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ANNUAL REPORT
2023-24

अखिल भारतीय समन्वित कृषि प्रणाली अनुसंधान परियोजना
AICRP on Integrated Farming Systems

ICAR-Indian Institute of Farming Systems Research
Modipuram, Meerut-250110 (UP)

ICAR-IIFSR

ICAR Indian Institute of Farming Systems Research (IIFSR) formerly Project Directorate for Farming Systems Research (PDFSR) was established by Indian Council of Agricultural Research New Delhi in April 1989 at Modipuram Meerut Uttar Pradesh.

Vision

Management of natural source of holistic improvement of small and marginal farmers through Integrated Farming Systems

Mission

Improve food, nutrition, livelihood and financial security of small and marginal households through climate smart Integrated Farming Systems (to make marginal and small households as bountiful)

Mandate

- Research in integrated farming Systems on production technologies for improving productivity and resource use efficiencies
- Develop efficient, economically viable and environmentally sustainable integrated farming system models for different farming situations.
- On-farm testing, verification and refinement of system-based farm production technologies.
- Co-ordinate and monitor integrated farming system research in the country

All India Coordinating Coordinated Research Project on Integrated Farming System (AICRP on IFS) is an integral part of ICAR-IIFSR with 74 centres to undertake on-station main (25 no's.) on-station sub (11 no's.) on-station voluntary (6 no's) and on-farm research (32 no's) spread across length and breadth of the country. The institute is also leading an All India Network Programme on Organic Farming (AI-NPOF) with 20 centres

ALL INDIA CO-ORDINATED RESEARCH PROJECT ON INTEGRATED FARMING SYSTEMS

ANNUAL REPORT 2023-24

ICAR- Indian Institute of Farming System Research

Modipuram, Meerut – 250110, INDIA

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Important Notes:

- This compilation is a joint contribution of all the associated scientists and technical staff of 74 AICRP-IFS centers (data generation), ICAR-IASRI New Delhi (statistical analysis) and ICAR-IIFSR, Modipuram (report writing, compilation, editing and printing).
- The report is based on experimental data generated during, kharif, rabi and summer seasons of 2022-23 (period ending June 2023), under 'on-station' and 'on-farm' research programmes of AICRP on Integrated Farming Systems. The other details are relevant to 31st March 2024.
- The report includes both processed and semi-processed data, generated in different sub-projects under AICRP on Integrated Farming Systems, and as such no material / data should be reproduced in any form without prior written permission of the Director, ICAR- Indian Institute of Farming Systems Research and due credit to the concerned scientists.

ACKNOWLEDGMENT

All India Coordinated Research Project on Integrated Farming Systems (AICRP-IFS) initiated in 2010-11 is operating with 25 main, 11 sub, 6 ICAR institute-based and 32 on-farm centres in 25 States/Union territory. The results of experiments conducted during 2022-23 by all the co-operating centres are processed and compiled in the Annual Report 2023-24. I take this opportunity to record my sincere thanks to **Dr. Himanshu Pathak**, Former Secretary, Department of Agricultural Research and Education and Director General, Indian Council of Agricultural Research, New Delhi and **Dr M.L. Jat**, Secretary (DARE) and Director General (ICAR) for their critical remarks and guidance during the review. I extend my gratitude to **Dr S K Chaudhari**, Deputy Director General (Natural Resource Management) for his constant support extended to the scheme. The time-to-time guidance received from **Dr. Rajbir Singh**, Former Assistant Director General (Agronomy, Agroforestry and Climate Change) and **Dr. A. Velmurugan**, Assistant Director General (Agronomy, Agroforestry and Climate Change)-Acting and ADG (SWM) for improving the performance and output of the scheme is also duly acknowledged. Scientific inputs received from Quinquennial Review Team (QRT), Research Advisory Committee (RAC) and Institute Management Committee (IMC) are thankfully acknowledged as those inputs provided immense help in taking new initiatives, shaping and improvement of the programme for practical utility. I am highly thankful to each and every scientist and research fellows involved in the scheme at the all the centres for putting the meticulous effort to conduct a field experiment, lab analysis and generating data. The sincere efforts put forth by **Dr. A. K. Prusty**, Principal Scientist, **Dr. M. Shamim**, Senior Scientist, **Dr Meraj Alam Ansari**, Senior Scientist, **Dr. Raghuveer Singh**, Scientist, **Dr.Raghavendra K.J,** Scientist **Mrs Himanshu Chauhan,** Senior Technical Officer, **Dr Vipin Kumar**, Chief Technical Officer and **Mrs. Jailata Sharma,** Personal Assistant for their Cooperation in compilation of the data, its statistical analysis, drafting and proof corrections and administration of the scheme. The contributions of all the other scientific, technical, administrative, and skilled supporting staff either directly or indirectly at various levels during preparation of this report also acknowledged. Significant findings obtained from the experiments of cropping and farming systems and its validation in the farmers field including programmes undertaken with the participation of under privileged households through STC/SCSP programmes will help for building the resilient farming systems in the future.

(Project Coordinator)

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1. INTRODUCTION

The Genesis of the" All India Coordinated Research Project on Integrated Farming Systems" may be traced back to all visit of Dr. A.B Stewart of Macaulay Institute of Soil Research, Aberdeen U.K., somewhere in mid-forties. He was invited by to 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 crop yield. 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 centres. Prompted by these suggestions, a "Simple Fertilizer Trails at cultivators' fields" scheme 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 climatic 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 fertilizers use for the production of crops.

Subsequently in 1956 experiments on carefully selected centres called 'Model Agronomic Experiments 'were added to the project and started as All India Coordinated Agronomic Experiment 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 manure 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 fertilizers.

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 required 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 to 1969, 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 economic factors such as fertilizers (including micronutrients), irrigation, weed control, liming etc.

ii. To study the menu requirements of important crop rotation 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 climatic condition of the country and.

v. To determine the most suitable cropping patterns and fertilizer responses under rainfed condition.

Under the revised scheme with the main objectives of the simple fertilizer trial were.

i. To study the responsiveness of introduced high yielding and local Delhi improved varieties to nitrogen and phosphorus applied alone in the combination and to potassium in the presence of nitrogen and phosphorus and educated as well as dry and land location.

ii. To compare different methods of application of Nitrogen on series 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 soil 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 intact. However, within two decades of existence of PDCSR, the mandate of the Directorate Farm Research' remaining was broadened during 2009-10 to undertake research in integrated farming system mode andthe 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 production technologies.

viii. To develop capacity building of stakeholders in integrated Farming Systems through training.

The name and mandate of AICRP on Cropping Systems were also changed accordingly, with major emphasis on farming systems research and objectives modified as hereunder. The Project Directorate for Farming Systems Research was renamed as ICAR-Indian Institute of Farming Systems Research (IIFSR) during November 2014 and the mandate was redefined further as given below.

- Research in integrated farming systems on production technologies for improving productivity and resource use efficiencies.
- Develop efficient, economically viable and environmentally sustainable integrated farming system models for different farming situations.
- On-farm testing, verification and refinement of system-based farm production technologies.
- Coordinate and monitor integrated farming systems research in the country.

All India Coordinated Research project on Integrated Farming Systems (AICRP on IFS) is an integral part of IIFSR with 74 centres to undertake on-station and on-farm research across length and breadth of the country. The institute is also leading a Network Project on Organic Farming (NPOF) with 20 centres.

2. OBJECTIVES

On-Station Research

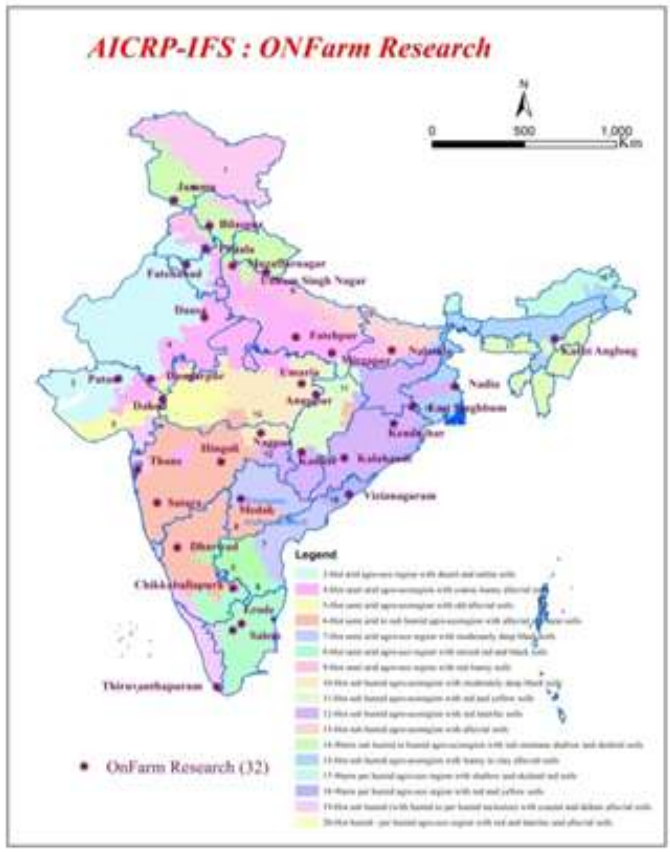
- To undertake applied and adaptive research in integrated farming systems (IFS), especially on production technologies for improving system productivity and resource use efficiencies.
- To develop efficient, economically viable and environmentally sustainable IFS models for different zones.
- To undertake capacity building and human resource development in IFS.

On-Farm Research

- To undertake characterization of existing farming systems for identification of production constraints and problem prioritization.
- To undertake on-farm testing and refinement of system-based farm production technologies.
- To optimize on-farm integration of farm enterprises for enhanced farm incomes, resource/ input use efficiencies, and employment opportunities.

3. LOCATION

Under the aegis of AICRP -IFS there are 25 main centers, 11 sub centers, 32 on-farm research centres and 6 voluntary centres. All main and sub centres are engaged in basic and applied research and are necessarily located at SAU's or their Regional Research Stations or Agricultural colleges of those general universities, where strong agricultural research base is available. Whereas, on-farm research centres (earlier known as Experiments on Cultivators' Field /ECF agro climatic centres) are engaged in farmers participatory research and are located in different zones. These OFR centres remain shifted from one zone /farming situation to another, every 4-5 years. The voluntary centres are situated in ICAR institutes and are taking up only IFS model development activity. The location of different AICRP- IFS centres during the year under report (2023-24) is depicted in Map - 1 & 2, and details are given in table 3.1.



Map of AICRP-IFS centre

Table-3.1: Location of Different AICRP-IFS centres during the year under report (2022-23)

S. No.	State	Centre/district	Status	Ecosystem	Agro-climatic Regions/ Sub-Region of Planning	NARP Zone
1.	A&N	CIARI,, Portblair	Voluntary	Island	Island region	Northern Zone AN-1
2	Assam	Jorhat	Main Centre	Humid	Eastern Himalayan Region /Upper Brahmaputra Valley Sub-Region	Upper Brahmaputra Valley Zone (AS-2)
3.		Goalpara	OFR Centre	Humid	Eastern Himalayan Region	Central Brahmaputra Valley (AS-3)
4.	Andhra Pradesh	Maruteru (Dist. W. Godavari)	Sub Centre	Coastal	East Coast Plains and Hills Region/ South Coastal Andhra Sub-Region	Krishna Godavari Delta Zone (AP-1)
5.		Vizianagaram	OFR Centre	Sub-Humid	East Coast Plains and Hills Region	Andhra Pradesh-(AP-7)
6.	Bihar	Sabour (Dist. Bhagalpur)	Main Centre	Sub-Humid	Middle Gangetic Plains Region/ South Bihar Plains Sub-Region	South Bihar Alluvial Plain Zone (B1-3)
7.		Nalanda	OFR Centre	Sub-Humid	Middle Gangetic Plains Region	South Bihar Alluvial Plain Zone (BI-3)
8.		Patna	Vol. Centre	Sub-Humid	Middle Gangetic Plains Region	South Bihar Alluvial Plain Zone (B1-3)
9.	Chhattisgarh	Raipur	Main Centre	Sub-Humid	Eastern Plateau & Hills Region/ Wainganga Sub-Region	Chhattisgarh Plain Zone (CG-1)
10.		Kanker	OFR Centre	Sub-Humid	Eastern Plateau & Hills Region	Chhattisgarh Plain Zone (CG-1)
11.	Delhi	New Delhi	Vol. Centre	Semi-Arid	Trans Gangetic Plains region	Western Semi Arid (ND1)
12	Goa	Old Goa	Vol. Centre	Coastal	West Coast Plains & Hills Region	South Konkan Coastal
13.	Gujarat	S.K. Nagar (Dist. Banaskantha	Main Centre	Arid	Gujarat Plains and Hills Region/North Gujarat Sub-Region	North Gujarat Zone (GJ-4)
14.		Junagadh	Sub-Centre	Semi-Arid	Gujarat Plains and Hills Region/ South Saurashtra Sub-Region	South Saurashtra Zone (GJ-7)
15.		Navsari	Sub-Centre	Coastal	Gujarat Plains and Hills Region/ Southern Hills Sub-Region	South Gujarat Heavy Rainfall Zone (GJ-1)
16.		Dahod, Devgadh	OFR Centre	Semi-Arid	Gujarat Plains and Hills Region/ North Gujarat Sub-Region	Middle Gujarat Zone (GJ-3)
17.		Adiya, Patan	OFR Centre	Arid	Gujarat Plains and Hills Region/North west Sub-Region	North West Agroclimatic zone (GJ-5)
18.	Haryana	Hisar	Main Centre	Arid	Trans –Gangetic Plains Region/ Arid Sub-Region	Western Zone (HR-2)

S. No.	State	Centre/district	Status	Ecosystem	Agro-climatic Regions/ Sub-Region of Planning	NARP Zone
19.		Fatehabad	OFR Centre	Semi-Arid	Trans –Gangetic Plains Region	Western (HR-2)
20.	Himachal Pradesh	Palampur (Dist. Kangra)	Main Centre	Humid	Western Himalayan Region/ High Altitude Temperature Sub-Region	Mid-Hill Sub-Humid Zone (HP-2)
21.		Bilaspur	OFR Centre	Humid	Western Himalayan Region	Sub-Montane and Low Hills Sub-Tropical (HP-1)
22.	J & K	Chatha (Jammu)	Main Centre	Humid	Western Himalayan Region/ High Altitude Temperature Sub-Region	Mid to High Altitude Plain Zone
23.		Jammu	OFR Centre	Humid	Western Himalayan Region/ High Altitude Temperature Sub-Region	Mid to High Altitude Plain Zone
24.	Jharkhand	Kanke (Ranchi)	Main Centre	Sub-Humid	Eastern Plateau & Hills Region/Chhota Nagpur, South and West Bengal Hills & Plateau Sub-Region	Western Plateau Zone (B1-5)
25.		East Singhbhum	OFR Centre	Sub-Humid	Eastern Plateau & Hills Region	South-eastern Plateau Zone
26.	Karnataka	Kathalgere (Dist. Davangere)	Main Centre	Semi-Arid	Southern Plateau and Hills Region	Southern Transition Zone (KA-7)
27.		Chikkaballapura	OFR Centre	Semi-Arid	Southern Plateau and Hills Region	Central Dry Zone (KA-4)
28.		Siruguppa (Dist. Bellary)	Main Centre	Arid	Southern Plateau and Hills Region/Northern Dry Region of Karnataka	Northern Dry Zone (KA-3)
29.		Dharwad	OFR Centre	Semi-arid & arid	Southern Plateau and Hills Region	Northern Transition Zone - KA-8
30.	Kerala	Karamana (Dist. Thiruvanthapuram)	Main Centre	Coastal	West Coast Plains and Ghats / Mid land Sub-Region	Coastal Southern Zone (KE-2)
31.		Thiruvanan-thapuram	OFR Centre	Coastal	West Coast Plains and Ghats / Mid land Sub-Region	Coastal Southern Zone (KE-2)
32.	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)
33.		Indore	Sub-Centre	Semi-Arid	Western Plateau & Hills Region/ Central Plateau Sub-Region	Malwa Plateau Zone (MP-10)
34.		Powarkheda (Dist. Hoshangabad)	Sub-Centre	Sub-Humid	Central Plateau & Hills Region/Central Narmada Valley Sub-Region	Central Narmada Valley Zone (MP-6)
35.		Rewa	Sub-Centre	Sub-Humid	Central Plateau & Hills Region/ Kymore Plateau and Satpura Hills Sub-Region	Kymore Plateau and Satpura Hills Zone (MP-4)
36.		Anuppur	OFR Centre	Semi-Arid	Eastern Plateau and Hills	Northern hill zone of Chattisgarh (CG-3)

S. No.	State	Centre/district	Status	Ecosystem	Agro-climatic Regions/ Sub-Region of Planning	NARP Zone
37.		Umaria	OFR Centre	Semi-Arid	Central Plateau & Hills Region	Kymore Plateau and Satpura Hills (MP-1)
38.	Maharashtra	Akola	Main Centre	Semi-Arid	Western Plateau & Hills Region/ Central Plateau Sub-Region	Western Vidarbha Zone(MH-8)
39.		Katol, Nagpur	OFR Centre	Semi-Arid	Western Plateau and Hills	Central Vidarbha Zone
40.		Karjat (Dist. Raigad)	Main Centre	Coastal	Western Plains & Ghat Regions/ Coastal Hilly Sub-Region	North Konkan Coastal Zone (MH-2)
41.		Thane	OFR Centre	Coastal	West Coast Plains and Ghats	North Konkan Coastal Zone (MH-2)
42.		Parbhani	Main Centre	Semi-Arid	Western Plateau &Hills Region/ Central Plateau Sub-Region	Central Maharashtra Plateau Zone (MH-7)
43.		Hingoli	OFR Centre	Semi-Arid	Western Plateau & Hills Region	Central Vidarbha Zone
44.		Rahuri (Dist. Ahemadnagar)	Main Centre	Semi-Arid	Western Plateau & Hills Region/ Scarcity Sub-Region	Scarcity Zone (MH-6)
45.		Padegaon, Satara	OFR Centre	Semi-Arid	Western Plateau & Hills Region	Western Maharashtra Plain Zone
46	Meghlaya	Umiam	Vol. Centre	Sub-humid To Humid	Eastern Himalayan Region	Sub-Tropical Hill Zone
47.	Odisha	Bhubaneswar	Main Centre	Sub-Humid	East Coast Plains and Hills Region/ Orissa Coastal Sub-Region	East and South –Eastern Coastal Plain Zone (OR-4)
48.		Chiplima (Dist. Sambalpur)	Sub-Centre	Sub-Humid	Eastern Plateau & Hills Region/ Wainganga Sub-Region	West-Central Table Land Zone (OR-9)
49.		Kendujhar	OFR Centre	Sub-Humid	Eastern Plateau & Hills Region	North-central Plateau Zone
50.		Kalahandi	OFR Centre	Coastal	East Coast Plains and Hills Region/ Orissa Coastal Sub-Region	Western Undulating Zone
51.	Punjab	Ludhiana	Main Centre	Semi-Arid	Trans-Gangetic Plains Region/ Plains Sub-Region	Central Plain Zone (PB-3)
52.		Patiala	OFR Centre	Semi-Arid	Trans-Gangetic Plains Region/ Plains Sub-Region	Western Plain Zone
53.	Rajasthan	Durgapura (Jaipur)	Main Centre	Semi-Arid	Central Plateau & Hills Region/ Eastern Plains of Rajasthan	Semi-Arid Eastern Plain Zone (RJ-5)
54.		Dausa	OFR Centre	Semi-Arid	Western Dry Region	Eastern Plain Zone

S. No.	State	Centre/district	Status	Ecosystem	Agro-climatic Regions/ Sub-Region of Planning	NARP Zone
55.		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)
56.		Dungarpur	OFR centre	Semi-Arid	Central Plateau & Hills Region /Southern Plains of Rajasthan	Sub-Humid Southern Plain & Aravali Hills Zone (RJ-7)
57.	Tamil Nadu	Coimbatore	Main Centre	Semi-Arid	Southern Plateau and Hills Region/ Central Plateau of Tamil Nadu Sub-Region	Western Zone (TN-3)
58.		Thanjavur	Sub Centre	Coastal	East Coast Plains and Hills Region/ Thanjavur Sub-Region	Cauvery Delta Zone (TN-4)
59.		Yethapur	OFR Centre	Semi-Arid	Southern Plateau and Hills Region	North western Zone (TN-2)
60.		Bhavanisagar	OFR Centre	Semi-Arid	East Coast Plains and Hills Region	Sothern Zone (TN-5)
61	Telangana	Rajendra nagar	Main centre	Semi-Arid	Southern Plateau and Hills Region/ South Telangana Sub-Region	Southern Telangana Zone (AP-5)
62		Rudrur (Dist. Nizamabad)	Sub Centre	Semi-Arid	Southern Plateau and Hills Region/ North Telangana Sub-Region	Northern Telangana Zone (AP-4)
63		Medak	OFR Centre	Semi-Arid	Southern Plateau and Hills Region	Southern Telangana (AP-5)
64.	Uttar Pradesh	Kanpur	Main Centre	Semi-Arid	Upper Gangetic Plains Region/South Western Plains Sub-Region	Central Plain Zone (UP-6)
65.		Fatehpur	OFR Centre	Semi-Arid	Upper Gangetic Plains Region/ South Western Plains Sub-Region	Central Plain Zone (UP-4)
66.		Faizabad	Main Centre	Sub-Humid	Middle Gangetic Plains Region/ Eastern Plains Sub-Region	Eastern Plain Zone (UP-9)
67.		Mirzapur	OFR Centre	Sub-Humid	Middle Gangetic Plains Region/ Eastern Plains Sub-Region	Eastern Plain Zone (UP-7)
68.		Varanasi	Sub Centre	Sub-Humid	Middle Gangetic Plains Region/ Eastern Plains	Eastern Plain Zone (UP-9)
69.		Modipuram	Vol. Centre	Sub-Humid	Upper Gangetic Plains Region	Western Plain Zoan(UP-3)
70.		Muzaffarnagar	OFR Centre	Sub-Humid	Upper Gangetic Plains Region	Western Plain Zoan Dry sub-humid to semi-arid /(UP-3)
71.	Uttarakhand	Pantnagar (Dist. US Nagar)	Main Centre	Sub-Humid	Western Himalayan Region / Valley Temperate Sub-Region	Bhawar and Tarai Zone (UP-2)

S. No.	State	Centre/district	Status	Ecosystem	Agro-climatic Regions/ Sub-Region of Planning	NARP Zone
72.		Udam Singh Nagar	OFR Centre	Sub-Humid	Western Himalayan Region/ High hill Temperate Sub-Region	Hill Zone (UK-1)
73.	West Bengal	Kalyani (Dist. Nadia)	Main Centre	Humid	Lower Gangetic Plains Region/ Central Alluvial Plains Sub-Region	New Alluvial Zone (WB-3)
74.		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 soil (centre-wise) on which on- station experiment of CSR/FSR were conducted during the year 2022-23 and geographical coordinates (latitude and longitude)of the different research location are given in table 4.1. The general climatic conditions for the experimental location are described below in brief.

Table – 4.1: Soils type of geographical coordinates of different on – station FSR Centres.

S.No.	Centre	Soil Type	Latitude	Longitude
1.	Rajendranagar	Udic Ustochrepts, black soils	18° 59′ N	78° 55′ E
2.	Maruteru	Chromusterts clayey, medium black soils	16° 38′ N	81° 44′ E
3.	Rudrur	Chromusterts 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	Eutrocherpts (Very deep), low and 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	Haplaquals, deep medium black soils	24° 90′ N	72° 19′ E
8.	Junagadh	Ustochrepts, deep medium black soils	21° 30′ N	70° 30′ E
9.	Hisar	Vertic Ustochrepts deep medium black soils	20° 57′ N	72° 54′ E
10.	Palampur	Ustochrepts, very deep silty alluvial soils	29° 08′ 55″ N	74° 41′ 16″ E
11.	Navsari	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 Palustaifs very deep (90 cm) red soils	23° 79′ N	85° 19′ E
14.	Kathalagere	Aificols, dark reddish brown sandy clay loam	13° 02′ N	76° 15′ E
15.	Siruguppa	Type Chromusterts, very deep (90 cm) black soils	15° 38′ N	76° 54′ E
16.	Karamana	Typic Tropoflivents, very deep (90 cm depth)	11° N	77° E
17.	Jabalpur	Chromusterts, very deep (90 cm depth), medium to deep black	23° 10′ N	79° 57′ E
18.	Indore	Vertisols, medium and dark deep black soil	22° 04′ N	79° 57′ E
19.	Powarkheda	Deep black soil,clay to sandy loam	23° 25′ N	73° 98′ E
20.	Rewa	Ustochrepts-Vertic Ustochrepts association, fine loamy soils	24° 41′ N	81° 15′ E
21.	Akola	Medium deep black clayey soil	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 depts.), deep black soils	19° 08′ N	76° 05′ E
24.	Rahuri	Chromusterts, fine clayey soils	19° 47′ N	74° 18′ E
25.	Bhubaneswar	Haplustaifs very deep (90 cm depth), mediumtextured lateritic soils	20° 15′ N	85° 52′ E
26.	Chiplima	Haplaquents, very deep (90 cm depth) clay, ill-drained soils	20° 21′ N	80° 55′ E
27.	Ludhiana	Ustochrepts-Ustic Psamments Assciation, very deep (90 cm depth), alluvial sandy and sandy-loam soils	30° 56′ N	75° 52′ E
28.	Durgapura (Jaipur)	Torrid-Psamments/ Torrid-Fluvents 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 Rhodustalts, 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

S.No.	Centre	Soil Type	Latitude	Longitude
32.	Kanpur	Udic Ustochrepts, alluvial soils	26° 28′ N	80° 21′ E
33.	Faizabad	Udic fluvents-Fluaquents Association, loqland clayey soils	26° 47′ N	82° 12′ E
34.	Varanasi	Aeric Chroquals very deep (90 cm depth) alluvial clayey soils	25° 18′ N	83° 03′ E
35.	Pantnagar	Hapludolls, very deep (90 cm depth) alluvium coarse loam soils	29° 08′ N	79° 05′ E
36.	Kalyani	Fluventic Eutrochrepts, very deep (90 cm depth) alluvial soils	23° 40′ N	88° 52′ E
37.	PDFSR, Modipuram	Ustochrept	29.4′ N	77.46′ E
38.	ICAR-RC, Patna	Alluvial soil	25° 50′ N	84° 45′ E
39.	ICAR-RC, Umiam	Slfisols, Entisols, Inceptisols	25° 59′ N	85° 08′ E
40.	ICAR-RC, Goa	Lithic dystropepts karmali soils series	15° 13′ N	75° 55′ E
41.	ICAR-RC, Port Blair	Costal alluvial soil	11° 38′ N	92° 39′ E

Prevailing Weather at various AICRP centers of IFS for the reporting period of 2022-23

The weather conditions, focusing on key elements such as rainfall and monthly minimum and maximum air temperatures, were assessed across various Integrated Farming Systems Research (IFS) Centres of the AICRP for the reporting year from June 2022 to May 2023. Rainfall data were categorized into four seasons: Winter (January–February), Pre-monsoon (March–May), Southwest Monsoon (June–September), and Post-monsoon (October–December). The contribution of the Southwest Monsoon to the total annual rainfall was calculated as a percentage for each center, along with the percentage deviation of annual rainfall from the India Meteorological Department's (IMD) normal values. Results showed that five centers-Junagadh, Kalyani, Kathalgere, Navsari, and Siruguppa-received no rainfall during the winter season. The highest annual rainfall was recorded at Karjat, Raigad (4010 mm), while the lowest was observed at Siruguppa, Ballari (615.7 mm). Similarly, Karjat, Raigad also reported the highest Southwest Monsoon rainfall (3636.6 mm), with Coimbatore receiving the least (117.5 mm). The Southwest Monsoon contributed the largest percentage to the annual rainfall at Powarkheda (94.97%), whereas Coimbatore had the smallest contribution (16.36%). Among the centers, Hisar exhibited the highest positive deviation from normal rainfall (+105.02%), while Coimbatore experienced the greatest negative deviation (-45.82%). Sabour, Bhagalpur showed the least deviation from the IMD normal rainfall with only 0.44%. The annual maximum and minimum air temperatures for each station were also analyzed and are presented separately.

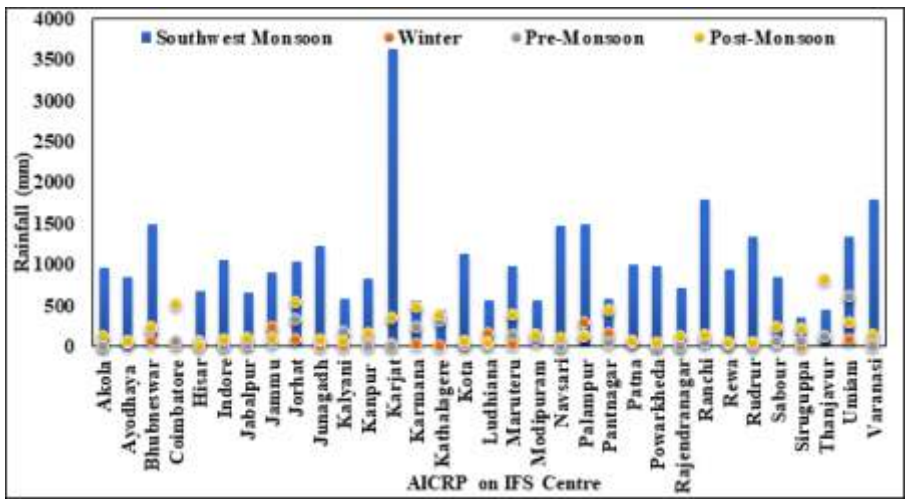


Fig. 1: Seasonal rainfall indices (mm) at various AICRP centers of IFS for the reporting period

Concerning the air temperatures, Siruguppa (49.8 °C) was the hottest AIRCP center, while Powarkheda (2 °C) was the coldest during the reporting period. Additionally, the Powarkheda station, with its maximum and minimum temperature of 44.5 °C & 2 °C also expressed the largest temperature range (42.5 °C), while the least was recorded for Karamana (10.7 °C) in the RY 2022-23. **Fig. 4** and **Fig. 5** illustrate the daily maximum & minimum temperatures during the months for the AIRCP centers.

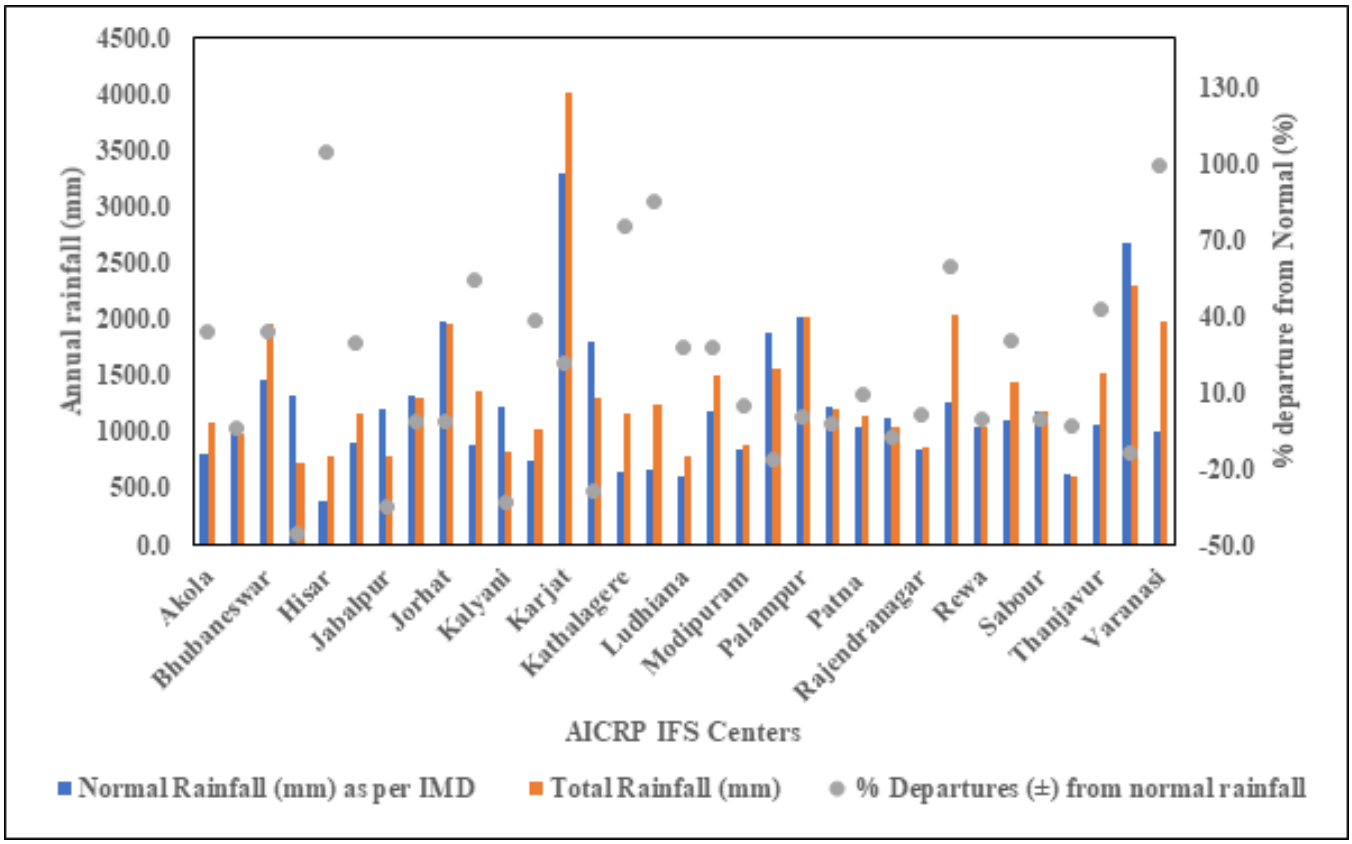


Fig. 2: Total annual rainfall, IMD normal rainfall along with % deviation for the reporting period

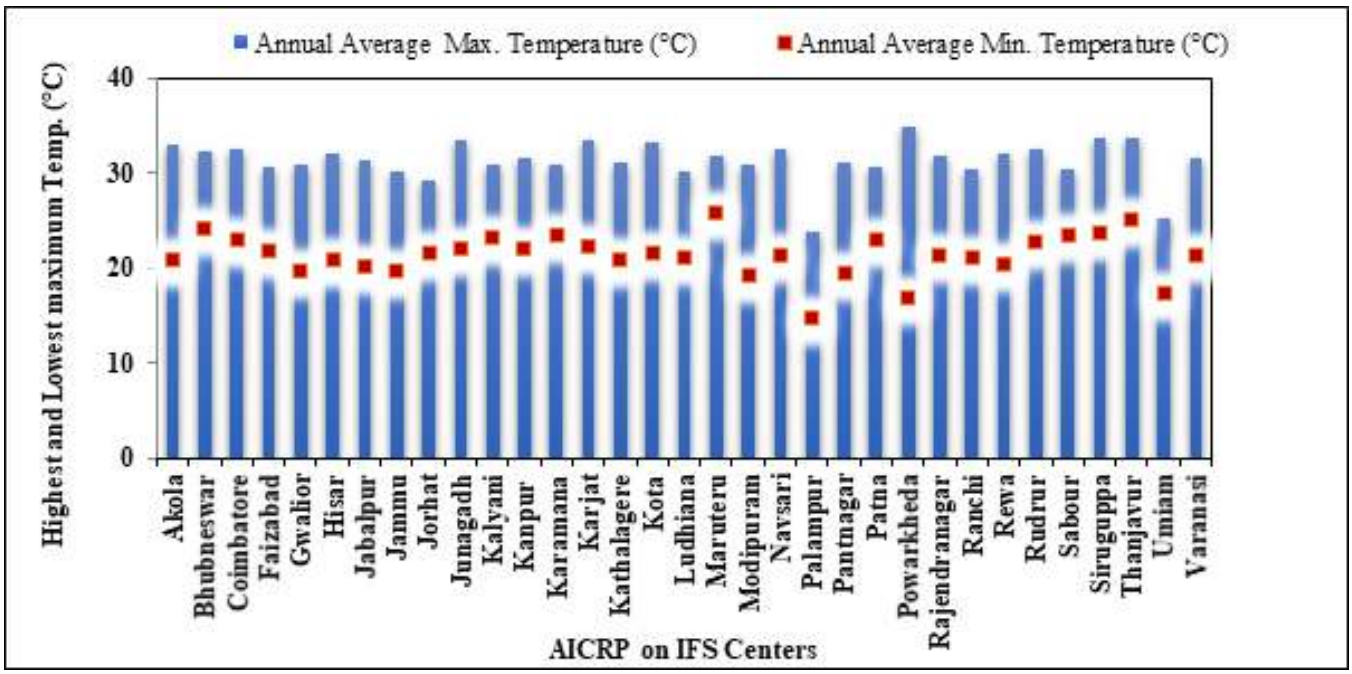


Fig. 3: Annual maximum and minimum air temperatures (in °C) various AICRP centers of IFS for the reporting period

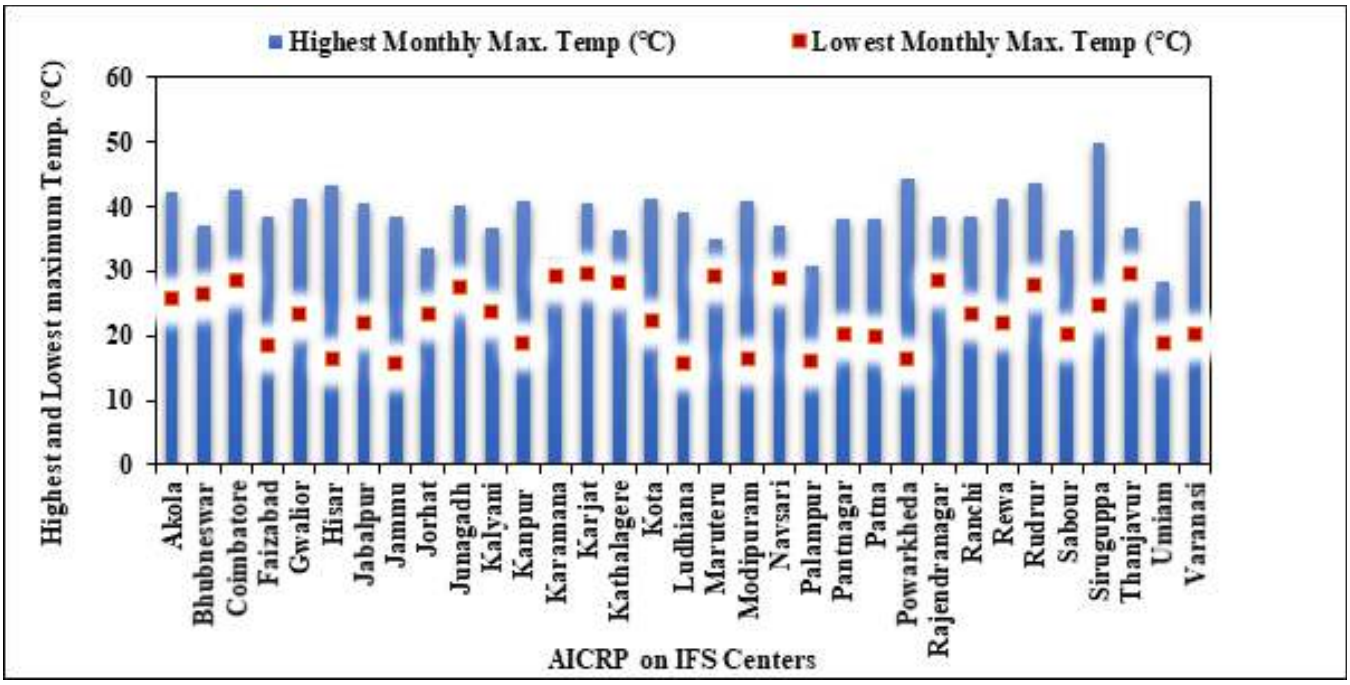


Fig 4 Daily maximum temperature range at IFS AICRP centers for the reporting period

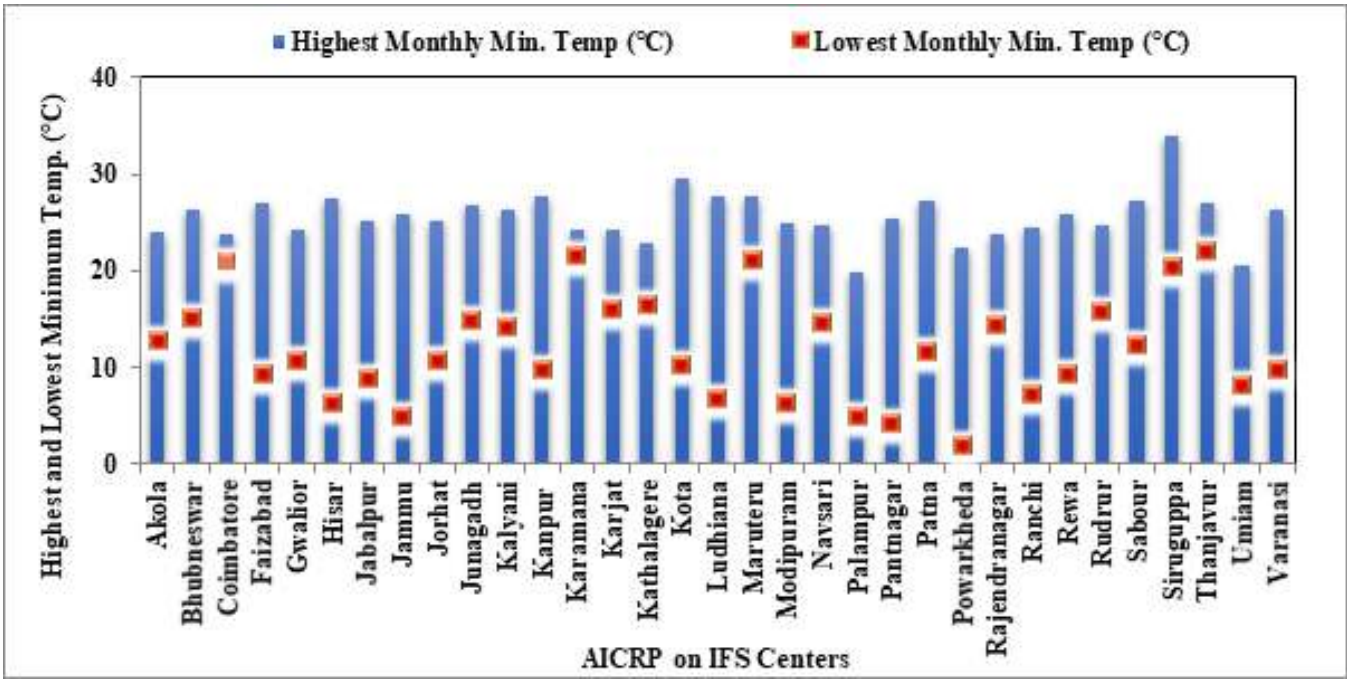


Fig 5 Daily minimum temperature range various AICRP centers of IFS for the reporting period

Akola: Akola received 1085.6 mm of annual rainfall, recording a +34.5% deviation from the normal. The Southwest Monsoon contributed 89% (969 mm) of this total. Post-Monsoon, Winter, and Pre-Monsoon seasons accounted for 116 mm, 1 mm, and 0 mm, respectively. July was the wettest month, with 357.9 mm. The daily maximum air temperature ranged from 42.4 °C in April to 25.9 °C in January, while the daily minimum varied from 27.1 °C in May to 11.3 °C in January.

