop cycles was higher (16.49 t ha^{-1}) under RDF and under all the organic nutrient management packages yield was recorded to be lower yield. During summer, the highest groundnut yield (1.46 t ha^{-1}) was recorded under T_5 which was 11.56% higher than that recorded under RDF. However, the mean groundnut yield was highest (1.89 t ha^{-1}) under T_4 .

Karmana

At Karamana, during *kharif* the highest yield (5.89 t ha^{-1}) was recorded in treatment of RDF (T_7), whereas it was the highest in T_1 (21.51 t ha^{-1}) under rice-cucumber-lady's finger cropping system. During summer, however, organic nutrient management package of T_3 gave the highest yield (10.56 t ha^{-1}) of cucumber. The highest mean yield performance in rice and cucumber over seven crop cycles has also been recorded under T_7 (5.70 and 16.80 t ha^{-1} , respectively) and that of lady's finger under T_3 (6.96 t ha^{-1}).

Karjat

At Karjat, in rice-maize cropping system, the highest rice as well as maize yields were recorded to be highest under RDF (T_7) (4.26 and 11.98 t ha^{-1} , respectively). The same was also true for mean performance for last three years. It is also worth to be mentioned that the crop yields during 2009-10 as well as in previous years was appreciably lower than the RDF in all the organic nutrient management packages.

Rewa

At Rewa, the highest grain yields of rice and wheat were recorded under T_3 (3.65 t ha^{-1}) and RDF (4.40 t ha^{-1}), respectively. However, over seven years' mean basis, the highest yields of rice (3.12 t ha^{-1}) as well as wheat (3.36 t ha^{-1}) were recorded under RDF (T_7).

Navsari

At Navsari, the highest yield of rice (4.69 t ha^{-1}) as well as groundnut (2.05 t ha^{-1}) were recorded

Table 7.2/3(c) contd.: Development of organic package for high value crops under different cropping system during 2009-10.

Treatment	Season	Centre (yield t/ha)									
		Powerkheda (Soybean-Wheat)	Bichpuri (Clusterbean-Potato- Onion)	Coimbatore (Chillies-Chick pea-Baby corn)	Durgapura (Groundnut-Onion)	Hisar (Green gram- Wheat)	Kota (Black gram- Corriander)	Palampur			
T1:50%Rec. NPK+50%N as FYM	Kharif Rabi Summer	1110 3528 -	7472 28842 NR	8502 669 6003	1083 13056 -	1067 2314 -	2346 NR NR	3401 8114 22676			
T2:FYM+Neem oil cake+VC	Kharif Rabi Summer	980 2450 -	6370 24613 NR	9953 705 6901	1083 13542 -	940 1884 -	2053 NR NR	3330 7122 23101			
T3:T2+ Inter crop	Kharif Rabi Summer	1043 2148 -	6014 20085 NR	10470 623 6622	1269+352 14269 -	598+176 1693+168 -	2110+1259 NR NR	1630 9921 21613			
T4:T2+ Org. Pract.	Kharif Rabi Summer	1068 2286 -	6784 25535 NR	9763 784 6464	1083 15181 -	826 1909 -	2059 NR NR	2197 8078 14314			
T5:50%N as FYM+R Phos+ BF	Kharif Rabi Summer	1061 2380 -	6250 24015 NR	9210 615 6440	1083 13963 -	572 1293 -	1984 NR NR	1842 9247 23030			
T6:T2+BF	Kharif Rabi Summer	1092 2270 -	6412 25185 NR	6840 584 6391	1083 14722 -	844 1974 -	2064 NR NR	2268 7228 21825			
T7:100%NPK+ Micronutrients as per soil test	Kharif Rabi Summer	1306 4181 -	7054 28015 NR	8669 718 6189	1083 16148 -	1191 2866 -	2162 NR NR	1276 3472 213			

under T_2 , which were 2.11 and 30.77% higher over RDF, respectively. However, if mean crop yield performance is considered then during *kharif* T_7 was on top with mean rice yield of 4.58 t ha^{-1} and during *rabi* it was T_2 with mean groundnut yield of 1.91 t ha^{-1} .

Maruteru

During *kharif* season, integrated nutrient management package (T_1) with a yield level of 4.57 t ha^{-1} and it out yielded RDF as well as all organic nutrient management packages. But the mean crop yield (mean for seven years) was the highest under RDF (4.64 t ha^{-1}). However, during *rabi* season, the mean yield was the highest under T_1 (5.30 t ha^{-1}).

Raipur

At Raipur, in rice-potato cropping system the highest rice yield was recorded under RDF (3.13 t ha^{-1}), followed by INM (T_1). This was also true for overall mean performance with the yield level of 5.70 t ha^{-1} . During *rabi* also, the highest grain yield of potato was recorded under RDF (10.82 t ha^{-1}).

Siruguppa

At Siruguppa, during *kharif*, the highest grain yield of rice was recorded under RDF (3.95 t ha^{-1}) followed by INM (2.81 t ha^{-1}). All organic nutrient management packages recorded lower yields ranging between 1.34 to 2.43 t ha^{-1} .

Maize-Based Cropping Systems

Indore

In maize (green cobs)-potato-onion cropping system at Indore, the highest cob yield of maize was recorded under RDF (6.96 t ha^{-1}) followed by INM (6.16 t ha^{-1}) and T_2 (5.81 t ha^{-1}). The mean performance of these treatments was also in the same order, i.e., RDF (7.07 t ha^{-1}) > INM (6.78 t ha^{-1}). During *rabi* the highest yield of potato was recorded under RDF (4.09 t ha^{-1}) followed by T_2 (4.06 t ha^{-1}). During *summer*, the highest onion yield was recorded under INM (2.01 t ha^{-1}) followed by RDF (1.47 t ha^{-1}). The yield performance of organic nutrient management was poorer and it ranged between 0.77 t ha^{-1} and 1.21 t ha^{-1} .

Kanpur

At Kanpur also, the highest maize cob yield was recorded under RDF (81.86 t ha^{-1}). Among organic nutrient management packages, T_5 recorded highest yield. But, during *rabi* highest potato yield was recorded under T_5 (34.58 t ha^{-1}) which was 21.42% higher over RDF. The mean performance of potato over the years was altogether different and followed the order of RDF (T_7) > INM (T_1) > T_5 . The onion crop during summer 2009-10 failed.

Faizabad

Highest maize yield was recorded under T_7 (4.48 t ha^{-1}) followed by T_4 and T_1 during *kharif*. The yield reduction under organic treatment T_4 over RDF was 11.16%. But if the mean performance of treatments over years is concerned, T_4 recorded highest yield (4.12 t ha^{-1}) which was statistically at par with T_7 and INM. In succeeding *rabi*, the highest potato yield was recorded under T_4 (33.50 t ha^{-1}) followed by T_7 and T_1 . The yield increase under T_4 was 8.06% over RDF. However, the mean yield of potato was highest under T_2 (31.03 t ha^{-1}) which was 10.17% higher over RDF. During *summer*, onion yield was recorded to be the highest under T_6 (14.80 t ha^{-1}) followed by RDF (T_7). The yield under T_6 was 10.17% higher over RDF. But the overall mean performance of this crop was highest under T_4 16.40 t ha^{-1} with 6.49 % yield increase over RDF.

Ludhiana

Among organic nutrient management packages, highest maize yield was recorded under T_6 (5.72 t ha^{-1}) which out yielded RDF by 17.6% but it was lower than INM (5.88 t ha^{-1}). However, over the years, mean performance of maize was best under T_6 which recorded 19.9% higher yield over RDF. During *rabi*, the highest yield was recorded under intercrop treatment (T_3) with potato yield 21.24 t ha^{-1} and coriander 48.00 t ha^{-1} . The next best performance was recorded under T_1 followed by T_7 . However, overall mean performance of intercropping of potato with coriander proved superior over others. The yield of onion during *summer* was lowest under T_5 followed by RDF and INM in increasing order. Among organic treatments, T_4 recorded highest yield (24.87 t ha^{-1}) and the next best was intercropping treatment.



Organic cultivation of onion+coriander crops in maize-potato-onion cropping system at Ludhiana centre gives very good yields

Akola

At Akola, in sweet corn-onion cropping system, the highest cob yield of sweet corn was recorded under T_1 and RDF. During *rabi*, T_3 recorded highest crop yield of sweet corn (6.42 t ha^{-1}) with additional yield of fenugreek (2.53 t ha^{-1}) and the next best performer was INM. However, over the years, intercropping of maize with fenugreek (T_3) proved superior. During *rabi*, the highest onion yield (7.47 t ha^{-1}) was recorded under T_7 followed by T_1 . Among organic treatments, intercropping (T_3) proved superior in terms of maize equivalent yield (though not reported in the table) during summer.

Rajendranagar

At Rajendranagar, in maize-potato-onion cropping system, the highest grain yield of maize was achieved under T_7 (4.55 t ha^{-1}), which was followed by INM (3.75 t ha^{-1}) and T_2 (3.52 t ha^{-1}). The mean performance of crop followed almost the same trend. During *rabi*, the highest tuber yield of potato was recorded under T_7 (25.24 t ha^{-1}), but if the yields of main crop and intercrop yield are taken into consideration, T_2 recorded highest yield (13.32 t ha^{-1} of onion and 13.18 t ha^{-1} of carrot).

Thanjavur

In maize-rice-green gram cropping system, the highest maize yield was recorded under T_2 (4.83 t ha^{-1}), which was 62.48% higher than RDF. Almost same trend was observed during *rabi* and *summer* and the highest rice and green gram yields were recorded under T_2 (4.31 t ha^{-1} and 0.66 t ha^{-1} ,

respectively). The percent increase over RDF for rice and green gram yields was 77.31 and 177.51, respectively.

Kathalgere

In maize-groundnut cropping system, the highest maize yield (5.88 t ha^{-1}) was recorded under T_7 (RDF) followed by T_2 , yield in later being 3.86% less than T_7 . Among organic treatments, overall performance of T_6 was better (5.69 t ha^{-1}) which recorded minimum yield reduction (13.43%) over RDF. The relative performance of summer groundnut in organic treatment of T_6 was superior over the RDF by 26.7% (1.90 t ha^{-1}). The mean yield over the years was also higher by 3.32% (1.80 t ha^{-1}).

Soybean-Based Cropping Systems

Parbhani

In soybean-onion cropping system, the highest soybean yield was recorded under RDF (2.87 t ha^{-1}), followed by INM (2.46 t ha^{-1}) and T_4 (2.18 t ha^{-1}). The mean performance of organics was inferior to RDF over the years also with a mean yield of 2.76 t ha^{-1} . However, under organic treatments, minimum yield reduction (21.2%) was recorded under T_6 .

Powarkheda

At Powarkheda also the highest soybean yield was recorded under RDF (1.30 t ha^{-1}) and the mean yield under this treatment was 1.75 t ha^{-1} . Among organic treatments, T_6 recorded highest soybean yield (1.09 t ha^{-1}). Wheat yield was also highest under RDF (4.18 t ha^{-1}). Among organic treatments, best performance was recorded under T_2 (2.45 t ha^{-1}) but on the basis of mean over years T_6 gave the highest yield (2.78 t ha^{-1}), which was 37.3% lower than that under RDF.

Miscellaneous Cropping Systems

Bichpari

In cluster bean (green pods)-potato-onion the highest cluster bean yield (7.47 t ha^{-1}) was recorded under INM followed by RDF. Among organic treatments, T_4 recorded highest yield (6.78 t ha^{-1}) with 3.82% yield reduction over RDF. Potato yield during *rabi* was also highest under INM (28.84 t ha^{-1}) followed by RDF. But, on mean basis potato yield followed the order of INM > Organics > RDF. However, the mean yield of onion over the years

was in order of RDF (3.94 t ha⁻¹) >INM (3.82 t ha⁻¹) >Organics (3.59 t ha⁻¹).

Coimbatore

At Coimbatore, the performance of organic treatments was superior over RDF and INM. All the three crops; chillies, chickpea and baby corm recorded highest yield under T₃, with yield levels of 9.97, 7.80 and 6.90 t ha⁻¹, respectively. However, the mean crop yields over years were highest under T₂ during *kharif* (8.97 t ha⁻¹) and summer (6.70 t ha⁻¹) and under T₄ during *rabi* (1.75 t ha⁻¹).

Durgapura

In groundnut-onion cropping system at Durgapura, highest yields of groundnut (1.27 t ha⁻¹) and intercropped green gram (0.35 t ha⁻¹) were recorded under T₃, which were superior over all other treatments. During *rabi*, the highest onion yield was recorded under RDF (16.15 t ha⁻¹) followed by T₄ (15.18 t ha⁻¹).

Hisar

At Hisar, in green gram-wheat cropping system, the highest grain yield of green gram was recorded under RDF (1.191 t ha⁻¹) followed by INM and organic management. However, over the years T₆ proved superior over RDF with mean crop yield of 1.43 t ha⁻¹ and 19.03% yield increase over RDF. During *rabi* also, highest grain yield of wheat was recorded under RDF (2.87 t ha⁻¹) followed by INM and organic nutrient management packages. Among organic treatments, T₆ proved better and recorded highest crop yield (2.09 t ha⁻¹) compared to 3.06 t ha⁻¹ under RDF.

Kota

In black gram-coriander cropping system at Kota, the highest grain yield of black gram was recorded under T₃ followed by INM and RDF. This was also true for mean performance of treatments over the years. The crop of coriander during *rabi* failed due to heavy disease occurrence. However if the mean performance of crop over years is considered, T₃ gave highest crop yield (main crop 0.77 t ha⁻¹ and intercrop 0.79 t ha⁻¹).

Palampur

Highest crop yield was recorded under T₂ (3.33 t ha⁻¹), which was 161.0% higher than the yield recorded under RDF, but over years INM recorded the highest crop yield (2.45 t ha⁻¹) followed by RDF (2.18 t ha⁻¹) and T₆ (1.87 t ha⁻¹). During *rabi* season,

T₃ recorded highest crop yield (9.92 t ha⁻¹) compared to 3.47 t ha⁻¹ under RDF. This treatment proved superior over years also with mean yield of 9.87 t ha⁻¹ which was 105.1% higher over RDF. The crop yield during summer was, however, the highest (23.1 t ha⁻¹) under T₂, compared to extremely low yield under RDF (0.21 t ha⁻¹).

Rudrur

In turmeric-sesame cropping system at Rudrur, the highest rhizome yield of turmeric was recorded under RDF (21.84 t ha⁻¹) followed by INM (19.84 t ha⁻¹) and T₂ (17.92 t ha⁻¹). The mean yield performance, over the years, was also the best under RDF (18.80 t ha⁻¹) followed by INM and organic treatment of T₆ (15.86 t ha⁻¹). During *rabi*, the performance of T₇ was superior followed by IPNS and organic nutrient management system. The yield reduction under T₂ (highest yielding treatment among organics) over RDF was 23.9% during the current year and 30.9% on the basis of mean over years.

S.K. Nagar

In green manure-potato-groundnut system at S.K. Nagar, the highest tuber yield of potato (24.75 t ha⁻¹) was recorded under RDF followed by INM and T₆. Compared to RDF, T₆ which is an organic nutrient management package recorded 11.70% reduction in yield. The overall performance of treatments over the years also followed the same trend in which T₆ recorded yield reduction of 23.04%. During summer season, highest yield of groundnut 2.27 t ha⁻¹ was recorded under T₆ which is 34.3% higher than the RDF. However, with 19.31% increase in crop yield, the mean performance of T₆, over the years, was superior to all other treatments.

Sabour

During *kharif*, the highest crop yield (5.2 t ha⁻¹) was recorded under INM (T₁) followed by T₆ and RDF. However, over years, RDF proved to be superior with a yield level of 4.94 t ha⁻¹ followed by T₄ (4.56 t ha⁻¹). During *rabi*, the highest yield was recorded under T₆ being numerically at par with T₁. The mean crop yield reduction under T₆ was 4.71%. During summer highest crop yield was recorded under T₁ being numerically at par with T₆ and producing 5.08% higher crop yield over RDF (11.8 t ha⁻¹). But over the years, T₃ (intercropping treatment along with organic nutrient management package) recorded highest crop yield.

7.2.4 SITE-SPECIFIC NUTRIENT MANAGEMENT (SSNM)

Title of the Experiment: Effect of Site-Specific Nutrient Management (SSNM) on yield of Different Cropping Systems.

Objectives:

1. Developing site-specific nutrient management packages to maximize rice-wheat productivity and economic returns
2. To evaluate the effect of SSNM on soil fertility status
3. Enhancing nutrient use efficiency through balanced fertilization

Locations and Cropping systems:

During 2009-10 this experiment continued only at Palampur (Rice-wheat system) and Karmana (Rice-rice system)

Treatments: Broadly treatments were common but the number of nutrients and their level, especially in respect of secondary and micronutrients, varied from location to location. The

details of treatments are given in relevant table, along with experimental results.

Results:

The details of treatments and crop yields and brief description of centre-wise results have been presented below.

Palampur

Site-specific nutrient management (SSNM) (T_{10}) having 100 kg, 25 kg P_2O_5 /ha and 120 K_2O kg/ha had highest rice grain yield (6.90 t /ha) followed by farmer's practice (T_{12}) and state recommended doses of fertilizer application, although the treatment differences were not significant (Table-7.2/4a). In succeeding wheat also T_{10} had maximum productivity and had edge over farmers practice (T_{12}) and state recommendation (T_{11}) of nutrients. Use of S, B and Zn in SSNM application schedule did not bring any significant improvement in both the crops.

Table-7.2/4a: Productivity of rice and wheat as influenced by site- specific nutrient management at Palampur (2009-10)

Treatment No.	Rice						Wheat			Yield (kg/ha)	
	Major and secondary nutrients (kg/ha)				Micronutrient fertilizers (kg/ha)		Major nutrients (kg/ha)			<i>Kharif</i>	<i>Rabi</i>
	N	P_2O_5	K_2O	S	Borax	$ZnSO_4$	N	P_2O_5	K_2O		
T_1	100	25	120	40	5	20	100	25	120	5521	3714
T_2	100	50	120	40	5	20	100	50	120	6294	5060
T_3	100	0	120	40	5	20	100	0	120	5870	3825
T_4	100	25	80	40	5	20	100	25	80	6294	3926
T_5	100	25	40	40	5	20	100	25	40	6237	4129
T_6	100	25	0	40	5	20	100	25	0	5333	3704
T_7	100	25	120	40	5	0	100	25	120	6501	4260
T_8	100	25	120	40	0	20	100	25	120	5502	4129
T_9	100	25	120	0	5	20	100	25	120	6708	4038
T_{10}	100	25	120	0	0	0	100	25	120	6897	4716
T_{11}	State Recommended doses of Nutrients (SR)						SR			6614	4574
T_{12}	Farmer's Practice (FP)						FP			6708	4028
CD at 5%										NS	811

Karmana

At Karmana, the grain yield of *kharif* and *rabi* rice had marked response to SSNM over recommended doses of nutrients or farmers' practice and the magnitude of response was more in case of *rabi* rice crop (Table-7.2/4b). Compared to the state recommendation (T_{13})/farmers' practice (T_{14}), SSNM treatment (T_4) - comprising addition of all deficient nutrients (T_8) gave an additional yield of 15% and 13%, respectively in *kharif* rice. Such responses for *rabi* rice over the state recommendation/ farmers' practice was to

the tune of 18 to 20%, respectively. The graded doses of P application (0, 30, 60 and 90 kg P_2O_5 /ha) did not produce any significant influence on *kharif* and *rabi* rice productivity but differential doses of K application had significant change only with its 120 kg application rate to both the season of rice crop. Use of 120 K_2O kg/ha application which gave an extra grain yield of 0.40 t/ha in *kharif* rice and 0.7 t/ha in *rabi* rice, respectively. Application of sulphur and zinc sulphate to *kharif* rice did not brought any yield advantage as direct effect in *kharif* rice and as residual effect in *rabi* rice crop (Table-7.2/4b).

Table 7.2/4b: Productivity of rice as influenced by site-specific nutrient management at Karmana (2009-10)

Treatment No.	Kharif rice				Rabi rice				Yield (kg/ha)	
	N	P_2O_5	K_2O	S	$ZnSO_4$	N	P_2O_5	K_2O	Kharif	Rabi
T_1	0	60	80	20	40	0	60	80	2832	5978
T_2	150	60	80	20	40	150	60	80	2794	6093
T_3	150	0	80	20	40	150	0	80	3083	5832
T_4	150	30	80	20	40	150	30	80	2717	5940
T_5	150	90	80	20	40	150	90	80	2738	6208
T_6	150	60	0	20	40	150	60	0	3020	6323
T_7	150	60	40	20	40	150	60	40	2675	6511
T_8	150	60	120	20	40	150	60	120	3417	7023
T_9	150	60	80	0	40	150	60	80	2905	6229
T_{10}	150	60	80	20	0	150	60	80	2717	6218
T_{11}	150	60	80	20	40	150	60	80	3417	6725
T_{12}	150	60	80	20	40	150	60	80	3093	6459
T_{13}	State Recommended doses of Nutrients (SR)					SR			2968	5936
T_{14}	Farmer's Practice (FP)					FP			3013	5853
	CD at 5%								312	812

7.3 TECHNOLOGY TRANSFER AND REFINEMENT

7.3.1 ON-FARM RESEARCH

Title of the Experiment: On-farm crop response to application of major plant nutrients in predominant cropping systems.

Objectives: To assess the response of major crops to application of N, P and K at recommended rates in predominant cropping systems in different agro-ecosystems, under farmers' field situation.

Year of start: 1999-2000

Treatments: There are five common treatments at various locations. They are control ($N_0P_0K_0$), N, N+P, N+K and N+P+K and all the nutrients are applied as per the recommended rates of crops/cropping systems evaluated at particular location.

Locations:

Results:

The centre-wise details of varieties, nutrients used, crop yield and crop responses to NPK application in terms of kg of grain per kg of nutrient applied, have been presented in Table 7.3/1. Brief descriptions of centre-wise results are given below.

Rice-rice system: The system was evaluated for nutrient response in 6 locations covering 192 on-farm experiments. Across the locations, response to applied nutrients was marginally higher during *rabi* than *kharif* season. On an average, response to applied N, P and K was found to be 7.6, 20 and 21.5 kg of yield kg^{-1} of nutrient respectively. Among

Cropping system	OFR Centre & State	No. of experiments
Rice-Rice	Tirupathi (A.P), Warangal (A.P.), Thiruvalla (Kerala), Roha (Maharashtra), Paiyur (T.N.), Chettinad (T.N.)	192
Rice-Wheat	Patna (Bihar), Arnej (Gujarat), Karnal (Haryana), Dumka (Jharkhand), Jammu (J&K), Gondia (Maharashtra), Seoni (M.P.), Katni (M.P.), Dhenkanal (Odhis), Amritsar (Punjab), Varanasi (U.P.), Santkabirnagar (U.P.), Pantnagar (Uttarakhand).	215
Rice-Chickpea	Gondia (Maharashtra)	12
Rice-Groundnut	Dhenkanal (Odhis)	16
Rice-Greengram (S)	Kakadwip (W.B.)	24
Rice-Greengram	Kendrapara (Odhis)	24
Rice-Maize (S)	Bangalore (Karnataka)	6
Rice-Fingermillet	Bangalore (Karnataka)	6
Rice-Brinjal (S)	Bangalore (Karnataka)	6
Pearlmillet-Mustard	Bhachau (Gujarat)	12
Cotton-Groundnut (S)	Bhachau (Gujarat)	12
Cotton-Jowar(F)(S)	Arnej (Gujarat)	8
Groundnut-Sorghum	Gadag (Karnataka)	5
Soybean-Wheat	Raipur (Chattisgarh), Ahmednagar (Maharashtra)	34
Custerbean-Wheat	Hanumangarh (Rajasthan)	20
Maize-Wehat	Palampur (H.P), Dumka (Jharkhand), Jammu (J&K), Udaipur (Rajasthan).	77
Maize-Gram	Udaipur (Rajasthan), Aurangabad (Maharashtra), Gadag (Karnataka)	17
Soybean-Gram	Aurangabad (Maharashtra)	12
Chilli+Onion-Cotton	Gadag (Karnataka)	10

the various locations, response to K was higher in Tirupathi, Thiruvalla and Roha while response to P was higher in Warangal, Paiyur and Chettinad. At Tirupathi, response to applied nitrogen, phosphorus and potassium was found to be 33, 32.6 and 12% higher in *rabi* compared to *kharif* season. At Warangal, the response in terms of rice equivalent yield was found to be 7.87, 20 and 13.5 kg kg⁻¹ of N, P and K applied respectively. Response at the rate of 10.9, 32.4 and 33.6 kg kg⁻¹ of nutrient was observed at Thiruvalla. Similarly the response of rice to applied nutrient was comparatively lower in Chettinad than other locations of rice-rice system.

Rice-wheat system: The experiment was conducted in 14 locations through 215 on-farm trials. Among the various locations, higher response to applied N in rice and wheat was found to be at Karnal with 25.83 kg kg⁻¹ of N in rice and 21.08 kg kg⁻¹ of N in wheat, while poor response to applied N was observed at Katni for rice and Arnej in Gujarat for wheat crop. In terms of applied phosphorus, Amritsar recorded higher response in rice (35.15 kg kg⁻¹ N) while Dumka recorded the higher response in wheat (25.28 kg kg⁻¹ N) compared to other locations. Rice and wheat have not responded with application of P at Arnej as it recorded only 4.95 and 2.76 kg of rice and wheat only with each kg of phosphorus. Soils of Patna having lower potassium have responded well with the addition of potassium as it recorded response of 28.35 kg kg⁻¹ of K in rice and 15.45 kg kg⁻¹ of K in wheat. Lower response to applied K was found at Karnal for rice (2.82 kg kg⁻¹ of K) and at Arnej for wheat (1.96 kg kg⁻¹ of K). In all the locations, application of N, P and K together in recommended dose to rice and wheat recorded higher yield than application of N, P and K alone. The increase in yield with the application of N, P, K was found to be 57.7% in rice at Amritsar over control and 97% in wheat at Pantnagar.

Rice-chickpea: Rice responded well with application of phosphorus while as expected response to applied N was found to be 15.65 kg kg⁻¹ of N at Gondia. Rice registered only 5.33 kg of grain kg⁻¹ of N at the recommended dose of 100 kg N ha⁻¹. Response to P and K was found to be similar as it recorded 9.50 and 9.40 kg kg⁻¹ of applied P and K at the recommended dose of 40 and 20 kg of P and K ha⁻¹.

Rice-groundnut: The system was evaluated in 16 on-farm trials at Dhenkanal. Rice recorded response of 6.40, 10.28 and 22.15 kg kg⁻¹ of applied N, P and K respectively while groundnut response was found to be only 9.40, 9.20 and 6.60 kg kg⁻¹ of nutrients respectively.

Rice-greengram (Summer): 24 on-farm trials were conducted at Kakadwip which indicates better response to applied K (13.89 kg kg⁻¹ of K) followed by P (9.51 kg kg⁻¹) and nitrogen (6.95 kg kg⁻¹) in rice. Greengram did not respond well with application of any of the nutrients. At Kendrapara, *kharif* rice recorded higher response of 14.79 kg kg⁻¹ of K followed by N (12.05 kg kg⁻¹). Greengram grown during *rabi* also recorded higher response with K (8.78 kg kg⁻¹) followed by N (7.80 kg kg⁻¹).

Rice-maize (Summer): Response study conducted at 6 locations in Bangalore indicated higher response to applied P (25.48 kg kg⁻¹) followed by K (16.66 kg kg⁻¹) in rice. As soils are low in K at Bangalore, maize recorded higher response of 37.45 kg kg⁻¹ of K followed by P (28.04 kg kg⁻¹ of P) and N (6.93 kg kg⁻¹).

Rice-finger millet (Summer): Rice-finger millet system commonly grown in Karnataka state was evaluated in 6 locations of Bangalore in sandy loam soil. Applied phosphorus had higher response of 25.70 kg kg⁻¹ followed by nitrogen. Similar to rice, finger millet had also registered better response with applied P (25.75 kg kg⁻¹).

Rice-brinjal (Summer): Available K was lower in soils at Bangalore compared to Nitrogen and phosphorus and as a consequence, application of K to rice and brinjal had better response of 28.53 kg kg⁻¹ in rice and 38.25 kg kg⁻¹ in summer brinjal. Application of N @ 125 kg ha⁻¹ had the response of 14.74 kg kg⁻¹ in brinjal.

Pearl millet-mustard: 12 on-farm trials conducted at Bhachau in Gujarat recorded response of 22.64, 10.35 and 6.71 kg K, P and N kg⁻¹ of nutrient in pearl millet crop while mustard response was higher for K (12.22 kg kg⁻¹) followed by nitrogen.

Cotton-groundnut (Summer): The system was evaluated at 12 locations in Bhachau in sandy loam soil. Cotton recorded response of 7.76 kg of kapas kg⁻¹ of N, 9.41 kg kg⁻¹ of P and 6.46 kg kg⁻¹ of K.

Table-7.3/1. Agronomic response to NPK application in different cropping systems under farmers' field conditions (2009-10)

State	NARP/Centre/ No. of Trials	Soil Type	Variety/ Fert. Dose	Yield (kg/ha)				SEm±	CD at 5%	CV%	Response(kg/kg)			
				Control	N	NP	NK				NPK	N	P	K
A.P.	Southern/ Tirupati/ (24)	Sandy Clay	NLR-34449	2586	3608	4059	4253	4765	45	89	5.71	8.52	8.03	16.89
			120-60-40	3791	5150	5759	5876	6545	76	150	6.90	11.33	10.65	18.90
	CT/ Warangal/ (24)	Sandy Clay	BPT-5204	2670	3614	4367	3773	5099	55	110	6.90	7.87	17.33	11.14
			120-60-40	2370	3316	4767	4038	5312	64	128	7.95	7.88	22.71	15.84
Kerala	Special/ Thiruvalla/ (72)	Alluvial	Uma	1982	2979	4672	4720	6020	24	47	4.90	11.08	33.26	34.32
			90-45-45	1923	2882	4553	4617	5779	22	43	4.66	10.66	31.48	32.90
	North Konkan/ Roha/ (24)	N. A.	Shyadri	3940	4620	5500	5970	7245	74	147	6.61	6.80	21.55	30.95
			100-50-50	2584	3062	3863	4027	5082	63	125	8.23	3.98	18.56	21.84
T.N.	North Eastern/ Paiyur (24)	Sandy Loam	Paiyur-I	3542	4645	5890	5594	7132	43	85	3.94	7.35	27.83	21.91
			150-50-50	3553	4890	6193	5813	7392	46	91	4.02	11.14	36.03	26.53
	Southern/ Chettinad (24)	Clay Loam	ADT-42	3744	4020	4637	4432	5372	33	66	3.66	1.84	15.57	11.47
			150-50-50	3839	4197	4854	4588	5597	39	77	4.17	2.98	21.92	14.92
Bihar	North West Alluvial Plain/ Patna (24)	N.A.	ADT-36	1919	2735	3528	3204	4193	22	44	3.40	10.20	22.28	28.35
			120-38-38	1412	2587	3211	3103	3931	30	59	5.21	9.79	12.10	15.45
	Rice-Wheat													

Contd..../-

State	NARP/Centre/ No. of Trials	Soil Type	Variety/ Fert. Dose	Yield (kg/ha)				SEM±	CD at 5%	CV%	Response(kg/kg)				
				Control	N	NP	NK				NPK	N	P	K	
Gujarat	Bhal & Coastal/ Arnej (16)	Clay	Gujari	4753	5291	5668	5706	5824	79	158	5.83	5.38	4.95	5.71	
			100-50-50												
			GW-496 120-60-60	2424	2823	2921	2873	3106	30	60	4.18	3.33	2.76	1.96	
Haryana	Eastern Alluvial Plain/Karnal (12)	Clay-loam	PR-114	2877	6752	7209	6919	7380	56	113	1.13	25.83	7.65	2.82	
			150-60-60												
			DBW-17 150-60-60	1541	4703	5028	4882	5172	26	53	2.15	21.08	5.13	2.69	
Jharkhand	Central and NEP/Dumka (24)	Sandy Loam	Lalat	790	1719	2514	2070	3068	39	77	9.44	9.29	17.93	18.10	
			100-50-25												
			K-9107 100-50-25	725	1314	2509	1581	2914	38	75	10.31	5.89	25.28	13.44	
J & K	Sub-Tropical/ Jammu (11)	Clay-loam	Jaya	2476	3754	4652	4061	5110	25	51	2.07	10.65	16.23	12.75	
			120-60-30												
			DBW-17 100-50-25	1582	2292	2976	2594	3274	16	32	2.08	7.10	13.64	12.00	
Maharashtra	High Rainfall EV2 Gondia (12)	N.A.	PKV-Khamang	2858	3367	3767	3542	4117	44	89	4.35	5.09	9.75	5.25	
			100-50-50												
			AKW-3722 100-50-50	1494	1870	2306	2052	2607	26	53	4.38	3.76	9.91	4.83	
M.P.	Kymore Plateau & Satpura Hill/ Seoni(10)	N.A.	MR-38-28	1228	1520	1980	1550	2245	26	53	4.91	2.43	9.63	3.69	
			120-60-40												
			DL-803-3 120-60-40	1309	2910	3650	3120	4350	115	232	11.81	13.34	16.42	11.38	
M.P.	Kymore Plateau & Satpura Hill/ Katni (8)	N.A.	MR-3828	1074	1191	1601	1431	1735	21	45	4.21	0.98	5.95	4.68	
			120-60-40												
			DL-8033 120-60-40	2924	3412	3885	3756	4078	20	42	1.59	4.07	6.63	6.71	
Orissa	Mid-Central Table Land/ Dhankanal (8)	Sandy Loam	Lalat	2892	3555	3756	4047	4295	46	96	3.54	8.29	5.61	12.89	
			80-40-40												
			Sonalika 80-50-40	1420	1709	1905	2098	2394	58	120	8.61	3.61	4.92	10.98	

Contd..../-

State	NARP/Centre/ No. of Trials	Soil Type	Variety/ Fert. Dose	Yield (kg/ha)				SEM±	CD at 5%	CV%	Response(kg/kg)			
				Control	N	NP	NK				NPK	N	P	K
Punjab	Central Plain/ Amritsar/ (24)	Sandy Loam	PAU-201 120-30-30 HD-2733 120-60-30	5071	6344	7383	6927	7997	73	145	5.30	10.61	35.15	19.95
				2836	3855	4386	4083	4594	53	105	6.56	8.49	8.68	7.27
				2154	3519	4298	3964	4990	28	56	3.11	11.38	15.04	9.48
U.P.	Eastern Plain/ Varanasi/ (18)	Sandy Loam	HD-2733 120-60-40	1726	3132	3912	3616	4403	31	62	3.95	11.72	13.06	12.19
				1835	2872	4135	3422	4623	30	59	4.41	8.64	20.53	8.65
U.P.	Bundelkhand/ Sant Kabirnagar/ (24)	Sandy Loam	HUW-234 120-60-40	1605	2605	3463	3105	3921	36	71	5.93	8.33	13.95	11.98
				2546	3249	4204	3787	4636	40	81	3.74	7.03	15.03	12.13
Ultra- Khand	Mid Western/ Pantnagar/ (12)	Sandy Loam	Pusa 1121 100-60-40 PBW-550 150-60-40	2261	3152	3983	3660	4464	29	59	2.88	5.94	13.63	12.36
				3587.5	5335.833	6252.417	6047.25	7172.75	87	176	2.62	11.66	17.02	20.40
Ultra- Khand	Mid Western/ Pantnagar/ (12)	Sandy Loam	PBW-550 150-60-40	2223.417	2789	3598.833	3446.667	4159.167	34	69	1.89	3.77	12.69	15.23
				Rice-Chickpea										
Mahara- shtra	High Rainfall EV2 Gondia (12)	N.A.	PKVKhamang 100-50-50 AKG-46 20-40-20	2825	3358	3892	3642	4229	38	77	3.68	5.33	11.21	6.21
				690	1003	1346	1154	1571	18	36	5.55	15.65	9.50	9.40
				Rice-G.Nut										
Orissa	Mid-Central Table Land/ Dhankanal (16)	Sandy Loam	Lalat 80-40-40 Smruti 20-40-40	2702	3214	3703	4178	4511	47	94	5.00	6.40	10.28	22.15
				1675	1863	2247	2143	2495	37	74	6.80	9.40	9.20	6.60

Contd.../-

State	NARP/Centre/ No. of Trials	Soil Type	Variety/ Fert. Dose	Yield (kg/ha)				SEM±	CD at 5%	CV%	Response(kg/kg)			
				Control	N	NP	NK				NPK	N	P	K
West Bengal	Coastal Saline/ Kakdwip (24)	Clay-loam	Pankaj 80-40-40 Chait Moong 20-40-40	2197	2753	3180	3355	3689	33	65	5.14	6.95	9.51	13.89
				501	577	673	669	*3831 779	8	16	5.59	3.80	2.58	2.48
								**813						
Orissa	East and South Eastern Coastal Plain/Kendrapara (24)	Clay-loam	Swam 80-40-40 Local 20-40-20	2323	3287	3615	3760	4325	36	71	5.07	12.05	11.16	14.79
				529	685	830	880	986	9	18	5.43	7.80	3.14	8.78
Karna- taka	Eastran Dry/ Banglore (6)	Sandy Loam	IR-30864 100-50-50 NAH-2049 150-75-40	2498	3689	5220	4779	5796	113	236	6.3	11.91	25.48	16.66
				2453	3492	5274	4669	7093	97	202	5.19	6.93	28.04	37.45
Karna- taka	Eastran Dry/ Banglore (6)	Sandy Loam	IR-30864 100-50-50 GPU-66 100-50-50	2482	3952	5439	4647	5730	162	343	8.93	14.70	25.70	9.86
				1610	2707	3972	3106	4416	121	257	9.34	10.97	25.75	8.43
Karna- taka	Eastran Dry/ Banglore (6)	Sandy Loam	IR-30864 100-50-50 Greenlong-Bji 125-100-50	2824	3674	4438	4526	6339	459	973	25.9	7.50	26.77	28.53
				5409	7252	8456	9374	10159	431	914	12.98	14.74	9.95	38.25
Gujarat	North West/ Bhachau (12)	Sandy clay Loam	GHB-577 80-40-25 GM-3 50-50-25	1321	1858	2521	2673	2838	35	71	5.35	6.71	10.35	22.64
				1095	1595	2127	2072	2261	40	81	7.59	10.00	7.21	12.22

