वार्षिक प्रतिवेदन
2021

ANNUAL REPORT
2021

आज़ादी का अमृत महोत्सव

भा.कृ.अनु.प. भारतीय कृषि प्रणाली अनुसंधान संस्थान
मोदीपुरम, मेरठ-250 110, भारत

ICAR-Indian Institute of Farming Systems Research
Modipuram, Meerut - 250 110, India

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Annual Report 2021

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Modipuram, Meerut-250 110, Uttar Pradesh

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Note : This compilation is a joint contribution of all the scientists and other staff of institute, and their role is duly acknowledged.

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CONTENTS

PREFACE

ICAR-Indian Institute of Farming Systems Research, Modipuram has 70 years of history working tirelessly to strengthen and evolve farming practices to increase the food and nutritional security, profitability, sustainability, resource use efficiency, employability, and adaptation to climate change for the country. During the year, the institute operated 24 institute funded projects, 15 outside funded projects, 2 contract research projects and a consultancy project. Apart from these two national schemes namely All India Coordinated Research Project on Integrated Farming Systems (AICRP-IFS) and All India Network Programme on Organic Farming (AINP-OF) were operated in 26 states/ UTs.

Three Research Divisions namely Integrated Farming Systems, Cropping Systems and Resource Management, Organic Agriculture Systems, one section namely Technology Transfer and Assessment and Project Coordination Unit were formally notified during the year as per the recommendation of QRT and approval by ICAR. Refinement of farming system models, development of package of practices, initiation of study on natural farming at national level were undertaken. Although, COVID-19 pandemic partially affected our extension activities during the year, yet for the upliftment of the weaker sections of the farming community, technological backstopping was provided through the 'Schedule Caste Sub Plan' (SCSP) by covering about 1373 housholds in 17 villages in 4 districts of Uttar Pradesh and Uttarakhand. Other important ICAR run programmes like 'Farm, Innovations, Resources, Science and Technology' (Farmers FIRST) was implemented in 3 villages of Muzaffarnagar district in Uttar Pradesh. Information Technology and social media-based extension services through whatsapp, telephone, facebook, youtube, twitter was strengthened which helped to reach stakeholders across India.

Under the AICRP on IFS, 60 prototype IFS models were developed partnering with SAUs and ICAR institutes over the years. Emphasis was given for scaling of these models. Selected states like Kerala, Odisha and Tamil Nadu are implementing the IFS models in large scale covering about 79 districts. Under AINP-OF scheme, organic farming packages for 62 cropping systems suitable to 16 states have been developed besides identifying 104 varieties of 21 major crops and 8 integrated organic faming models. During the financial year 2021-22, institute utilized 99.2% of allocated grant. Revenue of Rs. 68.41 lakh was generated.

I express my gratitude to Dr. Trilochan Mohapatra, Secretary, DARE and Director General, ICAR, New Delhi and Dr. S K Chaudhari, Deputy Director General (NRM), ICAR, New Delhi for their constant guidance, encouragement, and support. My appreciation is also due to Dr. S. Bhaskar, ADG (AAF&CC), ICAR, New Delhi and to other staff members of NRM division for cooperation and support. I appreciate the Editorial Committee in compiling and timely publication of the Annual report.

(A S Panwar)

कार्यकारी सारांश

1. सस्थान का नाम व पता : **भाकृअनुप–भारतीय कृषि प्रणाली अनुसंधान संस्थान,**
मोदीपुरम, मरेठ (उत्तर प्रदेश) 250110

2. बजट रू (2019–20)

क. संस्थागत (रू लाख में)

प्रावधान	व्यय	सरकारी अनुदान	आवंटनः आंतरिक + परिषद के शेयर में से मुख्याालय द्वारा प्रदान की गई अतिरिक्त राशि	कुल आवंटन (कॉलम3+4)	सरकारी मद से हुआ व्यय	राजस्व सृजन से हुआ व्यय	कुल व्यय (कॉलम 6+7)
1	2	3	4	5	6	7	8
2061.62	2045.31	2061.62	–	2061.62	2045.31	–	2045.31

ख. वाह्यः स्त्रोत (रू. लाख में)

स्त्रोत	बजट	व्यय
पेंशन एवं अन्य सेवानिवृत्ति लाभ	459.00	444.77
कुल	**459.00**	**444.77**

ग. उत्पन्न राजस्व (लाख में)

कृषि उपज	46.31	
लाइसेंस शुल्क/पानी शुल्क	3.66	
विविध	13.80	
ऋण और अग्रिम पर ब्याज	1.27	
टीडीआर पर ब्याज	2.84	
अन्य (रॉयल्टी और संस्थान शुल्क)	0.53	
dy	**68-41**	

3. कर्मचारियों की स्थिति (02.07.2022 तक)

श्रेणी	स्वीकृत	पद पर	रिक्त
वैज्ञानिक			
निदेशक	01	01	00
संभाग के प्रमुख	03	00	03
परियोजना समन्वयकः एआईसीआरपी–आईएफएस	01	00	01
प्रधान वैज्ञानिक	00	03′	00
वरिष्ठ वैज्ञानिक	08	06	02
वैज्ञानिक	28	20	08
उप–योग	**41**	**30**	**14′**
तकनीकी कर्मचारी वर्ग			
श्रेणी–3 (टी–6, 7/8)	02	00	02
श्रेणी–2 (टी–3, टी–4 एवं टी–5)	19	09	10
श्रेणी–1 (टी–1 एवं टी–2)	03	03	00
उप–योग	**24**	**12**	**12**
प्रशासनिक वर्ग			
वरिष्ठ प्रशासनिक अधिकारी	01	01	00
वरिष्ठ वित्त एवं लेखा अधिकारी	01	00	01
सहायक प्रशासनिक अधिकारी	02	02	00
सहायक	08	03	05
यू.डी.सी.	03	03	00
पी.एस.	02	02	00
पी. ए.	02	02	00
आशुलिपिक	01	01	00
एल.डी.सी.	02	02	01
उप–योग	**23**	**16**	**07**
सहायक कर्मचारी वर्ग			
सहायक	23	23	00
कुल योग	**111**	**81**	**33**

03 प्रधान वैज्ञानिक पद अधिक हैं और संभाग प्रमुख के स्वीकृत पद के प्रति समायोजित हैं।

अनुसंधान फार्म

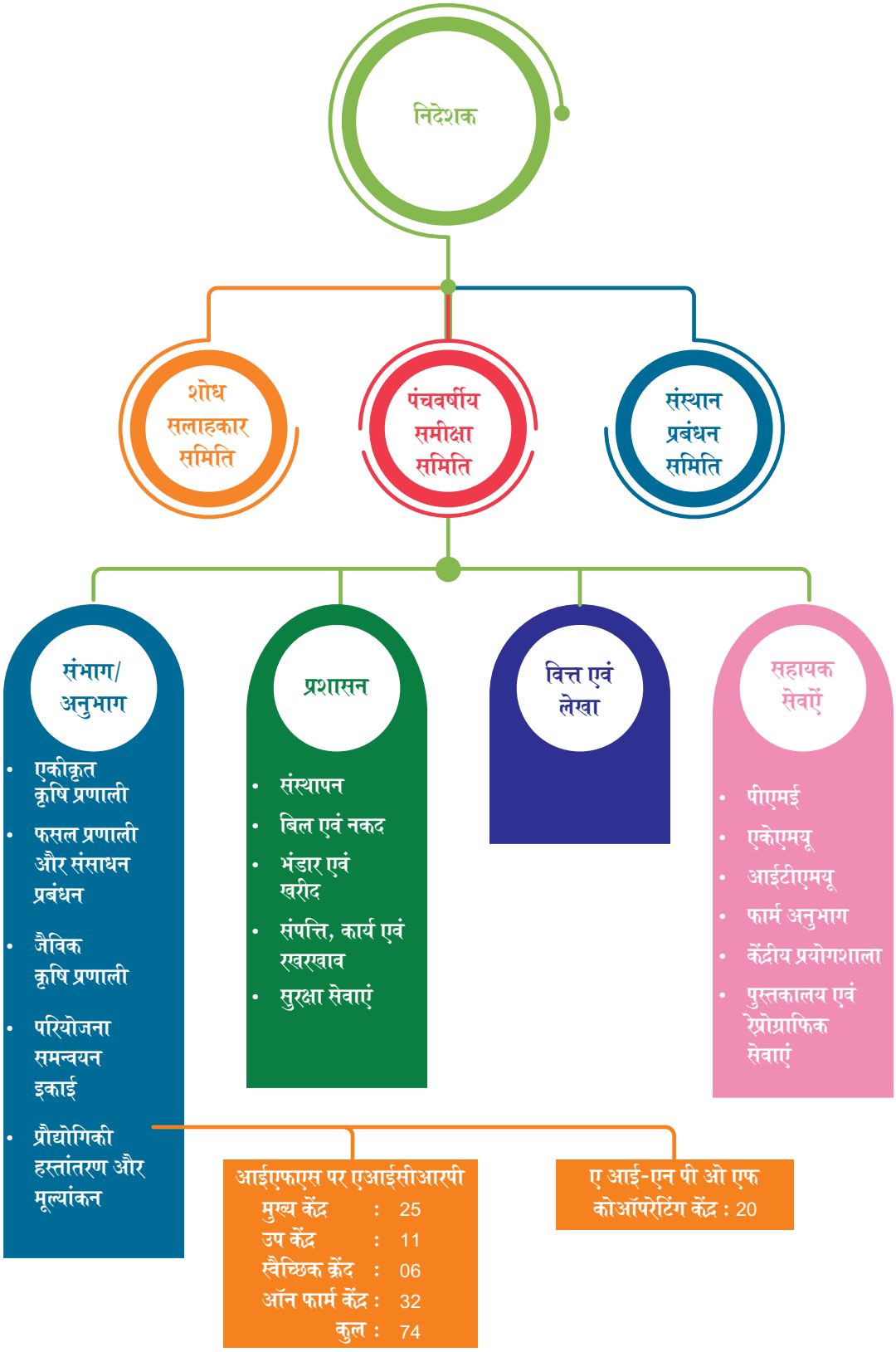
मुख्य फार्म:

आई.सी.ए.आर.–आई.आई.एफ.एस.आर. का मुख्य फार्म 29° 4′ 33′′ उ. अक्षांश और 77° 42′ 23′′ पू. देशांतर पर स्थित है, जिसमे कुल 26 हेक्टेयर भूमि शामिल है तथा यह क्षेत्र ''ए.–सी.'' तक अनुसंधान ब्लॉक में बंटा हुआ है। कुछ प्रमुख अनुसंधान प्रयोग जो मुख्य फार्म में स्थापित किए गए हैं; उत्तर प्रदेश के पश्चिमी मैदानी क्षेत्र के लिए सतत आईएफएस मॉडल का विकास, बागवानी आधारित एकीकृत खेती, संरक्षण कृषि पद्धतियों के तहत फसल गहनता के लिए विभिन्न फसल अनुक्रमों का मूल्यांकन, फसल प्रणाली/कृषि प्रणाली दृष्टिकोण के माध्यम से अनुकूलन और शमन क्षमता, जैविक खेती के तहत विभिन्न फसल प्रणालियों में पोषक तत्व प्रबंधन उत्पादन प्रणाली, जैविक खेती के लिए कीट और रोग प्रबंधन पैकेज का विकास, जैविक खेती पर अखिल भारतीय नेटवर्क कार्यक्रम (एआई–एनपीओएफ)– भारत के विभिन्न क्षेत्रों के लिए एकीकृत जैविक खेती प्रणाली (आईओएफएस) मॉडल का विकास, मत्स्य पालन मॉड्यूल पर आईएफएस मॉडल में कीटनाशकों के अनुप्रयोग का प्रभाव एवं जलीय कृषि तालाबों से ग्रीनहाउस गैस उत्सर्जन की माप, कृषि प्रणालियों के परिप्रेक्ष्य में मौसम आधारित कृषि तकनीकी हस्तक्षेप, कृषि परिवारों की आजीविका में सुधार के लिए और कृषि आजीविका सुधार के लिए सजावटी और बायोफ्लोक मत्स्य पालन मॉड्यूल की स्थापना पर खोजपूर्ण अध्ययन। फार्म मशीनरी यार्ड भी मुख्य फार्म में स्थित है जिसमें ट्रैक्टर, सीड ड्रिल, जीरो टिल, लेजर लैंड लेवलर, पावर टिलर, थ्रेशर, रोटावेटर आदि यार्ड में कुछ भारी उपकरण शामिल हैं।

सिवाया फार्म:

भा.कृ.अनु.प.–आई.आई.एफ.एस.आर. का सिवाया फार्म 29° 5′ 4′′ उ. अक्षांश और 77° 41′ 38′′ पू. देशांतर पर स्थित है, यह 24 हेक्टेयर क्षेत्र फैला हुआ है जिसमे ''डी एवं ई'' अनुसंधान ब्लॉक शामिल हैं। यहां स्थित प्रमुख अनुसंधान प्रयोग हैं: जैविक उत्पादन प्रणाली के लिए फसल सुधार, जैविक और अजैविक खेती के लिए बासमती धान की किस्मों का मूल्यांकन, जैविक वातावरण के तहत सरसों की किस्मों का मूल्यांकन, एकीकृत कृषि प्रणाली के माध्यम से सतत आजीविका उत्पादन, जिसमें गैर–आर्थिक मवेशी शामिल हैं। खाद्य और पोषण सुरक्षा के लिए सब्जी आधारित कृषि प्रणाली मॉडल पर शोध और टिकाऊ उत्पादन और आजीविका के लिए पुनर्योजी कृषि वानिकी आधारित आईएफएस मॉडल का विकास। सिवाया फार्म में एक थ्रेसिंग फ्लोर और फार्म कार्यालय भवन भी स्थित है।

संगठात्मक व्यवस्था



प्रमुख निष्कर्षः

- उत्तराखंड प्रदेश में प्रचलित कृषि प्रणालियों के लाक्षणिक अध्ययन में पाया गया कि प्रदेश के ऊधम सिंह नगर जनपद एवं प्रखंड में 9.5% कृषक परिवार कृषि मषीनों द्वारा किराये के आधार पर आय अर्जित कर रहे थे, जबकि बाजपुर प्रखंड में यह संख्या 13.8% पायी गयी। इन ब्लाकों में फसल+पशुधन प्रमुख कृषि प्रणालियाँ हैं। खरीफ ऋतु के दौरान उत्तराखंड के दोनों प्रखंडों में रोपित धान की खेती प्रमुख फसल के रुप से अपनायी जा रही है।

- उत्तर प्रदेश के पश्चिमी मैदानी क्षेत्र के लिए टिकाऊँ एकीकृत कृषि प्रणाली (आईएफएस) मॉड्ल का विकास 1.5 हेक्टेयर क्षेत्र में किया गया, जिसमें फसल, डेयरी, बागवानी, मत्स्य पालन, मशरुम के साथ–साथ द्वितीयक कृषि क्रियाएं सम्मलित है। इस अध्ययन में यह पाया गया कि आईएफएस के अन्य मॉड्यूलों की अपेक्षा में बागवानी मॉड्यूल में उच्चतम लाभः लागत अनुपात रहा। आईएफएस के विभिन्न मॉड्यूलों में, डेयरी मॉड्यूल के बाद फसल मॉड्यूल में उच्चतम गन्ना समतुल्य उपज प्राप्त की गयी। यह भी देख गया कि पशुधन की अपषिष्ट सामग्री का उपयोग खाद के रुप में किया जा सकता है जिससे उर्वरकों की लागत कम हो जाती है।

- पश्चिमी उत्तर प्रदेश के किसानों की खाद्य एवं पोषण सुरक्षा के लिए 1.5 हेक्टेयर क्षेत्र में सब्जी आधारित कृषि प्रणाली मॉड्ल का परिष्करण भी किया गया। मॉड्ल में अंतः–फसल मॉड्यूल वाली फलों के बगीचें, सब्जी आधारित मॉड्यूल, फसल आधारित मॉड्यूल, और मुर्गी पालन आधारित मॉड्यूल के साथ पॉन्ड डाइक प्रणाली शामिल थे। अंतः–फसलों में मॉड्यूल फल आधारित उच्चतम शुद्ध लाभ दर्ज किया गया जिसके बाद सब्जी आधारित मॉड्यूल का स्थान रहा। विभिन्न मॉड्यूलों में, मुर्गी पालन आधारित (1.0) के साथ पोंड डाइक प्रणाली मॉड्यूल अत्यधिक ऊर्जा सक्षम पाए गए, इसके बाद फसल आधारित मॉड्यूल (1.4) का स्थान रहा।