Ayodhya: Ayodhya recorded 988.2 mm of annual rainfall, a -4% deviation from normal. The Southwest Monsoon was predominant, contributing 854 mm (86%). Seasonal rainfall from Post-Monsoon, Winter,

and Pre-Monsoon was 59 mm, 35 mm, and 40 mm, respectively. September received the maximum monthly rainfall of 352.8 mm. Air temperature varied between 38.6 °C (max) in April and 18.4 °C in January; minimum temperatures ranged from 27.0 °C in July to 8.4 °C in January.

Bhubaneswar: Annual rainfall in Bhubaneswar was 1970.5 mm, showing a +34.2% deviation. The SW Monsoon contributed 1482 mm (75%), followed by Post-Monsoon (232 mm), Winter (70 mm), and Pre-Monsoon (186 mm). September recorded the highest monthly rainfall at 579.4 mm. Daily maximum temperatures spanned from 36.9 °C in April to 26.5 °C in January, while the minimum ranged between 26.5 °C (April) and 14.7 °C (January).

Coimbatore: Coimbatore received 718 mm of rainfall during the period, which is -45.8% below normal. The SW Monsoon contributed 118 mm (44.1%), while Post-Monsoon, Pre-Monsoon, and Winter added 517 mm, 67 mm, and 17 mm, respectively. November was the rainiest month with 271.9 mm. Maximum daily temperatures varied from 42.7 °C in May to 28.4 °C in November, with minimums between 24.6 °C in April and 20.7 °C in January.

Hisar: Hisar recorded 783 mm of annual rainfall, with a significant +105% deviation. The SW Monsoon contributed 86%, with Post-Monsoon, Winter, and Pre-Monsoon receiving 7.1 mm, 69.8 mm, and 33.1 mm, respectively. September was the wettest month (428.2 mm). The highest daily max temperature was 43.4 °C in July; the lowest was 23.4 °C in January. The daily minimum ranged from 27.5 °C in July to 6.3 °C in December.

Indore: Annual rainfall at Indore was 1168.3 mm, marking a +29.9% deviation. The SW Monsoon accounted for 1052.5 mm (90.1%), followed by post-monsoon (84.1 mm) and Winter (31.7 mm). No Pre-Monsoon rain was observed. September had the peak rainfall (377.6 mm). Maximum daily temperatures ranged from 41.1 °C in May to 23.4 °C in December; minimums ranged between 27.1 °C in May and 9.6 °C in February.

Jabalpur: Jabalpur experienced 790.1 mm of rainfall during the period, with a -34.8% deviation. The SW Monsoon contributed 82.6% of this total. Seasonal rainfall included 17.4 mm (Pre-Monsoon), 27.7 mm (Winter), and 92.6 mm (post-monsoon). July recorded the maximum monthly rainfall of 242.6 mm. Maximum temperatures ranged from 40.5 °C in April to 22.0 °C in January; minimums varied between 25.1 °C in July and 8.4 °C in January.

Jammu: Jammu reported 1304.2 mm of rainfall, with a slight deviation of -1.6% from normal. The SW Monsoon accounted for 69.7%, while Pre-Monsoon, Winter, and Post-Monsoon contributed 50.2 mm, 236.4 mm, and 108 mm, respectively. July was the rainiest month with 488.4 mm. Maximum temperatures ranged from 38.3 °C in May to 15.7 °C in June; minimum temperatures ranged between 25.9 °C in July and 5.0 °C in December.

Jorhat: Jorhat received 1962.4 mm of rainfall, showing a -1.2% deviation from normal. SW Monsoon contributed 52.6%, while Pre-Monsoon, Winter, and Post-Monsoon brought 322.2 mm, 81.5 mm, and 526.6 mm, respectively. June saw the highest monthly rainfall (321.8 mm). The daily maximum ranged from 33.7 °C in September to 23.3 °C in January, while the daily minimum spanned 25.2 °C in July to 9.6 °C in January.

Junagarh: Junagarh received 1368.1 mm of rainfall, exceeding the norm by +54.9%. SW Monsoon contributed 89.7%, while Pre- and Post-Monsoon rains added 62.7 mm and 77.6 mm, respectively.

Winter rainfall was negligible (0.2 mm). September recorded the highest rainfall (843.3 mm). The highest max temperature was 40.1 °C (April), and the lowest was 27.7 °C (January). Minimums varied between 26.7 °C (June) and 11.8 °C (January)

Kalyani: The Kalyani station registered an annual rainfall of 822.9 mm, which was 32.9% below the long-term average. The Southwest Monsoon was the primary contributor, delivering 70.7% of the total rainfall. The Pre-Monsoon and Post-Monsoon seasons accounted for 182.7 mm and 58.8 mm, respectively, while no rainfall was recorded in winter. June recorded the highest monthly rainfall at 168.1 mm. Regarding temperatures, the daily maximum ranged between 23.7 °C in January and 36.7 °C in April. The daily minimum varied from 12.4 °C in January to 26.4 °C in July.

Kanpur: Kanpur recorded 1031.6 mm of rainfall over the year, marking a 38.6% increase from the normal. The Southwest Monsoon provided the bulk (79.7%) of the total, while Post-Monsoon, Winter, and Pre-Monsoon periods contributed 154.6 mm, 54.1 mm, and 0.2 mm, respectively. July had the heaviest monthly rainfall at 349.3 mm. Maximum daily temperatures fluctuated between 18.7 °C in January and 41.0 °C in April. Minimum temperatures ranged from 7.7 °C in January to 27.6 °C in July.

Karjat: During the observation period, Karjat received 4010.0 mm of rainfall, exceeding the norm by 21.5%. The Southwest Monsoon accounted for 90.7% (3636.6 mm) of this total. Additional contributions came from the post-monsoon (351.6 mm), Winter (21 mm), and Pre-Monsoon (0.8 mm). July saw the highest monthly rainfall at 1644.3 mm. Maximum daily temperatures were 40.6 °C in April and 29.6 °C in June, while minimums were 24.5 °C in May and 14.6 °C in January.

Karmana: Karmana experienced 1298 mm of annual rainfall, which was 28.4% below average. Only 42.6% of this came from the Southwest Monsoon. Post-Monsoon (486.2 mm), Pre-Monsoon (229.4 mm), and Winter (29.2 mm) contributed the remainder. The wettest month was October with 311.9 mm. The highest daily temperatures were 32.2 °C in June and 29.4 °C in November. The minimums ranged from 25.1 °C in May to 21.5 °C in June.

Kathalgere: The station received 1156.2 mm of rainfall, 76% more than the average. The Southwest Monsoon contributed 456.2 mm (39.5%). Rainfall from Post-Monsoon, Winter, and Pre-Monsoon periods was 390.1 mm, 0.0 mm, and 309.9 mm, respectively. The highest monthly rainfall was in October (272.7 mm). Daily maximum temperatures varied from 28.3 °C in August to 36.2 °C in April. Minimums ranged from 15.8 °C in January to 22.8 °C in June.

Kota: Kota recorded an annual precipitation of 1244.6 mm, which was 85.2% higher than the normal. The Southwest Monsoon accounted for 90.7% of the total. Other seasonal contributions were minimal, with Post-Monsoon, Winter, and Pre-Monsoon rains amounting to 68 mm, 24 mm, and 23.2 mm, respectively. July was the wettest month (489.2 mm). Daily maximum temperatures ranged between 21.3 °C in January and 41.2 °C in June. Minimum temperatures spanned from 9.2 °C in January to 29.5 °C in June.

Ludhiana: Ludhiana received 786.2 mm of rain, 27.8% below the normal. The Southwest Monsoon delivered 71.9% of this. Additional rainfall came from Winter (156.9 mm), post-monsoon (37.6 mm), and Pre-Monsoon (26.4 mm). July saw the highest rainfall at 271.2 mm. Maximum temperatures varied between 15.7 °C in January and 39.2 °C in May, while minimums ranged from 6.7 °C in December to 27.8 °C in July.

Modipuram: The total annual rainfall at Modipuram was 892.6 mm, showing a slight negative deviation of 4.5%. The Southwest Monsoon contributed 63.9%, while Post-Monsoon, Winter, and Pre-Monsoon periods added 136.7 mm, 132.5 mm, and 53.4 mm, respectively. July recorded the maximum monthly rainfall (274.4 mm). Maximum temperatures ranged from 16.5 °C in January to 40.9 °C in October. Minimums ranged between 6.4 °C in winter and 25.0 °C in July.

Maruteru: Maruteru received an annual precipitation of 1511.6 mm during the recorded period, representing a positive deviation of 28.1% from the long-term average. The Southwest Monsoon contributed approximately 64.3% of the total precipitation, with the remaining portions coming from the Post-Monsoon and Pre-Monsoon rainfalls, which amounted to 384.7 mm and 131.3 mm, respectively. Additionally, winter rainfall during the reporting period totaled 23.6 mm. July recorded the highest monthly rainfall with a total of 381.1 mm. Regarding air temperature, April and January recorded the highest daily readings, with values of 35.0 °C and 29.3 °C, respectively. Similarly, the daily minimum temperatures ranged from 27.7 °C in June to 19.6 °C in December.

Navsari: The total annual rainfall received during the reporting period was 1565 mm, which displayed a negative deviation (-16.6 %) from the normal rainfall trend. The post-monsoon contributed to 95.0 mm of rain, whereas the SW monsoon contemplated 1470.0 mm of rain corresponding to 93.9 % of the total annual. No rainfall was recorded during the winter and pre-monsoon season. Cumulatively maximum monthly rain was registered during September which was 493 mm. The highest monthly maximum air temperature was observed in March (37.0 °C), whereas the lowest minimum of 13.7 °C was recorded during February.

Palampur: Annual precipitation observed at Palampur for the recording period was 2025.3 mm with the SW monsoon contributing to 73.3 % of the total. Further, a positive 0.5 % deviation of rainfall from the normal is also observed indicating a little more rain was recorded during the period of observance with respect to the long-term average. Contributions from the Post-Monsoon, Winter, and Pre-Monsoon rainfalls were 112 mm, 284.6 mm, and 144.5 mm, respectively. Month-wise July was contemplated as the wettest month with a monthly cumulative rain of 575.6 mm. In the context of the daily maximum air temperature, a range of 30.9 °C and 16.0 °C during June and January, respectively. In addition, the daily minimum range of 19.8 °C and 4.5 °C was recorded in July and January.

Pantnagar: The station experienced an annual precipitation of 1203.8 mm, with a deviation of -2.1% from the normal rainfall. The Southwest Monsoon contributed 47.7% (573.9 mm) to the total annual rainfall, while the Post-Monsoon, Winter, and Pre-Monsoon seasons contributed 432.5 mm, 149.3 mm, and 48.1 mm, respectively. The highest monthly rainfall occurred in October, totaling 427.5 mm. In terms of air temperature, the daily maximum ranged from 38.2 °C in April to 20.2 °C in January. Similarly, the daily minimum temperature varied between 25.4 °C in August and 4.3 °C in December.

Patna: The center received a total annual precipitation of 1150.5 mm of rainfall for the period of observance. During the Post-Monsoon, Winter, and Pre-Monsoon seasons, rainfall amounts of 52.0 mm, 63.4 mm, and 34.6 mm were recorded. Further, 87.0 % was contributed from the SW Monsoon. A 9.1 % positive deviation at the center suggests that the rainfall was relatively higher for the reporting period than the normal trend. The lowest minimum temperature was recorded during January (10.8 °C), while the highest monthly mean maximum temperature was observed during April (38.2 °C).

Powarkheda: Most of the annual rainfall (1038.2 mm) at the Powarkheda center was concentrated in the SW Monsoon, which contributes to 95.0 % of the total. Additionally, a negative deviation of -7.4 % was observed for the reporting period suggesting that the concerned tenure has received somewhat lesser rainfall than what is observed under the typical pattern. The Post-Monsoon, Winter, and Pre-Monsoon rainfalls aggregate 52.2 mm of rain, while calendar month-wise June receives the most, which is 303.9 mm. In reference to air temperature, the daily minimum was in the range of 22.5 °C and 2 °C observed in Sep & Dec, respectively. Parallelly, the daily maximum temperature ranges from 44.5 °C and 16.4 °C during April & February.

Rajendranagar: For the reporting period, a cumulative annual precipitation of 859.6 mm was perceived at the Rajendranagar center. A positive 1.6 % deviation was noticed from the normal amount with the SW Monsoon contributing to 84.1 % of the total annual amount. Additionally, 119 mm, 4.6 mm, and 13.0 mm were received from Post-Monsoon, Winter, and Pre-Monsoon showers, respectively. Monthly rainfall data suggested that July received the most rainfall for the observance duration which was 305.8 mm. In regards to the air temperature daily maximum ranged from 38.3 °C and 28.5 °C during April and December & January, respectively. Correspondingly, the daily minimum varied from 25.2 °C and 14.5 °C during May and December, respectively.

Ranchi: Concerning the air temperature indices, the daily maximum varied from 38.3 °C and 23.5 °C in April and January, while the daily minimum ranged from 24.8 °C and 7.3 °C in May and December, respectively. In regards to the annual precipitation, 2035.2 mm was recorded at the gauging site. The annual rainfall displayed a large positive deviation of 59.9 % from the normal trend. Of the total rainfall received, 87.9 % was contributed from the SW Monsoon. The apportionments from Post-Monsoon, Winter, and Pre-Monsoon rainfalls were 132.6 mm, 77.6 mm, and 36.5 mm, respectively. Maximum monthly rainfall of 686.3 mm was recorded during the month of July.

Rewa: The total annual rainfall received during the reporting period was 1046.5 mm, which displayed a very little negative deviation (-0.3 %) from the normal rainfall trend. The Pre-Monsoon and Post-Monsoon contributed to 56.6 mm of rain, whereas the SW monsoon contemplated 949.3 mm of rain corresponding to 90.7 % of the total annual. Additionally, 40.6 mm of rain was recorded during the winter season. Cumulatively maximum monthly rain was registered during August which was 395.6 mm. The highest monthly maximum air temperature was observed in May (41.4 °C), whereas the lowest minimum of 8.4 °C was recorded during January.

Rudrur: The station's yearly precipitation was 1435.9 mm, deviating from +31.0 % with respect to the normal. Of the total yearly rainfall 92.8 %, corresponding to 1332.9 mm, is due to the SW Monsoon. The precipitation amounts during the Post-Monsoon, Winter, and Pre-Monsoon are 50.6 mm, 45.9 mm, and 6.5 mm, respectively. July saw the highest monthly rainfall of 515.7 mm. Regarding the air temperature, the highest daily temperature was recorded in May which was 43.7 °C, while in December it was 28.0 °C. In terms of the daily lowest, variations of 27.0 °C to 14.9 °C were contemplated in May and January, respectively.

Sabour: Sabour experienced 1190.2 mm of annual precipitation over the recorded period, deviating by a minor negative of -0.2 % from the normal. About 71.7 %, of the total precipitation, was imparted by the SW Monsoon, with the remaining amounts being contributed from the Post-Monsoon, Winter, and Pre-Monsoon rainfalls, which were 225.6 mm, 40.1 mm, and 70.6 mm, respectively. With a total of 331.2 mm,

July had the largest cumulative monthly rainfall. In reference to the air temperatures, April & January had the greatest daily maximum readings, with numerical values of 36.3 °C and 20.3 °C, respectively. Parallel to this, the daily minimum was between 27.3 °C and 10.8 °C in August & September and January, respectively.

Siruguppa: Concerning the air temperature indices, the daily maximum varied from 49.8 °C and 24.6 °C in April & December, while the daily minimum ranged from 34.1 °C and 18.6 °C in September and January, respectively. In regards to the annual precipitation, 615.7 mm was recorded at the gauging site. The annual rainfall displayed a negative deviation of -2.7 % from the normal trend. Of the total rainfall received, 56.6 % was contributed from the SW Monsoon. The apportionments from Post-Monsoon and Pre-Monsoon rainfalls were 204.9 mm and 62.5 mm, respectively. Winters did not receive any rainfall during the observation period/ Maximum monthly rainfall of 163 mm was recorded during the month of July.

Thanjavur: Thanjavur received an annual rainfall of 1518.3 mm, marking a 43.4% surplus over the normal. The Southwest Monsoon accounted for 29.5% of the total rainfall, while the Post-Monsoon, Winter, and Pre-Monsoon seasons contributed 823.5 mm, 122.9 mm, and 123.9 mm, respectively. November emerged as the wettest month with 538 mm of rainfall. Regarding air temperature, the daily maximum ranged from 36.6 °C in May to 29.6 °C in November, while the daily minimum ranged between 27.0 °C in June and 20.3 °C in February.

Umiam: Umiam recorded 2309.7 mm of annual rainfall, showing a 13.9% deficit from the normal. The Southwest Monsoon contributed 57.7% (1333.4 mm) of the total, while Post-Monsoon, Winter, and Pre-Monsoon rainfalls amounted to 283.5 mm, 73.2 mm, and 619.6 mm, respectively. The wettest month was May, which received 499.2 mm. In terms of temperature, the daily maximum ranged from 28.5 °C in September to 19.0 °C in February, whereas the daily minimum varied between 20.5 °C in July and 7.1 °C in February.

Varanasi: Varanasi registered a cumulative annual rainfall of 1991.0 mm, reflecting a significant 99.7% surplus over the normal. The Southwest Monsoon dominated with a 90.2% share of the total rainfall. Contributions from the Post-Monsoon, Winter, and Pre-Monsoon seasons were relatively lower, amounting to 129.3 mm, 60.6 mm, and 5.8 mm, respectively. The maximum monthly rainfall was observed in June, totaling 671.3 mm. For air temperature, the daily maximum varied from 40.9 °C in April to 20.3 °C in January, while the daily minimum ranged from 26.3 °C in July to 9.0 °C in January.

5. STAFF POSITION

Table 5: Staff position under AICRP-IFS(University-wise) as on 31.3.2023

S.NO.	Name of the University	Scientific		Technical	
		Sanctioned	Filled	Sanctioned	Filled
1	ANGRAU ,Guntur	2	2	6	5
2	PJTSAU, Rajendranagar	6	6	7	3
3	AAU, Jorhat	5	5	6	3
4	BAU, Sabour	5	5	6	0
5	BAU, Ranchi	4	1	6	5
6	IGKV Raipur	4	4	6	1
7	HPKVV, Palampur	4	3	6	3
8	CSA, Kanpur	4	2	6	4
9	NDUAT, Faizabad	4	2	6	2
10	BHU,Varanasi	1	0	1	0
11	GBPUAT, Pantnagar	5	4	6	0
12	PAU, Ludhiana	4	2	6	1
13	HAU Hisar	5	5	6	0
14	SKNAU,Jobner	4	4	6	2
15	SDAU, S.K.Nagar	5	2	6	3
16	NAU, Navsari	1	1	1	1
17	JAU, Junagarh	1	1	1	1
18	AAU, Anand	1	1	5	5
19	JNKVV, Jabalpur	9	6	13	5
20	RVSKVV, Gwalior	1	1	1	0
21	BCKV, Kalyani	6	3	6	1
22	OUAT, Bhubaneswar	7	5	12	4
23	PDKV, Akola	4	3	6	3
24	VNMKV, Parbhani	4	3	6	4
25	MPKV, Rahuri	3	2	6	1
26	DBSKV, Dapoli	4	4	6	6
27	UAS, Raichur	3	3	1	1
28	USAD, Dharwad	1	1	5	5
29	UAS, Bangalore	2	2	5	5
30	UAHS, Shivamogga	3	3	1	1
31	TNAU, Coimbatore	6	6	12	12
32	SKAUST, Jammu	4	4	6	3
33	KAU, Trissur	5	5	6	5
34	MPUAT, Udaipur	2	1	5	4 JRF
35	AU, Kota	1	1	1	1
36	ICAR-IIFSR, Modipuram	1	0	5	2
	Total	**131**	**103**	**196**	**102**

6. BUDGET

Revised RE 2023-24 of AICRP on Integrated Farming Systems (ICAR share in Rs.)

Sl. No.	Name of University/ Institute	Salary 2023-24	A.Total (Other than STC (TSP)/SCSP/NEH) Grant-in-Aid 'General'				Grant-in -Aid 'Capital'#						Total (Other than STC (TSP)/ SCSP/NEH) Grant-in-Aid 'General'	B. STC (TSP)					
			Domestic T.A.	Operational Charges	Research Expenses	Sub Total	Equipments (1)	Works (2)	Information Technology (3)	Livestock (4)	Furniture & Fixture (5)	Sub Total		Operational Charges	Research Expenses	Grant-in -Aid Sub Total	Capital'# Equipment (7)	Sub Total	Total STC(TSP)
1	ANGRAU, Guntur	11703000	125000	450000	150000	725000	0	0	75000	0	0	75000	800000	2327000	1323000	3650000	509000	509000	4159000
3	HPKVV, Palampur	15617000	80000	400000	300000	780000	0	0	0	0	0	0	780000	0	0	0	0	0	0
5	CSAU&T, Kanpur	8800000	50000	400000	300000	750000	0	0	0	0	0	0	750000	0	0	0	0	0	0
7	BHU, Varanasi	0	0	450000	100000	550000	0	0	0	0	0	0	550000	0	0	0	0	0	0
9	BAU, Sabour	6568000	58000	350000	300000	708000	0	0	0	0	0	0	708000	0	0	0	0	0	0
11	AAU, Jorhat	16295000	50000	800000	300000	1150000	0	0	0	0	0	0	1150000	0	0	0	0	0	0
13	HAU, Hisar	11383000	60395	599985	139620	800000	0	0	0	0	0	0	800000	0	0	0	0	0	0
15	SDAU, S.K. Nagar	7607000	25000	639000	325000	989000	0	0	0	0	0	0	989000	0	0	0	0	0	0
17	JAU, Junagadh	3574000	6721	257512	170767	435000	0	0	0	0	0	0	435000	0	0	0	0	0	0
19	JNKVV,Jabalpur	23090000	56813	795831	947356	1800000	0	0	75000	0	0	75000	1875000	0	0	0	0	0	0
21	IGKV, Raipur	10682000	64871	598608	336521	1000000	500000	0	0	0	0	500000	1500000	0	0	0	0	0	0
23	PDKV, Akola	7714000	80000	450000	300000	830000	0	0	0	0	0	0	830000	0	0	0	0	0	0
25	MPKV, Rahuri	11632000	50000	450000	300000	800000	200000	0	0	0	0	200000	1000000	0	0	0	0	0	0
27	UAS, Raichur	8960000	50000	200000	100000	350000	0	0	0	0	0	0	350000	0	0	0	0	0	0
29	UAS, Bangalore	4996000	50000	100000	0	150000	0	0	0	0	0	0	150000	0	0	0	0	0	0
31	TNAU, Coimbatore	25962000	303975	1352233	699792	2356000	200000	0	150000	0	0	350000	2706000	0	0	0	0	0	0
33	KAU, Thrissur	7820000	160000	535000	200000	895000	0	0	0	0	0	0	895000	0	0	0	0	0	0
35	AU, Kota	4417000	40000	450000	150000	640000	0	0	0	0	0	0	640000	0	0	0	0	0	0
37	P.C.Unit,IIFSR, Modipuram	0	278015	1664985	0	1943000	0	0	145000	0	79000	224000	2167000	0	0	0	0	0	0
39	ICAR Res. Comp., Umiam	0	0	800000	100000	900000	0	0	0	0	0	0	900000	0	0	0	0	0	0
41	ICAR-CIARI- Port Blair	0	40000	509000	150000	699000	0	0	0	0	0	0	699000	0	0	0	0	0	0
Total		328057000	2839594	21496159	10205247	34541000	1685000	1406000	820000	513000	138000	4562000	39103000	6387000	3823000	10210000	1020000	1020000	11230000

Sl. No.	Name of University/ Institute	C. SCSP							D. NEH											
			Grant-in-Aid 'General'			Grant-in -Aid 'Capital'#				Grant-in-Aid General				Grant-in-Aid 'Capital'#						
		Research Expenses	Operational Charges	Sub Total	Equipment (11)	Livestock (12)	Sub Total	Total (SCSP)	Domestic T.A.	Operational Charges	Research Expenses	Sub Total	Equipments (15)	Works (16)	Livestock (17)	Furniture & Fixtures (18)	Information Technology (19)	Sub Total	Total NEH	GRAND TOTAL (Salary +A+B+C +D)
1	ANGRAU, Guntur	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16662000
2	PJTSAU, Hyderabad	400000	800000	1200000	55000	0	55000	1255000	0	0	0	0	0	0	0	0	0	0	0	17983000
3	HPKVV, Palampur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16397000
4	GBPUA&T, Pantnagar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9788000
5	CSAU&T, Kanpur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9550000
6	NDUA&T, Faizabad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7892000
7	BHU, Varanasi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	550000
8	BAU, Ranchi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8940000
9	BAU, Sabour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7276000
10	BCKVV, Kalyani	400000	800000	1200000	0	48000	48000	1248000	0	0	0	0	0	0	0	0	0	0	0	10622000
11	AAU, Jorhat	0	0	0	0	0	0	0	150000	950000	200000	1300000	325000	200000	300000	100000	75000	1000000	2300000	19745000
12	PAU, Ludhiana	200000	181000	381000	0	0	0	381000	0	0	0	0	0	0	0	0	0	0	0	12597000
13	HAU, Hisar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12183000
14	SKNAU, Jobner	300000	600000	900000	0	0	0	900000	0	0	0	0	0	0	0	0	0	0	0	10312000
15	SDAU, S.K. Nagar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8596000
16	NAU, Navsari	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4532000
17	JAU, Junagadh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4009000
18	AAU, Anand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5824000
19	JNKVV,Jabalpur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24965000
20	RVSKVV, Gwalior	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4326000
21	IGKV, Raipur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12182000
22	OUAT, Bhubaneswar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19675000
23	PDKV, Akola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8544000
24	MAU, Parbhani	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8791000
25	MPKV, Rahuri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12632000
26	KKV, Dapoli	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10393000
27	UAS, Raichur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9310000
28	UAS, Dharwad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5621000
29	UAS, Bangalore	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5146000
30	UAHS, Shimoga	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8003000
31	TNAU, Coimbatore	450000	800000	1250000	270000		270000	1520000	0	0	0	0	0	0	0	0	0	0	0	30188000
32	SKUAST, Jammu	350000	642000	992000	100000	117000	217000	1209000	0	0	0	0	0	0	0	0	0	0	0	16239000
33	KAU, Thrissur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8715000
34	MPUAT, Udaipur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4850000
35	AU, Kota	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5057000
36	ICAR-IIFSR, Modipuram	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1918000
37	P.C.Unit,IIFSR, Modipuram	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2167000
38	ICAR Res. Comp., Patna	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2194000
39	ICAR Res. Comp., Umiam	0	0	0	0	0	0	0	50000	1150000	0	1200000	0	0	0	0	0	0	1200000	2100000
40	ICAR -CCARI, Old Goa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	900000
41	ICAR-CIARI- Port Blair	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	699000
42	ICAR-IASRI, New Delhi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	330000
Total		2100000	3823000	5923000	425000	165000	590000	6513000	200000	2100000	200000	2500000	325000	200000	300000	100000	75000	1000000	3500000	388403000

Revised RE 2023-24 of AICRP on Integrated Farming Systems (ICAR share in Rs.)

Sl. No.	Name of University / Institute	Grant-in-Aid 'General'				Grant-in -Aid 'Capital'#			Total (Other than STC (TSP)/SCSP/NEH)	GRAND TOTAL (A+B+C+D)
		Domestic T.A.	Operational Charges	Research Expenses	Sub Total	Equipments (1)	Works (2)	Sub Total		
1	ANGRAU, Guntur	0	0	0	0	0	0	0	0	0
2	PJTSAU, Hyderabad	0	150000	100000	250000	0	0	0	250000	250000
3	HPKVV, Palampur	0	0	50000	50000	0	0	0	50000	50000
4	GBPUA&T, Pantnagar	0	0	0	0	0	0	0	0	0
5	CSAU&T, Kanpur	48000	50000	50000	148000	0	0	0	148000	148000
6	NDUA&T, Faizabad	0	0	50000	50000	0	0	0	50000	50000
7	BHU, Varanasi	45000	150000	50000	245000	0	0	0	245000	245000
8	BAU, Ranchi	0	100000	50000	150000	0	0	0	150000	150000
9	BAU, Sabour	0	0	0	0	0	0	0	0	0
10	BCKVV, Kalyani	0	0	50000	50000	0	0	0	50000	50000
11	AAU, Jorhat	0	0	0	0	0	0	0	0	0
12	PAU, Ludhiana	0	50000	75000	125000	0	0	0	125000	125000
13	HAU, Hisar	0	0	0	0	0	0	0	0	0
14	SKNAU, Jobner	60000	50000	50000	160000	0	0	0	160000	160000
15	SDAU, S.K. Nagar	0	15000	0	15000	0	0	0	15000	15000
16	NAU, Navsari	0	0	50000	50000	0	0	0	50000	50000
17	JAU, Junagadh	0	0	0	0	0	0	0	0	0
18	AAU, Anand	0	0	0	0	0	0	0	0	0
19	JNKVV,Jabalpur	10000	100000	50000	160000	0	0	0	160000	160000
20	RVSKVV, Gwalior	0	30000	53000	83000	0	0	0	83000	83000
21	IGKV, Raipur	0	0	0	0	0	0	0	0	0
22	OUAT, Bhubaneswar	0	100000	50000	150000	0	0	0	150000	150000
23	PDKV, Akola	25000	50000	100000	175000	0	0	0	175000	175000
24	MAU, Parbhani	0	165000	0	165000	0	0	0	165000	165000
25	MPKV, Rahuri	55000	36000	0	91000	0	0	0	91000	91000
26	KKV, Dapoli	0	0	0	0	0	0	0	0	0
27	UAS, Raichur	90000	50000	50000	190000	0	0	0	190000	190000
28	UAS, Dharwad	20000	50000	50000	120000	0	0	0	120000	120000
29	UAS, Bangalore	10000	125000	100000	235000	0	0	0	235000	235000
30	UAHS, Shimoga	0	0	75000	75000	0	0	0	75000	75000
31	TNAU, Coimbatore	0	200000	133000	333000	0	0	0	333000	333000
32	SKUAST, Jammu	0	0	50000	50000	0	0	0	50000	50000
33	KAU, Thrissur	0	75000	50000	125000	0	0	0	125000	125000
34	MPUAT, Udaipur	0	50000	50000	100000	0	0	0	100000	100000
35	AU, Kota	10000	75000	50000	135000	0	0	0	135000	135000
36	ICAR-IIFSR, Modipuram	0	0	0	0	0	0	0	0	0
37	P.C.Unit,IIFSR, Modipuram	0	0	0	0	0	0	0	0	0
38	ICAR Res. Comp., Patna	20000	50000	50000	120000	0	0	0	120000	120000
39	ICAR Res. Comp., Umiam	0	0	0	0	0	0	0	0	0
40	ICAR -CCARI, Old Goa	0	0	0	0	0	0	0	0	0
40	ICAR -CCARI, Old Goa	0	0	0	0	0	0	0	0	0
41	ICAR-CIARI- Port Blair	0	0	0	0	0	0	0	0	0
42	ICAR-IASRI, New Delhi	0	0	0	0	0	0	0	0	0
Total		393000	1721000	1486000	3600000	0	0	0	3600000	3600000

7. RESEARCH RESULT

7.1 Integrated Farming System

Project Title: AICRP on Integrated Farming Systems (On-station National)

Under All Indian Coordinated Research Project (AICRP) on Integrated Farming Systems (IFS) on station experimentation Sustainable resource management for climate smart IFS were implemented (25 main, 2 sub and 5 ICAR institute centres) starting from 2017-18 with revised objectives, across different agro-climatic zones and continued through reporting period of **2022-23**. Development of region-specific IFS models at 9 sub centres and Carbon crediting and GHG emission estimation and measurement in IFS models (25 main, 11 sub and 5 ICAR institute centres) during the reporting period. Mean system production from IFS models in terms of REY was found to be 24.74 tonnes (Fig 1). Maximum REY was found to be 36.79 tonnes at TGP (Trans Gangetic Plains Region) two models (Hisar & Ludhiana, 1 ha), followed by (34.15) tonnes at WPH (Western Plateau and Hills) three models (Akola, Parbhani, Rahuri (MH), 1 ha), whereas, minimum REY was found to be 11.36 tonnes at LGP (Lower Gangetic Plains).

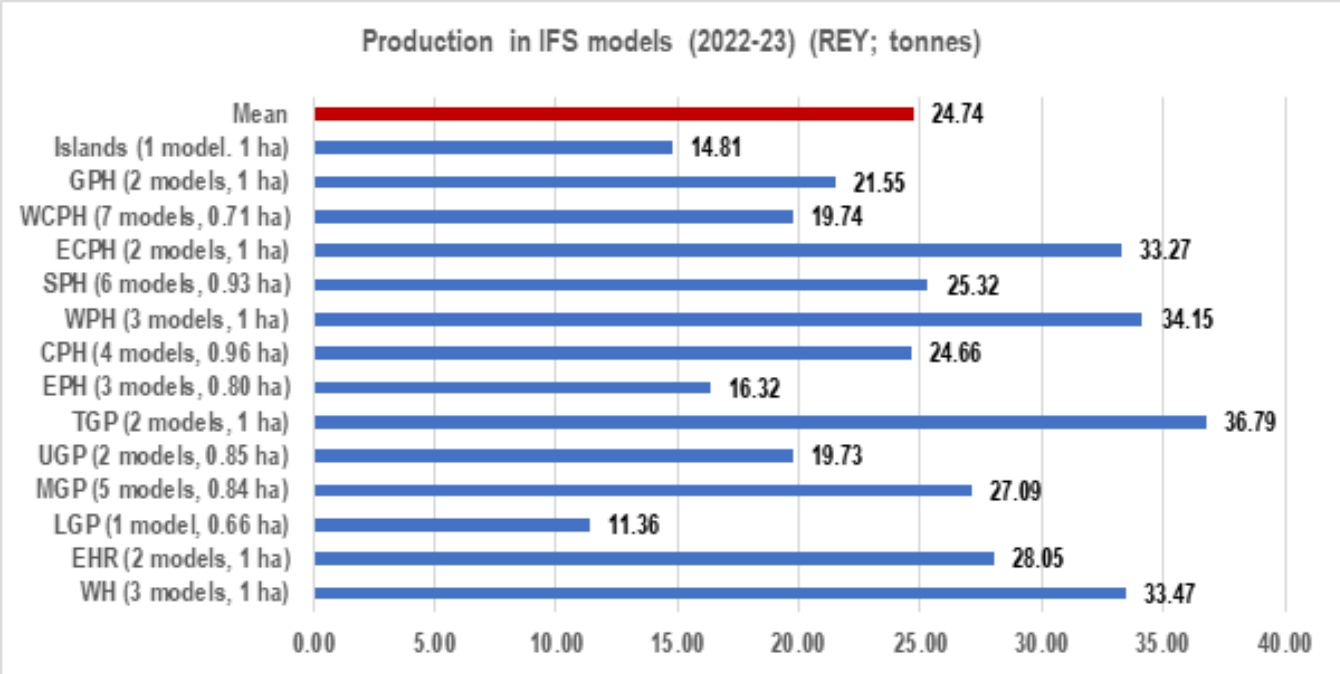


Fig.1. System productivity (REY in tonnes) from IFS models of different agro-climatic zones

Similarly, Mean Net return per rupee invested from IFS models of different ACZ was found to be (1.24%). Maximum Net return per rupee invested was found to be (3.62) at EHR (Eastern Himalaya Region) two models (Jorhat (AS), Umiam (ML), 1 ha) followed by (2.11) at WH (Western Himalaya) three models (Jammu (J&K), Palampur (HP), Pantnagar (UK), 1 ha), whereas, minimum Net return per rupee invested was found to be (2.25) at UGP (Upper Gangetic Plains) (Fig. 2)

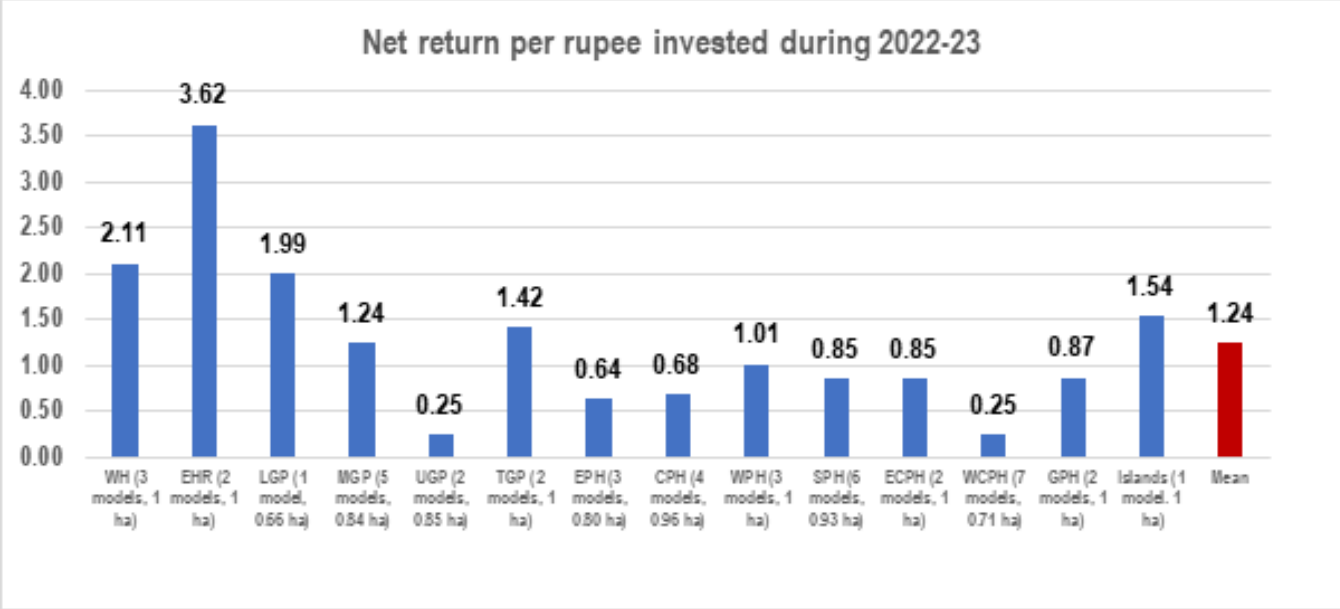


Fig.2. Mean net return per rupee invested from IFS models of different agro-climatic zones

Similarly, mean other key performance indicators like recycling values within IFS models of different ACZ was found to be Rs 71898. Maximum recycling values was found to be Rs.131533 at UGP (Upper Gangetic Plains) two models (Kanpur, Modipuram (UP), 0.85 ha) followed by Rs. 122521 at WH (Western Himalaya) Three models (Jammu (J&K), Palampur (HP), Pantnagar (UK) 1. ha), whereas, minimum recycling values was found to be Rs. 6500 at Islands. (Fig. 3).