Contd..../-

State	NARP/Centre/ No. of Trials	Soil Type	Variety/ Fert. Dose	Yield (kg/ha)					SEM±	CD at 5%	CV%	Response(kg/kg)		
				Control	N	NP	NK	NPK				N	P	K
Gujarat	North West/ Bhachau (12)	Sandy Loam	KrushiDhan-1 200-40-40 GG-2 25-50-25	989	2541	2923	2805	3176	47	95	6.50	7.76	9.41	6.46
				762	1213	1682	1621	1928	33	67	7.97	18.04	7.76	13.08
				Cotton-Gnut(Sum)										
Gujarat	Bhal & Coastal/ Arnej (8)	Clay	BT Cotton 240-0-40 GFSH-4 80-40-40	2021	2852	2977	3248	3435	104	215	10.16	3.46	-	10.68
				Cotton-Jowar(F)(Sum)										
Karna- taka	Northern Dry/ Gadag (5)		TMV-2 25-50-25 M-35-1 100-60-40	774	868	1182	1004	1305	24	51	5.24	3.76	6.15	5.18
				780	1050	1150	1040	1291	27	57	5.73	2.70	2.93	1.64
				G.Nut - Sorghum										
Chhatt- isgarh	CG Plain/ Raipur (10)	N.A.	- Lok-1 100-60-40	841	1593	2584	1765	2761	27	55	4.48	7.52	16.56	4.36
				1584	1843	2053	2267	2500	14	28	3.35	5.18	2.95	17.42
Mahara- shtra	Scarcity/ Ahmednagar/ (24)	Clay-loam	DS-228 50-75-25 NIAW-917 120-60-40	2061	2811	3231	3666	4328	45	89	6.87	6.25	9.02	24.40
				Clusterbean-Wheat										
Rajas- than	Irrigated North Western Plain/ Hanumangath (20)	Sandy Loam	RGC-936 20-40-20 Raj-3077 120-40-20	990	1175	1265	1234	1439	7	14	2.59	9.25	3.69	5.83
				2671	3268	3533	3476	3962	14	28	1.80	4.98	9.39	15.93

Contd.../-

State	NARP/Centre/ No. of Trials	Soil Type	Variety/ Fert. Dose	Yield (kg/ha)				SEM±	CD at 5%	CV%	Response(kg/kg)			
				Control	N	NP	NK				NPK	N	P	K
H.P.	Sub- mountain and low hill sub- tropical/Palam- pur(17)	N.A.	KH-101A 90-45-30	1828	2160	2802	2623	3414	22	44	3.55	3.69	15.92	17.92
				1832	2165	2907	2691	3365	34	68	5.39	4.16	17.70	12.30
				763	1570	2487	1981	2895	37	73	9.35	8.07	18.31	16.38
				552	1219	2372	1507	2793	44	87	12.89	6.67	24.39	14.18
Jhark- hand	Central North Plateau/ Dumka (24)	Sandy Loam	HQPM-1 100-50-25 K-9107 100-50-25	1446	2270	2991	2532	3364	10	20	1.32	13.73	19.41	15.88
				1351	1961	2606	2244	2968	21	42	3.33	10.17	22.82	16.13
				1004	2004	2646	2279	3167	63	127	9.76	11.11	21.86	13.27
Rajas- than	Sub-humid Southern Plain & Aravalli Hills/ Udaipur(12)	Sandy Loam	Pratap-Makka-5 90-35-30 Raj-4037 120-40-30	1842	2996	4154	3467	4663	101	204	10.20	9.62	29.43	16.33
				917	2083	2671	2433	2963	23	46	3.56	12.96	13.98	10.70
				1978	3764	4481	4214	5029	42	85	3.74	14.88	19.15	16.63
Rajas- than	Humid Southern Plain/ Udaipur(12)	Sandy Clay Loam	Pratap-Makka-5 90-40-30 Raj-4037 120-40-30	Maize-Gram										
				2423	2993	3187	3360	3503	49	99	5.50	5.70	2.25	4.55
				1083	1450	1557	1623	1777	15	30	3.53	14.68	2.61	7.86
				2701	3561	4262	3862	4722	85	180	4.96	5.73	10.41	10.15
Mahara- shtra	CMP/ Aurangabad/ (12)	N.A.	Maharaja 100-75-75 BDNG-797 25-50-25	860	1020	1461	1200	1731	43	91	7.69	6.40	9.72	-
				25-50-00										
Karna- taka	Northern Dry/ Gadag (5)	Clay Loam	150-75-37.5 BGD-103 25-50-00	Maize-Gram										

Contd..../-

State	NARP/Centre/ No. of Trials	Soil Type	Variety/ Fert. Dose	Yield (kg/ha)						SEM± CD at 5% C/P%			Response(kg/kg)		
				Control	N	NP	NK	NPK	SE	CD	C	P	K	N	P
Maharashtra	CMP/ Aurangabad/ (12)	N.A.	MAUS-71	1019	1273	1386	1339	1416	19	38	5.21	8.47	1.58	1.60	
			30-60-30	1116	1350	1483	1490	1607	12	24	2.93	9.36	2.50	5.28	
			BDNG-797 25-50-25												
Karnataka	Northern Trans -ition/Gadag (5)	N.A.	Byadegi dabbi	345	486	560	500	686	15	32	6.73	1.41	2.60	1.40	
			100-50-50 +N-53	1681	4373	4887	4600	5403	109	231	5.8	43.07	26.34	5.94	
			62.5-25-62.5 Jayadhar 7.5-3.75-3.75	342	528	580	556	664	10	21	4.19	24.80	21.33	14.93	
Karnataka	Northern dry/ Gadag (5)	N.A.	Byadegi dabbi	304	419	504	424	590	12	25	5.9	1.15	2.51	0.91	
			100-50-50 +N-53	1152	3605	4690	3898	5062	62	131	3.79	39.25	44.98	5.32	
			62.5-25-62.5 Jayadhar 7.5-3.75-3.75	410	544	656	578	854	9	19	3.29	17.87	51.73	30.93	

Groundnut had the response of 18.04 kg kg⁻¹ of N followed by K (13.08 kg kg⁻¹) and P (7.76 kg kg⁻¹).

Cotton-jowar (F) (Summer): At Arnej trials at 8 farmers field indicated response of 10.68 kg kg⁻¹ of K in cotton followed by 3.46 kg kg⁻¹ of N.

Groundnut-sorghum: Gadag district of Karnataka had the response of 3.76, 6.15, 5.18 kg kg⁻¹ of N, P, K in groundnut. The response to applied nutrients in sorghum was found to be lower for all the nutrients compared to other crops.

Soybean-wheat: Evaluated in 34 on-farm trials at two locations. At Raipur available P status in soil was found to be lower and as a consequence of this response to P was found to be higher (16.56 kg kg⁻¹ of P) in soybean. At Ahmednagar, soybean and wheat responded well with application of K (17.42 kg kg⁻¹ and 24.40 kg kg⁻¹ in soybean and wheat respectively).

Clusterbean-wheat: The system evaluated for nutrient response at Hanumangarh recorded the response of 9.25, 3.69 and 5.83 kg kg⁻¹ of N, P, K respectively in cluster bean and 4.98, 9.39 and 15.93 kg kg⁻¹ in wheat.

Maize-wheat: Evaluated at five locations under 77 on-farm trials. At Palampur, application of K had higher response (17.92 kg kg⁻¹) in maize while P had higher response in wheat (17.70 kg kg⁻¹). At Dumka, application of P had higher response in both the crops. Similar trend was observed in Jammu and Udaipur also.

Maize-gram: Evaluated in 2 locations through 17 on-farm trials indicated higher response of maize and gram to applied nitrogen as it recorded response of 5.70 and 14.68 kg kg⁻¹ of N in maize and gram respectively at Aurangabad. At Gadag,

application of P had the response of 10.41 and 9.72 kg kg⁻¹ of P in both the crops respectively.

Soybean-gram: The system has been evaluated in 12 farmers field at Aurangabad. The results reveals that both soybean and gram had higher response to applied nitrogen (8.47 kg kg⁻¹ of N in soybean and 9.36 kg kg⁻¹ of N in gram) followed by application of potassium.

Chilli+onion-cotton: Evaluated in 2 locations through 10 on-farm experiments. Application of P to chilli had higher response as it recorded response of 2.55 kg of dry chillies kg⁻¹ of P while onion and cotton had higher response at five experiments while other five locations had higher response to P (44.98 kg kg⁻¹ in onion and 51.73 kg kg⁻¹ in cotton). Soil fertility at the respective locations is the cause behind the varied response of the same system at different level of nutrient application.

Title of the Experiment: On-Farm evaluation of new diversified cropping systems under irrigated/ rainfed conditions.

Objectives: To assess the on-farm performance of alternative crops and cropping systems for increasing intensity as well as yield potential, calorific values and net returns in different agro-climatic zones.

Year of start: 1999-2000

Treatments: Four to seven best crop sequences involving three to four crops (cereals, pulses, oil seeds, vegetables or fodder crops) suited for specific requirement of different regions have been evaluated at all the centres. The cropping systems evaluated and crop cultivars used are given in table 7.3/2 under "Results" Section.

Locations:

Ecosystem	OFR Centre & State	No. of experiments
Arid	Bhachau (Gujarat)	24
Semi-arid	Warangal (A.P), Nellore (A.P), Arnej (Gujarat), Gadag (Karnataka), Bangalore (Karnataka), Katni (M.P.), Aurangabad (Maharashtra), Ahmednagar (Maharashtra), Karjat (Maharashtra), Gondia (Maharashtra), Ludhiana (Punjab), Hanumangarh (Rajasthan), Udaipur (Rajsthan) Chettinad (Tamil Nadu), Paiyur (T.N.).	334
Sub-humid	Patna (Bihar), Karnal (Haryana), Jammu (J&K), Dumka (Jharkhand), Dhankanal (Odhis), Kendrapara (Odhis), Varanasi (U.P.), Santkabirnagar (U.P.), Pantnagar (Uttrakhand)	222
Humid	Karimganj (Assam), Solan (H.P.), Kakdwip (W.B.)	82
Coastal	Thiruvalla	24

Results:

Performance of various cropping systems in terms of grain yield, total calories and net return are presented in Table 7.3/2. At Warangal among the four diversified system tested along with existing rice-rice system, rice-maize recorded higher net returns (Rs.88635 ha⁻¹) and total calories (45387 Kcal 1000) which is 37.8 and 25.4% higher than existing system respectively. Similar to Warangal, rice-maize recorded higher net returns of Rs.83596 ha⁻¹ at Nellore also even though total calories production was lesser than existing rice-rice system. The increase in net return was found to be 51.4% in rice-maize over rice-rice system. Rice-potato system at Karimganj can be replaced with rice-rajmah or rice-chilli as it registered net return of Rs.195197 ha⁻¹ and Rs.199990 ha⁻¹ respectively compared to existing system (Rs.101822 ha⁻¹). Rice-rajmah and rice-chilli were statistically on par. In terms of energy also rice-rajmah found to be higher (28590 Kcal) than other systems. Significantly higher net returns (Rs.74520 ha⁻¹) and energy (30682 Kcal) were recorded with rice-wheat-moong system at Patna which is 51.1% higher than rice-wheat system. Rice-chickpea also recorded net return of Rs.68776 ha⁻¹). At Arnej, diversification of two existing systems namely rice-wheat and cotton-fallow were evaluated. Rice-Lucerne fodder-Lucerne seed performed better by recording 70.5% higher net returns than existing rice-wheat system. Cotton+ sesamum-fodder sorghum recorded 45.8% higher net returns than Bt cotton alone. Cotton-fodder sorghum and cotton-fodder bajra have also registered 24.4 and 26.7% higher

returns than Bt cotton alone at Arnej. Diversification of pearl millet-mustard with mustard+Lucerne (seed), fennel, drill seed and Isobgol were evaluated at Bhachau in which it was observed that pearl millet-fennel recorded 150% higher net returns than pearl millet-mustard system even though total calories (6256 Kcal ha⁻¹) were lower. In an effort to diversity Bt cotton-fallow system at Bhachau for higher net returns, groundnut-wheat, groundnut+hybrid castor, groundnut-fennel and groundnut-mustard were tested at 12 farmers field. The yield indicates groundnut+hybrid castor recorded 139.8% higher net returns than Bt cotton alone. Groundnut-wheat and groundnut-mustard recorded net return of Rs.47034 ha⁻¹ and 46495 ha⁻¹ respectively which were on par.

Diversification of rice-wheat system with addition of moong in the sequence and



A farmer in conversation with scientists of PDFSR & PAU about experiment conducted on his field in Amritsar district

Table 7.3/2: Productivity, caloric value and net return of different crop sequences (2009-2010)

State/ NARP Zone/ Center/No. of trials	Crop sequences/Variety/N-P-K (kg/ha)						Total Calories (Kcal x1000)	Net return (Rs./ha)	
	Kharif		Rabi		Summer				
	Mean grain (kg/ha)	yield	Mean grain (kg/ha)	yield	Mean grain (kg/ha)	yield			
A.P. CT/ Warangal (24)	Rice(BPT-5204) 120-60-40		Rice(MTU-1010) 120-60-40				36166	64313	
	Rice(BPT-5204) 120-60-40		Maize(Pvt. Hybrid) 120-60-50				45387	88635	
	Rice(BPT-5204) 120-60-40		Clusterbean(Local) 30-62-62				17735	57189	
	Rice(BPT-5204) 120-60-40		Sesamum(Swetha) 40-40-60				20895	15358	
	Rice(BPT-5204) 120-60-40		Gr. Gram (WGG-37) 20-50-20				19678	51784	
			Rice(NLR-34449) 120-60-40	Rice(NLR-34242) 120-60-40					
			Rice(NLR-34449) 120-60-40	G.Nut(TCGS-29) 30-40-50					
			Rice(NLR-34449) 120-60-40	Maize(Pro Agro-4212) 120-60-50					
			Rice(NLR-34449) 120-60-40	Brinjal(Local Green) 100-60-60					
Assam Barak Valley / Karimganj (35)	Rice(Suwasini) 80-40-40		Potato(Kufri Jyoti) 60-50-50				24667	101822	
	Rice(Suwasini) 80-40-40		Rajmah (Uday) 30-40-20				28590	195197	
	Rice(Suwasini) 80-40-40		Chilli(Pusa Jawala) 70-40-60				13478	188990	
	Rice(Suwasini) 80-40-40		Capsicum (California -Wonder) 70-40-60				12976	111250	
Bihar Central & North Eastern Plateau/ Patna (24)	Rice(R. Shweta) 80-40-20		Wheat(PBW-373) 120-60-40				28066	49294	
	Rice(R. Shweta) 80-40-20		Wheat(PBW-373) 120-60-40	Moong			30682	74520	
	Rice(R. Shweta) 80-40-20		Linseed(Subhra) 60-30-20				20149	43779	
	Rice(R. Shweta) 80-40-20		Lentil (DPL-15) 20-40-0				19775	53455	
	Rice(R. Shweta) 80-40-20		Chickpea(Pusa-256) 20-45-00				21548	68776	

Contd..../-

State/ NARP Zone/ Center/No. of trials	Crop sequences/Variety/N-P-K (kg/ha)		Mean grain (straw) yield (kg/ha)	Total Calories (Kcal x1000)	Net return (Rs./ha)	
	Kharif	Rabi				Summer
Gujarat Bhal and Coastal/ Arnej (16)	Rice (Gurjari) 100-50-0	Wheat (GW-496) 120-60-0	5227	3380	61838	
	Rice (Gurjari) 150-50-0	Lucern-F (Anand-2) 20-80-0(Dur.-150 days)	5275	(63050)	84595	
	Rice (Gurjari) 150-50-0	Lucern-F (Anand-2) 20-80-0(Dur.-110 days)	5428	(63715)	86988	
	Rice (Gurjari) 150-50-0	Lucern-F (Anand-2) 20-80-0	5577	(42841)	105455	
					368	
Gujarat Bhal and Coastal/ Arnej (8)	Cotton (BT) 240- 0- 0		2777	-	55040	
	Cotton (BT) 240- 0- 0	F-Sorghum(GFSH-4) 80-40-0	2713	-	80241	
					+	
	Sesamum (GT-2) 40-20-0		344			
	Cotton (BT) 240- 0- 0	F-Sorghum(GFSH-4) 80-40-0	2769		(6589)	68457
Gujarat NWAC/ Bhachau (12)	Cotton (BT) 240- 0- 0	F-Bajra (Rajka Bajri) 80-40-0	2936	-	69728	
					(6921)	
					S.E.(m) C.D.(5%)	2022 4248
	Pearl millet(GHB-577) 80-40-0	Mustard(GM-3) 50-50-0	1643	1248	12681	
	Pearl millet(GHB-577) 80-40-0	Mustard(GM-3) 50-50-0	1679	1261	13098	
	Lucrene(seed)(Anand-2) 20-0-0		+	194		
Gujarat NWAC/ Bhachau (12)	Pearl millet(GHB-577) 80-40-0	Fennel (GF-11) 45-30-0	1703	973	6256	
	Pearl millet(GHB-577) 80-40-0	Drill Seed (GD-3) 30-30-0	1681	814	8552	
	Pearl millet(GHB-577) 80-40-0	Isobgol (GI-3) 40-20-0	1742	694	6287	
					S.E.(m) C.D.(5%)	1141 2306

Contd..../-

State/ NARP Zone/ Center/No. of trials	Crop sequences/Variety/N-P-K (kg/ha)		Mean grain (straw) yield		Total Calories (Kcal x1000)	Net return (Rs./ha)
	Kharif	Rabi	Kharif	Rabi		
Gujarat NWAC/ Bhachau (12)	Bt.Cotton(Krushi Dhan-1) 240-40-0	-	2665	-		32616
	G.Nut (GG-2) 12.5-25-0	Wheat(GW-496) 120-60-0	1733	3011		47034
	G.Nut (GG-2) 12.5-25-0		1436			78218
	Hy. Castor GCH-7) 75-50-0		2245			
	G.Nut (GG-2) 12.5-25-0	Fennel (GF-11) 90-45-0	1664	744		20246
	G.Nut (GG-2) 12.5-25-0	Mustard ((GM-3) 50-50-0	1755	1722		46495
	Rice (PR-114) 150-60-60	Wheat (DBW-17) 150-60-60	6982	4967		84954
	Maize (Kanchan-25) 150-62.5-60	Wheat (DBW-17) 150-60-60	2848	5019		51391
	Rice (PR-114) 150-60-60	Wheat (DBW-17) 150-60-60	7259	5067		90523
	Rice (PR-114) 150-60-60	Moong (SML-668) 15-40-00	7319	1872		69039
Rice (PR-114) 150-60-60	Moong (SML-668) 15-40-00	7262	1835		75066	
Rice (PR-114) 150-60-60	Moong (SML-668) 15-40-00					
H.P. Sub Mountane and Low Hills Sub-Tropical/ Solani (9)	Rice(Kasturi Basmati) 90-40-40	Wheat (HPW-155) 120-60-30	3177	3751		78853
	Rice(Kasturi Basmati) 90-40-40	Radish (J. White) 100-50-40	3203	16420		159937
	Rice(Kasturi Basmati) 90-40-40	Potato (Pukh Raj) 120-80-60	3230	14658		184393
	Rice(Kasturi Basmati) 90-40-40	French Bean(Cont- ender) 50-100-50	3274	14306		129833
	Rice(Kasturi Basmati) 90-40-40	Onion (N-53) 120-75-60	3261	-		106605
	Rice(Kasturi Basmati) 90-40-40	Berseem+Oat(Local) 30-60-00				

Contd...../-

State/ NARP Zone/ Center/No. of trials	Crop sequences/Variety/N-P-K (kg/ha)				Mean grain (straw) yield		Total Calories (Kcal x1000)	Net return (Rs./ha)	
	Kharif		Summer		Kharif	Rabi			Summer
	Kharif	Rabi	Summer						
Jharkhand Central and NEP sub-zone/ Dumka (24)	Paddy (Lalat) 80-40-20	Wheat ((K9107) 100-50-25			3240	2578	20129	36230	
	Paddy (Lalat) 80-40-20	Potato(K Cha Mukhi) 120-100-90			3116	11071	21521	75654	
	Paddy (Lalat) 80-40-20	Maize (H.G.M.I.) 100-50-25			3306	2727	20763	33924	
	Paddy (Lalat) 80-40-20	Cheakpea (KWR-108) 20-40-20			3233	1382	16161	40268	
	Paddy (Lalat) 80-40-20	Mustard (Shivani) 80-40-20			3392	569	14815	28207	
	Arhar (Birsas-1) 20-40-20				1160		305	4290	
	Arhar (Birsas-1) 20-40-20				913		605	8495	
	G-Nut(AK-12-24) 25-50-20				+				
	Arhar (Birsas-1) 20-40-20				815				
	Rice(Birsas V Dhan109) 40-20-20				+				
Jharkhand Central and NEP sub-zone/ Dumka (24)	Arhar (Birsas-1) 20-40-20				878		8034	22826	
	Maize (HDPM-1) 100-50-25				1414				
	Arhar (Birsas-1) 20-40-20				824		9536	23324	
	Black Gram(PU-35) 20-40-20				+				
	Chilli (Bayadagi dabi) 100-50-50				2015				
	Onion (N-53) 62.5-25-62.5				732		4798	16105	
	Cotton (Jayadhar local) 7.5-3.75-3.75				+				
	Sunflower(Laxmi-999) 35-50-35	Wheat (Kiran) 100-75-50			680		174	1158	
	Hybrid Maize (M-900) 100-50-25	Ben.Gram(BGD-103) 25-50-00			+		345	2292	
	Sunflower(Laxmi-999) 35-50-35	Ben.Gram(BGD-103) 25-50-00			454			62627	
Karnataka Northern Dry/ Gadag (5)					*				
					2503				
					*				
					788				
					1397	1571		11925	
				2585	1184		10330		
				1397	1184		18154		
							847		
							1846		

Contd..../-

State/ NARP Zone/ Center/No. of trials	Crop sequences/Variety/N-P-K (kg/ha)		Mean grain (straw) yield		Total Calories (Kcal x1000)	Net return (Rs./ha)
	Kharif	Rabi	Kharif	Rabi		
Karnataka Northern Transition/ Gadag (5)	Chilli (Bayadagi dabi) 100-50-50		414			47848
	Onion (N-53) 62.5-25-62.5		*			
	+ (1:3:2)		2355			
	Cotton (Jayadhar local) 7.5-8.75-3.75		*			
	Sunflower(Laxmi-999) 35-50-35	Ben.Gram(BGD-103) 25-50-00	1120	1020		24538
	Hybrid Cotton (Raasi) 30-15-15		1435			31797
	Ground Nut(TMV-2) 25-50-25	Sorghum(M35-1) 100-62-37.5	1289	1311		17629
					S.E.(m) C.D.(5%)	2539 5532
						22541
						11156
Karnataka Northern Dry/ Gadag (5)	Hybrid Maize (M-900) 150-75-37.5	Ben.Gram(BGD-103) 25-50-00	3691	1056		43232
	Sunflower(Laxmi-999) 60-75-60	Ben.Gram(BGD-103) 25-50-00	856	960		27633
	Hybrid Cotton(BT-Rasi) 150-75-75		2065			
	Chilli (Bagadi dabi) 150-75-75		808			3388 7382
					S.E.(m) C.D.(5%)	20992
						12528
						15911
						88695
						4861 10592
Karnataka Northern Dry/ Gadag (5)	Ground Nut(TMV-2) 25-50-25	Sorghum(M35-1) 100-60-40	1240	1421		
	Hybrid Maize (M-900) 100-50-25	Ben.Gram(BGD-103) 25-50-00	2031	980		
	Sunflower(Laxmi-999) 35-50-35	Wheat (WWR-162) 100-75-50	1160	1080		
	Chilli (Bayadagi dabi) 100-50-50		1060			
	Onion (N-53) 62.5-25-62.5		*			
	+ (1:3:2)		1100			
	Cotton (local) 7.5-3.75-3.75		*			
			1140			
					S.E.(m) C.D.(5%)	4861 10592

Contd..../-

State/ NARP Zone/ Center/No. of trials	Crop sequences/Variety/N-P-K (kg/ha)				Mean grain (straw) yield		Total Calories (Kcal x1000)	Net return (Rs./ha)
	Kharif		Rabi		Summer			
	Kharif	Rabi	Summer	Kharif	Rabi	Summer		
Kerala Special/ Thiruvalla (24)	Rice (Uma)	Rice (Uma)	-	5021	4829	-	34079	68845
	90-45-45	90-45-45	-	5093	4932	8140	38592	179670
	Rice (Uma)	Rice (Uma)	Cowpea (Veg.) (Jyothika)	5218	5036	-	40210	231321
	90-45-45	90-45-45	20-30-10	5236	5101	22347	38671	212018
	Rice (Uma)	Rice (Uma)	Bhindi (Arka Anamica)	5347	5189	-	82450	197796
	90-45-45	90-45-45	50-08-25	1479	3897	-	18601	57138
	Rice (Uma)	Rice (Uma)	Cucumber (Local)	1352	3865	16666	19216	72938
	90-45-45	90-45-45	70-25-25	1346	1606	-	10385	33282
	Rice (Uma)	Rice (Uma)	Amaranthus (Arun)	672	3991	-	16053	75321
	90-45-45	90-45-45	100-50-50	1232	8241	-	188	1285
M.P. Kymore Plateau & Satpura Hills / .Katni (8)	Rice(JRH-4)	Wheat(GW-273)	-	1479	3897	-	18601	57138
	120-60-40	120-60-40	-	1352	3865	-	19216	72938
	Soyabean(JS-9752)	Wheat(GW-273)	-	1346	1606	-	10385	33282
	20-60-20	120-60-40	-	672	3991	-	16053	75321
	Maize(MKI-163)	Gram(JK-62)	-	1232	8241	-	188	1285
	60-40-30	20-60-20	-	1346	1606	-	10385	33282
	Moong(TM-37)	Wheat(GW-273)	-	672	3991	-	16053	75321
	20-60-20	120-60-40	-	1232	8241	-	188	1285
	Soyabean (MAUS-71)	-	-	1232	8241	-	188	1285
	30-60-30	-	-	1232	8241	-	188	1285
Maharashtra Cent Mah Plateau/ Aurangabad (12)	+ (4:2)	-	-	1232	8241	-	188	1285
	Pigeonpea(BSMR-853)	-	-	1232	8241	-	188	1285
	(25-50-0)	-	-	1232	8241	-	188	1285
	Maize (Maharaja)	Gram (BDNG-797)	-	1232	8241	-	188	1285
	100-75-75	25-50-20	-	1232	8241	-	188	1285
	+ (1:1)	-	-	1232	8241	-	188	1285
	Black Gram (TAU-1)	-	-	1232	8241	-	188	1285
	25-50-0	-	-	1232	8241	-	188	1285
	Maize (Maharaja)	Gram (BDNG-797)	-	1232	8241	-	188	1285
	100-75-75	25-50-20	-	1232	8241	-	188	1285
Maharashtra Cent Mah Plateau/ Aurangabad (12)	Maize (Maharaja)	Gram (BDNG-797)	G.Gram(BPMR-145)	3420	1857	485	19999	53056
	25-50-0	25-50-20	25-50-0	3420	1857	485	19999	53056
	100-75-75	25-50-20	25-50-0	3420	1857	485	19999	53056
	Black Gram (TAU-1)	Gram (BDNG-797)	G.Gram(BPMR-145)	3420	1857	485	19999	53056
	25-50-0	25-50-20	25-50-0	3420	1857	485	19999	53056
	100-75-75	25-50-20	25-50-0	3420	1857	485	19999	53056
	Black Gram (TAU-1)	Gram (BDNG-797)	G.Gram(BPMR-145)	3420	1857	485	19999	53056
	25-50-0	25-50-20	25-50-0	3420	1857	485	19999	53056
	100-75-75	25-50-20	25-50-0	3420	1857	485	19999	53056
	Black Gram (TAU-1)	Gram (BDNG-797)	G.Gram(BPMR-145)	3420	1857	485	19999	53056

Contd..../-

State/ NARP Zone/ Center/No. of trials	Crop sequences/Variety/N-P-K (kg/ha)			Mean grain (straw) yield		Total Calories (Kcal x1000)	Net return (Rs./ha)	
	Kharif	Rabi	Summer	Kharif	Rabi			Summer
Maharashtra Cent Mah Plateau/ Aurangabad (12)	Soyabean(JS-335) 25-50-25	Wheat (HD 2189) 90-30-30		1418	2696		15455	34473
	Soyabean(MAUS-71) 30-60-30	Wheat (HD 2189) 100-50-50		1539	2851		16511	37379
	Soyabean(MAUS-71) 30-60-30	Safflower (PBNS-12) 60-40-0	F.Maize(African tall) 100-50-50	1630	1120	(36214)	11030	96413
	Soyabean(MAUS-71) 30-60-30	Gram (BDNG-797) 25-50-0	F.Maize(African tall) 100-50-50	1642	1756	(34197) S.E.(m) C.D.(5%)	13416	103626
							203 417	2178 4469
Maharashtra Scarcity/ Ahmednagar (24)	Soyabean(DS-228) 50-75-25	Wheat (NIAW-917) 120-60-40	-	2498	4379		25942	72361
	Soyabean(DS-228) 50-75-25	Gram(Digvijay) 25-50-00		2537	2552		19815	82999
	Soyabean(DS-228) 50-75-25	Onion (N-2-4-1) 100-50-50	-	2515	25384		23556	213350
	Soyabean(DS-228) 50-75-25	-	Chilly (Namdhari) 100-50-50	2519		5344	12430	139806
							81 162	1441 2882
Maharashtra North Konkan/ Karjat (24)	Rice (Sahyadri) 100-50-50	Cowpea(Konkan Safed) 25-50-00		6460	1258		22955	58445
	Rice (Sahyadri) 100-50-50	G.Nut(Kon. Trombay Topord) 25-50-00		6446	2239		35002	56375
	Rice (Sahyadri) 100-50-50	Maize(Ganga Safed) 100-50-50		6440	6285		43778	67786
	Rice (Sahyadri) 100-50-50	Merigold(Indica Orange) 150-75-50		6424	4241		22228	12139
	Rice (Sahyadri) 100-50-50	Wali (YB-7) 90-60-30		6342	3905		22958	55012
	Rice (Sahyadri) 100-50-50	Sweet Corn 1:4		6390	3502		35887	75152
						¹⁺ 1899		
		G.Nut(Kon. Trombay Topord) 25-50-00						
	Rice (Sahyadri) 100-50-50	Cowpea(Konkan Safed) 25-50-00	Okra (Maniko-10) 100-50-50	6421	1215	11164 (3814)	26708	142388
								231 457

Contd..../-

State/ NARP Zone/ Center/No. of trials	Crop sequences/Variety/N-P-K (kg/ha)				Mean grain (straw) yield		Total Calories (Kcal x1000)	Net return (Rs./ha)
	Kharif		Rabi		Summer			
	Kharif	Rabi	Kharif	Rabi	Summer	Summer		
Maharashtra Eastern Vidharbha High rainfall/Gondia (12)	Rice (PKV-Khamang) 100-50-50	Wheat(AKW-3722) 100-50-50	3892	2208		21106	47553	
	Rice (PKV-Khamang) 100-50-50	Mustard(Pusa Bold) 50-40-00	3971	904		18631	51210	
	Rice (PKV-Khamang) 100-50-50	Wheat(AKW-3722) 100-50-50	4096	2129	4650	23771	77445	
	Rice (PKV-Khamang) 100-50-50	Mustard(Pusa Bold) 50-40-00	4027	896	4900	21132	81157	
		Cowpea(Pusa dofa -sali) 25-50-0			S.E.(m) C.D.(5%)	209 429	1173 2407	
Maharashtra Eastern Vidharbha High rainfall/Gondia (12)	Rice (PKV-Khamang) 100-50-50	Chickpea(AKG-46) 20-40-00	3706	1300		17504	47370	
	Rice (PKV-Khamang) 100-50-50	Mustard(Pusa Bold) 50-40-00	3746	767		17108	45502	
	Rice (PKV-Khamang) 100-50-50	Chickpea(AKG-46) 20-40-00	3904	1233	4875	20288	78571	
	Rice (PKV-Khamang) 100-50-50	Mustard(Pusa Bold) 50-40-00	3896	781	4958	20086	75264	
		Cowpea(Pusa dofa -sali) 25-50-0			S.E.(m) C.D.(5%)	219 449	1201 2464	
Orissa Mid central table land Dhan Kanal (24)	Rice(Lalat) 80-40-40	Cowpea(Gomati) 25-50-60	4070	4298		16146	29651	
	Rice(Lalat) 80-40-40	Greengram(K-851) 20-40-0	4061	754		16571	20901	
	Rice(Lalat) 80-40-40	Okra(Hy-10) 60-40-40	4146	6478		16612	37587	
	Rice(Lalat) 80-40-40	Tomato(Hy-740) 75-50-50	4114	14733		17621	51190	
		Greengram(Local) 20-40-20			S.E.(m) C.D.(5%)	104 208	602 1203	
Orissa East & South Eastern Coastal Zone Kendrapara (24)	Rice(Swarna) 80-40-40	Sunflower(KBSH-1) 60-80-60	4834	904		19745	41291	
	Rice(Swarna) 80-40-40	G.Nut(Smurti) 20-40-40	4897	1431		25816	41105	
	Rice(Swarna) 80-40-40	Bittergourd(HB-1) 50-30-50	4874	2323		30034	53979	
	Rice(Swarna) 80-40-40		4864	6374		18424	71599	
					S.E.(m) C.D.(5%)	170 341	1229 2458	

Contd..../-

State/ NARP Zone/ Center/No. of trials	Crop sequences/Variety/N-P-K (kg/ha)				Mean grain (straw) yield		Total Calories (Kcal x1000)	Net return (Rs./ha)	
	Kharif		Summer		Kharif	Rabi			Summer
	Kharif	Rabi	Summer						
Punjab Central Plain/ Ludhiana (24)	Rice (PAU-201) 120-00-00	Wheat (DBW-17) 120-60-30	-	-	7489	4613	41874	86908	
	Rice (PAU-201) 120-00-00	G.Sarson (GSL-1) 100-30-00	-	-	7569	1498	34297	69441	
	Rice (PAU-201) 120-00-00	G.Sarson (GSL-1) 100-30-00	Moong (SML-668) 12.5-40-00	-	7551	1491	37834	91741	
	Rice (PAU-201) 120-00-00	Gram (GPF-2) 15-20-00	Moong (SML-668) 12.5-40-00	-	7631	1238	34453	35759	
	Rice (PAU-201) 120-00-00	Gram (GPF-2) 15-20-00	-	-	7490	1300	30596	66514	
								S.E.(m) 1306 C.D.(5%) 746 C.V. 9.13	
					925	4053	17110	97756	
					1377	4078	14921	86183	
					1366	1443	8614	55540	
					1378	3668	13139	73143	
Rajasthan North Western Plain/ Hanumangarh (20)	Moong(S.M.L.668) 20-40-20	Wheat (Raj.3077) 120-40-20	-	-					
	C.Bean (RGC 936) 20-40-20	Wheat (Raj.3077) 120-40-20	-	-	1377	4078	14921	86183	
	C.Bean (RGC 936) 20-40-20	Mustard (Laxmi) 60-32-20	-	-	1366	1443	8614	55540	
	C.Bean (RGC 936) 20-40-20	Barley (RD 2052) 80-40-20	-	-	1378	3668	13139	73143	
								S.E.(m) 533 C.D.(5%) 1067 C.V. 3.05	
					2567	3158	19706	65808	
					2804	3263	20552	59250	
					2154	2883	18917	75429	
					+				
					453				
Rajasthan Sub-Humid Southern Plain & Aravalli Hills/ Udaipur(12)	Maize (PM-5) 90-35-30	Wheat (Raj 4037) 120-40-30	-	-					
	Maize (PM-5) 90-35-30	Barley (RD 2035) 60-20-00	-	-					
	Maize (PM-5) 90-35-30	Wheat (Raj 4037) 120-40-30	-	-					
	+ (2:2) Urd (T-9) 20-40-30	Wheat (Raj 4037) 120-40-30	-	-					
	Sorghum (SPV 1616) 80-40-30	Wheat (Raj 4037) 120-40-30	-	-	2125	2358	16648	64204	
	+ (2:1)				+				
	G.Gram(RMG-344) 20-40-30	Wheat (Raj 4037) 120-40-30	-	-	321	3804	13688	74200	
	Clusterbean (RGC 936) 20-40-30	Wheat (Raj 4037) 120-40-30	-	-	892	3804	13688	74200	
								S.E.(m) 377 C.D.(5%) 762 C.V. 7.29	
								2499 5051 12.77	