- टिकाऊ उत्पादन और आजीविका के लिए एक पुनर्योजी कृषि वानिकी आधारित समेकित कृषि प्रणाली के विकास के लिए परियोजना तैयार की गई। सहजन, शाल और सीसम सस्य वानिकी प्रणाली में फसल संयोजन (मूँग, मक्का, बाजरा और ज्वार) के साथ, ज्वार और मूँग की फसलों ने क्रमशः पुआल और फली की उपज के संबंध में बेहतर प्रदर्शन किया।

- आईएफएस मॉड्ल फसल और कुक्कुट उद्यमों के साथ गैर–आर्थिक पशुओं के एकीकरण के साथ विकसित किया गया। यद्यपि फसल मॉड्यूल में उच्चतम लाभः लागत अनुपात (3.98) जबकि नयूनतम लाभः लागत अनुपात गैर–आर्थिक पशुओं के साथ डेयरी मॉड्यूल में दर्ज किया गया। किन्तु मॉड्ल का समग्र लाभःलागत अनुपात विभिन्न मॉड्यूल के वैज्ञानिक एकीकरण के साथ लाभदायक रहा। कृषि व्यवसाय जैसे डेयरी, मुर्गी पालन, फसल आादि का उचित संयोजन किसानों की दी गई कृषि–जलवायु परिस्थितियों और सामाजिक–आर्थिक स्थिति के अनुसार कृषि गतिविधियों में समृद्वि करने में सक्षम है। पशुओं के चारे के रुप में उपयोग किए जाने वाले फसल अवशेषों से चारे की लागत कम होगी। कृषि एवं पशुधन उद्यमों के संयोजन से श्रम की मांग बढ़ेगी और रोजगार के अवसर भी बढ़ेंगे।

- खेत पर काम के बोझ के आँकलन के साथ–साथ विभिन्न कृषि प्रणालियों के अन्तर्गत कृषि उपकरणों का मूल्यांकन और पहचान की गई। उन्नत रुप में निर्मित दरांती के लिए कार्य भार पारम्परिक रुप से निर्मित स्थानीय दरांती के लिए कार्य भार से कम देखा गया। भिंडी में रिंग कटर की कार्य क्षमता बिना किसी नुकसान के 1.1 कि.ग्रा. प्रति 100 वर्गमीटर रही, जबकि भिंडी की पारंपरिक तुडाई में भी कार्य कुषलता वही थी, परन्तु उसमें 8% का नुकसान पाया गया।

- आईएफएस मॉड्ल में जलीय कृषि के एकीकरण के साथ टिकाऊ कृषि उत्पादन प्रणाली के लिए आईएफएस मॉड्ल में पर्यावरण के अनुकूल अंतः क्षेप जैसे मल्चिंग, अन्तःफसलीकरण, यांत्रिक, खरपतवार नियंत्रण को सार्थक पाया गया तथा इनको आई.एफ.एस मॉड्ल में अपनाने की संस्तुति प्रदान की गयी।

- आईपीसीसी 2006 आधारित पद्वति का उपयोग करके 1.5 हेक्टेयर आईएफएस मॉड्ल से ग्रीन हाउस गैस (जीएचजी) उत्सर्जन का अनुमान लगाया गया। आईएफएस मॉड्ल से कुल ग्रीन हाउस गैसों के उत्सर्जन में पषुधन उद्यमों से 63.1% उत्सर्जन रिकार्ड किया गया। सस्य वानिकी एवं कम्पोस्ट पिट कार्बन के सिंक के रुप में कार्य कर आईएफएस मॉड्ल से ग्रीन हाउस गैसों के उत्सर्जन को निष्प्रभावी करने में सहायक सिद्व हुए जो आईएफएस मॉड्ल को कार्बन नकारात्मक मॉड्ल के रुप में प्रतिबिंबित करते हैं।

- केरल, तमिलनाडु और तेलंगाना के किसानों की आजीविका के लिए एकीकृत कृषि प्रणाली का मापन और प्रभाव आँकलन किया गया। किसानों की आय पर एकीकृत कृषि प्रणाली के प्रभाव का मूल्यांकन करने के लिए कोर्सेंड इम्पैक्ट मैचिंग (सीईएम) तकनीक को नियोजित किया गया। अध्ययन के परिणाम से पता चला कि राज्यों में किसानों की आय में कृषि एवं आजीविका सुरक्षा के लिए एकीकृत कृषि प्रणाली को अपनाने की बहुत आवश्यकता है।

- एकीकृत कृषि प्रणालियों पर एआईसीआरपी के अंतर्गत जलवायु स्मार्ट आईएफएस के लिए सतत संसाधन प्रबंधन तैयार किया गया। जिसमें यह पाया गया कि विभिन्न सब्सट्रेट के साथ केले के उद्यमों में मशरुम की खेती जैसी नई प्रौद्योगिकियों के वैज्ञानिक एकीकरण की भूमिका है। अन्य सब्सट्रेट की तुलना में धान की पुआल के साथ मशरुम की खेती में अधिक उपज दर्ज की गई। चिप्स, स्क्वाष, अचार, जैम, शॉस के लिए केले के मूल्यसंवर्धन से फार्म की आय में उल्लेखनीय सुधार हुआ। यह भी पाया गया कि इस जलवायु स्मार्ट आईएफएस मॉड्ल (0.7 हे.) ने संयुक्त राष्ट्र यूएन द्वारा दर्शाये गए 17 एसडीजी में से 13 सतत विकास लक्ष्यों (एसडीजी) को संबोधित किया।

- एकीकृत कृषि प्रणाली पर अखिल भारतीय समन्वित अनुसंधान परियोजना के अर्न्तगत लघु एवं सीमांत किसानों के लिए क्षेत्र विषिष्ट ऑन–स्टेषन एकीकृत कृषि प्रणाली मॉड्ल के अध्ययन में पाया गया कि देश के विभित्र क्षेत्रों में पारिवारिक श्रम द्वारा लागत बचत, निवेश किए गए प्रति रुपये से शुद्ध आय के साथ–साथ मृदा के जैविक कार्बन में सुधार आदि पर अलग–अलग प्रभाव देखा गया। यह देखा गया कि नई एकीकृत विधियों में उन्नत कृषि प्रौद्योगिकियों जैसें एकीकृत पोषक तत्व प्रबंधन, स्थान विशेष पोषण संरक्षण, प्रौद्योगिकी, जैव उर्वरक का उपयोग, फसल चक्र और कृषि प्रणालियों का उपयोग जैसे किसानों को उनकी गतिविधियों की उत्पादन क्षमता तथा पूरे फार्म की लाभप्रदता पर दृष्टि रखने में सहायता करते हैं।

- फसल सुधार कार्यक्रम पर छः वर्षो के अनुसंधान के बाद जैविक उत्पादन प्रणाली के लिए तीन अलग–अलग वंषों से सरसों की नौ नई स्ट्रेन विकसित की गई। नई स्ट्रेन के प्रक्षेत्र पर परीक्षण के दौरान सरसों की वरुणा और आर बी 50, गेहूं की 5–एस आर–05 और एच डी 3226 और बासमती धान की मालवीय बासमती, पी बी 1609 और पी बी 1718 को जैविक उत्पादन प्रणाली के लिए एवं उपयुक्त पाया गया ।

- रबी और खरीफ दोनों मौसमों में 5.0 टन प्रति हेक्टेयर सरसों की खली के प्रयोग के परिणामस्वरुप जैविक उत्पादन पद्धति में एकीकृत उत्पादन पद्धति के बराबर धान की उपज प्राप्त हुई। अन्य जैविक पौषक स्रोतों पर विभिन्न उपचारों के अर्न्तगत सरसों की खली के प्रयोग से सिस्टम उत्पादकता में 24.9 से 76.5 प्रतिशत सुधार हुआ। विभिन्न जैविक पोषक तत्वों के प्रबंधन में अधिकतम प्रणाली उत्पादकता 12.1 टन/हेक्टेयर और शुद्ध लाभ रु. 140522/हेक्टेयर प्राप्त हुआ।

- जैविक खेती में कीट और रोग प्रबंधन पैकेज के तैयार करने के अर्न्तगत बैंगन में फल और प्ररोह बेधक कीट, स्क्लेटेरोटिनिया ब्लाइट और मकड़ी को प्रमुख जैविक शत्रुओं के रुप में दर्ज किया गया। जैविक कीट और रोग प्रबंधन प्रणाली द्वारा बैंगन से प्राप्त उपज (322.05/हेक्टेयर) एकीकृत कीट और रोग प्रबंधन प्रणाली के बराबर प्राप्त हुई।

- वर्ष 2021 के दौरान, 16 राज्यों के 966 जैविक और 83 प्राकृतिक खेती करने वालें किसानों की उत्पादन पद्धतियों के आँकड़े एकत्र कर उनका एक विश्लेषण किया गया और किसान की जैविक खेती के अर्न्तगत उपज अंतर 11 से 76.5 प्रतिशत के मध्य दर्ज की गयी। जो कि वैज्ञानिक तकनीक से जैविक खेती को बढ़ावा देकर अधिक उत्पादन प्राप्त करने की संभावना को दर्शाता है।

- विभिन्न फसल प्रणालियों में, मक्का (पॉपकॉर्न)–आलू–भिंडी–ढैंचा हरी खाद प्रणाली के तहत उच्चतम धान समुतल्य उपज दर्ज की गई। इसके बाद बासमती धान–गेंहू–ढैंचा हरी खाद प्रणाली का स्थान रहा। जैविक और प्राकृतिक खेती की भौगोलिक स्थिति आधारित (जियोटैग्ड) विष्लेषण के दौरान कृषक प्रक्षेत्र–स्तर फसल की पैदावार की अपेक्षा 20.73–29. 12 प्रतिशत के मध्य उपज अंतर पाया गया।

- बासमती चावल–गेंहू प्रणाली में प्राकृतिक खेती के आगतों के मूल्यांकन के अर्न्तगत वैज्ञानिक तकनीक से जैविक खेती की अपेक्षा षून्य बजट प्राकृतिक खेती (जेड.बी.एन. एफ) में पहले, दूसरे और तीसरे वर्ष के दौरान बासमती चावल की उपज में क्रमशः 23.4, 66.2 और 58.8 प्रतिशत की कमी देखी गयी। तीसरे वर्ष के दौरान वैज्ञानिक

जैविक खेती पैकेज और एकीकृत फसल प्रबंधन की तुलना में जेडबीएनएफ के अर्न्तगत गेंहू की फसल की उपज भी क्रमशः 62.1 ओर 72.5 प्रतिशत कम दर्ज की गयी।

- मानव प्रतिरक्षा तंत्र को मजबूत करने के उद्देश्य से ठोस और तरल जैविक गुड़ के लिए प्रक्रिया और प्रोटोकॉल का विकास कर किसानों में प्रचालित किया गया।
- भारत में कृषि क्षेत्र से ग्रीनहाउस गैसों के उत्र्सजन को कम करने के लिए नाइट्रोजन अवरोधकों के उपयोग के साथ–साथ सीधी बुआई वाली धान की फसल (डीसआर) तकनीक को अपनाना एक बेहतर विकल्प हो सकता है।
- भारत के गंगा के मैदानी क्षेत्रों में विविध फसल प्रणालियों के अंतर्गत संसाधन संरक्षण प्रौद्योगिकियों का दीर्घकालिक उपयोग मृदा के भैतिक–रासायनिक एवं मिट्टी जैविक गुणों के रुप में मिट्टी की जैव विविधता में सुधार की एक बेहनर तकनीक सिद्ध हुई है।
- मइक्रोबियल कंसोर्सिया के साथ धाल के भूसे को भूमि में मिलाने की तकनीक का उपयोग न केवल मृदा के जैविक कार्बन स्तर में सुधार करने में मदद करता है अपितु इन अवषेषों को जलाने के कारण होने वाले वायुमंडलीय प्रदूषण को भी कम करता है।
- समय–समय पर फसल प्रणालियों के एटलस में सुधार कर देश की लगातार बढ़ती आबादी के भरण–पोषण के लिए भविष्य पर फसल योजनाओं की तैयारी के बारे में ठोस जानकारियों का संकलन किया जा रहा है और इससे नीति निर्माताओं को कृषक समुदाय के लिए बेहतर नीतियां तैयार करने में सहायक सिद्ध होगा।
- व्याधि एवं कीट नियंत्रण उपायों के जैविक रुप से विकसित उपयोग ने सब्जी की फसलों में रोग की गंभीरता को काफी कम करने के साथ–साथ आलू और टमाटर की फसलों में अधिक उपज दर्ज की गई।

EXECUTIVE SUMMARY

Budget (2021-22)

1. Institute Budget (Rs in Lakhs)

Plan					Non Plan		
Provision	Expenditure	Govt. Grant	Allocation internal + additional amount provided by Hqrs out of Council shares	Total Allocation (col. 3+4)	Exp. Out of Govt. Grant	Exp. Out of revenue generation	Total expenditure (col. 6+7)
1	2	3	4	5	6	7	8
2061.62	2045.31	2061.62	-	2061.62	2045.31	-	2045.31

2. External sources (in Lakhs)

Source	Budget	Expenditure
Pension and other retirement benefits	459.00	444.77
Total	**459.00**	**444.77**

3. Revenue generated (in Lakhs)

Farm Produce		46.31
License fee/ water charges		3.66
Miscellaneous		13.80
Interest on loan and advances		1.27
Interest on TDR		2.84
Others (Royalty and Inst. Charges)		0.53
Total		**68.41**

4. Staff position (As on 02.07.2022)

Category	Sanctioned	In Position	Vacant
Scientific			
Director	01	01	00
Head of Division	03	00	03
Project Coordinator – AICRP, IFS	01	00	01
Principal Scientist	00	03*	00
Senior Scientist	08	06	02
Scientist	28	20	08
Sub Total	**41**	**30**	**14***
Technical Staff			
Category-III (T-6, 7/8)	02	00	02
Category-II (T-3, T-4 & T-5)	19	09	10
Category-I (T-1 & T-2)	03	03	00
Sub Total	**24**	**12**	**12**
Administrative Staff			
Sr. Administrative Officer	01	01	00
SF & A O	01	00	01
A A O	02	02	00
Assistant	08	03	05
U D C	03	03	00
P S	02	02	00
P A	02	02	00
Stenographer	01	01	00
L D C	03	02	01
Sub Total	**23**	**16**	**07**
Supporting Staff			
Supporting	23	23	00
Grand Total	**111**	**81**	**33**

* 03 Principle Scientist positions are excess and adjusted against sanctioned position of Head of Division.