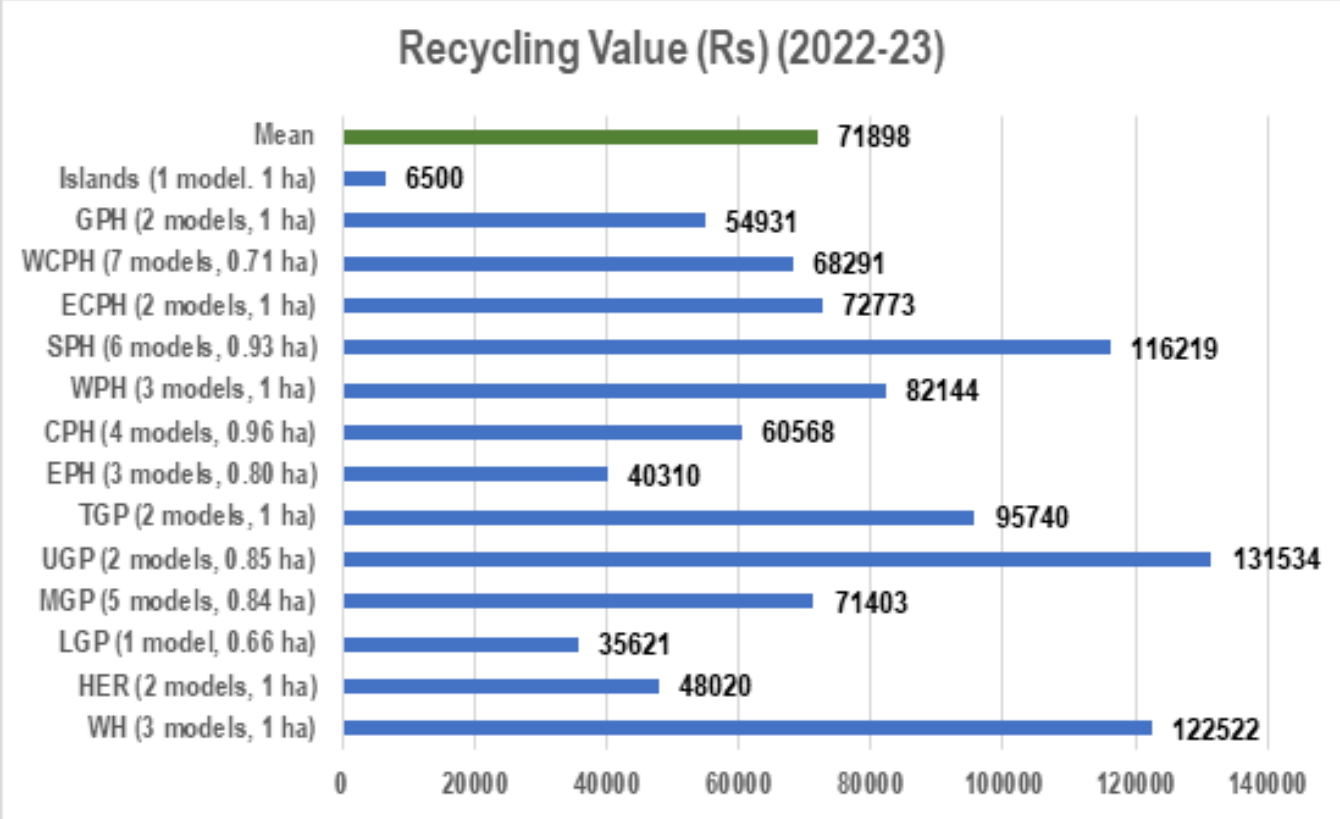


Fig.3. Mean value of recycling (Rs.) in IFS models of different ACZ

Similarly, other performance indicators like mean Soil organic carbon values within IFS models across different ACZ was found to be 25.08 (%). Maximum Soil organic carbon values were found to be 55.94 (%) at WCPH (West Coast Plains and Hills) seven models (Goa (2 nos); Karamana (4 nos) (KL), Karjat (MH), 0.71 ha) followed by 43.40 (%) at Islands (One models, 1. ha), whereas, minimum Soil organic carbon values were found to be 6.23 (%) at EPH (Eastern Plateau and Hills) (Fig. 4.).

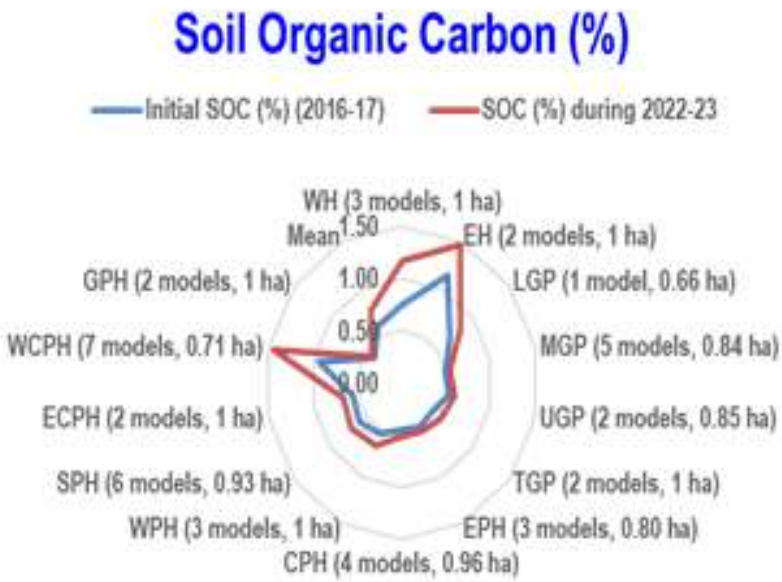


Fig.4. Improvement in SOC (%)

Similarly, other key performance indicators like mean number of employment generation within IFS models of different ACZ was found to be 388. Maximum number of employment generation was found to be 657 at UGP (Upper Gangetic Plains) two models Kanpur, Modipuram (UP) with average area of model being 0.85 ha followed by 502 at CPH (Central Plateau and Hills) with five models (Jabalpur, Rewa, Indore in MP as well as Kota and Durgapura in Rajasthan with average IFS model area being 0.96 ha, whereas, minimum number of employment generation were found to be 192 at Islands (A&N Islands) (Fig. 5.)

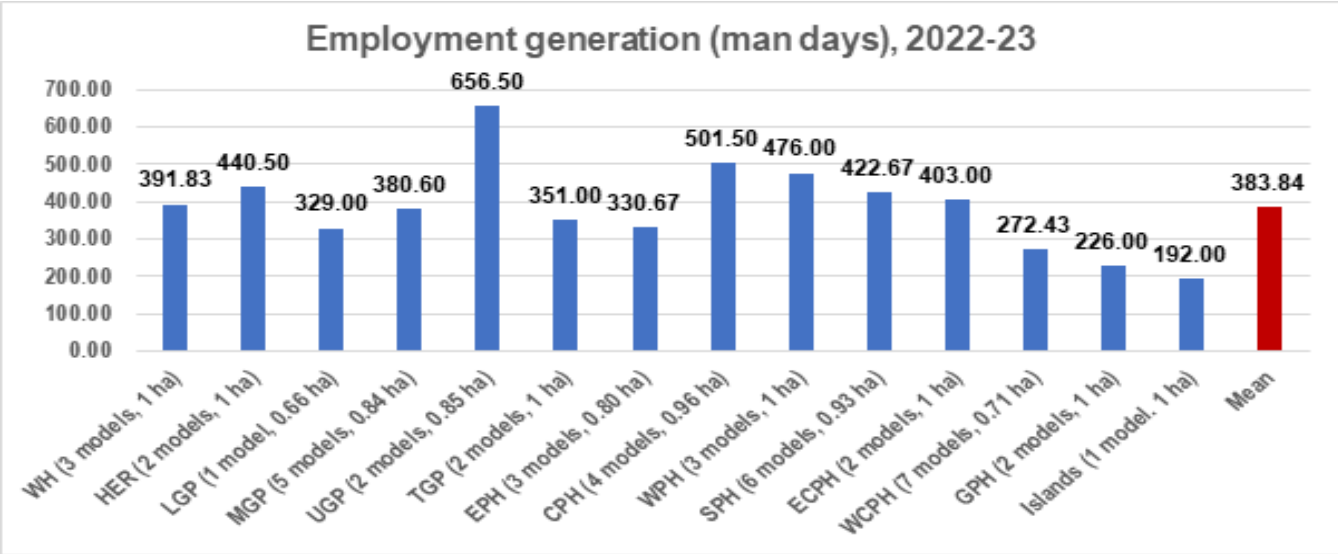


Fig. 5 Employment generation from IFS models (Man-days);

In most of the IFS models of different ACZ, the net emission of GHG i.e. source and sink difference as estimated using IPCC Tier II coefficients were found to be negative suggesting environmental suitability of these IFS models. (Fig. 6.)

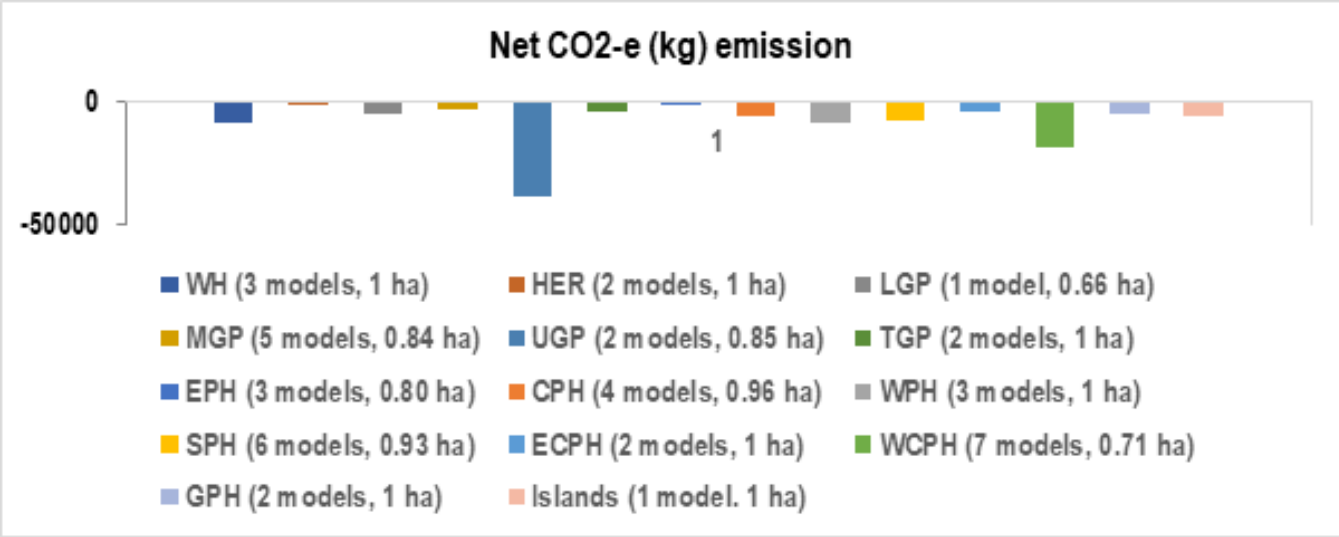


Fig.6. Net GHG emission from IFS models

Similarly, other key performance indicators like Sustainable Value Index (SVI) across IFS models of different ACZ was found to be 0.68. Maximum Sustainable Value Index was found to be 0.82 at LGP (Lower Gangetic Plains) with one model (Kalyani (WB) having area of 0.66 ha followed by 0.78 at MGP (Middle Gangetic Plains) with five models (Ayodhya, Varanasi (UP); Patna (2 nos), Sabour (BR) having mean area of 1.0 ha, whereas, minimum Sustainable Value Index were found to be 0.36 at CPH (Central Plateau and Hills) (Fig. 7.)

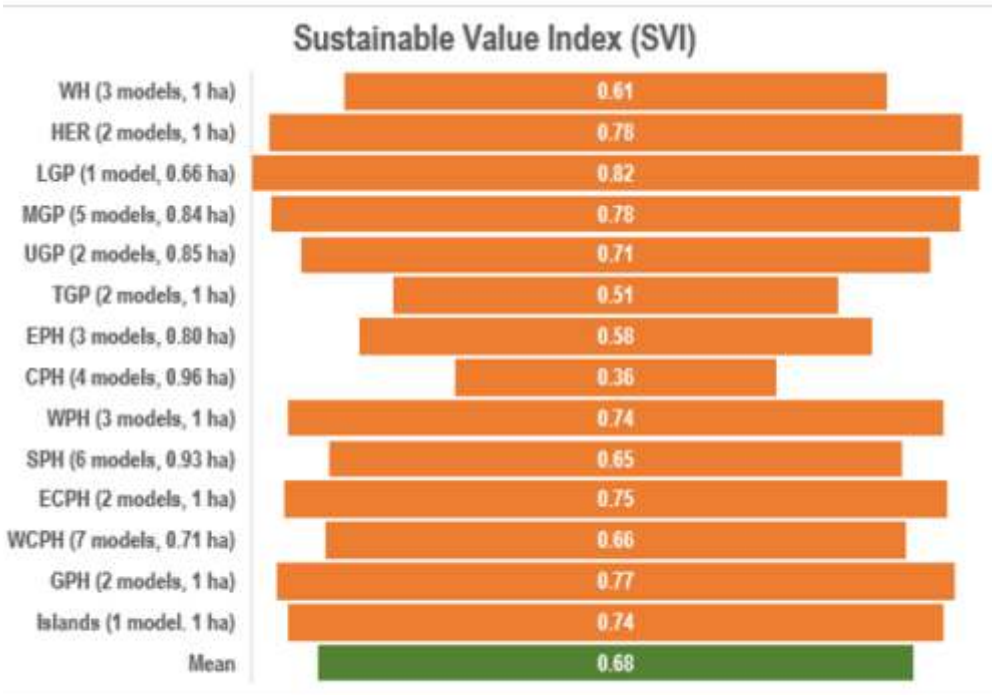


Fig.7. Sustainable Value Index (SVI) from IFS models

Fig.7. Sustainable Value Index (SVI) from IFS models

Further, a technical manual on Key Performance Indicators (KPIs) was developed for assessment of Integrated Farming Systems covering social, ecological and economical performance of IFS. Unit Costs for IFS were also notified and published by NABARD regional offices. The bankable IFS models prepared were included in the Unit cost documents of 12 states such as A&N Islands (2), Andhra Pradesh (1), Chhattisgarh (1), Bihar (2), Jharkhand (4), Karnataka (4), Kerala (4), Maharashtra (5), Punjab (1), Tamil Nadu (3), Telangana (3) and Uttarakhand (2).

7.2 CROPPING SYSTEM MANAGEMENT

Title of the Experiment: Identification of cropping systems module for different farming systems

Objectives

- To evaluate the cropping systems in ecological, nutritional, feed and economic perspective
- To identify the cropping system module for specific farming systems
- To assess the resource dynamics of identified cropping system module

Year of start: 2017-18

During reporting period i.e., 2022-23, several cropping systems encompassing 4 crop modules for meeting the various purposes of farming systems such as soil health improvement, family nutrition, livestock nutrition as well as income enhancement with check were evaluated across 14 Agroclimatic regions of the country. The locations and the respective agroclimatic regions are described in Table 1 and treatment details are given in Table 2.

Table 1: Location of experiments conducted during 2022-23

Sl. No.	Agro-Climatic Region	States	AICRP on IFS Centres
1	Western Himalayan Region	Jammu	Jammu
		Himachal Pradesh	Palampur
		Uttarakhand (Hill region)	Pantnagar
2	Eastern Himalayan Region	Assam	Jorhat
3	Lower Gangetic Plain Region	West Bengal (except the hilly areas)	Kalyani
4	Middle Gangetic Plain Region	Uttar Pradesh	Ayodhya
			Varanasi
		Bihar	Sabour
5	Upper Gangetic Plains Region	Uttar Pradesh (Central and western parts)	Kanpur
6	Trans-Ganga Plains Region	Punjab	Ludhiana
		Haryana	Hissar
7	Eastern Plateau and Hills	Jharkhand	Ranchi
		Chhattisgarh	Raipur
8	Central Plateau and Hill Region	Madhya Pradesh	Jabalpur
			Indore
			Powarkheda
			Riwa
		Rajasthan	Durgapura
			Kota
9	Western Plateau and Hill Region	Maharashtra	Akola
			Karjat
			Parbhani
			Rahuri

Sl. No.	Agro-Climatic Region	States	AICRP on IFS Centres
10	Southern Plateau and Hills Region	Telangana	Rajendranagar
			Rudrur
		Andhra Pradesh	Maruteru
		Tamil Nadu	Coimbatore
			Thanjavur
		Karnataka	Kathalgere
			Siruguppa
		Odisha	Chiplima
11	Eastern Coastal Plains and Hills Region	Orissa	Bhubaneshwar
12	Western Coastal Plains and Ghats Region	Kerala	Karmana
13	Gujarat Plain and Hill Region	Gujarat	SK Nagar
			Junagarh
			Navsari
14	Western Plain and Hill Region	Rajasthan	Durgapura

Table 2: Treatments details with crop modules undertaken during 2022-23

Treatments	Cropping Systems	Modul Names
T1	Predominant cropping system of the region	Check
T2		
T3	Ecological Cropping system involving pulses/green manures and other crops	For soil health improvement
T4		
T5	Cropping system involving cereals, pulses and oilseeds	To meet household nutritional security
T6		
T7	Cropping systems for round the year green and dry fodder production	To meet fodder requirement for livestock
T8		
T9	Cropping systems involving vegetables and others high value crops	For income enhancement

This report presents the outcomes of the four Cropping System modules such as Soil Health, Household Nutrition, Livestock Nutrition, and Income Enhancement across 14 Agro-climatic regions of India during 2022–23, highlighting wide variability in both Net Returns (NR) and productivity (REY). Livestock Nutrition and Income Enhancement emerged as the top-performing modules, delivering exceptional results in the Eastern Himalayan Region (NR: Rs. 934,525/ha; REY: 85.0 t/ha) and the Trans-Ganga Plains (NR: Rs. 651,019/ha; REY: 53.0 t/ha). In contrast, Soil Health modules contributed more modest returns but remain indispensable for long-term sustainability, while Household Nutrition modules ensured dietary security through stable though comparatively lower outcomes. The study recommends scaling up Livestock and Income modules, strengthening Soil Health interventions, diversifying Household Nutrition strategies, and adopting region-specific priorities through the integration of soil, crop, and livestock systems. Agro-climatic-wise data on various cropping systems were collected and analyzed to identify the most suitable systems for each region, as described below

Western Himalayan region: In the Western Himalayan Region, the four Cropping System modules produced a mean net return (NR) of Rs. 282,605/ha (±75,531), with values ranging from Rs. 198,216/ha to Rs. 380,332/ha, while the mean rice equivalent yield (REY) was 18.15 t/ha (±4.15), spanning 12.97–21.96

t/ha (Fig. 1). The Soil Health module generated Rs. 198,216/ha in NR and 12.97 t/ha in REY, both below national averages (NR: Rs. 237,956; REY: 16.52 t/ha). Household Nutrition returned Rs. 262,640/ha and 16.67 t/ha in REY, again modest compared with the national benchmarks (NR: Rs. 282,292; REY: 21.05 t/ha). Livestock Nutrition was the strongest performer with Rs. 380,332/ha in NR and 21.96 t/ha in REY, exceeding national means (NR: Rs. 344,773; REY: 29.11 t/ha). Income Enhancement, with Rs. 289,231/ha and 21.00 t/ha in REY, remained below national averages (NR: Rs. 481,812; REY: 37.72 t/ha).

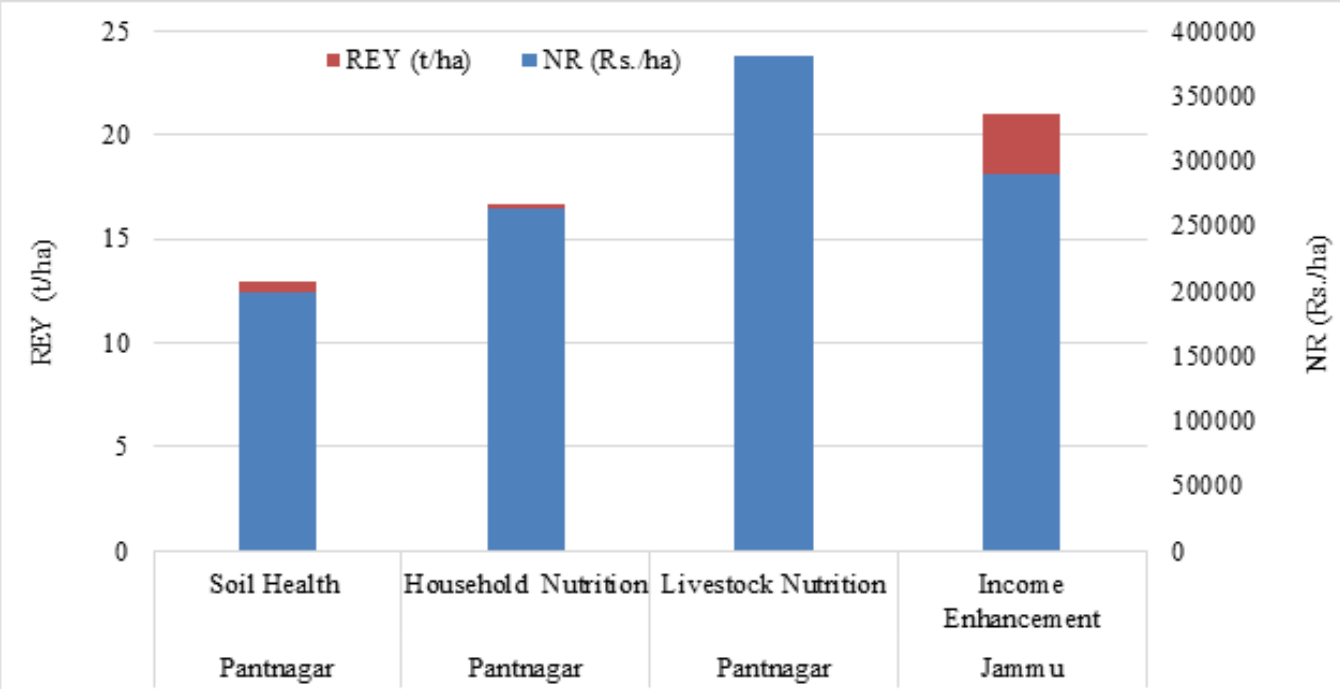


Fig. 1: System productivity (REY, t/ha) and net return (Rs. /ha) from cropping systems module in Western Himalayan Regions during 2022-23

Eastern Himalayan Region: In this region, the modules averaged Rs. 478,016/ha (±387,934) in NR, spanning Rs. 33,579/ha to Rs. 934,525/ha, and 42.00 t/ha (±33.18) in REY, ranging from 6.00 to 85.00 t/ha (Fig. 2). Soil Health performed weakest at Rs. 33,579/ha in NR and 6.00 t/ha in REY, both well below national standards. Household Nutrition, however, was stronger, yielding Rs. 358,317/ha and 28.00 t/ha in REY, surpassing national averages. Livestock Nutrition was outstanding, setting national records with Rs. 934,525/ha in NR and 85.00 t/ha in REY. Income Enhancement also performed well at Rs. 585,643/ha in NR and 49.00 t/ha in REY, above national benchmarks.

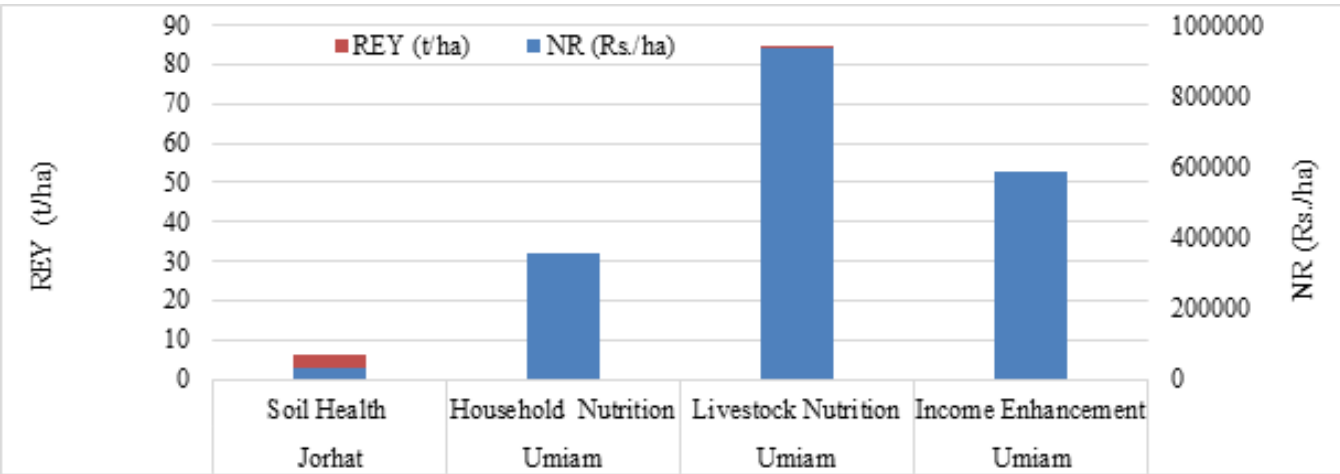


Fig. 2: System productivity (REY, t/ha) and net return (Rs. /ha) from cropping systems module in Eastern Himalayan Regions during 2022-23

Lower Gangetic Plain Region: Here, the modules recorded a mean NR of Rs. 349,291/ha (±309,905), varying between Rs. 68,365/ha and Rs. 808,667/ha, while the mean REY was 23.75 t/ha (±19.18), within 7.00–52.00 t/ha (Fig. 3). Soil Health achieved Rs. 343,313/ha in NR and 22.00 t/ha in REY, both slightly above national means. Household Nutrition remained modest at Rs. 177,817/ha and 14.00 t/ha in REY, below national standards. Livestock Nutrition was weakest, producing only Rs. 68,365/ha and 7.00 t/ha, marking the national minimum for this module. In contrast, Income Enhancement was highly successful with Rs. 808,667/ha in NR and 52.00 t/ha in REY, ranking among national maxima.

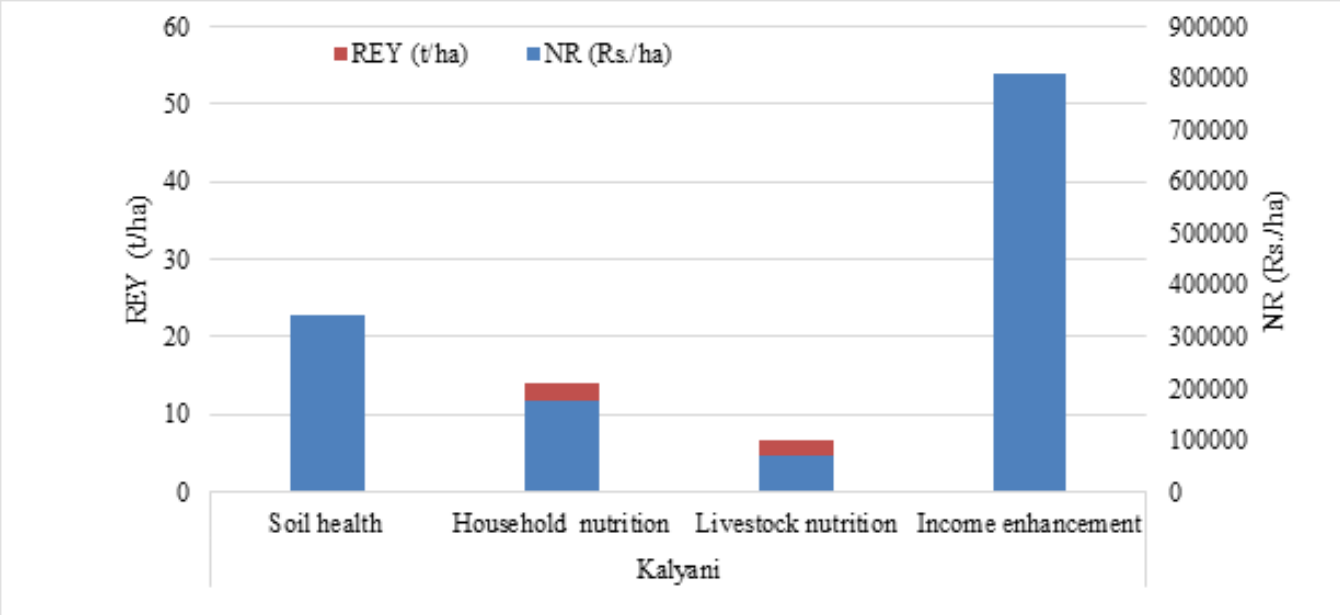


Fig. 3: System productivity (REY, t/ha) and net return (Rs. /ha) from cropping systems module in Lower Gangetic Plain Region during 2022-23

Middle Gangetic Plain Region: The Middle Gangetic Plains posted a mean NR of Rs. 179,141/ha (±39,845), between Rs. 136,846/ha and Rs. 233,766/ha, and a mean REY of 13.50 t/ha (±2.65), ranging from 12.00 to 18.00 t/ha (Fig. 4). Soil Health delivered Rs. 178,597/ha and 12.00 t/ha in REY, while Household Nutrition recorded the lowest, Rs. 136,846/ha and 12.00 t/ha, both below national standards. Livestock Nutrition produced Rs. 167,356/ha and 12.00 t/ha, also modest. Income Enhancement, however, was the strongest module at Rs. 233,766/ha and 18.00 t/ha in REY, though still under national averages.

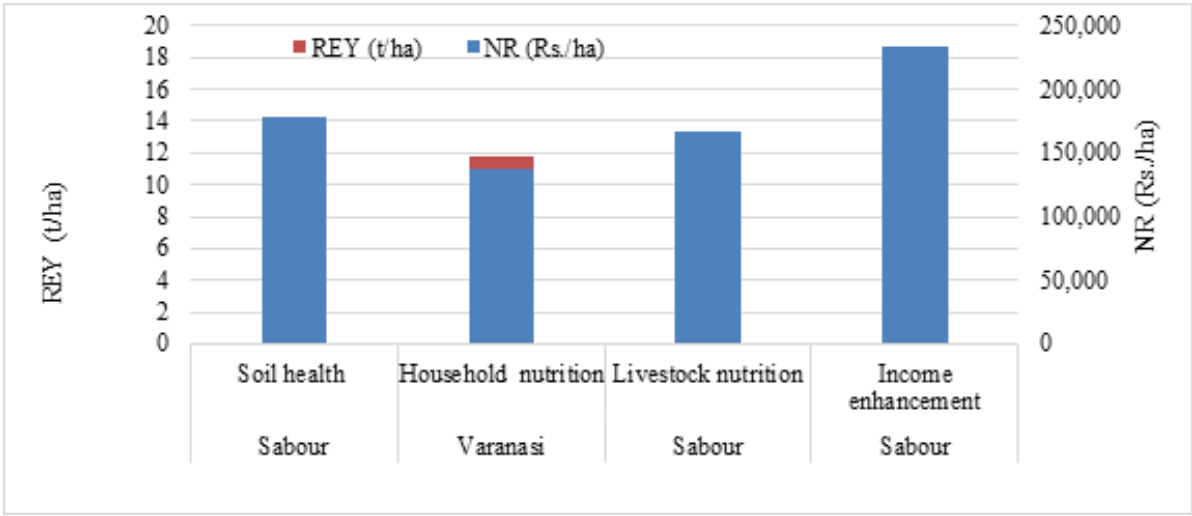


Fig. 4: System productivity (REY, t/ha) and net return (Rs. /ha) from cropping systems module in Middle Gangetic Plain Region during 2022-23

Upper Gangetic Plains Region: Modules in this region averaged Rs. 205,578/ha (±45,030) in NR, between Rs. 143,400/ha and Rs. 253,604/ha, and 15.75 t/ha (±2.99) in REY, spanning 13.00–20.00 t/ha (Fig. 5). Soil Health was the highest contributor in NR at Rs. 253,604/ha, with 15.00 t/ha in REY, close to national averages. Household Nutrition followed with Rs. 226,165/ha and 15.00 t/ha, still below national standards. Livestock Nutrition stood lower at Rs. 199,143/ha and 13.00 t/ha, while Income Enhancement had the lowest NR (Rs. 143,400/ha) but the highest REY (20.00 t/ha).

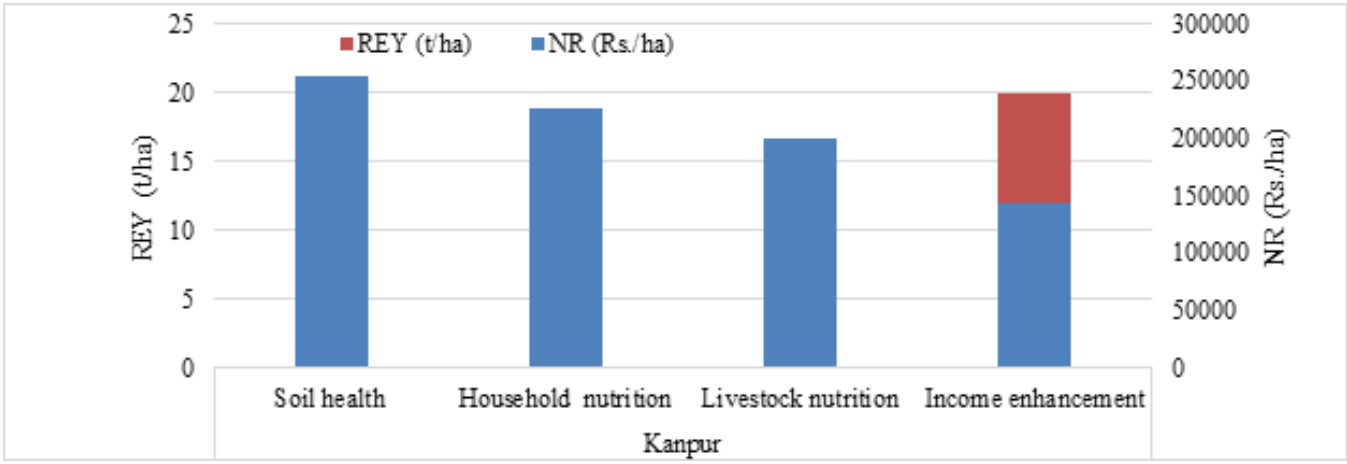


Fig. 5: System productivity (REY, t/ha) and net return (Rs. /ha) from cropping systems module in Upper Gangetic Plain Region during 2022-23

Trans-Gangetic Plains Region: The Trans-Ganga Plains recorded a mean NR of Rs. 456,512/ha (±165,360), varying from Rs. 273,278/ha to Rs. 651,019/ha, and a mean REY of 35.00 t/ha (±14.36), within 18.00–53.00 t/ha (Fig. 6). Soil Health contributed Rs. 371,379/ha and 26.00 t/ha, both higher than national averages. Household Nutrition was particularly strong at Rs. 530,371/ha and 43.00 t/ha, among the highest nationally. Livestock Nutrition lagged at Rs. 273,278/ha and 18.00 t/ha, below benchmarks. Income Enhancement excelled, reaching Rs. 651,019/ha and 53.00 t/ha, far above national means.

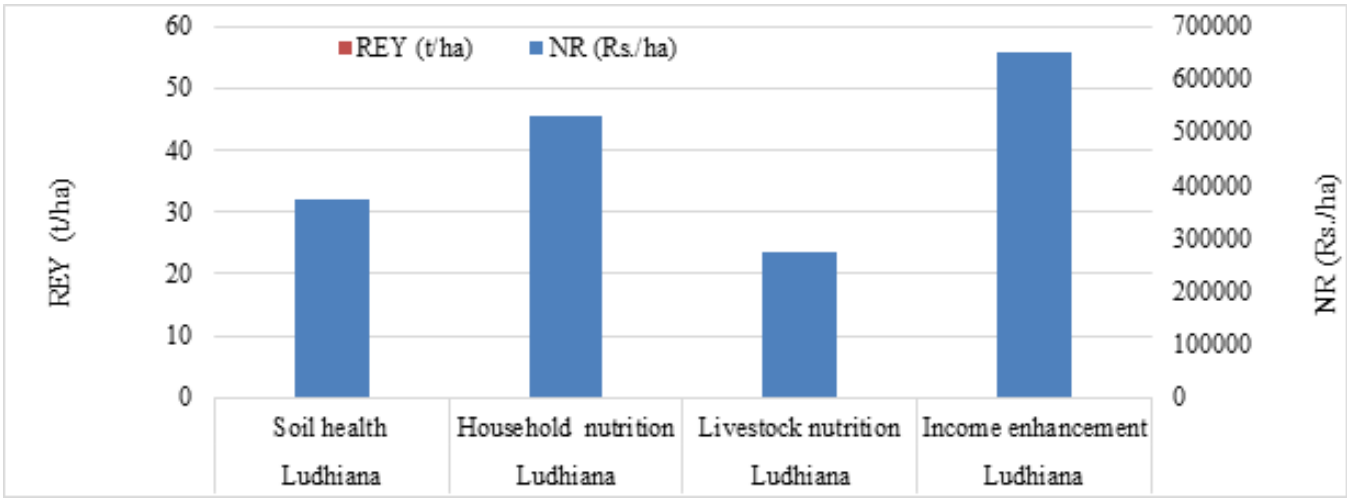


Fig. 6: System productivity (REY, t/ha) and net return (Rs. /ha) from cropping systems module in Trans-Gangetic Plain Region during 2022-23

Eastern Plateau and Hills: In this region, the modules yielded an average NR of Rs. 253,601/ha (±167,160), ranging from Rs. 130,305/ha to Rs. 529,076/ha, and a mean REY of 20.25 t/ha (±15.50), spanning 9.00–45.00 t/ha (Fig. 7). Soil Health remained lowest at Rs. 130,305/ha and 9.00 t/ha, well under national means. Household Nutrition generated Rs. 185,373/ha and 15.00 t/ha, while Livestock

Nutrition achieved Rs. 169,648/ha and 12.00 t/ha, both modest. Income Enhancement stood out with Rs. 529,076/ha and 45.00 t/ha, substantially higher than national averages.

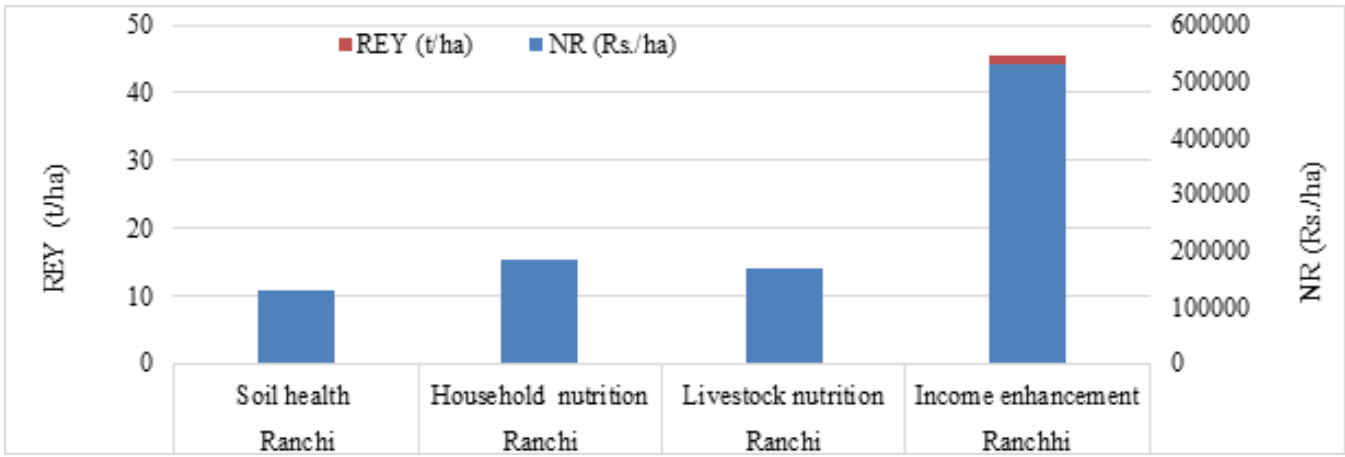


Fig. 7: System productivity (REY, t/ha) and net return (Rs. /ha) from cropping systems module in Eastern Plateau and Hills Region during 2022-23

Central plateau and Hill Region: The modules here averaged Rs. 497,642/ha (±175,502) in NR, spanning Rs. 273,846/ha–690,250/ha, and 33.50 t/ha (±10.18) in REY, within 18.00–43.00 t/ha (Fig. 8). Soil Health yielded Rs. 273,846/ha and 18.00 t/ha, modest compared with national benchmarks. Household Nutrition excelled at Rs. 690,250/ha and 43.00 t/ha, among the highest nationally. Livestock Nutrition contributed Rs. 378,822/ha and 35.00 t/ha, above national averages, while Income Enhancement produced Rs. 645,650/ha and 38.00 t/ha, also strong.

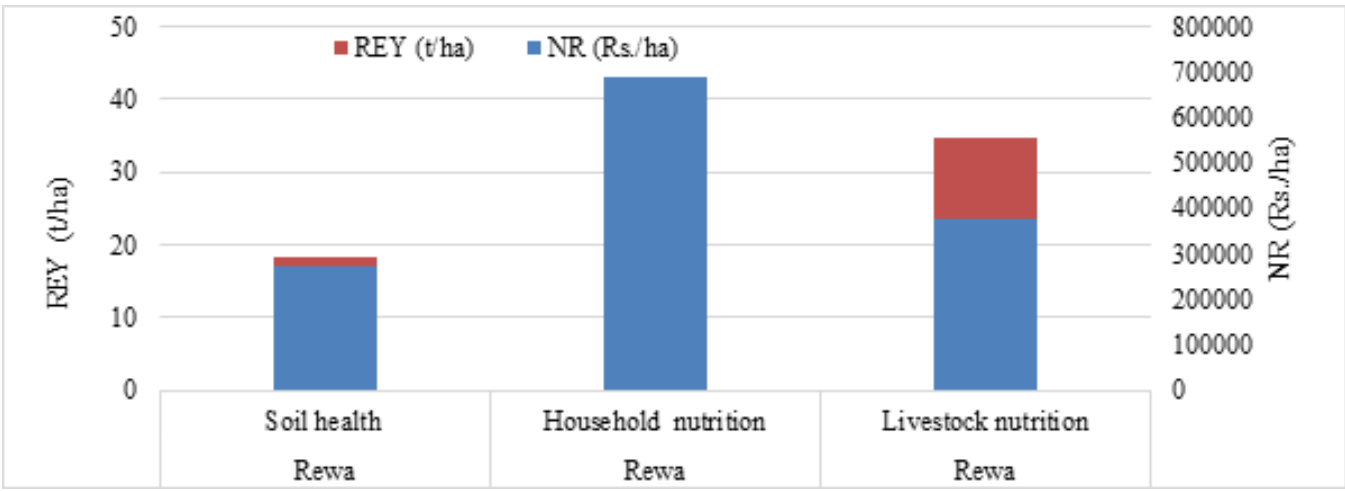


Fig. 8: System productivity (REY, t/ha) and net return (Rs. /ha) from cropping systems module in Central plateau and Hill Region during 2022-23

Western Plateau and Hill Region: This region recorded a mean NR of Rs. 439,979/ha (±275,989), from Rs. 111,328/ha to Rs. 717,657/ha, and a mean REY of 38.75 t/ha (±18.78), ranging 16.00–70.00 t/ha (Fig. 9). Soil Health reached Rs. 717,657/ha and 39.00 t/ha, the national maximum for this module. Household Nutrition was weakest at Rs. 111,328/ha and 16.00 t/ha, below national averages. Livestock Nutrition achieved Rs. 255,031/ha and 30.00 t/ha, close to benchmarks, while Income Enhancement excelled with Rs. 675,898/ha and 70.00 t/ha, near national highs.