Contd..../-

State/ NARP Zone/ Center/No. of trials	Crop sequences/Variety/N-P-K (kg/ha)				Mean grain (straw) yield		Total Calories (Kcal x1000)	Net return (Rs./ha)	
	Kharif		Summer		Kharif	Rabi			Summer
	Kharif	Rabi	Summer						
Rajasthan Humid Southern Plain/ Udaipur(12)	Maize (PM-5) 90-40-30	Wheat (Raj 4037) 120-40-30	-	2567	4201	-	23313	85457	
	Maize (PM-5) 90-40-30	Wheat (Raj 4037) 120-40-30	Greengram (K851) 20-40-30	2633	4188	933	26612	135485	
	Maize (PM-5) 90-40-30	Wheat (Raj 4037) 120-40-30	Lady finger (Arka Anamica) 60-30-30	1917	4504	7850	24887	230571	
	Urd (T-9) 20-40-30			+					
				371					
	Clusterbean (RGC936) 20-40-0	Wheat (Raj 4037) 120-40-30	Greengram (K851) 20-40-30	1025	4763	933	20203	145496	
	Clusterbean(RGC1003) 20-40-0	Wheat (Raj 4037) 120-40-30	Lady finger (Arka Anamica) 60-30-30	1071	4820	7883	20068	231058	
T.N. Southern/ Chettinad (24)	Rice (ADT-39) 150-50-50	Rice (ADT-36) 120-38-38		3832	3925			5632	
	Rice (ADT-39) 150-50-50	Black gram (VBN-5) 25-50-25		3847	840			11382	
	Rice (ADT-39) 150-50-50	Green gram(VBN-3) 25-50-25		3858	872			11.78	
	Rice (ADT-39) 150-50-50	Gingelly(SVPPR-1) 35-23-23		3853	617			26839	
								16227	
								16260	
								16808	
								94	
								185	
								2.41	
T.N. North West/ Paiyur (24)	Rice (Paiyur-1) 150-50-50	Rice (Paiyur-1) 120-40-40		7126	7154			118975	
	Rice (Paiyur-1) 150-50-50	Tomato (US 618) 150-100-50		7097	71883			41087	
	Rice (Paiyur-1) 150-50-50	Cabbage(Hari Rani) 50-125-25		7059	30289			32601	
	Rice (Paiyur-1) 150-50-50	Cau.flower(Namdhari) 50-100-100		7170	22950			39956	
								157	
								314	
								1.88	
								194	
								383	
								1.99	

Contd..../-

State/ NARP Zone/ Center/No. of trials	Crop sequences/Variety/N-P-K (kg/ha)				Mean grain (straw) yield			Total Calories (Kcal x1000)	Net return (Rs./ha)		
	Kharif		Rabi		Summer		Kharif			Rabi	Summer
	Kharif	Rabi	Rabi	Summer	Kharif	Summer					
U.P. Eastern Plane/ Varanasi (18)	Rice(NDR-359) 120-60-60	Wheat(HD-2733) 120-60-40			4838	4436		32090	67769		
	Rice(NDR-359) 120-60-60	Gram(Pusa-362) 18-46-00			4782	2304		24839	64263		
	Rice(NDR-359) 120-60-60	Mustard(NDR-8501) 80-40-40			4861	1684		25929	48098		
	Rice(NDR-359) 120-60-60	Pea(Rachna) 18-46-00			4863	2152		23605	48180		
							S.E.(m) C.D.(5%) C.V.	103 209 1.64	420 849 3.12		
U.P. Bondekhand/ Sant Kabir Nagar (24)	Rice(NDR-359) 120-60-40	Wheat(HUW-234) 120-60-40			4896	3687		29696	52625		
	Rice(NDR-359) 120-60-40	Mustard(NDR-8501) 120-60-40			4982	1819		27076	53337		
	Rice(NDR-359) 120-60-40	Lentil (NDL-1) 30-60-40			4965	1689		22975	56576		
	Rice(NDR-359) 120-60-40	Pea(Rachna) 30-60-40			5025	1838		23177	49083		
							S.E.(m) C.D.(5%) C.V.	163 326 3.10	949 1898 8.79		
Uttarakhand Hills/ Pantnagar (12)	Rice (Pusa -1121) 100-60-40	Wheat (PBW-550) 150-60-40		-	4673	4749		32598	96072		
	Rice (Pusa -1121) 100-60-40	Wheat (PBW-550) 150-60-40			4680	4510		32450	95544		
	+ Mustard(Kanti) Rice (Pusa -1121) 100-60-40	Potato(Kufri Badshah) 160-100-120		Urd (P U-31) 15-45-00	+121 4718	20318		39312	168666		
	Rice (Pusa -1121) 100-60-40	Potato(Kufri Badshah) 160-100-120		Moong.(PM-5) 15-45-00	4707	20555		39881	138772		
	Rice (Pusa -1121) 100-60-40	Pea .(Arkil) 30-70-50		F.Bean(VL Bouny-1) 120-70-50	4724	5559		34714	153778		
							S.E.(m) C.D.(5%) C.V.	250 505 2.42	3452 6977 9.16		

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State/ NARP Zone/ Center/No. of trials	Crop sequences/Variety/N-P-K (kg/ha)			Mean grain (straw) yield			Total Calories (Kcal x1000)	Net return (Rs./ha)
	Kharif	Rabi	Summer	Kharif	Rabi	Summer		
Uttarakhand Hills/ Pantnagar (12)	Rice (PSD-3) 150-60-40	Wheat (PBW-550) 150-60-40	-	6897	4357	-	38937	90624
	Rice (PSD-3) 150-60-40	Wheat (PBW-550) 150-60-40	-	6822	4008	-	39045	91677
	Rice (PSD-3) 150-60-40	+ Mustard(Kantli) Mustard(Kantli) 100-60-40	Urd (P U-31) 15-45-00	6823	+291 1301	1118	34525	135620
	Mustard(Kantli) 150-60-40	Moong.(PM-5) 100-60-40	6787	1330	1109	34382	99458	
	Rice (PSD-3) 150-60-40	Veg. Pea ,(Arkil) 30-70-50	15-45-00 F.Bean(Contander) 90-70-50	6849	7514	5004	31985	294749
W. B. Coastal Saline/ Kakdwip (24)	Rice (Pankaj) 80-40-40	GGram(Chait Moong) 20-40-40		4083	-	839	16930	40888
	Rice (Pankaj) 80-40-40	Bhindi(SG-016) 80-40-40		4096	-	4717	16641	35897
		+ (2:3)				400		
		GGram(Chait Moong) 20-40-40				19372	38473	
		SunFlower(G Kaveri) 80-40-40	4172 80-40-40 + (2:4)		550	-		
Rice (Pankaj) 80-40-40	GGram(Chait Moong)			394				
Rice (Gothra-1) 80-40-40	Mustard(B-54) 80-40-40	Bhindi(SG-016) 80-40-40		4344	687	9358	22024	67532
						S.E.(m) 94	894	
						C.D.(5%) 188	1788	
						C.V. 2.45	9.59	



Chief Agronomist (AICRP-IFS) at Jorhat centre explaining to farmers about IFS technologies

replacement of wheat with gram and raya were conducted at Karnal in 12 farmers field. All the sequences except rice-wheat-moong recorded lower net returns than existing rice-wheat system. The increase in net return with rice-wheat-moong was found to be 6.5% over rice-wheat system. The total calories also found to be in the similar pattern as that of net returns. At Solan, diversification of rice-wheat and maize-wheat were explored with 9 and 14 on farm trials respectively. All the options recorded more net returns than the existing system. Rice-potato-frenchbean can be recommended in place of rice-wheat system as it registered 133.8% higher net returns. Similarly maize+soybean-wheat and maize-gram recorded net return of Rs. 52667 ha⁻¹ and Rs. 53303 ha⁻¹ respectively while higher income of Rs.1,61,120 ha⁻¹ can be obtained from maize-potato-onion. Options to diversify rice-

wheat and maize-wheat with high value crops have also been explored at Jammu through 24 on-farm trials. The income from rice-wheat system (Rs.77819 ha⁻¹) can be increased to as high as Rs.225094 ha⁻¹ by growing rice-potato-onion system. Similarly maize-potato-onion can replace maize-wheat system as there exists scope for obtaining 227% higher net income with maize-potato-onion system. Energy also registered similar trend in both the sequences.

Existing cropping system viz., rice-wheat and Arhar at Dumka can be replaced by rice-potato and Arhar+groundnut respectively. Rice-potato recorded 109% higher returns than rice-wheat system. Similarly an additional net return of Rs.2844 ha⁻¹ can be obtained by growing Arhar+groundnut in place of Arhar alone. The energy content of the various sequences also recorded similar pattern as that of net returns. Chilli+onion+cotton recorded net return of Rs.55238 ha⁻¹ at Gadag which is higher than all the other crop sequences. Hybrid maize-bengal gram can be replaced by hybrid cotton as it recorded 91.8% higher net returns. Groundnut-sorghum can be diversified using chilli+onion+cotton as it has scope to increase the net returns by 322% from the present groundnut-sorghum system at Gadag. Rice-maize, rice-tomato and redgram+coriander-tomato has better scope for diversification of existing systems like rice-brinjal and rice-fingermillet at Bangalore. Redgram+coriander-tomato recorded 18.4% higher net returns than rice-maize system. Calorific values of produces also found to follow the similar pattern.



Tribal farmers feeling happy with a good crop of mustard in Kawardha district of Chhattisgarh



Rice-rice-okra recorded significantly higher net return of Rs.231321ha⁻¹ which is 236% higher than existing system at Thiruvalla. However, rice-rice-amaranthus recorded 142% and 105% higher calorific values than rice-rice and rice-rice-okra systems respectively. At Katni, moong-wheat can replace rice-wheat system as it had recorded 31.8% higher net returns and it was on par with soybean-wheat system (Rs.72938 ha⁻¹). At Aurangabad, maize-gram-green gram recorded 80.8% higher net returns than soybean+pigeonpea system. Similarly, additional net return of Rs.69,153 ha⁻¹ can be obtained by raising soybean-gram-fodder-maize in place of soybean wheat system. Soybean-onion recorded additional net return of Rs.140989 ha⁻¹ than soybean-wheat system at Ahmednagar. Rice-cowpea-okra recorded higher net returns of Rs.142388 ha⁻¹ compared to existing system of rice-cowpea at Karjat. At Gondia, experiments to find alternative cropping system for rice-wheat and rice-chickpea were experimented at 12 farmers field each. Rice-mustard-cowpea recorded net return of Rs.81157 ha⁻¹ which is 70.6% higher than rice-wheat system. Rice-chickpea recorded 65.8% higher returns than rice-chickpea alone. In order to replace the cowpea in rice-cowpea system, green gram, okra and tomato were evaluated in place of cowpea at Dhenkanal. The results revealed that rice-tomato and rice-okra recorded more returns compared to rice-cowpea system. However, introduction of green gram in place of cowpea led to 29.5% lower net returns. Rice-Greengram system can be replaced by rice-bittergourd as it recorded additional return of Rs.30308/ha⁻¹ compared to rice-greengram system though it recorded higher energy (19745 kcal ha⁻¹) at Kendrapara. Rice-G.sarson-moong had net return of Rs.91741 ha⁻¹ which is 5.6% higher than rice-wheat system at Ludhiana. Other systems had lower returns than rice-wheat thus having less scope to replace the existing system. Moong-wheat had net return of Rs.97756 ha⁻¹ at Hanumangarh while other systems had lesser returns and calories. In order to replace maize-wheat system at Udaipur, eight sequences were evaluated at 24 farmers field. The results reveals that clusterbean-wheat-okra and maize-wheat-okra had recorded net return of Rs.231058 ha⁻¹ and Rs.230571 ha⁻¹ respectively which is almost 170% higher than existing maize-wheat system in humid southern plain areas of

Udaipur while maize+urd-wheat and clusterbean-wheat can replace maize-wheat system at sub humid southern plain and Aravalli hills at Udaipur.

Rice-blackgram can be adopted in place of rice-rice system in order to realize 21.2% higher net returns at Chettinad. However, the energy content was found to be higher (26839 kcal ha⁻¹) with rice-rice than any other crop sequence. At Paiyur also, though rice-rice had higher energy content of 49410 Kcal ha⁻¹, net return was higher with rice-tomato (Rs.153776 ha⁻¹) which is 29.2% higher than rice-rice system. At Varanasi, existing rice-wheat system had higher return of Rs.67769 ha⁻¹ and energy (32090 kcal ha⁻¹) than the other systems. Rice-lentil is having the scope to replace rice-wheat system at Santkabirnagar as it recorded 7.5% higher returns. Rice-potato-urd can be grown in place of rice-wheat to realize 75.6% higher returns at Pantnagar. The same system had also 21% higher energy production than existing system. In the other set of evaluation of diversified system for rice-wheat at Pantnagar, rice-vegetable pea-french bean recorded higher net return of Rs.294749 ha⁻¹ which is 225% higher than rice-wheat system. Rice-mustard-okra had recorded Rs.67532 ha⁻¹ as net returns and 22024 kcal ha⁻¹ as energy which is 65% and 30% higher respectively than existing rice-green gram system at Kakdwip in net returns and energy than the rice-greengram system.

Across the locations and irrespective of various systems, diversification of existing system led to net return of Rs.1,13,397 ha⁻¹ compared to the present system (Rs.64032 ha⁻¹). On an average an additional return of Rs.49365 ha⁻¹ can be obtained through diversification of existing system with complimentary crops.

Title of the Experiment: On-farm agronomic management practices for sustaining the production of cropping systems

Objectives: To increase and sustain the productivity of the cropping systems by addressing the most important factor responsible for lowering down the production potential of the systems.

Year of start: 1999-2000

Treatments:

- T₁** : Farmer's practice (FP)
- T₂ & T₃** : FP + corrective measures for the most important constraint(s)/ factor(s) affecting the crop productivity – one or at the most.
- T₄** : Recommended package of practices

Locations:**Results:**

The results obtained for 2009-10 along with treatment details are given in table 7.3/3. Cropping system wise results are briefly summarized below.

Rice-rice: Recommended package with Co RH3 laybrid of rice at Paiyur recorded higher yield during *kharif* (8855 kg ha⁻¹) and *rabi* (8680 kg ha⁻¹). The increase in yield over farmers practice was 29 and 22% during *kharif* and *rabi* respectively. At Chettinad recommended package for addressing

Cropping system	Centre (State)	Constraint advanced	No. of experiments
Rice-Rice	Warangal (A.P.)	Micronutrient deficiency	24
	Thiruvalla (Kerala)	Weed, nutrient and plant population management	72
	Paiyur (T.N.)	Improved variety	24
	Chettinad (T.N.)	Weed control	24
Rice-Wheat	Patna (Bihar), Dumka (Jharkhand), Seoni (M.P.), Amritsar (Panjab), Varanasi (U.P.), Santkabirnagar (U.P.), Pantnagar (Uttrakhand).	Lower plant population	24
	Arnej (Gujarat)	Micronutrient deficiency	16
	Karnal (Haryana)	Lower population & weed management	12
	Jammu (J&K)	weed management	12
	Katni (M.P.)	Nutrient management	8
	Gondia (Maharashtra)	Nutrient management	12
	Dhenkanal (Odhis)	Lower population & micronutrient management	8
	Ludhiana (Punjab)	Plant population & nutrient management	24
	Palampur (H.P.)	Nutrient Management	8
	Dehradun (Uttrakhand)	Improved variety & Plant population management	24
	Santkabirnager (U.P.)	Nutrient Management	24
	Varanasi (U.P.)	Nutrient Management	18
Rice-groundnut	Raigad (Maharashtra)	Improved variety & Nutrient management	24
	Dhenkanal (Odhis)	Plant population & micronutrient management	16
Rice-Okra (Summer)	Bangalore (Karnataka)	Nutrient Management	8
Rice-Pumpkin-cowpea	Karimganj (Assam)	Improved variety	42
Rice-Maize (Summer)	Bangalore (Karnataka)	Improved variety & fertilizer management	8
Rice-greengram	Kendrapara (Odhis)	Plant population & micronutrient management	24
	Kakdwip (W.B.)	Plant population & micronutrient management	24

Cropping system	Centre (State)	Constraint advanced	No. of experiments
Rice-tomato (S)	Bangalore (Karnataka)	Plant population & fertilizer management	8
Rice-Onion	Raipur (Chattisgarh)	Improved variety & Nutrient management	10
Rice-Cabbage (S)	Raipur (Chattisgarh)	Improved variety & Nutrient management	10
Rice-finger millet	Bangalore (Karnataka)	Seed treatment & fertilizer management	16
Rice-brinjal (S)	Bangalore (Karnataka)	Seed treatment & nutrient management	8
Rice <i>rabi</i> -cotton (Early <i>Kharif</i>)	Tirupathi (A.P.)	Plant population & micronutrient management	24
Rice-Cowpea	Gondia (Maharashtra)	Nutrient Management	12
Pearl Millet –mustard	Bhachau (Gujarat)	Macro & micro nutrient management	12
Maize-Wheat	Udaipur (Rajasthan)	Improved variety & Nutrient management	12
	Udaipur (Rajasthan)	Fertilizer management	12
	Jammu (J.K.)	Weed management	12
	Palampur (H.P.)	Weed control, fertilizer management	12
Maize-mustard	Dumka (Jharkhand)	Improved variety, Plant population & fertilizer management	24
Maize-Bengalgram	Gadag (Karnataka)	Weed & micro nutrient management	5
	Aurangabad (Maharashtra)	Rain water management	12
Cotton-groundnut (S)	Bhachau (Gujarat)	Seed treatment & micronutrient management	12
Cotton-Sorghum (F) (S)	Arnej (Gujarat)	Micro nutrient management	8
Groundnut Sorghum	Gadag (Karnataka)	Improved cultural practices & micro nutrient management	5
Soybean-wheat	Seoni (M.P.)	Fertilizer & pest management	10
	Ahamad nagar (Maharashtra)	Improved variety & fertilizer management	24
Soybean-Gram	Aurangabad (Maharashtra)	Rain water management & fertilizer management	12
Clusterbean-wheat	Humumangarh (Rajasthan)	Improved variety & fertilizer management	20
Chilli+onion-cotton	Gadag (Karnataka)	Weed control	10

the weed constraint resulted in higher grain yield (6211 kg ha⁻¹ in *kharif* and 6340 kg ha⁻¹ in *rabi*). The yield increase was 40% each during *kharif* and *rabi*. At Thiruvalla, population, nutrient and weed management constraints was addressed through recommended package of practice which resulted in higher grain yield of 6272 and 6181 kg ha⁻¹ in *kharif* and *rabi* respectively and increase over farmers practice was 28% in *kharif* and 30% in *rabi*. In order to address Zn deficiency in rice-

rice cropping system, soil and foliar application of ZnSO₄ was tested at Warangal in 24 farmers field. Basal application of 50 kg ha⁻¹ of ZnSO₄ along with foliar spray @ 2g l⁻¹ of water at 30 and 40 days after planting resulted in higher grain yield in both the seasons (5219 kg ha⁻¹ in *kharif* and 5795 kg ha⁻¹ in *rabi*). The increase in yield over farmers practice was found to be 9 and 15% in *kharif* and *rabi* respectively.

Rice-wheat: Out of 12 centres in which different constraints in rice-wheat system was addressed, 5 centres have addressed optimum plant population, while only 2 centres have addressed the problem of weed infestation. Six centres have addressed the fertilizer management while 2 centres addressed on micronutrient constraints. Four centres have addressed more than one constraint. Recommended package of practices to rice and wheat at Patna resulted in higher grain yield of 4446 kg ha⁻¹ in rice and 4074 kg ha⁻¹ in wheat and it is 38 and 33% higher over farmers practice. At Karnal also recommended package for maintaining optimum population and weed control recorded grain yield of 7352 kg ha⁻¹ in rice and 5183 kg ha⁻¹ in wheat. However, the increase in yield of rice and wheat over farmers practice was only 8% in both the crops with recommended package. An increase of 33 and 49% in grain yield of rice and wheat respectively was observed with recommended package of both the crops at Dhankanal. Addition of ZnSO₄ @ 25 kg ha⁻¹ had 25% higher grain yield in rice and 38% higher yield in wheat over farmers practice. At Ludhiana, adoption of optimum plant population had resulted in only 7 and 10% increase in grain yield of rice and wheat. The increase was more pronounced when recommended package of practices with fertilizer dose of 120-0-0 kg N PK ha⁻¹ for rice and 120-60-30 kg NPK ha⁻¹ for wheat was adopted. Recommended package to rice and wheat at Dehradun resulted in 27 and 39% increase in grain yield of rice and wheat. At Jammu, recommended package to control weeds led to significantly higher grain yield of 5092 kg ha⁻¹ in rice and 3350 kg ha⁻¹ in wheat. The increase in yield was found to be 39 and 37% in rice and wheat respectively over farmers practice. Application of Butachlor 5G @ 30 kg ha⁻¹ with in 24 hours after transplanting of rice and Metribuzine @ 250 g ai ha⁻¹ at 35 DAS to wheat had increased yield to the tune of 14 and 17% respectively over farmers practice. Significantly higher grain yield of rice (1587 kg ha⁻¹) and wheat (4117 kg ha⁻¹) was recorded at Katni with recommended package to each crops and the yield increase over farmers practice was found to be 40 and 20% respectively. At Gondia also, recommended package had yield increase of 19% in rice and 55% in wheat over farmers practice. Application of NPK @ 90-40-40 kg ha⁻¹ to rice and 120-60-30 kg ha⁻¹ to wheat along with

10 t ha⁻¹ of FYM to each crop had resulted in 44% and 43% increase in grain yield of rice and wheat respectively over farmers practice at Palampur. Recommended package to rice and wheat crops at Santkabirnager resulted to 40 and 44% higher grain yield over farmers practice. Significantly higher increase in grain yield of rice (92%) and wheat (98%) was observed at Varanasi with recommended package of practices. Application of ZnSO₄ to rice and wheat at Arnej recorded grain yield of 5735 kg ha⁻¹ and 3203 kg ha⁻¹ in rice and wheat respectively which is 6 and 4% higher than farmers practice. However, recommended package to rice and wheat resulted in each 13% increase in yield over farmers practice.

Rice-groundnut: Improved variety in rice (Shyadri) and groundnut (Konkan Trombay tapora) recorded significantly higher grain yield of rice (7239 kg ha⁻¹) and pod yield of groundnut (2586 kg ha⁻¹). The increase over farmers practice was 76 and 83% respectively at Raigad. At Dhankanal, though recommended package resulted in 42 and 32% increase in yield of rice and groundnut, maintaining the plant population at 20x10cm in rice and 30x10cm in groundnut along with ZnSO₄ @ 25 kg ha⁻¹ to rice and gypsum @ 250 kg ha⁻¹ to wheat resulted in 30% increase in rice yield and 25% increase in groundnut pod yield over farmers practice.

Rice-okra (S): Application of nitrogen using leaf colour chart with recommended fertilizer of rice @ 75-50-50 kg ha⁻¹ resulted in significantly higher grain yield of 670 kg ha⁻¹ which is closely followed by recommended package (5319 kg ha⁻¹). The increase over farmers practice was 14 and 7% respectively. Similarly in okra also, use of biofertilizers and neem based plant protection chemicals along with recommended fertilizer dose of 125-75-63 kg ha⁻¹ resulted in yield of 9081 kg ha⁻¹ which is on par with recommended package. The increase in yield over farmers practice in both the treatment was only 10 and 9% respectively at Bangalore.

Rice-pumpkin-cowpea: Improved variety of all the crops (Suwasini, Ahki chandani and pusa barsati respectively) at Karimganj resulted in 32, 66 and 47% increase in yield of rice, pumpkin and cowpea respectively over farmers practice. However, the recommended package of practices had higher

Table 7.3/3: Crop yields as influenced by different treatments in different cropping systems (2008-2009)

State/ NARP Zone/ Center/No. of trials	Treatment			Yield (kg/ha)			% increase in yield over F.P.			Constraints addressed
	Rabi			Summer			Kharif			
	Kharif	Rabi	Summer	Kharif	Rabi	Summer	Kharif	Rabi	Summer	
Andhra Pradesh CT/ Warangal(24) (BPT-5204_MTU-1010)	Rice-Rice									
	T1= F.P.	T1= F.P.	T1= F.P.	4783	5060	5060	5.79	7.21		Micronutrient Management
	T2= T1+Basal application of 50 Kg/ha ZnSo4	T2= T1+Basal application of 50 Kg/ha ZnSo4	T2= T1+Basal application of 50 Kg/ha ZnSo4	5060	5425	5425				
	T3= Basal application of Chelatel Zn @ 1.25 Kg/ha	T3= Basal application of Chelatel Zn @ 1.25 Kg/ha	T3= Basal application of Chelatel Zn @ 1.25 Kg/ha	5019	5347	5347	4.93	5.67		
T4=T1+Basal application of 50 Kg/ha ZnSo4+foliar spray of ZnSo4 @ 2g/Lof water at 30 & 40 DAP	T4=T1+Basal application of 50 Kg/ha ZnSo4+foliar spray of ZnSo4 @ 2g/Lof water at 30 & 40 DAP	T4=T1+Basal application of 50 Kg/ha ZnSo4+foliar spray of ZnSo4 @ 2g/Lof water at 30 & 40 DAP	5219	5795	5795	9.12	14.53			
Kerala Special / Thiruvalla(72) (Uma_Uma)	T1= F.P.	T1= F.P.	T1= F.P.	39	42	42				Weed Fertilizer and Plant population management
	T2= T1+Organic Manure 5T/ha	T2= T1+Organic Manure 5T/ha	T2= T1+Organic Manure 5T/ha	79	85	85				
	T3=R.P.	T3=R.P.	T3=R.P.	3.80	3.83	3.83				
	T4=T1+(POP+OPD)	T4=T1+(POP+OPD)	T4=T1+(POP+OPD)	4888	4756	4756	9.74	8.70		
T.N. North Western / Paiyur(24) (CORH-3_CORH-3)	T1= F.P.	T1= F.P.	T1= F.P.	19	19	19				Improved Variety
	T2= T1+Var. Sonam	T2= T1+Var. ADT-39	T2= T1+Var. ADT-39	37	36	36				
	T3=R.P.	T3=R.P.	T3=R.P.	2.86	2.91	2.91				
	T4=T1+(POP+OPD)	T4=T1+(POP+OPD)	T4=T1+(POP+OPD)	6870	7123	7123	19.81	13.69		
T.N. Southern/ Chettinad(24) (ADJ-39_ADT-36)	T1= F.P.	T1= F.P.	T1= F.P.	29	25	25				Weed Control
	T2=T1+ Butachlor @2.5L/ha	T2=T1+ Butachlor @2.5L/ha	T2=T1+ Butachlor @2.5L/ha	59	50	50				
	T3=R.P.	T3=R.P.	T3=R.P.	1.78	1.51	1.51				
	T4=T1+(POP+OPD)	T4=T1+(POP+OPD)	T4=T1+(POP+OPD)	4428	4544	4544	10.34	11.09		
			4886	5048	5048	40.27	39.52			
			6211	6340	6340					
			19	20	20					
			38	39	39					
			1.82	1.81	1.81					

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State/ NARP Zone/ Center/No. of trials	Treatment			Yield (kg/ha)			% increase in yield over F.P.			Constraints addressed
	Kharif	Rabi	Summer	Kharif		Rabi		Summer		
				Kharif	Summer	Rabi	Summer	Kharif	Summer	
Rice-Wheat										
Bihar Central & North East Plateau / Patna (24) (R-Shweta_ PBW-373)	T1= F.P. T2+T1+ Line sowing at 15X15 cm spacing T3=R.P.	T1= F.P. T2=T1+Line sowing at 23 cm apart T3=R.P.	S.E(m). C.D. C.V	3228 3645 4446 27 55 3.56	3052 3220 4074 27 54 3.79	12.92 37.73	5.50 33.49	Plant Population Management		
Gujarat MGAC/ Arnej (16) (Gujari_GW-496)	T1=FP; T2=T1+Appl. of ZnSO4 T3=R,P	T1=FP; T2=T1 T3=R,P	S.E(m). C.D. C.V	5370 5735 6098 81 168 5.68	3070 3203 3497 54 112 6.64	6.80 13.56	4.33 13.91	Micronutrient Management		
Haryana Eastern Alluvial Plain/ Karnal(12) (PR-114_DBW-17)	T1=FP. T2=T1 + Treated 25Kg/ha & 30-32 hill/mt. Sq. T3=R,P T4=T1+Butachloz 3L/ha through sand application	T1=FP. T2=T1 +Treated 125Kg/ha & Drill sowing T3=R,P. T4=T1+Topik 400gm/ha +Algrip 20gm/ha at 35 DAS	S.E(m). C.D. C.V	6780 7142 7352 7010 19 39 0.94	4804 5028 5183 4956 13 28 0.93	5.34 8.44 3.39	4.66 7.89 3.16	Plant Population & Weed Management		
Jammu & Kashmir Sub-Tropical/ Jammu(12) (Jaya_DBW-17)	T1=FP. T2=T1+ Appl. of Butachlor 5G @ 30 kg/ha within 24 hour after transplanting T3=R,P	T1=FP. T2=T1+ Metribuzine @250 gma/ha at 35 DAS T3=R,P	S.E(m). C.D. C.V	3652 4156 5092 15 32 1.24	2440 2844 3350 21 43 2.49	13.80 39.43	16.56 37.30	Weed Management		

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State/ NARP Zone/ Center/No. of trials	Treatment		Summer	Yield (kg/ha)			% increase in yield over F.P.			Constraints addressed
	Kharif	Rabi		Kharif	Rabi	Summer	Kharif	Rabi	Summer	
Madhya Pradesh Keymore Platue Satpura/ hills/ Katni (8) (JRH-4_GW-273)	T1=FP. T2=T1+ 50% N by FYM in RF(120-60-40) T3=RP	T1=FP. T2=T1+ 50% N by FYM in RF(120-60-40) T3=RP	S.E(m). C.D. C.V	1137 1307	3444 3872	14.95	12.43	19.54	Fertilizer Management	
Maharashtra Eastern Vidharbha/ Gondia(12) (PKVHMTL_HD-2189)	T1=FP. T2=T1 +RF(100-50-50) T3=R.P. T4=T3+64N+46P+24K	T1=FP. T2=T1 +RF(100-50-50) T3=R.P. T4=T3+76N+30P+30K	S.E(m). C.D. C.V	3317 3608 3950 3706	1575 1977 2440 2050	8.77 19.08 11.73	25.52 54.92 30.16	Fertilizer Management		
Orissa Mid-Central Table Land/ Dhankana(8) (Local_Sonalika)	T1=FP. T2=T1 +(20x10 cm) spacing T3=R.P. T4=T2+ZnSO4@25kg/ha	T1=FP. T2=T1 +(20x10 cm) spacing T3=R.P. T4=T2+ZnSO4@25kg/ha	S.E(m). C.D. C.V	3435 3766 4583 4207	1699 1983 2533 2348	9.64 33.42 22.47	16.72 49.09 38.20	Plant Population & Micronutrient Management		
Punjab Central Plain/ Ludhiana (24) (PAU-201_DBW-17)	T1=FP. T2=T1 +(20x15 cm) spacing T3=R.P. T4=T3+R.F.(120-0-0)	T1=FP. T2=T1 +(15x12.5 cm) spacing T3=R.P. T4=T3+R.F.(120-60-30)	S.E(m). C.D. C.V	7252 7912 7765 8172	4375 4634 4822 4847	9.10 7.07 12.69	5.92 10.22 10.79	Plant Population & fertilizer		
H.P. Sub mountain and low hills sub-tropical / Palampur (8) (Kasturi Basmati_HP -155)	T1=FP. T2=T1 +RF(90-40-40) T3=R.P. T4=T2 + FYM 10 T/ha	T1=FP. T2=T1 +NPK(120-60-30) T3=R.P. T4=T2 + FYM 10 T/ha	S.E(m). C.D. C.V	2384 2767 3071 3421	2496 2927 3228 3579	16.07 28.82 43.50	17.27 29.33 43.39	Fertilizer Management		

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State/ NARP Zone/ Center/No. of trials	Treatment		Summer	Yield (kg/ha)		% increase in yield over F.P.		Constraints addressed
	Kharif	Rabi		Kharif	Rabi	Kharif	Rabi	
Uttarakhand Mid Western Plain Dehradun (24) (Local_Local)	T1=FP. T2=T1 +Imp.Var(Pusa 1121) T3=R.P. T4=T1+Line Transplanting	T1=FP. T2=T1 +Imp.Var (PBW-550) T3=R.P. T4=T1+Line sowing	SE(m). C.D. C.V	4621 4793 5887 4976 40 79 3.83	3269 3518 4550 3645 22 45 2.92	3.72 27.40 7.68	7.62 39.19 11.50	Improved Variety & Plant Population Management
Uttar Pradesh Bundelkhand/ Sant Kabir Nagar(24) (NDR-359_HUW-284)	T1=FP. T2=T1+ RF(120-60-40) T3=R.P	T1=FP. T2=T1+ RF(120-60-40) T3=R.P	SE(m). C.D. C.V	3594 4453 5033 37 75 4.20	2812 3544 4050 21 42 2.94	23.90 40.04	26.03 44.03	Fertilizer Management
Uttar Pradesh Eastern Plain/ Varanasi(18) (Local_Local)	T1=FP. T2=T1+ RF(120-60-60) T3=R.P	T1=FP. T2=T1+ RF(120-60-40) T3=R.P	SE(m). C.D. C.V	2772 4408 5334 46 95 4.69	2296 3910 4547 28 58 3.33	59.02 92.42	70.30 98.04	Fertilizer Management
Maharashtra North Konkan/ Raigarh (24) (Jaya_SB-11)	T1=FP. T2=T1 + RF(100-50-50) T3=R.P. T4=T1+Improved Variety (Shyadri)	T1=FP. T2=T1+RF(25-50-0) T3=R.P. T4=T1+Improved Variety (Konkan Trombay Tapora)	SE(m). C.D. C.V	4117 4893 5372 7239 71 140 6.42	1413 1751 2042 2586 25 49 6.26	18.85 30.48 75.83	23.92 44.52 83.01	Improved Variety & fertilizer Management
Orissa Mid-Central Table Dhankanal(16) (Lalat_Shruiti)	T1=FP. T2=T1 + Plant population (20X10cm) T3=R.P. T4=T2+ZnSO4 @ 25kg/ha	T1=FP. T2=T1 + Plant population (30X10cm) T3=R.P. T4=T2'+Gypsum @ 250kg/ha	SE(m). C.D. C.V	3191 3586 4518 4137 50 101 5.23	2153 2365 2852 2691 43 87 6.88	12.38 41.59 29.65	9.85 32.47 24.99	Plant Population & Micronutrient Management

Rice - G.Nut

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State/ NARP Zone/ Center/No. of trials	Treatment		Yield (kg/ha)			% increase in yield over F.P.		Constraints addressed
	Kharif	Rabi	Summer		Kharif	Rabi	Summer	
			Kharif	Rabi				
Karnataka Eastern Dry Zone/ Banglore (8) (Thanu_ Anamika)	T1=FP. T2=T1 +N use efficiency by LCC+RF(75-50-50)	Rice - Okra (Sum)	4955	8271	8271	14.43	9.79	Fertilizer Management
			5670	9081	9081			
			5319	9001	9001	7.35	8.83	
	T3=R.P.	Rice-Pumkin-Cowpea	113	152	152			
			247	332	332			
			6.04	4.90	4.90			
Assam Barak Valley/ Karimganj(42) (Ranjit_Baidya Batl_Ram aish)	T1= F.P. T2= T1+ Improved Variety (Suwasini)	Rice - Maize (Summer)	2729	5958	1668	32.50	47.18	Improved Variety
			3616	9867	2455			
			4702	14618	3408	72.30	145.35	
	T3=R.P.	Rice-Maize (Summer)	46	204	39			
			90	404	77			
			8.04	13.03	9.98			
Karnataka Eastern Dry Zone/ Banglore (8) (Thanu_NAH_2049)	T1= F.P. T2=T1+Aerobic Paddy Var. MAS-946+RF(100-50-50)+ ZnSO4@20Kg/ha+FeSO4@ 12Kg/ha+Saathi@250gm/ha	Rice - Maize (Summer)	4242	8020	8020	-23.97	16.56	Improved Variety Macronutrient & Fertilizer Management
			3225	9348	9348			
			4646	8952	8952	9.52	11.62	
	T3=R.P.	Rice-Maize (Summer)	284	747	747			
			609	1602	1602			
			19.88	24.08	24.08			

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State/ NARP Zone/ Center/No. of trials	Treatment		Summer	Yield (kg/ha)		% increase in yield over F.P.		Constraints addressed
	Kharif	Rabi		Kharif	Rabi	Kharif	Rabi	
Orissa East & South Eastern Coastal/Kendrapara(24) (Swarna_Local)	T1=F.P.	T1=F.P.		2622	680	13.42	10.15	Plant Population & Micronutrient Management
	T2=T1+ Plant Population (20x10cm) spacing	T2=T1+ Plant Population (30x10cm) spacing		2974	749	29.82	34.71	
	T3=R.P.	T3=R.P.		3404	916	63.35	21.18	
	T4=T2+ZnSO4@25kg/ha	T4=T2 +Gypsum@250kg/ha		4283	824			
West Bengal Coastal Saline/ Kakdwip(24) (Pankaj_Chait moong)	T1=F.P.	T1=F.P.	T1=F.P.	3620	600	6.05	15.00	Plant Population Micronutrient & Fertilizer Management
	T2=T1+ Plant Pop.(20x15cm) + Green Manure	T2=T1+ Plant Pop. (30x10cm) spacing	T2=T1+ Plant Pop. (30x10cm) spacing +RF(22-51-0)	3839	690	11.52	25.33	
	T3=T2+ZnSO4 application	T3=T2	T3=T2	4037	752	19.23	47.00	
	T4=R.P.	T4=R.P.	T4=R.P.	4316	882			
Karnataka Eastren Dry / Banglore (8) (Thanu_PKH_1)	T1=F.P.	T1=F.P.	T1=F.P.	5107	6790	9.38	14.62	Plant Population & Fertilizer Management
	T2= T1+N use efficiency through LCC+ RF(100-50-50)	T2= T1+N use of Nursery seedlings + RF(115-100-60)	T2=T1+Use of Nursery seedlings + RF(115-100-60)	5586	7783	3.15	9.75	
	T3=R.P.	T3=R.P.	T3=R.P.	5268	7452			
				108	76			
Chhattisgarh CG Plain/ Raipur 10 (N.A._Puna lal)	N.A.	T1= F.P.		9440	9440	80.08		Improved Variety & Fertilizer Management
		T2= T1+ RF(120-80-50)		17000	17000	125.95		
		T3= R.P		21330	21330	33.74		
		T4= T1+ Improved variety (Gota (Krishdhan))		12625	12625			
			383	383				
			786	786				
			8.02	8.02				