RESEARCH FARM

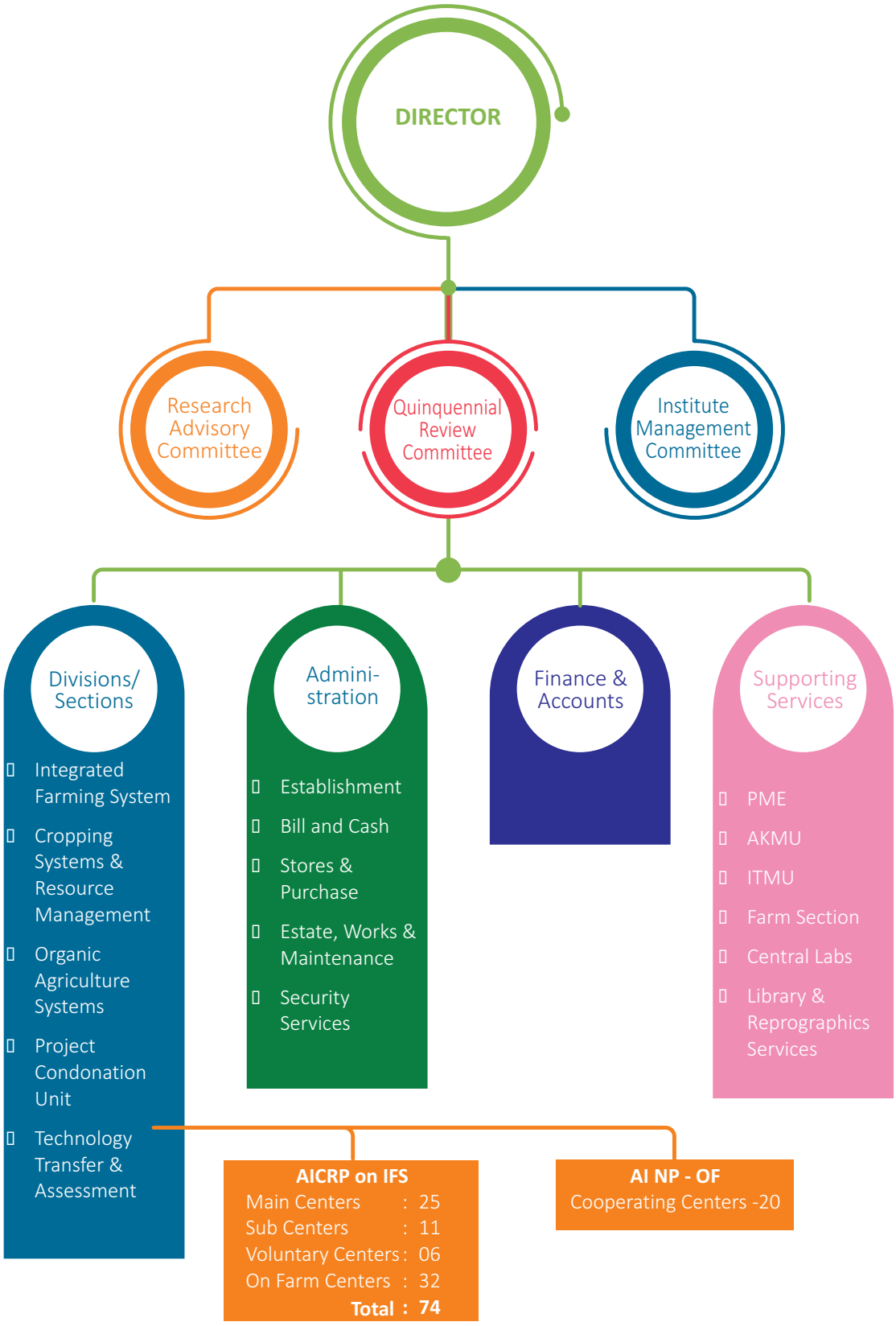
Main farm:

The main farm of ICAR IIFSR is located at 29° 4' 33'' N Latitude and 77° 42' 23'' E Longitude, it covers a total area of 26 ha. comprising of Research Blocks from 'A-C'. Some of the major research experiments that are established in the main farm are; Development of Sustainable IFS Model for Western Plain Zone of Uttar Pradesh, Horticulture based integrated farming; Evaluation of different cropping sequences for crop intensification under CA practices; Adaptation and mitigation potential through Cropping System/Farming System approach; Nutrient management in different cropping systems under organic production systems; Development of pest and disease management package for organic farming; All India Network Programme on Organic Farming (AI-NPOF) - Modipuram Centre; Development of Integrated Organic Farming System (IOFS) models for different regions of India; Influence of pesticides application in IFS model on fisheries module and measurement of GHGs emission from aquaculture ponds, Weather based on-farm technological interventions in farming systems perspective for improving livelihood of farm households and Exploratory study on establishment of Ornamental and Biofloc fisheries modules for Farm livelihood improvement. Farm machinery yard is also situated in main farm. Tractors, seed drill, zero till, laser land leveller, power tiller, threshers, rotavators etc. are some of the heavy equipments in the yard.

Siwaya Farm:

Siwaya farm of ICAR IIFSR is located at 29° 5' 4'' N Latitude and 77° 41' 38'' E Longitude, it covers an area of 24 ha. with research blocks D and E. Major research experiments that are situated here are, Crop improvement for organic production system; Evaluation of Basmati rice varieties for organic and Inorganic cultivation; Evaluation of mustard varieties under organic environment; Sustainable livelihood generation through IFS involving uneconomic cattle; Refinement of Vegetable Based Farming System Models for Food and Nutritional Security and Development of regenerative Agroforestry based IFS model for sustainable production and livelihood. A threshing floor and farm office building is also situated at Siwaya Farm.

ORGANOGRAM


DIRECTOR
Research Advisory Committee
Quinquennial Review Committee
Institute Management Committee
Divisions/ Sections
Integrated Farming System
Cropping Systems & Resource Management
Organic Agriculture Systems
Project Condonation Unit
Technology Transfer & Assessment
Admini-stration
Establishment
Bill and Cash
Stores & Purchase
Estate, Works & Maintenance
Security Services
Finance & Accounts
Supporting Services
PME
AKMU
ITMU
Farm Section
Central Labs
Library & Reprographics Services
AICRP on IFS
Main Centers : 25
Sub Centers : 11
Voluntary Centers : 06
On Farm Centers : 32
Total : 74
AI NP - OF
Cooperating Centers -20

Major Findings

- Characterization of existing farming systems was made in Uttarkhand in which, it was found that 9.5% farm house holds were earning through farm mechanization on rental basis in Udham Singh block where as 13.8% farm house hold of Bazpur block are engaged in same. Crop + Livestock are the predominant farming systems. During kharif season, Major crop was transplanted paddy in both the block of Uttarakhand.
- Development of sustainable Integrated Farming Systems (IFS) Model for Western Plain Zone of Uttar Pradesh was tried in 1.5 ha area, comprising of crop, dairy, horticulture, fishery, mushroom along with secondary agriculture practices. It was found that the horticulture module has the highest B:C ratio (3.72) as compare to the other modules of IFS. Among the different modules of the IFS, the highest Sugarcane Yield Equivalent was realized in case of crop module followed by dairy module. Livestock waste material can be utilized as manures lowered the cost on fertilizers.
- Refinement of vegetable-based farming system model was also carried out in 1.5 ha area for food and nutritional security of farmers of Western Uttar Pradesh. The model was comprising of fruit crops with inter crop module, vegetable base module, field crop base module and Pond dyke system with poultry based module. The highest net return was recorded from fruit base module with inter crops followed by the vegetable base module. Among the different module, pond dyke stems with poultry base module (1.0) found highly energy efficient followed by field crop base module (1.4).
- A project was formulated to development a regenerative agroforestry-based IFS model for sustainable production and livelihood. Among the Moringa, Tectona grandis and Dalbergia sissoo agroforestry systems with crop combination (moong, maize, bajra and jowar), jowar and moong crop performed better in respect of straw and pod yield, respectively.
- IFS model (1acre) was developed with the integration of uneconomical cattle along with crop and poultry enterprises. Though the B:C ratio of the crop module (3.98) was highest and lowest B:C ratio was recorded in dairy module with uneconomical cattle, but overall B:C ratio of the model was economical with the scientific integration of different module. A reasonable combination of agribusinesses such as dairy, poultry, crop etc. can bring prosperity in agricultural activities according to the given agro-climatic conditions and socio-economic status of the farmers. Crop residues used as fodder for livestock reduce the cost on feed. The combination of agricultural and livestock enterprises increase the demand for labor and increase employment opportunities.
- Evaluation and identification of farm implements under different farming systems was done along with the estimation of work load on farm. Work load for falcon made sickle was moderately higher whereas the work load was heavy for local sickle. Working efficiency of ring cutter in okra was 1.1 kg.100 m^{-2} with no damage, whereas, working efficiency in traditional plucking of okra was 1.1 kg.100 m^{-2} with 8% damage. Adopting new technology is one of the major benefits of an integrated farming system.
- Green House Gas (GHG)emission from IFS model (1.5 ha) was estimated by using IPCC 2006 Tire II method. Among the different module livestock enterprises 63.1% of the total GHG emission from the IFS model. Agroforestry and the compost pit act as a sink of carbon and neutralizes the GHG emission from the IFS model and accounted for carbon negative model.
- Scaling and Impact Assessment of Integrated Farming System for Livelihood of Farmers of Kerala, Tamil Nadu and Telangana was under taken. Coarsened Exact Matching (CEM) technique was employed to evaluate the impact of IFS on farmers income. The result of the study showed that adoption of Integrated Farming

Systems is very much needed for the improvement of farm income and livelihood security of the farmers in the states.

- Sustainable resource management for climate smart IFS was formulated under AICRP on Integrated Farming Systems in which it was realized that scientific integration of new technologies such as mushroom cultivation in banana enterprises with different substrate showed significant variation in yield. Cultivation of mushroom with rice straw recorded significantly higher yield as compare to others. Value addition of Banana for chips, Squash, pickles, Jam, sauce improved the farm income significantly. It was also found that this climate smart IFS model (0.7ha) addressed 13 Sustainable Development Goals (SDGs) out of 17 SDGs as depicted by United Nations (UN).

- Region specific on-station Integrated Farming System (IFS) models for small and marginal farmers was under taken under All India Co-ordinated Research Project on IFS. It was found that different region of the country has different effect on cost saving by family labour, net return per rupee invested, improvement of soil organic carbon over initial status etc. New integrated methods include improved farming technologies such as integrated nutrient management; site-specific nutrient management; conservation technology; use of bio fertilizer; crop rotation, and the use of agricultural systems which help farmers track their activities to production capacity and profitability of farms.

- Nine new strains of mustard have been developed from three different parentages for organic production system after six years of crop improvement program. During screening of crop varieties Varuna and RB 50 of mustard, 5-SR-05 and HD 3226 of wheat and Malwiya Basmati, PB 1609 and PB 1718 of Basmati Rice were found superior and suitable for organic production system.

- Application of 5.0 t ha^{-1} of mustard cake (MC) in both the seasons, resulted in highest system rice equivalent yield. System productivity was improved by the tune of 24.9 % to 76.5 % with the application of MC under different treatments over other organic nutrient sources. Among different organic nutrient management treatments, highest system productivity (12.1 t ha^{-1}) and net return (Rs.140522 ha^{-1}) were received under the application of 100% RDN + Sesbania green manuring followed by 75% RDN + Sesbania green manure for basmati rice-wheat system.

- Under development of pest and disease management package for organic farming, fruit and shoot borer; Sclerotinia blight; and spider mite were recorded as major biological stresses in brinjal during various months. Organic pest and disease management system showed promising results in terms of fruit yield (322.05q ha^{-1}) of brinjal which was at par with integrated pest and disease management system.

- During the year, 966 organic and 83 natural farming farmers from 16 States have been characterized and the yield gap under farmer's organic farming ranged from 11 to 76.5 % which indicated the scope for further increasing the production under organic farming by promotion of scientific organic farming practices.

- Among the different cropping systems evaluated, highest REY was recorded under Maize (popcorn)-potato-okra +sesbania green manuring system followed by basmati rice-wheat-sesbania green manuring system. During geo-tagged characterization of organic and natural farmings, an yield gap ranging from 20.73-29.12% was recorded as compared to on-station crop yields.

- Evaluation of concoctions of Natural Farming in Basmati Rice-Wheat system indicated that, yield of basmati rice was reduced by 23.4%, 66.2% and 58.8% during first, second and third year

respectively compared to scientific organic farming package. Yield of wheat crop was also reduced by 62.1% and 72.5% compared to scientific organic farming package and integrated crop management during third years, respectively.

- Process and protocol for immune boosting organic Jaggery standardized for solid and liquid organic jaggery. Maximum overall organoleptic score (7.9±0.2) was recorded for sugarcane juice treated with 1% Mulethi + 0.1% Safedmusli + 0.1% Tulsi + 1% Cinnamon and was recorded for sugarcane juice treated with Cardamom oil 0.1% respectively (8.1±0.3) for solid and liquid organic Jaggery.
- Adoption of direct seeded rice (DSR) technology coupled with used of nitrification inhibitors can be a superior technology to reduce the greenhouse gas emission from the agriculture sector in India.
- Long-term use of resource conservation technologies under diversified cropping systems in Indo-Gangetic plain have significantly improved the soil biodiversity in terms of various soil physico-chemical and biological properties.
- Use of microbial consortia along with incorporation of rice straw in soil not only helps in improvement of soil organic carbon level but also reduce the environmental pollution due to burning of these residues.
- Upgradation of cropping systems atlas at time interval will provide the concrete information about preparation of futuristic crop plans to feed the ever-growing population of the country and it will help the policy maker to prepare batter policy plans for the farming community.

INTRODUCTION

ICAR-Indian Institute of Farming Systems Research has 70 years of history contributing significantly for the development of agronomic management practices, encouraging use of nutrients and alternative cropping systems and methodologies for assessment and evaluation of crop management practices at country levels. Since 2010 onwards, the mandate of Institute is changed to farming systems to address the holistic issues in agriculture. The brief history of the institute is given below.

The genesis of the Cropping Systems Research Project may be traced back to the visit of Dr. A.B Stewart of Macaulay Institute of Soil Research, Aberdeen, U.K., somewhere in mid- nineteen forties. He was invited by the then 'Imperial Council of Agricultural Research' to review the status in respect of soil fertility investigations, in general, and manuring in particular, and to suggest necessary steps which might be taken to obtain adequate information under different conditions of soil and climate within a very short time so that the agricultural departments could provide relevant instructions to the farmers for increasing the crop yields. His review report, published in 1947, significantly influenced the philosophy and practice of fertilizer experimentation in the county. The importance of conducting simple fertilizer trials on cultivators' fields and complex experiments at selected centers was emphasized in the report which led to initiation of "Simple Fertilizer Trials on Cultivators Fields" in 1953 under Indo-American Technology Cooperation Agreement through Soil Fertility and Fertilizer Use Project."

Later, in 1956, Model Agronomic Experiments, *i.e.*, complex experiments on carefully selected centers, were also brought under the purview of the project and it was renamed as 'All India Coordinated Agronomic Experiments Scheme (AICAES)'. With the passage of time the scheme went through various stages of evolution to keep pace with the development in science and technology and to meet the increasing demands. The research arena was expanded to include agronomic research encompassing cultural practices, irrigation, nutrition, chemical weed control and multiple cropping. But the emphasis continued to remain on soil fertility and fertilizer use efficiency. In 1968-69 the scheme was sanctioned as 'All India Coordinated Agronomic Research Project (AICARP) with two components *viz*; 'Model Agronomic Experiments and 'Simple Fertilizer Trials'.

Nevertheless, even after green revolution, agricultural research centered on only individual crops in isolation. But for a sustainable development the system approach is a must. This realization might have given an impetus to start cropping systems-oriented research and the project was upgraded into a Directorate during 7th five-year plan and was established as the '**Project Directorate for Cropping Systems Research (PDCSR)**', which became functional in March, 1989 with its headquarters at Modipuram, Meerut, U.P. Further, during 11th five-year plan PDCSR has been re-designated as '**Project Directorate for Farming Systems Research (PDFSR)**' during 2009-2010. During 2014 (12th five-year plan) PDFSR was upgraded to a full-fledged institute and renamed as "**ICAR-Indian Institute of Farming Systems Research**" besides AICRP on IFS (74 centres) and NPOF (20 co-operating centres,) as an integral part of institute, covering 26 States/ UTs. The institute has three research divisions and one project coordinating unit and one section to address the mandate.

Vision, mission and mandate of the institute is given below:

Vision:

Management of natural sources for holistic improvement of small and marginal farmers through Integrated Farming Systems.

Mission:

Improve food, nutrition and livelihood 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.

Significant Achievement made by ICAR IIFSR:

1. Contribution in developing suitable fertilizer policy by the government of India for improving the productivity of major production systems such as rice-wheat, rice-rice and maize-wheat systems which meets around 72 % of Indian calories requirement.
2. Developed component production technologies for the emerging cropping systems at the state and national level in the form of All India Coordinated Agronomic Experiments Scheme.
3. Significant contribution in increasing the cropping intensity of the country by 25 % since independence.
4. Identification of Long term nutrient management strategies developed for cereal-cereal cropping systems to sustain the productivity of rice-wheat and rice-rice systems.
5. Documentation of nutrient response of crops and cropping systems in 96 districts of the country helped to estimate the production potential based on balanced nutrient application.
6. Developed and refined 64 farmer participatory Integrated Farming Systems (IFS) and Integrated Organic Farming System (IOFS) models for meeting the household level nutrition requirement of human, livestock, climate resilience and preserving soil resources as well as doubling farmers' income.
7. Documented 81 success stories for effective dissemination of component technologies of cropping and farming systems through various sources.
8. Development organic farming packages for 68 cropping system and 32 bankable IFS based farming models for demonstration of business modules of IFS in farmers' field.
9. Development of crop plan for 15 major agricultural crops.
10. Developed and updated the National Cropping System Atlas for the country.