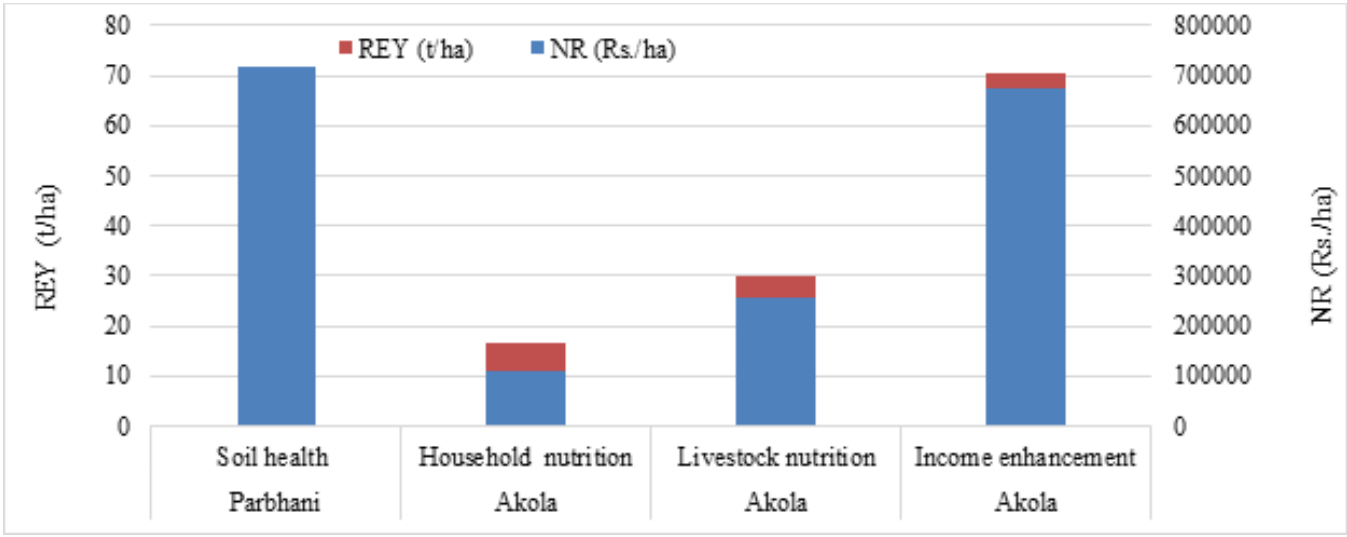


Fig. 9: System productivity (REY, t/ha) and net return (Rs. /ha) from cropping systems module in Western Plateau and Hill Region during 2022-23

South Plateau and Hills: The Southern Plateau and Hills reported a mean NR of Rs. 417,204/ha (±172,365), spanning Rs. 205,919/ha–605,909/ha, and a mean REY of 31.00 t/ha (±16.36), ranging 14.00–55.00 t/ha (Fig. 10). Soil Health posted Rs. 205,919/ha and 14.00 t/ha, below national standards, while Household Nutrition yielded Rs. 259,256/ha and 19.00 t/ha, again modest. Livestock Nutrition was the strongest with Rs. 605,909/ha and 55.00 t/ha, far exceeding national averages. Income Enhancement also performed well with Rs. 597,731/ha and 36.00 t/ha.

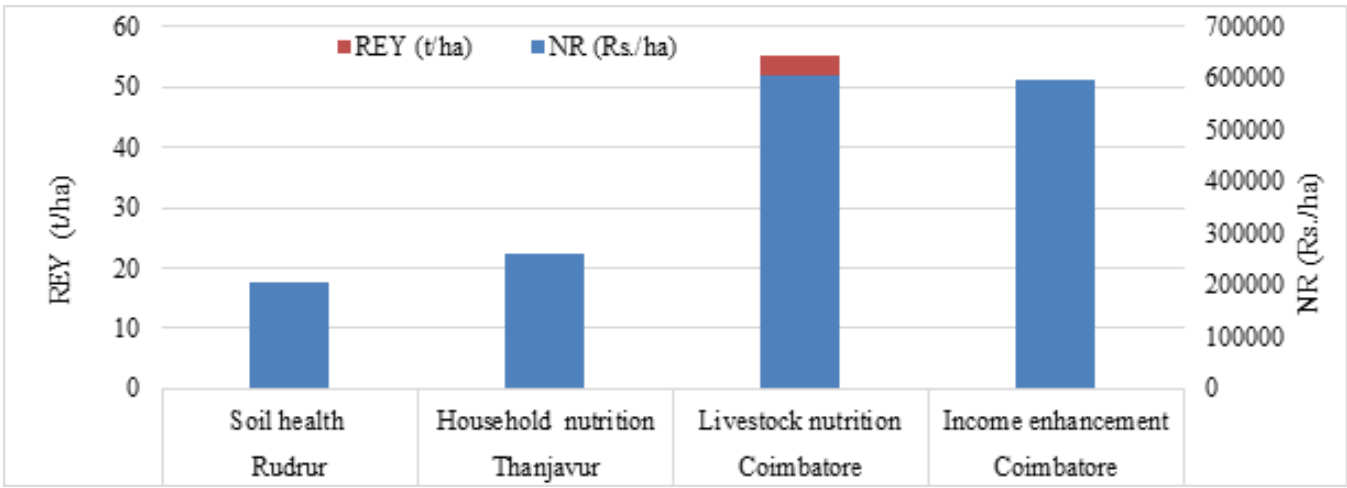


Fig. 10: System productivity (REY, t/ha) and net return (Rs. /ha) from cropping systems module in South Plateau and Hills Region during 2022-23

Eastern Coastal Plains and Hills: In this region, the average NR stood at Rs. 116,753/ha (±28,865), between Rs. 78,920/ha and Rs. 158,668/ha, while the mean REY was 14.25 t/ha (±3.20), spanning 10.00–18.00 t/ha (Fig. 11). Soil Health was strongest within the region at Rs. 158,668/ha and 18.00 t/ha, though still below national averages. Household Nutrition yielded Rs. 93,695/ha and 13.00 t/ha, while Livestock Nutrition recorded the lowest at Rs. 78,920/ha and 10.00 t/ha, among the weakest nationally. Income Enhancement delivered Rs. 135,730/ha and 16.00 t/ha, somewhat stronger but again below national means.

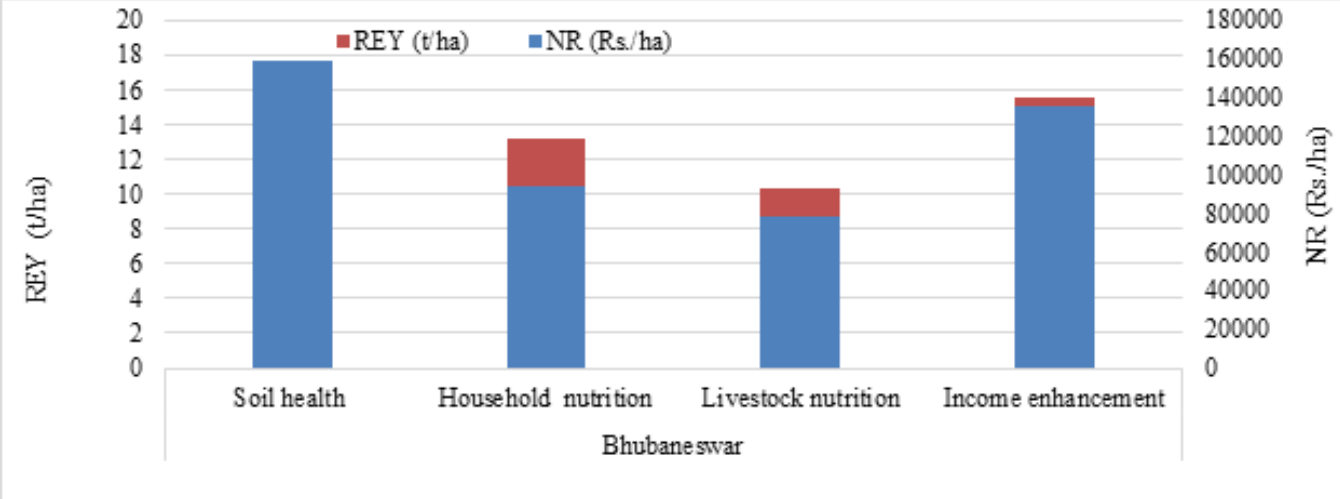


Fig. 11: System productivity (REY, t/ha) and net return (Rs. /ha) from cropping systems module in Eastern Coastal Plains and Hills Region during 2022-23

Western Coastal Plains and Ghats: The modules together averaged Rs. 324,686/ha (±247,666) in NR, spanning Rs. 116,021/ha–678,523/ha, and 26.25 t/ha (±14.09) in REY, ranging 11.00–47.00 t/ha (Fig. 12). Soil Health contributed Rs. 116,021/ha and 11.00 t/ha, below benchmarks. Household Nutrition was stronger at Rs. 340,400/ha and 31.00 t/ha, above national means. Livestock Nutrition was weaker at Rs. 163,798/ha and 16.00 t/ha, while Income Enhancement excelled with Rs. 678,523/ha and 47.00 t/ha, near national highs.

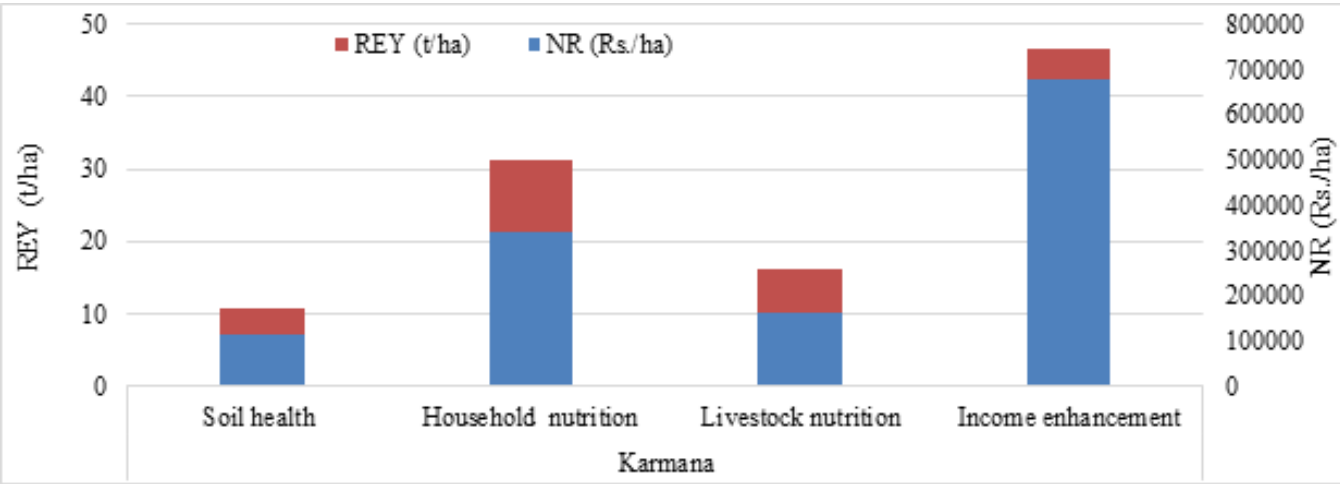


Fig. 12: System productivity (REY, t/ha) and net return (Rs. /ha) from cropping systems module in Western Coastal Plains and Ghats Region during 2022-23

Gujarat Plain and Hill Region: In this region, modules averaged Rs. 390,390/ha (±145,262) in NR, varying Rs. 240,766/ha–606,016/ha, and 27.50 t/ha (±9.03) in REY, spanning 18.00–42.00 t/ha (Fig. 13). Soil Health stood at Rs. 240,766/ha and 18.00 t/ha, modest relative to national averages. Household Nutrition delivered Rs. 245,015/ha and 19.00 t/ha, below benchmarks. Livestock Nutrition was the leading performer with Rs. 606,016/ha and 31.00 t/ha, exceeding national means, while Income Enhancement also performed well at Rs. 469,762/ha and 42.00 t/ha.

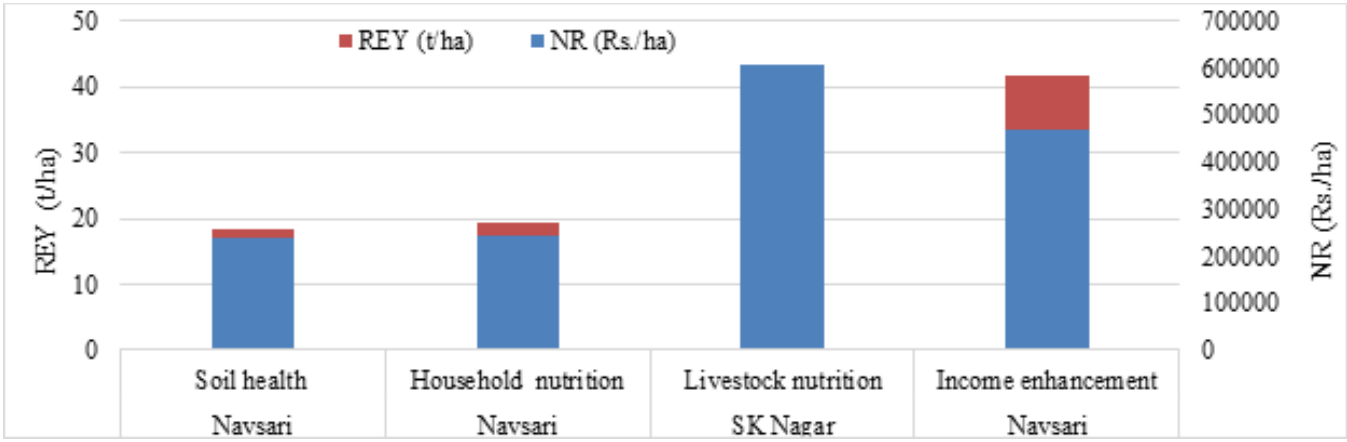


Fig. 13: System productivity (REY, t/ha) and net return (Rs. /ha) from cropping systems module in Gujarat Plain and Hill Region during 2022-23

Western Plain and Hill Region: The Western Plain and Hill Region averaged Rs. 295,181/ha (±181,001) in NR, ranging from Rs. 109,509/ha to Rs. 545,673/ha, and 19.00 t/ha (±7.26) in REY, spanning 9.00–28.00 t/ha (Fig. 14). Soil Health was lowest at Rs. 109,509/ha and 9.00 t/ha, among the weakest nationally. Household Nutrition followed with Rs. 224,267/ha and 17.00 t/ha, below national standards. Livestock Nutrition contributed Rs. 545,673/ha and 28.00 t/ha, above the regional average and close to national means, while Income Enhancement delivered Rs. 301,275/ha and 22.00 t/ha, moderate in comparison

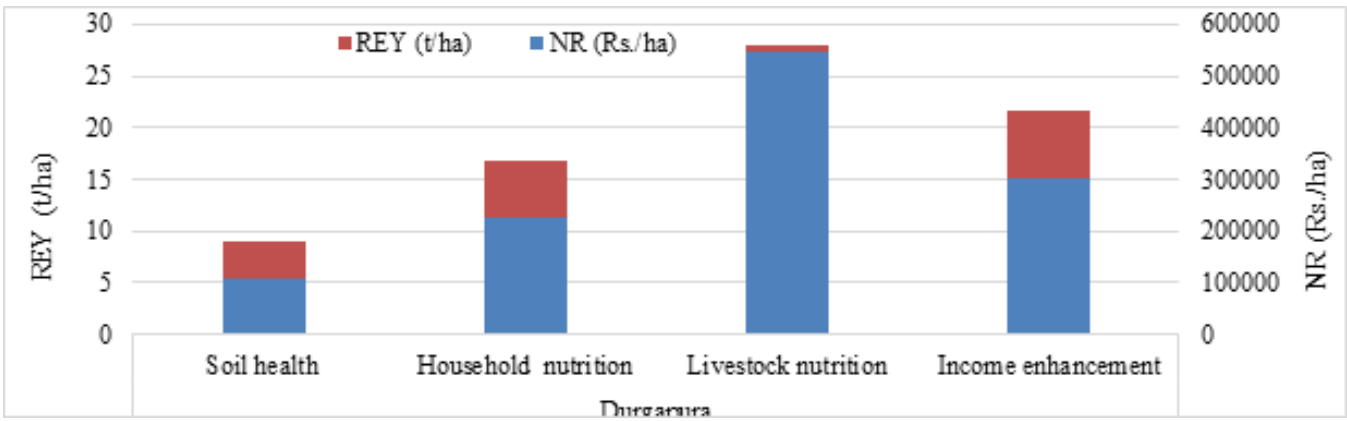


Fig. 14: System productivity (REY, t/ha) and net return (Rs. /ha) from cropping systems module in Western Plain and Hill Region during 2022-23

Between regions

The descriptive statistics reveal substantial variation across regions. Net Returns (NR) averaged Rs. 334,756/ha, with a minimum of Rs. 116,753/ha (Eastern Coastal Plains and Hills Region) and a maximum of Rs. 497,642/ha (Central Plateau and Hill Region). The interquartile range (IQR: Rs. 260,852–434,285) indicates moderate clustering around the median of Rs. 336,989/ha, while outliers such as the Eastern Himalayan and Trans-Ganga Plains elevated the upper range.

Similarly, Rice Equivalent Yield (REY) averaged 25.62 t/ha, ranging from a low of 13.50 t/ha (Middle Gangetic Plain Region) to a high of 42.00 t/ha (Eastern Himalayan Region). The IQR (18.36–32.88 t/ha) suggests a moderate spread, with a median of 25.0 t/ha. Eastern Himalayan Region was a clear positive outlier.

Conclusions: Eastern Himalayan vs Eastern Coastal Plains: Eastern Himalaya significantly outperformed Eastern Coastal in both NR and REY, highlighting the yield potential of hill ecosystems under diversified

cropping systems. Western Plateau vs Middle Gangetic: Western Plateau achieved markedly higher returns and yields compared to the Middle Gangetic, indicating the relative advantage of plateau soils and management practices. Trans-Ganga vs Upper Gangetic Plains: The Trans-Ganga Plains posted moderately higher NR and REY than Upper Gangetic, a difference still statistically significant, emphasizing their role as a strong performer.

7.3 TECHNOLOGY TRANSFER AND REFINEMENT

7.3.1 ON-FARM RESEARCH

7.3.1.1 On-farm crop response to application of nutrient

Title of the experiment: On-farm crop response to application of major plant nutrients in predominant cropping system

Objective: To assess the response of major crops to application of N, P and K at recommended rates in predominat cropping systems in different agro-ecosystem under farmers field condition.

Year of start: 1999-2000, Treatments are modified in 2010-11.

Treatments: There are five common treatments at various locations. They are ($N_0P_0k_0$), 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. Two treatments namely, N+P+K+ Supplement of deficient micronutrient based on soil test and farmer's practice were added during 2010-2011.

Locations:

Cropping system	OFR Centre (State)	No. of trials
Rice- Rice	Kayamkulam (Kerala), Ranga Reddy (Telanagana)	48
Rice- Wheat	Saraikela Kharsawan (Jharkhand), Unnao (U.P.), Jabalpur and Mandla (Madhya Pradesh)	168
Rice- Mustard	Bankura (W.B.), Golaghat (Assam)	48
Maize- Wheat	Rajsamand (Rajasthan)	24
Maize- Maize	Dindigul (Tamil Nadu)	12
Groundnut-Sesame	Dindigul (Tamil Nadu)	12
Soybean- Chickpea	Wardha (Maharashtra)	24
Soybean- Wheat	Sabarkanta (Gujarat)	24
Total		**360**

Results: During 2022-23, a total of 360 trials were conducted across 8 cropping systems in 7 agro-climatic regions. The breakdown includes: 48 trials in the rice–rice system, 96 in the rice–wheat system, and 48 in the rice–mustard system. Centre-wise details of varieties, nutrients used, crop yields, and crop response to NPK application (in terms of yield difference) are presented in Table 7.3.1. A brief description of centre-wise results is provided above.

Rice rice: A total of 48 trials were conducted at Kayamkulam (Kerala) and Ranga Reddy (Telangana). The application of micronutrients showed a very positive response. At Kayamkulam, the application of the recommended dose of fertilizers (RDF) led to a 222% increase in yield over the control. However, this was 12% lower than the yield obtained under farmers' practices during the rabi season, as farmers already apply a higher dose of fertilizers than the RDF. Zinc application showed a good response, contributing an additional 10–16% yield over RDF at both centres. An extra yield of 300–870 kg/ha can be achieved by supplementing the system with the required quantity of zinc in addition to the recommended NPK nutrients. It was observed that farmers tend to apply imbalanced doses in the rice–rice system. By adopting a balanced nutrient management approach, they can achieve higher returns with lower input costs.

Rice-wheat: A total of 96 trials were conducted at four locations across three NARP zones, covering the states of Jharkhand, Madhya Pradesh, and Uttar Pradesh. Yield improvement was observed with the application of micronutrients (zinc) in both crops. The highest percentage increase in yield over the recommended fertilizer dose (NPK only) was recorded for rice at Unnao (Uttar Pradesh) with 11.6%, and for wheat at Saraikela Kharsawan (Jharkhand) with 10.3%. A similar trend was observed with the application of the recommended dose of fertilizers (RDF), which consistently resulted in higher yields than the control across all seven locations. The increase ranged from 68% to 230% for rice, and from 78% to 275% for wheat. The highest yield gaps were also recorded at Saraikela Kharsawan (Jharkhand), with 4771 kg/ha for rice (230% increase) and 4577 kg/ha for wheat (278% increase). Across the NARP zones in the rice–wheat system, a mean yield gap of 2096 kg/ha was found between farmers' practices and the recommended nutrient practices. Additionally, a yield gain of up to 757 kg/ha is achievable by supplementing the system with the required quantity of zinc alongside the recommended levels of NPK. Overall, it was observed that farmers are increasingly aware of the importance of fertilizer application in cereal crops, as these crops respond well to nutrient inputs. However, a significant yield gap still exists, especially with the introduction of new high-yielding varieties. There remains considerable scope for increasing productivity in the rice–wheat system through proper fertilizer application, particularly in areas where agricultural technology has not yet fully penetrated or is adopted at a slow pace.

Rice- gram: A total 36 trials were conducted in 2 NARP zones Chhattisgarh plain zone (Kanker) of Chhattisgarh and North Central Plateau of Kendujhar Orissa. At kanker it was found that significantly higher additional yield of 1064 kg ha^{-1} can be obtained from rice through application of 100:60:40 Kg NPK + 20 kg zinc ha^{-1}. In gram, the additional yield over farmer practice was found to be 416 kg ha^{-1} due to application of 20:50:20: Kg NPK ha^{-1}. Application of zinc as micronutrient in rice gave 3.3 per cent additional yield in rice and 5.9% in case of Gram than recommended NPK. At Kendujhar it was found that significantly higher additional yield of 109 kg ha^{-1} can be obtained from rice through application of 60:30:30 Kg NPK + 25 kg zinc ha^{-1}. Application of zinc as micronutrient in rice gave 3.6 per cent additional yield than recommended NPK. Same way at Orissa gram give 5.6% additional yield.

Rice-mustard: A total of 48 trials were conducted across two NARP zones. In the **New Alluvial Zone** (Bankura, West Bengal), the application of 25 kg zinc per hectare resulted in an additional yield of 114 kg/ha in rice and 40 kg/ha in mustard. It was observed that the farmers' nutrient management practices led to lower yields—269 kg/ha for rice and 84 kg/ha for mustard—compared to the application of the recommended quantity of NPK and NPK + Mn. In contrast, in the **Lower Brahmaputra Valley Zone** (Golaghat, Assam), the effects of micronutrient and fertilizer application were more pronounced. The application of 10 kg zinc per hectare led to additional yields of 524 kg/ha in rice and 110 kg/ha in mustard. Similar to the other region, farmers' nutrient management practices here also resulted in significantly lower yields—2153 kg/ha for rice and 334 kg/ha for mustard—compared to the application of the recommended doses of NPK and NPK + Mn.

Maize-wheat: A total of 24 trials were conducted in one NARP zone—Sub-Humid Southern Plain and Aravalli Hill Zone (Udaipur), Rajasthan. The yield gap between farmers' practices and recommended NPK application was recorded at 1056 kg/ha in maize and 915 kg/ha in wheat. Further, the application of micronutrients led to an additional yield of 198 kg/ha in maize and 260 kg/ha in wheat.

Maize-maize: A total of 12 trials were conducted in one NARP zone—Dindigul, Tamil Nadu. The yield gap between farmers' practices and recommended NPK application was 699 kg/ha for Kharif maize and 771 kg/ha for Rabi maize. The addition of micronutrients further enhanced yield by 228 kg/ha (Kharif) and 338 kg/ha (Rabi). In South India, particularly in the maize–maize system, despite the high fertilizer demand of hybrid maize, the yield gap is relatively small. This is largely due to maize being cultivated as a cash crop, primarily to support the poultry sector, prompting better nutrient management by farmers.

Groundnut-sesame: A total of 12 trials were conducted in one NARP zone—Dindigul, Tamil Nadu. The yield difference between farmers' practices and recommended NPK application was recorded at 1094 kg/ha in groundnut and 1133 kg/ha in sesame. The inclusion of micronutrients contributed to an additional yield of 251 kg/ha in groundnut and 164 kg/ha in sesame. Compared to the maize–maize system, farmers apply fewer inputs in groundnut–sesame, as it is primarily grown under rainfed conditions, which still results in a significant yield gap.

Soybean-chikpea: A total of 24 trials were conducted in the Central Vidarbha Zone (Wardha), Maharashtra. A significant yield gap was observed between farmers' practices and recommended nutrient application. Adoption of the recommended practices resulted in an additional yield of 1136 kg/ha in soybean and 1203 kg/ha in chickpea, corresponding to a 55% increase in soybean and a 62% increase in chickpea. This indicates a high potential for improving productivity in this zone through proper nutrient management.

Soybean-wheat: A total of 24 trials were conducted in the Gujarat Plains and Hills Zone (Sabarkantha), Gujarat. A substantial yield gap was recorded between farmers' practices and recommended nutrient application, with additional yields of 369 kg/ha in soybean and 984 kg/ha in wheat. These correspond to a 31% increase in soybean and a 35% increase in wheat, highlighting the opportunity to improve system productivity through balanced fertilizer use.

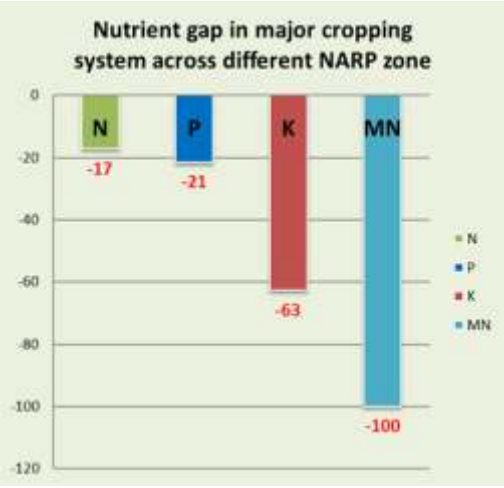


Fig:- 1 Nutrient gap across major cropping systems in different NARP zones

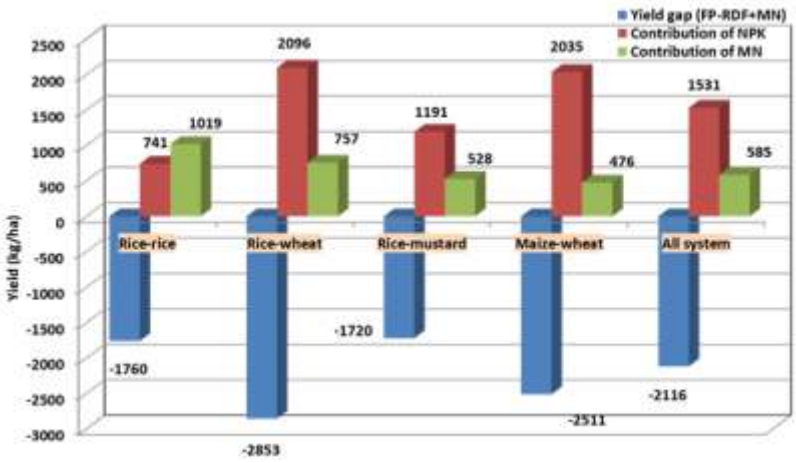


Fig:-2 Yield gap across major cropping systems in different NARP zones

Summary of Results on the Response of Prevalent Cropping Systems to Applied Nutrients in Various NARP Zones

- **Nutrient Gaps:** across various NARP zones, through the trail, it revealed significant gaps in nutrient application across locations and cropping systems recorded. The comparison between farmers'

practices and the recommended nutrient package indicated nutrient application gaps of: Nitrogen (N): 17%, Phosphorus (P_2O_5): 21%, Potassium (K_2O): 63% and Micronutrients: 100% These findings highlight the need for targeted nutrient management strategies to bridge these gaps, particularly for potassium and micronutrients, to enhance crop productivity and input efficiency.

- **System Yield Gaps:** The on-farm yield gap between the recommended dose of N, P_2O_5, and K_2O and farmers' nutrient management practices was observed as follows (in kg/ha): Rice–Rice: 741, Rice–Wheat: 2096, Rice–Mustard: 1191, Maize–Wheat: 2035 With the addition of micronutrients, the yield potential can be enhanced to: Rice–Rice: 1760, Rice–Wheat: 2853, Rice–Mustard: 1720 Maize–Wheat: 2511 When considering all cropping systems together, the average yield gap was 1531 kg/ha, which can increase to 2116 kg/ha with the application of micronutrients.
- **Agronomic Efficiency (AE) of Nitrogen (N):** The AE of nitrogen (kg grain yield per kg N applied) significantly improves when balanced fertilization (N + P + K) is practiced, compared to nitrogen application alone: Rice–Rice: From 8 to 33, Rice–Wheat: From 10 to 25, Rice–Mustard: From 9 to 29 and Maize–Wheat: From 10 to 19
- **Economic Response:** The mean economic return on nutrient application across cropping systems was: ₹8.0 per rupee invested on Nitrogen, ₹5.7 per rupee invested on Phosphorus (P_2O_5) and ₹5.8 per rupee invested on Potassium (K_2O)
- **Case of Kayamkulam (Kerala):** In the rice–rice system at Kayamkulam, farmers' practices resulted in higher yields than the recommended dose of fertilizers (RDF), primarily due to the application of excessive but imbalanced nutrients. This highlights the need to promote balanced fertilizer use, including micronutrients, to improve nutrient use efficiency and maximize returns.

7.3.2 Diversification of existing farming systems

Title of the experiment: Diversification and improvement of existing farming systems under small and marginal household conditions

Objectives

- To enhance the productivity and profitability of small and marginal farmers households through IFS approach
- To improve the livelihood and nutritional security through a diversification approach
- To estimate the impact of capacity building on the diversification of crop + livestock systems

Year of start: 2013-14 (Implemented in new districts from 2022-23)

The ever-increasing global population has intensified the pressure on agriculture, driving a shift toward smallholder farming systems. Historically, agricultural technologies have primarily catered to large, mechanized farms, exacerbating the disparity between large and small landholders. While strides have been made in achieving food security, livelihood security for farmers remains elusive, especially for smallholders and marginal farmers, who constitute over 80% of the global farming population. In India, these farmers account for nearly one-fourth of the world's small and marginal farms, cultivating less than 2 hectares of land. Raising the income of these smallholders poses a significant challenge to researchers, policymakers, and governments. Given the constancy of land resources, horizontal intensification is not possible. The solution lies in vertical intensification through diversification, exemplified by the Integrated Farming System (IFS). IFS integrates various farming enterprises, allowing the by-products of one enterprise to serve as inputs for another, enabling resource recycling, efficient use of labor and space, and reduced market dependency. However, implementing on-station IFS models directly at farmers' fields is impractical due to high initial costs. Interventions targeting critical inputs within existing farming systems, as demonstrated by the AICRP-IFS-OFR (All India Coordinated Research Project on Integrated Farming Systems–On-Farm Research), offer a promising alternative.

MATERIAL AND METHODS

Integrated Farming Systems (IFS) with location-specific, module-based, low-cost interventions were undertaken as part of the on-farm research component of the AICRP-IFS-OFR. These interventions involved farmer-participatory refinement of IFS practices across five key modules to enhance food security, nutrition, environmental sustainability, and income for small and marginal farmers.

The five modules include: details given in Table 1. These interventions, implemented in a participatory manner from 2022-23, aim to double farm incomes while promoting food and nutrition security, environmental health, and eco-friendly agriculture. Two blocks were selected from each OFR centre (district), among these, one is high productive block and the other is low productive block. Block was selected based on the average district productivity, if block productivity is below the district productivity, then, it is considered low and if above the district productivity, then, it is considered high productive block. From each block, three villages were selected and in each village, six farmers were covered on a random basis. So, in total 36 farmers were covered in each centre. A total 23 districts were covered from 14 agroclimatic zones, So in total, 828 farmers were covered across the country.

Table 1: Treatments details with crop modules undertaken during 2022-23

Farming System	Notation	Module name	Details
Existing	M0	Bench mark	Recording of benchmark data on crops, livestock, other components, and household as a whole
Improved	M1	Cropping system Diversification/ improvement	Most efficient cropping systems were introduced keeping in view the farmers' resources, perception, willingness, market, and requirement of other components in the system besides improving the practices of existing systems
	M2	Livestock diversification/ improvement	Mineral mixture + deworming+ round year fodder production + introduction of location-specific low-cost livestock components viz., Backyard poultry, duckery, piggery & goat
	M3	Product diversification	Preparation of mineral mixture/value addition of market surplus products/kitchen /roof gardens
	M4	Capacity building	Training of farm households on farming systems especially on newly added practices & components and assessing its impact

RESULTS AND DISCUSSION

Existing Farming System Characterization

Across the country, a total of 25 types of farming systems were recorded based on the permutation and combination of different farming components. It was observed that two-component farming systems are followed by 50% of households, three-component systems by 34% of farmers, four-component systems by 10% and five-component systems by 5%. Interestingly, about 1% of farmers incorporate six components into their systems. In terms of mean holding size and net return, there appears to be no direct relationship with the number of components followed. Among the various farming components, crops are the foundational element and occur in nearly all farming systems. Dairy emerges as the second most critical component, featuring in 83% of farming systems. Seven major farming systems were identified, with the following prevalence: Crop + Dairy with 42% in leading position, Crop + Dairy + Horticulture (11%), Crop + Dairy + Goatry (7%), Crop + Dairy + Goatry + Poultry (5%), Crop + Goatry (4.3%), Crop + Dairy + Goatry + Poultry (4.1%) and Crop + Dairy + Vegetable (2.8%). Together, these seven major farming systems represent 76% of the farming systems existing at the field level in the country.

Table:- 2. Agro-climatic zone-wise farming system with the mean area and benchmark net income

ACR (Planning commission)	Name of centre	Number of Farming Systems	Number of farmer	Farming System Description	Mean Area (ha)	Benchmark Net income (Rs)
Western Himalayan Region	Udhampur (J&K)	3	24	Field crops + Dairy	0.49	60291
			6	Crop+ Dairy+ Goat	0.4	96974
			6	Crop+ Dairy+ Poultry	0.37	62475
	Kullu (HP)	3	18	Crop+ Dairy	0.16	81825
			14	Crop + Dairy + Horticulture	0.2	60125
			6	Crop + Dairy + Goat/ Sheep + Hort.	0.16	17600
	Almora (UK)	2	7	Crop + Vegetables+ Cattle + Goat	1.09	84905
			29	Crop + Veg.+ Cattle + Goat +Poultry	0.82	120281

ACR (Planning commission)	Name of centre	Number of Farming Systems	Number of farmer	Farming System Description	Mean Area (ha)	Benchmark Net income (Rs)
Eastern Himlayan Region	Golaghat (Assam)	4	9	Crop+dairy+goatry+ poultry	1.35	91000
			9	Crop +dairy +goatry+ piggery+ poultry	1.39	95857
			11	Crop + dairy + goatry + piggery+ poultry+ fishery	1.29	91250
			7	Crop + dairy + poultry + fishery	1.26	76667
Lower Gangetic Plain	Bankura (WB)	4	18	Crop+dairy+goatery	0.9	19022
			5	Crop+dairy+poultry	0.81	19022
			7	Crop+goatery+poultry	0.55	19022
			6	Crop+dairy+goatery+fishery	0.98	19022
Middle Gangetic Plain	Saharsa (Bihar)	4	6	Crop + Vegetables	0.79	107218
			18	Crop + Livestock	0.75	154204
			8	Crop + Livestock + vegetables	0.83	173029
			4	Crop + Fisheries	1.08	133477
	Mau (UP)	1	36	Crop + dairy	0.52	60279
Upper Gangetic Plain	Unnao (UP)	5	17	Crop + Dairy + Horticulture	0.757	104796
			8	Crop + Dairy + Horticulture + Goatery	0.469	68885
			8	Crop + Dairy	0.875	59269
			2	Crop + Horticulture	0.688	95035
			1	Crop + Dairy + Goatry	0.375	47925
	Modipuram (UP)	2	22	Crop+ Dairy	1.62	201805
			14	Crop+ Dairy+Horticulture	1.97	242800
Trans gangetic Plain	Rewari (Haryana)	1	36	Crop + Dairy (Buffalo/cow)	0.99	238148
Eastern Plateau and Hills	Saraikela-Kharsawan (Jharkhand)	2	18	Crop+ Goat	1.2	34951
			18	Crop+ Goat + Poultry	1.24	37420
	Mandla (MP)	5	15	Crop + Dairy	1.11	123071
			6	Crop + Dairy + Vegetable	0.97	170980
			4	Crop + Dairy + Poultry	0.86	124460
			5	Crop + Dairy + Goatary	1	118190
			6	Crop + Goatry+ Poultry	1.28	130518
Central Plateau and Hills	Jabalpur (MP)	4	19	Crop + Dairy	1.02	114038
			8	Crop + Dairy + Vegetable	0.94	95811
			9	Crop + Dairy + Poultry	1.04	68667
			4	Crop + Dairy + Goatery	1.05	85311
Western Plateau and Hills	Solapur	4	9	Crop+ Dairy+Goatery+poultary	0.87	134798
			13	Crop + Dairy+Goatery	0.81	118067
			6	Crop + Dairy+poultary	0.81	118550
			8	Crop + Dairy	0.8	113920
	Nanded (MH)	4	10	Crop + Dairy	0.81	78236
			14	Crop + Goat	0.89	75481
			4	Crop + Horticulture	0.82	59370
			8	Crop + Sericulture	0.98	72984
	Wardha (MH)	2	15	Crop+Horti+Dairy	1.1	188133
			21	Crop+ Dairy	0.96	117108

ACR (Planning commission)	Name of centre	Number of Farming Systems	Number of farmer	Farming System Description	Mean Area (ha)	Benchmark Net income (Rs)
Southern Plateau and Hills	Dindigul (TN)	2	19	Crop+Dairy+poultry	0.74	68934
			17	Crop+Dairy+ Goat/sheep+ poultry	0.91	60594
	Rangareddy (Telangana)	6	14	Crop + Dairy	0.93	75581
			7	Crop + Dairy + Sheep	0.94	99530
			8	Crop+ Dairy+ poultry	0.84	69223
			3	Crop+ Goatery	0.65	63925
			2	Crop + Dairy + Sheep + vegetables	1.3	84750
			2	Crop+dairy+poultry+vegetable	0.8	70088
East coast plains and hills	Khordha (Odisha)	5	18	Crop + dairy	2.9	1,26,488
			5	Crop + poultry	0.9	25,160
			5	Crop + dairy + poultry	1.2	1,52,680
			2	Crop+goatery+poultry	0.8	1,06,425
			6	Crop + dairy + poultry + goatary	2.3	1,56,540
West Coast Plains and Hills	Uttara Kannada (KA)	2	16	Crop + Dairy	0.88	281375
			20	Crop + Dairy + Horticulture	0.77	320690
	Alappuzha (Kerala)	4	9	Coconut based IFS	0.66	102334
			9	Rice based IFS	1.03	68484
			9	Dairy-based FS	0.61	223651
			9	Aquaculture-based FS	0.62	186514
Western dry region	Rajasmand (RJ)	3	14	crop + dairy	0.77	72068
			8	Crop + Dairy + Horticulture	0.87	59697
			14	Crop + Dairy + Poultry	0.79	78445
Gujarat Plains and Hills	Sabarkantha (GJ)	1	36	Crop+Dairy	0.2	73064

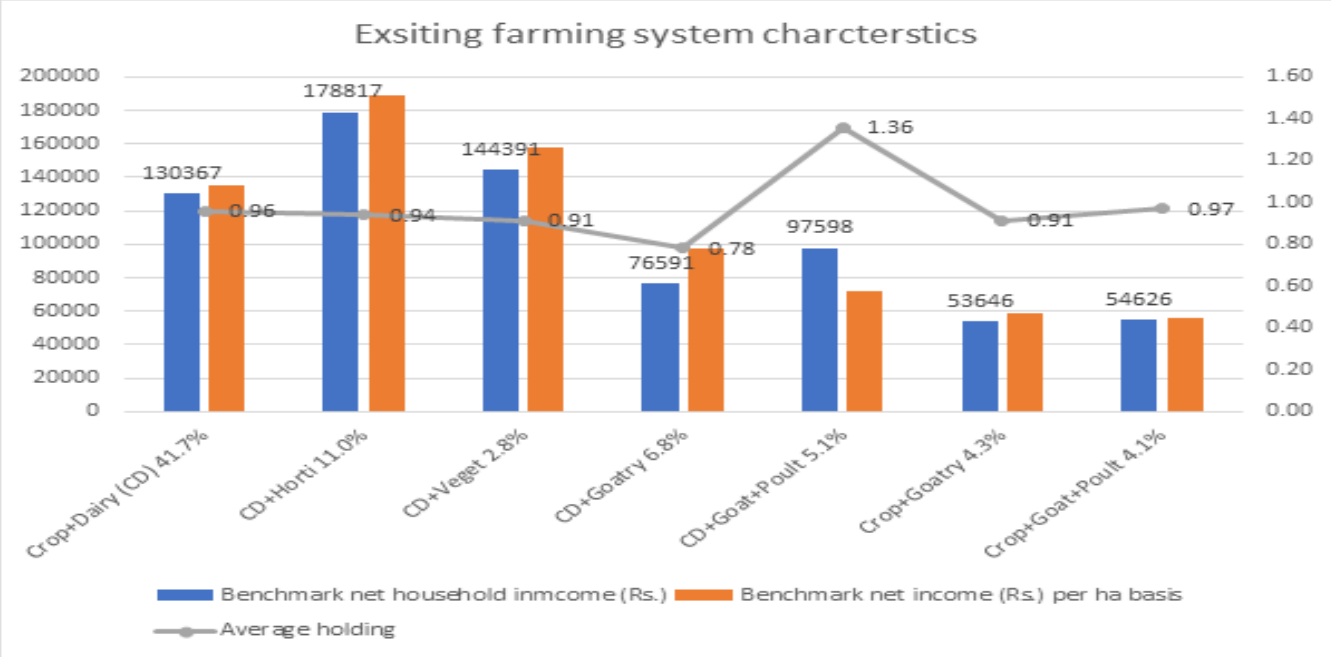


Fig 1. Existing major farming systems across the country have mean holding size and benchmark net household income along with benchmark net income per hectare basis.