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State/ NARP Zone/ Center/No. of trials	Treatment		Yield (kg/ha)			% increase in yield over F.P.			Constraints addressed	
	Kharif	Rabi	Kharif	Rabi	Summer	Kharif	Rabi	Summer		
Chhattisgarh CG Plain/ Raipur (10) (N.A._Green wal)	N.A.	T1= F.P. T2= T1+ RF(120-80-50) T3=R.P T4= T1+ Improved variety (Hyb.Bahar)	Rice-Cabbage						Improved Variety & Fertilizer Management	
			13030	33210	40400	17750	590	1211		7.15
			154.87	210.05	36.22					
Karnataka Eastren Dry / Banglore (16) (Thanu_GPU-48)	T1=FP. T2=T1+N use effctency through LOC T3=R.P	T1=FP. T2= T1+ Seed treatment with azotobactor 375gm.+RF (100-50-50) T3=R.P S.E(m). C.D. C.V	Rice- Fingermillet (Summer)						Seed treatment & Fertilizer management	
			4592	4414	5211	3285	61	126		7.27
			2832	4024	13.48					
			42.09	16.00						
Karnataka Eastren Dry / Banglore (8) (Thanu_Green long)	T1=FP. T2=T1+RF(100-50-50)+ Saathi @250gm/ha+ZnSO4@20Kg /ha+FeSO4@12Kg/ha T3=R.P	T1=FP. T2= T1+use of Biofertilizers and neem based PP chemicals+RF (100-50-50) T3=R.P S.E(m). C.D. C.V	Rice- Brinjal (Summer)						Seed treatment & Fertilizer management	
			4395	3113	4841	12953	273	596		5.79
			12953	13671	10.15					
			5.54	4.09						
Andhra Pradesh Southern/ Tirupati(24) (NLR_34449_MallikaBT)	T1= F.P. T2= T1+ Improved planting management 44 hills/m sq.at spacing 15x15 cm T3=R.P. T4= T1+ZnSO4 @ 50 kg/ha	T1= F.P. T2= T1+ Zero tillage T3=R.P. T4= T1+ Application of Mg,Zn and Boron	Rice(Rb.)>Cotton(Early Kh.)						Plant Population & Micro-Nutrient Management	
			5791	6050	6280	2089	2091	2560		2279
			4.47	0.10	8.44	3.63	22.43	9.10		
			45	27	91	53	3.68	5.78		

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State/ NARP Zone/ Center/No. of trials	Treatment		Summer	Yield (kg/ha)		% increase in yield over F.P.		Constraints addressed
	Kharif	Rabi		Kharif	Rabi	Kharif	Rabi	
Maharashtra Eastern Vidharbha/ Gondia(12) (Jayshirram_Local)			Rice-Cowpea					
	T1=F.P. T2=T1 +RF(100-50-50) T3=R.P. T4=T3+82N+36P+20K	T1=F.P. T2=T1 +RF(20-40-0) T3=R.P. T4=T3+13N+23P	S.E(m). C.D. C.V	3696 3896 4142 3979 49 101 4.33	885 1008 1365 992 17 35 5.52	5.41 12.07 7.66	13.90 54.24 12.09	Fertilizer Management
			Pearl millet -Mustard					
	T1=F.P. T2=T1+ Azotobactor+ 40 kg/ha of P2O5 as basal T3=R.P.	T1=F.P. T2= T1+ 25 kg/ha Sulphur as basal T3=R.P	S.E(m). C.D. C.V	1477 1634 2002 17 35 3.36	1375 1470 1776 14 30 3.20	10.63 35.55	6.91 29.16	Micronutrient & Fertilizer Management
Rajasthan Sub humid Southern Plain & Aravalli Hills/Udaipur(12) (Local_Lok-1)			Maize - Wheat					
	T1= F.P. T2=T1+Impr. Var. (Pratap Makka 5) T3= R.P. T4=T1+RF(90-35-30) + Impr. Var. (Pratap Makka 5)	T1= F.P. T2=T1+Impr. Var. (Raj-4037) T3= R.P. T4=T1+RF(120-40-30)+ Impr. Var. (Raj-4037)	S.E(m). C.D. C.V	1413 2167 2958 2650 50 103 7.61	2971 3621 4667 4296 68 139 6.03	53.36 109.34 87.54	21.88 57.09 44.60	Improved Variety & Fertilizer Management
			Maize - Wheat					
	T1= F.P. T2=T1+Impr. Var. (Pratap Makka 5) T3= R.P. T4=T1+RF(90-40-30) + Impr. Var. (Pratap Makka 5)	T1= F.P. T2=T1+Impr. Var. (Raj-4037) T3= R.P. T4=T1+RF(120-40-30)+ Impr. Var. (Raj-4037)	S.E(m). C.D. C.V	1550 2213 2796 2563 29 59 4.36	2968 3937 4905 4563 48 98 4.05	42.77 80.39 65.35	32.65 65.26 53.74	Improved Variety & Fertilizer Management
Rajasthan Humid Southern Plain Udaipur(12) (Local_Lok-1)			Maize - Wheat					
	T1= F.P. T2=T1+Impr. Var. (Pratap Makka 5) T3= R.P. T4=T1+RF(90-40-30) + Impr. Var. (Pratap Makka 5)	T1= F.P. T2=T1+Impr. Var. (Raj-4037) T3= R.P. T4=T1+RF(120-40-30)+ Impr. Var. (Raj-4037)	S.E(m). C.D. C.V	1550 2213 2796 2563 29 59 4.36	2968 3937 4905 4563 48 98 4.05	42.77 80.39 65.35	32.65 65.26 53.74	Improved Variety & Fertilizer Management

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State/ NARP Zone/ Center/No. of trials	Treatment		Summer	Yield (kg/ha)		% increase in yield over F.P.		Constraints addressed
	Kharif	Rabi		Kharif	Rabi	Kharif	Rabi	
Jammu & Kashmir Sub-Tropical/ Jammu(12) (Kanchan_DBW-17)	T1=F.P. T2=T1+ Appl. of Atrazine @ 1 kgai/ha pre emergence T3=R.P	T1=F.P. T2=T1+ Metribuzine @250 gmai/ha post emergence T3=R.P	S.E(m). C.D. C.V	2379	1889	15.59	13.98	Weed Management
				2750	2153	35.01	42.14	
				3212	2685	27.77	25.61	
				11	16	52.46	44.60	
H.P. Sub mountain and low hills sub-tropical / Palampur (12) (KH-101A_HPW-155)	T1= F.P. T2=T1+RF(90-45-30) T3=R.P. T4=T2+10t/ha FYM+ Chemical Weed control	T1= F.P. T2=T1+RF(80-40-40) T3=R.P. T4=T2+ ChemicalWeed control+10 T/ha FYM	S.E(m). C.D. C.V	2049	2128	71.01	62.41	Weed control & Fertilizer Management
				2618	2673	27.77	25.61	
				3124	3077	52.46	44.60	
				3504	3456	71.01	62.41	
Jharkhand Central/NEP/ Dumka (24) (Local _Local)	T1= F.P. T2=T1+NPK(100-50-25)+ 60x30 cm spacing T3=R.P. T4=T2 + Improved variety (HQPM-1)	T1= F.P. T2=T1+RF(80-40-20) T3=R.P. T4=T2+ 30x10 cm spacing+ Imp. Var (Shivani)	S.E(m). C.D. C.V	1198	297	20.37	39.06	Improved Variety Plant Population & Fertiliser Management
				1442	413	40.65	78.45	
				1685	530	130.30	264.31	
				2759	1082	33	17	
Karnataka Northern Dry/ Gadag (5) (M-900_BGD-103)	T1= F.P. T2= T1+25 Kg/ha ZnSo4 T3=R.P.	T1= F.P. T2= T1+PBS@1.25Kg/ha +Rizobium1.25Kg/ha T3=R.P.	S.E(m). C.D. C.V	3201	750	15.00	18.67	Weed & Micro-Nutrient Management
				3681	890	38.14	65.46	
				4422	1241	31	72	
				35	81	2.09	7.26	

Maize - Mustard

Maize- Bengal gram

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State/ NARP Zone/ Center/No. of trials	Treatment		Summer	Yield (kg/ha)			% increase in yield over F.P.		Constraints addressed	
	Kharif	Rabi		Kharif	Rabi	Summer	Kharif	Rabi		Summer
Maharashtra OMP/ Aurangabad(12) (Ganga Kaveri_Local)	T1= F.P. T2=R.P.	T1= F.P. T2=RF		1131		14.65	25.91		Rain water management	
	T3=T2+Rain water managem -nt furrows in alternate row	T3=T2+Rain water managem -ent by furrows in each row		1424		23.65	39.17			
	T4=T2+Rain water managem -ent by furrows in each row		S.E(m). C.D. C.V	1671		26.31	47.75			
				52 107 6.56						
Gujarat NWAC/ Bhachau (12) Local pouch_Local	T1=FP. T2=T1+25kg/ha ZnSO4 & PSB culture T3=R.P.		Cotton-G.nut(Sum)						Seed treatment & Micronutrient Management	
			T1=FP. T2=T1+50kg/ha FeSo4 & Seed Treatment T3=R.P.	1238 1403		17.77	13.33			
			S.E(m). C.D. C.V	1665 23 48 5.47		37.10	34.49			
				2116 2492						
Gujarat Bhal Coastal Arnej (8) (BT_GFSH-4)	T1=FP. T2= T1+Application of ZnSO4 T3=R.P		Cotton-Sorghum(F) (Sum)						Micro-Nutrient Management	
			T1=FP. T2= T1 T3=R.P	6521 7150 7863		8.43 19.91	9.97 20.58			
			S.E(m). C.D. C.V	140 304 5.50						
				2988 3240 3583 70 153 6.08						
Karnataka Northern Dny/ Gadag(5) (TMV-2_M-35-1)	T1=FP. T2=T1+ZnSO4 @25Kg/ha +FeSO4 @25Kg/ha T3=R.P	T1=FP. T2=T1+Azopirillum@ 50gm/ha+Trichodema @30gm/ha T3=R.P	G.Nut -Sorghum						Micro-nutrient & impr. cultural management	
			T1=FP. T2=T1+ T3=R.P	1060 1230		15.19	16.04			
			S.E(m). C.D. C.V	1396 14 31 2.46		32.24	31.70			
				915 1054						
M.P. Kymore Plateau / Satpura hill/ Seoni(10) (JS-9305 _ DL-803-3)	T1= F.P. T2=T1+ 50% N as FYM drilled at sowing in R.F.(20-60-20)+ Targa 2 ml/L 20 DAS T3=R.P.	T1= F.P. T2=T1+ 50% N as FYM drilled at sowing in RF(120-60-40)+ 2-4-Dat 25 DAS T3=R.P.	Soyabean-Wheat						Fertilizer Management & Pest Management	
			S.E(m). C.D. C.V	3015 3960		40.27	31.34			
				673 944		15.30	11.94			
				776 32 58 69 122 12.85						

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State/ NARP Zone/ Center/No. of trials	Treatment		Summer	Yield (kg/ha)		% increase in yield over F.P.		Constraints addressed
	Kharif	Rabi		Kharif	Rabi	Kharif	Rabi	
Maharashtra Scarcity/ Ahmednagar(24) (JS-335_NIAW-301)	T1= F.P. T2=T1+RF(50-75-25) T3=R.P. T4=T1+Imp. Var.(NIAW-917) +RF(120-60-40) as 1/2N Urea & FYM each +Spacing 22.5cm	T1= F.P. T2=T1+RF(120-60-40) T3=R.P.	1811 2155 2495 2335	2378 2886 4448 3949	19.00 37.77 28.93	21.36 87.05 61.86	Improved Variety & Fertilizer Management	
			14 27 3.05	25 49 3.55				
			Soyabean-Gram					
			1329 1396 1509 1552	1469 1579 1606 1666	5.04 13.54 16.78	7.49 9.33 13.41	Fertilizer Management & Rain water	
Maharashtra CMP/ Aurangabad(12) (MAUS-71_BDNG-797)	T1= F.P. T2=R.P. T3=T2+Rain water manageme -nt through alternate furrows T4=T2+Rain water managem -ent by furrows in each row	T1= F.P. T2=RF T3=T2+Rain water manageme -nt through alternate furrows T4=T2+Rain water managem -ent by furrows in each row	34 70 8.16	28 57 6.10				
			Cluster bean-Wheat					
			1263 1327	3749 3920	5.07	4.56	Improved Variety & Fertilizer Management	
			1440 4 8 1.29	4099 19 39 2.17	14.01	9.34		
Rajasthan Irrigated North Western Plain /Hanuman Garh(20) (RGC-936_ Raj-3077)	T1= F.P. T2=T1+Imp. Var. (HG 365) 1/2N as basal+1/2 N topdressing after 20 days of sowing Impr. Var.(Raj. 1482) T3=R.P.	T1= F.P. T2=T1+Fert. (120-40-0) with 1/2N as basal+1/2 N topdressing after 20 days of sowing Impr. Var.(Raj. 1482) T3=R.P.	1765 2166	596 667	24.16 52.13	11.91 42.10	Weed Management	
			2940 34 73 4.72	680 12 19 25 40 6.58 8.53				
			Chilli+Onion-Cotton					
					22.72 66.57			
Karnataka Northern Transection/ Gadag (10) (Byadagi dabh_N53_ Jayadhar)	T1= F.P. T2= T1+Pendimithalor @1Kg/ha T3=R.P.	T1= F.P. T2= T1 T3=R.P.	1765 2166	596 667	24.16 52.13	11.91 42.10	Weed Management	

yield increase (72, 145 and 104% respectively for rice, pumpkin and cowpea) over farmers practice.

Rice-maize: Change in variety from Thanu to aerobic paddy variety MAS 946 with recommended fertilizer dose of 200-50-50 kg NPK ha⁻¹ + ZnSO₄ @ 20 kg ha⁻¹ + FeSO₄ @ 12 kg ha⁻¹ + Saathi @ 250 g ha⁻¹ in paddy at Bangalore resulted in 24% reduction in grain yield over farmers practice. However, in maize recommended fertilizer @ 150-75-40 kg ha⁻¹ + ZnSO₄ @ 15 kg ha⁻¹ and biofertilizer @ 15 kg ha⁻¹ resulted in 17% increase in yield. However, recommended package had only 9.5% increase in yield of rice and 12% in maize compared to farmers practice.

Rice-greengram: Maintaining plant population at 20x10 cm spacing with 25 kg ha⁻¹ ZnSO₄ to rice at Kendrapara resulted in 4283 kg ha⁻¹ of grain yield of rice which is 63% higher than farmers practice. Recommended package had resulted in 35% increase in yield of greengram over farmers practice. The yield increase due to optimum plant population alone in both the crops ranged from 10 to 14% only. Optimum plant population with ZnSO₄ application to rice had increased the yield by 12% and optimum population with recommended fertilizer 22-51-0 kg NPK ha⁻¹ to greengram resulted in 25% increase in yield over farmers practice. However, recommended package resulted in 19% and 47% increase in yield of rice and greengram respectively at Kakdwip.

Rice-tomato (S): Nitrogen application through leaf colour chart (LCC) with recommended NPK dose of 100-50-50 kg ha⁻¹ in rice and use of nursery seedlings and application of NPK @ 115-100-60 kg ha⁻¹ at Bangalore resulted in higher grain yield of rice (5586 kg ha⁻¹) and fruit yield of tomato (7783 kg ha⁻¹). The increase in yield was also observed to the tune of 9% in rice and 15% in tomato over farmers practice.

Rice-onion: At Raipur, recommended package to onion resulted in yield of 21330 kg ha⁻¹ which is 126% higher than farmers practice. Recommended fertilizer application @ 120-80-50 kg NPK ha⁻¹ to onion alone resulted in 80% increase in yield compared to farmers practice. Farmers practice resulted in low yield of 9440 kg ha⁻¹ only.

Rice-cabbage: Recommended package of practices for cabbage at Raipur resulted in 40 400 kg ha⁻¹ which is 210% higher than farmers practice. Application of recommended NPK of 120-80-50 kg ha⁻¹ to cabbage had yield increase of 155% changing the cabbage variety greenwal to hybrid bahar resulted in yield of 17750 kg ha⁻¹ which is only 36% higher than the existing variety. Farmers practice had lower yield of 13030 kg ha⁻¹ only.

Rice-fingermillet (S): Nitrogen application using leaf colour chart in rice at Bangalore resulted in 4% reduction in yield while recommended practice to rice resulted in grain yield of 5211 kg ha⁻¹ which is 13% higher than farmers practice (4592 kg ha⁻¹). In finger millet, seed treatment with *azotobacter* @ 375 g ha⁻¹ and recommended NPK of 100-50-50 kg ha⁻¹ leaf to 42% higher yield over farmers practice and 22% higher yield over recommended package of practices.

Rice-brinjal (S): Application of recommended package to rice and use of biofertilizers and neem based plant protection chemicals along with recommended NPK of 100-50-50 kg ha⁻¹ to brinjal resulted in higher yield of 10% and 5.5% respectively over farmers practice. Addition of Saathi @ 250 g/ha + ZnSO₄ and FeSO₄ to rice resulted in reduction in yield to the tune of 29% over farmers practice at Bangalore.

Rice (rabi)-cotton (Early Kharif): Improved planting management with 44 hills m⁻² at the spacing of 15x15cm in rice resulted in 6050 kg ha⁻¹ of grain yield which is only 4% higher than conventional practice. However, the recommended practice had increased the yield to the tune of 8%. Addition of ZnSO₄ @ 50 kg ha⁻¹ to rice and application of Mg, Zn and boron increased the yield to the tune of 3.6% and 9.1% respectively at Tirupathi.

Rice-cowpea: At Gondia, application of NPK @ 82-36-20 kg ha⁻¹ in addition to recommended package to rice resulted in higher grain yield of 3979 kg ha⁻¹ which is 12% higher than farmers practice while recommended package with 13-23kg NP ha⁻¹ resulted in 12% increased yield.

Pearlmillet-mustard: Addition of *Azotobacter* with 40 kg P ha⁻¹ as basal in pearl millet resulted in 11% increase in yield while 7% increase in yield

was observed in mustard with addition of 25 kg sulphur ha⁻¹ at Bhachau. In both the crops, recommended package recorded 36 and 29% higher yield respectively compared to farmers practice.

Maize-wheat: In maize, recommended package had resulted in 2958 kg ha⁻¹ yield followed by recommended NPK @ 90-35-30 kg ha⁻¹ with improved variety viz., Pratap makka 5. The increase in yield over farmers practice was found to be 109 and 88% respectively. Improved variety in maize with Pratap makka 5 alone increased the yield by 53% at Udaipur. Significantly higher wheat yield was observed with improved variety Raj 4037 (22%) and recommended NPK @ 120-40-30 kg ha⁻¹ + Raj 4037 (45% increase over farmers practice). In wheat also higher yield was realized with recommended package (57%). Similar results were observed at other set of experiments in which also Pratap makka 5 and Raj 4037 along with recommended fertilizer dose of maize and wheat were experimented. At Jammu, the yield difference between farmers and recommended practice was found to be 35% in maize and 42% in wheat. Application of Atrazine @ 1 kg ai ha⁻¹ as pre emergence herbicide to maize and Metribuzine @ 250 g ha⁻¹ as post emergence to wheat resulted in 16 and 14% yield increase over farmers practice. Significantly higher yield in maize and wheat were observed at Palampur with recommended NPK of 90-45-30 kg ha⁻¹ + 10 t FYM ha⁻¹ + chemical weed control to maize and recommended NPK of 80-40-40 kg ha⁻¹ + chemical weed control and 10 t FYM ha⁻¹ to wheat. The yield increase over farmers practice was found to be 71 and 62% respectively in which recommended fertilizer alone contributed 28 and 26% yield increase in maize and wheat. In both the crops, the yield increase was lesser with recommended package than recommended nutrient + chemical weed control + 10 t FYM ha⁻¹.

Maize-mustard: NPK dose of 100-50-25 kg ha⁻¹ with 60x30cm planting of HQPM-1 maize resulted in maize yield of 2759 kg ha⁻¹ at Dumka which is 130% higher than farmers practice. NPK dose and 60x30cm spacing alone contributed only 20% yield increase. In case of mustard, NPK dose of 80-40-20 kg ha⁻¹ with Shivani variety sown at 30 x 10 cm spacing resulted significantly higher yield of mustard (1082 kg ha⁻¹) which is 264% higher

than farmers practice. Recommended dose of NPK alone recorded only 39% increase in yield.

Maize-bengalgram: At Gadag, application of 25 kg ZnSo₄ ha⁻¹ to maize resulted in grain yield of 3681 kg ha⁻¹ which is 15% higher than farmers practice (3201 kg ha⁻¹). Similarly in Bengal gram incorporation of PBS @ 1.25 kg ha⁻¹ + *Rhizobium* @ 1.25 recorded 19% increase in yield. In both the crops recommended package recorded significantly higher increase (38.1% in maize and 65.5% in Bengal gram) in yield. At Aurangabad, recommended package + rain water management by furrows in alternate rows and recommended package + rain water management by furrows in each row of maize recorded on par yield (2928 and 2991 kg ha⁻¹) which is 24 and 26% higher respectively than farmers practice. In case of bengal gram, significantly higher yield was observed with recommended fertilizer + rain water management by furrows in each row (1671 kg ha⁻¹) and it is 48% higher than yield obtained from farmers practice. The contribution of recommended fertilizer / package alone to maize and bengal gram resulted in only 15 and 26% increase in yield.

Cotton-groundnut (S): Around 37% increase in cotton yield was observed with recommended package at Bhachau. The yield increase in groundnut was observed to be 35%. Application of 25 kg ha⁻¹ of ZnSo₄ and PSB culture to cotton and 50 kg FeSo₄ and seed treatment to groundnut recorded 2901 and 1665 kg ha⁻¹ of cotton and groundnut pods respectively which is 18 and 13% higher than farmers practice.

Cotton-sorghum (F) (S): Application of ZnSo₄ to cotton and fodder sorghum registered yield increase of 8.4 and 10% respectively over farmers method. In both the crops, recommended package had higher influence as it recorded 20 and 21% yield increase at Arnej.

Groundnut-sorghum: Application of ZnSo₄ and FeSo₄ @ 25 kg each ha⁻¹ to groundnut recorded 1054 kg of groundnut pods ha⁻¹ which is 15% higher than farmers method of cultivation. In case of sorghum, *Azospirillum* @ 50 g ha⁻¹ + *Trichoderma* @ 30 g ha⁻¹ recorded yield of 1230 kg ha⁻¹ and it is 16% more than the normal practice adopted by

the farmers. In both the crops, the increase in yield due to adoption of recommended package was found to be 32% each at Gadag.

Soybean-wheat: At Seoni, 40 and 31% increase in yield was observed with application of 50% N as FYM drilled at sowing with recommended NPK of 20-60-20 kg ha⁻¹ + Targa 2 ml l⁻¹ at 20 DAS to soybean and 50% N as FYM drilled at sowing with recommended fertilizer of 120-60-40 kg NPK ha⁻¹ + 2-4D at 25 DAS in wheat respectively. The increase in yield was less pronounced in case of recommended practice in both soybean and wheat. At Ahmednagar recommended NPK dose of 50-75-25 kg ha⁻¹ to soybean and 120-60-40 kg ha⁻¹ to wheat registered 19 and 21% increase in yield while improved variety + recommended nutrient of respective crops as ½ N from Urea and FYM each led to 28% increase in soybean and 61% increase in wheat yield. Higher increase of 87% was observed in wheat with recommended package of practices.

Soybean-gram: Recommended fertilizer with rain water management by furrows in alternate and each rows to soybean and gram had statistically on par yield and percent increase was in the range of 9-16% at Aurangabad. Recommended fertilizer / package alone contributed only 5% increase in soybean and 7% in gram.

Cluster bean-wheat: Improved variety of cluster bean (HG 365) has recorded 1327 kg ha⁻¹ of yield and it is only 5% higher than farmers method. However, there exists scope to increase the yield of cluster bean by 14% through adoption of recommended package of practices. Similarly in wheat also, only 4.5% increase in yield was observed with fertilizer dose of 120-40-0 kg ha⁻¹ with ½ N as basal and ½ N as top dressing after 20 days of sowing in improved variety of wheat Raj 1482. The yield increase with recommended package was found to be 9% at Hanumangarh.

Chilli + onion-cotton: Application of Pendimethalin @ 1 kg ha⁻¹ to chilli and cotton had recorded yield of 555 kg dry chillies ha⁻¹ and 667 kg cotton ha⁻¹ which is 24 and 11% higher than the farmers practice. Recommended practice to chilli and cotton resulted in 62 and 42% yield increase respectively over farmers practice. In case of onion, yield can be increased by 23% by weed management using herbicides and 67% by adopting recommended package.

Across the locations and crops, the yield increase due to adoption of recommended package was 47% over farmers practice thus giving scope to increase the yield and profitability of crops in all the locations simply by giving thrust to transfer of technology and adoption of recommended scientific packages by farmers.

8. GENERAL/MISCELLANEOUS

- 8.1 List of Publications**
- 8.2 Participation of Scientists in Symposia/Seminars/Workshops/Trainings etc.**
- 8.3 Group Meetings/Workshops Organised**
- 8.4 Radio and Television Talks Delivered by Project Staff**

8. GENERAL/MISCELLANEOUS

8.1 LIST OF PUBLICATIONS

8.1.1 Research Papers

ANGRAU, Rajendranagar (A.P.)

Reddy, M. M., Padmaja, B. and Rao, L. Jalapathi, 2009. Influence of drought management practices on growth and yield of pigeon pea. *Indian J. Dryland Agric. Res. & Dev.*: **24 (1)**: 63-66

Malathi, S., Radhakrishna, K.V., Reddy, M. Malla and Rao, L. Jalapathi, 2009. Integrated management of pod borer (*Helicoverpa armigera*) on pigeon pea [*Cajanus cajan* (L.) Millsp.] *Andhra Agricultural Journal*, **56 (4)**: 522-25.

Prasad, V. Rajendra and Goverdhan, M. 2009. Economic analysis of zero tillage technology in maize in Nalgonda district of Andhra Pradesh. *Manage Extension Research Review*, **9(1)**: 73-78.

Prasad V. and Rajendra, 2009. Evaluation of yield and economic sustainability of SRI cultivation in Andhra Pradesh. *Andhra Agricultural Journal*, **55 (4)**: 527-32.

CCS HAU, Hisar (Haryana)

Kumar, A., Hooda, R.S., Yadav, H.P., Chugh, L.K., Kumar, M and Gera, Rajesh. 2009. Compensating nutrient requirement in pearl millet (*Pennisetum glaucum*)-wheat (*Triticum aestivum*) cropping system through manures and biofertilizers in semi- arid regions of Haryana. *Indian Journal of Agricultural Sciences* **79(10)**: 767-71.

CSK HPKV, Palampur (H.P.)

Rana, S.S., Sharma, J.J., Sharma H.L., Sharma, Sanjay K., Sharma S.K, Saroch Kapil and Bhargava, M. 2010. Production potential, sustainability and economic viability of rice based crop sequences under mid hills of Himachal Pradesh. *Himachal Journal of Agricultural Research* **36(1)**: 7-12.

BAU, Ranchi, (Jharkhand)

Prasad, J. Karmakar, S. Kumar, R. and Misra, B., 2010. Influence of integrated nutrient management on yield and soil properties in maize-wheat cropping System in an alfisol of Jharkhand. *Journal of the Indian Society of Soil Science*. **58 (2)** 200-4.

KAU, Karmmana (Kerala)

Varughese, K., and Thomas, Mathew, 2009. Integrated Farming systems for coastal ecosystem. *Indian Journal of Agronomy* **54(3)**.

RVS KVV, Indore (M.P.)

Jha, S.K., and Sharma, A.K., 2010. Productivity and economics of soybean affected by sowing dates and time of fertilizer application for malwa region of Madhya Pradesh. *Intn. J. Tropical Agriculture* .**28 (3-4)** 371-7

Thakur, N.S., Kushwaha, B.B. and Sinha, N.K. 2011. Response of Kharif sorghum (*Sorghum bicolor* L. Moench.) to mulches under different land configuration systems. *Indian J. Agron.* **56 (1)** : 6-10

PAU,Ludhiana(Punjab)

Brar, A.S., Walia, S.S. and Singh, Satpal 2010. Farming system characterization for realizing high productivity and rational use of resources in south-western Punjab. *Indian Journal Social Research* **51(2)**: 175-81.

Dhaliwal, S.S., Manchanda, J.S., Walia, S.S., and Phutela, R.P. 2010. Nutrition management in maize-potato-onion cropping sequence through organic and inorganic sources. *Environment and Ecology* **28 (1)**: 136-43.

Walia, S. S, Gill, M.S. and Mahal, S.S 2010. Performance of Basmati rice (*Oryza sativa* L.)cultivars under direct seeded and transplanted methods of planting. *Geobios*: 45-48.

Walia,S.S., Gill,M.S,Dhaliwal,S.S.andPhutela,R.P.2009. Evaluation of different cropping systems for increased yields, water productivity and profitability in Punjab. *Journal of Research, PAU* **46(3 & 4)**: 131-36.

Walia,S.S., Gill,M.S., and Dhaliwal,S.S. 2010. Production potential and economics of different cropping systems and their impact on soil health. *Indian Journal of Ecology* **37 (1)**: 23-26.

Walia,S.S., and Kler, D.S. 2010. Effect of organic and inorganic sources of nutrition on growth, macro and micro nutrient uptake in maize under maize-wheat sequence. *Indian Journal of Ecology* **37(1)**: 27-29.

Walia,S.S.and Kler,D.S.2009. Organic Versus Chemical farming- A review. *Journal of Research, PAU* **46(3 & 4)**: 114-26.

MPUAT,Udaipur (Kota)

Dadarwal, R.S.,Jain,N.K.and Singh, D.2009.Integrated nutrient management in baby corn(*Zea mays*). *Indian Journal of Agricultural Science* .**79(12)**:1023-25.

TNAU Coimbatore (Tamil Nadu)

Devasenapathy,P., Senthilkumar,G. and Shanmugam,P.M. 2009. Energy in crop production. *Indian Journal of Agronomy* **54(1)**:80-89.

Senthilkumar,G., Shanmugam,P.M., Devasenapathy,P. and Vennila,C. 2010. Productivity and economics of rice based cropping system as influenced by different organic nutrients. *Agric. Sci. Digest*, **30(1)**: 69-70.

Shanmugam, P.M., Siddeswaran, K. and Senthilkumar, G. 2010.Alternate cropping system for increasing productivity and profitability in irrigated uplands of Tamil Nadu. *Green farming into J.*(1)5:474 -76.

Shanmugam,P.M. and Senthilkumar,G.2010.Technology transfer in rice. *International Journal of Agricultural sciences* **6(1)**:337-39.

8.1.2 Papers presented in seminar

AAU, Jorhat (Assam)

Baishya, A., Hazarika, J.P., Kalita, M.C., Basumatary, A. and Ahmad, S. 2010. Reduction of chemical fertilizer nitrogen use through integrated nitrogen management in rice-rice system under rainfed medium land situation. Paper Presented in 5th International Nitrogen Conference on “Reactive-N Management for Sustainable Development - Science, Technology and Policy” held on 3-7 December, 2010 at New Delhi, (Abstracts published in N 2010/part/FS/0136, p. 60).

BAU, Sabour (Bihar)

Sharma, R.P., Raman, K.R., Pathak, S.K. and Kumar, B. 2010. Effect of tillage and planting methods on productivity and profitability of rice (*Oryza sativa*)-wheat (*Triticum aestivum*) system. Paper presented in National Congress on “Emerging Trends in Agricultural Research” held at PDFSR, Modipuram, Meerut (U.P.) during September 11-12, 2010. (Abstract in Proc. pp. 34-35).

Sharma, R.P., Haque, M., Tyagi, S. and Lal, M. 2010. Impact of organic farming on productivity, profitability under irrigated conditions of Bihar. Paper presented in National Congress on “Emerging Trends in Agricultural Research” held at PDFSR, Modipuram, Meerut (U.P.) during September 11-12, 2010. (Abstract in Proc. pp. 35-36).

Sharma, R.P., Pathak, S.K., Chattopadhyaya, N. and Lal, M. 2010. Impact of organic farming on soil fertility and quality of scented rice-potato-onion cropping system. pp.36-37. Paper presented in National Congress on “Emerging Trends in Agricultural Research” held at PDFSR, Modipuram, Meerut (U.P.) during September 11-12, 2010. (Abstract in Proc. pp. 36-37).

Sharma, R.P., Pathak, S.K., Chattopadhyaya, N., Lal, M. 2010. Integrated nutrient management in rice (*Oryza sativa*)-wheat (*Triticum aestivum*) cropping system for sustainable productivity. Paper presented in National Symposium on “Resource Management Approaches Towards Livelihood Security” held at University of Agricultural Science, Bengaluru, Karnataka during 2-4, December, 2010. (Abstract in Proc. p. 141).

CSK HPKV, Palampur (H.P.)

Rana, S.S., Sharma, H.L., Subehia, S.K., Negi, S.C and Sharma, S.K., 2010. Need based cropping systems for mid hills agro climatic conditions of Himachal Pradesh. XIX National Symposium on Resource Management Approaches Towards Livelihood Security’ 2-4 December 2010, Bengaluru, Karnataka pp 362.

UAS, Siruguppa (Karnataka)

Basavanneppa, M.A., Aladakatti, Y.R. Biradar, D.P., and Nidagundi, J.M., 2009, Effect of planting geometry and nutrient levels on yield and economics of Bt cotton under irrigated conditions of Tunga Bhardra Project Area. In: National Symposium on Bt cotton: Opportunities and Prospects held on 17-19 November 2009 at CICR Nagpur, (Abstract in Proc. p.72).

KAU, Karmmana (Kerala)

Varughese, K. 2009. Group Management in Rice Farming Workshop Compendium Scaling up successful models for food security organized by Kerala State Board, Sponsored by Planning Commission on 16-17 December 2009. Thiruvananthapuram. (Abstract in Proc. pp.36-37).

Jacob ,J., Shirmila, J., Sarada, S., Anu, S. and Roy, S. 2010. Assessment of allelopathic compatibility of trees and Guinea grass in Integrated Homestead Farming Systems. Paper presented in National Seminar on Sustainable Agriculture-Emerging Trends . (Abstract in Proc. p.112).

Rani, B., Varughese, K., Jacob, J., Suja, A., and Vijayan, M. 2009. Response of Wetland Rice to Long Term Fertilization in an Entisol. Paper presented in XVIth International Plant Nutrition Colloquium., Sacramento, California, 26- 30 August, 2009.

Varughese, K., Rani, B., Suja, A., Jacob, J., and Vijayan, M. 2009. Organic Farming Practices for rice under diversified Cropping Systems in the Humid Tropics Paper presented in XVIth International Plant Nutrition Colloquium., Sacramento, California, 26- 30 August, 2009.

PAU,Ludhiana(Punjab)

Singh,S.,Walia,S.S. and Bhushan,B.2010. Enhancing farmers' income with the adoption of alternate farm enterprises. Paper presented in 13th Punjab Science Congress organized by Panjab University, Chandigarh during 7-9 Feb,2010. (Abstract in Proc. P61).

TNAU Coimbatore (Tamil Nadu)

Siddeswaran, K. and Shanmugam, P.M. 2010. Strategies for efficient management of crop residues in conservation agriculture. Conservation Agriculture. Published by Sri Sakthi Promotional Litho Press, Coimbatore, Tamil Nadu.pp.61-67.

Senthil,Kumar,G.,Shanmugam,P.M., Thiyageshwari,S. and Devasenapathy,P.2009. Comparative efficiency of organic and integrated weed management practices under rice based cropping system. Paper presented in National symposium on Weed Threat to Environment, Biodiversity and Agriculture Productivity held on August 2-3, 2009 at Tamil Nadu Agricultural University, Coimbatore. (Abstract in Proc. P.98).

Siddeswaran,K.,Shanmugam,P.M.,Muthukrishnan,P.and Devasenapathy, P.2010. Diversification of traditional cropping system for sustainable productivity in irrigated uplands. Paper presented in 97th session of Indian Science Congress held on 3-7 Jan, 2010 at Thiruvananthapuram. (Abstract in Proc. P.98)

Shanmugam, P.M., Siddeswaran, K., Devasenapathy, P.and Muthukrishnan,P.2010. Alternate cropping system for increasing productivity and profitability. 97th session of Indian Science Congress held on 3-7 Jan, 2010 at Thiruvananthapuram. (Abstract in Proc. P.88).

GBPUAT, Pantnagar (Uttarakhand)

Singh, D.K. and Kumar, P. 2009. Economic studies on diversification and intensification of rice-wheat cropping system in Garhwal region of Uttarakhand. Paper presented in *National Symposium on Achieving Millennium Development Goals: Problems & Prospects*, 25-26, October 2009, Bundelkhand University, Jhansi (U.P.), (Abstract in Proc. pp.164-165).

8.1.3 Popular Articles

ANGRAU, Rajendranagar (A.P.)

Reddy M.M., Padmaja, B.R. Reddy, Uma and. Reddy,D.Raja R, 2010.*Zero tillage MokkaJonna/o Bhaswaram Lopa Lakshnalu-Nivarana. Vyavasayam* March, pp:3-4

Reddy M.M., Padmaja, B. and Reddy,D.Raja,R. 2010.*Aruthadi pantallo neeti yajamanyam Bindu sedyam Avasyakatha. Vyavasayam*, April. pp: 4-8.

Padmaja, B., Reddy, M. Malla. and L. Rao, J. 2010. *Pantallo samagra posakala avasyakatha in Annadatha* January

Reddy, M. Malia and Padmaja, B., 2010. *Digubadulni penche sukshma poshakalu: Padi- ranta*, Saakshi Daily April 5th,

Reddy, M. Malia, Padmaja, B. and Reddy, R. Uma. 2009. *Varilo Dammu cheyakunda neruga vithu padhithi Annadatha*, June,

V. Rajendra Prasad 2009. "Marketing aspects of Cotton and importance of cultivation of traditional beneficial food crops in place of Cotton" in Saakshi daily.