Weather during 2021

During the reporting year the onset of southwest monsoon was recorded on 13th July, which was 16 days delayed onset. Total annual precipitation of 897.5 mm was received with uneven distribution. This was 20.1% higher than the normal precipitation of 747.0 mm. Out of the total annual precipitation, Southwest monsoon contributed 63.5%. The mean maximum temperature varied from 18.3ºC in January to 36.9ºC in April while the mean minimum temperature varied between 6.5ºC in December to 25.1ºC in July. The average relative humidity and sunshine hours were 75.2% and 5.8 hours/day, respectively. There were

44 rainy days with rainfall more than 2.5 mm. The highest daily maximum temperature recorded was 41.5ºC on 28th April and the lowest minimum temperature was 2.5ºC on 27th January. The summary of the monthly meteorological data is presented in Table 1.

The weekly pan evaporation reached 54.5 mm during the 15th standard meteorological week (SMW) and came down slowly from this week onwards (Fig. 1 & 2). Highest maximum temperature of 38.4ºC was recorded during the 27th SMW and lowest minimum temperature of 3.7ºC was recorded during the 51st SMW.

Table 1. The summary of the monthly meteorological data recorded at Agromet observatory

Month	Temperature (ºC)		Avg. RH (%)	Sunshine hours (hr/day)	Rainfall (mm)	Rainy days	Pan Evaporation (mm)
	Max.	Min.					
January	18.3	6.9	80.5	2.9	**23.9**	**4**	38.3
February	25.7	9.4	72.0	6.6	10.6	1	84.8
March	31.2	15.3	69.0	6.1	0.0	0	125.0
April	36.9	18.4	66.4	4.0	7.1	1	209.6
May	35.3	21.2	66.4	7.0	153.2	6	184.4
June	35.8	23.9	72.9	8.3	39.5	4	191.0
July	34.4	25.1	81.7	6.9	272.4	10	141.7
August	33.2	24.8	84.7	5.9	84.2	4	124.0
September	32.5	22.8	86.5	6.0	173.9	9	79.8
October	31.4	18.5	77.9	6.4	129.3	5	109.0
November	27.0	9.7	71.6	5.1	0.0	0	92.5
December	21.3	6.5	72.4	4.1	3.4	0	51.8
Annual	**30.2**	**16.9**	**75.2**	**5.8**	**897.5**	**44**	**1431.9**

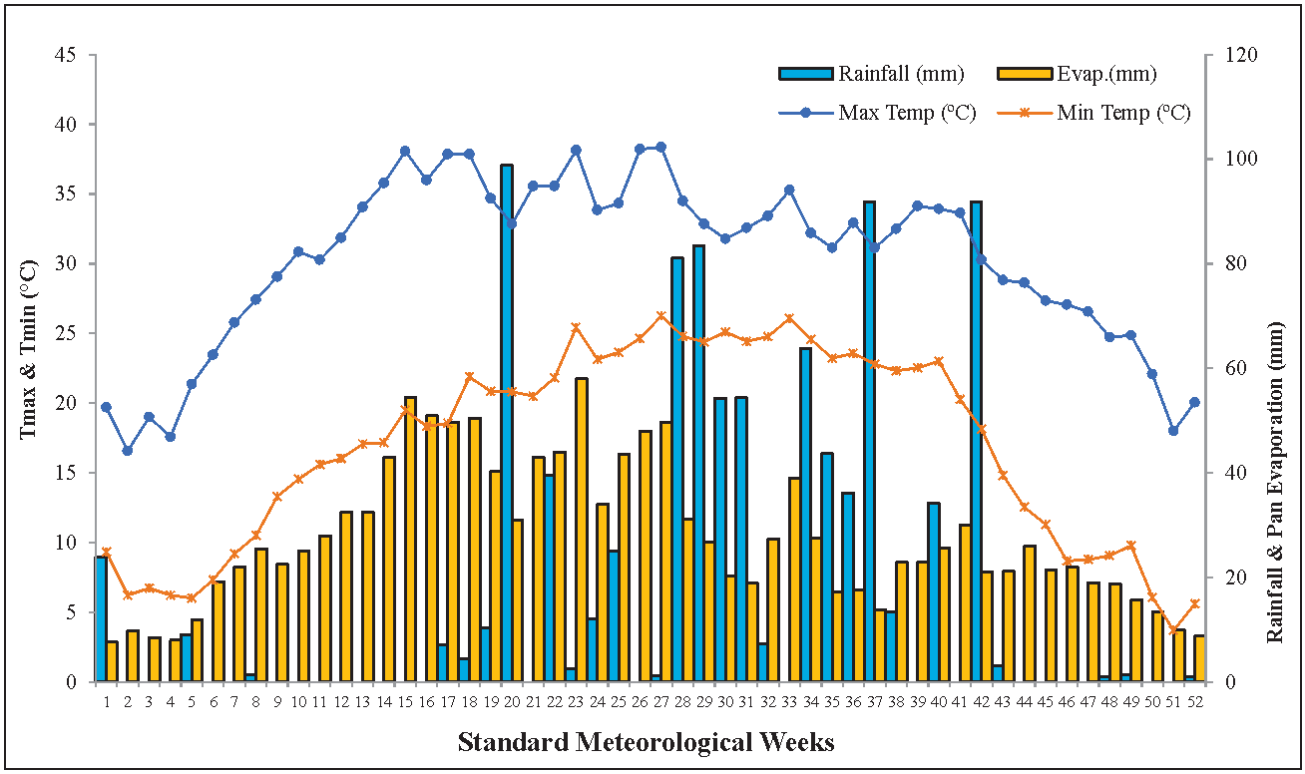


Fig. 1. Weekly Pan Evaporation, Rainfall, Maximum and Minimum temperature recorded during the year 2021

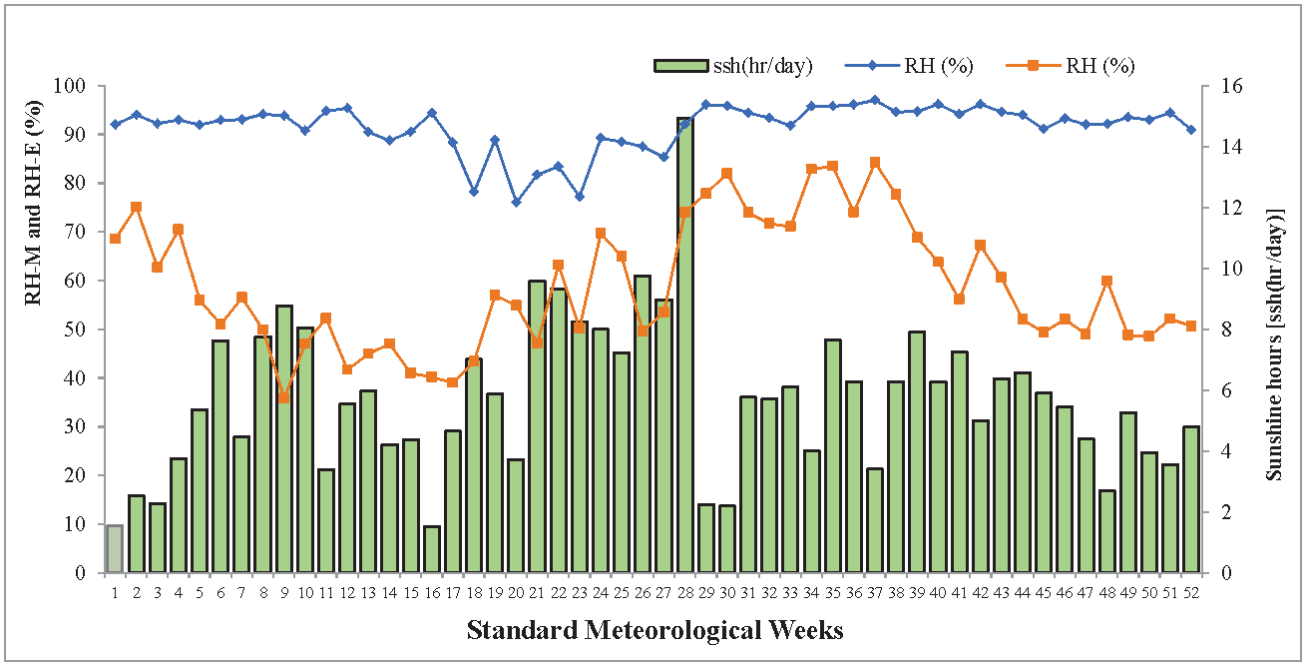


Fig. 2. Weekly RH (morning), RH (evening) and sunshine hours recorded during the year 2021

INTEGRATED FARMING SYSTEMS

Project : Characterization of Existing Farming Systems of Uttarakhand

A Survey was conducted to characterize the existing farming systems, income pattern (farm and off farm), mechanization level and its effect on labour usage and income level, constraints and technological solutions identified in existing farming systems of Uttarakhand. The total sample comprises a random sample of 60 households i.e. (1 District x 2 block/ district x 6 villages/ block x 10 households) using a stratified sampling frame. Anandpur, Kanakpur and Pratapur villages of Udham Singh Nagar (USN) block, District USN (high productive) whereas Chakarpur (Bhoodpuri), Khambari (Mashra), Pahadpur (Nagadpuri) villages of Bazpur block (low productive), USN District of Tarai and Bhabhar zone of Uttarakhand (>1000 m above sea level) were surveyed. Both the quantitative and qualitative data were used in the study. Data was collected by personal interview method using pre-tested structured questionnaire through face to face interaction with the men and women farmers. Socio-economic status of the farmers of the study area was as follow (Table 1).

Off Farm enterprises in existing farming systems: Around 32.7 % households are having off farm enterprises, out of which around 14.28 per cent found to have business, 9.5 % were earning through farm mechanization on rental basis, out which they earn through flour, spice making, field crop harvesting through combine harvester, straw making through reaper, sowing of seeds through seed drill, land preparation through tractor and attached implements on rental basis etc. Around 4.8 % farm households were earning through each private service and govt. pension in USN block. However, in Bazpur block around each of 27.6% households were earning through private/govt service and farm labour whereas 13.8% were earning through farm mechanization on rental basis.

Income pattern in the existing farming systems of USN: The Benefit : Cost ratio in respect of total mean net returns (off + on farm) and mean net returns (farm and off farm) was found to 1.44 in case of USN block whereas in Bazpur block B:C Ratio was found to be 2.10. The higher B:C ratio for Bazpur block in spite of lower mechanization was due to involvement of more family labours as well as higher intercropping. Also, the cost of operation in terms of labour use

Table 1. Socio-economic status of farmers in existing farming systems

Variables	Farm households	Farm size (ha farm household^{-1})
Operational land holding	3.41(0-16.19)	0.78 (0.40-1.21)
Leased in	3.38 (0-16.19)	0 (0)
Total	6.79(1-16.19)	0.78(0.40-1.21)
Farm fragments	1.38 (0-3)	1.0 (0-2)
Off farm enterprises	33%	71%
Family Size	8.23 (3-19)	5.41(3-12)

(mandays ha^{-1}), water and electricity was found to be higher in the existing farming systems of USN block.

Pre-dominant farming systems of USN: Crop (paddy/sugarcane-wheat/mustard) + Livestock (Dairy/poultry) (42.9%) followed by Crop (paddy-paddy-wheat/mustard) + vegetables (23.8%) were the pre-dominant farming systems found in USN block, Dist USN. Crop (paddy-wheat) (19.0 %) and Crop (paddy/sugarcane-wheat/mustard) + vegetables + livestock (Dairy/Poultry) (14.3 %) were the other existing farming systems. The major crops sown in all the pre-dominant farming systems was found paddy followed by wheat covering more than 70 % of gross sown area.

Mechanization level in existing Farming Systems: The good availability of machineries in USN block shows that the mechanization level is high whereas the mechanization level was comparatively low in Bazpur block specially in terms of owned machineries and implements.

Labour use pattern in existing farming systems of USN: Highest human labour is being used in cultivation of sugarcane crop (358.1 mandays ha^{-1}) followed by summer rice (176.2 mandays ha^{-1}) in the existing farming systems of USN block, whereas in Bazpur block, highest human labour was required in Mentha + wheat crop (103.7 mandays ha^{-1}). The highest percentage of manual cost of operation was noticed to be in summer rice (42.5 %) followed by *kharif* rice (38.2%) which correspond to highest total cost of operation for summer rice (45.8 %) and paddy crops (42.7%) in USN block respectively.

Resource Mapping

Data pertaining to Fig 1a and 1b depicted that farming system of USN block is having excellent farm resource base but inefficient utilization was observed. Around 31.5 ton yr^{-1} of paddy straw and 13.3 ton yr^{-1} of sugarcane straw used to burn by the farmers which can be efficiently used in biogas plant, water geysers, non-woven mulches, mushroom production, very-

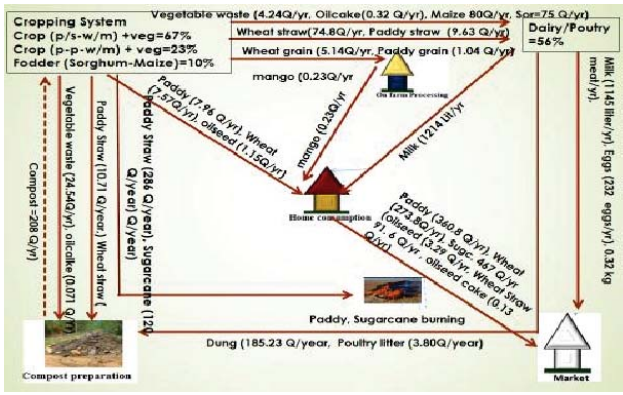


Fig 1a. Resource map of USN block

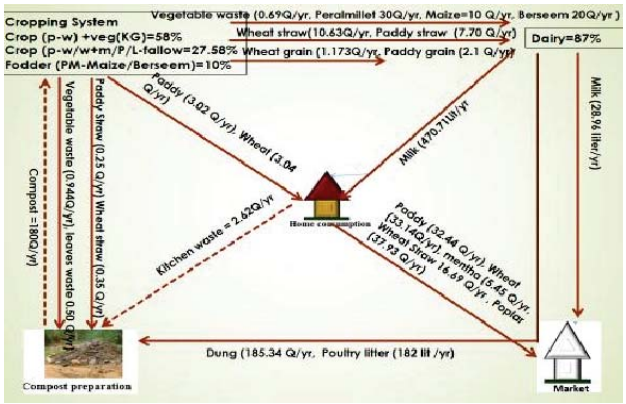


Fig1b. Resource map of Bazpur block

composting etc. Bazpur block has comparatively less resource base but their utilization was efficient.The major constraint perceived by the farmers of existing farming systems of USN block is less rate of paddy and wheat due to non-maintenance of required moisture content and poor storage facilities followed no price for rice stalk, which forces farmers to burn paddy fields. However, lack of assured remunerative prices as well as high incidence of insect, pest and diseases were perceived by (82.8%) of farmers of Bazpur block followed by scarcity of farm labour (72.4%) and inadequate and non-availability of farm credit (58.6%) causes less productive of Bazpur block. Therefore, the study depicts there is an urgent need either to diversify the system or to reduce the operational costs through improving the mechanization for existing crops beside efficient use of resources.

Project: Development of Sustainable IFS Model for Western Plain Zone of Uttar Pradesh

Integrated farming systems approach is one of the most powerful tools for enhancing productivity, profitability, nutritional security, recycling of farm based wastes, environmental protection, employment generation and comprehensive a sustainable imposement of the entire system. There is a need of hours to develop area specific integrated farming system model to resolve multi-dimensional glitches. The IFS model was developed for Western Plain Zone of Uttar Pradesh which comprises of crop, dairy, horticulture, fishery and mushroom module along with secondary agriculture. The land allocated (1.04ha) under crop component was 69% of the total model area (1.50 ha). The sugarcane - equivalent yield (SEY) of different cropping systems revealed that higher SEY of sugarcane-ratoon-wheat system (31.0 ton yr^{-1}), followed by pearl millet – chickpea – okra system (24.4 ton yr^{-1}) and sorghum-mustard-moong bean (21.0 ton yr^{-1}), respectively (Table 2). However, maximum gross return of ₹ 100850 yr^{-1} from 3500 m^2 area and net return of ₹ 68600 yr^{-1} were realized under sugarcane-ratoon-wheat cropping system followed by pearl millet- chickpea-urd bean in terms of contributing more gross and net returns from 1800m^2 area. Return per unit investment was higher (3.71) when rice-wheat-dhaincha cropping system was being adopted and the next best cropping system was Napier fodder based cropping system (3.51) due to less inputs requirement and higher conversion towards productivity than remaining cropping systems in the model. The maximum energy output (11.2 x 10^4 MJ calories of energy) and energy input (3.4 x 10^4 MJ calories) observed in the sugarcane-ratoon-wheat cropping in 3500 m^2 area (Fig.2). But higher output energy use efficiency (9.0 x10^4MJ) was under maize-berseem-urd bean cropping system from 1800 m^2 area and it was next to sugarcane-ratoon-wheat cropping system.