The Crop + Dairy system generates a net income of ₹1.35 lakh from an average landholding of 0.96 ha. When, horticulture and vegetable components are integrated with the Crop + Dairy system, they provide additional returns. The highest net income per household and per unit of landholding was recorded in the Crop + Dairy + Horticulture system i.e. ₹1.78 lakh, followed closely by the Crop + Dairy + Vegetable system ₹1.44 lakh (Fig 1). Conversely, the inclusion of goatry and poultry components tended to reduce net returns. This could be attributed to differences in resource availability between irrigated and rainfed areas. In irrigated areas, resource-rich farmers prefer high-value components, whereas, in rainfed areas, farmers often opt for goatry due to its lower water requirements. Backyard poultry is typically avoided by resource-rich farmers due to social obligations, while goatry faces challenges such as high mortality rates due to diseases, disorganized selling practices, lack of dry fodder throughout the year, and shrinking grazing lands. These factors collectively contribute to lower returns from goatry.

Fig 2. Intervention made in the IFS at the farmer's field A $FeSO_4$, $ZnSO_4$ and Trichoderma harzianum to Citrus; B Improved variety wheat-PDKV-Sardar; C Napier saplings-Yashwant D compost enriching at Wardha, Maharashtra

Fig 3. Intervention made in the IFS at the farmer's field A mineral mixtrure to cattle; B backyard poultry; C vegetable on fish pond buns D fruit harvesting at Kayalkulam (Kerala)

7.3.3 Model Value Chain Development in IFS

Title: Model Value Chain Development in Integrated Farming Systems

Year of start: 2021-22

Integrated Farming System (IFS) is a holistic approach to agriculture that synergistically combines crops, livestock, aquaculture, agroforestry, and other complementary enterprises to enhance productivity, sustainability, and income security for farmers. While the adoption of IFS contributes significantly to resource optimization and ecological balance, the true potential of this system can be realized only when it is supported by a robust and well-structured value chain. **Model Value Chain Development in IFS** focuses on establishing efficient linkages from input supply to production, processing, storage, marketing, and consumption. It ensures that each component of the farming system contributes to and benefits from the economic cycle, creating added value at every stage. A well-developed value chain not only increases profitability for farmers but also reduces post-harvest losses, improves product quality, enhances market access, and encourages agro-entrepreneurship.

This model approach emphasizes capacity building, collective action through farmer-producer organizations (FPOs), the use of technology, and strong institutional support. By aligning production with market demand and integrating service delivery, value chain development within IFS creates a resilient, diversified, and market-responsive farming ecosystem-especially critical for small and marginal farmers in India and other developing regions. Keeping the above thing in mind MVCD in IFS implemented by IIFSR, Modipuram, Meerut trough AICRP-IFS-OFR in 7 districts.

Steps in Model Value Chain Development in Integrated Farming Systems

The Model Value Chain Development in IFS follows a participatory and systematic approach, where a group of farmers sharing a common farming system is mobilized to work collectively. The process is designed to optimize both the main enterprise (e.g., crop production) and the supplementary components (e.g., dairy, poultry, etc.) based on the group's potential and available resources. The steps involved are as follows:

- Farmer Group Formation Farmers practicing a similar Integrated Farming System are organized into a group. Each group focuses on a specific primary product (e.g., finger millet) and an associated

supplementary enterprise (e.g., dairy). This grouping enables coordinated planning, resource sharing, and collective decision-making.

- Assessment of Marketable Potential The production capacity of both the main and supplementary components is assessed based on land, livestock, resources, and market demand. The quantity of produce that can be marketed profitably is estimated to guide planning.
- Input Supply and Capacity Building Improved varieties of crops (e.g., high-yielding finger millet) and essential inputs like seeds, fertilizers, and bio-agents are supplied to the group. Farmers are trained on improved cultivation practices, sustainable resource use, and integrated system management.
- Scientific Guidance and Monitoring At every stage-from land preparation and sowing to harvesting-scientific support is provided by experts to ensure optimal production and quality. This results in high-quality raw material suitable for value addition.
- Post-Harvest Management and Value Addition Harvested products undergo proper post-harvest operations, including cleaning, grading, storage, and primary processing. Value addition is carried out at the group level, enabling the creation of market-ready products such as finger millet flour, health mixes, etc.
- Branding and Marketing The group markets their value-added products under a common brand name, either independently or through linkages with Farmer Producer Organizations (FPOs). This enhances visibility, consumer trust, and market reach.
- Integration of By-products Crop residues like finger millet straw are utilized efficiently-fed to livestock within the group-thus strengthening the dairy component. This cyclical use of resources ensures better input-output efficiency and sustainability.
- Holistic Support and Handholding Throughout the process, scientists and extension personnel provide continuous technical support, ensuring best practices are followed and challenges are addressed promptly.

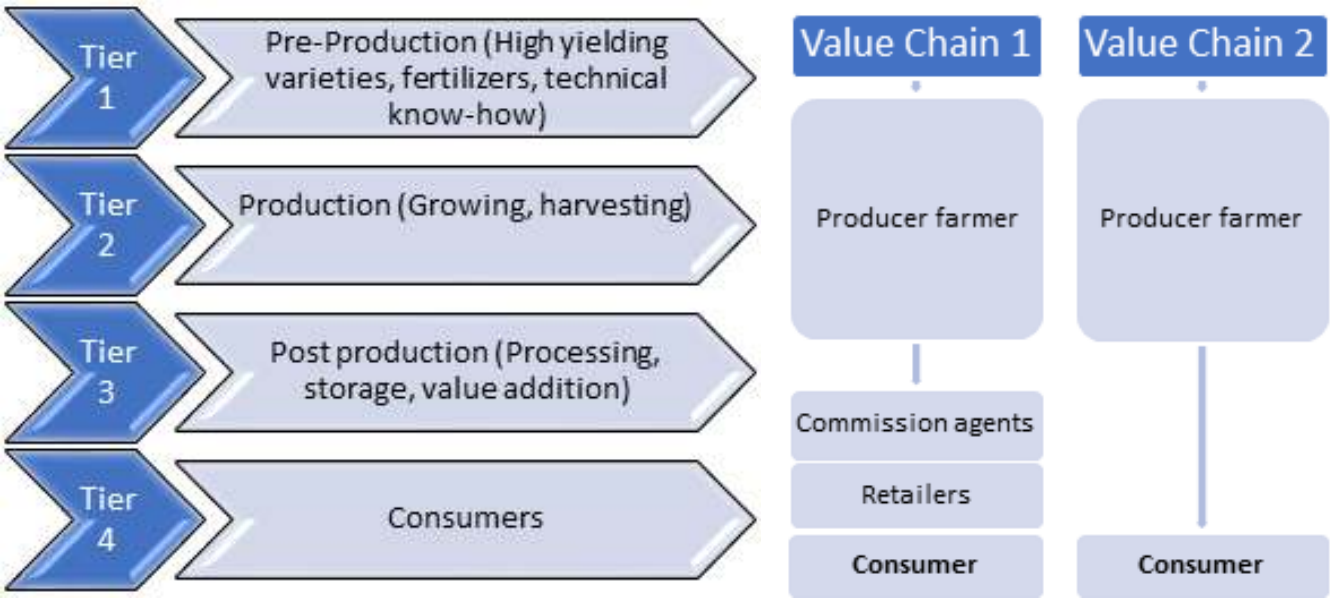


Fig: 1. Steps in MVCD in IFS

This model creates a win-win situation, where the integration of primary and supplementary enterprises enhances income, resource use efficiency, and market value. It encourages group-based entrepreneurship, ensures better price realization, and promotes the development of resilient farming communities. The targeted group, working in unison with scientific guidance, becomes a successful example of Model Value Chain Development in IFS.

Results: Implementation of Model Value Chain Development in IFS

The Model Value Chain Development in Integrated Farming Systems (MVCD-IFS) was successfully implemented across seven districts in seven states of India. The initiative aimed to build resilient and market-oriented farming communities by strengthening primary and supplementary farm components through value chain interventions. The program emphasized collective farming, value addition, branding, and market linkages, leading to increased income and livelihood security among small and marginal farmers. Table 1 summarizes the coverage and outcomes achieved under MVCD-IFS across the selected locations:

Table 1. Coverage under Model Value Chain Development in IFS

Name of State	Name of District	Number of households covered	Total area (ha)	Total livestock population (Numbers)	Number of SHGs formed
Punjab	Patiala	300	1,485	1232	2 FIG
Andhra Pradesh	Vizianagaram	391	154	1528	20+58 JLG+2 FPO (Deeksha and Argyo millet)
Gujarat	Dahod	300	234	2803	2 SHG
Maharashtra	Thane	300	205	1852	5 SHG
Karnataka	Chikkaballapur	331	1500	8400 (5400 Poultry)	5 SHG
Salem	Tamil Nadu	300	150	745	2 SHG+2 JLG+1 FPO (Thrivuvalluvar)
Kendhujhar	Odisha	300	174	2580	-
Total		**2222**	**3902**	**19140**	**34 SHG+60 JLG+2 FIG+ 3 FPO**


Fig 2: Tomato-based value addition and post-harvesting and linking




Fig 3: Finger millet-based value addition and post-harvesting and linking

Outcomes:

A total of 2,222 households were mobilized under the MVCD-IFS initiative. The program covered approximately 3,902 hectares of agricultural land. More than 19,000 livestock, including poultry, were integrated into the value chain system. Multiple community institutions were formed and strengthened: 34 Self-Help Groups (SHGs), 60 Joint Liability Groups (JLGs), 2 Farmer Interest Groups (FIGs) and 3 Farmer Producer Organizations (FPOs) Specific branding efforts were initiated through FPOs such as Deeksha, Argyo Millet, and Thiruvalluvar to market value-added products like millet-based foods and dairy items. This broad-based implementation demonstrates the scalability and effectiveness of MVCD in IFS across agro-climatic zones, with tangible impacts on livelihood improvement, market access, and farming system resilience.

7.3.4 FLD on Oilseeds

Frontline Demonstration on Cropping Systems Involving Oilseeds

India holds a prominent position in global oilseed production, ranking fourth worldwide. Oilseeds account for 20% of the global cultivated area and contribute 10% to global oilseed production. In India, these crops are cultivated over 25.3 million hectares, second only to food grains in terms of area. Over the past three decades, oilseed cultivation in India has witnessed significant growth in both area and production. However, in comparison to staple cereals like rice and wheat, the expansion and yield improvement of oilseeds have been relatively modest, with considerable variation across states. Farmers have continually sought technological innovations and agronomic practices that improve profitability, often responding positively to favorable economic incentives. Major oilseed crops in India include groundnut, rapeseed, mustard, sunflower, safflower, soybean, sesame, and castor. While overall productivity and production have remained largely stagnant, select crops have shown moderate gains following the launch of the Technology Mission on Oilseeds. To promote crop diversification and enhance farm income, the Indian Institute of Farming Systems Research (IIFSR), through its 32 On-Farm Research (OFR) centres across the country, has implemented Frontline Demonstrations (FLDs) by integrating oilseed crops into existing farming systems. This report presents the results of FLDs conducted by the OFR units of AICRP-IFS during 2023–24 on farmers' fields.

Objectives

- To demonstrate the production potential and monetary advantages of well identified cropping and inter cropping systems under real farm situation involving oilseed as one of the component crops in various agro ecosystems.

Technical Programme

The FLDs were conducted at three On-Farm Research (OFR) units of the All India Coordinated Research Project on Integrated Farming Systems (AICRP on IFS) across two agro-ecosystems—Semi-Arid and Sub-Humid—covering three states. The crops and cropping systems under which the FLDs were conducted are presented in Table 1. In the Semi-Arid ecosystem, 20 FLDs were conducted on soybean, while in the Sub-Humid ecosystem, 40 FLDs were conducted on groundnut. Soybean was planted during the kharif season as part of a soybean–wheat cropping system, whereas groundnut was planted in the rabi/summer season under a rice–groundnut system. Only two treatments were considered for comparison: Farmers' Practice (FP) and Improved Practice (IP). These treatments were applied to well-established, time-tested oilseed-based cropping systems relevant to each location.

Table 1: List of centres of Front Line Demonstrations (FLD) on oilseed-based cropping systems (2023-24)

Agro Ecosystem	Name of Centre (State)	Crop/cropping system (s)	Number of demonstrations
1. Semi-Arid	Kota	Soybean	20
2. Sub-humid	Yethapur	Groundnut	20
3. Sub-humid	Chikkaballapura	Groundnut	20
Total			**60**

crop varieties along with management practices used by farmers and recommended improvements within various cropping systems (Table 2). At all three locations—Kota, Jabalpur, and Vizianagaram—farmers adopted the latest improved varieties, optimal seed rates, and balanced nutrient management practices. Generally, farmers tend to rely on local or older varieties, use higher-than-recommended seed rates, and apply imbalanced fertilizers, which often results in suboptimal yields. For oilseed crops, in particular, applying sulfur fertilizers is essential for oil synthesis in plants. Improved practices recommend using Single Super Phosphate (SSP) instead of Diammonium Phosphate (DAP) to meet the sulfur requirements more effectively.

Table 2 Details of management practices adopted in farmers and improved practice

Agro Ecosystem	Name of Centre (State)	Intervention	Farmer practices	Improved practices
1. Semi-Arid	Kota (Rajasthan)	Varieties	Soybean variety (JS-95-60)	Soybean JS-20-34 (2014)
		Seed rate	100	80
		Seed treatment	-	Fungiside, Rhizobium and PSB
2. Sub-humid	Yethapur Tamil Nadu	Varieties Seed traetment	Local -	TMV-14 (2019) Seed treatment with fungiside
3. Sub-humid	Chikkaballapura (Karnataka)	Varieties	Local	Groundnut KCG-6 (2016)

Financial source

FLDs on oilseed based cropping systems were 100% financed by the Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India through Directorate of Oilseeds Research, Hyderabad. During 2023-24 , an amount of Rs 4,20,000/- has been released to the different centres as indicated in Table 3.

Table 3: Centre wise budget allocation for FLD (2023-24)

a) FLD on oilseed				
Agro Ecosystem	**Name of Centre (State)**	**Name of crop**	**Number of demonstrations conducted**	**Amount released (Rs)**
1. Semi-Arid	Kota (Rajasthan)	Soybean	20	60,000
2. Sub-humid	Yethapur Tamil Nadu	Soybean	20	96,000
3. Sub-humid	Chikkaballapura (Karnataka)	Groundnut	20	96,000
Total			**60**	**108000**
b) Training of farmers				
"Crop diversification and remunerative cropping system involving oilseeds (Soybean/Groundnut/other)".				
1	IIFSR, Modipuram, Uttar Pradesh	1		24,000
2	Dahod (Gujarat)	1		24,000
3	Golapara (Assam)	1		24,000
4	Yethapur (Tamil Nadu)	1		24,000
b) Total	96,000			
1	Kota (Rajasthan)	1		36,000
2	Chikkaballapura (Karnataka)	1		36,000
c) Total				**72,000**
Grand total				**4,20,000**

Salient findings

- Out of 60 demonstrations on oilseed based cropping systems, 20 were on cropping systems involving soybeans. Groundnut evaluated at 2 centre with total 40 FLD.

Yield

The mean yield of soybean under the improved package was recorded at 1,694 kg/ha in Kota, Rajasthan (Table 4). The yield increase in soybean due to the improved package was higher (15%), attributed to the use of the improved variety (JS 20-34) and enhanced agronomic practices. In groundnut, a 15% increase in yield was observed at Chikkaballapura, Karnataka, with the adoption of an improved variety. The average yield of *rabi* groundnut was 2,170 kg/ha, which increased to 2,525 kg/ha with the improved package. At the Yethpur centre, the *rabi* groundnut yield was recorded at 1,940 kg/ha, increasing to 2,560 kg/ha with the improved package. *Rabi* groundnut cultivation in South India has shown very encouraging results. Farmers have expressed satisfaction with it as an alternative crop after rice harvesting. *Rabi* groundnut thus presents itself as a potential crop for rice-fallow areas.

Gross and Net returns

Gross returns were higher in improved packages for both soybean and groundnut due to an increase in yield. Higher gross return was realized in groundnut (Rs 170548 ha^{-1}). In the case of per cent improvement 14 % increase was recorded in soybean, followed by 23-61% in groundnut. Across the locations, the improvement in net returns with the improved package in 17 % increase was recorded in soybean, followed by 34% in groundnut (Table 5&6).

Table 4: Influence of farmers and improved practices on grain or pod yield (kg/ha) of various crops under FLD (2023-24)

Agro Ecosystem	Name of Centre (State)	Crop/cropping system (s)	Number of demonstrations	Yield farmer practices	Yield improved practices	per cent increase
1. Semi-Arid	Kota (Rajasthan)	Soybean	20	14.98	16.94	13.0
2. Sub-humid	Yethapur Tamil Nadu	Soybean	20	19.40	25.60	31.95
3. Sub-humid	Chikkaballapura (Karnataka)	Groundnut	20	20.70	25.25	23.30

Table 5: Influence of farmers and improved practices on gross returns (Rs/ha) of various crops under FLD (2023-24)

Agro Ecosystem	Name of Centre (State)	Crop/cropping system (s)	Number of demonstrations	gross returns farmer practices	gross returns improved practices	per cent increase
1. Semi-Arid	Kota (Rajasthan)	Soybean	20	-	-	13.8
2. Sub-humid	Yethapur Tamil Nadu	Soybean	20	106000	170548	60.90
3. Sub-humid	Chikkaballapura (Karnataka)	Groundnut	20	60339	74524	23.50

Table 6: Influence of farmers and improved practices on net returns (Rs/ha) of various crops under FLD (2023-24)

Agro Ecosystem	Name of Centre (State)	Crop/cropping System (s)	Number of demonstrations	net returns farmer practices	net returns improved practices	per cent increase
1. Semi-Arid	Kota (Rajasthan)	Soybean	20	-	-	17.2
2. Sub-humid	Yethapur Tamil Nadu	Soybean	20	-	-	-
3. Sub-humid	Chikkaballapura (Karnataka)	Groundnut	20	41373	55615	34.4

Awareness through training

Total 5 training for farmers conducted during 2023-24 in which total 340 farmers (262 male and 78 female) participated

Table 7: Detail training of farmers

Name of Centre	Date	Participants		
		Male	Female	Total
IIFSR, Modipuram, Uttar Pradesh	16-10-2023	120	30	150
Dahod (Gujarat)	18-01-2024	40	-	40
Golapara (Assam)	29-02-2024	23	27	50
Yethapur (Tamil Nadu)	29.02.2024	37	13	50
Yethapur (Tamil Nadu)	07.03.2024	42	8	50
Total		**262**	**78**	**340**

A total of 2 training sessions for farmers were conducted during 2023-24, in which a total of 60 Officers/workers/input dealers (50 male and 10 female) were trained

Table 8: Detail Training of Extension Officers/workers/input dealers

Name of Centre	Date	Participants		
		Male	Female	Total
Kota (Rajasthan)	27-28 Feb 2024	16	4	20
Chikkaballapura	22-23 Dec 2023	34	6	40
Total		**50**	**10**	**60**


दैनिक भास्कर कोटा 29-02-2024
• कृषि अनुसंधान केंद्र उम्मेदगंज पर समेकित कृषि प्रणाली अनुसंधान परियोजना के तहत प्रशिक्षण
हाड़ौती में तिलहनी फसलों को बढ़ावा देना है: डॉ. जेपी

Fig 1. Glimpse of FLD on oilseed in 2023-24

Constraints encountered in implementation of the programme

- Demonstration cost of Rs 3000-4800/ demonstration is too low to meet all the expenditures on improved package like seeds of improved varieties, fertilizers, other inputs and organizing field days. This needs to be enhanced to at least Rs 7500/ demonstration for meeting all the expenditures of inputs, training, labelling of demonstration plots etc.

8.1 Review/ Research Papers in NAAS rated Journals (Published during 2023-24)

S.No.	State	Name of centre	Research paper/Review paper					
			Authors	Year	Title of paper	Journal name	Volume, pages	NAAS rating (as per 2023 score)
1.	Chhattisgarh	Raipur	Harshika Tiwari, DK Chandrakar, Sunil Kumar, Nitish Tiwari, Aditya Swarnkar, Ankita Dewangan and Keval Kumar Sahu	2023	Economics of lentil production under delayed planting condition in vertisol of Chhattisgarh plains.	The Pharma Innovation Journal	12(8): 2697-2699	5.23
			Harshika Tiwari, DK Chandrakar, Sunil Kumar, Nitish Tiwari, Aditya Swarnkar, Ankita Dewangan and Keval Kumar Sahu	2023	Study the interaction between dates of planting and genotypes on growth, yield attributes and yield of lentil	The Pharma Innovation Journal	12(9): 694-699	5.23
			Ankita, Dr. Sunil Kumar, Dr. MC Bhambri, Dr. SS Porte, Dr. RR Saxena, Dr. SK Jha, Aditya Swarnkar and Harshika Tiwari	2023	Evaluation of chickpea (Cicer arietinum L.) cultivars under organic production system.	The Pharma Innovation Journal	12(9): 603-607	5.23
2.	Gujarat	S K Nagar	Desai, L.J. Patel, R.R., Patel, K.M. Patel, P.K. Patel, K.N. Patel and V.K. Patel	2023	Characterizing the Farming System Components of Small and Marginal Land Holder Farming Systems of Patan District, Gujarat	Indian Agriculturist,	Vol. 64, No. 3 & 4, pp: 75-81	3.76
			Desai L. J., Patel K. M., Patel P. K. Patel V. K. and Patel R. R.	2023	Evaluation of Response of Different Varieties of Major Crops for Organic Farming under North Gujarat Condition	International Journal of Plant & Soil Science	Volume 35, No. 20, pp:1-7	5.07
			Desai L.J., Patel K.M., Patel P.K., Vidhi K., Gami J.K.	2024	Impact possibility of organic, inorganic and integrated production systems on crop productivity and soil fertility	International Journal of plant and soil science	Vol. 36, No. 3pp: 35-44	5.07

S.No.	State	Name of centre	Research paper/Review paper					
			Authors	Year	Title of paper	Journal name	Volume, pages	NAAS rating (as per 2023 score)
			Dharaviya R.G, Desai L.J. and Patel K.N.	2023	Effect of integrated nutrient management on yield and quality of summer pearlmillet variety.	International journal of plant and soil Science	Vol. 35, No. 20 pp:1 221-1229	5.07
			Kalal, P.H., Desai, L.J. and Virdia, H.M.	2024	Effect of integrated weed management on oil quality and oil yield of linseed (Linum usitatissimum L.) under south Gujarat condition	International Journal of Research in Agronomy	Vol. 7, No. 3 pp: 163-165	5.2
		Junagadh	Gharsiram; Solanki, R.M.; Suchitra; Kumawat Laxman and Jaryal Rishi Dev.	2023	Assessment of crop-water requirement of Alfalfa using FAO-CROPWAT model-8.0	International Journal of Environment and climate change	13(10): 3896-3905	
		Navsari	Sumanth Kumar G.V., L.K. Arvadiya, Vishwanatha V. E. Dhwani Bartwal, Katara Akshay R., Patel Prerak M., Kashinath Gurusiddappa Teli, Tamminaina Sunil Kumar and Chethan K. S.	2023	Effect of Nutrient Management Practices on Growth, Yield and Economics of Vegetable Indian Bean and its Residual Effects on Fodder Pearl Millet under Vegetable Indian Bean Fodder Pearl Millet Cropping System IJBSM June 2023,	International Journal of Bio-resource and Stress Management	14(6):862 871	>5.0
			Y Yernaidu, Dr. RB Ardeshna, Dr. Sonal Tripathi, Dr. VP Usdadiya, Dr. LK Arvadiya and Dr. YA Garde		Weed parameters and weed indices as influenced by different weed management practices in Bt cotton	International Journal of Research in Agronomy	7(4): 441 448	>5.0
			Rotte Sai Mithra, L. K. Arvadiya, M. Devika Patel and K. Hari Priya		Integrated farming system an eco-friendly and sustainable approach for promising farmers income under climate change scenario- A review	Plant Archives	vol 24, Sp. Issue (GABELS) pp. 129 135, ISSN:0972 5210	>5.0
3.	Karnataka	Kathalagere	CHETHAN, G.S, HUGAR, A. Y., SARVAJNA, B. SALIMATH, GIRIJESH, G. K. AND DUSHYANTHA KUMAR, B. M	2023	Influence of bio stimulants on growth and productivity of Foxtail Millet (Setaria italica) Genotypes.	Environment conservation Journal	ISSN 0972 -3099	5.66

S.No.	State	Name of centre	Research paper/Review paper					
			Authors	Year	Title of paper	Journal name	Volume, pages	NAAS rating (as per 2023 score)
			KRISHNA AILI, SARVAJNA, B. SALIMATH, RAVIKUMAR, D., HUGAR, A.Y. AND SHARANAPPA JANGANDI	2023.	Characterization of salt affected soils of Vanivilassagar command area, hiriyurtaluk, Chitra Durga dist.	The Pharma Innovation Journal.	12 (1): 2938-2943	5.66
		Siruguppa	Sunitha N H, Manjunatha Bhanuvally and C M Kalibavi	2023	Popularization of white finger millet through frontline demonstrations in Vijayanagar district of Karnataka, India: A case study.	The Pharma Innovation Journal, 12	(3):2072-2074	>4
4.	Kerala	Karamana	Sowmya, K., Bindhu, J.S. and Pillai, P.S.	2023	Agro-ecological sustainability with pulses under system of crop intensification: A Review	Agricultural Reviews	44(3): 385 - 388. doi: 10.18805/ag.R-2521	4.84
			Sushmitha T., Sajeena A., Deepu Mathew, Radhakrishnan, N. V., John, J. and Anuradha T.	2023	First report of bacterial wilt of yardlong bean (Vigna unguiculata subsp. sesquipedalis (L.) Verc.) caused by Kosakonia oryzae in India	Journal of Plant Pathology	105:1727-1728	8.20
			Raj, A. B., John, J., Pillai, S. P., Meera, A. V., Manju, R. V., and Sudha, B.	2023	Alternative cropping systems to mitigate carbon dioxide emission in rice fields under different nutrient levels	Intl. J. Environ. Climate Change	13(9): 540-546 2023	5.16
			Sruthy, H., Shalini Pillai,P., Shimi, G. J., Bindhu, J.S. and Sajeena, A.	2023	Growth and yield of grain cowpea (Vigna unguiculata sub sp. cylindrica) in response to foliar nutrition and graded levels of phosphorus and potassium.	Int.J. Envt. Climate Change	13(11): 4001-4014.	5.16
			Bincy, B., Gladis, R., Rani , B., Aparna, B., Sandeep,S. and Bindhu,J.S.	2023	Impact of diverse agricultural land uses on soil organic matter fractions: A comprehensive evaluation	Int. J. Plant and Soil Sci.	35(23): 23-31.	5.07
			Bincy, B., Gladis,R., Rani , B., Aparna, B., Sandeep,S. and Bindhu, J. S.	2023	Influence of land uses on soil carbon mineralization in selected agro-ecological units of South Kerala, India. Int.J. Envt. Climate.	Int.J. Envt. Climate Change	Change13 (11): 4166-4174	5.16

S.No.	State	Name of centre	Research paper/Review paper					
			Authors	Year	Title of paper	Journal name	Volume, pages	NAAS rating (as per 2023 score)
			Ashish, K.G., Bindhu, J.S., Pillai, S.P., Ameena, M. and Aparna, B	2023	Productivity and Profitability of Tomato under Organic Nutrition in Wicking Bed System.	Agricultural Science Digest	10.18805/ag.D-5839	5.52
			Mani, K. M., Ameena, M., Joy, M. J., Pillai, S. P., John, J., and Beena, R.	2023	Root endophyte Piriformospora indica significantly affects mechanisms involved in mitigating drought stress in rice (Oryza sativa).	Indian Journal of Agronomy.	68 (3): 324-327 (2023)	5.55
			Greeshma, U., Bindhu, J.S. Shalini Pillai, P. Jacob, D. and Sarada, S.	2023	Influence of wicking bed system characteristics on tomato (Solanum lycopersicum L.) growth and yield	Journal of Applied Horticulture,	25(2): 184-187	5.43
			Mani, K. M.,Ameena, M., Joy, M. J., Anith, K. N., Pillai, S. P., John, J., and Beena, R.	2023	Endophytic fungus Piriformospora indica mitigates moisture stress in rice by modifying root growth.	Rhizosphere	28: 100799	9.44
			Diya , R., Meera , A. V., Rani, B., Leno , N., and John , J.	2023	Physico-chemical characterization of biochar from different biomass materials.	International Journal of Environment and Climate Change,	13(11), 278–2787.https://doi.org/10.9734/ijecc/2023/v13i113446	5.16
			Anjali S., Sudha B., Shalini Pillai P., John, J. and Aparna, B.	2023	Aquatic weeds and rice chaff: Potential inputs for generation of organic manures in rice based integrated farming system	Ind. J. Ecology	50 (5): 1608-1613 DOI: https://doi.org/10.55362/IJE/2023/4103	5.79
			Boddu Archana, Bindhu, J.S. Shalini Pillai, P. , John, J., and Meera, A.V.	2024	Zinc nutrition in rice based cropping systems: A comprehensive review	Journal of Experimental Agriculture International	46(5): 574-583	5.14
			Francis, R., Bindhu, J.S. Shalini Pillai, P.	2024	Rhizotron: A unique technique for root study: A Review	Agricultural Reviews	http://dx.doi.org/10.18805/ag.R-2671	4.84
			Elizabeth Mathew., Sudha, B., Pillai, S. P., John, J., and Chitra, N.	2024	Growth and yield response of different cowpea (Vigna unguiculata (L.) Walp.) varieties under varying phosphorus management	Journal of Tropical Agriculture	62(1): 126-133, 2024	4.85

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			Authors	Year	Title of paper	Journal name	Volume, pages	NAAS rating (as per 2023 score)
			Raghavendra , K. J., John, J., Jacob, D., Rajendran, T., Prusty, A. K., Ansari, M. A., Ravi sankar, N., Kumar, S., Singh, R., Shamim, M., Punia, P., Nirmal, Meena, A. L., Kashyap, P., Shivaswamy, G. P., and Dutta, D .	2024	Unraveling determinants of integrated farming systems adoption for sustainable livelihood and dietary diversity.	Frontiers in Nutrition	11:1264658. doi: 10.3389/ fnut.2024. 1264658	11
		OFR Centre, Kayamkulam	Greeshma, U., Bindhu, J.S., Shalini Pillai, P., Jacob, D., and Sarada, S	2023	Influence of wicking bed system characteristics on tomato (Solanum lycopersicum L.) growth and yield	Journal of Applied Horticulture	25(2): 184-187	5.13
			Sneha, S.R., Sheeja K. Raj., Jacob, D., Shalini Pillai, P., and Radhakrishnan, N.V	2023	Weed management in finger millet (Eleusine coracana L.) intercropped in coconut garden.	Indian Journal of Weed Science	55(3): 349–354	5.84
			Sneha, S.R., Sheeja K. Raj., Jacob, D., and Shalini Pillai, P	2023	Impact of weed management on yield, uptake and availability of nutrients in direct sown rag	Journal of Crop and Weed	19(2): 208-215	5.46
			Arunima Babu, C.S., Sheeja K. Raj, Jacob, D., and Shalini Pillai P.	2023	Allelopathic effect of sesame varieties on germination and seedling growth of cowpea and okra	Indian Journal of Ecology	50(5):1413-1417	5.79
			Krishna, N., Innazent, A., Bindhu, J.S., Meera, A.V., and Jacob, D.	2023.	Improved yield and grain zinc enrichment of rice (Oryza sativa L.) varieties through ferti-fortification in Southern Coastal Plains of Kerala	Journal of Crop and Weed	19(3):42-48	5.46
			Arunima, A.S., Manju, R.V., Viji, M.M., Roy, S., Sarada, S., and Jacob, D.	2023	Effect of elevated CO2 induced high temperature on yield and quality parameters in crops, with preference to tomato: A review	Annual Research & Review in Biology	38(11):34-38	4.90

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			Authors	Year	Title of paper	Journal name	Volume, pages	NAAS rating (as per 2023 score)
			Raghavendra, K.J., John, J., Jacob, D., Rajendran, T., Prusty, A.K., Ansari, M.A., Ravisankar, N., Kumar, S., Singh, R., Shamin, M., Punia, P., Nirmal, Meena, A.L., Kashyap, P., Shivaswamy, G.P., and Dutta, D.	2024	Unravelling determinants of integrated farming systems adoption for sustainable livelihood and dietary diversity.	Frontiers in Nutrition	pp. 1-12. https://doi.org/10.3389/fnut.2024.1264658	11.00
			Sowmya, K., Bindhu, J.S., Pillai, P.S., Jacob, D. and Gladis, R.	2023	Productivity and Profitability of Green-gram [Vigna radiata (L.) Wilczek] Under System of Crop Intensification.	Agri. Sci. Digest.	doi: 10.18805/ag.D-5703.	5.13
			Raj, A. B., John, J., Pillai, S. P., Meera, A. V., Manju, R. V., and Sudha, B.	2023.	Alternative cropping systems to mitigate carbon dioxide emission in rice fields under different nutrient levels.	Intl. J. Environ. Climate Change.	13(9): 540-546.	8.64
			Sushmitha, T. Sajeena, A., Mathew, D., Joy, M., Radhakrishnan, N. V., John, J., and Anuradha, T.	2023	First report of bacterial wilt of yardlong bean (Vigna unguiculata subsp. sesquipedalis (L.) Verdc.) caused by Kosakonia oryzae in India.	J. Plant Path.	https://doi.org./10.1007/s42161-023-01476-0	4.69
			Jacob, J. S., Salini, S., and Shanas, S..	2023	Coptosoma variegatum (Herrich-Schäeffer, 1838) (Hemiptera, Plataspidae) infesting mango in Kerala and Karnataka with redescription of the species.	Entomon.	48(1): 89-94. https://doi.org/10.33307/entomon.v48i1.848	4.69
5.	Madhya Pradesh	Indore	Aswani R.C., Gathiye G. S., Kumawat N., Singh L., Jain D. K., Tyagi S. K. and Yadav R.K	2023	Response of genotypes, crop geometry and fertilizer application on growth, yield and yield attributes in ajwain (Trachyspermum ammi L.)	International Journal of Agricultural Sciences,	19: 76-81.	
			Kumar R., Mishra J.S., Pandey N.K., Biswas A.K., Kumawat N., Singh A.K., Prakash V., Kumar S., Kumar S. and Das A.	2023	Effect of crop establishment methods and nutrients management productivity of lentil (Lens culinaris) under rice-fallow system of eastern of India.	Indian Journal of Agronomy	S132-138	

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			Authors	Year	Title of paper	Journal name	Volume, pages	NAAS rating (as per 2023 score)
			Singh D., Kumawat N. and Singh M	2023	Enhancement of growth and productivity of cucumber (Cumumis sativus L.) through calcium based fertilizers	Journal of Krish Vigyan,	11 (2): 106:109.	
		Jabalpur	Maurya, B.M. Singh K.M. and Kurmvanshi S.M	2024	. Studies on sustainable resource management for climate smart IFS model	International Journal of Environment and climate change	14 (2) : 571 -576	
			Maurya, B.M. Singh D; Sanjay R.C. and Singh S	2024	Studies on climate smart IFS model for marginal farmers	International Journal of Research in Agronomy	7(2) : 81-84	
		Rewa	Maurya, B.M. Singh K.M. and Kurmvanshi S.M	2024	Studies on sustainable resource management for climate smart IFS model	International Journal of Environment and climate hange	14 (2) : 571-576	
			Maurya, B.M. Singh D; Sanjay R.C. and Singh S	2024	Studies on climate smart IFS model for marginal farmers	International Journal of Research in Agronomy	7(2) : 81-84	
6.	Odisha	Bhubaneswar	T R Mohanty, R K Paikray, A K Patra, S K Swain, K C Sahoo, P K Samant	2023	On-farm evaluation of balanced fertilization in rice-groundnut cropping system for productivity, nutrient use efficiency and profitability.	Legume Research- An International Journal	46(1): 75-79	6.67
7.	Punjab	Ludhiana	CHETHAN, G.S, HUGAR, A. Y. SARVAJNA, B. SALIMATH, GIRIJESH, G. K. AND DUSHYANTHA KUMAR, B. M	2023	Influence of bio stimulants on, growth and productivity of Foxtail Millet (Setaria italica) Genotypes.	Environment conservation Journal	ISSN 0972 -3099	5.66
			KRISHNA AILI, SARVAJNA, B. SALIMATH, RAVIKUMAR, D., HUGAR, A.Y. AND SHARANAPPA JANGANDI	2023.	Characterization of salt affected soils of Vanivilassagar command area, hiriyurtaluk, Chitra Durga dist.	The Pharma Innovation Journal.	12 (1): 2938-2943	5.66

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			Yadav RK, Purakayastha TJ, Bhaduri D, Das R, Dey S, Sukumaran S, Walia SS, Singh R, Shukla VK, Yadava MS and Ravisankar N	2024	Development of unique soil organic carbon stability index under influence of integrated nutrient management in four major soil orders of India.	Journal of Environmental Management	360, 121208	14.70
			Bhagat R, Walia SS, Sharma K, Singh R, Singh G and Hossain A	2024	The integrated farming system is an environmentally friendly and cost-effective approach to the sustainability of agri-food systems in the modern era of the changing climate: A comprehensive review.	Food and Energy Security	13, 534	11
			Bhagat R, Walia SS, Dheri GS, Singh G, and Sharma K	2024	Pear (Pyrus communis)-based agroecosystem improves soil nutrient dynamics, microbial biomass, enzymatic activity,	farm productivity and profitability Scientia Horticulturae	336, 113398.	10.30
			Walia, S S, Dhaliwal, S S, Gill R S, Kaur T, Kaur K, Randhawa M K et al	2024	Improvement of soil health and nutrient transformations under balanced fertilization with integrated nutrient management in a rice-wheat in Indo-Gangetic Plains–A 34-year Research outcomes	Heliyon	10 e25113	10
	Dhaliwal S S, Dubey S K,		Kumar D, Toor A S, Walia S S, Randhawa M K, Kaur G, Brar S K, Khambalkar P A	2024	Enhanced organic carbontriggers transformations of macronutrients, micronutrients and secondary plant nutrients and their dynamics in the soil under different cropping systems	Journal of Soil and Plant Nutrition	https://doi.org/10.1007/s42729-024-01907-6.	9.90
			Walia S S, Kaur T, Gupta R K, Siddiqui MH and Rahman M A	2023	Long-term impact of the continuous use of organic manures on crop and soil productivity under maize–potato–onion cropping systems.	Sustainability 15 (10), 8254;	https://doi.org/10.3390/su15108254,	9.89