CCS HAU, Hisar (Haryana)

Kumar Pawan, Yadav, S.K., and Singh, A. 2009. *Phasal avshesh "Mahatvpuran avum rakshniy. Haryana Kheti 42(4):* 29.

Kumar Pawan and Yadav S K. 2009. *Mulching ka mahatav. Haryana Kheti 42(6):* 4.

UAS, Siruguppa (Karnataka)

.Basavanneppa M.A., Aladakatti, Y.R. and Biradar, D.P., 2009. *Battada beleyalli kshetravaru nirdhishta poshakamshagala nirvhane, Krishi Munnade, 22(2):*6-10.

Basavanneppa M.A., Rajakumar G.R. and Biradar D.P., 2009, *Bt hattiyalli hosa tanthirikate-sasi nati paddati, Krishi Munnade, 22(3):*7-8.

JNKVV, Jabalpur (M.P.)

Chauhan, R., and Mourya, B.M. 2009. "Bee keeping is profitable (in Hindi)" *Krisak Doot*, 25-31 Aug: 6

Chauhan R. and Mourya, B.M. 2009. "How to improve nitrogen use efficiency in paddy" (in Hindi): *Krisak Doot*, 4-10 Aug: 4

Chauhan, R. and Mourya, B.M. 2009. "Get profit by sericulture" (in Hindi): *Krisak Doot*, 8-14 Sep: 7

PAU, Ludhiana (Punjab)

Walia, S.S., Bhushan, B., and Aulakh, C.S. 2009. Diversification options for sustainable agriculture. *Progressive Farming 45(9):* 11-12.

Walia, S.S. and Singh, Parminder, 2009. *Sabzian adharit fassli chakar apnao. Changi Kheti 45 (9):*8.

Singh, Satpal and Walia, S.S. 2009. *Karo sahi same ate sahi dhang nall kanak de bijai. Deshbani. Nov. 1-7*

Saini K S, Walia S S and Walia U S 2010. *Bahar rut vitch bedan te garmi rut de mungi de kashat. Changi kheti 46 (4):* 5-6.

Walia, S. S, Singh, Roopinder, and Aulakh, C. S. 2010. *Dalan ugao fassli ghanta ate amdan vadhao. Akali Patrika* April 2, 2010.

Walia, S.S., Aulakh, C.S., and Singh, Surjit. 2010. Crop intensification through legumes. *Progressive Farming 46 (4):* 15-16.

CSKHPKV, Palampur (H.P.)

Subehia, S. K. and Katoch, K. K. 2010. Determination of available phosphorus in soil. *In* Compendium No. SS/01/2010 on North Zone Regional workshop-cum- Training on soil Testing: 50-54.

Rana SS, SC Negi, Rajju Priya Soni and Mitu Katoch 2011. Panchgavya: A multiuse preparation. Dharamsala Times Voll, Series 13, 27th February -6th March.

Soni Rajju Priya, Meetu Katoch, SS Rana and SC Negi 201.1. Benefits of Panchgavya. Dharamsala Times Vol, Series 17, 28th March -.3rd April.

BCKV, Kalyani (West Bengal)

Ray, M. 2009. *Boro dhaner adhik falaner janya bijyan bhittik chash* (Bengali).Krishibidhan, **3**: 7.

Ray, M.,and Sengupta, K.2009. *Sharse chasher kichhu bastav samasya and tar samadhan* (Bengali). Krishibidhan,**2**:4.

8.2 PARTICIPATION OF SCIENTISTS IN SYMPOSIA/ SEMINARS/ CONFERENCES/ WORKSHOPS/ TRAININGS

BAU, Sabour (Bihar)

Dr. R.P. Sharma, Chief Scientist, AICRP on Integrated Farming System to attend National Symposium on “Resource Management Approaches Towards Livelihood Security” at University of Agricultural Science, Bengaluru, from 2-4, December, 2010.

Dr. S. K. Pathak, Senior Scientist (Agronomy) and Dr. N. Chattopadhyaya, Senior Scientist (Soil Science), AICRP on Integrated Farming System attended 29th Biennial Workshop of AICRP on Integrated Farming System from 10 -13 December, 2010 at ANGRAU, Hyderabad (A.P.).

SDAU, S.K. Nagar (Gujrat)

Patel B.S. attended the two-day national conference on “Food Security through Water Security” held at Ahmedabad Management Association, Ahmedabad on March 26-27, 2010.

UAS, Siruguppa (Karnataka)

Basavanneppa M.A., Attended”National Symposium on Bt cotton: Opportunities and prospects “at CICR, Nagpur, 17-19 Nov, 2009

MPKV, Rahuri (Maharashtra)

Dr. A.G. Wani, Chief Agronomist attended workshop on “Organic farming” at College of Agriculture, Pune, organized by the Department of Agriculture during 19-20th December, 2009.

Dr. A. G. Wani, Chief Agronomist, IFSRP, MPKV, Rahuri attended International Seminar “ on “India Organic”- statigies to surge ahead” and South Asia Conference on “Outstanding Organic Agriculture Techniques” during 10-11th Sept, 2009, at UAS, Bangalore.

Dr. V.S. Patil, Junior Soil Chemist (IFSRP) and Shri. S. M. Todmal, JM (ECF) attended Platinum Jubilee Symposium on “Soil Science in meeting the Challenges to Food Security and Environmental Quality” organized by Indian Society of Soil Science, New Delhi, during 22-25 th December, 2009.

CSAUAT, Kanpur (U.P.)

Dr. U.S. Tiwari attended a National Symposium on “*Soil Science in meeting the challenges to food security and environmental quality*” held at IARI, New Delhi during December 22-25, 2009.

8.3 GROUP MEETINGS/WORKSHOPS ORGANIZED

Meeting of Scientists Associated with AICRP-IFS Programme at PDFSR, Modipuram and IASRI, New Delhi

A one-day joint meeting of scientists associated with AICRP-IFS Programme at PDFSR, Modipuram and IASRI, New Delhi was arranged at PDFSR Modipuram on 5th May 2010 to discuss and resolve various issues, related to acquisition, submission and analysis of experimental data of AICRP-IFS. Dr B. Gangwar, Project Director, PDFSR, chaired the meeting. The participating scientists were; Dr. Rajendra Prasad, Dr P.K. Batra, Dr. Anil Kumar and Dr. N.K. Sharma from IASRI, New Delhi, and Dr. Kamta Prasad, Dr A. Sarkar, Dr. S.S. Pal, Dr. S.P. Singh, Dr. V.K. Singh, and Dr. K.P. Tripathi, from PDFSR, Modipuram. After detailed deliberations following decisions were taken by a general consensus:

1. Value of nutrient response ratios, as worked out by Dr. N.K. Sharma at IASRI, and based on data reported from experiment-1 under OFR component of AICRP-IFS, need to be looked into critically for certain locations before publishing the same. To eliminate the outlines, PDFSR may obtain the specific comments from agronomists of concerned centres. Dr. Sharma was advised to categorize the data, in respect of rice and maize, for hybrids and varieties separately.

2. To further improve upon the utility of information generated through above experiment it was decided that –

- ❑ One additional treatment of NPK + critically deficient micronutrient in the district should be included as a regular treatment (Tr. No. 6).
- ❑ For meaningful comparison of treatments with farmers' practice, an appropriate area should be earmarked on adjoining plot – fully managed by farmer - and data on crop yield, variety and fertilizer dose should be recorded, and invariably reported on data sheet. Although it would not form part of the regular experiment for statistical analysis but it would be helpful in interpreting the observations.
- ❑ To save on time these two changes should be introduced with effect from *kharif* 2010 itself and a ratification of change would be sought during next workshop of the project. All ECF units to be informed by Coordination Unit accordingly within 15 days.

3. To meet out the deadline of publication of Annual Report of AICRP-IFS, following schedule was agreed.

It was also decided that, in case, data sheets from any centre are not received by the stipulated

Activity	Date
(i) A general reminder to be issued to all the centres by PF (CU)	31 st August.
(ii) Receipt of duly filled data sheets (for all the three seasons) at IASRI	30 th September
(iii) A centre-specific reminder by IASRI scientists for any deficiency in data	10 th October
(iv) Analyzed data to be submitted to PDFSR by IASRI Scientists	31 st December
(v) Discrepancy, if any, to be pointed out by concerned Programme Facilitator to IASRI and concerned centres.	15 th January
(vi) Submission of Annual Report write up by concerned Programme Facilitators, to PF (CU)	31 st January
(vii) Printing of Report	30 th April



Some glimpses of inaugural session of Brain Storming Session – cum – Launching Workshop of Integrated Farming Systems Programme

data, i.e., 30th September, the results would not be included in the relevant report and matter would be reported to concerned Vice Chancellor / Director of Research. Similarly breach of schedule at any level would be viewed seriously and even resource cuts may be imposed.

4. The printing of Annual Report 2008-09 is held up due to non-receipt of processed data as some centres have not sent the data of all the seasons. Therefore, it was decided that the concerned Chief Agronomists/ Agronomists are to be requested to send complete data sheets latest by 30th May to IASRI, failing which data of that centre should not be included in the report and action to be initiated.
5. On-line data submission and analysis software for AICRP-IFS expts, developed and tested at

IASRI should also be tested at PDFSR before its commissioning.

6. Any change in ECF centre should be informed to Dr N.K. Sharma, Sr. Scientist, IASRI, to enable him to establish contact with ECF Agronomist.
7. To avoid any problem at later stage regarding statistical analysis of experimental data, start of a new experiment or any change in design of on-going experiment or additional/deletion of treatment, IASRI scientists should be consulted well in advance about such modifications.
8. In accordance with the recommendations of RAC of PDFSR and Brain Storming Session on IFS at Trivandrum, the sampling procedure

to be adopted for characterization of existing farming systems in different states was also discussed and finalized after due presentation by Dr S.P. Singh, Programme Facilitator (SDD)

Brain Storming Session – cum – Launching Workshop of Integrated Farming Systems Programme and Biennial Group Meeting of AICRP-IFS

In accordance with the recommendation of last year's Annual Meeting of Vice Chancellors of State Agricultural Universities, 'Brain Storming Session – cum – Launching Workshop of Integrated Farming Systems Programme' was Jointly Organized by Project Directorate for Farming System Research and KAU Cropping Systems Research Centre, Karamana, Thiruvananthapuram (Kerala) on 6-7 March, 2010. 'Biennial Group Meeting of AICRP-IFS' was also arranged in succession on 8-9 March. The purpose of the meeting was to finalize the road map and strategies for IFS research under AICRP on IFS and to finalize the technical programme for IFS research component in respect of each centre. The event was inaugurated by Hon'ble Agriculture Minister, Govt. of Kerala, Shri Mullakkra Ratnakaran ji and Dr. A.K. Singh, Deputy Director General (NRM), ICAR, and Shri K.R. Vismambharan, Vice Chancellor, Kerala Agricultural University, Thrissur, presided over the inaugural function. Dr G.B. Singh, Former DDG (NRM), ICAR, New Delhi and Vice Chancellor of JNKVV Jabalpur and Dr I.C. Mahapatra, Chairman of Research Advisory Committee of PDFSR and Former Vice Chancellor, OUAT Bhubneshwar were special invitees. Besides scientists of the project, several directors of ICAR institutes and other dignitaries participated in the deliberations. After 4-days long deliberations following recommendations emerged out:

1. The Integrated Farming Systems Research is to be carried out in two steps. As a first step (initial three years), the suitable modules should be standardized and integrated systems designed in 'on-station research' mode and subsequently they should be validated and refined through on-farm interventions under AICRP-IFS. Under 'on-station research' mode more than one farming situation (such as irrigated & rainfed or small & marginal farm household) may be considered for model development.
2. Socioeconomic profile and nutritional security (as per WHO standards) of the farmers and micro-credit and insurance policies of the government should be taken into consideration before we initiate research on IFS.
3. Constitution of multi-disciplinary teams of scientists, which may work cohesively, and appropriate inter-institutional linkages should be ensured at each centre.
4. The road map for IFSR, as approved by the house is as follows:
 - ❑ The major focus should be on small and marginal farmers of different agro-ecological sub-zones of the country as 82% of farmers belong to this category.
 - ❑ The predominant farming system is to be decided based on the component (s) which contribute (s) more than 50% share in terms of total production or monetary returns.
 - ❑ The major constraints and options available to address the constraints need to be identified.
 - ❑ The resource allocation should be decided based on the household need of about 5 members' family (or average size of farm family as exists in the zone/ district)
 - ❑ In general, only cost effective most appropriate pre-tested modules need to be integrated in the farming system model. However, to improve upon the household incomes, some new components may be required to be introduced into the existing farming systems but it would be ensured that suggested new modules are farmer-friendly, cost-effective and socially acceptable to farmers.
 - ❑ For deciding the inclusion of any enterprise or module the SWOT analysis needs to be carried out

- Approach for finalization of most fit model for different locations needs to be considered in special meetings. For analysis and synthesis of IFS data linear programming and multi-criteria decision programming is considered to be the suitable approach. However, special efforts have to be made to develop and refine the methodology for farming systems research model for synthesis of results.
5. Each participating centre has to identify three prominent farming systems in their region so as to offer alternative choice for the stake holders.
 6. A comprehensive project document along with the year-wise activity schedule and milestones is to be prepared by each centre.
 7. For effective and regular monitoring, every year 5-6 monitoring teams would be formed well in advance at PDFSR; one each for eastern, western, northern, southern and central parts of India; with the following composition:
 - One senior level scientist from PDFSR
 - One chief agronomist/ PI of the region
 - One OFR agronomist/Economist of the region

(These teams would visit all the IFSR/ CSR/ OFR centres located in the respective parts normally during *kharif* (September-October) and *rabi* (January-February) every year and submit their specific observations/ recommendations in prescribed format to the Project Director, PDFSR, for further necessary action.)
 8. For characterization of existing farming systems it was agreed upon that:
 - The sampling technique should be revised in consultation with the officials/ scientists of Survey Design and Research Division of National Sample Survey Organization (Ministry of Statistics and Plan Implementation), Kolkata, National Centre for Agriculture Economics and Policy Research, New Delhi and IASRI, New Delhi.
 - The questionnaire is to be displayed on the PDFSR website and the feedback is to be obtained from participating centres for further modifications.
 - The survey work should be completed within the same benchmark year by different centres with local manpower under the supervision of PDFSR.
 9. Standard data analysis tool is to be developed/ identified by PDFSR in consultation with IASRI, so that the same can be used by all the participating centres.
 10. Appropriate monitoring mechanism is to be developed by PDFSR for elimination of spurious data.
 11. A comprehensive manual should be developed and circulated to all the participating scientists/ centres. The manual should contain detailed instructions, including relevant procedures, observations to be recorded, sampling methods and data sheet formats etc; to maintain the uniformity in conduct of experimentation and recording of observations across the centres.
 12. Quantification of outflow-inflow of materials, soil nutrients, water, farm-wastes and by-products, energy and finance among different components is necessary for optimum allocation of resources for each component.
 13. Information on month-wise distribution of income, labour requirement, fodder requirement vis-à-vis production, should be generated on regular basis.
 14. To the maximum extent possible latest production technologies for growing crops and raising animals, such as micro-irrigation techniques, composite fish culture, should be integrated in the system while developing the model.
 15. Adequate provision should be kept for allocation of farm land for different enterprises, including

land required for production of feed/ fodder for livestock/ poultry/ fish etc.

16. The component of value addition/ post-harvest processing needs to be given due importance at all the centres.
17. For expeditious exchange of information all the Chief Agronomists/ PIs may be allowed to subscribe one wireless internet connection with one time connection cost of approximately Rs. 4000/- and monthly subscription of Rs. 500/- and expenditure may be met out of sanctioned grant under the Head 'Recurring Charges' and Sub-Head 'Contingencies'.

XXIX Biennial Workshop of All India Coordinated Research Project on Integrated Farming Systems

XXIX Biennial Workshop of All India Coordinated Research Project on Integrated Farming Systems was held at ANGRAU, Rajendranagar, Hyderabad on 10-13 December, 2010. The inaugural session was chaired and presided over by Hon'ble Vice Chancellor, ANGRAU, Hyderabad and Hon'ble Minister of Agriculture and Agriculture Technology Mission, Govt. of Andhra Pradesh, Shri Y.S. Vivekananda Reddy inaugurated the workshop. Based on deliberations during different technical sessions of the workshop, following recommendations emerged out:

1. The proposal of providing one laptop computer (with an estimated cost of Rs. 40,000/- each) and one multi-function machine with printer/ scanner/ photocopier functions (estimated cost of Rs. 15,000/- each) at each of the 74 centres (31 IFSR centres, 11 on-station CSR centres and 32 on-farm CSR centres), instead of desktop computer, UPS, laser printer and scanner (already approved in XI Plan for 31 centres), a mobile phone recharge coupon costing not more than Rs 300/- per month for all the OFR Agronomists and Rs. 200/- per month for each of their Technical/ Field Assistants (working in OFR programme only), and allowing all the Chief Agronomists/ PIs/ Sub centre Agronomists/ OFR Agronomists to subscribe one wireless internet connection with one-time connection cost (including data

card) not exceeding Rs. 3,500/- and monthly subscription not exceeding Rs. 300/- came up again for consideration. It was highlighted from several quarters that proposal does not require any additional funds but Providing these equipments/ facilities will certainly improve upon the output and working efficiency of the project staff on following accounts:

- Providing laptop computers and MF Machines instead of desk top computers would facilitate the scientists to work beyond office hours and beyond office premises. It would also enable an OFR Agronomist to enter and revisit the data in computer while making visits to different sites of the OFR experiments. Further providing of wireless internet connection would enable a 24-hr connectivity among scientists of PDFSR Headquarters, Chief Agronomist and OFR Agronomist, for quick exchange of information and experimental data. And, the most important thing is that with this change instead of one unit to Chief Agronomist only, we would be able to provide one unit to all the Chief Agronomists/ Agronomists/ PIs/ OFR agronomists without any additional costs.
- Similarly, providing mobile phone recharge coupons at OFR centres would enable to maintain 24-hr connectivity among field staff - OFR agronomist – farmer. It will also facilitate the OFR Agronomist to keep better track of his/ her field staff as well as provide need-based input on call from a field staff or a farmer, which is very essential.

In view of this justification, it was strongly recommended that Project Directorate should expedite the approval of proposed substitution so that purchase is effected within current financial year.

2. To get the AICRP-IFS scientist well acquainted with the software, being developed for on-line submission and statistical analysis of data of experiment no.-1 (Nutrient response), IASRI scientists should provide a short-term hands-on training on the software to all the OFR Agronomists.

3. During review of the progress of IFS models, it was noted that at some of the IFS centres, several cropping systems have been included under crop component. In view of the fact that marginal and small farmers, for whom these models are being developed, may not go for all sorts of crops, especially vegetables and high value crops, and accordingly not more than 3-4 cropping systems, involving major crops of their household requirement, should be considered for evaluation.
4. At Sabour centre, allocation of area for animal and apiary units under proposed IFS model (40 & 50 m², respectively) seems to be inadequate. This needs to be re-looked into.
5. For organic farming experiment, the supply of organic manures, when sourced from open market, leads not only to highly enhanced cost of cultivation but is also against the basic

concept of organic agriculture. Therefore, these manures, especially FYM and vermi-compost, should be prepared at research farm itself.

6. At present, there is no uniformity in reporting of soil parameters; i.e., physico-chemical properties, available nutrients and microbial properties. A minimum data set may be worked out for each of the experiments at PDFSR, and that should be mandatory for reporting by each centre and for database creation at IASRI.
7. To improve upon the quality of experimentation, all the vacant posts of field assistants or any other positions, may be filled expeditiously with the contractual staff by the concerned university, after specific approval from the Project Director, PDFSR, Modipuram. However, it should be kept in mind that all such staff, appointed in lieu of any regular vacancy,



Some glimpses of inaugural session of 29th workshop of AICRP-IFS

- should be appointed for a term not exceeding 6-12 months, purely on contractual basis, and his/ her gross emoluments per month should not exceed minimum of band pay+grade pay+HRA payable to a regular incumbent against that particular post. It should also be ensured that any contractual staff, so appointed, would have no claim, whatsoever, for regularization of his/ her appointment in ICAR or any such scheme operating at that university and funded, partially or fully, by the ICAR directly or through any of its Institutes/ Bureaux/ Directorates/ NRCs/ AICRPs.
8. Presently, while working out the monetary returns in different experiments at IASRI, only main product is considered, whereas in recent years, in most of the cases, saleable value of crop straw has increased appreciably due to their use as fodder or raw material in paper industry. Therefore, data on straw yield should also be reported by the centres and Chief Agronomists/ IASRI scientists should include it for calculating monetary returns in each experiment.
 9. For smooth, meaningful and expeditious completion of characterization of farming systems, a one-day orientation programme will be organized by PDFSR at selected locations, fully considering the linguistic requirements.
 10. In case of failure of experiments at some of the locations, in any season, under on-farm research programme, their data should not be included for averaging out the results as it may lead to wrong conclusions.
 11. In all the presentations and reports, the 'Recommended Package of Practices' should be elaborated below the table(s).
 12. Staff position at many of the On-Farm Research Centres is not satisfactory. It is adversely affecting the functioning and output of these centres. Similarly, non-replacement of jeep in the project is hampering the working efficiency. PDFSR/ ICAR authorities may take suitable action on these issues.
 13. During monitoring visits by Project Director or other scientists of PDFSR, the conduct of on-farm experiments at many centres has been observed to be unsatisfactory on several accounts. These deficiencies are often brought to the notice of concerned OFR Agronomists, Chief Agronomists and even to their Directors of Research. Despite this no improvement is noted on such centres. It was decided to identify all such centres and performance-based fund cut should be implemented.
 14. To avoid confusion of Benefit:Cost (B:C) ratio in future, all centres should report additional cost involved and additional returns recorded instead of B:C ratio. Similarly, per day productivity should be calculated by dividing total yield of the system with 365 days. For calculating cost of cultivation, human labour cost should also be included.
 15. To avoid any confusion about receipt of filled data sheets at PDFSR/ IASRI, it was agreed upon that in future (w.e.f. crop season ending June 2011) all the centres would submit two hard copies of their data sheets (for all three seasons together) only to the Project Director, PDFSR and not to IASRI and in return it would be mandatory on part of PDFSR to acknowledge the receipt of data. It was also agreed upon to adopt the following schedule

Activity	Date
(viii) Receipt of duly filled data sheets (hard copy only) in duplicate (for all the three seasons) at PDFSR, Modipuram	30 th September
(ix) Preliminary screening and corrections/ clarifications, if any, by PDFSR scientists.	31 st October
(x) One set of data set to be forwarded to IASRI Scientists after needful corrections.	15 th November
(xi) Data tables for all on-farm and on-station experiments would be sent back to PDFSR after statistical analysis..	31 st December
(xii) Submission of Annual Report write up by concerned Programme Facilitators, to PF (CU)	31 st January
(xiii) Printing of Report	30 th April

of data submission, analysis and report preparation:

16. It was also agreed that if data sheets from any centre are not received by the stipulated date, the results would not be included in the relevant report and matter would be reported to senior authorities of concerned universities.
17. After detailed discussions following decisions were also taken regarding reporting of experimental data:
 - i. While reporting the experimental data only common English names of the crops should be given and local names should be avoided
 - ii. Henceforth replication-wise yield data should not be reported in terms of kg or number/plot but should be reported in terms of kg/ha only.
18. The purchase of hand-held GPS device for OFR programme needs to be expedited. In view of the increasing importance of geo-referencing of data generated under this programme, it was suggested that OFR data for the current crop year (2010-11) will not be accepted unless accompanied with GPS-based location details.
19. In view of the shift in mandate of the programme, the requirement of minimum number of experiments to be conducted at each centre was reviewed and it was decided that from next crop year (2011-12) minimum number of experiments to be conducted at each centre would be 4+IFS model for main centres, 3 for sub centres (except Varanasi sub-centre where IFS model development is also to be taken up) and 3+farming systems characterization for OFR centres. For time being the mandate of voluntary centres (All the five ICAR Institutes) would be to develop IFS model only. It was further decided that experiment No. 1a (crop diversification), 2a (ongoing long-term INM) and IFS model are mandatory while other experiments could be taken based on regional requirements.
20. It was decided to prepare a compendium of technical programme, containing details and locations of on-going experiments under AICRP-IFS. But, instead of updating it every year, updating would be done every alternate year (preferably after biennial workshop, wherein need-based modifications in technical programme are incorporated).
21. It was decided that following eight OFR centres, which have completed four or more than four years in that particular NARP zone would have to be shifted to another zone with effect from *kharif* 2011. The concerned chief agronomists/ OFR agronomists were advised to submit suitable proposals to PDFSR so that final decision about the new location is taken before 31st March 2011 and experimentation in new districts is initiated w.e.f. *kharif* 2011.

Name of the Centre	Current location & Year of Shifting
JNKVV, Jabalpur	Sheoni (2007)
OUAT, Bhubaneshwar	Dhenkenal (2006)
ANGRAU, Hyderabad	Nellore (2007)
MPKV, Rahuri	Chas (2006)
MPUAT, Udaipur	Udaipur (2004)
GBPUAT, Pantnagar	Srinagar (2006)
BAU, Sabour	Patna (2006)
CCS HAU, Hisar	Kurukshetra (2006)

It was further decided that consequent upon division of area of jurisdiction of JNKVV between newly created RVSKVV and JNKVV, one of the two OFR centres with Jabalpur University may be transferred to new University. Since the performance of Seoni centre has been observed to be extremely poor since its beginning, it will be more appropriate to get it closed down and transferred to the RVSKVV. It was also agreed by Project Director to allow the Nellore centre to continue up to December 2011 and shift it to new location thereafter, because the programme for current session has already started. Similarly it was also agreed that Kurukshetra centre, should be shifted to Sirsa where cotton-wheat cropping system is predominant.

22. No centre should initiate any experiment of its own. Any new experiment or any major modification in the format of on-going experiment has to be approved in the workshop only.
 23. In view of a possible greater role of IFS adoption in making agriculture more resilient to climate changes, possibilities should be explored for accommodating IFS programme for funding through the mega project on climate change, which is likely to be taken up shortly by ICAR.
 24. During 10th five-year plan the post of Jr Statistician was converted into Jr. Agronomist at most of the centres. However, in view of the shift in the mandate of the project, the change has to be re-looked into. Therefore, it was desired that this post should be converted into the post of Jr. Economist/ Horticulturist/ Animal Scientist etc. as per critical need to strengthen IFS multi-disciplinary teams.
 25. All the centres should submit a self-contained note regarding the continuation of the project along with their requirement of equipment, in order of priority and in accordance with the proforma circulated for inclusion in XII Plan proposals.
 26. Poor performing centers should be identified and relocated in new agricultural universities for better output during XII plan.
3. Permanent plot experiment on integrated nutrient management in cereal-based cropping systems (Expt. No. 2a).
 4. Long-range effect of continuous cropping and manuring on soil fertility and yield stability (Expt. No. 2b).
 5. Development of organic farming package in system-based high value crops. However, needs to be critically reviewed in a separate meeting.
 6. Development of sustainable production model for important cropping systems. However, efforts should be made to synthesize the results and may be concluded in next workshop.
 7. Development of region-specific integrated farming system model for small and marginal farmers.
 8. On-farm evaluation of alternative crops and cropping systems in different agro-climatic zones (On-Farm Expt. No. 2).

In addition to above recommendations, following technical programme under the project was finalized:

A. On-going experiments which will continue as such:

1. Identification of need based cropping systems for different agro-climatic zones (No. 1a). However, treatments should reflect farming system perspective.
2. Tillage and planting management in different cropping systems (Expt. No. 3) (at selected locations only).

B. Modifications in On-going experiments:

1. On-farm crop response to application of major plant nutrients in predominant cropping systems (On-Farm Expt. No. 1). Two treatments added as detailed below:

T₀ - For meaningful comparison of treatments with farmers' practice, an appropriate area should be earmarked on adjoining plot – fully managed by farmer - and data on crop yield, variety and fertilizer dose should be recorded, and invariably reported on data sheet.

T₅ - One additional treatment of NPK + critically deficient micronutrient in the district should be included as a regular treatment (Tr. No. 6).

C. On-going experiments which are to be concluded after *rabi* summer 2010-11:

1. Effect of site-specific nutrient management (SSNM) on yield of different cropping systems.

2. On-farm agronomic management practices for sustaining the production of cropping systems (On-Farm Expt. No. 3).

D. New Studies Proposed (To be started w.e.f. 2011-12)

I. *Characterization and evaluation of existing farming systems in different agro-climatic zones.*

The study was accepted with the following objectives:

1. To identify and characterize the existing farming systems across agro-climatic zones.
2. To determine relative importance of factors contributing to farm productivity and viability of farming systems.

It was also decided that:

- i. All the centres would take up this study on top most priority.
- ii. The sampling technique and the estimation procedures would be finalized in consultation with the scientists of Sample Survey Division of IASRI. If needed consultant may be hired.
- iii. Programme Facilitator (RCSD) and other scientists associated in the project at PDFSR Modipuram, Meerut, will monitor the project work and examine the report.
- iv. Chief Agronomist/ ECF Agronomist/ Economist /Statistician of the respective AICRP-IFS centre will be responsible for data collection, digitization, analysis and interpretation as per given methodology and proforma.
- v. The project staff will be imparted need-based training to fill up the schedule and questionnaire before starting of survey in the respective zone.
- vi. Characterization and documentation of information in respect of one zone per year per centre will be the minimum target.

- vii. In case sufficient hands are not available, the work may be got done on contract basis through NGOs or by hiring trained graduates for survey and digitization and payment may be regulated on proforma basis.

- viii. The expenditure may be booked under contingency head already provided in the project, and if need be an additional fund of Rs. 50,000/- will be provided by PDFSR but would be linked with the actual performance in this regard.

II. *On-farm evaluation of farming system modules for improving the profitability of small and marginal farmers*

The study was accepted to be taken up at all the OFR centres in lieu of on-going Expt. No. 3, in farmers' participatory mode. The objectives of the study are:

- To address critical constraints in small farm systems for overall improvement.
- To increase the profitability of house holds and livelihood security.

The following steps would be involved in this study:

- i. Identify predominant farming system of the particular zone, where OFR centre is located.
- ii. Diagnose the component-wise most critical constraint(s) limiting the productivity of that predominant farming system. However, the number of components (enterprises) in case of each selected farmer should not more be more than three (3).
- iii. Sample two representative farmers (one small with about 1-1.5 ha land holding size and another marginal with 0.4-0.5 ha) for study in two different villages of each selected block.
- iv. Based on existing scientific knowledge, natural resource base and farmers' own socioeconomic setup; identify all possible

interventions and prioritize them in order of merit, to improve upon system productivity/ economics.

- v. In the first year implement all such interventions and monitor their effect on system productivity/ profitability for next three years.

Technical programme:

T_0 = Identify the dominant system and characterize the farming system. It should be the representative of the area/village/location in different farming situations. If needed videography may be done at a starting point.

T_1 = T_0 + intervention no.-1 in respect of crop component (module 1).

T_2 = T_0 + intervention no.-2 which will address the animals (module 2).

T_3 = T_0 + value addition through grading/ processing/ packaging or establishment of subsidiary enterprises (module 3). The details to be specified based on constraint analysis

T_4 = Optional (module 4)

III. Resource conservation and sustaining high productivity through cropping system management and land configuration

Objective: To study the effect of different land configurations and cropping systems on resource conservation, system productivity and profitability as well as soil fertility

Treatments:

A. Land configurations

- Flat bed (FB) system (absolute control)
- Furrow irrigated raised bed (FIRB) system
- Broad bed furrow (BBF) system

B. Cropping systems (to be taken according to local requirements. Here only example is given for clarity)

(a) Flat bed system

Kharif	Rabi	Summer
Maize	Wheat	Green gram (G + R)
Rice	Lentil	Green gram (G + R)
Sorghum (F)	Mustard	Green gram (G + R)
Pigeon pea	Vegetable pea	Green gram (G + R)

(b) FIRB system

Kharif	Rabi	Summer
Maize cob (B) + Sesbania (F)	Vegetable pea (B) + Wheat (F)	Green gram (G + R)
Green gram (B) + Rice (F)	Wheat (F) + Lentil (B)	Green gram (G + R)
Sorghum (B) + Sesbania (F)	Lentil (B) + Mustard (F)	Green gram (G + R)
Pigeon pea (B) + Sesbania (F)	Wheat + Mustard (5:1)	

(c) BBF system

Kharif	Rabi	Summer
Maize cob (BB) + Veg. Cowpea (2:1) + Sesbania (F)	Veg. Pea (BB) + Wheat (F)	Green gram (G + R)
Green gram (BB) + Rice (F)	Lentil (BB) + Wheat (F)	Green gram (G + R)
Sorghum (BB) + Veg. Cowpea (2:1) + Sesbania (F)	Lentil (BB) + Mustard (F)	Green gram (G + R)
Pigeon pea (BB) + Black gram (2:1) + Sesbania (F)	Wheat (BB) + Mustard (F)	

(Note: It was decided that a suitable design would be worked out after examining the objectives and treatments of the experiment critically. Statistical design to be decided in consultation with IASRI, separately.)

IV. Development of Innovative Farming Practices to Mitigate the Effects of Climate Change.

Objectives:

- i. To design and identify economically viable and efficient farming practices for resource conservation and counteracting adverse effects of climate change.
- ii. To study the effect of resource conservation technologies on photosynthetic efficiency, biomass production, economic yield, soil thermal regimes and soil health.

Treatments:

A. Main plots (Crop establishment methods x Cropping Systems)-8

(i) Crop establishment methods -2

T₁ = No tillage/minimum tillage/bed planting/ any other using suitable seed drill/planter.

T₂ = Conventional tillage

(ii) Cropping Systems (location specific)-4

CS₁ = Predominant cropping system of the region

CS₂ = Best identified cropping system from expt. 1(a)

CS₃ & CS₄ = New cropping systems designed by involving C₄ plants (as they are known to perform better under enhanced CO₂ and higher ambient temperatures), low water requiring and physiologically more efficient crops.

B. Sub-plots (Mulch x Fertilizer)-4

(i) Mulch – 2

M₁ = No mulch

M₂ = Crop residue mulch (crop residue – straw or stover – to be recycled *in situ*, especially in *rabi* season crops, and to be applied uniformly on inter-row space after crop seedling establishment)

(ii) Fertilizer rates – 2

F₁ = Recommended Dose of Fertilizer (RDF)

F₂ = 75% RDF + 25% N through Organic Manure (INM)

Design: Split plot

Replications: Three

Observations to be recorded

Crop parameters:

- i. Periodic growth parameters (LAI & DM accumulation)
- ii. Photosynthetic rate at grand growth & flowering stages.
- iii. Days to flowering (75% in case of determinate plants) and flowering initiation (in case of indeterminate plants).
- iv. Days to physiological maturity
- v. Plant height and yield attributing characters at harvesting stage
- vi. Biological & Economic yields
- vii. Economics (Gross returns, Cost of cultivation and Net returns)

Soil parameters (0-15 cm):

- i. Bulk density and Texture
- ii. EC, pH at initial stage and at the completion of each crop cycle
- iii. OC, available N, P, K, S, Zn, Mn, Fe, Cu at initial stage and at the completion of each crop cycle.