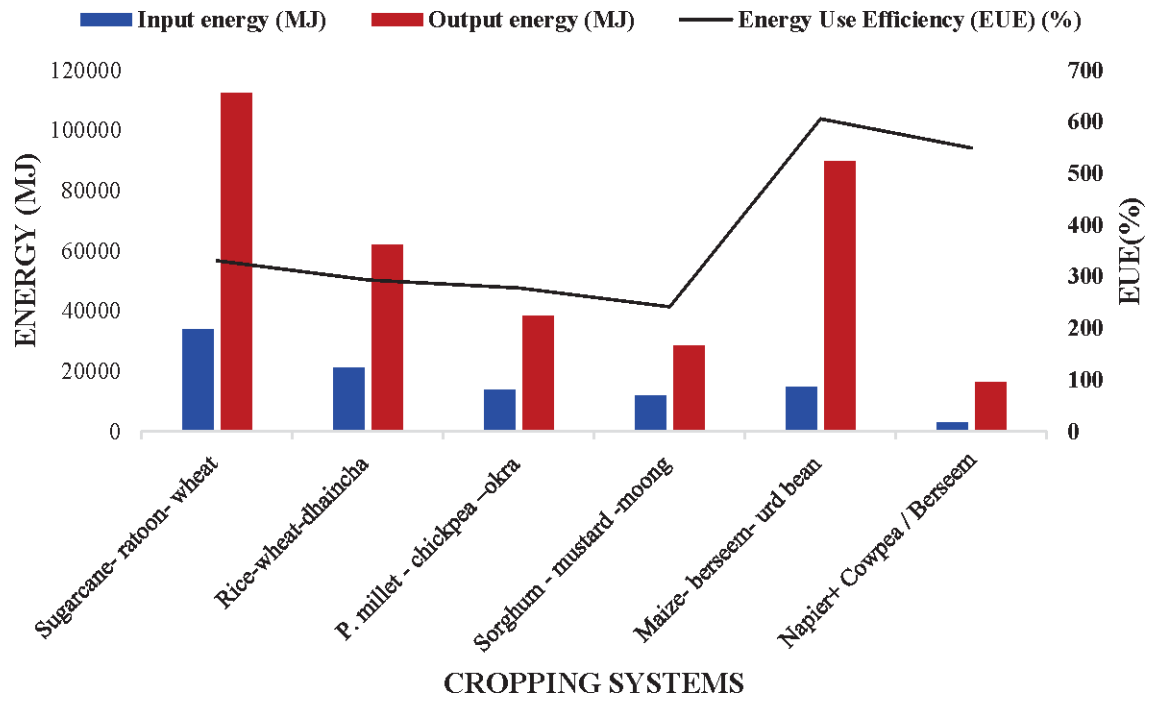


Fig.2 Energy budgeting of different cropping systems in IFS model

Table 2. Performance of different crops under diversification of existing cropping systems

Cropping system	Area allocation in ha.	Main and by products kg yr^{-1}			SEY ton	Gross return ₹	Net return ₹	Cost of cultivation invested	[1]Return per Rs.
		Kharif	*Rabi*	Summer					
Sugarcane-ratoon-wheat	0.35 (34%)	-	800 (1200)	23800 (1000)	31.0	100850	68600	32250	3.12
Rice-wheat-dhaincha (GM)	0.18 (17%)	600 (1000)	900 (1400)	875 (4860*)	16.3	53020	38750	14270	3.71
Pearl millet–chickpea–okra	0.18 (17%)	500 (1500)	650 (1380)	1000 (500**)	24.4	77450	53680	24770	3.13
Maize-berseem-urd bean	0.18 (17%)	900 (1350)	7650	135 (300)	16.9	45950	29600	16350	2.81
Sorghum-mustard-moong bean	0.11 (11%)	12600	400 (600**)	145 (500**)	21.0	65750	46235	19515	3.37
Napier intercrop with cowpea (*kharif*) and berseem(*rabi*)	0.04 (4%)	1085	1065	2650	3.7	12000	8590	3410	3.51
Total	**1.04 (100%)**				**113.3**	**355020**	**245455**	**110565**	
SEm ±				19.3					
CD at 5%				60.7					

Where: *Fresh weight of dhaincha ** yproduce

Plate 1a. Murrah Buffalo

Plate 1b. Gir Cow

The dairy module comprised of three milch animals and were feed by the fodder obtained from various crops residue of the model. Milk production from dairy module was recorded 3424 litres / lactation of two Murrah buffaloes (Plate 1a) and 1894 litres/ lactation of one Gir cow (Plate 1b). The gross and net returns from dairy component were of ₹ 238993 and ₹ 146203 respectively. The return per investment was 2.57 on dairy component of IFS Model.

Under horticulture module (0.22ha) with different fruit plants like guava (*Psidium guajava*), mango (*Mangifera indica*), pear (*Pyrus communis*), peach (*Prunus persica*), and karonda (*Carissa carandas*) plants were grown for nutritional security and revenue generation of farm households. Fruit production from guava plants (35) was 1850 kg, from mango plants (5) 210 kg, pear plants (10) 460 kg, peach plant (1) 20 kg and plants of karonda (40) produced 210kg. After selling the fruits from horticulture component, gross and net return were ₹ 93300 and ₹ 67550, respectively. The B: C ratio of this module was highest (3.72) than other moduels of the model.

Composite fish culture of mixed fish species (rohu, catla, mrigal, common carp, silver carps and grass carp) was integrated as a module in IFS module with a pond size of 0.1 ha. The pond water was used for irrigation of the field crops beside fishery. Periodic fertilization with NPK mixture was done to maintain the fertility of fish pond for optimum plankton production. Fishes were fed with floating pelleted diets accounting 26% protein content , apply @ 5% oftheir body weight. Periodic random samplings of fishes were carried out for adjusting the feed demand. A total of 450 kg fishes were harvested. A gross return of ₹ 39600 was realized from sale of 450 kg of harvested fish beside employment generation of 52 days. The water quality parameter like dissolved oxygen, pH was measured periodically and were found to be within optimum range for carp culture. The size of the harvested fishes ranged from 0.8 kg to 1.4 kg. A carp breeding hatchery unit consisting of breeding pool, hatching pool and spawn collection chamber in the IFS was also introduced. The unit was installed and one trail breeding was at a introduce. Further, on experimental basis another module namely rearing and breeding of ornamental fishes for aquarium purposes is being integrated for increasing livelihood security for rural youth and farm women.

From mushroom unit (0.02 ha) 80 kg button mushroom and 70 kg milky mushroom were harvested during their favourable growing seasons (spring and winter), with this an additional yield of 350 kg high-quality organic manure from button mushroom the spent and 200 kg of animal feed from the spent straws of milky mushroom was obtained. The mushroom module generates about ₹ 8650 and ₹ 5890 as gross and net returns respectively. The poultry component of IFS model were having 10 birds of CARI Nirbheek breed removed in bamboo hut nearby fish pond area. By the selling of eggs (1580) and poultry manure (75 kg), the gross and net returns were gained in the tune of ₹ 7680 and ₹ 4430, respectively. Poultry manure were chemically analysed and found that manure contained 1.5% N, 0.6% P and 1.8 % K. Thus, total NPK (2.9 kg) was produced from 75 kg of poultry manure. Farm yard manure (FYM) and vermi-compost (VC) produced in compost area (0.02 ha) by three dairy animals and their calves and farm wastes in the extent of 2160 kg and 5184 kg per year on dry weight basis. Thus, a total of NPK nutrients released from farm-based by products (442.9 kg), thereof 170.8 kg N, 94.0 kg P and 178.1 kg K, respectively. Thus, we can save around ₹ 9220 yr^{-1} through recycled of all farm-based wastes like FYM, Green manure, VC, weeds, mushroom spent, sugarcane trashes, crop residues and tree leave etc.) with in the system. Round the year leafy and green vegetables were grown on 0.02 ha in the kitchen garden in order to ensure nutritional dietary of the household. The production of vegetables was 328 kg in *kharif,* 460 kg in *rabi* season and 255 kg in summer season, respectively. Hence, from kitchen garden a gross and net returns were ₹ 5600 and ₹ 3150 can be ensured.

Plantation on field boundaries with fruit trees like Aonla (*Phyllantus emblica*), Jackfruit (*Articarpus hetrophyllus*), Bael (*Aegle marmelos*), Karonda

(*Carisa carendis*) and Kagji Nimboo *Citrus* spp. produced 550 kg fruit in current year. Hence, gross and net returns after marketing of fruits were ₹ 11875 and ₹ 8295, respectively. Among different modules of IFS, highest SEY was realized in case of crop module (113.3 ton yr^{-1}) and followed by diary module (73.5 ton yr^{-1}). Highest gross and net returns were available from the crop and dairy components of the model. On the other hand, the higher return per Re-invested (3.72) was recorded from horticulture component followed by boundary plantation (3.31). Total man-days in the IFS (1.5ha) were 569 days. However, maximum man-days were generated from crop component (171) and dairy component (149) than other components of the model. Therefore, the IFS model comprises of different module supported the food security as well as nutritional security of the farm family besides livelihood security and environmental protection through recycling of farm resources.

Project: Refinement of Vegetable Based Farming System Models for Food and Nutritional Security of Farmers of Western Uttar Pradesh.

This project was formulated to identify the different horticulture based farming systems in the Western Uttar Pradesh. On-station horticulture model (1.5 ha) based four different modules viz., Module-1(M_1)- Fruit Orchards (with intercropping of vegetables) , Module-2(M_2)- Vegetables, Module-3(M_3)- Field crops and Module-4(M_4)-Pond Dyke system with integration of poultry birds for improving profitability, enhancing productivity and nutritional security of small and marginal farmers particularly of western plain zone of Uttar Pradesh.The percent share of area (in %) under different modules were 34% area under M_2 (vegetables base) followed by 27% area under M_1 (fruits + Intercropping of vegetables). M_3 (Crop Based) occupied 27 % area followed by 7% area under M_4 (Pond Dyke system + integration of poultry). Similarly, total cost incurred in developing the Model has also been studied. It has been reported that M_1 had the highest share (43%) of total cost incurred followed by M_2 (24%), M_3 (23%) and M_4(10%). Module-4 is most economic efficient as compared to the other modules of the Model.

Economics : Total Gross returns(GR) obtained from the model were ₹ 4,07,776 Net return (NR) were ₹ 181815 (B:C 1.8) (Table 3). Upon comparison among the different modules of the model, the highest GR have been recorded from M_1 (₹ 1,72,460), followed by Module 2 (₹ 1,00,875) and M_3(₹ 99,422). The least GR have been reported from M_4 (₹ 10,705/). On studying the cost of cultivation involved in different modules, highest cost of cultivation(COC) has been involved in M_1 (₹ 72450) followed by M_2 (₹ 48432) and M_3 (₹ 46712). The lowest cost had been incurred in execution of M_4 (₹ 14147). The net returns obtained in the model were highest from M_1(₹ 100010) followed by M_2(₹ 52443) and lowest in M_4(₹ 52710). The energy dynamics of the modules upon study showed that M_4 is the highly energy efficient system (1.0) followed by M_3 (1.4).

The Economic efficiency of different modules were studied and found highest in M_1(₹ 685 ha^{-1} $days^{-1}$) followed by M_3 (₹ 361 ha^{-1} day^{-1}), M_2 (₹ 287 ha^{-1} day^{-1}) and M_4(₹ 279 ha^{-1} day^{-1}). If family labour is employed for carrying out different inter cultural operations, the net returns would be higher (₹ 293725) as compared to the hired labour (₹ 141615). Under this model 26 types of crops (covering 16 crop families) are grown in a year providing a perennial cover of around 39 %. Thus, much diversity is prevalent in the system which is very much essential for a balanced eco system.

A significant increase in the total microbial population and activity of different enzymes involved in nutrient mineralization has been found significant during this year (2021) as compared to previous year. This may be due to the use of pond water for irrigation purpose and incorporation of organic manures. Pond water contains readily available nutrients which allow the multiplication of the microbes for better crop growth. The highest Bacterial count has been recorded for M_1 (9.8×10^6) and the least for M_2 (1.31×10^7) but the highest Fungi count has been recorded for M_4

Table 3.Economics of 1.5 ha horticulture based farming systems Model

Enterprises	Components	Area (ha)	Gross return ₹	Cost of cultivation ₹	Net return ₹
Horticulture (Module-1)	Orchards (with inter crop)	0.4	172460	72450	100010
	Vegetables	0.5	100875	48432	52443
Secondary (Module 2)	Field Crops	0.4	99422	46712	52710
Complimentary (Module 3)	Fish pond dyke-vegetable system	0.1	24314	14147	10167
Supplementary (Module 4)	Poultry (20 birds)		10705	2560	8145
Grand Total		1.5	407776	225961	181815
			B:C ratio = 1.8		

(8.3×10^3) followed by M_2 (3.4×10^4) and the least for M_3 2.0×10^4 CFU/ml^{-1}. Similar trend has been reported for actinomycetes status where highest colonies of actinomycetes has been reported for M_3 (9.1×10^5CFUml$^{-1)}$ followed by M_4 (8.7×10^4 CFU/ml^1) and the least for M1 (6.2×10^5 CFU/ml^{-1}). The highest Dehydrogenase (31.8 ± 2.8 µg TPF.g^{-1} soil h^{-1}), Â-glucosidase (20.6 ± 2.19 µg PNP g^{-1} soil h^{-1}), Urease (15.2 ± 1.2 mg urea g^{-1} soil h^{-1}) and Phosphatase (60.1 ± 4.1 µg PNP.g^{-1} soil h^{-1}) enzymatic activity in soil under different module were recorded in M_1. This vegetable based farming system model have the ability to fullfill the food requirement of five member's farmer family besides ensuring the nutritional security. Apart from annual family food requirement, surplus amount of agriculture produce was also obtained from this farming system model which upon selling in the market, farm family may generate additional income from the model. The model was able to address the goal of gender equity where men has contributed to 40 % and Women has contributed to 60% of the total work force required. The model provided more opportunities for women labour hence balancing the gender equity. Integration of compost and other biomass application in soil of the model, the OC and other soil microbial properties was improved.

Project: Development of fruit crop based Integrated farming system for western Plain Zone of UP

Integrated farming system can ensure the highest standard of food production with the minimum environmental impact and improve the quality of life of farmers. A project was formulated to develop a fruit based IFS model to evaluate suitable crop along with fruit plant species. Plants of three varieties of guava (*Psidium guajava*) viz., Allahabad Safeda, Sardar (L-49) and Sweta, three varieties of Ber (*Jujupus jujube) viz.* Gola, Seb, Umran, three varieties of Pomegranate (*Punica granatum*) viz., Bhagwa, Arakta and G-137, were planted along with plants of Sweet orange/ Mosambi (*Citrus sinensis*) Nagpur mandarin (*Citrus reticulata*) and Kinnow (Mandarin x Orange).

Table 4 . Yield of intercrops (REY) grown under different cultivars of fruit crops (2020-21)

Cropping systems	Yield of intercrops (REY) in kg plot^{-1} in different cultivars of Fruit crops								
	Guava			Pomegranate			Citrus spp		
	Shweta	A Safeda	L-49	Arakta	Bhagwa	G 137	Kinnow	S. orange	Mandarin
Cereal based (Rice-Wheat- Mung)	9.7	8.6	9.1	13.7	12.9	13.4	11.3	12.4	12.8
Vegetable based (Cow Pea – Potato- Okra)	13.5	12.6	14.8	18.4	17.5	19.9	27.9	24.1	24.1
Fodder based (Sorghum-Berseeem-Cowpea)	10.1	10	9.4	10.8	11.6	11.8	10.5	10.6	11.3

Among fruit, significantly higher yield of inter crop vegetables such as okra and potato was recorded in citrus species. There was significant difference in yield levels (REY) of intercropping modules (Cereal based, vegetable based and fodder based). Fruits base IFS model with vegetable based intercropping module was most profitable in all crops and their cultivars. It ranged between 12.6 to 27.9 kg REY plot^{-1} (Plot size 90 m^2)which was significantly higher than cereal based cropping (8.6 to 13.7 kg REY plot^{-1}) and fodder based cropping (9.4 to 11.8 kg REYplot^{-1}) (Table 4). Therefore, in fruit base farming systems, cultivation of vegetables as intercrop are more profitable than other crops.