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			Authors	Year	Title of paper	Journal name	Volume, pages	NAAS rating (as per 2023 score)
			Rani Sushma, Chhatwal Neeraj and Walia S S	2023	manure application on yield, zinc, and copper uptake in maize, peas, and mungbean (Vigna radiata L.) Cropping System.	Journal of Soil, Plant and Environment	2(2): 63-79 (Impact factor 2.4)	
			Singh S, Walia S S and Bhullar K	2023	Impact of cowpea- maize intercropping and bio-rational product on fall armyworm, Spodoptera frugiperda (JE Smith) in fodder maize.	Legume Research	10.18805/ LR-5199:1-7	6.67
			Brar M S, Kumar R and Walia S S	2024	Determination of Agronomic attributes and Essential Oil yield of Peppermint (Mentha piperita L.) varieties under altered planting time and harvesting schedules	AMA, Agricultural Mechanization in Asia, Africa and Latin America	55(02): 17249-17262	6.30
			Brar M S, Kumar R, Walia SS and Kaur N	2024	Field studies of crop geometry and nitrogen application on growth and yield of peppermint (Mentha Piperita L.)	AMA, Agricultural Mechanization in Asia, Africa and Latin America	55(02): 17225-17238	6.30
8.	Rajasthan	Durgapur, Jaipur	Sangeetha, S.P and Anandavalli, M	2023	Effect of Enriched Vermicompost and Organic Foliar Spray on Growth and Yield of Prosomillet (Panicum miliaceum L.)	Biological Forum–An International Journal	15(7): 172-176	5.11
		Kota	CHETHAN, G.S, HUGAR, A. Y., SARVAJNA, B. SALIMATH, GIRIJESH, G. K. AND DUSHYANTHA KUMAR, B. M	2023	Influence of bio stimulants on growth and productivity of Foxtail Millet (Setaria italica) Genotypes.	Environment conservation Journal	ISSN 0972-3099	5.66
			KRISHNA AILI, SARVAJNA, B. SALIMATH, RAVIKUMAR, D., HUGAR, A.Y. AND SHARANAPPA JANGANDI	2023.	Characterization of salt affected soils of Vanivilassagar command area, hiriyurtaluk, Chitra Durga dist.	The Pharma Innovation Journal.	12 (1): 29 38-2943	5.66

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			Authors	Year	Title of paper	Journal name	Volume, pages	NAAS rating (as per 2023 score)
		Rajsamand	Singh , H., Sharma , S. K., & Meena , M. K. Asian	2023	Preliminary Study of Organic Farming Practices in Southern Rajasthan, India.	Journal of Agricultural Extension, Economics & Sociology,	41(12), 364–371	
9.	Telangana	Rajendranagar	Chaithra GM, Basavanneppa MA, Satyanarayana Rao, Koppalkar BG, Pralhad and Ashok Kumar Gaddi	2024	Effect of different nutrient management practices on growth and yield of chickpea under foxtail millet-chickpea cropping system in integrated farming system under Tungabhadra project area of Karnataka, India	International Journal of Research in Agronomy.	7(3): 399-403	5.20
			Chaithra GM, Basavanneppa MA, Satyanarayana Rao, Koppalkar BG, Pralhad and Ashok Kumar Gaddi	2024	Impact of nutrient management practices on yield and economics of foxtail millet under foxtail millet-chickpea cropping system in integrated farming system under Tungabhadra project area of Karnataka, India	International Journal of Research in Agronomy.	7(3): 599-603	5.20
			Shriram, Prabhuling Tevari, Vaishnavi, GB Lokesh, Jagrati. B Deshmanya and Vijaya Kumar K	2023	An economic analysis of rabi sorghum and chick pea seed production in Nek region	The Pharma Innovation Journal	12(4): 2145-2150	5.23
			Shwetanjali, Prabhuling Tevari , Suresh K, Devendra Beeraladinni and Shivanand Kammar	2023	Economic analysis of horticulture nursery enterprises in Koppal district of Karnataka		J. Farm Sci., 194	36(2): 189-4.58
			Asha Biradar, Prabhuling Tevari, G B Lokesh, Devendra Beeraladinni and Shivanand Kammar	2024	An Economic Analysis of Credit Availment for Grape Cultivation and Value Addition from Different Sources in Vijayapura District of Karnataka, India	Archives of Current Research International,	24(6):5-12	5.13

S.No.	State	Name of centre	Research paper/Review paper					
			Authors	Year	Title of paper	Journal name	Volume, pages	NAAS rating (as per 2023 score)
			Chaitanya G, Prabhuling Tevari and Hanumanthappa D	2024	Path analysis: An overview and its application in social sciences	International Journal of Agriculture Extension and Social Development,	7(4):299-303	5.04
			Asha Biradar, Prabhuling Tevari, G B Lokesh, Devendra Beeraladinni and Shivanand Kammar	2024	An economic analysis of credit utilization pattern and credit gap for grape cultivation and value addition (raisin making) in Vijayapura district of Karnataka, India	Journal of Experiment al Agriculture International	46 (8): 252-262	5.14
10.	Tamil Nadu	Coimbatore	Pavithra, G., Velayutham, A., Shanmugam, P. M., Boominathan, P. and Bharathi,C.	2023	Effect of Non-Chemical Weed Management Practices on Weed Dynamics and Yield in Blackgram Plant & (Vigna mungo)	International Journal of Soil Science	35(18): 1666 -1673	5.07
			Parthasharathi, S., Velavan, C., Rohini,A., Shanmugam, P. M. and Prahadeeswaran, M.	2023	Measurement of efficiency and profitability of the coir processing firms in the western zone of Tamil Nadu	The Pharma Innovation Journal	SP-12(8): 1729 1733	
			Selvamani, S., Senthil, A., Ravichandran, V., Djanaguiraman, M., Anitha, K., Shanmugam, P. M. and Manikanda Boopathi, N.	2023	Mitigation of Salinity Stress by Application of Plant Growth Promoting Substances in Rice	International Journal of Environment and Climate Change	13(10): 2175-2185	5.13
			Iswarya, S., Shanmugam, P.M., Somasundaram, E., Chitdeshwari, T. and Suganthy, M.	2023	In silico and in vitro Assessment of Indigenous Organic Practices on Germination and Seedling Metrics of Compact Cotton using GerminaR R Software Package	Indian Journal of Agricultural Research Online first	(10.18805/IJARe.A -6102)	5.20
			Rajarathinam, P., Shanmugam, P.M., Annadurai, K., Sivakumar, S. D., Hariharasudhan, V., Vjayaprabhakar, A., Sujitha, E. and Radhakrishanan, V.	2023	Effect of different lateral spacing and fertigation level on yield and economics of cotton and maize	The Pharma Innovation Journal	12(10): 987-990	

S.No.	State	Name of centre	Research paper/Review paper					
			Authors	Year	Title of paper	Journal name	Volume, pages	NAAS rating (as per 2023 score)
			Sangeetha, S.P and Anandavalli, M	2023	Effect of Enriched Vermicompost and Organic Foliar Spray on Growth and Yield of Prosomillet (Panicum miliaceum L.)	Biological Forum–An International Journal	15(7): 172-176	5.11
	Sub centre	Thanjavur	T. Parthipan and K.Subramaniyan	2023	Integrated approach weed management in groundnut	Agricultural Mechanization in Asia.	Volume 54, Issue for 05, (13179 13183)	
			A. Vinitha, D. Vijayalakshmi, M. Raveendran, V. Ravichandran and T. Parthiban	2023	Designing and validation of a rapid and reliable protocol for screening anaerobic germination tolerance in rice	Electronic Journal of Plant Breeding.	Vol. 14 (3).	
			S.Thiruvarassan, E. Jamuna, T.Parthiban and J. Jayakumar	2023	Evolve Technology for Controlling Binding Weeds in Grown-up Sugarcane Crop	Agriculture Association of Textile Chemical and Critical Reviews Journal	Volume 11, Issue 4, P. No. 93-97.	
			C.VijayaraghavanT. Parthipan and Zadda Kavitha	2024	Effect of Bio Rational Insecticides on Major Defoliators of Groundnut	Frontiers in Crop Improvement,	Vol. 12 (1) (15-17)	
			A. Vinitha, D. Vijayalakshmi and T. Parthipan	2024	Physiology and performance of anaerobic germination tolerant rice varieties under direct seeded cultivation	Plant Physiology reports.	https://doi.org/10.1007/s40502-024-00780-w	
			P.M.Shanmugam, S. P. Sangeetha, P. C. Prabu , S.V.Varshini, A. Renukadevi, N. Ravisankar,	2024	Crop – Livestock-Integrated Farming System: a strategy to achieve synergy between Agricultural Production, Nutritional security and environmental sustainability	Frontiers in Sustainable Food Systems.	Vol. 8 (1-14)	
			Subrahmaniyan Kasirajan, T. Parthipan, S Elamathy, G. Senthil Kumar, M. Rajavel,	2024	Dynamics of soil penetration resistance moisture depletion			

S.No.	State	Name of centre	Research paper/Review paper				
			Authors	Year	Title of paper	Journal name	Volume, pages	NAAS rating (as per 2023 score)
			P. Veeramani		pattern and crop productivity determined by mechanized cultivation and lifesaving irrigation in zero till black gram	Heliyon	Vol. 7 & Issue 10	
			Harisudan C, P Veeramani, K Kalaiselvi, T Parthipan, G Gayathry, R Baskaran and K Subrahmaniyan	2024	Integrating veterinary and poultry component with rice-based farming system for effective utilization of resources, environmental restoration and profitability	International Journal of Veterinary Sciences and Animal Husbandry	SP-9(2): 324-326	
			A.Vinitha, D. Vijayalakshmi, V. Ravichandran, and T. Parthipan	2024	Seed Nutrient and Seed Hormonal Contents Underlying Anaerobic Germination Tolerance in Black Coloured Rice Landraces of Tamil Nadu	Russian Journal of Plant Physiology.	Vol. 71:14. 10.1007/ s40502-024-00780-w	
			A.Vinitha, D. Vijayalakshmi, M.Raveendran, V. Ravichandran, and T. Parthipan	2024	Identifying Donors for Anaerobic Germination Tolerance and Director Seeded Rice Cultivation by Exploring Seed and Seedling Traits	Agricultural Science Digest.	Vol. 44 Issue 2. 333-339	
			T. Parthipan	2023	Salt Stress Injury and Resistance Mechanism in Crop Plants	AgriGate - An International Multi disciplinary Monthly e Magazine.	Vol.4(4): 63-68 (ISBN : 978-81-965582-9-1)	
			T. Parthipan	2023	Cropping Systems Management	AgriGate - An International Multi disciplinary Monthly e Magazine.	Vol.3 (10): 63-68 (ISBN : 978-81-965582-9-1)	

S.No.	State	Name of centre	Research paper/Review paper					
			Authors	Year	Title of paper	Journal name	Volume, pages	NAAS rating (as per 2023 score)
			Parthipan, T	2023	Integrated Farming System – A Novel Approach for Livelihood Security	AgriGate- An International Multi disciplinary e-Magazine.	Vol. 3 (11): 74-78.	
			T. Parthipan and K.Subrahmaniyan	2023	Benefits of Summer ploughing	Malarum Velanmai. Bulletin	Vol. 21(5): P.No.52	
11.	West Bengal	Kalyani	Ray, M., Mukhopadhyay S. K., Chatterjee, S., Saha, S., Biswas, A. and Ghosh, T.	2024	Farming systems interventions for improving farm production of marginal tribal farmers in coastal	West Bengal Journal of Crop and Weed	20(1):85-91	5.27
			Mohanty, S., Saha, S., Saha, B., Asif, Md. Sk., Poddar, R., Ray, M., Mukhopadhyay, S.K. and Hazra, G	2024	Substitution of fertilizer- N with biogas slurry in diversified rice-based cropping system: Effect on productivity, carbon footprints, nutrients and energy balance	Field Crops Research	307 (2024) 109242 https://doi.org/10.1016/j.fcr.2023.109242	11.80
12.	Uttar Pradesh	Kanpur	Reenu Kumar, M. Z. Siddiqui, Vikas Teotia, Anurag Dhanker, Ram Naresh, Naushad Khan, Suryabhan	2023	"Performance of Integrated Nutrient Management and Foliar spray of Micronutrient on Growth, Yield Attribute and Yield of Wheat (Triticum aestivum L.)"	International Journal of Environment and climate change	13(11): 241-248	5.13
			Reenu Kumar, M. Z. Siddiqui, Ram Naresh, Sanjeev Kumar, Vikas Teotia, jitendra Kumar, Anushi	2023	Effect of Integrated Nutrient Management and Agronomic Bio fortification on growth and Yield of Wheat (Triticum aestivum L.)"	International Journal of Plant and Soil Science	35(20): 1038-1046	5.07
			Rohit Yadav, R A Yadav, M Z Siddiqui, Sanjeev Kumar, Mohit yadav, Sanjay Babu, Yogesh Kumar and Ravindra Sachan	2024	Effect of Tillage Practices and Fertilizer Level on Nutrient Uptake and Content in grain and Straw of Wheat under Rice-Wheat Cropping system and Yield of Wheat (Triticum aestivum L.)"	Journal of Experimental Agriculture International	46(06): 723-732	5.14

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			Rohit Yadav, R A Yadav, M Z Siddiqui, Sanjeev Kumar, Mohit yadav, Mahendra Yadav and Ravindra Sachan	2024	Effect of Tillage Practices and Fertility Level on Growth, Yield Attributes and Yield of Wheat in Rice-Wheat Cropping System	International Journal of Plant and Soil Science	36(07): 209-222	5.07
			Sunil Kumar Prajapati, V.K. Verma, Naushad Khan, Shivendra Singh, Gurwaan Singh, Shivam Yadav	2024	Impact of organic and inorganic plant growth promoters on growth indices and yield of wheat (Triticum aestivum L.).	Environment and Ecology	42(1): 84-93	5.15
			Shailendra Pratap Singh, C. L. Maurya, Naushad Khan, Bal Veer Singh, Kaushal Kumar and Sarvesh Kumar	2024	Productivity and economic feasibility of Pigeonpea base companion cropping under additive series planting system	Journal of Advances in Biology & Biotechnology	Volume 27, Issue 5, Page 277-280	5.30
			Sunil Kumar Prajapati, V. K. Verma, Naushad Khan, Shivendra Singh, Gurwaan Singh, Shivam Yadav	2024	Impact of Organic and Inorganic Plant Growth Promoters on Growth Indices and Yield of Wheat (Triticum aestivum L.) Varieties	Environment and Ecology	42 (1) : 84-93	5.15
			Shivendra Singh, Ram Ashish Yadav , Sunil Kumar Prajapati, Pradeep Kumar, Praveen Kumar Yadav, Naushad Khan and Prashun Sachan	2024	Impact of Different Doses of Herbicides on Weed Density and Weed Control Efficiency in Maize	International Journal of Plant & Soil Science	Volume 36, Issue 5, Page 425-431	5.15
			Shailendra Pratap Singh, Naushad Khan, C. L. Maurya, Bal Veer Singh, Kaushal Kumar and Sarvesh Kumar	2024	Effect of Companion Cropping of Sesame on Development of Pigeon pea.	International Journal of Environment and Climate Change	Volume 14, Issue 4, Page 57-61	5.13
			Shivendra Singh, Ram Ashish Yadav , Sunil Kumar Prajapati, Pradeep Kumar , Parthik Gangwar, Prashun Sachan and Naushad Khan	2024	Effect of Different Doses of Herbicides on Growth and Yield in Maize (Zea mays L.)	Journal of Experimental Agriculture International	Volume 46, Issue 5, Page 494-499	5.14
			Shailendra Pratap Singh , C. L. Maurya and Naushad Khan	2024	Feasibility of Parallel Cropping of Black Gram with Pigeon pea in Central Trait of Uttar Pradesh	Journal of Experimental Agriculture International	Volume 46, Issue 5, Page 360-365	5.14

S.No.	State	Name of centre	Research paper/Review paper					
			Authors	Year	Title of paper	Journal name	Volume, pages	NAAS rating (as per 2023 score)
		Varanasi	Kumari, P., Sharma, P. K., Kumari, R., Sharma, B., & Singh, U. P.	2023	Kinetics of rice straw decomposition under different tillage and crop establishment practices in Indo-gangetic plain	Journal of the Indian Society of Soil Science	71	5.39
			Bhangare Rupali, V., Prakash, P., &Singh, U. P	2023	Growth and physiological parameters of rice (Oryza sativa L.) as influenced by conservation agriculture-based crop establishment methods and nutrient management in RW cropping system	The Pharma Innovation Journal	12	5.23
			Reddy, M. B., Nanda, A., Manichandana, V., Kumar, A., Reddy, G. P., Singh, N. K., & Singh, U. P	2023	Weed Management Studies in Wheat (Triticumaestivum L.) Through New Herbicide Molecule Aclonifen 600 SC under Climate Changing Era	International Journal of and Climate Change	Environment	
			Bhangare, R.V., Singh, U.P., Jangde, S. and Prakash, P	2024	Physiological and Biochemical Basis of Variation in Yield of Rice (Oryzasativa L.) under under CA-based Crop Establishment Methods and Nutrient Management in R-W Cropping System	Indian Journal of Agricultural Research		
			Upadhyay, A., Singh, U. P., Singh, N. K., Mahajan, N. C., Verma, K., Jha, S., & Singh, R. P.	2024	Effect of Crop Establishment Methods and Precision Nutrient Management on Growth, Yield Attributes and Yield of Rice under Rice-wheat System	International Journal of Plant & Soil Science	36(7), 501-507	
			Bhardwaj L, Kumar D, Singh U. P., Joshi C. G., Dubey S. K.,	2024	Herbicide application impacted soil microbial community composition and biochemical properties in a flooded rice field	Science of the Total Environment	914; 169911.	

Paper presented in seminar/symposia

1.	Kerala	Karmana	Bindhu, J.S., John, J., Meera, A. V. and Sudha, B.	2023	Diversification of farming system models through integrated approaches in West Coast Plains and Ghat region	XXII Biennial National Symposium on "Climate Smart Agronomy for Resilient Production Systems and Livelihood Security"	Indian Society of Agronomy ICAR-Central Coastal Agricultural Research Institute, Goa, 22-24 Nov. 2023
			Swathi, G. and Meera, A. V.	2023	Assessment of soil quality in the post flood soils of southern and central foothills of Kerala	National Seminar on Soil and Water Symbiosis for Sustainable Agriculture	CoA, Vellayani, Kerala Agricultural University 06 Dec. 2023
			Diya, R., Meera, A. V., Rani, B., Leno, N., and John, J.	2023	Effect of biochar on seed germination and seedling vigour	National Seminar on Soil and Water Symbiosis for Sustainable Agriculture	CoA, Vellayani, Kerala Agricultural University 06 Dec. 2023
			Chethankumar, P., Meera, A. V., John, J., Bindhu, J. S., and Sajeena, A.	2023	Soil enzyme activities and microbial count under diverse rice-based cropping systems in West Coast Plains and Ghat region	National Seminar on Soil and Water Symbiosis for Sustainable Agriculture	CoA, Vellayani, Kerala Agricultural University 06 Dec. 2023
			Meera, A. V., Thampatti, M. K. C., Leno, N., Diya, R., and Ambili, S.	2023	Phytoremediation using aquatic weeds for water quality improvement	National Seminar on Soil and Water Symbiosis for Sustainable Agriculture	CoA, Vellayani, Kerala Agricultural University 06 Dec. 2023
			Ambili, S., Meera, A. V., Rani, B., Leno, N., and Bindhu, J. S.	2023	Phytoremediation using aquatic weeds for water quality improvement	National Seminar on Soil and Water Symbiosis for Sustainable Agriculture	CoA, Vellayani, Kerala Agricultural University 06 Dec. 2023
			Archana, B., Bindhu, J.S and Shalini Pillai, P.	2024	Climate resilient approaches to enhance water use efficiency in rice farming (p. 28) In::.	Corteva International Plant Science - Advanced Technologies and Innovatice Practices for Climate Smart Agriculture: Bridging Academi, Industry and Society	CoA, Vellayani, Kerala Agricultural University 18-19 Jan. 2024
			John, J., Bindhu. J.S., Meera, A. V., Sudha, B. Sajeena, A. and Shanas, S.	2024	Small scale irrigation systems in homesteads (p.40).	International Seminar on Sustainable Urban Agricultural Systems and Community Resilient Cities	TSS, CoA, Vellayani Kerala Agricultural University 22-23 Mar., 2024
			Ashish, K.G., Bindhu, J.S., Pillai, P.S., Ameena, M. and Aparna, B	2024	Nurturing organic tomato for enhanced yield and revenue in wicking bed system.	International Seminar on Sustainable Urban Agricultural Systems and Community Resilient Cities	TSS, CoA, Vellayani Kerala Agricultural University 22-23 Mar., 2024

	Archana, B., Bindhu, J.S and Shalini Pillai, P.	2024	Agronomic biofortification of cereals with zinc through nano particles: A resilient strategy to address nutritional insecurities of the nation (p.155)	International Seminar on Sustainable Urban Agricultural Systems and Community Resilient Cities	TSS, CoA, Vellayani Kerala Agricultural University 22-23 Mar., 2024
	Greeshma, U., Bindhu, J.S and Shalini Pillai, P.	2024	Wicking bed: Sustainable Agricultural Practice for urban gardens.	International Seminar on Sustainable Urban Agricultural Systems and Community Resilient Cities	TSS, CoA, Vellayani Kerala Agricultural University 22-23 Mar., 2024
	Sreelakshmi, S., Sarada,S., Bindhu. J.S. , Gopinath, P.P. and Nisha, S.K.	2024	Performance of tomato (Solanum lycopersicum L.) varieties for flowering and fruit characters nand yield under different species and fertilizer level in AEU 8.	International Seminar on Sustainable Urban Agricultural Systems and Community Resilient Cities	TSS, CoA, Vellayani Kerala Agricultural University 22-23 Mar., 2024
	Innazent, A., Anitha, S., Navyashikha, B., Krishna, N., and Jacob, D.	2023	Chilli+Amaranth intercropping system as influenced by plant geometry and fertigation. In Mini, C., Nair, D.S., Asha, C., and Durga, A.R. (Eds.)	International Biotechnology Conclave. Agricultural Sciences p. 28	CoA, Vellayani Kerala Agricultural University Aug 7-11, 2023
	Krishna, N., Innazent, A., Navyashikha, B., and Jacob, D.	2023	Zinc fertifortification of rice (Oryza sativa L.) cultivars In Mini, C., Nair, D.S., Asha, C., and Durga, A.R. (Eds.)	International Biotechnology Conclave. Agricultural Sciences. p. 31	CoA, Vellayani Kerala Agricultural University Aug 7-11, 2023
	Navyashikha, B., Innazent, A., Krishna, N., and Jacob, D.	2023	Effect of different weed management practices on yield and economics of summer sesame (Sesamum indicum L.). In Mini, C., Nair, D.S., Asha, C., and Durga, A.R. (Eds.)	International Biotechnology Conclave. Agricultural Sciences. p. 34	CoA, Vellayani Kerala Agricultural University Aug 7-11, 2023
	Raghavendra, K.J., Jacob, D., Rajendran, T., Ravisankar, N., Prusty, A.K., Ansari, M.A., Punia, P., Nirmal, Kumar, S., John, J., Shamin, M., Singh, R., and Meena, A.L.	2023	Impact of integrated farming systems on farmers income and dietary diversity in India: A case study	XVI Agricultural Science Congress. Policies and Institutions for Transforming Agri-food Systems. Diet Diversification and Food System Transformation, p. 680	National Academy of Agricultural Sciences (NAAS) at ICAR- CMFRI Oct.10–13, 2023

	Sheeja, K.R., Jayalekshmy, V.G., Arun, C., Shahiba, A.M., Namitha, V.V., Jacob, D., Radhakrishnan, N.V., Kavitha, G.V., and Nisha, S.K	2024	Morpho-molecular characterization of a novel mutant in red banana (Musa acuminata cv. Red banana).	Advanced technolo gies and innovative practices for climate smart agriculture: Bridging academia, industry, and society. High-throughput crop improvement. p. 3	CoA, Vellayani Kerala Agricultural University 18-19 Jan 2024
	Arunima, B.C.S., Sheeja, K.R., Shalini, P.P., Jacob, D., Pratheesh P.G., and Radhakrishnan, N.V.	2024	Optimization of nutrients and evaluation of sesame varieties for agroecological unit 8, Kerala.	Advanced technologies and innovative practices for climate smart agriculture: Bridging academia, industry, and society. High-throughput crop improvement. p. 6	CoA, Vellayani Kerala Agricultural University 18-19 Jan 2024
	Vandana, D.V.S., Sheeja, K.R., Shalini, P.P., Jacob, D., and Aparna, B.	2024	Response of finger millet (A climate resilient crop) to live mulch and stale seed bed.	Advanced technologies and innovative practices for climate smart agriculture: Bridging academia, industry, and society. Innovative crop health management solutions. p. 5	CoA, Vellayani Kerala Agricultural University 18-19 Jan 2024
	Dhanu, U., Sheeja, K.R., Jacob, D., Shalini, P.P., and Ameena, M.	2024	Crop protective herbicide applicator: An innovative tool for safe herbicide application in crops.	Advanced technologies and innovative practices for climate smart agriculture: Bridging academia, industry, and society. Innovative crop health management solutions. p. 7	CoA, Vellayani Kerala Agricultural University 18-19 Jan 2024
	Arunima Babu, C.S., Sheeja, K.R., Shalini, P.P., Jacob, D., Gopinath P.P., and Radhakrishnan, N.V.	2024	Central Composite Design (CCD): A statistical tool for optimizing nutrients for sesame in Southern Laterites (AEU 8), Kerala.	74th ISAS National Annual Conference Harnessing statistics and artificial intelligence for sustainable and smart agriculture. pp. 102-103	Dept. of Agrl Statistics, N.M. College ofAgriculture Navsari Agricultural University, Navsari, Gujarat 2-4 Feb 2024

	Innazent, A., and Jacob, D.	2024	Role of women in integrated farming system prevailing in Southern Coastal Plains of Thiruvananthapuram.	In:International seminar on sustainable agricultural systems and community resilient cities. Technology and innovation in urban agriculture. p. 1	TSS, CoA, Vellayani Kerala Agricultural University 22-23 Mar., 2024
	Krishna, N., and Jacob D.	2024	Enhancing zinc bioavailability in different rice grain fractions (Oryza sativa L.) through zinc fertifortification	International seminar on sustainable agricultural systems and community resilient cities. Technology and innovation in urban agriculture. p. 3	TSS, CoA, Vellayani Kerala Agricultural University 22-23 Mar., 2024
	Arunima, B.C.S., Sheeja, K.R., Shalini, P.P., Jacob, D., Pratheesh P.G., and Radhakrishnan, N.V.	2024	Standardization of nutrients for sesame intercropped in coconut gardens of AEU 8, Kerala	In International seminar on sustainable agricultural systems and community resilient cities. Technology and innovation in urban agriculture. p. 44	TSS, CoA, Vellayani Kerala Agricultural University 22-23 Mar., 2024
	Ameya Satheesh, Sheeja, K.R., Shalini, P.P., Anith, K.N., and Jacob, D.	2024.	Standardization and evaluation of enriched retted coir pith compost on Amaranthus tricolor.	In International seminar on sustainable agricultural systems and community resilient cities. Urban biodiversity and ecosystem services. p. 3	TSS, CoA, Vellayani Kerala Agricultural University 22-23 Mar., 2024
	Namitha V.V., Raj, S.K., Shalini, P.P., and Jacob, D.	2024	Fostering urban growth: Nurturing community gardens with coconut-based cropping system	In International seminar on sustainable agricultural systems and community resilient cities. Urban biodiversity and ecosystem services. p. 4	TSS, CoA, Vellayani Kerala Agricultural University 22-23 Mar., 2024
	Navya M. V., Jacob D., Sheeja K. R., Shalini P. P., and Rachana V. R..	2024	Cooling urban landscapes: harnessing hydrogel technology for mitigating the heat island effect in urban agriculture.	In International seminar on sustainable agricultural systems and community resilient cities. Urban biodiversity and ecosystem services. p. 11	TSS, CoA, Vellayani Kerala Agricultural University 22-23 Mar., 2024

	Rachana, V. R., Jacob D., Navyashika, B., Navya, M. V., and Prakash, A.J.	2024	Growing resilience: urban agriculture's role in ensuring food security	International seminar on sustainable agricultural systems and community resilient cities. Socioeconomic impacts of urban agriculture. p. 14	TSS, CoA, Vellayani Kerala Agricultural University 22-23 Mar., 2024
	Innazent, A., Anitha S., and acob D.	2024	Intercropping system under fertigation and different plant geometry	In Baviskar, P.P., Bharadwaj, M. Badwal, D.P.S., Gaware, U.P., Raj, G.B. (Eds.) 06th International Conference on Holistic innovation and technological advances for sustainable agriculture pp. 8-19	SR University, Hyderabad 06-08 MARCH, 2024ISBN: 978-93-340-3294-9
	Navyashika, B., Jacob D, Rachana V.R., and Raj, S.K.	2024	Weed management in sesame: Integrated approach for better growth and yield	In Baviskar, P.P., Bharadwaj, M. Badwal, D.P.S., Gaware, U.P., Raj, G.B. (Eds.) 06th International Conference on Holistic innovation and technological advances for sustainable agriculture pp.40-42	SR University, Hyderabad 06-08 MARCH, 2024ISBN: 978-93-340-3294-9
	Krishna, N., and Jacob D.	2024	Zinc fertiforti fication of rice (Oryza sativa L.) cultivars	In Baviskar, P.P., Bharadwaj, M. Badwal, D.P.S., Gaware, U.P., Raj, G.B. (Eds.) 06th International Conference on Holistic innovation and technological advances for sustainable agriculture pp.257-258	SR University, Hyderabad 06-08 MARCH, 2024ISBN: 978-93-340-3294-9
	K. Dakshina Murthy, M. Srinivas, Ch. Sreenivas and M. Bharatha Lakshmi	2023	Use of crop models for risk assessment and climate change adaptation across scales	Souvenir of 13th National Symposium of Indian Society of Coastal Agricultural Research (ISCAR) - Fostering Resilient Coastal Agro-Ecosystems	Pp:37-40
	Ch. Srinivas, A. Sireesha, T. Usha Rani, D. Srinivas, M. Srinivas, K.M. Dakshina Murthy, T. Srinivas, G. Jogi Naidu and M. Bharatha Lakshmi	2023	Innovative Sustainable Nutrient Management Strategies in Rice Production for Andhra Pradesh	Souvenir of 13th National Symposium of Indian Society of Coastal Agricultural Research (ISCAR) - Fostering Resilient Coastal Agro-Ecosystems	pp:41-46

	Manukonda Srinivas, L. Rajashekar Reddy, KM Dakshina Murthy, B. Anusha, M. Ramabhadra Raju and G. Jogi Naidu	2023	Productivity of rice-rice cropping system influenced by puddling practices and planting techniques	2nd Indian Rice Congress. An International Event on Transforming Rice Research: Recent Scientific Developments and Global Food Crisis held at ICAR-NRRI, Cuttack. Extended Summaries	Pp: 238-240
	Manukonda Srinivas, L. Rajashekar Reddy, N. Ravisankar, B. Anusha, MRB Raju, KM Dakshina Murthy and M Bharatha Lakshmi	2023	Non-chemical weed management practices in Rice-Sweet corn cropping system suitable for Coastal Agro-Ecosystem	13th National Symposium of Indian Society of Coastal Agricultural Research (ISCAR) - Fostering Resilient Coastal Agro-Ecosystems held at Regional Agricultural Research station, ANGRAU, Tirupati from 22-25, February, 2023	Pp:32
	L. Rajashekar Reddy, Manukonda Srinivas, B. Anusha, MRB Raju, KMD Murthy and M Bharatha Lakshmi	2023	Green House Gases Emission studies from Wet Land IFS Model under Godavari Delta Region of Andhra Pradesh	13th National Symposium of Indian Society of Coastal Agricultural Research (ISCAR) - Fostering Resilient Coastal Agro-Ecosystems held at Regional Agricultural Research Station, ANGRAU, Tirupati from 22-25, February, 2023	Pp: 123
	G. Surya Teja, B. Prasanna Lakshmi, Manukonda Srinivas, K.M. Dakshina Murthy, BNVVD Narayana Raju and Ch. Sreenivas	2023	Impact of different crop establishment methods of rice under North, east and South Indian Conditions	13th National Symposium of Indian Society of Coastal Agricultural Research (ISCAR) - Fostering Resilient Coastal Agro-Ecosystems held at Regional Agricultural Research Station, ANGRAU, Tirupati from 22-25, February, 2023	Pp: 25
	B. Prasanna Lakshmi, G. Surya Teja, Manukonda	2023	Review on usage of Nano Fertilizers for Smart Agriculture	13th National Symposium of Indian Society of Coastal	Pp: 122

	Srinivas, K.M. Dakshina Murthy, and Ch. Sreenivas			Agricultural Research (ISCAR) - Fostering Resilient Coastal Agro-Ecosystems held at Regional Agricultural Research Station, ANGRAU, Tirupati from 22-25, February, 2023	
	Ch. Sreenivas, D. Srinivas, K.M. Dakshina Murthy, M. Srinivas and M. Bharatha Lakshmi	2023	An evaluation of Nutrient ratios for sea water intrusion of Kolleru Lake and Upputeru Estuary, Andhra Pradesh, India	13th National Symposium of Indian Society of Coastal Agricultural Research (ISCAR) - Fostering Resilient Coastal Agro-Ecosystems held at Regional Agricultural Research Station, ANGRAU, Tirupati from 22-25, February, 2023	Pp: 147
	MRB Raju, V. Bhuvaneswari, J. Krishna Prasadji, K. Vijay Krishna Kumar, S. Krishnam Raju, Y. Satish, Manukonda Srinivas, T. Srinivas, G. Jogi Naidu and M. Bharatha Lakshmi	2023	Integration of Poultry Manure Application with prophylactic foliar spray of Tebuconazole for effective management of stem rot in rice	13th National Symposium of Indian Society of Coastal Agricultural Research (ISCAR) - Fostering Resilient Coastal Agro-Ecosystems held at Regional Agricultural Research Station, ANGRAU, Tirupati from 22-25, February, 2023	

Technology Bulletins/ Pamphlets/ Popular Articles/Book/Book Chapter (Published during 2023-24)

S. No.	State	Name of centre	Authors	Year	Title of paper/pamphlet/ bulletin	Publisher name	Volume, pages
1.	Assam	Jorhat	Gogoi, Bhabesh; Borah, M.; Borah, A.S.; Talukdar, L.; Kalita, J.J.; Hazarika, J, and D. Borah	2024	Research Bulletin on "Cropping systems and Integrated Farming Systems packages for Assam"	for IFS Research, (AICRP on IFS under ICAR-IIFSR, UP), AAU, Jorhat	No. AAU/DR/23/ BU/ 654/ 2023-24. Pages:1-27
			Gogoi, Bhabesh; Borah, M.; Borah, A.S.; Talukdar, L.; Kalita, J.J.; Pathak, K, and D. Borah	2024	Research Bulletin on "Raised and sunken bed system for crop diversification and soil productivity enhancement in low-land"	Advanced Centre for IFS Research, (AICRP on IFS under ICAR-IIFSR, UP), AAU, Jorhat	No. AAU/DR/23/ BU/ 653/ 2023 24. Pages:1-18
			Gogoi, Bhabesh; Borah, M.; Borah, A.S.; Talukdar, L.; Kalita, J.J. and D. Borah	2024	Leaflet on Procedures for Soil Sampling and Processing	Advanced Centre for IFS Research, (AICRP on IFS under ICAR-IIFSR, UP), AAU, Jorhat	Pages:1-2
			Bidyut C. Deka and Gogoi Bhabesh	2024	Rice-based Integrated Farming Systems: A viable technology for enhancing productivity and ecological security. Book Chapter; In.: Sustainable Technologies for Rice-based Cropping System in Assam (Eds. S. Singh and R. Borgohain)	AAU, Jorhat and IRRI under APART. Publisher: SM Press, Jorhat	Pages: 56-99. Drones in Agriculture: A
			Sarma, S., Chhetri, B., Sarma, K.C., Gogoi Bhabesh and H.S. Datta	2024	Smart Approach of Stress Detection and Crop Improvement. Book Chapter; In.: Smart Agriculture: Digital Era in Farming(Eds. M. Kachari, H.S. Datta, R. Sarmah and R.C. Boro)	Elite Publishing House, Rohini, New Delhi.	Pages: 175-193
			Gogoi Bhabesh and L. Kalita.	2024	Nutrient Management Practices for Quality Planting Materials. In: Workshop Compendium on Quality Planting Material for Promoting Agroforestry in Assam (Eds. K.G. Bhutia and V. Sharma. (Assam Agroforestry Development Board, Govt. of Assam sponsored Prog. during December 13-22, 2022).	ICFRE-RFRI, Jorhat	Pages: 43-54.

S. No.	State	Name of centre	Authors	Year	Title of paper/pamphlet/ bulletin	Publisher name	Volume, pages
2.	Gujarat	S.K. Nagar (Book Chapter)	L.J.Desai and V.K.Patel	2023	Water Productivity Enhancement in Scarcity Zones: Approaches and Applications	ISBN No.: 978-93-5786-682-8	152-155
		Junagadh	Madhavan, G.; Pazhanivelan, S.; Solanki, R.M. and Jeshima Khan Yasin	2023	Agroforestry and Silvipastoral Systems: Integrated Approoaches Advances in Agronomy	Stella International TM Publication	(Volume-2) PP:115-139
3.	Kerala	Karamana	Sajeena, A., John, J., Meera, A. V., Shanas, S., Bindhu, J. S., Krishnakumar, G., and Hiroshkumar, K. S.	2023	Products of IFSRS	IFSRS, KAU	4
			Sajeena, A., John, J., Sudha, B., Meera, A. V., Shanas, S., Krishnakumar, G., and Hiroshkumar, K. S.	2023	Agriculture progress through IFS-based on success stories of 16 farmers practicing IFS of 8 panchayats of Vamanapuram block	IFSRS, KAU	30
			Bindhu, J. S., John, J.,Jacob, D., Meera, A.V., Sajeena, A., Shanas, S.	2023	Food security and Profitability through Horticulture+ Poultry IFS Model	IFSRS, KAU	4
			John, J., Sajeena, A., Meera, A. V., Bindhu, J. S., and Shanas, S.	2023	Vertical farming structures to counter space constraint (Stalaparimithiye adhijeevikkan lamba ghadanakal)	Farm Information Bureau	Sept 2023 (p.17–19)
			Jisha, A., Meera, A. V., Midhun, M., Bindhu, J. S., Sajeena, A., and Shanas, S.	2024	Green manures for enriching soil health (Mannu pariposhanathinu pachilavalangal)	Kerala Karshakan	May 2024 (p.55-58)
			Meera, A.V., Midhun, M., Bindhu, J. S., Sajeena, A., Shruthy, O. N., and Shuaib, A. N	2024	Grafting technique for vegetable seedlings (grafting sankethika Vidhya pachakkari thaikalil)	Kerala Karshakan	2024 (p.42-44)
			Meera, A. V., John, J., Sajeena, A., Bindhu, J. S., and Shanas, S.	2024	DAESI- A Training Manual	Integrated Farming System Research Station, Karamana, Kerala Agricultural University	151 p
			Chief Editor: Dr. Jacob John	2024	Package of Practices Recommen dations: Crops. 16th edition. ,	Publisher: Kerala Agricultural University, Thrissur- 434 p. ISBN-10. 8196912161	435 p.