Ancillary data:

- i. Irrigation water requirement (no. of irrigation and depth of each irrigation)
- ii. Sub-soil temperature (at 15.0 cm depth)
- iii. Weather parameters (Min & Max temp)
- iv. Microbial Biomass Carbon

8.4 RADIO AND TELEVISION TALKS DELIVERED BY PROJECT STAFF

Centre/ Date	Title of the talk	Name of Doordarshan/ Akashwani Kendra	Name of Staff
ANGRAU, Rajendranagar			
24-07-09	Role of upland rice in utilizing water resource	AIR, Vijayawada	Dr. P. Sujathamma
22-10-09	Alternate crops to rabi rice	AIR, Vijayawada	Dr. P. Sujathamma
07-01-10	Importance of biofertilizers and organic manures in rice cultivation	AIR, Vijayawada	Dr. P. Sujathamma
19-01-10	Fertilizer and water management in rice.	Doordarshan, Vijayawada : Warangal	Dr. P. Sujathamma
28.05.2009	Intercropping	Doordarshan, Hyderabad	Dr. V.B. Bhanumurthy
08.08.2009	Agril. Situation in the state	Doordarshan, Hyderabad	Dr. V.B. Bhanumurthy
26.08.2009	Contingent situation in the state	TV 5, Hyderabad	Dr. V.B. Bhanumurthy
31.08.2009	Suitable crops and cropping systems	All India Radio, Hyderabad	Dr. V.B. Bhanumurthy
29.10.2009	Suitable Rabi crops	All India Radio, Hyderabad	Dr. V.B. Bhanumurthy
18.3.2009	Green Manuring	All India Radio, Hyderabad	Dr. V.B. Bhanumurthy
19.06.2009	Hints for castor production	All India Radio, Hyderabad	Dr. V.B. Bhanumurthy
19.06.2009	Production technology for Sunflower in kharif	All India Radio, Hyderabad	Dr G.E.Ch. Vidya Sagar
19.06.2009	Weed management in rice	All India Radio, Hyderabad	Dr.G.E.Ch. Vidya Sagar
22.06.2009	Production technology for Sunflower in kharif	All India Radio, Hyderabad	Dr.G.E.Ch. Vidya Sagar
26.06.2009	Phone-in-live-Programme on IPM, INM, IWM, Organing farming, Production technology Irrigation water management in field crops	All India Radio, Hyderabad	Dr G.E.Ch. Vidya Sagar
23.03.2009	Weed management in Rice Electronic wing ANGRAU	All India Radio, Hyderabad	Dr.G.E.Ch. Vidya Sagar
07-08-09	Contingency crops and old age rice nursery management	Electronic wing ANGRAU AIR, Warangal	Dr A Upendra Rao
01-10-09	Existing problems in different crops	AIR, Warangal	
05-11-09	Phone -in -live programme on "Rabi crops	AIR, Warangal	
10-12-09	Phone -in -live programme on "Rabi rice and ID crops" on	AIR, Warangal	
07-01-10	Phone -in -live programme on "Cultivation of ID crops during summer"	AIR, Warangal	
06-05-10	Live programme on <i>Kharif</i> crops	AIR, Warangal	

Centre/ Date	Title of the talk	Name of Doordarshan/ Akashwani Kendra	Name of Staff
18.03.10	Live-in programme on "Summer I.D. Crops"	AIR, Warangal	
25-06-09	South West Monsoon rainfall pattern, crop situation-contingency plan"	NTV Namasthe Andhra Pradesh	
05-07-09	Prospects and consequences of co-operative farming	TV 5.	
12-07-09	Prices of pulses, solutions and crop scenario" live programme through	NTV "Namasthe Andhra Pradesh	
11-08-09	Zinc and iron deficiency in turmeric and fertilizer management in rice	ETV 2.	
11-08-09	Zero tillage crops in rice fallows" on to	BKP Media Vision Pvt., Limited, New Delhi.	
02-09-09	Contingent crops" on to	NTV	
27-10-09	Given Voice to "Cultivation of rabi I.D. Crops" on.	TV 5	
09-11-09	Given Voice to - "Proper use of herbicides in oilseeds and cereals"	ETV-Annadatha	
12-11-09	Given Voice to "Green manure crops" on	NTV	
18-12-09	Live-in programme on "Zero tillage maize cultivation"	Doordarshan saphthagiri	
15-01-10	Given Voice to on "Soil salinity -solutions & green manures"	N-studio Tv channel	
BAU, Sabour			
01.07.10	<i>Is mah ki kheti bari</i>	AIR, Bhagalpur	Dr. S.K.Pathak
8.11.10	<i>Gahu ki unantsheel kisme</i>	AIR, Bhagalpur	Dr. S.K.Pathak
04.12.10	<i>Masoor ki vagaynic kheti ki mukya-mukya bate</i>	AIR,, Bhagalpur	Dr. S.K.Pathak
PAU, Ludhiana (Punjab)			
11.9.2009	<i>Organic farming da bavikh</i>	AIR, Jalandhar	Dr S S Wallia
23.9.2009	Diversify cropping systems through oilseeds	AIR, Patiala	Dr S S Wallia
Portblair			
11/01/20	<i>Bat adhti Se Sabzi Va Machali u adan</i>	AIR,	
BAU, Ranchi			
4.11.2008	<i>Gahun ka unatta kishamea abam ushaki baiganik khati</i>		Dr .R.S.Singh
25.12.2008	Late sown of wheat through Scientific method and their management		Dr .R.S.Singh
22.10.2008	<i>Kharif phasal me Urbarko ka anusansa abam upogita</i>		Dr J. Prasad

Centre/ Date	Title of the talk	Name of Doordarshan/ Akashwani Kendra	Name of Staff
25.9.2008	<i>Vermicompost bananae ki beadhi abam upogitha</i>		Dr. J. Prasad
14.07.2008	Howe to get more crops from one plot through diversification		R.P. Manjhi
02.06.2009	Cultivation of sweet potato		R.P. Manjhi
03.08.2009	Cultivation of rainy season potato		R.P. Manjhi
25.08.2009	Integrated nutrient management on maize		R.P. Manjhi
19.11.2009	Cultivation of mustard		R.P. Manjhi
06.12.2009	Cultivation of crops in intensified and diversified system		R.P. Manjhi
MPKVV,Rahuri (Maharatra)			
17-09-09	Preparations for Rabi season.		Dr. A. G. wani
19-04-10	Preparations for Kharif season		Dr. A. G. wani
13-08-10	Cultivation of Rabi Jowar		Prof. M.M. Deasi
03-09-09	Importance of protective irrigations to rabi crops		Dr. V. S. Patil
05-01-10	Fertilizer Management for Sugarcane		Dr. V. S. Patil
26-04-10	Soil testing		Dr. V. S. Patil
11-12-09	Cultivation of summer pealrilmillet.		Prof. Y.C. Sale
25-09-09	Importance of Mulching		Shri. S. M. Todmal
15-01-10	Cultivation of summer Pearlmillet		Shri. S. M. Todmal
17-07-09	Use of green manuring crops in agriculture		Shri. S. M. Todmal
JNKVV,Jabalpur			
25-11-09	Irrigation management in wheat	Akashwani Jabalpur	Dr. V. B. Upadhyay
01-01-09	Improved technology for maximum production of late sown wheat	Akashwani Jabalpur	Dr. V. B. Upadhyay
02-03-09	Production technology of Bajra for forage crops	Akashwani Jabalpur	Dr.S.K.Vishwakarma
29-09-09	Soanf ki Kheti	Akashwani Jabalpur	Smt. Nisha Mehra
09-03-10	Techniques for improving organic farming	Doordarshan M.P	Smt. Nisha Mehra
10-03-10	Cultivation of summer moong	ETV, Madhya Pradesh	Smt. Nisha Mehra

Centre/ Date	Title of the talk	Name of Doordarshan/ Akashwani Kendra	Name of Staff
16-03-10	Cultivation of summer Black gram	ETV, Madhya Pradesh	Smt. Nisha Mehra
24-03-10	Cultivation of summer groundnut,	ETV, Madhya Pradesh	Smt. Nisha Mehra
30-03-10	Cultivation of summer Sunflower	ETV, Madhya Pradesh	Smt Nisha Mehra
09-10-09	Improved package and practices of lentil cultivation	ETV, Madhya Pradesh	Smt Nisha Mehra
24-10-09	Importance of cropping systems for getting maximum income	Doordarshan , Madhya Pradesh	Smt Nisha Mehra
UAS,Raichur			
24-11-2009	Bengal Gram improved Agronomic practices TBP command area	AIR, Hospet	
10-07-7-09	Transplanting techniques in Bt cotton	Doordarshan, Gulbarga	
10-07-09	Refugia crop management in Bt cotton	Doordarshan, Gulbarga	
MPUAT, Udaipur			
09-03-10	Kaliyano avm Bhandar gato me choha niyantran	AIR, Udaipur	

9. APPENDICES

APPENDIX I: INITIAL SOIL PARAMETERS FOR ON-STATION EXPERIMENTAL SITES DURING 2009-10

Name of CSR centre	Experiment no	PH	EC (m mhos/cm)	O.C.%/g/kg	Available nutrient kg/ha		
					N	P	K
Rajendranagar	1(a)	8.4	0.27	0.54		32	414
	2(a)	8.5	0.24	0.54		34	224
	CA-CI	8.12	0.23	0.56		31.4	162
	OF	7.6	0.55	0.36		24	293
Maruteru	1(a)	NR	NR	0.9		38	314
	2(a)	5.1	0.38	0.9		38	344
	OF	5.8	0.76	0.8		34	479
Rudrur	1(a)	7.6	0.39	0.58		36.1	389
	2(a)	8.1	0.37	0.52		18	304
	TPM	7.5	0.42	0.42		40.2	380
	OF	7.3	0.48	0.46		41	425
Jorhat							
Sabour	1(a)	8.11	0.21	0.47	155	26.9	122
	2(a)	7.4	0.29	0.46	194	23	155
	SPM	7.52	0.15	0.53	283.3	27.2	208.6
	CA-CI	7.4		0.54	200.7	26.5	219.5
	OF	8.1		0.5	153.4	26.9	122
Raipur	1(a)	6.9	NR	0.52	243	20.2	240
	2(a)	NR	NR	0.51	234	11.5	232
	SPM	NR	NR	NR	197	11.8	278
	OF			0.58	169	17.4	270
	CA-CI	NR	NR	NR	NR	NR	NR
SK Nagar	1(a)			0.38	196	12.2	215
	2(a)			0.3	190	38	230
	OF			0.26	195	23.9	261
	TPM			0.32	198	19.26	208
Junagadh	1(a)			0.68	190	9.5	140
	2(a)With potash			0.77	240	29.9	165
	2(a)WithOut potash			0.36	245	32	216
	OF			0.83	199	19	160
	TPM			0.56	218	15.96	106
Navsari	1(a)			0.59	194	18.2	153
	2(a)			0.58	297	29	317
	OF			0.36	176	6.5	219
	TPM			0.59	256	21.4	160
Palampur	1(a)	5	0.63	390	58.8	117.5
	2(a)	5.5		0.6	667.1	21.9	221
	TPM		NOT REPORTED				
	OF						
Chatha, Jammu	1(a)	8.1		0.55	216	23	118
	2(a)	7.1		0.62	456	13.8	154
	SPM	7.2		0.52	200	26.3	124
	SSNM	8.07		0.56	240.93	24.5	117.56
	TPM	8.03		0.55	247.67	22	103.27
Ranchi	1(a)	6.0		0.38	225	20	115
	2(a)	6.4		0.42	260	19.5	195
	2(b)	6.4	NR	0.42	260	19.5	195
Kathalagere	1(a)	6.1	0.2	0.6		22.2	197
	2(a)	6.4	0.13	0.68		12.3	211
	TPM	5.2	0.09	0.6		22	197
	OF	5.3	0.14	0.52		12	273.6

Contd...

Name of CSR centre	Experiment no	PH	EC (m mhos/cm)	O.C.%/g/kg	Available nutrient kg/ha		
					N	P	K
Siruguppa	1(a)	NR	NR	NR	NR	NR	NR
	2(b)	NR	NR	NR	NR	NR	NR
	TPM	NR	NR	NR	NR	NR	NR
	OF	8.11	0.34	0.39	285	13	395
Jabalpur	1(a)	7.7	0.48	6.8 g/kg	266	9.2	300
	2(a)	7.62	0.55	6.5 g/kg	240	16	448
	OF	NR	NR	6.4 g/kg	210	8.8	370
	CA-CI	NR	NR	NR	NR	NR	NR
Powarkheda	1(a)	7.65	0.48	5.9 gram/kg	262	9.5	300
	OF	7.65	0.48	5.9 gram/kg	262	9.5	300
	SPM	7.65	0.53	0.61 g/kg	267	9.6	247
Rewa	1(a)	7.68	0.53	6.5 gram/kg	260	9	295
	2(b)	7.5	0.54	6.8 g/kg	257	14.7	500
	OF	7.25	0.46	5.6 g/kg	224	8.2	315
Rahuri	1(a)	8.0	0.26	0.62	220	7.0	585
	2(a)	8.1	0.35	0.64	153	14.2	705
	TPM	8.1	0.33	0.64	241	10.9	527
	OF(S-Y)	8.3	0.33	0.64	208	12.9	442
	OF(C-W)	8.5	0.28	0.52	182	9.1	503
Parbhani	1(a)	NR	NR	NR	168.71	11.74	358.11
	2(a)	NR	NR	NR	138.5	28	440
	OF	NR	NR	NR	142.2	11.1	337.
Akola	1(a)				250	13	281
	2(a)				209	11	350
Karjat	1(a)	7.01	0.03	0.97	217.28	42.08	240.12
	2(a)	7.55	0.027	1.25	213	29.85	294.88
	OF	NR	NR	NR	NR	NR	NR
Ludhiana	1(a)	7.2	0.4	0.38	71.7	41.4	89.6
	2(a)	8.15	0.32	0.311	143	11.2	101
	SPM	7.8	0.38	0.44	134.4	20.4	144
	SSNM	7.8	0.14	0.38	134.4	26.7	179.2
	OF	7.4	0.2	0.39	179.4	22.3	135.8
Durgapura	1(a)	8.1	0.18	0.25	NR	34.7	192.2
	SPM	8.1	0.19	0.2	NR	33.9	190.0
	OF	8.1	0.18	0.21	NR	21.9	193.4
Kanpur	1(a)	7.79	0.29	0.39		13	180
	2(a)	8.1	0.18	0.24		10.4	170
	TPM	7.9	0.12	0.36		13.5	130
	OF	8.02	0.16	0.4		14.4	125
Faizabad	1(a)	7.3	0.11	0.61	142	18	136
	2(a)	8.8	0.5	0.37	102	13.8	355
	2(b)	7.7	0.15	0.45	130	10	113
	OF	8.2	0.4	0.46	127	17.4	247
Bichpuri	2(a)			0.311	124	10.6	204
	OF	7.8	1.8	0.31	123	10.6	284
Pantnagar	1(a)	7.8	NR	NR	122	5.6	156
	2(a)	5.5		0.6		20	143
	SPM	7.7				16	125
	OF	7.8				15.5	122
Kalyani	2(a)	7.5	0.09	9.4	150	18	140

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APPENDIX II: WEATHER PARAMETERS (MONTHLY AVERAGES) AT DIFFERENT CROPPING SYSTEM CENTRES DURING 2009-10

A: Monthly Rainfall (mm)

CSR Centre	Rainfall received during the month (mm)											
	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Rajendranagar	59.1	54.0	203.7	165.5	96.0	32.2	5.0	9.6	0.0	5.6	0.0	38.0
Maruteru	0	137.5	125.4	157.8	25	63.9	1	4.4	0	0	46	208
Rudrur	81.9	167.8	230.8	215.8	27.8	41.2	3	19.2	9.9	0	0	16.3
Jorhat	430	304.4	278.8	167.8	47.6	22.4	2.1	2.8	16.7	90.1	283.1	305.3
Sabour	63.9	279.6	360	126	154.1	2.7	0	0	5.2	6.2	8.1	59.4
Raipur	80	636.3	266.2	97.2	51	49.5	19.3	15.4	7	0.8	0	11.4
SK Nagar	109	299.3	81.4	0	0	0	0	7.4	0	0	0	0
Navsari	269.4	1057.2	199.8	231	84	0	0	0	0	0	0	0
Hisar	NR	92.4	14	239.9	0	0	0	11.5	7.6	2.5	0	1.9
Palampur	42.6	612.3	469.2	219	33.9	69.4	0.2	25.2	120.6	26	27.9	92.8
Jammu	10.4	243	395.5	27.8	4.2	9.2	0	8.8	20.8	6	0.8	40.6
Ranchi	40.5	26.8	256.4	430.2	86	15.6	9.6	0	12.4	0	0	0
Kathalagere	91.7	158.7	150.1	175.7	104	46.4	71.9	0	0	0	3.2	189.4
Siruguppa	151	33	133.1	328.8	51.5	65.4	0	209.1	0	0	12.2	73.8
Karmana	21.3	30.1	11.1	16.7	104.2	69.7	7.4	0	0	0	8.8	33.9
Jabalpur	64.4	506	348.2	441.8	42.8	55.7	25.4	12.4	0	2.8	0	14.6
Powarkheda	128.8	308.4	376.8	124.4	99.4	93.3	43.8	3	4	0	0	0
Rewa	20.4	315.6	141.2	117	83.2	78	0.9	0	NR	NR	NR	NR
Rahuri	59.6	67.6	252	71.8	74.8	143.8	0	0	0	0	0	0
Akola	2.4	357.9	69.9	35.2	67.5	102.5	14.7	30.9	1.3	15.9	NR	NR
Karjat	138.7	1343.4	286.6	228.5	457.9	127	0	0	0	0	0	0
Ludhiana	94	497	112.2	69.1	26.2	8.1	0	18.4	26	0	6.4	0

Contd...

CSR Centre	Rainfall received during the month (mm)											
	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Kota	5.62	222.4	82.2	8.6	33.2	8.8	2.7	0	6.4	0	NR	NR
Durgapura Jaipur	44.2	163.6	130	56.8	13.6	8.8	0	4.6	4	0	0	21.4
Coimbatore	14.6	83.8	39	0	127.1	232.8	2.3	0.2	0	0	22.2	4.1
Thanjavur	36	15	40.2	111	183.2	216.3	263.7	0	31.4	263.7	0	40
Kanpur	NR	184.3	258.8	163.6	117.2	3	9.1	3.2	15.2	0	0	8.9
Faizabad	48.8	222.3	265.6	302.4	133.2	3.2	6.6	5.2	25.3	0	9.5	58.6
Varanasi	22	166	71.2	178.5	16.4	290	1.8	1.4	16.8	0	0	8.4
Bichpuri	0	116.1	191.3	70.5	139.9	26.1	6.8	8.3	13.8	0	0	21.9
Pantnagar	NR	NR	NR	NR	NR	NR	NR	NR	32.2	0.2	0	54.8
kalyani	46.5	227.4	387.3	211.1	91.1	3.8	0	0	7.2	0.5	NR	NR

B: Maximum and Minimum Temperature (°C) (June 2009 to May 2010)

CSR Centres	Temperature (°C)																							
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May												
	max. min.	max. min.	max. min.	max. min.	max. min.	max. min.	max. min.	max. min.	max. min.	max. min.	max. min.	max. min.												
Rajendranagar	35.2	29.7	29.4	22.5	31.2	23.3	31.4	22.2	31.0	19.5	29.6	18.1	28.5	14.1	28.2	13.8	33.0	17.2	37.1	20.2	40.3	24.1	39.5	26.0
Maruteru	37.3	28.3	31.9	26.0	31.7	26.1	31.6	25.4	31.0	24.3	28.7	22.2	27.6	18.4	27.8	18.5	30.2	19.7	31.3	23.3	32.4	24.4	34.2	25.8
Rudrur	36.4	24.6	32.3	23.7	32.0	23.5	33.0	22.1	32.9	19.7	31.8	17.3	30.4	14.5	29.4	14.8	34.2	18.5	37.5	22.3	41.3	25.8	42.8	26.5
Jorhat	31.0	25.5	32.9	26.0	31.8	25.7	33.0	25.8	31.0	21.9	27.1	16.4	23.6	12.2	23.5	9.8	26.5	10.3	27.0	16.6	27.0	20.2	29.3	22.8
Sabour	36.9	26.0	33.2	26.4	32.5	25.7	33.3	25.4	31.3	20.1	27.9	15.1	24.1	9.1	18.7	6.8	26.1	10.4	33.5	16.4	38.5	21.9	36.8	24.2
Raipur	40.6	28.9	30.8	35.5	30.9	25.1	32.3	25.2	31.4	19.7	28.4	16.6	27.6	13.3	26.8	10.5	31.7	15.6	38.0	21.2	42.7	24.9	42.6	27.6
SK Nagar	39.2	25.1	34.0	24.2	33.8	23.6	35.8	36.6	21.7	16.1	29.1	9.2	27.8	6.7	12.0	6.7	31.3	13.4	37.3	18.9	40.6	22.9	42.4	26.0
Navsari	32.7	26.8	29.5	25.4	30.8	25.8	33.1	25.3	34.1	20.8	31.6	19.5	31.3	16.5	30.8	15.7	32.1	16.1	34.9	20.1	35.8	24.1	34.9	20.1
Hisar	NR	NR	36.7	26.4	38.0	26.8	34.4	22.5	33.4	15.5	27.1	9.9	23.1	4.9	17.3	5.9	25.8	7.4	34.9	16.7	41.1	20.4	42.9	24.4
Palampur	32.1	19.0	27.9	19.1	28.0	18.8	26.2	16.6	25.6	11.6	20.8	7.6	5.2	1.5	18.3	4.9	18.3	6.2	25.6	12.4	30.3	15.7	31.9	18.8
Jammu	40.7	23.4	36.5	24.6	33.4	24.2	33.3	22.9	31.6	14.4	25.7	9.1	21.1	5.2	16.1	4.8	22.5	8.5	30.5	12.7	37.2	18.6	39.6	22.1
Ranchi	36.2	23.0	30.0	22.6	29.9	22.7	29.8	19.4	28.0	15.4	25.7	12.1	23.4	7.2	22.2	5.1	26.6	9.8	34.1	15.0	NR	NR	NR	NR
Kathalagere	31.9	21.2	28.5	21.4	29.3	21.1	29.5	21.1	29.2	20.3	28.3	18.8	29.7	17.2	28.7	16.6	30.8	19.5	32.7	19.5	30.5	18.2	33.9	21.8
Siruguppa	29.0	21.4	27.5	21.6	26.8	21.0	27.2	21.1	27.8	21.3	26.7	18.4	24.8	16.9	25.8	24.8	28.1	20.5	31.0	22.1	27.3	20.5	34.4	25.1
Karmana	31.2	24.1	30.1	23.9	30.3	24.4	29.8	24.2	30.3	24.2	28.8	24.4	30.0	23.7	31.2	23.0	32.0	23.9	33.7	24.4	34.3	25.3	33.1	25.3
Jabalpur	41.6	27.3	31.7	23.9	31.5	23.3	32.3	22.5	32.3	16.1	27.6	12.5	26.3	10.0	23.4	8.0	30.2	11.6	36.4	17.1	41.0	22.1	41.7	25.3
Powarkheda	41.2	24.0	32.0	24.0	31.5	24.0	33.0	23.0	33.6	16.8	28.5	13.0	28.3	10.8	25.4	6.9	29.3	9.7	36.9	14.5	NR	NR	NR	NR
Rewa	42.7	25.0	33.6	25.5	33.7	24.5	33.9	23.4	33.5	15.6	30.0	12.6	26.8	6.0	25.1	3.9	NR	NR	NR	NR	NR	NR	NR	NR
Rahuri	35.9	22.8	30.5	23.0	31.1	22.0	32.4	21.7	32.7	16.6	28.3	14.0	30.0	13.1	28.3	10.9	32.9	14.0	36.7	16.8	38.7	19.9	38.1	22.0
Akola	41.0	28.2	31.1	24.0	32.1	23.9	32.2	23.1	33.6	18.1	28.7	15.7	27.4	12.2	28.5	11.8	33.2	16.0	38.8	21.1	NR	NR	NR	NR
Karjat	35.2	26.2	29.3	24.7	30.5	24.7	31.5	24.2	33.2	20.2	32.6	19.7	33.2	16.7	33.4	15.8	35.2	17.0	38.9	20.1	40.4	23.6	40.1	26.1
Bhubaneswar	35.6	26.6	31.8	25.8	32.7	25.9	33.3	25.9	32.5	21.7	30.9	19.6	29.4	15.4	28.9	14.3	35.5	19.9	38.3	25.1	37.2	25.3	36.6	27.3
Chiplima	43.1	23.4	33.6	20.9	36.6	20.8	36.5	22.6	33.3	18.1	29.9		28.9		27.3	8.8	33.0	15.9	36.1	20.7	39.8	22.6	40.8	25.9
Ludhiana	39.6	25.1	34.0	26.7	34.0	26.6	32.7	23.7	31.7	16.2	24.3	9.7	21.1	6.4	16.3	6.5	23.4	10.2	31.7	14.9	38.8	31.2	39.6	24.1

Contd...

CSR Centres	Temperature (°C)											
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
	max. min.	max. min.	max. min.	max. min.	max. min.	max. min.	max. min.	max. min.	max. min.	max. min.	max. min.	max. min.
Kota	41.6 29.0	34.2 26.6	33.0 25.2	35.8 23.4	33.9 18.5	27.6 12.1	24.9 9.5	22.4 5.6	28.2 9.4	36.8 16.1	NR NR	NR NR
Durgapura	39.9 27.1	34.9 36.1	33.8 25.7	35.2 24.3	33.5 20.2	27.0 14.3	24.9 12.4	22.7 8.6	27.6 13.7	35.0 19.7	36.7 22.5	40.6 26.7
Coimbatore	31.1 23.6	29.7 23.0	31.4 32.9	31.6 22.9	31.1 21.8	29.0 22.1	29.1 21.1	29.7 19.4	33.5 20.5	35.7 32.7	36.3 25.1	34.6 25.1
Thanjavur	36.6 24.8	35.6 25.9	34.5 28.5	34.3 28.8	32.2 27.4	29.2 24.6	28.0 22.9	30.0 22.3	32.3 25.0	34.9 26.8	35.2 24.8	37.8 27.4
Kanpur	NR NR	35.4 26.8	34.5 26.3	33.4 24.5	31.5 17.7	27.3 12.9	23.4 9.0	17.2 7.8	25.6 12.0	34.4 17.4	41.0 22.9	40.5 26.5
Faizabad	40.2 26.6	33.2 26.8	33.3 26.5	32.6 24.9	31.6 18.5	27.3 12.3	25.3 7.5	16.1 7.1	24.9 9.4	33.1 14.5	40.1 21.3	39.7 24.4
Varanasi	40.8 28.2	34.1 27.3	32.9 26.9	33.2 25.7	31.6 19.7	2.4 15.2	24.6 11.0	18.8 8.1	26.7 13.1	34.4 17.7	41.0 24.0	40.7 26.8
Bichpuri	38.8 27.7	34.8 28.0	32.1 26.2	33.0 23.8	31.2 16.8	25.4 10.6	22.2 7.0	19.5 5.9	27.2 10.5	33.8 14.2	39.1 21.7	41.6 28.4
Pantnagar	NR NR	NR NR	NR NR	NR NR	NR NR	NR NR	NR NR	17.3 6.6	24.0 10.0	31.1 13.9	38.6 19.6	38.7 23.5
kalyani	35.6 27.4	32.8 26.5	32.3 26.2	32.9 26.3	32.4 22.0	30.3 18.4	26.8 11.8	23.7 9.3	29.6 14.7	35.8 22.4	NR NR	NR NR

APPENDIX III: CENTRE-WISE STAFF POSITION

1. ANGRAU, HYDERABAD (A.P.)

Main Centre, Rajendranagar

Chief Agronomist	Dr. V.B. Bhanu murthy
Jr. Agronomist	Dr. M. Venkata Ramana
Jr. Soil Scientist	Dr. S. Sridevi
Technical Asstt.	Vacant, 2 SRF Working
Field assistant	Mr. K. Sugunanandam
Jr. Steno/UDC	Vacant
Messenger	Mr. G. Saibaba

Sub Centre, Maruteru

Agronomist	Dr. A. Upendra Rao
Technical Asstt.	Vacant
Field assistant	Mr. K. Viswanadham
Field assistant	Mr. V. Kondala Rao
LDC/Typist	Vacant

Sub Centre, Rudrur

Agronomist	Dr. G.E. Ch. Vidya Sagar
Technical Asstt.	Vacant
Field assistant	Vacant
Field assistant	Mr. M. Narsinga Rao
LDC/Typist	Vacant

On-Farm Centre, Nellore

Agronomist	Dr. P. Sujathamma
Field assistant	Mr. D. Vajravelu
Field assistant	Mr. P. Mohan Rao
Field assistant	Mr. S. Lakshminarayana
Field assistant	Mr. K. Praveen Kumar
Field assistant	Mr. V. Subbaramaih
Field assistant	Vacant
Jr. Stenographer	Vacant
Driver	Mr. N. Venkateswarlu
Watchman	Vacant

On-Farm Centre, Warangal

Agronomist	Dr. M. Malla Reddy
Jr. Economist	Mr. V. Rajendra Prasad
Field assistant	Mr. N. Mukkanti
Field assistant	Mr. Syed Abid Hussain
Field assistant	Mr. M.A. Hafeez
Field assistant	Mr. K.V. Subramanyan
Field assistant	Mr. G. Venkata Swamy
Field assistant	Mr. P. Yadagiri
Jr. Stenographer	Vacant
Driver	Vacant
Watchman	Vacant

2. AAU JORHAT (ASSAM)

Main Centre, Jorhat

Chief Agronomist	Dr. Ajit Baishya
Jr. Soil Scientist	Dr. B.K. Medhi
Jr. Economist	Dr. J.P. Hazarika
Technical Asstt.	Mr. B. Dutta
Field assistant	Mr. T. Gogoi
Field assistant	Mr. J.C. Dutta
Jr. Steno/UDC	Mr. A.B. Rajkonwar
Messenger	Mr. B. Kalita

On-Farm Centre, Tinsukia

Agronomist	Dr. M.C. Kalita
Jr. Economist	Dr. J.K. Gogoi
Field assistant	Mr. B. Saikia
Field assistant	Mr. S. Pathak
Field assistant	Vacant
Field assistant	Mr. N.N. Kalita
Field assistant	Mr. H.K. Goswami
Field assistant	Mr. I. Gogoi
Jr. Stenographer	Mrs. Beauti Devi
Driver	Mr. B. Boruah
Watchman	Mr. D.P. Gohani

3. RAU, PUSA (BIHAR)

Main Centre, Sabour

Chief Agronomist	Dr. R.P. Sharma
Jr. Soil Scientist	Dr. N. Chattopadhyaya
Jr. Agronomist	Dr. S.K. Pathak
Technical Asstt.	Mr. K.R. Raman
Field assistant	Mr. C.B. Prasad, F.O.
Field assistant	Mr. S.R. Singh, F.O.
Jr. Steno/UDC	Mr. Ram Kumar Sharma
Watchman	Mr. Ganesh Ram

On-Farm Centre, Patana

Agronomist	Dr. N.K. Choudhary
Technical Asstt.	Vacant
Field assistant	Mr. S.K. Sharma
Field assistant	Mr. S.N. Thakur
Field assistant	Mr. Hardeo Mahto
Field assistant	Mr. Athar Ahmad
Field assistant	Vacant
Field assistant	Vacant
Jr. Steno/UDC	Vacant
Driver	Vacant
Watchman	Vacant

4.IGKV,RAIPUR(CHHATISSGARH)**Main Centre,Raipur**

Chief Agronomist	Dr. S.K. Sarawgi
Jr. Soil Scientist	Dr. Alok Tiwari
Jr. Agronomist	Dr. Shrikant Chitale
Technical Asstt.	Mr. B.K. Chandrakar
Field assistant	Mr. R.K. Yadav
Field assistant	Mr. G.P. Yadav
Jr. Steno/UDC	Vacant
Messenger	Mrs. S. Mishra

On-Farm Centre, Kawardha

Agronomist	Dr. V.K. Singh
Technical Asstt.	Vacant
Field assistant	Mr. J.L. Soni
Field assistant	Mr. D.D. Singh
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Jr. Steno/UDC	Mr. A.K. Tiwari
Driver	Vacant
Watchman	Mr. C.B. Dwivedi

5. SDAU,S.K.NAGAR(GUJRAT)

Chief Agronomist	Dr. B.S. Patel
Jr. Soil Scientist	Mr. P.K. Patel
Jr. Agronomist	Mr S.M. Patel
Technical Asstt.	Mr. Shaukat Ali
Field assistant	Mr. B.R. Patel
Field assistant	Mr. H.D. Patel
Jr. Steno/UDC	Mr. R.A.Sindhi
Watchman	Mr. R.A. Joshi

On-Farm Centre,Deesa

Agronomist	Dr. S.K. Patel
Jr. Sci.(Eco)	Dr. R.R. Patel
Tech.Asstt.	Mr. Jitendra Singh
Field assistant	Mr. S.S. Chaudhary
Field Assistant	Mr. A.G. Patel
Field Assistant	Mr. B.B. Jat
Field Assistant	Mr. D.P. Parekh
Field Assistant	Mr. J.H. Chaudhary
Field Assistant	Mr. S.S. Patel
Jr.Stenographer	Mr. P.B. Joshi
Driver	Mr. V.A. Goswami
Watchman	Mr. G.K. Chaudhary

6.JAU,JUNAGADH(GUJARAT)**Sub Centre, Junagadh**

Chief Agronomist	Dr. B.M. Dabhi
------------------	----------------

Technical Asstt.
Field assistant
Field assistant
Jr. Steno/UDC

Mr. A.K. Padaliya
Mr. C.T. Dalwadi
Mr. K.G. Rabadia
Mr. J.B. Sodha

7. NAU,NAVSARI(GUJRAT)**Sub Centre, Navsari**

Agronomist
Technical Asstt.
Field assistant
Field assistant
Jr. Steno/UDC

Dr. R.A. Dungrani
Mr. P.M. Patel
Mr. M. B. Patel
Mr. M.B. Solanki
Mrs. N.J. Desai

8. AAU,ANAND (GUJRAT)**On-Farm Centre,Arnej**

Agronomist
Field assistant
Field assistant
Field assistant
Field assistant
Field assistant
Field assistant
Field assistant
Jr.Stenographer
Driver
Watchman

Dr. M.S. Jakasaniya
Mr. V.H. Rathava
Mr. R.S. Rana
Mr. N.S. Vala
Mr. S.S. Rathava
Mr. K.B. Raval
Mr. D.J. Gohil
Mr. H.M. Padheriya
Mr. Vijay Chauhan
Mr. A.M. Rathod

9.CCS HAU,HISAR(HARYANA)**Main Centre, Hisar**

Chief Agronomist
Jr. Soil Scientist
Jr. Agronomist
Technical Asstt.
Field assistant
Field assistant
Jr. Steno/UDC
Watchman

Dr. S.K. Yadav
Dr. Manoj Kumar
Dr. Pawan Kumar
Mr. Attar Singh
Mr. Tara Chand
Vacant
Mrs. Veena Grover
Mr. Kuldeep Singh

On-Farm Centre, Kurukshetra

Agronomist
Field assistant
Field assistant
Field assistant
Field assistant
Field assistant
Field assistant
Driver
Watchman

Dr. Hari Om
Mr. Sube Singh
Mr. Santosh Kumar
Mr. Pritam Singh
Mr. Sant Lal
Mr. Satnarain
Mr. Churia Ram
Mr. Dharam Pal
Mr. S.B. Singh

10.CSK HPKVV,PALAMPUR (H.P.)**Main Centre, Palampur**

Chief Agronomist

Dr. S.C. Negi

Jr. Soil Scientist
Jr. Agronomist
Technical Asstt.
Field assistant
Field assistant
Field assistant
Jr. Steno/UDC
Jr. Steno/UDC
Watchman
Messenger

Dr. S.K.Subehia
Dr. S.S Rana
Mrs. Anuradha
Mr. R.K.Sharma
Mr. Pratap Chand
Mr. Sandhu Ram
Mr. Mehar Chand
Mr. Ramesh Kumar
Mr. Babu Ram
Mr. Dilip Singh

Field assistant
Field assistant
Jr. Steno/UDC
Messenger

Mr. M. Munda
Mr. Raju Gari
Mr. S.K. Pandey
Mrs. Deomani Devi

On-Farm Centre, Arkot,Una

Agronomist
Field assistant
Field assistant
Field assistant
Field assistant
Field assistant
Field assistant
Driver

Dr. S.K.Sharma
Mr. Rakesh Kumar
Mr. Balak Ram
Mr. Rajesh Kumar
Mr. Bihari Lal
Mr. Anirudh
Mr. Pradeep Kumar
Mr. Kartar Singh

11.SKUAST,Jammu(J &K)

Main Centre, Chatta,Jammu

Chief Agronomist
Jr. Soil Scientist
Jr. Agronomist
Technical Asstt.
Technical Asstt.
Field assistant
Field assistant
Jr. Steno/UDC
Messenger

Prof. Dileep Kachroo
Dr. N. P. Thakur
Dr. Vijay khajuria
Miss. Manpreet kour
Mr. Parshotam kumar
Mr. Bishan Lal
Mr. Romesh Lal
Mrs. Rajni Bharti
Mr. Mohammad yaqoob

OFR Centre, Jammu

Agronomist
Field assistant
Field assistant
Field assistant
Field assistant
Field assistant
Field assistant
Jr. Steno/UDC
Driver
Watchman

Dr. A.K. Gupta
Mr. S. Khazan Singh
Mr. Babu Ram
Mr. Ab. W. Katoch
Mr. Baba Ditta
Mr. Ghulam Mohd.
Mr. Jai Krishan
Vacant
Mr. Mohd. Saleem
Mr. Tarsem Singh

12.BAU,RANCHI(JHARKHAND)

Main centre,Ranchi

Chief Agronomist
Jr. Soil Scientist
Jr. Agronomist
Technical Asstt.

Dr. M.K. Singh
Dr. J. Prasad
Mr. R.P. Manjhi
Mr. Rakesh Mitra

Agronomist
Technical Asstt.

Field assistant
Field assistant
Field assistant
Field assistant
Field assistant
Jr.Stenographer
Driver
Watchman

On-Farm Centre,Jamtara

Mr. W. Aind
Mr. Rakesh Kumar
Sinha
Mr. S.K. Soy
Mr. S.N. Baitha
Mr. K. Dom
Mr. Saikullah
Mr. Karjru Oraon
Mr. B.L. Singh
Mr. Dinesh Toppo
Mr. Krishun Kujar
Mr. Sarif Ansari

13.UAS,Bangalore(KARNATAKA)

Main Centre, Kathalelgere

Chief Agronomist
Jr. Soil Scientist
Jr. Agronomist
Technical Asstt.
Field assistant
Field assistant
Jr. Steno/UDC
Messenger

Dr. H. Chandrappa
Dr. A. Sathish
Dr. A.Y. Hugar
Mr. Nagaraja kusugur
Mr. N. Rajappa
Mr. P. Maheshwarappa
Mr. Ajith Kumar K.B
Mr. K.M. Chandrakala

On-Farm Centre, Bangalore

Agronomist
Jr. Soil Scientist
Technical Asstt.(SRF)*
Field assistant
Field assistant
Field assistant
Field assistant
Field assistant
Field assistant
Field assistant
Jr. Steno/UDC
Driver

Dr. A.P. Viswanath
Mr. M.N. Venkatamana
Mr. Maheshgowda
C.B (On contract basis)
Mr. K.V. Vera Setty (On contract basis)
Mr. N. Suresha (On contract basis)
Mr. A.L.N. Gowda (On contract basis)
Mr. B.K. Ashoka (On contract basis)
Mr. V. Murali (On contract basis)
Mr. K.V. Suresha babu (On contract basis)
Mrs. N. Vasanthi (On contract basis)
Mr. M.K. Jagadish (On contract basis)

Watchman Mr. N. Sathisha (On contract basis)

14.UAS,Raichur(KARNATAKA)

Main Centre, Siruguppa

Chief Agronomist Mr. Basavarajappa M.A
Jr. Soil Scientist Dr. Ashok Kumar Gaddi
Jr. Economist Dr. Prabhuling Tewari
Technical Asstt. Mr. Erappa Yankannvar
Technical Asstt. Mr. Bhimanna Hugar
Field assistant Mr. Basavaraj G.
Field assistant Mr. S.V. Angadi
Jr. Steno/UDC Mr. Mallesh Yankappa

15.UAS Dharwad

On-Farm Centre, Gadag (KARNATAKA)

Agronomist Dr. M.H. Hosmani
Technical Asstt. Mr. C.B. Koujalagi
Field assistant Mr. B.Y. Bhajantri
Field assistant Mr. Channabasappa
Field assistant Mr. M.S. Talakeri
Field assistant Mr. R.P. Pinjar
Field assistant Mr. Vidyadher
Field assistant Mr. N.N. Hokkundi
Jr. Steno/UDC Vacant
Driver Vacant
Watchman Mr. A.M. Harinath

16.KAU,THRISSUR (KERALA)

Main Centre, Karmana (Thiruvananthapuram)

Chief Agronomist Dr. Kuruvilla Varughese
Jr. Soil Scientist Dr. B. Rani
Jr. Agronomist Dr. B. Jacob john
Technical Asstt. Vacant
Technical Asstt. Mrs. Suja abraham
Field assistant Mr. Tony Abraham
Field assistant Mrs. K.S. Sujatha
Jr. Steno/UDC Mrs. P.S. Sindhu
Messenger Mr. K. Maniyam

On-Farm Centre, Sadanandapuram

Agronomist Dr. Thomas Mathew
Jr. Soil Scientist Dr. Mrs. Meagle Joseph
Field assistant Mr. K.V. Natrajan
Field assistant Mr. K. Vijayanarayana
Field assistant Mr. Sceenivassan Palassery
Field assistant Mr. N.R. Rajan
Field assistant Mr. P.C. Girijavallaban

Jr. Steno/UDC Driver
Watchman

Mr. P.A. Mumtaz
Mr. C. Balakrishna
Mr. T.A. Muthaleef

17.JNKVV,Jabalpur(M.P.)