Project: Development of regenerative Agroforestry based IFS model for sustainable production and livelihood

Ongoing project counducted in Siwaya Research Farm of the institute to evaluate and compare productivity and performance of three trees *Moringa oleifera* (Drumstick tree), *Tectona grandis* (Teak) and *Dalbergia sissoo* (Shisham) crop combinations in Alley cropping design (Plate 2a & 2b). Leveling and gap filling of the experimental site was done for the establishment of Agroforestry system. Crop combinations of moong, maize, bajra and jowar were sown with each tree species in *kharif* 2021. Yield obtained were recorded for each tree crop combination (Table 5).

Table 5 . Straw yield and Grain yield of different tree-crop combinations.

Tree Sp.	Yield (kg/m^2)	Moong	Maize	Bajra	Jowar
Moringa	Straw	0.47	1.24	2.17	1.79
	Pod/cob	0.56	0.52	0.61	0.26
Teak	Straw	0.33	1.45	3.15	1.45
	Pod/cob	0.08	0.53	0.79	0.15
Shisham	Straw	0.35	1.87	2.74	1.42
	Pod/cob	0.11	1.13	0.88	0.31
Control	Straw	0.52	2.25	3.28	1.14
	Pod/cob	0.11	1.20	1.15	0.18

Plate 2a. Moringa + moong

Plate 2b. Shisham +moong crop

Among different tree-crop combinations, it was seen that biomass yield was highest in control *i.e.* field without trees due to uninhibited growth. In Moong highest straw yield was seen in control (0.5 kg m^{-2}) similarly in maize highest straw yield was found in control (2.3 kg m^{-2}), bajra (3.3kg m^{-2}) except in jowar where maximum straw yield was observed with Moringa (1.8 kg m^{-2}), pod yield in moong was highest with Moringa (0.56 kg m^{-2}), in maize again maximum cob yield was found in control (1.20 kg m^{-2}) in bajra maximum cob yield was observed in control (1.15 kg m^{-2}) in jowar maximum cob yield was observed in Shisham (0.31 kg m^{-2}). Among the different agroforestry systems under the study, jowar and moong crop perform better in respect of straw and pod yield respectively.

Project: Sustainable livelihood generation through IFS involving uneconomic cattle.

A Farming system model was tried to develop with uneconomic cattle. The concept behind the project was that if uneconimical cattles are properly manage and provided optimum balance feed, then income may be generated from the IFS model with uneconomic cattle. The milk, vermicompost and distilled urine of the IFS model may be sold to compensate the cost of feeds and management practice.

During the year 2021, three male calves and five cows were in dairy module. The total milk production of all the five was 2459 lts. and gross income from milk was ₹ 98,370. Total gross Income and net income from dairy unit was found to be ₹ 1,44,120 and ₹ 1,840 respectively. The loss in dairy module was due to lack of efficient labour. The five-day old chicks (Bro Dhanraja) were procured from Central Avian Research Institute, Izatnager (Bareilly). The chicks were brooded and reared under deep litter system. The total mortality during the period was 7.2 %. The sale of broiler started after 6 weeks of age and total live weight was 972 kg with gross income of ₹ 1,26,400. The total gross income from the poultry module was ₹ 1,30,560. The variable cost on chicks, feed and labour etc. were ₹ 87,300 and net income from poultry module was ₹ 43,260.

The cow dung and poultry faeces were converted into FYM, Vermicompost and poultry manure. During the period, a total of 25.1 ton of FYM, Vermicompost and poultry manure were incorporated in the crop field. Through incorporation of different manures, 172 kg Nitrogen, 82 kg Phosphorus and 161 kg Potash was added in the soil, which is equivalent to 373 kg Urea, 511 kg SSP and 269 kg MOP fertilizer.

The model consisting of Crop, dairy and poultry modules. The highest net income was contributed by cropping system module of ₹ 52,883 with highest B:C ratio 3.98 followed by poultry of ₹43,260 with B:C ratio of 1.50. The overall net return from the system was ₹ 1.61 lakhs with B:C ratio of 1.88 (Table 6).

Table 6 : Economics of 01 acre IFS model consisting of uneconomic cattle.

Component	Total Yield	Variable (₹)	Cost Gross Return (₹)	Net Return (₹)	B:C ratio
Cropping system	615 kg grain+156 kg oil seed+ 24,733 kg Green fodder+ 20,650 kg fodder+ 650 kg straw.	17705	70588	52883	3.98
Dairy (05 Cow + 03 male grower)	2459.26 lts. milk + 215 q. FYM + 15 q. Vermi-compost	145961	144120	-1841	0.99
Poultry (500 CARI Bro Dhanraja broiler)	972.31 kg. live wt.+ 20.80 q. manure.	87300	130560	43260	1.50
Including family labour	Total =	250966	345268	94302	1.38
Excluding Family labour	Total =	183811	345268	161457	1.88

Regarding fodder crops, Bajra Napier Hybrid (BNH) variety CO-5 was given the highest system productivity of 284.6 t/ha, by supplying 14,230 kg from 500 m^2 area in five cuts, followed by oat 85.0 t/ha in two cuts in comparison to other fodder crops. Though the uneconomic cattle were integrated in the IFS model but the model become economical with the scientific intervention different modules.

Project: Exploratory study on establishment of Ornamental and Biofloc fisheries modules for Farm livelihood improvement.

In India especially in the Western, Eastern and Southern region a well flourishing business has been operating with excellent growth potential besides providing employment and entrepreneurship. In the Northern region there is a considerable gap whereas demand is high for the ornamental fish. Keeping in view of the demand and potential it is necessary for a demonstration unit to be set up where interested farmers can be provided training and hands on demonstration for setting up an ornamental breeding unit in the back yard. For this purpose, a setting up a demonstration unit of ornamental fish breeding as well as a module for breeding culture fish was undertaken. During the reporting period, FRP hatchery (Plate 3a) consisting of breeding pool, hatching pool and spawn collection chamber was procured and installed in the IFS model. A new module as carp breeding hatchery unit consisting of breeding pool, hatching pool and spawn collection chamber in the IFS system was developed.

Further, on experimental basis for incorporation into IFS model, another module namely rearing and breeding of ornamental fishes for aquarium purposes is being developed. The aquarium fishes namely, gold fishes of different varieties, Koi carp, balk and silver molly of various varieties were brought and reared in the plastic tubs (Plate 3b) as a backyard activity for increasing livelihood security for rural youth and farm women. The fishes are being reared and acclimatized for confined culture without filters. Aeration was provided into the tanks and regular water exchange is being undertaken. The integration of aquaculture in the IFS model may be act as a profitable entrepreneur for the farm family.

Plate 3b. Rearing of aquarium fishes in plastic tubs

Plate 3a. Installed FRP hatchery

Project: Evaluation and Identification of Farm Implements under Different Farming systems

Ergonomics study may be defined as the study of people in their working environment. The goal of the study is to eliminate discomfort and risk of injury due to work**.** Ergonomics study on evaluation of traditional and improved tools/implements in the agriculture field has been conducted on female and male farmers depending upon the gendered activities performed. A comparative study on demonstration and evaluation of low vibration brush cutter (STIHL make), improved sickle (falcon make) was studied over traditional sickle in paddy harvesting activities. Different types of masks (cotton mask) developed by PAU, non-woven mask developed by Falcon over traditional practice (covering with a piece of cloth) was tested for manual paddy threshing activity under field crop based production system. Ergonomic and performance evaluation of ring cutter and protective clothing developed by PAU, Ludhiana over traditional harvesting (covering hands with very thin plastic gloves) was studied for okra harvesting under vegetable based production system. Similarly, comparative study on demonstration and evaluation of dibbler was studied over traditional sowing of pea in papaya and banana as intercropping under agri-horti production system.

Ergonomics evaluation in field crop based production system: An experiment on ergonomic assessment of brush cutter was done for paddy harvesting in farmers' field on 3 male farmers of age group (45-55 years). In another experiment assessment of physiological workload was conducted on 3 female farmers of age group (35-45 years) for evaluating improved sickle over traditional sickle for paddy harvesting activity. The subjects were physically fit for participating in the study. Before that age, stature, weights and BMI of each subject were recorded. In another experiment assessment of physiological workload was conducted on Three female farmers of age group (40-50) for evaluationg drudery in manual

Plate 4. Plucking of okra with ring cutter

Table 7. Physiological workload for paddy harvesting

Physiological variables	Paddy harvesting		
	Local sickle	Falcon make	Brush cutter
Working Heart rate (beats min^{-1})	120.33 ± 3.05	106.66 ± 2.51	168.33 ± 4.16
Energy Expenditure (kJ min^{-1})	10.41 ± 0.48	8.24± 0.40	18.04 ± 0.66
Ä HR (beats min^{-1})	44.0 ± 5.29	24 ± 1.0	76 ± 2.64

paddy threshing activity and effect of different types of masks (cotton mask) developed by PAU, mask developed by Falcon over traditional practice (covering with a piece of cloth) in paddy threshing activity under field crop based production system.

The results of the study shows (Table 7) that the mean heart rate of male farmers while working with brush cutter was 168.3 ± 4.2 beats min^{-1} whereas the energy expenditure was 18.0 ± 0.7 kJmin^{-1}. However, mean heart rate of female farmers while working was 106.7 ± 2.5 and 120.3 ± 3.1 energy expenditure was 8.2± 0.4 and 10.4 ± 0.5 respectively for falcon make and local sickle respectively. Type of workload for Falcon made sickle was found moderately heavy whereas for local sickle the type of workload was found heavy, whereas the type of workload for brush cutter was observed to be extremely heavy.

The physiological cost reduction while working with Falcon make sickle was found 48.2 % and the physiological cost reduction while working with brush cutter was found 36.3 % as compared to traditional tool during paddy harvesting.

Further study on paddy threshing shows that the mean heart rate of female farmers was 110 ± 2.0 beats min^{-1} and 107.0 ± 2.0 beats min^{-1} whereas the energy expenditure was 8.8± 0.3 kJmin^{-1} and 8.3 ± 0.3 kJmin^{-1} while threshing paddy (mannually through beating on drum) wearing mask falcon and PAU make respectively. Type of workload during manual paddy threshing wearing both the masks was found moderately heavy. The falcon make mask was made from non-wovwn polypropylene fabric which induces more exertion amongst workers during threshing activity due to forceful oxygen intake. Thereby, the heartbeat rate and energy expediture was observed to be slighly more while wearing falcon make mask as compared to PAU make (cotton mask).

Localized discomfort was measured through body mapping technique. In terms of paddy harvesting, the body part discomfort score (BPDS) for local sickle was obtained 29.0 for falcon make the score was reduced to 25.0 whereas the BPDS was observed 29.0 while harvesting with brush cutter. Similarly, the BPDS was found 43.0 and 43.5 respectively during paddy threshing (manually through beating on drum), wearing mask falcon make and PAU make respectively. The high discomfort during mannual threshing was noticed due to high beating force, working continously in bending position alongwith cough and respiratory tract allergies due to inhalation of dust and dirt particles. Wearing both types of masks reduced inhalation of dust and dirt particles amongst the workers. Women farmers also percieved sweating and slighly more discomfort during working with wearing falcon make mask as compared to PAU make (cotton mask).

Ergonomics evaluation in vegetable-based production system: An experiment on ergonomic assessment of ring cutter (Plate 4) and cotton gloves with canvas covering in palm developed by PAU, Ludhiana was done for okra harvesting over traditional harvesting (covering hands with very thin plastic gloves) in farmers' field on 3 female farmers of age group (40-50 years) under vegetable-based production system. The subjects were physically fit for participating in the study. Before that age, stature, weights of each subject were recorded. Body mass

index (BMI) was calculated by dividing square of height (m^2) to body weight (kg) of subjects.

Work related discomfort studies: Localized discomfort was measured through body mapping technique. The BPDS in terms of traditional harvesting was observed to be 4 whereas the BPDS was reduced to 3 in terms of harvesting with protective clothing (cotton gloves with canvas covering in palm) developed by PAU. However nil discomfort was found during harvesting with ring cutter. Apart from that the problem of itching, prickle and skin irritation perceived to be nil while working with improved tools/ protective gloves. Working efficiency of ring cutter was 1.1 kg.100 m^{-2} with no damage, whereas, working efficiency in traditional plucking was 1.1 kg.100 m^{-2} with 8% damage.

Ergonomics evaluation in agri-horti production system: An experiment on ergonomic assessment of dibbler was done for pea dibbling over traditional sowing (placing of seeds in soil) in farmers' field on 3 male farmers of age group (45-55 years) under agri-horti production system. The results of the study shows that the mean heart rate of male farmers was 140.3 ± 2.5 beats min^{-1} and 148.7 ± 2.5 beats min^{-1} whereas the energy expenditure was 14.9± 0.6 $kJ.min^{-1}$ and 13.6 ± 0.4 $kJ.min^{-1}$ during dibbling of pea (intercropping in papaya) and pea (intercropping in banana) respectively. Type of workload during pea dibbling was found very heavy in both the cases. The working efficiency in traditional sowing (placing of seeds in soil) was found to be 2.6 hr.100m^{-2}, whereas the working efficiency during sowing with dibbler was found to be 0.30hr.100 m^{-2}.

Project : Influence of pesticides application in IFS model on fisheries module and measurement of GHGs emission from aquaculture ponds

During the reporting period database of pesticide usage and quantification of active ingredients in 21 IFS models analyzed. IFS models were categorized into low (less than 0.2 Kg a.i. ha^{-1}), medium (between 0.2 to 0.4 Kg a.i. ha^{-1}) and High (above 0.4 Kg a.i. ha^{-1}). Results revealed pesticide usage varied in the range of 0.006 to 1.740 kg a.i. ha^{-1} (Fig. 3)

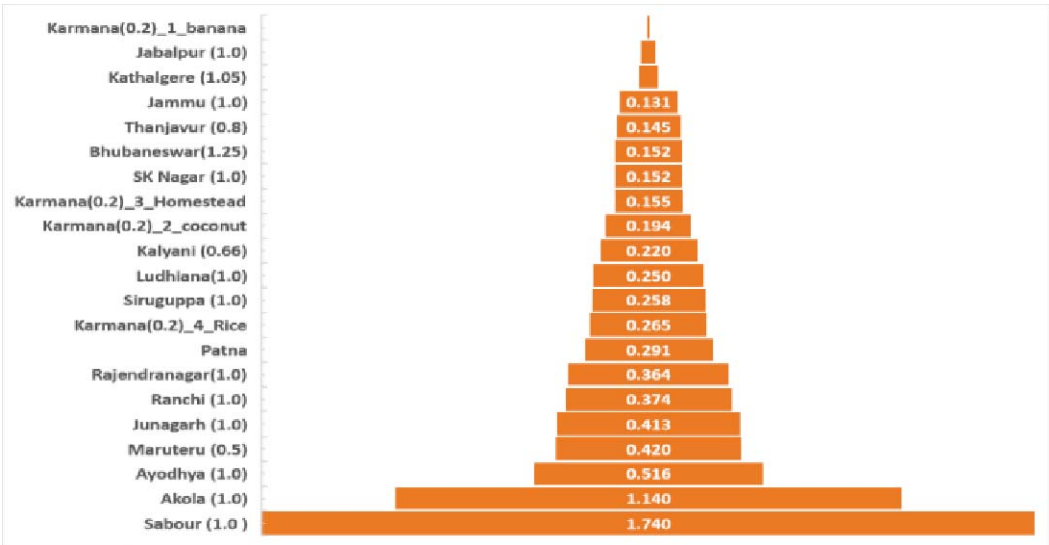


Fig. 3. Pesticides/chemical usage in different IFS models

Further, the contribution of chemicals was classified in terms of herbicides, fungicides and insecticides used in IFS models so as delineate suitable strategies to reduce their usage or deduce alternative management. Based on the results alternate eco-friendly strategies such as mulching, intercropping, mechanical weeding is being incorporated for sustainable agriculture production system with the integration of aquaculture in IFS model.