S. No. State	Name of centre	Authors	Year	Title of paper/pamphlet/ bulletin	Publisher name	Volume, pages
		Jacob John	2024	Agro Ecological Units of Kerala (Malayalam). In: DAESI-A Training Manual. Meera, A. V., John, J., Sajeena, A., Bindhu, J. S., and Shanas, S. (eds)	IFSRS, Karamana, KAU	pp. 7-9
		Meera, A. V.	2024	Soil formation and properties (Malayalam). In: DAESI-A Training Manual. Meera, A. V., John, J., Sajeena, A., Bindhu, J. S., and Shanas, S. (eds)	IFSRS, Karamana, KAU	pp. 20-22
		Bindhu, J. S.	2024	Scientific banana cultivation (Malayalam). In: DAESI-A Training Manual. Meera, A. V., John, J., Sajeena, A., Bindhu, J. S., and Shanas, S. (eds)	IFSRS, Karamana, KAU	pp. 54-58
		Bindhu, J. S.	2024	Scientific cultivation of oil seeds (Malayalam). In: DAESI-A Training Manual. Meera, A. V., John, J., Sajeena, A., Bindhu, J. S., and Shanas, S. (eds)	IFSRS, Karamana, KAU	pp.81-83
		Meera, A. V.	2024	Role of nutrients and deficiency disorders (Malayalam). In: DAESI-A Training Manual. Meera, A. V., John, J., Sajeena, A., Bindhu, J. S., and Shanas, S. (eds)	IFSRS, Karamana, KAU	pp. 95-99
OFR Centre, Kayamkulam		Innazent, A., and Jacob, D.	2023	Weed Management in cropping systems. In Dash, S., and Chowdhury, M. D. R. (Eds.), Weeds and their management in field and horticultural crops Vol-II.	Akinik Publications, New Delhi,	pp. 73-77. https://doi.org/10.22271/ed.books2487 (ISBN No. 978-93-5570-851-9)
		Navyashikha, B., Innazent, A., Rachana, V.R., and Jacob, D.	2023.	Allelopathy: A potential weed management strategy in green agriculture. In Dash, S., and Chowdhury, M. D. R. (Eds.), Weeds and their management in field and horticultural crops Vol-II.	Akinik Publications, New Delhi,	pp. 83-107. https://doi.org/10.22271/ed.books2487 (ISBN No. 978-93-5570-851-9)

S. No.	State	Name of centre	Authors	Year	Title of paper/pamphlet/ bulletin	Publisher name	Volume, pages
			John, J., Shanas, S., Sajeena, A., Meera, A. V., and Bindhu, J. S.	2024	IFSRS- A Centre of Academic and Skill Excellence	Kerala Agricultural University	p.20
			Meera, A. V., John, J., Bindhu, J. S., Sajeena, A., Shanas, S., and Rohith, A. K.	2024	Integrated farming for carbon neutrality (Samyojitha Krishi carbon thulanavasthakku: In Malayalam)	DoE, KAU	p.2
			John, J., Bindhu, J. S., Meera, A. V., Sajeena, A., Shanas, S., and Haznath, T.	2024	Role of millets in integrated farming (Samyojitha krishiyil cherudhanyangalude pradhanyam: In Malayalam)	DoE, KAU	p.2
			Sajeena, A., John, J., Meera, A.V., Bindhu, J. S., and Shanas, S.	2024	Pest-disease management in terrace farming (Roga-keeda niyant	ranam mattuppavu krishiyil:In Malayalam) DoE, KAU	p.2
			Shanas, S., John, J., Sajeena, A., Meera, A. V., Bindhu, J. S., and Anjukrishnan, G.	2024	Diversity in honeybee (Theneechakalile vaividhyam : In Malayalam)	DoE, KAU	p.2
4-	Madhya Pradesh	Indore	;kno] vkj-ds- ,oa dqekor] ujsUæ	2023	ljlksa esa lefUor Qly çca/ku	—"kd txr	13 ¼05½: 15&1
5.	Maha-rashtra	Karjat	Dr. N. V. Mhaskar	2023	Konkan bhagatil Nagli lagwad tantradnyan	RCF Sheti Patrika	1, 19-20
			Dr. N. V. Mhaskar	2023	Rala – Ek Vaividhyapurn bharad dhanya	RCF Sheti Patrika	1, 11-12
6.	Punjab	Ludhiana	Neeraj Rani and Walia S S	2023	How to prepare vermicompost	Progressive Farming	59(5): 7
			Walia S S and Neeraj Rani	2023	PAU Integrated Farming system model for income enhancement.	Progressive Farming	59(4): 24
			Neeraj Rani and Walia S S	2023	Gandoya khad kive tyar Karaye (Punjabi)	Kheti Sandesh Ank	293
			Walia S S and Neeraj Rani	2023	Adopt PAU Integrated Farming system model for income enhancement.	Changi Kheti	59(4): 20
			Pandove G, Aulakh C S and Walia S S	2023	Biofertilizers: An important component of organic farming.	Progressive Farming	59(3): 24
			Walia S S, Saini K S and Kaur T	2023	Spring groundnut based crop diversification options.	Punjab Advance	10 (9) : 44-47

S. No.	State	Name of centre	Authors	Year	Title of paper/pamphlet/ bulletin	Publisher name	Volume, pages
			Singh S and Walia S S	2023	Pest management on basmati and non-basmati rice under organic farming system.	Punjab Advance	7 (9) : 24-25
			Singh S and Walia S S	2023	Pest management for basmati and non-basmati rice under organic farming system.	Kheti Sandesh	No, 308 dated 26/07/2023. pp 5
			Sohan Singh Walia and Vajinder Pal Kalra	2023	Amdan Vdaun Lai Sanyukat Kheti Pranali	Changi Kheti	pp28 April 2023
			Vajinder Pal Kalra, Sohan Singh Walia and Kuldeep Singh	2023	Shayak dhandean vich mohri kisan- Dara Singh.	issue 287 dated 1.03.2023	Review Article
			Dhaliwal S S, Shukla Arvind Kumar, Behera S K, Dubey S K, Sharma S, Randhawa M K, Kaur G, Walia S S, Toor A S and Khambalkar P A	2024	Fertilization and soil ploughing practices under changing physical environment lead to soil organic carbon dynamics under conservation agriculture in rice-wheat cropping system: a scoping review	Agricultural Sciences	15(01): 82-113. (Impact Factor 1.01)
			Dhaliwal S S, Shukla Arvind Kumar, Behera S K, Dubey S K, Mandal A, Randhawa M K, Kaur G, Walia S S and Toor A S	2024	Impact of fertilization and tillage practices on transformations of carbon, essential plant nutrients and microbial biota composition in soils: a review.	Technology in Agronomy	4:https://doi.org/10.48130/tia-0023-0020. (Impact factor:1.0)
			Walia S S and Kaur T	2023	Basics of Integrated Farming Systems		ISBN-13:978 9819984244 ISBN-10: 9819965551. Springer
			Walia S S, Kaur K and Kaur T	2023	Rainfed Agriculture and Watershed Management		ISBN-13:978-9819965557 Springer
			Walia S S, Riar T S, Kalra V P and Kaur T	2024	IFS for livelihood security		ISBN: 978-93-92405-55-6, published by Punjab Agricultural University, Ludhiana. pp 1-64.
			Walia S S, Dhakad A K, Dhillon GPS, Kumar V, Gill RIS and Kaur K	2024	Moringa/Drum stick –A Multipirpose and Miracle Tree		ISBN: 978-93-92405-37-2 published by Punjab Agricultural University, Ludhiana. pp 1-32.

S. No.	State	Name of centre	Authors	Year	Title of paper/pamphlet/ bulletin	Publisher name	Volume, pages
			Walia S S, Riar T S and Kaur K	2024	Useful plants (2024) (Punjabi)		ISBN: 978-93-92405-93-8, published by Punjab Agricultural University, Ludhiana. pp 1-212
			Walia S S and Kaur T	2024	Integrated farming system for ncome enhancement. In: Brar A S, Singh J and Brar P S(eds) Maintenance of Goats		Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana. pp 84-87
			Pushpa Parameshwari and Walia S S	2024	Inductively coupled plasma atomic emission spectrometry. In: Singh D, Sharma M and Barik S (eds) Advanced Techniques for Assessment of Biomarkers of Oxidative Stress in Clinical Samples of Animals		Under SERB sponsored High End Workshop. Department of Physiology and Biochemistry, College of Veterinary Science, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana
			Walia S S and Kalra V P	2023	Organic Farming		Punjab Agricultural University, Ludhiana. pp 72
6.	Rajasthan	Kota	Anuj Kumar, J.P. Tetarwal and Anju Bijarnia	2023	Celebrating Millets – As Nutri cereals for food, Nutrition & health		Agri Articles (e-magazine for agricultural articles) Vol. 3, Issue-1, Page No.424-427
			Anuj Kumar and J.P. Tetarwal	2023	Nano Urea is a low cost and high yield product for future food needs	The Agriculture magazine	Vol. 2, Issue 5
			Anuj Kumar, J.P. Tetarwal and Anju Bijarniya	2023	Chamomile: A Herbal Medicine of the Bright Future	The Agriculture Magazine	Vol (2), Issue-7, PP. 308-311
			J.P. Tetarwal, Rakesh Kumar Yadav, Baldev Ram, Mahendra Singh, B.L. Dhaka and Pratap Singh	2023	Livelihood security through integrated farming system: A novel approach for farmers under Haroti region (Success Story)	Indian Farming (ICAR)	Vol. 73 (04): 6-8.
7.	Tamil Naidu	Coimbatore	Shanmugam, P.M., S.P. Sangeetha, P.C. Prabu, S. Panneerselvam and S.V.Varshini.	2023	Fifty years of cropping and farming systems research in Tamil Nadu (1973-2023) 978-81-960545-6-4	Thannambikai publications, Coimbatore	

S. No.	State	Name of centre	Authors	Year	Title of paper/pamphlet/ bulletin	Publisher name	Volume, pages
			Annadurai, K., P.M.Shanmugam, A. Vijay Prabhakar V. Hariharasudhan	2023	Irrigation and weed management learning for beginners	Scientific Publishers, Jodhpur, Rajasthan	
			P.M. Shanmugam S.P. Sangeetha P.C. Prabu, S.V. Varshini	2023	Integrated farming system for farmers livelihood security	Dept. of Agronomy,TNAU, Coimbatore	
			P.M. Shanmugam, S.P. Sangeetha K.Sivasubramanian S.V. Varshini	2023	Integrated farming system for small and marginal farmers	Dept. of Agronomy, TNAU, Coimbatore	
			Dr.S.K. Natarajan S.Manickam S.Panneerselvam P.M.Shanmugam S.P. Sangeetha M.Velmurugan T. Rajendran	2023	Soil sample collection	TCRS, TNAU, Coimbatore	
			P.M. Shanmugam, S.P. Sangeetha P.C. Prabu, S.Panneerselvam S.V. Varshini,	2023	Integrated farming system for irrigated upland of western zone of Tamil Nadu	Department of Agronomy, TNAU Coimbatore	
			N.Satheesh kumar T. Selvakumar P.M.Shanmugam, P.C.Prabu S.P. Sangeetha, S.V. Varshini	2023	Integrated farming systems suitable for small and marginal farmers of Erode district	AICRP - IFS, OFR Centre, Maize Research Station Vagarai	
			S.K. Natarajan ,T. Rajendran P.M.Shanmugam, S.Manickam S.Panneerselvam, S.V. Varshini	2023	Integrated farming system for north western zone of Tamil Nadu	AICRP - IFS, OFR Centre, Tapioca and Castor Research Station, Yethapur	
			T. Parthipan, S.Porpavai A.Ramanathan, P.M. Shanmugam, P.C. Prabu S.P. Sangeetha N.Ravishankar S.K. Natarajan	2023	Integrated farming system for Cauvery delta region (Tamil)	AICRP - IFS, Sub centre, ARS, Kattuthottam	
			V.Geethalakshmi, S.Manickam P.M.Shanmugam, S.Panneerselvam, S.P. Sangeetha	2023	Integrated agricultural waste management through accelerated vermicompost production	AICRP - IFS, OFR Centre, Tapioca and Castor Research Station, Yethapur	

S. No.	State	Name of centre	Authors	Year	Title of paper/pamphlet/ bulletin	Publisher name	Volume, pages
			S.K. Natarajan, V.Geethalakshmi S.Manickam, P.M.Shanmugam S.Panneerselvam, S.P. Sangeetha	2023	Farm waste management through accelerated vermicompost pro duction (Tamil)	AICRP - IFS, OFR Centre, Tapioca and Castor Research Station, Yethapur	
			Iswarya, S., Shanmugam, P.M., Arun Balaji, G. and Sangeetha, S. P.	2023	Buckwheat. In: Millets - A Look into Nutritious Food for Food Security in South Asia. 978-93-56512-36-8	Jaya Publishing House, Delhi	978-93 56512 36-8
			Arivukkumar, N., Lalruatfeli, P. C. Mohammed Saud and Shanmugam, P. M.	2023	Modern Concepts on Climate Resilient Crop Production. Impact of climate change on agriculture and food production. Vol. I. 978-93-95967-06-8	JPS Scientific Publications, Tamil Nadu	978-93 95967 06-8
			P.M.Shanmugam, S.V.Varshini, S.P.Sangeetha and P.C.Prabu	2023	Convergence of developmental schemes at ground level for large scale implementation of IFS: Case study from Tamil Nadu. In: Training -Manual on Agro ecology and Integrated Farming Systems,	National Bank Staff College (NBSC), Lucknow In Collaboration with ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut-250110, UP during 10-12 April 2023	
			P.C.Prabu, P.M.Shanmugam S.P.Sangeetha, S.V.Varshini A.Renukadevi, P.Panneerselvam	2023	Climate resilient Integrated farming system	National Conference "AGMET 2023" Advances in Agro meteorological interventions for climate resilient agriculture organised by ACRC, TNAU, Coimbatore 15-17.02.2023	
			Sangeetha SP, PM Shanmugam, PC Prabu, SV Varshini, P Parasuraman,T Parthiban	2023	Effect of Millet based Cropping systems on profitability and Economics	International Millets ConferenceAnd Futuristic Food Expo, 2023 IMCFFE. organised by Tamil Nadu Agricultural University Coimbatore and Indian Society of Plant Breeders 24 to 26.05.2023	ISBN : 978- 81-95444- 57-1

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			Sangeetha SP, Pakhale Smruti Dilip, SMaragatham, E Somasundaram, K Vanitha	2023	Effect of nutria cereals Intercropping in castor on weed control efficiency.	International Millets Conference And Futuristic Food Expo, 2023 IMCFFE. organised by Tamil Nadu Agricultural University Coimbatore and Indian Society of Plant Breeders 24 to 26.05.2023	ISBN : 978- 81-95444-57-1
			S.V. Varshini and C. Jayanthi	2023	Crop Establishment and Micro Irrigation Technologies - A Innovation for Improving Productivity in Bajra Napier Hybrid Grass [CO (BN) 5]	School of Post Graduate Studies Tamil Nadu Agricultural University Coimbatore. August 22 & 23, 2023	
			P.M.Shanmugam	2023	Extended summary Integrated farming system: a tool to achieve national food security with sustainability	XXII Biennial National Symposium on Climate Smart Agronomy for Resilient Production Systems and Livelihood Security November 22–24, 2023atICAR-Central Coastal Agricultural Research Institute, Ela, Goa	
8.	Uttar Pradesh	Kanpur	Ajay Kumar, S.N. Pandey, C.B. Singh, Naushad Khan Amrendra Yadav, Sandeep Singh and Shivam Mishra	2024	Utilization of Agro met Advisory Services to the Farmers under Central Plain Zone & South-Western Semi-Arid Zone of Uttar Pradesh	Conference proceeding held & Oral Presentation presented during the 8-10 February, 2024. 14th International Conference on Climate change & Agroecosystems; Threats, Opportunities & Solutions INAGMET-2024 at Institute of environment and sustainable development at Banaras Hindu University, Varanasi.	
			Dhruvendra Singh Sachan, Dr. M. Z. Siddiqui and Dr. Naushad Khan	2023	Zaid Mung ki Unnat Kheti: Uttar Bharat ke Maidani Kshetron ke liye	Zaid Visheshank 2023-24, Published by; Directorate Extension C. S. A. U. A. & T. Kanpur.	

S. No.	State	Name of centre	Authors	Year	Title of paper/pamphlet/ bulletin	Publisher name	Volume, pages
			Majhrool Hak Ansari , Santosh Kumar Chaudhary , Sourabh Kumar , Mohammad Hashim and Naushad Khan	2023	Impact of Various Planting Techniques and Weed Control Strategies on Rice Yield in Irrigated Environments	Krishi Manjusha: 6(1): 26-28	
			Naushad Khan , Majhrool Hak Ansari and Santosh Kumar Chaudhary	2023	Effect of Various Planting Patterns on Growth and Yield of Onion (Allium cepa L.)	Krishi Manjusha: 6(2): 59-62.	
			Sandeep Kumar Maurya , Nausad Khan , Mandeep Kumar, Shravan Kumar Maurya, and Durgesh Kumar Maurya		Economic Analysis of Soil Conservation Practices in Prone Area written in Technological Innovations and Economic Productivity.	Erosion	
		Ayodhya	Robin Kumar, Neeraj Kumar and A.K. Singh	2023	Integrated farming system: Increasing livelihood and doubling farming system	Eco-Farming E- magazine for agriculture and allied science	Volume 3 (01) 77-80, e-ISSN: 2583-0791.
9.	West Bengal	Kalyani	A. Palit & M. Ray	2024	Prakritik upaye chash	Anandabazar Patrika	4th Sept. 2024

8.2 Proceedings

8.2 Annual Group Meeting(IGKV Raipur) 29-31 January 2024.

The Annual Group Meeting of ICAR-AICRP on Integrated Farming Systems was organized during 29-31 January 2024 at Indira Gandhi Krishi Viswavidyalaya, Raipur, Chhattisgarh as per ICAR approval vide F. No. NRM/7-5/2023-AFC dated 25 October 2023 to review the on-going research programmes of on-station and on-farm centres including Tribal Sub Plan (STC), Scheduled Caste Sub Plan (SCSP), Pilot Project for Crop Diversification and to review the progress on whole farm modelling and integrative sustainability assessment tools in IFS. As suggested by DDG (NRM), other ICAR institutes working on integrated farming systems was also invited to attend the annual group meeting. A special session was organized for the ICAR institutes working of integrated farming systems. All the Chief Agronomist, Agronomist of AICRP-IFS from on-station and on-farm centres participated besides scientists from ICAR-IIFSR and other invitees. The proceedings of different sessions and recommendations are given below.

Dr S.K. Chaudhari, Deputy Director General (Natural Resource Management), ICAR inaugurated the Annual Group Meeting as Chief Guest while Dr Girish Chandel, Vice Chancellor, IGKV, Raipur chaired the session. Dr P.K. Ghosh, Director, ICAR-NIBSM, Raipur, Dr J.S. Mishra, Director, ICAR-DWR, Jabalpur, Dr C.L. Acharya, Former Director, ICAR-IISS, Bhopal participated as Guest of Honour. Dr Vivek Kumar Tripathi, Director (Research), IGKV welcomed all the delegates and presented the overview on research activities of IGKV, Raipur with specific reference to integrated farming systems. Dr N. Ravisankar, Project Coordinator, AICRP-IFS presented the progress and brief achievements of the scheme including details of 74 prototype IFS models developed, key performance indicator for evaluation of IFS models, cropping systems research, model value chain development and impact of the research done under the scheme in various states in the form of technology development and sharing with stakeholders. He also highlighted the initiation of Pilot Project for Crop Diversification initiation in various states to demonstrate the crop diversification with identified alternate cropping systems from the scheme. Dr Sunil Kumar, Director, ICAR-IIFSR in his opening remarks informed that upscaling needs to be given more thrust by the centres besides generating the resources in the form of sponsored projects for basic and strategic research on IFS. Dr C.L. Acharya, Former Director, ICAR-IISS, Bhopal emphasized on reworking the IFS models and cropping systems to be more applicable for small and marginal farmers with less financial and land resources. Dr J.S. Mishra, Director, ICAR-DWR, Jabalpur emphasized for more linkages with AICRP on Weed management in addressing the issue of use of herbicides in IFS models and suggested to integrate more non-chemical weed management strategies in the IFS models. Dr P.K. Ghosh, Director, ICAR-NIBSM, Raipur appreciated the key performance indicator (s) used for evaluation of IFS models and suggested that there is a need to incorporate non-farm activities as part of IFS for additional income and employment generation. Dr S.K. Chaudhari, DDG (NRM), Chief Guest released the Annual Report of the scheme and Cropping System Atlas of India publications brought out by PC Unit. Chief Guest also felicitated the retired Chief Agronomists from AICRP-IFS centre, Raipur, Mr D. Tripathi, CTO (due for retirement in March 2024) and also progressive IFS farmers. Dr S.K. Chaudhari, DDG (NRM) and Chief Guest in his address highlighted the importance of the scheme and contributions made in

enhancing the sustainability in agriculture. He appreciated the progress made and also informed that impact assessment is important for identifying the constraints and further scaling process. Chief Guest also further emphasized that there is a need for documentation in the local languages on the benefits of IFS and modifications made in the existing farming systems. He also stressed on need for convergence in implementing crop diversification programme and asked the other ICAR institutes to also adopt the common observations and evaluation of IFS models. It was also stressed by him that non-farm activities also need to be integrated in IFS models. Dr Girish Chandel, Vice Chancellor, IGKV, Raipur and Chairman of the inaugural session emphasized on integrating modern technologies including artificial intelligence and IoT in decision making for IFS implementation. Drudgery reduction is another area needs to be addressed in agriculture and more so in various farming systems. Dr Adikant Pradhan, Chief Agronomist presented the Vote of thanks. Salient recommendations emerged from the Annual Group Meeting is given below.

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Recommendations

1. Technical Manual on Key Performance Indicator (KPI) based evaluation of Integrated Farming Systems should be developed for uniform application by all the centres. This should have the model calculations and interpretation of results.
2. Animal feed (concentrates) production within integrated farming systems needs to be given thrust by using the non-salable grain ingredients for feed preparation. This is essential for reducing the

animal feed purchase from market and to enhance the self-reliance level of IFS models. Feed preparation should be mechanized with low-cost feed mills.

3. "Model Value Chain Development for Integrated Farming Systems" programme needs to be further strengthened by integrating off-farm enterprises and aligning with local development department schemes. Allocations under SCSP/STC should be used for further strengthening the programme as per extant guidelines.
4. Success Stories should be documented and published based on the impact assessment of integrated farming systems interventions made under On-Farm Research during 2017 to 2022 in different districts and States.
5. Impact study on Integrated Farming Systems needs to be expanded to all the States to cover the IFS implemented under National Mission on Sustainable Agriculture (NMSA) by DA&FW and Integrated Farming Cluster (IFC) by Department of Rural Development (DoRD).
6. Close linkage with all the district level agricultural officials needs to be ensured for effective implementation of "Pilot Project for Crop Diversification" funded by DA&FW. National level meeting needs to be organized by involving district and state level officials and crops division of DA&FW for scaling the demonstration pilots on crop diversification.
7. All the on-station centres should invariably report the resource generation from IFS in Audit Utilization Certificate. Corpus fund may be created as per ICAR guidelines. M.Sc and Ph.D student fellowship for undertaking research on IFS and cropping systems can be considered from the corpus fund generated from the centres.

9. APPENDIX

APPENDIX IA :

WEATHER PARAMETERS (MONTHLY AVERAGES RAINFALL) AT DIFFERENT FARMING SYSTEM CENTERS DURING 2022-23

Centre	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May
Akola	249.7	357.93	148.4	212.6	72	1.4	42.6	1	0	0	0.0	0.0
Bhubaneswar	352.0	265.5	285.1	579.4	77.2	82.6	72.6	29.1	41.1	0.0	0.0	185.9
Coimbatore	15	30.5	38.5	33.5	190.6	271.9	54.5	16.6	0	9.2	41.2	16.5
Faizabad	214.6	114.8	172	352.8	42	2	15	34.6	0	0	0	40.4
Hisar	10.9	167.2	66.7	428.2	5.5	0.4	1.2	64	5.8	0	1.5	31.6
Indore	250.9	204.7	219.3	377.6	66.8	0	17.3	31.7	0.0	0.0	0.0	0.0
Jabalpur	169	242.6	84.2	156.6	67	1.8	23.8	16.1	11.6	0	0.2	17.2
Jammu	61.2	488.4	186.6	173.4	107.2	0	0.8	191	45.4	1	4.6	44.6
Jorhat	321.8	243.7	166.5	300.1	235.8	240.2	50.6	41.0	40.5	41.5	142.0	138.7
Junagadh	9.60	53.10	81.00	260.70	42.60	843.30	77.60	0.00	0.00	0.20	0.00	0.00
Kalyani	168.1	164.5	156.3	92.5	58.8	0.0	0.0	0.0	0.0	21.4	26.4	134.9
Kanpur	96.5	349.3	186	190.9	144.8	1.2	8.6	41.1	13	0	0	0.2
Karjat	792.5	1644.3	365	834.8	207.6	69.8	74.2	21	0	0.8	0	0
Karmana	138.2	125.5	184.1	105.9	311.9	92.0	82.3	18.5	10.7	13.7	78.7	136.9
Kathalagere	63.20	259.80	89.60	43.60	272.70	93.30	24.10	0	0	0	73.70	236.20
Kota	91.6	489.2	434.6	114.0	68.0	0.0	0.0	24.0	0.0	15.2	0.0	8.0
Ludhiana	84.8	271.2	107.6	101.8	37.6	0.0	0.0	113.4	43.5	0.8	0.0	25.6
Maruteru	67.0	382.1	241.4	281.5	176.2	207.1	1.4	23.6	0.0	0.0	7.2	124.1
Navsari	384.0	423.0	170.0	493.0	18.0	11.0	66.0	0.0	0.0	0.0	0.0	0.0
Palampur	187	575.6	339	382.6	88.6	0	23.4	216.8	67.8	9.4	14.8	120.3
Patna	431.8	185.3	232.8	150.6	41.4	0.0	10.6	28.6	34.8	0.0	0.0	34.6
Pantnagar	4.4	239.8	299.7	30	427.5	0.0	5	98.9	50.4	0	2.6	45.5
Powarkheda	303.9	209.7	208.5	263.9	43.8	0	0	8.2	0	0	0	0.2
Rajendranagar	55.8	305.8	106.2	255.2	100.8	18.2	0.0	4.6	0.0	3.2	6.2	3.6
Ranchi	374.0	686.3	282.0	446.2	85.8	24.2	22.6	40.6	37.0	0.0	0.0	36.5
Rewa	201.6	192.1	395.6	160	13.4	-	25.4	40.6	-	-	-	17.8
Rudrur	179.3	515.7	226.2	411.7	38.3	11.3	1	45.9	0	0	0.00	6.50
Sabour	298.6	331.2	104.7	119.4	210.0	0.0	15.6	7.7	32.4	0.0	2.0	68.6
Siruguppa	79.5	163.0	62.3	43.5	67.9	137.0	0.0	0.0	0.0	0.0	5.5	57.0
Thanjavur	69.1	77.8	215.5	85.6	281.0	538.0	4.5	80.9	42.0	30.0	57.8	36.1
Umiam	226.2	352.8	400.6	353.8	230.9	0	52.6	44	29.2	10.8	109.6	499.2
Varanasi	671.3	555	256.1	312.9	120.7	0	8.6	55.6	5	0	0.00	5.80

Appendix II B :
Maximum and minimum temperature(0C) (June 2022 to May 2023)

	JUNE		July		August		Sept		Oct		Nov		Dece		Jan			Feb	March		April		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
Akola	34.50	24.00	31.80	24.00	30.80	23.30	30.50	23.00	32.30	19.60	31.40	16.70	28	12.8	25.9	11.3	31.5	12.5			42.4	24.5	42.1	27.1
Bhubaneswar	34.0	26.3	33.5	26.1	33.3	26.1	32.4	25.5	33.0	24.7	30.2	21.8	26.8	15.2	26.5	14.7	30.0	17.2	35.4	22.5	36.9	26.5	35.9	26.3
Coimbatore	32.4	23.7	31.2	23.6	31.6	22.9	31.7	23.3	30.6	23.2	28.4	22.4	28.9	20.9	30.2	20.7	32.1	21.1	34.5	21.7	34.6	24.6	42.7	23.9
Faizabad	33.0	26.2	34.7	27	32.7	26	32.4	25.5	32.2	21.9	28.2	13	24.6	9.3	18.4	8.4	23.1	10.4	31.8	15.1	38.6	20.4	37.2	25.1
Gwalior	34.80	24.17	30.11	24.19	27.47	22.95	28.72	22.73	30.85	18.90	28.40	12.57	23.40	10.81	25.23	10.13	25.68	9.55	34.76	16.39	40.30	22.33	41.08	27.08
Hisar	40.8	26.7	43.4	27.5	35.5	26.6	32.3	25.4	32.0	19.6	27.9	9.9	21.3	6.3	16.4	7.2	23.2	8.1	31.9	13.8	40.2	19.0	40.9	25.0
Jabalpur	33.9	24.3	32.3	25.1	30.2	24.4	31.12	23.9	31.8	19	28.4	11.8	24.7	8.9	22	8.4	26.6	9.5	34	14.8	40.5	19.7	40.1	24.6
Jammu	38.0	25.0	34.9	25.9	35.0	25.8	33.0	24.2	31.2	18.0	26.4	9.0	21.1	5.0	15.7	7.4	20.8	6.8	29.9	13.6	37.9	18.0	38.3	21.9
Jorhat	32.0	24.3	31.1	25.2	32.9	25.0	33.7	24.4	32.6	22.8	28.4	14.4	26.0	10.8	23.3	9.6	23.6	10.2	30.8	16.1	27.0	19.2	30.5	22.0
Junagadh	36.6	26.7	32.7	25.2	32.4	24.1	30.0	24.2	33.7	21.8	33.3	17.3	28.7	14.8	27.7	11.8	31.4	14.3	37.9	21.0	40.1	23.2	38.4	23.9
Kalyani	32.67	25.85	32.74	26.4	32.88	26.33	31.76	25.61	31.29	23.32	28.41	17.85	24.48	14.11	23.7	12.4	27.2	13.5	34.2	20.7	36.7	26.1	34.0	24.7
Kanpur	35.7	26.8	34.9	27.6	33.1	26.7	32.9	26.0	32.6	21.3	27.8	12.6	23.0	9.8	18.7	7.7	24.7	9.7	33.4	16.1	41.0	20.8	40.3	26.0
Karamana	32.2	21.5	31.9	23.0	30.0	24.0	30.3	24.3	30.0	23.9	29.4	23.5	30.4	23.1	30.7	23.3	30.9	24.0	31.9	24.9	32.0	24.8	30.9	25.1
Karjat	30.92	24.22	29.60	23.90	29.81	23.50	29.98	23.73	32.98	22.00	34.23	20.10	32.21	16.11	30.70	14.60	33.72	14.81	38.90	18.35	40.61	21.77	37.53	24.51
Kathalagere	30.40	22.80	28.30	22.20	28.30	21.90	29.10	21.50	29.90	21.30	29.70	18.70	29.70	16.40	30.1	15.8	32.6	17.5	35.2	20.3	36.2	22.5	34.4	22.7
Kota	41.15	29.46	34.51	26.05	32.86	24.93	34.14	24.92	34.06	19.86	31.52	13.75	26.40	10.24	22.30	9.17	30.75	13.98	33.20	21.50	38.30	27.00	39.10	26.80
Ludhiana	36.3	25.3	34.3	27.8	33.7	27.2	31.7	25.3	31.3	19.5	26.8	10.7	20.7	6.7	15.7	8.4	21.1	8.5	30.8	15.9	39.0	20.5	39.2	26.1
Maruteru	35.0	27.7	30.4	26.9	31.7	27.0	31.4	26.6	31.3	26.3	29.8	22.9	29.3	21.2	29.7	20.4	31.8	19.6	32.2	20.3	33.8	22.2	34.7	21.9
Navsari	32.6	24.5	31.3	24.7	30.6	23.4	30.6	22.9	33.9	20.1	33.7	18.3	29.3	14.7	29.0	13.9	31.2	13.7	37.0	19.1	36.2	22.8	34.9	26.8
Palampur	30.9	19.4	27.4	19.8	27.1	19.3	26.3	17	25	12.5	21.4	8.3	18.8	5.0	16.0	4.5	20.8	7.8	21.6	9.4	24.3	12.1	27.1	14.6
Patna	33.30	26.20	33.70	27.30	33.00	26.80	33.10	26.50	31.80	23.20	28.70	15.00	24.20	11.60	19.78	10.79	23.60	11.81	33.01	18.22	38.21	24.16	36.12	25.62
Pantnagar	35.7	24.7	36.4	24.4	33.7	25.4	33.4	24.2	29.7	16.6	26.3	11.4	25.0	4.3	20.2	8.7	23.7	6.7	33.9	10.0	38.2	15.5	37.8	22.6
Powarkheda	40.1	22.5	39.5	22	34.6	22	34.9	22.5	35.6	12.5	32.1	9.5	30.4	2	26.9	2.9	16.4	5.4	41.1	10	44.5	15.6	42.6	21.5
Rajendranagar	32.9	23.8	30.2	23.1	30.5	23.1	28.8	22.4	31.0	20.7	28.6	19.3	28.5	14.5	28.5	15.0	31.3	14.9	35.7	19.0	38.3	23.3	38.0	25.2
Ranchi	33.1	21.9	33.4	23.8	32.7	24.5	32.7	24.3	31.2	21.7	28.5	16.9	24.5	7.3	23.5	8.9	24.9	10.1	32	14.7	38.3	21.6	30.6	24.8
Rewa	35.1	24.9	35.4	25.8	31.9	25.2	32.9	24.7	32.7	17.2	24.5	12.1	24.4	9.2	21.9	8.4	28.0	10.6	35.6	14.1	41.1	18.8	41.4	25.4
Rudrur	33.2	24	29.7	24.6	29.3	24.3	30.4	23.9	31.6	23	29.6	20.4	28.0	15.8	28.2	14.9	31.3	17	35.1	20.31	40.7	25.35	43.7	27.03
Sabour	33.8	26.1	33.0	26.4	32.4	27.3	32.7	27.3	31.9	24.4	28.0	16.3	25.0	12.3	20.3	10.8	23.9	11.3	32.6	18.8	36.3	22.8	35.4	23.5
Siruguppa	35.5	24.7	30.4	24.1	33.1	21.0	32.5	34.1	32.0	22.0	30.1	20.6	24.6	20.4	30.2	18.6	32.7	21.6	36.7	22.7	49.8	25.5	37.3	25.4
Thanjavur	36.3	27.0	35.2	26.6	35.0	26.0	35.0	25.8	33.0	25.0	29.6	23.3	30.0	22.0	30.4	21.7	31.4	20.3	36.1	21.0	35.4	23.1	36.6	23.7
Umiam	28.0	20.3	27.9	20.5	27.7	20.3	28.5	19.6	27.5	18.7	24.5	10.6	21.8	8.1	19.4	7.8	19.0	7.1	27.5	13.9	26.5	17.6	25.2	17.6
Varanasi	34.8	26.1	34.6	26.3	33.5	25.7	32.6	24.1	32.5	21.8	28.9	13.0	24.0	9.7	20.3	9.0	24.9	10.3	33.4	16.2	40.9	20.8	39.7	24.6

APPENDIX III
CENTRE-WISE STAFF POSITION

1. AAU JORHAT (ASSAM)	
Main Centre, Jorhat	
Chief Agronomist	Dr.Debasish Borah
Junior Agronomist	Ms. Lipika Talukdar
Jr. Soil Scientist	Mr. Bhabesh Gogoi
SRF,Veterinary	Dr. Jahnabi Jyoti Kalita
On-Farm Centre,Golaghat	
Jr. Agronomist	Mr. Ajoy Sankar Bora
Jr.Economist	Mrs. Monisha Borah
Field assistant	Mr. R. Borah
Field assistant	Mr. P.Dutta
Field assistant	Mr. A.K.Borthakur
Driver	Sri Suresh Boro
LDA	Mrs. D.J.Saikia
Messenger	Sri Bubul Borsaikia

2. ANGRAU, Guntur (A.P.)	
Sub Centre,Maruteru	
Agronomist	Dr. B.Sahadeva
Technical Asstt.	A. S. Saibaba Reddy
On-Farm Centre,Vizianagaram	
Agronomist	Dr. Tejeswara Rao
Field assistant	Mr.N.Murali Mohan Rao
Field assistant	Mr. B.V.A. Satyanarayana
Field assistant	Mr. A.V.Ramana
Field assistant	Mr. K.Gopi
Driver	Vacant

3. BAU, Sabour (BIHAR)	
Main Centre, Sabour	
Chief Agronomist	Dr. Sanjay Kumar
Jr. Soil Scientist	Sri Anupam Das
Jr. Agronomist	Dr. Sushant
Technical Asstt.	Vacant
S.R.F.	Dr. Satyaveer Singh
On-Farm Centre,Saharsa	
Agronomist	Dr.(Mrs.) Sneha Kumari
Jr. Economist	Mrs Ashwini Choudhary
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Driver	Vacant

4. IGKVV,RAIPUR (CHHATISSGARH)	
Main Centre,Raipur	
Chief Agronomist	Dr. Adikant Pradhan
Jr. Soil Scientist	Shri Vinod Nayak
Jr. Agronomist	Shri Sunil Kumar Agrawal,
Technical Asstt.	Mr. B.K.Chandrakar
On-Farm Centre, Bastar	
Agronomist	Dr. P. K.Salam
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Driver	Vacant

5. SDAU, S.K.NAGAR	
Main Centre, S K Nagar	
Chief Agronomist	Dr.L. J. Desai
Jr. Soil Scientist	Mr. P.K.Patel
Jr. Agronomist	Dr. K. M. Patel
Technical Assistant	Vacant
Junior Agronomist	Vacant
Senior Research Fellow	Vidhi K Patel
Senior Research Fellow	Neha G. Chaudhary
Agriculture Officer	Mr.J.K.Gami
Senior Clerk	Vacant
OFR- Khedbrahma	
Agronomist	Vacant(Additional Charge hold by Dr. M.S Dabhi)
Jr. Economist	Vacant(Additional Charge hold by Dr. M.S Dabhi)
Field Assistant	Mr.A.K.Goswami
Field Assistant	Mr. P.M.Kalotara
Field Assistant	Mr.R.M.Patel
Field Assistant	Charge hold by Mr. D. P. Parekh
Driver	Mr. D.A.Chauhan
On-Farm Centre, Dantiwada	
Agronomist	DrJ.J.Mistri
Jr. Ag Economist	Dr. R.R.Patel
Field assistant	Mr.A.K Goswami
Field Assistant	Mr. M.N.Prajapati
Field Assistant	Mr. D.P. Parekh
Field Assistant	Mr. S.S.Patel
Driver	Vacant

6. JAU,JUNAGADH(GUJARAT)	
Sub Centre, Junagadh	
Agronomist	Dr. R. M. Solanki
Technical Asstt.	Shri K. K. Sarvaiya
7. NAU,Navsari	
Sub Centre, Navsari	
Agronomist	Dr. L.K. Arvadiya
Technical Asstt.	K.M. Patel
8. AAU,ANAND	
On-Farm Centre,Dahod, Devgadh	
Agronomist	Dr. Y.B. Chauhan
Field assistant	Mr. D.J. Gohil
Field assistant	Mr.V.H. Rathva
Field assistant	Mr. P.G. Solanki
Field assistant	Mrs. R.S. Thakor
Driver	Mr. B.S.Patel
9. CCS HAU,HISAR (HARYANA)	
Main Centre, Hisar	
Chief Agronomist	Dr. R.S.Dadarwal
Assistant Scientist (Agronomy)	R. D. Jat
Jr. Soil Scientist	Dr. Ritambhara
Technical Asstt.	Vacant
OFR Centre, Rewari	
Agronomist	Dr. Anil Mehta
Jr. Economist	Dr.(Mrs.) Kavita Yadav
Field Assistant	Mr.Mahinder Singh
Agril. Inspectors	Sh. Sadi Lal
Agril. Inspectors	Sh. Mahinder Singh
Agril. Inspectors	Sh. Sat Narain
Agril. Inspectors	Sh. Gaya Lal
Driver	Jitender
10. CSK HPKVV,PALAMPUR (H.P.)	
Main Centre, Palampur	
Chief Agronomist	Dr. Dhanbir Singh
Jr. Soil Scientist	Dr. Sanjay K Sharma
Jr. Agronomist	Dr. G.D.Sharma
Technical Asstt.	Sh. Manohar Lal
On-Farm Centre, Kullu	
Agronomist	Dr.Vinod Kumar Sharma
Field assistant	Sh. Ramesh Chand
Field assistant	Sh. Gurmeet Singh
Field assistant	Mr.Saran Das
Field assistant	Mani Raj
Driver	Mr. Ashok Kumar

11. SKUAST,Jammu(J &K)	
Main Centre, Chatha,Jammu	
Chief Agronomist	Dr. N.P. Thakur
Jr. Soil Scientist	Dr.N. P.Thakur
Jr. Agronomist	Dr. Vijay Khajuria,
Technical Asstt.	Vacant
SRF Animal Science	Vacant
SRF Horticulture	Vacant
OFR Centre ,Udhampur Jammu	
Agronomist	Dr. A.K.Gupta
Field assistant	Kuldeep Sharma
Field assistant	Dheeraj Rajwal
Field assistant	Vikas Koul
Driver	Mohd.Saleem
12. BAU,Ranchi (JHARKHAND)	
Main Centre,Ranchi	
Chief Agronomist	Dr. S. Karmakar
Jr. Soil Scientist	Mr. A. N. Puran
Jr. Agronomist	Mr.R.P.Manjhi
Technical Assistant	Sri R. B. Singh
SRF	Dr. Piyush Kumar Bhargaw
SRF	Dr. Rahul Kumar
Junior Steno	Mr. Pawan Kumar Mahto
Supporting staff	Vacant
On-Farm Centre,East Singhbhum	
Agronomist	Dr.Shambhu Saran Kumar
Field assistant	Rajesh Kujur
Field assistant	Sri Parwej Alam
Field assistant	Anant Kumar Mandal
Field assistant	Tulsi Baitha
Young Professional -1	Vacant
Junior steno	Vacant
Supporting staff	Vacant
Driver	Md. Sarif Ansari
13. UAHS, Shivamoga	
Main Centre	
Chief Agronomist	Dr.H.G.Sannathimmappa
Jr. Soil Scientist	Dr Ramya H S
Jr. Agronomist	Dr Sharanappa Kuri
Technical Asstt.	Dr. Chandru Patil
14. UAS,Banglore (Karnataka)	
On-Farm Centre, Chikkaballapura	
Agronomist	Dr.M.T.Sanjay
Jr. Scientist	Dr. Mahin Sharif/ Dr.Anjan kumar M J
Field assistant	Mr.Sunil Kumar
Field assistant	Mr. Narayanaswamy

Field assistant	Mr. Basavaraja
Field assistant	Mr. ALN Gowda
Driver	Jagadeesh, M. K.