Main Centre,Jabalpur

Chief Agronomist Dr. V.B. Upadhyay
Jr. Soil Scientist Dr. G.S. Nayak
Jr. Agronomist Dr. Mrs Nisha Mehra
Technical Asstt. Dr. S.K. Vishwakarma
Field assistant Mr. S.R. Singh
Field assistant Mr. S.P. Dubey
Jr. Steno/UDC Mr. T.P. Verma
Messenger Mr. N.L. Bhumiya

Sub Centre,Rewa

Agronomist Dr. B.M. Mouya
Tech.Assistant Vacant
Field assistant Mr. R.S. Tiwari
Field assistant Miss. Richa Singh
Jr. Steno/UDC Mr. S.S. Dwivedi

Sub Centre,Powerkheda

Agronomist Dr. R.S. Lidder
Tech.Assistant Dr. A.K. Dubey
Field assistant Mr. Viswanath Sitoke
Field assistant Mr. Sudhir Dubey
Jr. Steno/UDC Mrs. Sushila Jhariya

On Farm Centre,Seoni

Agronomist Dr. C.M. Mishra
Jr. Soil Scientist Dr. N.P. Sharma
Field assistant Vacant
Field assistant Mr. V.R. Ghorke
Field assistant Vacant
Field assistant Vacant
Field assistant Vacant
Field assistant Vacant
Jr. Steno/UDC Mrs. Abha Shrivastava
Driver Vacant
Watchman Vacant

On Farm Centre,Katni

Agronomist Dr. P.K. Tyagi
Technical Asstt. Dr. R.K. Sharma
Field assistant Mr. A.K. Kulshrestha
Field assistant Mr. B.L. Gupta
Field assistant Mr. T.S. Dudve
Field assistant Mr. R.D. Mahor
Field assistant Mr. M.S. Prajapati
Field assistant Mr. S.K. Baghel

Jr. Steno/UDC	Mr. M.K. Shrivastva
Driver	Vacant
Watchman	Vacant

18.RMVRSUA&T GWALIAR**Sub Centre, Indore**

Agronomist	Dr. A.K. Sharma
Tech.Assistant	Mr. N.K. Sinha
Field assistant	Mr. R.K. Tamere
Field assistant	Mr. G.S. Yadav
Jr. Steno/UDC	Mr. N.K. Bangre

19.MPKV,RAHURI (MAHARASHTRA)**Main Centre,Rahuri**

Chief Agronomist	Dr. A.G. Wani
Jr. Agronomist	Vacant
Jr.Soil Scientist	Dr. V.S. Patil
Tech. Assistant	Mr. N.S. Ugale
Field Assistant	Mr. M.L. Kuldharan
Field Assistant	Mr. J.A. Rajnur
Jr.Stenographer	Mr. R.R. Gore
Messenger	Vacant

On Farm Centre,Chas(Ahmednagar)

Agronomist	Prof. M.M. Desai
Jr.Scientist	Prof. Y.C. Sale
Tech. Assistant	Mr. S.M. Todmal
Field Assistant	Mr. S.P. Kahar
Field Assistant	Mr. R.P. Gangurde
Field Assistant	Mr. N.S. Kudal
Field Assistant	Mr. R.H. Rathod
Field Assistant	Mr. A.B. Nikrad
Field Assistant	Vacant
Jr.Stenographer	Mr. A.M. Chavan
Driver	Mr. S.G. Avhad
Messenger	Mr. E.R. Jadhav
Watchman	Mr. V.P. Ghegde

20.DPDKV,AKOLA(MAHARASHTRA)**Main Centre,Akola**

Chief Agronomist	Mr. B.V. Saoji
Jr. Agronomist	Mr. B.S. Morwal
Jr.Soil Scientist	Mr. R.J. Nikesar
Tech. Assistant	Vacant
Field Assistant	Mr. S.D. Panzade
Field Assistant	Mr. T.L. Pawar
Jr.Stenographer	Mr. S.T. Girhe
Messenger	Vacant

Sub Centre, Hiwara

Agronomist	Dr. G.V. Thakre
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Technical Assistant	Mr. F.F. Khan
Field Assistant	Mr. K.B. Kukade
Field Assistant	Mr. K.G. Lanjewar
Field Assistant	Mr. S.D. Kadam
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Jr.Stenographer	Vacant
Watchman	Mr. Y.S. Ghonmode

21.MAU,PARBHANI(MAHARASHTRA)**Main Centre,Parbhani**

Chief Agronomist	Dr. W.N. Narkhede
Jr.Economist	Prof. J.L. Katkade
Jr.Soil Scientist	Dr. M.S. Deshmukh
Jr.Stenographer	Mr. R.R. Dharasurkar
Tech. Assistant	Mr. S.A. Khan
Field Assistant	Mr. G.Y. Sonwane
Messenger	Vacant

On Farm Centre,Aurangabad

Agronomist	Shri. R.S. Raut
Tech. Assistant	Dr. D.P. Deshpande
Field Assistant	Mr. M.K. Shinde
Field Assistant	Mr. S.K. Choudhari
Field Assistant	Mr. B.N. Ambad
Field Assistant	Mr. R.P. Kerai
Field Assistant	Mr. B.S. Kakade
Jr.Stenographer	Mr. S.S. Mundhe

22.DBS KKV,DAPOLI(MAHARASHTRA)**Main Centre,Karjat**

Chief Agronomist	Dr. L.G. Pawar
Jr. Soil Scientist	Mr. D.G. Jondhale
Jr. Agronomist	Mr. A.S. Dalvi
Technical Asstt.	Mr. P.M. Talha
Technical Asstt.	Mr. P.M. Hegade
Field assistant	Mr. A.B. Gaikwad
Field assistant	Mr. J.P. Hambir
Jr. Steno/UDC	Mr. R.L. Biwalkar
Messenger	Mr. L.N. Hambir

On Farm Centre,Mulde

Agronomist	Mr. M.S.I. Shaikh
Field Assistant	Mr. S.V. Kamble
Field Assistant	Mr. B.L. Shanwar
Field Assistant	Mr. D.R. Kasalkar
Field Assistant	Mr. S.D. Phale
Field Assistant	Mr. V.S. Daphal
Field Assistant	Mr. P.P. Jalgaonkar
Jr.Stenographer	Mr. P.V. Nagamwad

Driver Mr. S.J. Jadhav
 Messenger Mr. V.D. Zagade

23.OUAT,BHUBNESWAR (ORISSA)

Main Centre,Bhubaneswar

Chief Agronomist Dr. L.M. Garnayak
 Jr. Agronomist Mr. A.K. Mohanty
 Tech. Assistant Mrs. M. Mohanty
 Tech. Assistant Mr. D.K. Raut
 Field Assistant Mr. Trinath Routray
 Field Assistant Mr. B. Biswal
 Jr.Stenographer Mrs. N. Kanungo
 Messenger Mr. G. Mahabhoi

Sub Centre,Chiplima

Agronomist Mr. J. Haldar
 Tech. Assistant Mr. B. Danta
 Field Assistant Mr. N.K. Sahoo
 Field Assistant Mr. J.K. Behera
 Jr.Stenographer Mr. N.K. Parida

On Farm Centre,Dhenkanal

Agronomist Dr. B.K. Mohapatra
 Jr.Economist Dr. S.N. Mishra
 Field Assistant Mr. S. Baral
 Field Assistant Mr. M.K. Acharya
 Driver Mr. B. Behra
 Watchman Mr. K.C. Bhujabal

On Farm Centre,Kendrapara

Agronomist Dr. B.R. Rath
 Field Assistant Mr. T. Sahoo
 Field Assistant Mr. S. Bisal
 Driver Mr. K.C. Mallick
 Watchman Mr. S. Munda

24.PAU,LUDHIANA(PUNJAB)

Main Centre,Ludhiana

Chief Agronomist Dr. Sohan Singh Walia
 Agronomist Dr. C.S. Aulakh
 Jr.Soil Scientist Mr. Roopinder Singh
 Tech. Assistant Mr. Surender Singh
 Field Assistant Mr. Khandu Ram
 Field Assistant Mr. Bhupinder Singh
 Field Assistant Mr. Prem Prakash
 Jr.Stenographer Mr. Rakesh Yadav
 Watchman Mr. Jagmohan Singh

On Farm Centre,Amratsar

Agronomist Dr. Satpal Singh
 Field Assistant Mr. Amrik Singh

Field assistant Mr. Bir Singh
 Field assistant Mr. Prakash chand
 Field assistant Mr. Sukdev Singh
 Field assistant Mr. Atwar Singh
 Field assistant Vacant
 Jr.Stenographer Mr. Balbir Singh
 Driver Mr. Gurudev Singh
 Watchman Vacant

25.MPUAT,Udaipur(RAJASTHAN)

Sub Centre,Kota

Agronomist Dr. G.S. Bhatnagar
 Tech. Assistant Mr. H.P. Meghwal
 Field Assistant Vacant
 Field Assistant Mr. Bhagwan Singh
 Jr.Stenographer Mr. H.P. Meena

On Farm Centre,Udaipur

Agronomist Dr. N.K. Jain
 Jr.Economist Mr. Hari Singh
 Field Assistant Mr. N.S. Jhala
 Field Assistant Mr. Ramji Lal
 Field Assistant Mr. Madan Lal
 Field Assistant Mr. Sheoraj Hada
 Field Assistant Mr. N.S. Rathore
 Field Assistant Mr. A.S. Rathore
 Jr.Stenographer Mr. Vishal Ajmera
 Driver Mr. Nana Lal Salvi
 Messenger Mr. Ganeshy

26.RAU,Bikaner,(RAJASTHAN)

Main Centre, Durgapura

Chief Agronomist Dr. O.P. Gill
 Jr. Soil Scientist Dr. D.K. Pareek
 Jr. Agronomist Vacant
 Technical Asstt. Mr. Mangal Ram
 Sharma
 Field assistant Mr. Nonand Singh
 Field assistant Mr. M.L. Kumawat
 Jr. Steno/UDC Mr. Ashok Sharma
 Messenger Mr. Kana Ram

On-Farm Centre, Hanumangarh

Agronomist Vacant
 Technical Asstt. Vacant
 Field assistant Mr. Banwari Lal
 Field assistant Mr. Chaju Ram Jat
 Field assistant Mr. Iswar Singh
 Field assistant Mr. Hanuman Lal
 Field assistant Vacant
 Field assistant Vacant

Driver Vacant
Jr. Steno/UDC Vacant

27.TNAU,COIMBATORE(TN)

Main Centre,Coimbatore

Chief Agronomist Dr. K. Siddeswaran
Jr.Soil Scientist Dr. S. Thiyageshwari
Jr. Agronomist Dr. P.M. Shanmugam
Tech. Assistant Dr. S.P. Sangeetha
(RA) Agronomy
Tech.Assistant M. Keerthana Priya
(JRF)
Field Assistant Mr. A. Gowthaman
Jr.Stenographer Mrs. R. Vennila
Messenger M. Vijayalakshmi

Sub Centre,Thanjavur

Agronomist Dr. S. Vallal Kannan
Tech. Assistant Mr. M. Periasamy
Field Assistant Mr. S. Palanisamy
Field Assistant P. Amutha
Jr.Stenographer M. Muruga

On farm ,Chettinad

Agronomist Mr. P. Kathirvelan
Field Assistant A. Rajeshwari
Field Assistant V. Krishnan
Field Assistant S. Selvi
Field Assistant M. Baskarandian
Field Assistant Mr. M.K. Rajendran
Field Assistant Mr. C. Shanmugam
Jr.Stenographer Mr. Paramasivam
Driver Mr. M. Radha
Messenger Vacant

On farm,Paiyur

Agronomist Dr. S. Vijayabaskaran
Field Assistant Mr. Th. A.Murugan
Field Assistant Mr. D. Gnanandurai
Field Assistant Mr. K. Mohandass
Field Assistant Mr. R. Solai
Field Assistant Mr. A. Ravichandran
Field Assistant Mr. N. Chandrasekaran
Jr.Stenographer Mr. R. Chitra
Driver Mr. V. Sekar
Messenger Mr. C. Murugesan

28.CSAUAT,KANPUR(U.P.)

Main Centre,Kanpur

Chief Agronomist Dr. M.P. Yadav
Jr. Soil Scientist Dr. U.S. Tiwari

Jr. Agronomist Dr. Jharakhande Rai
Technical Asstt. Mr. U.S. Yadav
Technical Asstt. Vacant
Field assistant Mr. Harimohan
Field assistant Mr. N.S. Kushwaha
Jr. Steno/UDC Mr. S.T. Siddiqui
Messenger Mr. Jagdish Prasad

On Farm Centre,Saini(Koushambi)

Agronomist Dr. Mohd Aslam
Field Assistant Mr. Jagdish Chandra
Field Assistant Mr. Ram Babu
Field Assistant Mr. Virendra Singh
Field Assistant Dr. S.P. Singh
Field Assistant Vacant
Field Assistant Vacant
Jr.Stenographer Mr. R.P. Singh
Driver Mr. Mahendra Singh
Messenger Mr. B. Singh

29.NDUAT,FAIZABAD (UP)

Main Centre,Faizabad

Chief Agronomist Dr. H.P. Tripathi
Jr. Soil Scientist Dr. Alok Kumar
Jr. Agronomist Dr. R.A. Yadav
Technical Asstt. Dr. R.P. Dwivedi
Technical Asstt. Mr. Ram Asrey Pandey
Field assistant Mr. Iswar Nath
Field assistant Mr. Anup Pratap Singh
Jr. Steno/UDC Mr. Rs. R.A. Zaidi
Messenger Mr. Daya Ram

On Farm Centre,Sant Kabir Nagar

Agronomist Dr. S.P. Singh
Field Assistant Mr. Tilak Ram
Field Assistant Mr. Santosh Kumur
Field Assistant Vacant
Field Assistant Vacant
Field Assistant Vacant
Field Assistant Vacant
Jr.Stenographer Mr. Ram Lal
Driver Mr. Jai Prakash Yadav
Watchman Mr. Satendra Kumar
Singh

On Farm Centre,Varanasi

Agronomist Dr. R.A. Singh
Field Assistant Mr. Phool Chand Tripathi
Field Assistant Mr. Akhila Nand Pandey
Field Assistant Mr. B.P. Chaurasiya
Field Assistant Mr. A.N. Pandey

Field Assistant	Mr. A.P. Singh
Field Assistant	Mr. Md. Waseem
Jr.Stenographer	Mr. Md. Naeem
Driver	Mr. Desh Raj sharma
Watchman	Mr. O.N.Pandey

30.BHU,VARANASI(UP)

Sub Centre,Varanasi

Agronomist	Dr. J.S. Bohra
Tech. Assistant	Mr. Manoj Kumar
Field Assistant	Mr. Dheeraj Verma
Field Assistant	Mr. Ravindra Rajput
Jr.Stenographer	Mr. Mohan Ram

31.RBS COLLEGE,BICHPURI(AGRA)

Agronomist	Dr. Ranjeet Singh
Tech. Assistant	Dr. Rahul Pundir
Field Assistant	Mr. Ramdhari
Field Assistant	Mr. Susheel Kumar Singh
Jr.Stenographer	Dr. Bhumi Raj Singh

32.GBPUAT,PANTNAGAR(UTTARAKHAND)

Main Centre,Pantnagar

Chief Agronomist	Dr. A.K. Bhardwaj
Jr. Agronomist	Dr. Dinesh Kumar Singh
Jr.Soil Scientist	Dr. Ajeet Pratap Singh
Tech. Assistant	Mr. Y.S. Khokar
Tech. Assistant	Vacant
Field Assistant	Mr. A.K. Tiwari
Field Assistant	Mr. M.P. Singh
Jr.Stenographer	Mr. D.R. Sharma
Messenger	Mr. Laloo Singh

On Farm Centre,Srinagar(Garhwal)

Agronomist	Dr. Purushottam Kumar
Tech. Assistant	Vacant
Field Assistant	Mr. Y.P. Gangwar
Field Assistant	Mr. S.K. Verma
Field Assistant	Mr. Gulsher Ahmed
Field Assistant	Mr. Virendra Singh
Field Assistant	Mr. D.S. Chaturvedi
Field Assistant	Mr. Gurudeep (SRF)
Jr.Stenographer	Vacant
Driver	Vacant
Messenger	Mr. Panjabi Mahtao

33.BCKV,Kalyani

Main Centre,Kalyani

Chief Agronomist	Dr. Manabendra Ray
Jr. Soil Scientist	Dr. P.K. Mani
Jr. Economist	Dr. S. Chatterjee
Technical Asstt.	Dr.Dilip Saha
Technical Asstt.	Mr. Basudev Datta
Field assistant	Mr. Bipul Chandra Pal
Field assistant	Mr. Amar Chakrabarty
Jr. Steno/UDC	Miss. Sonali Rakshit
Messenger	Mrs. Kanak Prabha Biswas

On-Farm Centre,Kakdwip

Agronomist	Dr. Manabendra Ray
Field assistant	Mr. A.K. Bhaumik
Field assistant	Mr. K. Maiti
Field assistant	Mr. Md.F. Haque
Field assistant	Mr. S.K. Dutta
Field assistant	Mr. N.C. Ghosh
Field assistant	Mr. N. Das
Jr. Steno/UDC	Mr. Nilanjan Mukherjee
Driver	Mr. Subrata Mitra

APPENDIX IV: SOIL FERTILITY STATUS AND NUTRIENT UPTAKE

Table A: Soil fertility status - Organic carbon (%) and available N, P and K (kg/ha) after *Kharif/Rabi/summer* season in Expt. No. 1(a)

Name of CSR Centre	Season*	Nut./Treat.	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄	T ₁₅		
Rajendra nagar	Kharif	OC%	0.51	0.49	0.54	0.48	0.58	0.55	0.51	0.48									
		N	172	169	176	168	176	177	171	168									
		P	34.3	27.8	35.8	32.3	36.5	35.6	33.6	32.3									
Rabi	Rabi	OC%	0.58	0.47	0.61	0.6	0.54	0.56	0.62	0.65									
		N	181	167	185	183	176	178	185	190									
		P	30.2	28.1	34.1	33	33.8	35.6	34.5	31.5									
Maruteru	Kharif	OC%	0.78	0.76	0.81	0.79	0.75	0.84											
		P	34.6	33.6	31.8	32.9	35.6	35.2											
		K	236	226	217	199	180	148											
Rudrur	Rabi	OC%	0.54	0.48	0.55	0.59	0.58	0.42	0.46	0.45	0.45	0.54	0.62	0.56	0.6				
		P	33.8	33.2	41.5	39.5	37	35.3	32.4	38.1	36.5	34.8	156	159	152	125			
		K	316	297	313	348	332	317	278	312	331	310	29	34	24	30	50	52	50
Jorhat	Rabi	OC%	0.62	0.55	0.65	0.6	0.62	0.63	0.54	0.54	0.54	0.65	0.62	0.56	0.6				
		N	156	178	180	141	196	197	199	166	156	156	159	152	125				
		P	31	34	34	32	26	33	30	34	29	34	29	34	24	30	50	52	50
Sabour	Summer	OC%	0.54	0.55	0.55	0.53	0.55	0.56	0.55	0.55	0.54	0.56	0.54	0.54	0.54				
		N	210.3	200.8	211.8	198.3	212.4	199.5	195.4	196.1	210.7	212.5	205.7	197.2					
		P	24.8	25.2	25.6	24.4	25.6	24.2	24.9	24.2	26.3	25.7	24.3	24.8					
Raipur	Kharif	OC%	0.5	0.5	0.5	0.51	0.51	0.51	0.5	0.5	0.51								
		N	247	251	241	244	245	253	249	251									
		P	19.3	20.6	18.9	20.2	18.5	21.4	19.5	19.6									
Rabi	Rabi	OC%	0.51	0.52	0.51	0.52	0.52	0.52	0.53	0.53	0.53								
		N	261	252	256	257	255	257	259	263									
		P	20.8	20.8	20.4	20.2	20.4	21.1	20.4	21.6									
Summer	Summer	OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N	258	253	252	251	252	251	255	260									
		P	20.2	20.4	19.6	19.6	20.2	20.4	19.2	20.4									
		OC%	0.51	0.53	0.5	0.54	0.53	0.52	0.54	0.53	0.53								
		N</																	

Name of CSR Centre	Season*	Nut./Treat.	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄	T ₁₅		
SK Nagar	Summer	OC%	0.36	0.39	0.38	0.38	0.42	0.38	0.44	0.45	0.47	0.41							
		N	201.0	204.0	198.0	218.0	214.0	212.0	218.0	218.0	225.0	228.0	212.0						
		P	15.1	16.1	14.8	13.8	16.1	15.6	15.6	15.6	16.6	18.5	16.4						
Junagadh		K	218.0	199.0	208.0	220.0	218.0	196.0	206.0	220.0	236.0	230.0							
		OC%	0.71	0.70	0.73	0.70	0.70	0.73	0.78	0.78	0.76	0.80	0.70						
		N	225.0	220.0	242.0	228.0	215.0	218.0	228.0	242.0	249.0	235.0							
Navsari	Summer	P	13.2	10.2	21.3	11.3	12.5	13.1	15.5	22.4	18.6	14.1							
		K	162.0	182.0	282.0	168.0	168.0	176.0	192.0	274.0	202.0	186.0							
		OC%	0.64	0.68	0.64	0.60	0.60	0.62	0.60	0.63	0.61	0.62							
Hisar	Kharif	N	216.0	216.0	212.0	198.0	198.0	206.0	204.0	206.0	208.0	202.0							
		P	22.0	24.6	24.3	20.1	21.2	18.2	22.3	21.6	19.6	21.0							
		K	168.0	182.0	174.0	164.0	160.0	158.0	160.0	178.0	162.0	160.0							
Hisar		OC%	0.46	0.47	49	0.49	0.54	0.47	0.5										
		N	147	147	146.3	148.8	164.5	147	155.8										
		P	12.5	14.5	12	13	13.5	11	13.5										
Palampur	Kharif	K	278.5	301.3	320	298.7	298.7	297.5	297.5	297.5	297.5								
		OC%	0.48	0.46	0.47	0.48	0.46	0.49	0.47										
		N	169.8	168	173.3	150.5	54	176.8	171.5										
Palampur	Summer	P	13	14	13.5	2	2.5	14	13										
		K	300	301.3	291.3	291.3	303.8	291.3	297.5										
		OC%	0.47	0.48	0.47	0.48	0.47	0.47											
Palampur	Kharif	N	154	159.3	154	159.3	162.8												
		P	14	14.5	14	14.5	14	14											
		K	260	275	260	275	286.3	286.3											
Palampur	Rabi	OC%	0.85	0.92	95	0.86	98	0.89	82	0.9	0.88								
		N	289	258	271	277	280	277	277	280	280								
		P	40.9	60.5	52.6	47.6	62.6	76.2	47.6	68.3	67.2								
Jammu	Summer	K	88	125.1	93.9	89.3	105.8	127.4	104.5	138.3	176.7								
		OC%	1.1	1.0	11.0	1.0	1.1	1.1	1.0	1.0	1.0								
		N	304.5	307.6	319.6	316.6	316.6	313.6	304.6	298.3	304.6								
Jammu		P	43.1	73.9	72.8	67.8	68.3	71.1	65.5	74.5	73.9								
		K	89.1	93.9	92.6	88.7	83.2	130.1	91.4	146.5	170.2								
		OC%	0.53	0.62	0.55	0.57	0.54	0.56	0.54	0.56	0.56								
Jammu	Summer	N	205.7	235.3	206	201.3	233.5	214.2	204.7	218.2	219.5	212.8							
		P	20.4	24.1	20.7	20.1	21.7	21.5	20.8	20.3	21.5	21.2							
		K	109.1	117.8	117.5	123.6	122.2	121.8	124.7	120.7	115	121.5							

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Name of CSR Centre	Season*	Nut./Treat.	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄	T ₁₅	
Ranchi	Summer	OC%	0.38	0.4	0.39	0.41	0.4	0.4	0.4									
		N	219	260	290	250	278	282	245									
		P	35	30.5	31	22.6	29.7	300	23.1									
Kathalagere	Summer	OC%	0.62	0.63	0.65	0.63	0.67	0.76	0.75	0.73	0.73	0.73	0.73	0.75	0.71			
		N	318.8	314.2	324.8	314.5	311	330.2	320.5	326.6	313.5	391.3	299	323.3				
		P	15.4	19.6	21	18.7	21.8	23.9	21.5	20.9	22.9	22.1	220	20.9				
Siruguppa	Kharif	K	135.2	172.8	186.9	184.5	185.1	192.5	191.6	189.7	188.2	191.6	187.4	148.9				
		N	209	222	230	246	224	252	263	254	226	220						
		P	23	25	23	26	25	24	28	30	27	24						
Karmana	Kharif	S	30	30	32	30	31	32	33	33	29	29						
		K	348	349	353	353	366	345	377	364	338	349						
		N	230	228	245	238	239	254	260	265	233	241						
Jabalpur	Rabi	P	25	24	24	26	25	26	31	31	23	21						
		K	335	332	331	341	337	333	360	370	332	325						
		S	31	34	32	33	29	31	27	32	29							
Powarkheda	Rabi	OC%	1.06	0.65	0.61	0.86	0.89	0.99	0.45	0.6								
		N	259	229	252	273	269	240	252	221	221							
		P	15.3	13.8	15.8	14.4	24.9	21.2	10	10	10							
Rewa	Rabi	K	108	72	85	75	104	116	66	69								
		OC%	0.96	0.93	0.87	1.21	0.84	0.88	0.97	1.1	1.1							
		N	246	250	234	261	261	257	246	227	227							
Ranchi	Summer	P	27.8	27.3	34.7	27.5	44.8	35.1	78.4	22.6								
		K	97.4	84.3	73.9	78.7	93.3	109	282.6	336								
		OC%	0.92	0.77	0.97	0.61	0.96	1.1	0.62	0.71	0.71							
Jabalpur	Rabi	N	326	311	321	313	253	298	296	315								
		P	29.8	71.8	44.1	28.1	96.3	36	27	39.2	39.2							
		K	89.2	70.9	165	156.8	758.2	162.7	127.6	86.2								
Powarkheda	Rabi	OC g/kg	6.8	7.1	7	7	7.2	7.1	7	7.1	7	6.8	6.7	6.9				
		N	258	265	270	263	265	270	269	268	267	267	268	261	271			
		P	9.3	9.6	9.4	9.2	9.2	9.5	9.4	9.1	9.6	9.6	9.1	9.3	9.2			
Rewa	Rabi	K	308	314	325	299	304	317	311	306	303	300	302	305				
		OC g/kg	6.8	7.9	6.9	6.8	7.1	7	6.8	6.8	6.9	6.8	6.8	6.2	6.4			
		N	261	264	266	263	264	267	265	263	264	270	270	241	245			
Ranchi	Rabi	P	9.6	9.8	9.6	9.7	9.5	9.8	9.9	9.5	19.1	9.5	9.5	9.8	9.5			
		K	312	316	327	303	307	320	313	307	306	303	303	298	300			
		OC g/kg	5.3	6.2	6.4	6.3	5.9	6.2	6.3	6	6.4	6.1	6.2	6.4	6.4			
Ranchi	Rabi	N	235	249	250	228	230	240	242	230	240	239	241	245				
		P	9.8	9.7	10	9.7	9	10.3	9.7	9.9	9.6	9.7	9.8	9.5				
		K	305	299	322	313	317	329	300	301	311	295	298	300				

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Name of CSR Centre	Season*	Nut./Treat.	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄	T ₁₅	
Rahuri	Kharif	OC%	0.57	0.58	0.59	0.58	0.57	0.6	0.62	61	0.62	0.63	0.6	0.62	0.59	0.61	0.6	
		N	180	17.9	184	185	187	198	205	208	210	200	192	194	190	190	196	190
		P	17	16	19	18	16	19	20	21	20	21	18	19	19	21	20	19
	Rabi	K	526	531	528	534	530	540	538	545	548	542	536	540	540	542	546	548
		OC%	0.6	0.63	0.63	0.65	0.65	0.63	0.63	0.58	0.6	0.56	0.57	0.63	0.64	0.63	0.65	0.68
		N	185	194	192	193	194	191	200	200	185	206	189	188	198	172	199	177
Parbhani	Rabi	P	15	14	17	16	15	17	18	19	17	15	16	16	18	17	16	
		K	521	528	524	530	527	533	532	538	541	543	531	535	535	536	539	540
		OC%	145.3	185.4	195.2	167.2	185.5	140.2	155.2	150.7	160.1	160.1	190	178.4	140	140	140	140
	Akola	P	11	128	13.5	12	12.7	11.9	11.6	11.4	11	11	12.4	12.4	10.6	10.6	10.6	10.6
		K	340	376	365	355	370	340	350	328	355	355	389	376	355	376	376	355
		OC%	268	307	316	320	276	298	274	283	295	301	301	301	301	301	301	301
Karijat	Rabi	P	12.3	19.1	17.8	18.7	14.9	15.3	16.6	13.2	13.6	16.2	16.2	16.2	16.2	16.2	16.2	16.2
		K	370	409	476	484	459	429	440	431	456	443	443	443	443	443	443	443
		OC%	1.37	1.31	1.26	1.15	1.3	1.32	1.36	1.33	1.26	1.26	1.28	1.18	1.28	1.18	1.18	1.18
	Durgapura	N	257.1	221.6	211.7	204.3	221.6	223.2	231	227.9	212.2	215.3	206.9	206.9	206.9	206.9	206.9	206.9
		P	28.8	19.6	22.1	10.7	13.3	10.9	25.1	27	17.3	14.4	23.2	23.2	23.2	23.2	23.2	23.2
		K	333.7	261.6	205.8	235.4	232.7	236.1	281.1	270.5	221.3	267	228	228	228	228	228	228
Coimbatore	Rabi	OC%	0.25	0.26	0.36	0.41	0.29	0.28	0.29	0.27	0.35	0.28	0.28	0.28	0.28	0.28	0.28	
		P	34	37.1	35.8	34.2	35.6	35.4	34.8	36.9	35.7	346	346	346	346	346	346	
		K	189.2	197.2	200.8	191.9	194.3	191	193.1	195.4	191.4	192.2	192.2	192.2	192.2	192.2	192.2	
	Kharif	N	294	210	266	252	266	322	280	264	238	264	238	238	238	238	238	
		P	36.3	27.6	33.9	31.5	26.7	31.5	24	24	21.8	31.5	31.5	31.5	31.5	31.5	31.5	
		K	508	486	652	512	648	678	684	674	702	702	702	702	702	702	702	
Rabi	N	218	246	249	258	260	252	218	244	230	244	230	230	230	230	230		
	P	29.7	32.7	34	32.1	30.9	31.6	32.7	34.5	26.3	26.3	26.3	26.3	26.3	26.3	26.3		
	K	498	512	562	486	602	532	545	496	574	574	574	574	574	574			
Summer	N	210	308	308	316	280	336	294	243	258	258	258	258	258	258	258		
	P	39.1	31.5	36.3	32.5	33.9	342	36.7	32.2	29.8	29.8	29.8	29.8	29.8	29.8			
	K	446	528	474	512	468	496	532	484	466	466	466	466	466				
Kanpur	Rabi	OC%	0.61	0.64	0.66	0.63	0.63	0.66	0.65	0.65	0.67	0.67	0.67	0.67	0.67	0.67	0.67	
		P	20.7	21.3	21.3	21.1	21.5	223	22.5	22.5	22.5	22.6	22.6	22.6	22.6	22.6		
		K	283	286	288	286	287	290	293	291	293	293	293	293	293			
	Faizabad	Summer	OC%	0.54	0.6	0.58	0.61	0.63	0.59	0.64	0.58	0.58	0.58	0.58	0.58	0.58	0.58	
			N	153	164	160	166	162	167	170	159	159	159	159	159	159		
			P	21.6	22.8	23.4	22.7	23.2	22.7	23.3	21.6	21.6	21.6	21.6	21.6	21.6		
Pantnagar	Rabi	K	148	154	161	159	164	156	160	155	155	155	155	155	155	155		
		N	157	82.3	193	186	123	176.5	170.6	179.5	179.5	179.5	179.5	179.5				
		P	25	31	34	28	27.2	29	28	28.2	28.2	28.2	28.2	28.2				
	Kalyani	Rabi	K	176	192.2	183	180.7	179.6	183	182.6	182.6	182.6	182.6	182.6	182.6	182.6		
			OC%	0.78	69	0.87	0.81	0.84	0.87	0.81	0.81	0.93	0.96	0.93	0.96			
			N	216	216	246	246	246	246	246	216	246	246	246	246			
Kalyani	Rabi	P	38	38	42	42	38	42	38	30	38	38	38	38	38			
		K	185	194	282	207	198	207	202	172	242	242	242	242				
		OC%	0.78	69	0.87	0.81	0.84	0.87	0.81	0.81	0.93	0.96	0.93	0.96				

Table B: Nutrient uptake (kg/ha) N, P, K Expt. No. 1(a)

Name of CSR Centre	Season*	Nut./Treat.	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄	T ₁₅		
Rajendra nagar	Kharif	N	76.0	78.5	72.2	81.4	48.6	50.3	47.2	46.9									
		P	23.8	27.2	23.8	22.5	4.2	3.8	4.7	4.2									
		K	62.7	67.9	59.2	68.7	15.0	15.8	14.5	14.5									
	Rabi	N	153.7	155.6	136.8	145.7	130.6	150.8	107.7	118.9									
		P	33.8	40.7	34.3	36.0	23.8	22.2	11.4	18.5									
		K	96.3	120.9	93.2	137.2	105.4	99.0	41.9	54.2									
Maruteru	Kharif	N	108.2	115.9	120.2	109.4	121.6	125.3											
		P	27.7	30.1	31.7	28.7	32.0	32.9											
		K	79.4	85.7	87.9	83.1	92.8	94.6											
	Kharif	N	88.8	92	85.6	85	86.7	113.9	115.2	13.6	109.1	108.9	109.3	108.5					
		P	23.8	24.7	22.9	22.8	23.2	30.5	30.8	30.5	29.3	29.2	29.3	29					
		K	107.4	11.5	103.4	102.7	105	138	139.2	137.3	132.4	131.4	132.2	131.3					
Rabi	N	104.6	238.7	18.3	149.4	181.9	243.9	249.4	32.5	85.9	149.6	135.9	69.1						
	P	268	73.1	28.9	52.3	74.6	74.7	49.3	14.6	22.4	41.3	23.6	10.2						
	K	116.9	244.5	123.8	184.6	246.9	253.0	150.4	39.0	93.6	125.8	99.1	31.4						
Summer	N	N	101.3	101.3	31.6	123.4	55.8	117.7	102.6	80.3	31.8	82.9	127.1	80.5					
		P	16.9	16.9	4.8	41.3	17.5	30.4	17.1	2.7	5	20.7	28.7	22					
		K	67.5	67.5	13.9	150.8	57.4	75.9	685	67.9	14.2	51.6	73.8	71.2					
	Kharif	N	66.1	64.5	189.3	212.2	197.8	75.3	96.5	85.0	149.5	165.1							
		P	14.4	8.9	29.0	30.0	31.2	10.4	31.4	11.6	21.3	22.8							
		K	54.5	40.5	80.0	91.8	106.9	45.1	28.4	33.5	60.4	76.6							
Rabi	N	97.5	108.6	-	-	-	161.5	58.7	-	-	-	-	-						
	P	29.6	34.5	-	-	-	21.2	16.3	-	-	-	-	-						
	K	38.1	43.8	-	-	-	65.0	54.7	-	-	-	-	-						
Summer	N	-	128.0	143.3	84.8	142.0	-	103.1	162.2	138.8	151.7								
	P	-	34.5	43.0	18.0	36.6	-	26.2	48.9	23.5	45.9								
	K	-	119.6	142.4	51.3	132.6	-	69.6	142.7	43.4	135.3								
Junagadh	Kharif	N	100.2	95.7	112.0	85.4	87.7	115.3	109.1	55.0	117.4	89.7							
		P	9.6	9.2	11.2	27.0	14.6	17.1	15.9	16.9	16.9	16.3							
		K	30.3	29.4	35.2	77.0	61.5	52.6	48.3	42.2	46.6	43.1							
	Rabi	N	105.9	144.4	28.5	27.4	138.8	116.7	81.1	127.4	-	-	-						
		P	18.6	37.1	3.7	3.3	20.0	20.5	6.4	15.3	-	-	-						
		K	82.4	120.1	31.5	18.2	75.1	87.5	24.0	109.1	-	-	-						
Summer	N	-	82.4	38.9	40.0	-	34.8	123.6	110.6	66.2	56.8								
	P	-	17.0	12.1	9.9	-	7.8	11.0	10.3	7.8	14.7								
	K	-	75.6	31.2	33.0	-	25.2	139.9	133.1	27.1	43.0								