Project: Measurement and Estimation of Greenhouse Gases (GHG) emission and carbon footprint in sustainable Integrated Farming System (IFS) models of Western Plain Zone of Uttar Pradesh

This project was started in 2018 to quantify GHG emission from sustainable IFS models (1.5ha) to assess carbon footprint of IFS models and to quantify climatic resilience of IFS Models. IPCC Tier-II approach was used for estimating the GHG emission. Highest emission of 2929 kg CO_2-e was recorded with livestock component, which was 63.1 % of the total emission of 6228 kg CO_2-e. Among the cropping systems, sugarcane-ratoon-wheat cropping system emitted 326 kg CO_2-e followed by 296 kg CO_2-e by rice-wheat-dhaincha system. The incorporation of biomass and compost added to the system along with the agro-forestry system act as sink of carbon and resulted carbon negative IFS model.

Project : Scaling and Impact Assessment of Integrated Farming System for Livelihood of Farmers

The study undertaken to evaluate the capacity building to upscale the IFS and impact of IFS on farmers livelihood in Kerala, Tamil Nadu and Telangana. The primary data collected from 2 districts of Tamil Nadu i.e. Erode and Salem with a representative sample of 70 farmers who are beneficiaries of government scheme and another 70 farmers as counterfactuals for impact assessment. Coarsened Exact Matching (CEM) technique was employed to evaluate the impact of IFS on farmers income.

Results shows that the mean age of farmers was 51 years, with average years of schooling 8.5 years (Table 8). More than 60 % of farmers belongs to backward classes, with farming experience of 31 years. Majority of the farmers having membership in coo-operative societies. In CEM we considered variables like owned land, education, age, total cost and cop intensity, and results reveals that farmers beneficiaries have income advantage over the other farmers who not adopted IFS cultivation in terms of gross and net income (Table 9). The IFS adopters have net income of ₹ 29573 over the other farmers and Gross income of ₹ 33378 over the non-IFS adopters. This clearly indicates the necessary of adopting the IFS and promote it among farmers groups for better income and livelihood.

IFS program facilitates more of backward class (~60 %) of farmers belongs to small and marginal land holdings and IFS adopters have more diversified farming systems than Non-adopters. The CEM results show that there is positive and significant impact on the income through adoption of IFS. This clearly indicates the necessary of adopting the IFS and promote it among farmers groups for better income and livelihood.

Project : Sustainable resource management for climate smart IFS under AICRP on Integrated Farming Systems

A 0.70 ha integrated farming system model with 7 modules such as cropping systems (0.38 ha), horti-pasture (0.18 ha), agri-horti (0.12 ha), dairy (1 buffalo + 1 desi cow), vermicompost (0.005ha), boundary plantation and secondary agriculture (value-addition) modules were evaluated for marginal farm households of irrigated areas in western Uttar Pradesh. Results of study made during the year related to productivity and economics of different modules in IFS model is briefed in Table 10 and performance of banana module in Table 11.

Table 8. Socio-economic characteristics of IFS adopter and non-adopter farmers

Variables	Classification	IFS adopters		Non-adopters	
		Mean	SD	Mean	SD
Age	<45 years	28.6		32.9	
	45 years & above	71.4		67.1	
	Mean age (years)	52.7	10.2	50.9	10.4
Education (%)	Up to class 5	27.1		32.9	
	Class 6-12	54.3		52.9	
	Graduate & above	18.6		14.3	
	Mean (Years)	9.2	3.8	8.2	4.6
Category share in total (%)	General	41.4		31.4	
	OBC	54.3		60.0	
	SC	4.3		7.1	
	ST	0.0		1.4	
Farming experience	Years	32.1	11.7	30.3	12.8
Family size	Male	2.0	0.9	2.0	0.7
	Female	2.0	1.3	1.9	0.8
Membership in organizations	Co-operatives	85.7		58.6	
	SHGs	2.9		5.7	
	Organic groups	0.00		4.3	

Table 9. Economic benefit from adoption of IFS among farmers (L1 distance: 0.937)

	Control	Treated		Net Returns (₹)	Gross returns (₹)
All	70	70	Coefficient	29573.5** (13904.6)	33377.7 ** (14754.2)
Matched	29	32	Constant	39599.9*** (10070.9)	63220.3*** (10686.3)

Table 10: Productivity and economics of different modules in IFS model.

Module	SEY (t)	COC (₹)	Gross Return (₹)	Net Return (₹)
Cropping System	35.4	33415	115049	81635
Agri-horti	11.3	14260	35915	21955
Dairy	2330 lit.	113526	153734	40208
Boundary Plantation	16.9	5900	54912	49012
Including family labour		166801	359610	192809
Excluding Family labour		85801	359610	273809

Table 11: Performance of banana module inter cropped with vegetable Pea and Soybean in IFS

Variety	Monthan (2x2 m)	Crop/ Inter crops	Yield (kg)
Purpose	Culinary purpose	Banana	380
Duration	12-14 months	Vegetable Pea (Intercrop)	84
Intercrops	Vegetable Pea-Soybean	Soybean (Intercrop)	42

Plate 5. Mushroom production in banana plantation

Vermicompost production in Banana plantation: Vermi-beds were laid between banana allays and 1.4 tons of vermicompost was harvested from 3.3 tons substrate from one allay of banana (February-April).

Integration of Mushroom with Banana: Three substrates such as rice, mustard and banana were tested for mushroom (*Pleurotus florida*) production inside the banana plantation (Plate 5). Fungi belonging to the *Pleurotus* genus, also known as oyster mushroom, develop with efficiency in lignocellulosic wastes. They have specific enzymes that degrade lignocellulosic compounds present in those types of raw material. The waste from the banana tree is another material with high potential for utilization as substrate in edible mushroom cultivation. The substrates based on leaves of banana cultivar (Monthan) were used to evaluate the production of *Pleurotus florida* mushroom. A huge amount of waste (pseudo-stem and leaves) is generated after harvest of banana. The cultivation technology of edible mushrooms in the Western Uttar Pradesh is still less developed and needs further refinement for successful integration in farming systems. Among the different

substrates tested, the highest biological efficiency has been recorded for Rice straw (57.6%) with a yield of 575.7 g kg^{-1} of dry straw followed by Mustard straw (47.5 %) with a yield of 470.5 g kg^{-1} of dry straw and the lowest for straw prepared from banana leaves (43%) with a yield of 430.0 g kg^{-1} of dry straw.

By-product utilization from banana: Banana crop waste is a cheap source of nutrients, it increases organic matter, stimulates soil microbial life, enhances water holding capacity and increases crop yields besides improvement of soil biodiversity, and reduction of environmental risks. It is suggested that banana crop residues can be recycled for compost with other organic sources. The pseudo-stem and leaves of banana after harvest are utilized for compost preparation and total of 8.1 kg of Nitrogen, 1.6 kg of Phosphorus and 18.1 kg of Potash can be saved. However, through the recycling wastes from 0.7 ha IFS model, can save 119.8 kg N, 33.5kg P and 109.9 kg K. The share of recycling through banana module in the Model is 6.5% for N, 4.9% for P and 16.5% for K. Thus Banana crop residues can be recycled for compost with other organic sources for better utilization of waste.

Value Addition: Five products such as banana chips, squash, pickles, jam and sauce were prepared during the year and evaluated for its contribution to income improvement from the model. Income improvement due to processing of Banana chips, Banana Squash, Banana pickles, Banana Jam, Banana sauce were 0.8, 2.6, 0.9, 8.5 and 3.7 times respectively. Soil health status of IFS model and banana module is presented in Plate 6 and soil health status of banana module in Table 12.

Plate 6. Soil health status of IFS model

Table 12. Soil health status of Banana module

pH	: 8.1±0.36	Range :	7.24 to 8.24
N (kg ha^{-1})	: 292± 26.17	Range :	238 to 539
P (kg ha^{-1})	: 47.1 ± 8.64	Range :	35.27 to 57.4
K (kg ha^{-1})	: 432.1 ± 38.54	Range :	366.2 to 715
OC(%)	: 0.61 ±0.08	Range :	0.36 to .0.83

Total cost, gross return, net return, and B:C of 0.70 ha IFS model was 1.63 lakhs, 3.45 lakhs, 1.81 lakhs and 2.11, respectively. Through the recycling of waste/residue 119.8 kg N, 33.5 kg P and 109.9 kg K was recycled and could be able to meet 77.8% N, 27.3% P and 71.9% K requirements within the IFS model. Improved IFS model have higher net income (45.2%), better water use efficiency and more employment generation as compared to prevailing farming system of the region. Out of 17 SDGs, 13 SDGs can be addressed at household level through integrated farming system. Scientific integration of different modules in the IFS mode interacts with environment without dislocating the ecological and socio economic balance on one hand and attempts to meet the food, fibre, fodder and fuel needs as the national goal on other hand.

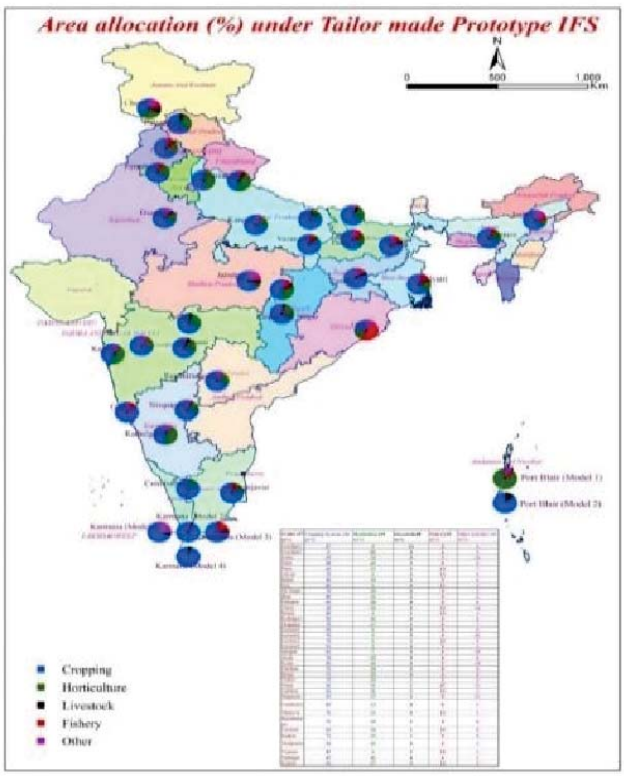


Fig. 4 Scheme: AICRP on Integrated Farming Systems- On station (National)

Sustainable resource management for climate smart IFS programme with its revised objectives was started since 2017-18 under AICRP on Integrated Farming Systems, a plan scheme initiated from 2010-11. During the year under report, 43 IFS models were executed and evaluated of which 4 IFS models were in establishment stage while at 39 centres IFS models are well established (Fig.4).

The major objectives of the on-station programme on the theme sustainable resource management for climate smart IFS are i) To identify ecologically and economically viable enterprises for different regions under climate change scenario ii) To undertake resource budgeting in systems perspective with special reference to soil, water, nutrients and energy. iii) To evaluate the low carbon production modules in the system iv) To identify and evaluate secondary agriculture avenues in farming systems perspective for attracting rural youth. The programme is being undertaken at 32 locations involving 25 main centres, 2 sub centres and 5 ICAR based centres. Accordingly, in 36 IFS models cropping systems were planned and executed keeping in mind soil health, family nutrition, income generation and livestock nutrition goals, while in 29 models fruits/ plantation crops/spices were integrated. Further, in 28 IFS models livestock module was integrated while fishery component was integrated in 18 IFS models. Other complementary and supplementary activities based on local needs were integrated in 31 IFS models. The salient achievement of development of region specific on-station models for small and marginal farmers are as follows:

- Market input cost excluding labour (13.1 % in LGP to 66.4 % in TGP)
- Value of recycling excluding family labour (10.7 % in WCPH to 43.6 % WHP)
- Cost of hired labour (0 % in Islands to 40.2 % in CPH)
- Cost saving by family labour (49.8% in UGP being highest and lowest in TGP i.e. 0)
- Purchase of animal feed from market as share of market input excluding labour (18.2 % in GPH to 89.5 % in Islands)

- Net return per rupee invested varied from 0.38 in LGP to 1.7 in UGP
- SVI varied between 0.6 to 0.8
- Improvement in soil OC over initial status in range of 4.8% (GPH) to 96.2 % (TGP)
- Water productivity (^{1} m^{-3}) was highest being in MGP (186) while lowest being in ECPH (14.9)

ORGANIC AGRICULTURAL SYSTEMS

Project: Status of Organic Agriculture in Western Himalayan Regions

This project is being continued since 2018 on characterization of organic, inorganic and integrated farming systems of Jammu district. Survey was conducted during 2019-20 and data was synthesized and analysed to characterize the existing farming systems of the region. Three stage sampling procedure was followed and a total of 120 farmers (40 organic, 40 inorganic and 40 integrated farmers) were selected from the study area of Jammu district on the basis of having interventions from the different SKUATS centres. Descriptive statistics were derived and calculated for analysing the socio-economic data. Propensity score matching (PSM) was applied with kernel matching and radius matching methods to assess the impact of organic, inorganic and integrated farming on farmer's employment creation and income generation.

The result of the study showed that, out of 120 samples, share of different categories of farmers i.e. landless, marginal, small, medium and large were as 14, 19, 46, 13, and 08 % respectively. Among the five farming systems identified, the highest numbers of farmers were under crop+ livestock+ poultry system followed by crop+ livestock+ poultry+ agro-forestry. About 73% of land was used under high yielding variety of crops whereas, only 27 % land use was under local variety. There were five major cropping patterns observed in the region. The net return was observed highest with rice-maize-vegetable cultivation (₹120344 ha^{-1}) followed by rice-pulses-wheat (₹ 98000 ha^{-1}). Average net return of the farm was ₹ 37064/- (₹ 32800/- from livestock and ₹4264/- from crop) during the year year 2019–2020. The total income was categorized into different components i.e. crop, livestock, poultry, homestead, agro forestry and off farm income. In case of marginal and semi medium farmings, off-farm income was higher compared to on-farm income. Contrary, in case of small, medium and large farmers, on-farm income was higher compared to off-farm income. The main farming system constraints identified was lack of knowledge about new crop variety and latest technology and this was followed by high price of inputs, lack of knowledge for quality seeds/fingerlings/duck links, lack of credit facility, lack of knowledge about homestead vegetables production, vaccination, de- worming, feed of livestock and poultry, insect/ pests/weeds and lack of purchasing power.

Project: Crop Improvement for organic production system

The present work was initiated during the year 2015 for breeding of new mustard varieties for organic production system. During sixth year of the project, a total of nine new strains of mustard have been developed from three different parentages (Table1). These strains were tested during *rabi* 2021against standard check (RH 749) for preliminary yield trial under organic production system.

Results were encouraging as three strains namely; MM 16A 241, MM 16A001 and MM 17A008 were found superior over standard check (RH 749) in terms of seed yield, biomass and other yield contributing traits.

In other trials for evaluation of various crop varieties for organic production system, 20 varieties of mustard; 10 varieties of wheat and 10 varieties of Basmati rice were tested for their yield performance under organic production system. Out of 20 mustard varieties tested for seed yield, Varuna (27.92qha^{-1}), Maya (26.43qha^{-1}) and Basanti (26.17qha^{-1}) were found superior under organic production system. Among wheat genotypes tested, 5-SR-05 (29.47qha^{-1}), HD 3226 (26.91qha^{-1}) and DBW 71 (26.81qha^{-1}) were best performing varieties. For Basmati rice, Malviya Basmati (57.30qha^{-1}) followed by PB 1609

Table 1: New strains of mustard developed and isolated from F6 individual plant progenies for organic production system

S. N0.	Mustard strains developed	Parentages
1.	M 16A 001	IJ 31x EC 597313
2.	M 16A 081	IJ 31x EC 597313
3.	M 16A 082	IJ 31x EC 597313
4.	M 16A 083	IJ 31x EC 597313
5.	M 16A 241	IJ 31x EC 597313
6.	M 16A 242	IJ 31x EC 597313
7.	M 16B 001	MJA 38 x MJR 9
8.	M 16B 002	MJA 38 x MJR 9
9.	M 17A 008	MJA 25 x MJR 3

(52.72qha^{-1}), PB 1718 (51.38qha^{-1}) and PB 1637 (50.27qha^{-1}) were leading varieties in terms of grain yield. It is concluded from the study that, mustard varieties viz; Varuna, RB 50, wheat varieties viz; 5-SR-05 and HD 3226 and rice varieties viz; Malwiya Basmati, PB 1609 and PB 1718 were found superior and suitable for organic production system.