15. UAS, Raichur

Main Centre, Siruguppa

Principal Scientist (Agronomy)	Dr. C.M.Kalibavi,
Jr. Soil Scientist	Dr. Ashok Kumar Gaddi
Jr. Economist	Dr.Prabhuling Tewari
Technical Asstt.	Mr.Erappa Yankannvar

16. UAS, Dharwad (KARNATAKA)

On-Farm Centre, Dharwad (KARNATAKA)

Agronomist	Dr R.B.Neglur
Field assistant	Mr. V.D. Kalwad
Field assistant	Mr. R.S. Hiremath
Field assistant	Mr.V.D.Kalawad
Field assistant	Mr. V.G. Chickmath
Driver	Mr. U.S. Athanimath

17.KAU,THRISSUR (KERALA)

Main Centre, Karamana (Thiruvandrum)

Chief Agronomist	Dr.Jacob John
Jr. Soil Scientist	Dr.Meera.A.V.
Jr. Agronomist	Dr.(Mrs.)Bindhu J.S.
Technical Asstt.	Ms Revathy M R/ Aswani K Vinod/ Veena Raj S S/ Sree Lekshmi M Pillai
Senior Research Fellow	Smt. Sheeba U.
Junior Steno/Typist	Vacant
Supporting (Skilled)	Vacant

On-Farm Centre, Thiruvananthapuram/Kayamkulam

Agronomist	Dr. D. Jacob
Jr. Ag. Economist	Miss Sreena K.S./ Dr Atul Jayapal
Field assistant	Smt. Bindu V S
Field assistant	Mrs. Smitha P.
Field assistant	Mrs Melany Treesa Jose
Field assistant	Mr Mohammed Faisal K L
Driver	Vacant
Young Professional	Mr Sreerag
Administrative	Vacant
Supporting	Vacant

18. JNKVV,Jabalpur (M.P.)

Main Centre, Jabalpur

Chief Agronomist	Dr. P. K. Mishra
Chief Agronomist	Dr. P.B. Sharma
Jr. Soil Scientist	Vacant
Scientist (Agronomy)	Dr. R.P.Sahu
Jr. Agronomist	Dr. Vikas Gupta
Technical Asstt.	Dr. Abhijeet Dubey

Sub Centre, Rewa

Agronomist	Dr.B.M.Mourya
Tech.Assistant	Vacant

Sub Centre,Powerkheda

Agronomist	Dr. Vinod Kumar
Tech.Assistant	Shri. Sudhir Dubey

On Farm Centre, Mandla

Agronomist	Dr. Manisha Shyam
Field assistant	Shri Sunil kumar Malviya
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Driver	Vacant

On Farm Centre,Umaria

Agronomist	Dr. Namrata Jain
Field assistant	Shri Deepak Singh Marko
Field assistant	Shri Rakesh Mobia
Field assistant	Vacant
Field assistant	Vacant
Driver	Vacant

19. RMVRSUA&T GWALIOR ,(M.P.)

Sub Centre, Indore

Agronomist	Dr Narendra Kumawat
Technical Asstt.	Shri N.K. Sinha

20. MPKV,RAHURI (MAHARASHTRA)

Main Centre,Rahuri

Chief Agronomist	Dr U S Surve
Jr. Agronomist	Dr.N.S.Ugale
Jr.Soil Scientist	Dr. A. S. Takate
Field Assistant	Mr.B.K.Jadhay

On Farm Centre, Padegaon, Palghar

Agronomist	Dr. S.S. Pinigari
Jr.Economist	Dr Yashawant C Sali
Field Assistant	Shri R. K. Chaudhari
Field Assistant	Shri A. G. Nikrad
Field Assistant	Shri B. K. Pisal
Field Assistant	Vacant
Driver	Vacant

21. PDKV,AKOLA (MAHARASHTRA)

Main Centre,Akola

Chief Agronomist	Dr. J. P. Deshmukh
Jr. Agronomist	Shri B.S.Morval
Jr.Soil Scientist	Dr. D.S. Kankal,
Technical Assistant	Mrs. P. N. Kalane

On-Farm Centre, Katol, Nagpur	
Agronomist	Dr. S.N. Potkile
Field Assistant	Mr.S.D.Kadam
Field Assistant	Mr. R. S. Ghorpade
Field Assistant	Miss Sharda G. Bunde
Field Assistant	Vacant
Driver	Vacant
22. MAU,Parbhani (MAHARASHTRA)	
Main Centre,Parbhani	
Chief Agronomist	Dr.Anand K. Gore
Jr.Agronomist	Dr. S.P. Chenalwad,
Jr.Soil Scientist	Dr.S.T. Shirale
Tech. Assistant	Shri. D. Y. Chavan
On Farm Centre, Nanded	
Agronomist	Dr. A.D. Pandagale,
Field Assistant	Shaikh Ilahi Shaikh Lal
Field Assistant	Mr.A.U.Dukre/Mr.A.U.Dukre
Field Assistant	N.V.Kadam
Field Assistant	Vacant
Driver	Vacant
23.DBSKKV, Dapoli (MAHARASHTRA)	
Main Centre, Karjat	
Chief Agronomist	Dr. V.V. Sagvekar
Jr. Soil Scientist	Dr.D.G.Jondhale
Jr. Agronomist	Dr. N.V. Mhaskar
Technical Asstt.	Shri. D. J. Shet
On Farm Centre,Thane	
Agronomist	Dr M.N. Waghmare
Field Assistant	Shri. S.V. Kamble
Field Assistant	Shri. V.S. Daphal
Field Assistant	Shri. V. N. Patil
Field Assistant	Shri. G. N. Totkar
Driver	Mr.Vaibhav R Salunke
24. OUAT,Bhubaneswar (ODISHA)	
Main Centre, Bhubaneswar	
Chief Agronomist	Dr. Alok Kumar Patra
Jr. Agronomist	Vacant
Jr. Soil Scientist	Mr.B.B.Behera
Tech. Assistant	Mr.Dilip Kumar Rout
Sub Centre, Chiplima	
Agronomist	Dr. Sanjukta Mohapatra
Tech. Assistant	Mr. S. K. Pradhan
On Farm Centre, Kendujhar	
Agronomist	Dr. Kishore Chandra Sahoo
Jr.Economist	Vacant
Field Assistant	Mr.Kasinath Mallick
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Driver	Vacant
On Farm Centre, Kalahandi	
Agronomist	Dr.Bhabani Shankar Nayak
Field Assistant	Mr. Ananda Chandra Sahu
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Driver	Vacant
OFR, Khordha	
Agronomist	Dr. Alok Kumar Patra
Field Assistant	Mr. Prakash Chandra Khuntia
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Driver	Vacant
25. PAU, Ludhiana (PUNJAB)	
Main Centre,Ludhiana	
Chief Agronomist	Dr.Sohan Singh Walia
Chief Agronomist	Dr.C.S.Aulakh
Jr.Soil Scientist	Dr (Mrs). Neeraj Rani
Tech. Assistant	Manpreet Singh
Junior Typing Assistant	Mr. Aman Atwal
SRF	Tamanpreet Kaur
SRF	Karamjeet Kaur
Supporting	Vacant
Supporting	Vacant
On Farm Centre,Patiala	
Agronomist	Dr. Vijinder Pal Kalra
Field Assistant	Lakhwinder Singh
Field assistant	Varinder Singh
Field assistant	Gurwinder Singh
Field assistant	Harpreet Singh
Young Professional-II	Harpreet Singh
Young Professional-II	Harjivan Singh
Driver	Avtar Singh
26. AU, Kota (RAJASTHAN)	
Sub Centre,Kota	
Agronomist	Dr. J. P. Tetarwal
Tech. Assistant	Vacant
27. MPUAT,Udaipur (RAJASTHAN)	
On Farm Centre, Dungarpur	
Agronomist	Dr. Harpool Singh
Jr.Economist	Dr.Hari Singh
Field Assistant	Mr.N.S.Jhala
Field Assistant	Mr.Ramji Lal

Field Assistant	Mr.Madan Lal
Field Assistant	Mr.A.S.Rathore
Driver	Sh. Neeraj Kumhar

28. SKNAU, Jobner, (RAJASTHAN)

Main Centre, Durgapura,Jaipur

Chief Agronomist	Dr. R. Sammauria
Jr. Agronomist	Dr. O.P.Meena
Jr. Soil Scientist	Dr Pratibha
Technical Asstt.	Shri Ram Lal Nehra

On-Farm Centre, Dausa

Agronomist	Dr. Ramphool Puniya
Field Assistant	Sri. Ramesh Gaotm
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Driver	Vacant

29. PJTSAU, Rajendranagar, Hyderabad

Main Centre, Rajendranagar

Chief Agronomist	Dr. Mohammad Lateef Pasha
Jr. Agronomist	Dr.Ch.Pragathi Kumari
Jr. Soil Scientist	Sri G.Kiran Reddy
Technical Asstt.	C.Madhusudhan

Sub Centre, Rudrur

Agronomist	Smt.Firdoz Shahana
Technical Asstt.	M.Praveen

On-Farm Centre, Medak

Agronomist	Dr. Kodam Chiranjeevi
Jr.Economist	Dr. Md. Ali Baba
Field assistant	Md Munaweruddin
Field assistant	Sri. P.Yadagiri
Field assistant	S.Aziz Hasan
Field assistant	Vacant
Driver	Sri. Shaik Shabbir

30 . TNAU,Coimbatore (TAMILNADU)

Main Centre, Coimbatore

Chief Agronomist	Dr.P.M.Shanmugam
Jr. Agronomist	Dr. S.P.Sangeetha
Junior Scientist (Env. sci.)	Dr.P.C.Prabu
Junior Scientist (Env. sci.)	Dr. K.Sivasubramanian

Junior Agricultural Officer P.Kasthuri

Assistant Agricultural Officer	M.Raja
Senior Resreach Fellow	Dr. S.V.Varshini
Skilled worker	D.Pushparaj
Skilled worker	R.Sri Vidhya
Skilled worker	S.Parimaladevi
Contractual labour	P.Jothiammal

Sub Centre,Thanjavur

Agronomist	Dr.T.Parthipan
Tech. Assistant	Tmt.D.Ramya

On farm ,OFR Centre Erode, Bhavanisagar /Vagarai

Agronomist	Dr.N.Sathish kumar
Field Assistant	Th. A. Amuthakrishnan
Field Assistant	Mrs. K.Sumathi
Field Assistant	Mrs.A. Muthulakshmi
Field Assistant	Th. A.Padaleeswaran
Driver	Th. D. Ganesan
Vacant	Young professional 1
Vacant	Steno/LDC
Vacant	Skilled worker

On farm,OFR Centre, Salem, Yethapur,

Agronomist	Dr.S.K. Natarajan
Jr. Ag economist	Dr.T.Rajendran
Agricultural Supervisor	K.Murugan
Agricultural Supervisor	M.P. Raja
Assistant Agricultural Officer	P.Nallathambi
Assistant Agricultural Officer	T.Jayasankar
Driver	S.Radhakrishnan
Technical Assistant	R.Vijay
Skilled Worker	M.Mani

31. CSAUA&T,Kanpur (UTTAR PRADESH)

Main Centre, Kanpur

Chief Agronomist	Dr M Z Siddiqui
Jr. Soil Scientist	Vacant
Jr. Agronomist	Dr Naushad Khan
Technical Asstt.	Mr. Suhail Ahmed
Jr. Clerk	Sri Sunil Gautam
Fourth class staff	Mohd Taufeeq
Young Professional - I	Sri Praveen Kumar

On Farm Centre,Fatehpur

Agronomist	Vacant
Field Assistant	Mr. Sudhir Pratap Singh
Field Assistant	Mr. Rajesh Saxena
Field Assistant	Mr. Yogesh Mishra
Driver	Mr. Mahendra Pal Singh

32. ANDUAT, Ayodhya (UTTAR PRADESH)

Main Centre, Ayodhya

Chief Agronomist	Dr. A K Singh
Jr. Soil Scientist	Vacant
Jr. Agronomist	Vacant
Technical Asstt.	Mr. A. P. Singh

On Farm Centre,Ambedkar Nagar	
Agronomist	Vacant
Field Assistant	Mr. A.N.Pandey
Field Assistant	Mr. Ashutosh Singh
Field Assistant	Mr. V.B.Singh
Field Assistant	Vacant
Driver	Vacant

33. OFR Centre, ICAR-IIFSR, Modipuram, Meerut,(UTTAR PRADESH)	
Agronomist	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Field Assistant	Vacant
Driver	Vacant

34.BHU,Varanasi (UP)	
Sub Centre,Varanasi	
Agronomist	Dr.U P Singh
Tech. Assistant	Vacant

35.GBPUAT,Pantnagar (UTTARAKHAND)	
Main Centre,Pantnagar	
Chief Agronomist	Dr.Rohitashav Singh
Jr.Soil Scientist	Dr.Ajeet Pratap Singh
Jr. Agronomist	Dr. Dinesh kumar Singh
Tech. Assistant	Mr.Y.S.Khokar

On- Farm Centre,Udham Singh Nagar	
Agronomist	Dr.D K Singh I/C
Jr. Scientist(Economics)	Vacant
Field Assistant	M P Singh
Field Assistant	Mahendra Singh
Field Assistant	Ashok Kumar
Field Assistant	Vacant
Driver	R B Yadav

36. BCKV,Kalyani (WEST BENGAL)	
Main Centre,Kalyani	
Chief Agronomist	Dr.Manabendra Ray
Jr. Soil Scientist	Dr. Sushanta Saha
Jr. Agronomist	Vacant
Technical Asstt.	Vacant
On-Farm Centre, Nadia	
Agronomist	Dr.Manabendra Ray
Jr. Economist	Dr.Soumitra Chatterjee
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Field assistant	Vacant
Driver	Vacant

APPENDIX IV
SOIL FERTILITY STATUS AND NUTRIENT UPTAKE 2022-23

Table A :Soil fertility status-Organic carbon (%) and available N,P and K (Kg/ha) after kharif/rabi/summer season in Exp No. 1(a)

Name of centre	Season	Nut/treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
ANGRAU, Guntur	Kharif	OC%	1.18	1.19	1.18	1.16	1.17	1.17	1.17	1.17	1.16	1.16
		N	0.97	1.05	1.08	1.14	1.14	1.10	1.06	1.06	1.13	1.11
		P	0.44	0.50	0.48	0.45	0.48	0.47	0.47	0.47	0.49	0.49
		K	3.29	2.24	3.29	2.39	2.52	2.31	2.49	2.40	2.74	2.81
	Rabi	OC%	1.16	1.16	1.16	1.17	1.16	1.16	1.14	1.16	1.16	1.14
		N	2.29	2.89	3.46	2.50	3.41	2.91	0.34	0.21	0.21	7.33
		P	1.08	1.46	1.73	1.23	1.66	1.41	0.17	0.10	0.11	3.58
		K	6.68	8.32	10.06	7.19	9.89	8.37	0.96	0.60	0.63	21.38
PJTSAU, Hyderabad	Kharif	OC%	0.4	0.39	0.43	0.43	0.44	0.43	0.44	0.44	0.4	0.4
		N	200	175	225	213	225	183	213	211.5	182.6	176.5
		P	30.1	28.9	38.6	40.6	42.6	36.9	36.5	40.3	30.5	29.3
		K	201.6	187	192.2	196.2	192.3	192.7	185.2	195.3	175.6	174.5
	Rabi	OC%	0.4	0.39	0.43	0.44	0.45	0.43	0.43	0.44	0.4	0.4
		N	183	175	212.3	225	225	187	200	212.3	181.5	175.3
		P	29.9	28.9	38.5	40.7	42	37.5	37.8	40.5	30.5	29.4
		K	203.3	187	191.2	195.5	191.2	193.2	192.5	196.3	177.4	175.6
	Summer	OC%	0.52	0.42	0.36	0.23	0.45	0.36	0.44	0.31	0.41	0.38
		N	178	183	182	170	221	211	216.7	213.5	183.7	189.2
		P	23.2	28.1	35.2	36.2	42.4	45.2	36.9	40.5	30.8	38.2
		K	189.2	186.2	193.2	186.2	193.7	177.8	186.6	190.3	178.5	168.2
BAU, Sabour	Kharif	OC g/kg	4.86	4.89	4.85	4.95	4.86	4.94	4.88	4.86	4.97	4.86
		N	241.5	253.1	258.6	263.1	236.4	248.9	234.4	228.7	222.4	220.7
		P	30.4	34.2	37	38.3	32	34.5	32.5	33.8	32.3	33.4
		K	186.5	189.4	197.4	185.1	174.1	192.4	184.7	177	179.6	176.9
	Rabi	O°C g/kg	4.82	4.88	4.84	4.94	4.85	4.93	4.87	4.85	4.96	4.85
		N	239.7	252.6	258.1	262.5	236	248.4	234	228.2	221.9	220.3
		P	30.1	34.1	36.9	38.2	31.9	34.4	32.4	33.7	32.2	33.3
		K	185.1	189	197	184.7	173.8	192	184.3	176.7	179.3	176.6
	Summer	OC g/kg	4.84	4.9	4.86	4.96	4.87	4.95	4.89	4.87	4.98	4.87
		N	240.9	253.9	259.5	263.9	237.2	249.7	235.2	229.4	223.1	221.5
		P	30.3	34.3	37.1	38.4	32.1	34.6	32.6	33.9	32.4	33.5
		K	186.1	190	198.1	185.7	174.7	193	185.3	177.6	180.2	177.5
JAU, Junagadh	Kharif	OC%	5.21	4.9	4.68	4.78	4.13	4.25	4.86	4.23	4.13	4.72
		N	245	253	221	235	243	215	240	235	219	228
		P	31.2	36.2	35.1	30.45	32.5	38.2	30.4	32.1	31.6	32.6
		K	178	189	188	145	162	178	192	189	179	196
	Rabi	OC%	3.21	4.2	4.5	4.6	4.3	4.1	4.2	4.9	4.2	4.3
		N	199	187	177	196	176	179	180	191	202	210
		P	32.1	35.2	32.9	34.2	31.5	30.8	32.4	33.5	36.5	30.1
		K	180	181	179	168	170	175	168	189	179	185
	Summer	OC%	8.4	8.43	8.42	8.52	8.18	8.47	8.35	7.78	8.26	8.09
		N	234	232	240	243	240	236	238	240	236	238
		P	26.51	27.07	29.49	29.87	23.15	25.76	26.41	25.48	26.79	26.23

Name of centre	Season	Nut/treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
		K	252	240	251	246	223	222	214	229	245	228
SKUAST,	Kharif	OC%	4.2	4.3	5.2	5.6	4.3	4.2	4.8	4.1	4.7	4.2
Jammu		N	213	222	225	241	235	223	236	242	215	220
		P	23.1	22.5	28.6	29.3	30.5	31.2	24.5	25.6	28.2	24.3
		K	218	223	243	226	237	220	218	235	230	226
	Rabi	OC%	5.3	5.4	5.2	5.8	5.3	5.1	5.7	5.2	4.9	4.8
		N	203	205	213	210	208	209	211	214	216	218
		P	25.4	20.3	21.6	24.5	22.3	23.6	28.2	24.6	27.3	22.5
		K	198	186	201	205	214	210	212	215	217	220
	Summer	OC%	5.8	6.6	6.8	6.6	6.5	6.3	6.5	6.5	6.4	6.2
		N	220	238	245	225	232	230	235	232	220	215
		P	19.1	23.2	22.12	21.7	21.85	22.1	23.8	22.65	23.1	23.1
		K	122	130	135	128	126	132	131	128	122	118
KAU,	Kharif	OC%	2.26	2.1	1.9	1.87	2.5	2.13	3.2	3.5	2.9	2.7
Thrissur		N	188	175	198	176	185	182	189	176	196	186
		P	18.2	18.5	19.2	17.5	17.6	19.3	17.8	18.8	19.8	20.1
		K	113	145	121	135	111	112	120	125	128	130
	Rabi	OC%	4.3	2.8	3.5	3.6	3.1	2.9	2.8	2.7	2.6	3.1
		N	198	197	201	213	207	189	176	185	192	190
		P	20.1	19.8	21.5	21.9	21.7	20.3	20.9	20.7	21.2	19.8
		K	112	103	115	120	123	128	127	123	131	120
	Summer	OC%	1.26	1.31	1.64	1.58	1.37	1.52	1.68	1.54	1.82	1.63
		N	311	307	339	351	322	327	296	287	318	317
		P	39.5	38.7	48.61	52.05	42.2	47.22	42.34	41.8	47.3	46.8
		K	153	154	172	181	169	165	151	158	161	164
DBSKKV,	Kharif	OC%	1.21	1.12	1.13	1.42	1.07	1.08	1.33	1.22	1.23	1.14
Karjat		N	223.91	220.77	237.08	236.45	234.57	227.05	218.89	220.77	218.27	219.52
		P	11.2	11.4	11.91	11.71	11.61	11.51	10.59	10.69	10.69	10.89
		K	185.92	202.16	208.88	206.36	204.12	196	181.16	190.96	184.52	196.84
	Rabi	OC%	1.1	1.13	1.17	1.16	1.11	1.12	1.02	1.04	1.06	1.05
		N	228.93	231.44	245.86	244.61	242.73	237.71	224.54	226.42	220.15	222.66
		P	12.12	12.32	12.63	12.32	12.52	12.42	11.51	11.61	10.79	11.3
		K	197.4	195.16	192.36	191.52	186.88	190.68	189	186.76	209.44	207.48
	Summer	OC%	1.5	1.9	1.6	2.5	2.8	1.6	1.8	1.9	2.2	2.1
		N	281	288	285	283	315	310	281	235	225	238
		P	16.12	18.54	16.12	17.92	17.92	18.12	21.5	20.5	16.33	16.12
		K	237	262	213	202	202	251	236	226	217	292
Ayodhya	Kharif	OC%	0.417	0.5	0.505	0.467	0.493	0.494	0.45	0.434	0.461	0.463
		N	213.5	230	233.2	235	224	229.4	219	215.75	223.12	233
		P	21	25.1	25	27.9	24.86	24.1	24.6	23.9	25.1	24
		K	270.1	269.1	271.6	270.2	270.8	267.3	251.9	252	269.9	265.7
	Rabi	OC%	0.418	0.501	0.503	0.465	0.491	0.493	0.448	0.43	0.458	0.461
		N	214.6	229	231.9	235.9	223.8	230.5	220.05	213	221.8	233.1
		P	21.9	25	25.87	27	24.1	24.18	23.96	22.1	24.6	23.75
		K	268.1	270.8	270.9	272	268.4	266.2	249.86	253.1	267	265
	Summer	OC%	0.419	0.502	0.504	0.466	0.492	0.493	0.449	0.432	0.46	0.462
		N	213.9	229.68	232.1	235.06	223.6	229.1	219.96	214.9	222.22	234.9
		P	21.87	25.12	25.36	27.66	24.96	24	24.5	23	24.96	24.98
		K	269.9	270.6	272.68	271.1	269.8	266.9	250.1	252.1	268.4	266.9
TNAU,	Kharif	OC%	0.56	0.55	0.59	0.56	0.55	0.55	0.66	0.65	0.57	0.58
Coimbatore		N	244	274	231	257	244	225	322	330	296	233

Name of centre	Season	Nut/treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
		P	19.9	20.9	20	20.7	17.8	20.5	21.9	21.7	20.9	19.5
		K	627	644	666	619	662	643	680	667	628	659
	Rabi	OC%	1.23	1.12	1.1	1.15	1.14	1.18	1.23	1.19	1.18	1.25
		N	189	196	220	212	210	209	208	213	214	218
		P	18.9	16.5	19.5	18.5	19.6	20.6	21.6	20.7	20.8	21.5
		K	524	532	555	524	498	528	502	504	542	536
	Summer	OC%	0.89	0.78	0.85	0.76	0.82	0.74	0.83	0.81	0.57	0.92
		N	199	187	201	206	210	189	205	207	206	200
		P	19.2	17.8	18.2	19.7	19.6	18.6	22.5	21.9	20.8	20.9
		K	221	218	216	205	217	209	210	203	208	204
RSVKVV,	Kharif	OC%	0.38	0.42	0.64	0.50	0.42	0.40	0.46	0.48	0.44	0.38
Gwalior		N	172	184	246	200	184	180	192	196	188	172
		P	10.40	9.20	10.40	8.80	10.40	10.00	10.40	8.80	10.4	8.2
		K	525	531	531	563	538	494	469	494	513	513
	Rabi	OC%	0.38	0.42	0.62	0.52	0.40	0.38	0.50	0.50	0.46	0.36
		N	172	184	241	207	180	172	200	200	192	165
		P	10.80	10.40	10.80	9.20	10.80	10.00	10.80	9.20	9.6	8.1
		K	500	485	520	535	430	445	460	530	520	500
	Summer	OC%	0.40	0.41	0.64	0.56	0.42	0.40	0.46	0.48	0.46	0.38
		N	180	185	246	221	184	180	192	196	192	172
		P	11.00	8.20	10.40	8.80	10.40	10.80	9.60	8.40	10	9.2
		K	495	500	500	545	425	460	445	490	495	485
CSHAU	Kharif	OC%	0.45	0.27	0.56	0.43	0.51	0.41	0.45	0.43	0.47	0.48
		N	185	189	176	182	190	192	177	186	189	178
		P	10.45	8.91	9.56	7.53	8.88	8.67	10.23	7.96	8.23	7.98
		K	221	231	198	201	212	215	214	208	204	206
	Rabi	OC%	0.43	0.28	0.51	0.41	0.57	0.42	0.44	0.42	0.46	0.49
		N	176	180	221	204	189	179	198	189	195	182
		P	10.23	9.25	10.14	8.98	10.65	10.23	10.40	9.80	10.4	8.9
		K	445	325	241	325	333	321	302	256	278	298
	Summer	OC%	0.40	0.36	0.62	0.70	0.46	0.45	0.56	0.49	0.58	0.49
		N	125.50	127.00	135.00	148.00	130.50	129.50	142.00	135.00	131.33	128.67
		P	14.35	14.50	25.90	23.00	20.35	23.35	24.00	19.67	22.00	21.00
		K	311.50	302.50	333.33	284.00	313.50	295.00	327.50	258.00	324.33	338.67
AAU,	Kharif	OC%	6.64	6.62	6.7	6.72	6.67	6.69	6.69	6.67	6.65	6.68
Jorhat		N	221.5	222.8	231.5	235	234	230.5	229.5	232	227.8	233
		P	7.7	7.9	8.6	8.8	8.7	8.6	8.4	8.5	8.6	8.3
		K	83.5	85	90	91.8	90	87.8	87.3	85.8	87.5	90
	Rabi	OC%	6.61	6.66	6.5	6.8	6.2	6.72	6.68	6.08	6.24	6.34
		N	220	215	228	231	236	225	227	235	223	235
		P	7.02	6.98	8.4	8.2	8.45	8.23	7.98	8.2	8.4	8.23
		K	82	7.9	7.12	8.67	90	82	98	79	92	88
	Summer	OC%	6.08	6.12	6.71	6.45	6.56	6.51	6.78	6.77	6.12	6.34
		N	218	221	226	228	232	231	226	231	224	233
		P	7.5	7.01	8.12	8.34	8.6	8.11	8	7.82	8.02	7.98
		K	77	82	89	91	89	83	87	89	92	95
BCKV,	Kharif	OC%	0.92	0.90	1.02	1.06	1.06	1.04	0.88	0.92	0.84	0.87
Kalyani		N	232.20	210.80	262.20	258.70	238.40	234.10	222.40	214.80	210.80	224.70
		P	55.40	57.80	68.70	69.20	67.20	64.80	62.80	58.40	68.70	78.20
		K	170.20	160.10	195.40	192.70	178.20	165.80	168.40	168.20	174.20	200.80
	Rabi	OC%	0.84	0.82	0.88	0.89	0.90	0.88	0.82	0.78	0.76	0.78

Name of centre	Season	Nut/treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
		N	222.80	210.40	245.80	240.80	217.90	219.40	200.80	190.70	198.40	190.20
		P	48.20	46.80	55.80	52.10	50.80	49.70	45.20	42.80	60.80	70.00
		K	162.20	148.80	169.40	172.80	158.20	148.20	143.70	149.50	162.80	172.90
	Summer	OC%	0.85	0.89	0.97	0.98	1.03	1.01	0.86	0.88	0.81	0.83
		N	220.2	197.6	254.2	244.7	223.9	227.4	204.5	195.7	203.0	195.5
		P	49.4	47.1	60.7	57.7	52.3	54.2	50.0	45.8	64.7	71.0
		K	163.1	152.1	192.1	196.2	165.1	151.4	158.6	161.4	164.7	194.6
CSAU&T,	Kharif	OC%	0.53	0.51	0.5	0.46	0.49	0.44	0.45	0.42	0.45	0.41
Kanpur		N	215	225	231	235	220	228	219	217	220	233
		P	20	24	25	26	24	22	28	27	25.1	24
		K	270.1	269.1	271.6	270.2	270.8	267.3	251.9	252	269.9	265.7
	Rabi	OC%	0.41	0.58	0.49	0.46	0.49	0.49	0.44	0.43	0.45	0.46
		N	212.6	229	230.9	225.9	223.8	230.5	210.05	213	221.8	231.1
		P	21.9	25	25.87	27	24.1	24.18	23.96	22.1	24.6	23.75
		K	268.1	270.8	240.9	272	218.4	266.2	259.86	253.1	287	265
	Summer	OC%	0.452	0.468	0.505	0.490	0.455	0.488	0.460	0.455	0.478	0.445
		N	203.40	210.60	227.25	220.50	204.75	219.60	207.00	204.75	215.10	200.25
		P	13.43	13.58	13.70	13.60	13.48	13.60	13.55	13.45	13.52	13.44
		K	201.20	206.50	224.80	218.10	200.40	214.25	204.40	199.60	210.80	197.20
HPKVV,	Kharif	OC%	11.5	11.9	12.6	12.9	12.1	12.6	11.3	11.1	11	11.5
Palampur		N	360.4	373.2	421.1	417.1	404.5	366.7	399.7	400.2	385.4	385.9
		P	52.2	51.6	60.2	62.4	55.2	58.4	57.8	58.8	57.5	55.8
		K	156.9	160.8	143.5	147.5	160.7	139.2	178.8	152.5	175.8	196.4
	Rabi	OC%	11.9	12.2	13	13	12.8	12.9	12.4	12.1	11.8	11.7
		N	370.7	383.2	435.4	425.2	415.6	378.2	412.3	410.4	396.7	397.2
		P	45.5	54.2	60.8	64.2	58.4	60.5	58.6	60.5	59.8	57.4
		K	172.5	179.7	154.2	158.5	172.8	149.5	179.8	169.5	184.8	208.5
	Summer	OC%	10.200	11.230	12.320	13.000	11.200	11.230	11.450	11.360	11.235	10.120
		N	302.40	305.60	317.25	321.50	305.75	309.60	307.00	304.75	305.10	300.25
		P	13.43	13.58	13.70	13.60	13.48	13.60	13.55	13.45	13.52	13.44
		K	171.20	176.50	154.80	168.10	160.40	154.25	164.40	199.60	166.80	197.20
UAS,	Kharif	OC%	0.45	0.52	0.48	0.42	0.44	0.42	0.41	0.42	0.43	0.42
Raichur		N	202.6	209	210.9	205.9	213.8	220.5	210.05	213	211.8	221.1
		P	21.9	25	25.87	27	24.1	24.18	23.96	22.1	24.6	23.75
		K	208.1	200.8	240.9	272	208.4	266.2	209.86	253.1	257	265
	Rabi	OC%	0.452	0.468	0.505	0.490	0.455	0.488	0.460	0.455	0.478	0.445
		N	203.40	210.60	227.25	220.50	204.75	219.60	207.00	204.75	215.10	200.25
		P	13.43	13.58	13.70	13.60	13.48	13.60	13.55	13.45	13.52	13.44
		K	201.20	206.50	224.80	218.10	200.40	214.25	204.40	199.60	210.80	197.20
	Summer	OC%	5.8	6.3	7.1	7.1	6.8	6.8	5.9	6.3	6.7	6.9
		N	194	176	198	194	186	191	173	184	188	186
		P	9.9	13	14.1	16.1	14.9	14.3	15.2	15.4	15.0	12.5
		K	365	357	367	354	374	362	343	365	364	370
BHU,	Kharif	OC%	0.41	0.48	0.45	0.53	0.46	0.50	0.51	0.54	0.52	0.57
Varanasi		N	186.8	186.7	185.0	186.9	196.7	205.9	198.7	211.3	227.9	227.7
		P	11.4	12.2	12.7	13.9	14.1	13.2	14.0	16.0	15.0	18.1
		K	183.6	174.5	180.8	178.0	171.4	186.0	192.0	188.1	196.2	199.7
	Rabi	OC%	0.38	0.42	0.40	0.47	0.41	0.44	0.45	0.48	0.46	0.51
		N	174.3	165.6	164.0	165.7	174.4	182.6	176.2	187.4	202.1	201.9
		P	10.7	11.4	11.9	12.9	13.1	12.3	13.0	14.9	14.0	16.9
		K	171.4	162.9	168.8	166.1	159.9	173.6	179.2	175.5	183.2	186.4

Name of centre	Season	Nut/treat	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
	Summer	OC%	0.39	0.43	0.41	0.48	0.42	0.45	0.46	0.49	0.47	0.52
		N	177.9	168.9	167.4	169.1	178.0	186.4	179.8	191.2	206.3	206.0
		P	10.9	11.6	12..1	13.2	13.4	12.6	13.3	15.2	14.3	17.2
		K	174.9	166.2	172.2	169.5	163.2	177.16	182.81	179.12	186.9	190.2

10. ANNEXURE

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Annexure-II
Price (Rs./q) & Calorie per 100gm for (2023-24)

Crops	Price (Rs./q) 2022-23	Price (Rs./q) 2023-24	Cal./ 100 gm	Crops	Price (Rs./q) 2022-23	Price (Rs./q) 2023-24	Cal./ 100 gm
All Fodders**	210	233	16	Knolkhol**	550	610	43
All green manuring**	315	345	16	Ladyfinger**	1650	1800	35
Amaranthus grain**	5500	6000	49	Lentil /Masur*	5500	6100	343
Arhar/Pigeonpea/* Redgram	6600	7200	335	Linseed**	4595	4750	530
Baby Corn**	3300	3650	125	Maize(Grain)*	1962	2100	342
Barley*	1635	1800	336	Maize (green cobs)**	1.65/ cob or 495/q	1.85/ cob or 510/q	1
Beetroot**	550	650	25	Maize Sweet Corn**	2035	2150	342
Berseem (seed)**	11000	12100	344	Marigold**	2200	2350	4
Bitter Gourd**	1100	1210	25	Rapeseed& Mustard*	4620	4950	541
Blackgram/Urad*	6600	7250	347	Gobi sarson/Hayola**	3000	3250	541
Bottle gourd (Lauki)**	2200	2450	12	Niger Seed*	7287	7450	515
Brinjal**	1210	1350	24	Oat**	1623	1750	374
Broccoli**	3000	3300	45	Onion (big)**	1650	1800	50
Buck Wheat**	1100	1250	346	Pea*	7040	7650	315
Cabbage**	550	610	27	Pea (veg.)**	2200	2450	93
				Pearlmillet/Bajra**	2350	2500	361
Carrot**	1100	1220	48	Potato**	660	720	97
Cassava**	1845	2050	134	Pumpkin**	1760	1875	25
Castor**	4950	5450	440	Radish (White)**	550	615	17
Cauliflower**	550	610	66	Ragi/Fingermillet**	3578	3850	328
Chillies(green)**	2750	3050	29	Rice(coarse)*	1950	2150	346
Clusterbean **	3520	3950	35	Ricebean fodder**	235	275	16
Coleus**	2300	2550	86	Ridge /Round gourd**	3300	3550	17
Coriander(S)**	6050	6650	288	Safflower**	5440	5850	356
Coriander(L)**	450	495	49	Sesamum/Gingely/ Til**	7830	8150	563
Cotton(F-4/1180)*	6080	6700	332	Sorghum/Jowar*	2970	3250	349
Cotton (H-1380)*	6380	7000	332	Soyabean (b)*	3190	3450	432
Cowpea/Lobia(S)**	2950	3350	323	Soyabean (y)*	3740	4050	432
Cowpea (Veg.)pod**	1750	1950	48	Sugar beet**	1073	1175	48
Cucumber**	780	890	13	Sugarcane*	350	385	34
Cumin/SiyaZeera**	22000	24500	356	Summer Squash**	1600	1750	16
Fennel grain**	5500	6000	31	Sweet Potato**	1650	1780	120
Fennugreek (seed)**	5610	6100	333	Tomato (green)	825	900	23
Fennugreek leaves /spinach**	1625	1750	49	Toria/Raya/*	4510	4850	541
Field bean**	2200	2350	48	Turmeric**	7700	7350	349
Fieldpeas/Veg.peas**	3300	3550	93	Wheat*	2015	2150	346

Crops	Price (Rs./q) 2022-23	Price (Rs./q) 2023-24	Cal./ 100 gm	Crops	Price (Rs./q) 2022-23	Price (Rs./q) 2023-24	Cal./ 100 gm
Frenchbeans**	2200	2375	26	White gingely**	7810	8350	563
Garlic**	5720	5950	145	Rajmash/Rajmah**	6270	6750	346
Ginger**	2200	2450	67	Sunflower seed *	6400	7000	620
Gram/Chickpea/ Bengalgram*	5082	5250	360	Rice Basmati*	1950	2085	346
Greengram/Moong*	7755	8350	334	Horse gram**	3850	4250	321
Groundnut*	5850	6050	567	Indian bean**	2750	3950	26

* Minimum support price fixed by Government of India for 2023-24.
**Farm gate price at OFR Centre.

Annexure-III

S.N	COMMON NAME	Botanical name	Hindi Name
1	Ajwain/Ajowan Caraway	Trachyspermum copticum	Ajwain
2	Ashwagandha/India Ginseng	Withania somnifera(L.) Dunal	Ashwagandha
3	Barley	Hordeum vulgare L.	Jau
4	Black caraway /Fennel flower	Nigella sativa Sumac	Kalongi
5	Black gram	Phaseolus mungo L.	Urd/Urd bean
6	Bottle gourd	Lagenaria siceraria (Mol.)/L.vulgaris L.	Lauki
7	Brinjal/Egg plant	Solanum melongena L.	Baigen
8	Broccoli	Brassica oleracea (L.)var.italica	Hari Phool Gobhi
9	Cabbage	Brassica oleracea (L.)var.capitata	Band gobhi/Patta gobhi
10	Castor	Ricinus communis L.	Arandi
11	Cauliflower	Brassica oleracea L.var botrytis	Phool Gobhi
12	Chickpea	Cicer arietinum L.	Chana
13	Chickpea /Bengal gram	Cicer arietinum L.	Chana
14	Chicory	Cichorium intybus L.	Kasni
15	Chilli	Capsicum annum L.	Mirch
16	Cluster bean	Cyamopsis tetragonoloba L.Taub .	Guar/Guar bean
17	Coriander	Coriandrum sativum L.	Dhania
18	Cotton	Gossypium hirstum L.	Kapaas
19	Cowpea	Vigna unguiculata (L)Walp.	Lobia
20	Cumin	Cuminum cyminum L.	Jeera
21	Egyptian clover	Trifolium alexandrinum L.	Berseem
22	Fenugreek	Trigonella foenum -graecum L.	Methi
23	Finger millet	Eleusine coracana (L.)Gaertn.	Ragi/Mandua
24	Garden Cress/ Water Cress	Lepidium sativum L.	Chandrasur
25	Garlic	Allivum sativum L.	Lahsun
26	Garlic	Allium sativum L.	Lehsum
27	Green gram	Phaseolus radiatus (L,) Wilczek	Moong/Moong bean
28	Groundnut	Arachis hypogea L.	Moongfali
29	Hyacinth bean/indian bean	Dolichis lablab L./D.purpureus/ Lablab purpureus	Seim
30	Indian Mustard	Brassica juncea Coss.	Sarson /Raya
31	Indian rape	Brassica campestris L.var .Toria	Toria
32	Lady finger /Okra	Abelmoschus esculantus Moench .	Bhindi
33	Lentil	Lean culinaris Medikus	masoor
34	Linseed /Flax /Flax seed	Linum usitatissinum L.	Alsi
35	Maize	Zea mays L.	Makka
36	Marigold	Calendula officinalis L.	Gainda
37	Mustard	Brassic campestris L.var. Yellow sarson/Brown sarson	Sarson
38	Oat	Avena sativa L.	Jaee
39	Onion	Allium cepa L.	Pyaz
40	Pearl millet	Pennisetum americanum L.	Bajra

S.N	COMMON NAME	Botanical name	Hindi Name
41	Pea /Vegetable Pea	Pisum sativum L.	Mastar
42	Pigeon pea	Cajanus cajan (L) Milsp	Arhar /Tauar
43	Potato	Solonum tuberosum	Aloo
44	Psyllium	Plantago ovata Forssk	Isabgol
45	Pumpkin	Cucurbita pepo Duch .	Kaddu
46	Radish	Raphanus sativus L.	Mooli
47	Rape/Oilseed rape	Brassica napus var.napus	Gobhi sarson
48	Red /Purple Amaranth	Amaranthus cruentus L.	Chauiai/ Ramdana /Rajgira
49	Rice /Paddy	Oryza sativa L.	Dhan
50	Ridge groud /Sponge groud	Lufa acutangula /L.aegyptica/L. Cylindrica	Torai
51	Sesame	Sesamum indicum L.	Till
52	Sorghum	Sorghum bicolor (L.)Moench .	Jowar
53	Soybean	Glycine max L.(Merr.)	Soybean
54	Spinach	Spinacia oleracea L.	Palak
55	Suger beet	Beta vulgaris L.	Chukander
56	Sugarcane	Saccharum officinarum L.	Ganna
57	Sunflower	Helianthus annus L.	Surajmukhi
58	Sunhemp	Crotolaria juncea L.	Sanai
59	Sweet potato	Ipomoea batatas (L.)Lam.	Sakarkand
60	Tomato	Solanum lycopersicumL./Lycopersicon esculantum/L.lycopersicum	Tamatar
61	Turmeric	Curcuma longa L.	Haldi
62	Wheat	Triticum aestivum L.emend .Fiori $ Paol.	Gehun

NOTE

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