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Name of CSR Centre	Season*	Nut./Treat.	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄	T ₁₅	
Navsari	Kharif	N	58.3	62.7	67.7	61.9	71.2	56.6	60.0	55.7	67.1	59.4						
		P	14.0	13.0	12.4	13.9	17.5	12.7	11.8	11.1	16.3	13.5						
		K	56.7	62.9	60.2	59.8	67.3	74.1	74.3	82.6	74.3	85.8	75.2					
	Rabi	N	73.2	55.4	58.3	62.5	-	71.8	101.3	101.3	74.2	62.6	86.3					
		P	9.1	5.6	7.9	8.0	-	15.3	20.7	20.7	14.8	8.8	5.1					
		K	46.7	22.0	41.4	40.9	-	70.1	60.4	60.4	66.9	49.6	21.3					
	Summer	N	-	68.5	136.5	78.9	134.7	69.8	60.7	60.7	83.0	73.6	107.6					
		P	-	9.7	14.5	11.3	13.4	13.8	7.4	7.4	7.3	13.9	20.1					
		K	-	42.9	41.9	41.4	77.5	79.3	34.9	34.9	29.4	64.7	64.6					
	Ranchi	Kharif	N	77.3	73.9	74.8	85.2	74	76.8	84.5								
			P	15.3	15.2	16	18.5	15.5	15.8	17.4								
		Rabi	K	66.9	64.5	65.1	75	64.2	69.4	76.3								
N			95.6	69.8	62.2	130.3	101.9	103.4	152.4									
Summer		P	19.2	16.6	11	42.6	20.5	19.4	56.6									
		K	98.2	69.7	54.2	146.9	108	105.7	179.8									
Kathalagere	Kharif	N	170.4	210.5	217.9	202.7	174.2	209.8	186.7	195.4	219.2	107.2	251.4	94.9				
		P	33.1	33.4	39.3	35	41.8	64.6	33.9	36.1	32.4	19.1	32.6	12.5				
	Rabi/Summer	K	163.7	188.8	173.8	176.6	166	147.3	165.7			188.3	175.2	197.1	48.6			
		N	100	98	102	94	105	93	112	121	117	114						
	Summer	P	16	14	16	15	18	17	18	21	18	20						
		K	111	110	112	109	113	103	124	133	128	129						
Siruguppa	Rabi/Summer	N	107	11	11	7	11	26	2	8	13	112	113					
		P	19	2	1	1	3	2	2	2	4	20	21					
	Summer	K	119	9	1.4	8	11.2	3	9	11.9	135	129						
		N	115.2	198	188.6	213.1	246.3	202.5	194.3									
	Kharif	P	22.6	38.5	26.1	42.7	69.6	53.2	49	37.6								
		K	58.08	81.65	89.12	97.48	125.8	106.7	93.8									
Karmana	Rabi	N	87.3	76.5	95.8	90.6	107.3	90.8	8.5	22								
		P	25.8	25.4	28.6	31.9	39.7	30.1	4.3									
	Summer	K	60.3	57.3	60.6	60.7	59.8	1409	152.2	148.5	152.4	152.8	43.6	44.4	42.9	43.2	43.8	
		N	10	10.8	10	9.9	10.4	21.3	23.2	21.5	23.3	24.2	7.9	7.5	7.2	7.3	7.9	
	Rabi	K	114.7	113.7	115.3	112.9	112.9	56.1	62.7	61.1	63.9	62.6	83.7	86.4	88.8	87.3	86.5	
		N	65.4	45.2	156	133.9	106	71.9	50.1	173.1	141.3	115	71.2	47.8	168.7	150.3	105.4	
Rahuri	Kharif	P	14.2	167	34.8	7.9	28.2	14.7	19.6	36.2	21.7	30.6	15	19.1	34.7	22.9	26.4	
		K	54.6	54.3	31.1	81.1	112.7	56.6	51	34.5	826	115	58.5	59.8	31.4	90.5	108.7	

Table C: Soil fertility status (kg.ha) of different crop sequence in Expt. No. 2(a)

Name of CSR Centre	Season*	Nut./Treat.	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄	
Rajendra nagar	Kharif	OC%	0.54	0.57	58	0.55	0.55	64	0.66	0.66	0.63	0.57	0.61	0.63			
		N	179	181	177	177	189	191	187	191	179	185	187	183			
		P	36	36	38	36	39	43	43	42	42	42	37	36	39		
	Rabi	K	99	105	102	132	111	144	139	138	114	102	102	102	119		
		OC%	0.64	0.59	0.58	0.58	0.51	0.70	0.70	0.69	0.70	0.67	0.69	0.60	0.65		
		N	180	173	175	188	184	185	194	192	194	202	191	183	183		
Maruteru	Kharif	P	31	30	33	39	34	39	43	33	34	27	31	30			
		K	105	125	125	158	144	153	193	182	193	183	155	156	141		
		OC%	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	0.9	1.0	1.0	1.1	0.9		
	Rudrur	P	31	29	30	298	31	34	34	36	33	31	36	35	33		
		K	239	239	212	259	239	238	22	22	235	264	222	237	215		
		OC%	0.49	0.55	0.69	0.65	0.67	0.68	0.64	0.64	0.63	0.64	0.65	0.58	0.64		
Sabour	Rabi	P	25	25	32	27	22	33	21	34	27	34	24	28			
		K	355	344	320	316	311	335	287	327	287	339	320	300	357		
		OC%	0.35	0.4	0.5	0.56	0.59	0.78	0.74	0.72	0.74	0.7	0.77	0.72	0.46		
	Rajpur	N	118	138	154	163	1708	227	227	215	220	198	223	209	144		
		P	13	23	33	38	41	51	51	46	44	40	51	43	28		
		K	117	120	129	127	139	174	174	152	190	170	174	155	126		
SK Nagar	Rabi	OC%	0.5	0.5	0.6	0.6	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.6			
		N	173	203	233	246	265	260	253	256	253	251	274	266	233		
		P	114	19	20	23	29	26	24	26	26	21	29	25	21		
	Junagadh	K	173	218	231	243	277	278	283	283	260	255	289	281	243		
		OC%	0.12	0.18	0.2	0.22	0.25	0.33	0.31	0.31	0.31	0.3	0.32	0.3	0.18		
		N	117	170	175	178	186	206	212	202	212	200	208	204	178		
Rabi With Potash	Rabi With Potash	P	15	31	32	33	38	44	40	45	42	41	40	23			
		K	140	152	158	156	162	188	182	192	182	172	176	162	156		
		OC%	0.54	0.54	0.65	0.68	0.64	0.69	0.78	0.82	0.78	0.8	0.71	0.74	0.68	0.63	
	Rabi Without Potash	N	185	220	223	236	240	256	252	248	252	242	246	236	208		
		P	9	21	22	24	25	33	32	30	32	30	32	30	21		
		K	161	187	187	190	194	200	204	196	204	202	195	193	152		
Rabi Without Potash	Rabi Without Potash	OC%	0.56	0.56	0.68	0.7	0.72	0.73	0.77	0.76	0.78	0.68	0.68	0.74	0.69	0.71	
		N	156	208	210	215	220	231	224	220	224	219	224	216	182		
		P	7	23	26	27	30	34	33	33	33	32	34	34	14		
	SK Nagar	K	146	161	161	160	158	161	158	158	162	159	161	160	157		

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Name of CSR Centre	Season*	Nut./Treat.	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄	
Navsari	Rabi	OC%	0.5	0.52	0.55	0.56	0.61	0.66	0.62	0.66	0.63	0.65	0.63	0.63	0.55		
		N	184	241	245	246	250	259	258	258	262	258	261	248	236		
		P	20	29	31	31	33	37	37	37	37	37	37	36	33		
Hisar	Kharif	K	174	182	188	187	190	218	205	208	198	210	210	208	185		
		OC%	0.39	0.43	0.47	0.48	0.51	0.52	0.51	0.51	0.48	0.48	0.5	0.49	0.47		
		N	123	144	152	161	186	193	180	180	172	172	172	170	154		
Palampur	Kharif	P	14	14	14	15	19	19	18	15	15	18	18	19	15		
		K	221	245	264	291	303	308	299	310	310	299	286	298	281		
		OC%	0.39	0.43	0.47	0.48	0.49	0.51	0.47	0.47	0.48	0.47	0.49	0.48	0.46		
Jammu	Rabi	N	151	159	186	196	229	235	210	219	207	224	214	215			
		P	10	11	14	14	16	18	16	16	15	14	17	16	13		
		K	208	228	236	254	223	336	328	315	309	318	311	311	293		
Ranchi	Rabi	OC%	0.6	0.66	0.69	0.73	0.75	0.93	0.86	0.85	0.78	0.85	0.85	0.77	0.75		
		N	193	206	209	234	268	318	2786	2786	292	266	308	285	234		
		P	21	39	53	72	80	94	86	86	76	68	78	71	76		
Kathalagere	Summer	K	129	148	148	155	180	181	174	180	168	174	168	173			
		OC%	0.57	0.63	0.68	0.71	0.74	0.88	0.84	0.85	0.85	0.77	0.8	0.75	0.73		
		N	193	209	231	223	278	314	284	298	271	309	285	285	260		
Jabalpur	Rabi	P	20	38	72	53	80	94	87	77	70	79	69	79			
		K	123	143	155	155	178	186	172	180	170	178	1663	176			
		OC%	0.48	0.58	0.54	0.55	0.45	0.8	0.69	0.82	0.82	0.72	0.7	65	0.48		
Kathalagere	Summer	N	157	162	152	166	203	252	228	214	212	242	187	163			
		P	8	12	15	17	24	36	28	22	22	25	23	19	13		
		K	90	105	110	97	116	123	117	128	111	108	105	99			
Kathalagere	Summer	OC%	0.38	0.38	0.39	0.4	0.4	0.5	0.47	0.46	0.48	0.43	0.39	0.29			
		N	199	213	218	220	226	277	264	256	267	240	218	183			
		P	142	45	51	56	79	91	82	65	56	58	54	13			
Jabalpur	Rabi	K	144	132	142	134	142	171	148	152	134	135	130	129			
		OC%	0.62	0.63	0.64	61	0.65	0.73	0.73	0.72	0.72	0.75	0.7	0.71	0.63		
		N	299	304	304	302	315	307	308	313	313	337	302	309	303		
Jabalpur	Rabi	P	18	19	20	19	21	22	21	21	22	21	22	19			
		K	157	172	192	193	188	196	192	191	191	193	192	190	168		
		OC g/kg	6.0	6.3	6.6	6.6	6.9	7.6	7.5	7.6	7.6	7.5	7.9	7.6	7.2		
Jabalpur	Rabi	N	246	258	263	268	270	282	279	280	279	292	271	272			
		P	9	9	9	11	14	15	16	16	16	17	17	15			
		K	284	315	334	369	431	466	461	487	466	488	474	440			
Jabalpur	Rabi	S	6.3	7.1	7	7.2	7.2	8.4	8.2	8.1	8.3	8.5	8.2	7.9			
		Zn	0.24	0.25	0.31	0.31	0.32	0.43	0.4	0.39	0.36	0.45	0.41	0.37			

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Name of CSR Centre	Season*	Nut./Treat.	T 1	T 2	T 3	T 4	T 5	T 6	T 7	T 8	T 9	T 10	T 11	T 12	T 13	T 14	
Rahuri	Kharif	OC%	0.43	0.53	0.42	0.45	0.42	0.66	0.67	0.68	0.61	0.65	0.58	0.55	0.59		
		N	110	148	155	161	175	206	163	238	166	194	194	172	163		
		P	6	11	13	15	18	19	19	19	15	17	15	16	12	18	
	Rabi	K	562	627	655	662	668	683	673	613	610	670	648	560	650		
		OC%	0.43	0.48	0.48	0.47	0.46	0.6	0.53	0.54	0.56	0.5	0.54	0.45	0.59		
		N	142	166	181	188	196	208	198	160	166	182	207	176	191		
Parbhani	Rabi	P	8	12	15	17	19	21	20	16	15	19	18	15	18		
		K	553	618	645	652	671	688	669	609	602	674	655	547	658		
		N	113	140	150	154	192	235	182	175	178	212	202	130	178	200	
	Av.P2O5	Av.K2O	15	24	23	25	38	40	32	30	32	33	35	40	23	36	34
		OC%	0.23	0.46	0.49	0.51	0.61	0.64	0.64	0.57	0.54	0.54	0.56	0.55	0.42		
		N	113	217	220	235	310	324	304	304	315	297	314	307	207		
Akola	Kharif	P	5	14	16	19	30	33	29	24	21	25	26	11			
		K	216	307	315	337	419	448	401	369	361	391	385	305			
		OC%	0.34	0.49	0.51	0.54	0.6	0.64	0.61	0.61	0.61	0.59	0.61	0.59	0.45		
	Rabi	N	127	228	246	255	297	327	306	306	310	293	307	281	226		
		P	3.5	13.6	192	21.2	24.7	35.7	33.4	23.7	21.4	21.4	22.7	23	12.6		
		K	207	311	325	353	403	437	423	384	373	409	347	277			
Ludhiana	Rabi	OC%	0.35	0.38	0.39	0.36	0.39	0.58	0.56	0.48	0.47	0.57	0.56	0.56	0.39	0.46	
		N	156	161	181	179	190	235	221	209	201	231	231	223	217	211	196
		P	11	15	16	22	31	38	39	28	29	29	34	31	40	35	35
	K	101	105	101	105	111	165	151	138	131	131	146	135	150	131		
		OC%	0.15	0.34	0.47	0.47	0.55	0.64	0.54	0.49	0.47	0.61	0.61	0.53	0.4		
		P	9	15	17	22	27	23	23	22	23	24	24	24	20		
Faizabad	Rabi	K	92	142	149	157	174	163	159	164	162	170	168	135			
		OC%	0.26	0.41	0.38	0.43	0.51	0.63	0.59	0.59	0.6	0.57	0.62	0.6	0.42		
		P	515	17	19	22	25	23	20	19	19	26	24	17	13		
	Rabi P40	K	206	219	233	243	251	259	256	256	268	255	248	254	228		
		OC%	0.76	0.89	0.9	0.89	0.99	1.1	1.2	1.2	1	0.94	1.2	1.1	1		
		N	193	224	256	249	267	263	262	273	251	251	323	314	313		
Pantnagar	Rabi Po	P	12	14	15	15	13	16	18	17	18	20	18	18			
		K	159	170	174	170	173	181	173	172	170	170	189	175	197		
		OC%	0.76	0.87	0.84	0.87	0.93	1.2	1.2	1	0.96	0.96	1.3	1.2	0.95		
	Rabi P40	N	199	228	259	253	274	286	263	263	279	255	328	319	316		
		P	15	20	19	20	22	23	27	25	25	25	30	26	24		
		K	163	168	176	174	175	184	179	175	174	174	193	179	208		

Table D: Nutrient uptake (kg/ha) of different crop sequence in Expt. No. 2(a)

Name of CSR Centre	Season*	Nut./Treat.	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	
Rajendra nagar	Kharif Rice	N	35.4	37.9	42.4	61.4	72.6	68.2	63.7	50.7	50.2	72.3	80.8	60.5	
		P	7.7	9	9.4	14	17.4	16.1	17.7	12.9	15.2	15.2	14.3	14.6	11.8
	Rbi Rice	K	37.2	46.1	40.5	59.9	66.5	71.9	80.7	57	60.4	60.4	75.6	81.4	54.7
		N	74.9	91.1	117.3	134.7	157.2	146.1	119.7	120	115.1	115.1	155.4	164	142.9
		P	16.8	20.2	26.4	27.4	33.5	34.7	32.3	29.3	35.3	35.3	31.3	31.8	28.6
		K	84.2	114.3	120.3	120.8	126.8	151.9	143.2	127.3	154.9	154.9	144.6	159.1	123.7
Maruteru	Rice+Rice	N	42.6	72.9	70.9	95.5	110.9	115.9	103.7	108.8	102.3	112.9	109.8	86.9	
	P	11.8	21.5	18.5	21.7	27.1	28.2	32.1	26.7	28.5	28.5	28.9	30.4	23.5	
	K	39.1	61.7	64.3	77.2	95.6	92.1	92.5	90.8	88.8	88.8	94.9	98.7	77.6	
Rudhr	Kharif Rice	N	50.9	83.2	82.8	98.9	122.7	120.3	124.6	117.5	117.3	123.8	129.1	101.1	
		P	90	144.9	147.1	176.1	218.3	212.4	217.1	208.3	206.1	218.7	227.8	178.7	
	Mustard	K	140.9	228.1	229.9	275	341	332.7	341.7	325.8	323.4	323.4	342.5	356.9	279.8
		N	8.8	18.0	19.9	18.9	26.3	25.3	26.3	24.8	25.6	25.6	26.9	29.8	21.1
		P	0.99	2.0	2.0	2.0	2.9	2.8	2.5	2.6	2.5	2.5	2.7	2.6	2.1
		K	1.3	2.7	3.3	2.8	4.1	4.1	4	3.9	4.3	4.3	4.1	4.4	3.1
Jorhat	Winter Rice	N	17	22	23	26	33	29	30	28	36	27	30	21	
	P	9	14	15	16	18	19	22	22	24	24	18	22	14	
	K	10	16	20	22	29	25	27	25	29	29	26	27	18	
Sabour	Autumn Rice	N	6	9	10	9	14	10	14	13	27	11	12	8	
		P	2	5	6	6	8	7	8	8	11	11	7	8	5
	Rice	K	5	11	12	12	18	14	14	16	14	20	13	17	9
		N	19.1	49.4	51.9	68.2	93.7	104.9	95.9	100.0	92.0	92.0	102.4	948	57.7
		P	5.3	13.5	13.7	17.5	25.0	27.6	25.5	26.3	24.4	24.4	27.4	25.8	15.0
		K	27.0	63.5	65.6	84.1	112.5	127.4	119.1	124.8	114.0	114.0	125.5	115.7	72.8
Wheat	N	19.4	48.0	88.6	68.9	98.1	109.9	101.3	105.2	99.9	99.9	109.7	101.9	65.1	
	P	5.2	13.4	24.3	19.8	28.0	31.4	28.2	30.2	27.2	27.2	31.0	28.7	17.1	
Rajpur	NOT REPORTED	K	22.9	55.1	99.9	79.0	108.5	126.6	113.4	126.4	121.3	125.5	117.2	76.1	
SK Nagar	Pearlmillet	N	2.4	16.1	18.4	21.6	28.4	44.2	52.1	38.6	42.0	51.2	54.9	23.1	
		P	0.5	4.0	4.4	5.2	7.2	11.0	13.8	9.7	10.8	14.1	14.5	5.3	
	K	3.3	15.6	17.3	20.0	24.9	37.9	43.6	33.6	36.8	45.6	48.2	48.2	21.5	

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Name of CSR Centre	Season*	Nut./Treat.	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂
Junagadh	Wheat	N	2.7	17.2	24.9	32.3	54.2	81.0	73.9	77.5	72.6	72.9	75.2	35.6
		P	0.5	2.9	4.1	5.8	10.6	14.9	14.1	15.3	13.8	14.3	14.1	6.5
		K	3.2	18.9	29.5	35.4	54.3	73.7	69.6	73.1	64.2	67.5	73.0	48.0
Junagadh	Pearlmillet	N	32.2	53.8	53.9	63.8	69.1	84.4	78.2	68.2	64.6	68.6	70.2	51.1
		P	11.5	18.3	18.2	19.4	24.1	29.4	25.1	24.0	22.0	24.5	23.4	16.5
		K	36.3	55.6	59.0	66.1	72.2	82.4	75.0	66.4	65.5	65.9	67.0	52.2
Junagadh	Wheat	N	17.7	45.1	54.5	47.8	59.9	76.9	60.3	69.8	54.5	60.2	49.4	51.1
		P	3.0	7.0	9.6	7.9	10.7	16.9	10.9	14.1	9.7	12.1	10.0	8.6
		K	25.7	52.0	57.7	56.4	59.1	71.6	59.3	69.0	54.7	57.4	49.6	57.9
Navsari	Rice	N	26.1	29.3	32.8	34.6	34.9	46.3	57.1	45.5	53.0	53.1	63.2	31.3
		P	5.3	6.9	8.0	7.1	7.1	10.2	14.7	10.2	10.6	10.1	11.5	6.2
		K	34.5	44.0	47.1	50.2	47.9	62.3	80.1	62.2	71.4	69.1	82.6	42.7
Navsari	Wheat	N	32.6	54.7	68.2	59.6	67.8	85.3	85.7	85.8	81.4	83.8	71.9	59.4
		P	4.6	8.1	11.2	8.9	10.0	13.9	14.6	13.6	13.2	13.9	9.5	9.6
		K	23.9	35.1	43.5	41.6	44.3	56.0	57.6	53.8	53.6	53.1	48.8	41.4
Hisar	Pearlmillet-	N	93	208	228	273	339	373	327	253	278	305	334	274
	Wheat	P	51	184	286	219	322	344	269	303	254	324	261	277
		K	144	392	515	492	662	717	596	556	532	629	595	552

Table E: Soil fertility status (kg/ha) in organic farming

Name of CSR centre	Season	Nut./Treat.	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈
Rajendra nagar	Kharif	OC%	0.67	0.76	0.71	64	0.62	0.73	0.55	0.67
		N	243	254	247	238	249	251	227	242
		P	37	39	43	42	40	40	32	43.5
		K	281	245	289	245	315	253	201	259
	Rabi	OC%	0.64	0.76	0.64	0.64	0.52	0.64	0.45	0.76
		N	248	263	248	248	233	248	225	268
		P	30.9	40.1	49.7	47.5	23.5	48.4	22.2	30.5
		K	529	648	495	673	530	505	493	594
Maruteru	Kharif	OC%	0.76	0.87	0.89	0.79	0.82	0.79	0.77	0.81
		P	32.3	34.2	36.5	33.8	34.6	40.1	31.8	35.6
		K	203	218	192	186	204	153	160	243
Rudrur	Rabi	OC%	0.5	0.58	0.68	0.73	0.68	0.71	0.54	0.53
		P	33.7	40.8	42.6	44.1	35.8	40.3	394	43
		K	297	251	353	248	208	276	304	276
Sabour	Summer	OC%	0.62	0.7	0.71	0.68	0.65	72	0.57	0.64
		N	192.7	194.5	196.5	201.8	203.8	208.7	179.3	193.7
		P2O5	41.6	43.3	40.4	44.5	45.7	48.2	38.7	43.8
		K2O	158.6	160.7	159.3	162.9	159.7	164.3	138.6	158.3
Raipur	Rabi	OC%	0.52	0.53	0.53	0.52	0.51	0.54	0.5	
		N	244	230	246	226	221	232	260	
		P	19.7	18.1	20.6	18.7	17.6	20.4	23.4	
		K	261	252	254	250	243	252	284	
SK Nagar	Rabi	OC%	0.32	0.36	0.35	0.33	0.31	0.29	0.29	0.28
		N	234	228	232	230	220	228	231	229
		P	35.6	32.4	32.4	32.6	40.68	33.12	33.98	32.6
		K	342	312	306	282	278	278	312	286
Junagadh	Rabi	OC%	0.86	0.88	0.84	0.87	0.85	0.89	0.84	0.85
		N	241	241	240	245	236	240	242	242
		P	25.76	25.55	26.22	25.81	29.75	29.66	27.53	27.61
		K	196	192	190	192	194	189	198	188
Navsari	Rabi	OC%	0.57	0.6	0.65	0.69	0.61	0.61	0.57	0.62
		N	226	241	249	248	230	245	241	243
		P	17.98	13.12	14.08	14.88	19.82	18.78	16.78	12.52
		K	211	219	200	194	205	199	208	183
Hisar	Kharif	OC%	0.53	0.5	0.52	0.53	0.5	0.52	0.55	0.5
		N	187.6	177.8	182	184.8	152.6	183.4	186.2	180.6
		P	17.2	16.4	16.4	16.8	18	17.6	18.4	16.8
		K	223	225	230	227	196	228	232	222
	Rabi	OC%	0.49	0.51	0.51	0.51	0.47	0.5	0.52	0.51
		N	156.8	155.4	156.8	155.4	140	159.6	163.8	155.4
		P	13.6	12.4	13.6	14	17.6	16	18.8	12
		K	192	213	210	203	185	205	220	215
Palampur	Kharif	OC%	2.73	2.37	2.76	2.49	2.82	2.31	0.96	2.34
		N	341	353	341	341	377	365	292	365
		P	224	179	190	168	168	157	67	157
		K	973	937	1086	1012	1040	927	307	894

Contd...

Name of CSR centre	Season	Nut./Treat.	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈
	Rabi	OC%	2.7	2.4	27	2.6	2.9	2.6	0.9	2.4
		N	518	506	566	518	530	518	289	518
		P	235	190	202	157	146	157	90	146
	Summer	K	911	890	986	957	939	970	336	814
		OC%	2.6	2.7	2.7	2.7	2.7	2.5	0.9	2.6
		N	506	494	542	506	554	506	277	518
		P	235	168	190	156	145	168	78	179
		K	1001	916	1001	981	1017	942	375	778
Kathalagere	Summer	OC%	0.7	0.71	69	0.66	0.71	72	0.69	
		N	360	338	356	326	341	363	340	
		P	15.6	16.8	15.9	15.9	17.8	19.3	18	
		K	222	228	225	227	225	230	224	
Siruguppa	Kharif	OC%	0.83	0.99	0.93	0.99	0.89	0.93	0.68	0.87
		N	235	218	245	230	224	235	224	224
		P	24.3	30.6	29.5	29.3	25.3	31.5	25.4	30.6
		K	324	348	360	381	324	338	321	346
		S	32.5	32.5	31.2	34.5	29.8	31.6	26.5	33.5
	Summer	OC%	0.83	1.0	0.95	1.0	0.85	0.95	0.66	0.89
		N	235	241	241	252	224	240	224	235
		P	19.6	33.2	26.3	24.8	26.5	24.6	22.6	28.7
		K	333	358	338	380	309	341	316	328
S	30.5	34.2	34.2	34.5	30.5	32.5	28.9	30.2		
Jabalpur	Rabi	OC g/kg	6.7	6.5	6.8	6.6	6.7	6.5	6.5	6.6
		N	226	220	213	215	212	214	209	210
		P	9.3	8.8	8.7	8.6	9.5	9.7	8.6	8.8
		K	385	377	388	372	373	379	390	374
Rewa	Rabi	OC g/kg	5.8	5.9	5.7	5.8	5.8	5.7	5.7	5.6
		N	240	235	231	230	233	236	237	230
		P	8.5	8.8	8.6	8.6	8.6	8.7	8.8	8.5
		K	321	330	330	320	331	322	340	326
Powarkheda	Rabi	OC g/kg	69	7	6.7	6.8	7	6.9	6.6	6.8
		N	270	254	251	248	250	257	249	256
		P	9.6	9.9	9.7	9.8	9.7	9.6	9.6	9.6
		K	317	307	310	304	309	312	300	309
Rahuri	Kharif	OC%	0.61	0.64	0.63	0.65	0.66	0.67	0.52	0.42
		N	218	226	223	225	231	238	210	165
		P	12	14	12	13	15	16	17	8
		K	593	601	585	597	625	588	634	540
	Rabi	OC%	0.62	0.65	0.62	0.64	0.66	0.67	0.53	0.41
		N	181	216	210	214	213	218	178	154
		P	13	16	14	16	16	17	15	9
		K	573	595	573	585	574	611	591	499
Parbhani	Rabi	N	174	154	134	148	154	160	170	151
		P	12	11	11	11	12	13	13	11
		K	351	330	330	345	352	330	360	340
Akola	Kharif	N	250	220	245	225	185	235	265	160
		P	29.5	11.6	21.8	16.6	18.2	20.5	32.6	7.2
		K	506	474	492	344	330	380	521	291

Contd...

Name of CSR centre	Season	Nut./Treat.	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	
Karjat	Rabi	N	290	240	275	250	210	260	310	165	
		P	31.8	14.5	29.4	19.2	22.2	25.7	357	8.4	
	Summer	K	583	504	548	431	414	448	571	307	
		N	215	253	188	256	192	225	268	134	
		P	12.5	14.3	8.9	17.9	10.7	12.5	21.4	5.3	
	Kharif	K	K	336	448	370	437	302	481	392	280
			OC%	1.31	1	1.1	1.2	1.2	1.1	1.3	
			N	225	175	187	221	200	150	263	
			P	32	26	24	25	28	27	34	
		Rabi	K	244	235	217	220	240	229	270	
			OC%	1.1	0.99	1	0.96	1.1	0.94	1.1	
			N	213	137	163	175	188	150	238	
			P	26	21	22	20	24	23	27	
	K	K	306	294	297	299	303	292	318		



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PRICES (RS./100 KG) ASSUMED FOR DETERMINING GROSS RETURNS & CALORIFIC VALUE PER 100 G FOR 2009-10*

Crops	Price	Energy value
Ajwain	5000	363
All Fodders	100	16
All green manuring	65	16
Amaranthus	2000	49
Pigeonpea	2300	335
Artimesia	1200	295
Ashwagandha(Siruguppa)	8000	45
Baby Corn	80paise/cob or 5500/q	125
Barley	750	336
Berseem (seed)	2200	344
Bitter Gourd	400	25
Blackgram/Urad	2520	347
Bottle gourd (Lauki)	200	12
Brinjal	400	24
Broccoli	1000	45
Bt. cotton	3000	332
Cabbage	400	27
Capicum	400	24
Carrot	400	48
Cassava(Karmana)	600	134
Castor	1500	NA
Cauliflower	400	66
Chandrasur	1300	300
Chillies(green)	400	29
Clusterbean	400	16
Coleus(Karmana)	1400	86
Coriander(S)	2300	288
Coriander(L)	550	49
Cotton (F-44/1180)	2500	332
Cotton (H-1380)	3000	332
Cowpea (Lobia)(S)	1550	323
Cowpea (Veg.)pod	350	48
Crotalaria Juncea(Coimbatore)	65	16
Cucumber	400	13
Cumin/SiyaZeera	2800	356
Dolichosbean (pod)/LabLab	400	48
Elephant foot yam(Kalyani)	1200	79
Fennugreek (seed)	4000	333
Fennugreek leaves/spinach	330	49
Fieldbean-	1500	48
Fieldpeas/Veg.peas	600	93
Frenchbeans	600	26
Garlic	3000	145
Ginger	5000	67
Gram/Chickpea/Bengalgram	1760	360
Greengram/Moongbean	2760	334
Groundnut	2100	567
Guar	1500	93

Crops	Price	Energy value
Horsegram	1550	321
Indian bean	600	26
Isabgol	5950	124
Jute stalk	1375	350
Kalongi	4000	656
Kasni	1600	33
Knolkhol	200	43
Ladyfinger	360	35
Lentil	2050	343
Linseed	2300	530
Maize(Grain)	840	342
Maize (green cobs)	0.60/cob	125
Maize Sweet Corn grain	1000	342
Marigold	1000	NA
Mentha	8000	48
Methi	1650	333
Mothbean	1900	334
Rapeseed & Mustard	1830	541
G.sarson	2000	541
Niger Seed	2400	515
Oat	1300	374
Onion (big)	400	50
Pea	1600	315
Pea (veg.)	400	93
Pearlmillet/Bajra	840	361
Potato	300	97
Pumpkin	550	25
Radish (White)	150	17
Ragi/Fingermillet	1000	328
Rajgira	1540	319
Rajmash/Rajmah/frenchbean	1650	346
Rice Basmati	1800	346
Rice(coarse)	1030	346
Ricebean fodder	100	16
Ridge gourd/Round gourd	400	17
Safflower	1680	356
Sesamum/Gingely/Til	2850	563
Sorghum	1000	349
Soyabean (black)	1350	432
Soyabean (yellow)	1390	432
Sugar beet	360	48
Sugarcane	130	398
Summer Squash	600	16
Sunflower	2215	620
Sweet Potato	600	120
Tomato (green)	400	23
Toria/Raya/Ridgeguard	1735	541
Turmeric	3000	349
Wheat	1100	346

Remarks : * Prices are indicative only. Fluctuates region to region and area to area

BOTANICAL AND HINDI NAMES OF DIFFERENT CROPS BEING GROWN AT AICRP-IFS CENTRES IN DIFFERENT EXPERIMENTS

S.N.	Common name	Botanical name	Hindi Name
1	Ajwain/ Ajowan/ caraway	<i>Trachyspermum copticum</i>	Ajwain
2	Ashwagandha/ Indian Ginseng	<i>Withania somnifera</i> (L.) Dunal	Ashwagandha
3	Barley	<i>Hordeum vulgare</i> L.	Jau
4	Black caraway/ Fennel flower	<i>Nigella sativa</i> Sumac	Kalongi
5	Black gram	<i>Phaseolus mungo</i> L.	Urd/ Urd bean
6	Bottle gourd	<i>Lagenaria siceraria</i> (Mol.)/ <i>L. vulgaris</i> L.	Lauki
7	Brinjal/ Egg plant	<i>Solanum melongena</i> L.	Baigan
8	Broccoli	<i>Brassica oleracea</i> (L.) var. <i>italica</i>	Hari Phool Gobhi
9	Cabbage	<i>Brassica oleracea</i> (L.) var. <i>capitata</i>	Band gobhi/ Patta gobhi
10	Castor	<i>Ricinus communis</i> L.	Arandi
11	Cauliflower	<i>Brassica oleracea</i> L. var. <i>botrytis</i>	Phool Gobhi
12	Chickpea	<i>Cicer arietinum</i> L.	Chana
13	Chickpea/ Bengal gram	<i>Cicer arietinum</i> L.	Chana
14	Chicory	<i>Cichorium intybus</i> L.	Kasni
15	Chilli	<i>Capsicum annum</i> L.	Mirch
16	Cluster bean	<i>Cyamopsis tetragonoloba</i> L. Taub.	Guar/ Guar bean
17	Coriander	<i>Coriandrum sativum</i> L.	Dhania
18	Cotton	<i>Gossypium hirsutum</i> L.	Kapaas
19	Cowpea	<i>Vigna unguiculata</i> (L) Walp.	Lobia
20	Cumin	<i>Cuminum cyminum</i> L.	Jeera
21	Egyptian clover	<i>Trifolium alexandrinum</i> L.	Berseem
22	Fenugreek	<i>Trigonella foenum-graecum</i> L.	Methi
23	Finger millet	<i>Eleusine coracana</i> (L.) Gaertn.	Ragi/ Mandua
24	Garden Cress/ Water Cress	<i>Lepidium sativum</i> L.	Chandrasur
25	Garlic	<i>Allivum sativum</i> L.	Lahsun
26	Garlic	<i>Allium sativum</i> L.	Lehsun
27	Green gram	<i>Phaseolus radiatus</i> (L.) Wilczek.	Moong/ Moong bean
28	Groundnut	<i>Arachis hypogea</i> L.	Moongfali
29	Hyacinth bean/ indian bean	<i>Dolichos lablab</i> L./ <i>D. purpureus</i> / <i>Lablab purpureus</i>	Seim
30	Indian Mustard	<i>Brassica juncea</i> Coss.	Sarson/ Raya
31	Indian rape	<i>Brassica campestris</i> L. var. <i>Toria</i>	Toria

S.N.	Common name	Botanical name	Hindi Name
32	Lady's finger/ Okra	<i>Abelmoschus esculantus</i> Moench.	Bhindi
33	Lentil	<i>Lens culinaris</i> Medikus	masoor
34	Linseed/ Flax/ Flax seed	<i>Linum usitatissimum</i> L.	Alsi
35	Maize/ Corn	<i>Zea mays</i> L.	Makka
36	Marigold	<i>Calendula officinalis</i> L.	Gainda
37	Mustard	<i>Brassica campestris</i> L. var. Yellow sarson/ Brown sarson	Sarson
38	Oat	<i>Avena sativa</i> L.	Jae
39	Onion	<i>Allium cepa</i> L.	Pyaz
40	Pearl millet	<i>Pennisetum americanum</i> L.	Bajra
41	Pea/ Vegetable Pea	<i>Pisum sativum</i> L.	Matar
42	Pigeon pea	<i>Cajanus cajan</i> (L) Milsp.	Arhar/ Tuar
43	Potato	<i>Solanum tuberosum</i> L.	Aloo
44	Psyllium	<i>Plantago ovata</i> Forssk.	Isabgol
45	Pumpkin	<i>Cucurbita pepo</i> Duch.	Kaddu
46	Radish	<i>Raphanus sativus</i> L.	Mooli
47	Rape/ Oilseed rape	<i>Brassica napus</i> var. napus	Gobhi Sarson
48	Red/ Purple Amaranth	<i>Amaranthus cruentus</i> L.	Chaulai/ Ramdana/ Rajgira
49	Rice/ Paddy	<i>Oryza sativa</i> L.	Dhan
50	Ridge gourd/ Sponge gourd	<i>Lufa acutangula</i> / <i>L. aegyptica</i> / <i>L. cylindrica</i>	Torai
51	Sesame	<i>Sesamum indicum</i> L.	Til
52	Sorghum	<i>Sorghum bicolor</i> (L.) Moench.	Jowar
53	Soybean	<i>Glycine max</i> L. (Merr.)	Soybean
54	Spinach	<i>Spinacia oleracea</i> L.	Palak
55	Sugar beet	<i>Beta vulgaris</i> L.	Chukander
56	Sugarcane	<i>Saccharum officinarum</i> L.	Ganna
57	Sunflower	<i>Helianthus annuus</i> L.	Surajmukhi
58	Sunhemp	<i>Crotalaria juncea</i> L.	Sanai
59	Sweet potato	<i>Ipomoea batatas</i> (L.) Lam.	Sakarkand
60	Tomato	<i>Solanum lycopersicum</i> L./ <i>Lycopersicon esculentum</i> / <i>L. lycopersicum</i>	Tamatar
61	Turmeric	<i>Curcuma longa</i> L.	Haldi
62	Wheat	<i>Triticum aestivum</i> L. emend. Fiori & Paol.	Gehun

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