Project: Nutrient management in different cropping systems under organic production systems

Project aims to standardize the doses of various organic manures to develop nutrient management package for various crops and cropping systems.

Nutrient management using mustard oil cake: Eleven different treatments were evaluated under randomized complete block design with three replications under rice-mustard cropping system. Grain yield of basmati rice was significantly affected by application of mustard cake (MC). Highest basmati rice grain yield (4634 kg ha^{-1}) was recorded under application of 5.0 t ha^{-1}MC in *kharif* + 5.0 t ha^{-1} MC in *rabi* and found at par with application of 5.0 t ha^{-1} MC in *kharif* + FYM & Vermicompost (VC) in *rabi*. Similarly, seed yield of mustard (3033 kg ha^{-1}) was registered highest under application of 5.0 t ha^{-1} MC in *kharif* + 5.0 t ha^{-1}MC in *rabi* and found significantly higher over other treatments. System productivity in term of rice equivalent yield (REY) was significantly

Plate 1: Mustard crop applied with oil cake

Table 2: Effect of mustard oil cake application on System productivity and economics of basmati rice-mustard system

Treatment	Rice grain yield (kgha^{-1})	Mustard seed yield (kgha^{-1})	System REY (kgha^{-1})	Cost of cultivation (kgha^{-1})	Gross return (kgha^{-1})	Net return (kgha^{-1})	B:C ratio
5.0 t ha^{-1} MC (*kharif*) + 5.0 t ha^{-1} MC (*rabi*)	4634	3033	12573	275,774	343217	67443	1.24
5.0 t ha^{-1} MC (*kharif*) + FYM & VC (*rabi*)	4500	2005	10107	195,342	277264	81922	1.42
FYM & VC (*kharif*) + 5.0 t ha^{-1} MC (*rabi*)	3412	2925	10804	183,674	294812	111138	1.61
2.5 t ha^{-1} MC (*kharif*) + 2.5 t ha^{-1} MC (*rabi*)	4319	2523	11039	168,604	301453	132849	1.79
2.5 t ha^{-1} MC (*kharif*) + FYM & VC (*rabi*)	4406	1883	9717	138,172	266277	128105	1.93
FYM & VC (*kharif*) + 2.5 t ha^{-1} MC (*rabi*)	3134	2534	9582	133,674	260899	127225	1.95
1.25 t ha^{-1} MC (*kharif*) + 1.25 t ha^{-1} MC (*rabi*)	4038	2225	10022	134,489	273371	138882	2.03
1.25 t ha^{-1} MC (*kharif*) + FYM & VC (*rabi*)	4005	1740	8896	121,157	243692	122535	2.01
FYM & VC (*kharif*) + 1.25 t ha^{-1} MC (*rabi*)	3198	2255	9039	116,574	247338	130764	2.12
Inorganic	4402	2612	9073	62,258	281796	219538	4.53
FYM & VC (*kharif*) + FYM & VC (*rabi*)	3105	1450	7123	103,242	196861	93619	1.91
SEm±	55.0	77.7		-	-	-	-
CD (P=0.05)	163.4	230.8		-	-	-	-

Selling price of basmati rice was Rs. 2600/quintal; Mustard Rs. 4650/quintal
* 25% premium price was used for organic treatments

improved with the application of MC. Highest REY (12573 kg ha^{-1}) was recorded under application of 5.0 t ha^{-1}MC during both the seasons. It was followed by the application of 2.5 t ha^{-1} MC in *kharif* + 2.5 t ha^{-1}MC in *rabi* (Table 2).

Nutrient management of different cropping systems under organic production system: This experiment was conducted in split plot design with three cropping systems {Sugarcane + Sesbania (GM)-Sugarcane ratoon-wheat; rice-wheat-Sesbania (GM) and maize-chickpea-green gram} in main plot and five different nutrient management systems (in sub-plot) with three replications. Yield parameters of sugarcane were significantly affected by different organic nutrient management practices. Among organic

nutrient management treatments, highest number of millable cane (NMC) ha^{-1} (123810), average cane height (223.4 cm), no. of nodes/cane (22.8), cane weight (1206 g) and cane yield (83.8 t ha^{-1}) and net return were recorded highest under application of 100% recommended dose of nitrogen (RDN) with Sesbania green manuring (GM) (Table3).

Table 3: Productivity and brix % of sugarcane plant crop under different nutrient management

Treatments	Cane yield (t ha^{-1})	Green top yield (t ha^{-1})	Brix %	COC (₹ ha^{-1})	Gross return (₹ ha^{-1})	Net return (₹ ha^{-1})	B:C ratio
100% RDN + GM	83.8	12.7	22.2	95332	272388	177056	2.86
75% RDN + GM	71.0	11.4	22.4	84258	230802	146544	2.74
100% RDN w/o GM	78.6	13.0	22.5	95332	255598	160266	2.68
75% RDN w/o GM	76.8	12.4	22.5	84258	249751	165493	2.96
Inorganic	100.9	13.0	22.3	58822	328026	269204	5.58
SEm±	2.67	0.52	0.143	-	-	-	-
CD (P=0.05)	8.48	NS	NS	-	-	-	-

*RDN: 180 kg Nha^{-1} through FYM, vermi-compost and mustard cake
GM: Intercropping with Sesbania Green Manure

***Basmati rice-wheat system*:** Yield of basmati rice and wheat were significantly affected by different nutrient management systems and highest yield was recorded under inorganic management system. Among the different organic nutrient management, highest grain yield of basmati rice (3477 kg ha^{-1}) and wheat (4910 kg ha^{-1}) were found under application of 100% RDN through MC, FYM and VC with Sesbania green manuring. The system REY was registered highest under inorganic management followed by the application of 100% RDN through MC, FYM and VC with Sesbania green manuring.

***Maize-chickpea-greengram system*:** Among different nutrient management treatments, highest cob yield (7943 kg ha^{-1}) was recorded under inorganic management followed by application of 100% RDN through MC, FYM and VC with legume crop residue incorporation. However, yield of chickpea (3048 kg ha^{-1}) and green gram (1417 kg ha^{-1}) were recorded highest with 75% RDN through MC, FYM and VC with legume crop residue incorporation and found at par with 100% RDN through MC, FYM and VC with legume crop residue incorporation. System productivity was found highest (21.0 t REY ha^{-1}) under application of 100% RDN through MC, FYM and VC with legume crop residue incorporation and was followed by the application of 75% RDN through MC, FYM and VC with legume crop residue incorporation. It could be concluded from the study that, application of MC (5.0 t ha^{-1}) in both the seasons, resulted in highest system rice equivalent yield. System productivity was improved by the tune of 24.9 % to 76.5 % with the application of MC under different treatments over other organic nutrient sources. Among different organic nutrient management treatments, highest system productivity (12.1 t ha^{-1}) and net return (Rs.140522 ha^{-1}) were received under the application of 100% RDN + Sesbania green manuring followed by 75% RDN + Sesbania green manure for basmati rice-wheat system.

Project: Development of pest and disease management package for organic farming

This project is being continued since 2018-19 to develop organic pest and disease management (OPDM) package for important vegetable crops in different vegetable based cropping systems i.e. early cauliflower-tomato-chilli; brinjal-brinjal and cow pea-cauliflower-summer tomato in cropping system mode. Observations on scoring of various pests and diseases were collected from different treatments by following standard scoring systems for individual insect-pest/ disease.

Fruit and shoot borer (*Lucinodes arbonalis*) was recorded as major problem in case of brinjal causing 26.87% average loss in fruit yield across the treatments. Fruit cracking was another physiological disorder responsible for 10.05% average loss in fruit yield of brinjal in the month of January and February. Sclerotinia fruit rot was also recorded as a major disease but causing only about 1.62% average yield loss across the treatments (Table 4). Maximum infestation (37%) of fruit and shoot borer was recorded under inorganic treatment followed by integrated and inorganic according to table it should be followed by inorganic and integrated management systems. It indicates that, fruit and shoot borer remains a big challenge for organic production system of brinjal (Fig. 1).

Plate 2: Fruit & Shoot Borer (*Lucinodes arbonalis*) infestation in brinjal

Table 4: Yield loss (%) in brinjal caused by various stresses in different treatments

Treatment	Per cent loss if fruit yield of brinjal			
	Fruit & Shoot Borer	Fruit rot	Fruit cracking	Total
1. Organic	29.56	1.86	10.00	41.42
2. Integrated	22.46	1.34	9.73	33.53
3. Inorganic	28.59	1.67	10.43	40.69
Average =	26.87	1.62	10.05	

Maximum marketable fruit yield (322.37 kg ha^{-1}) of brinjal was recorded under integrated pest and disease management system and it was at par with organic treatment (322.05q ha^{-1}) (Fig. 2). In spite highest losses (41.42%) due to pests and diseases, the fruit yield of brinjal under organic pest and disease management system was found promising because, it was more than 200q ha^{-1}which is treated as encouraging yield for an organic production system.

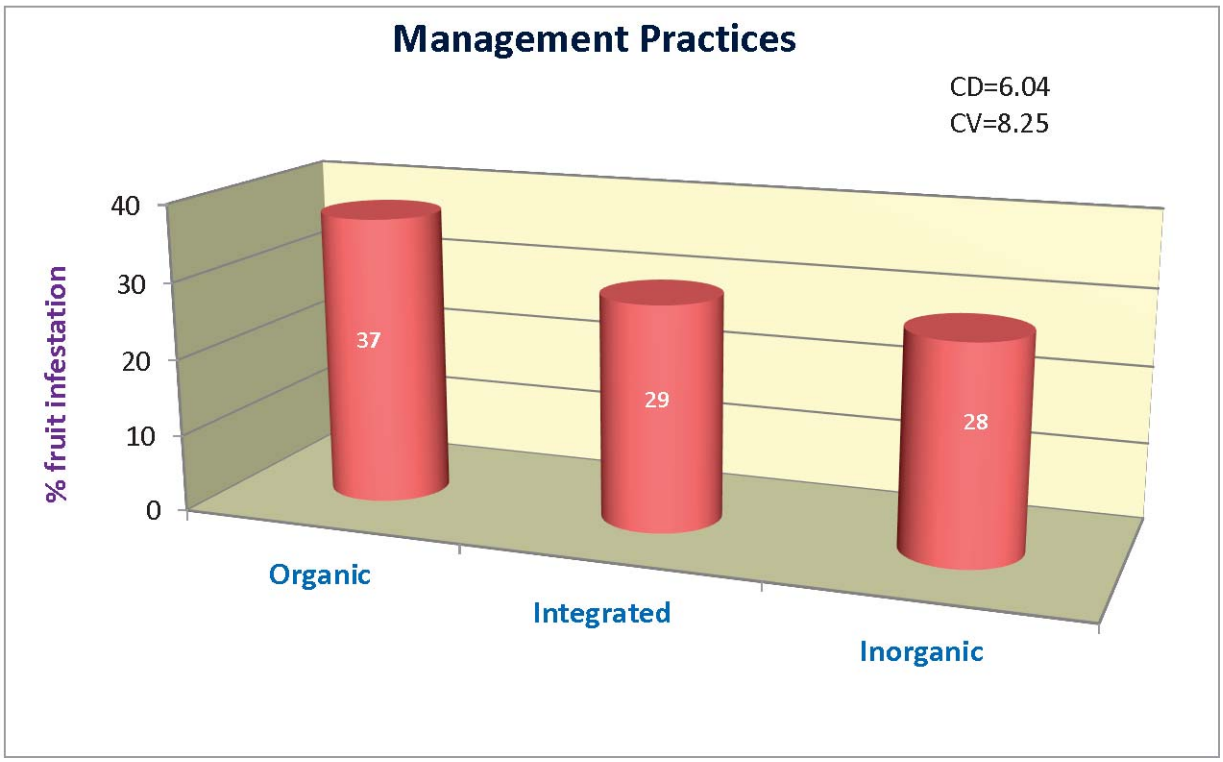


Fig.1: Effect of different management practices on fruit infestation by Lucinodes arbonalis in Brinjal.

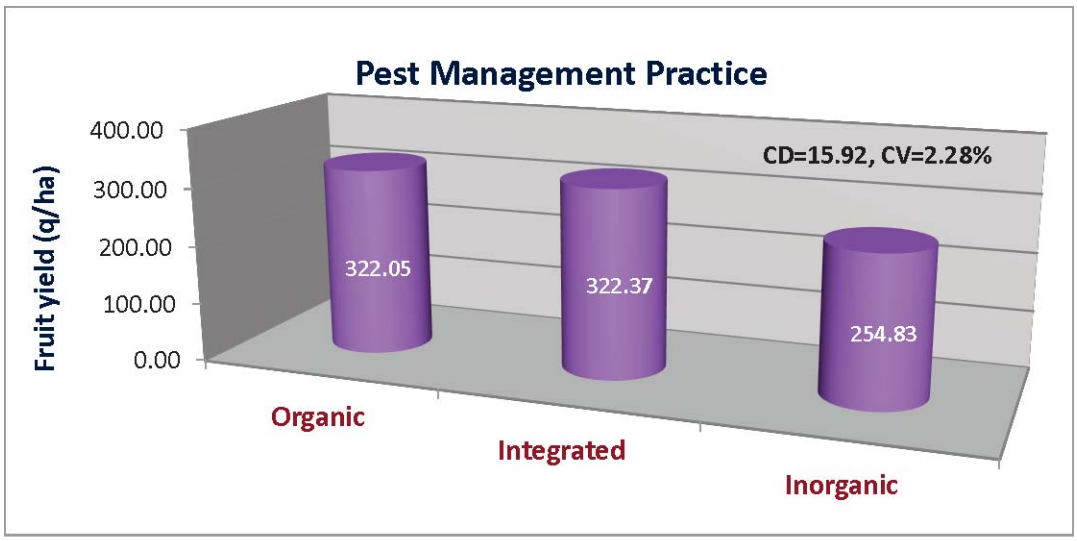


Fig. 2: Effect of different management practices on marketable fruit yield of Brinjal.

Under development of pest and disease management package for organic farming, fruit and shoot borer; Sclerotinia blight; and spider mite were recorded as major biological stresses in brinjal during various months. Maximum infestation (37%) of fruit and shoot borer was recorded under organic treatment followed by inorganic and integrated management systems. Organic pest and disease management system showed promising results in terms of fruit yield (322.05q ha^{-1}) of brinjal which was at par with integrated pest and disease management system.

Scheme: All India Network Programme on Organic Farming (National)

All India Network Programme on Organic Farming (AI-NPOF), a plan scheme initiated from 2004-05 operates currently with 20 centres covering 10 agro-climatic regions (16 States) of the country. Activities of the scheme have been organized in to 4 programmes namely Characterization of organic practices and inputs adopted by organic growers (Table 5); development of scientific package of practices for organic production (Table 6, Fig. 3); organic farming systems assessment (Table 7) and Capacity building including policy support to Central and State Agencies (Table 8). Programme-wise salient achievements made under the scheme are given as below:

During this year 2020-21, 966 organic and 83 natural farming farmers from 16 States have been characterized and yield gap between farmers and scientific organic farming package of major crops analysed over the years. The yield gap ranged from 11 to 76.5 % which indicated the scope for further increasing the production under organic farming by promotion of scientific organic farming practices.

Table 5: Characterization of organic inputs and practices

Output parameter	Up to 2019-20	2020-21
Geo-tagged Characterization of Lorganic and natural farmers	3755 from 16 States	966 organic farmers in 16 States; 83 natural farmers (NF) farmers in 8 States
Bio-chemical characterization and molecular identification of microbial population of indigenous organic inputs	5 (*Shasyagavya*, *Panchagavya*, Kunapajala, Ghanjeevamrit & Jeevamrit); 13 bacterial isolates Accession number generated	7 (Beejamrit, Vermiwash, Dashparni, CUBS, Matkakhad, Neemastra, Brahmastra) 36 are in process
Documentation and validation of Organic ITKs	6 (pest management practices including storage pests)	5 (nutrient, insect-pest, storage pest)

Table 6: Development of scientific package of practices for organic production.

Output parameter	Up to 2019-20	2020-21
Scientific package of practices for Organic crop production in Systems perspective	PoPs for 51 cropping systems (33 cropping systems from 2014-2019)	11 cropping systems in 6 States
Identification of varieties for major crops for organic farming in Systems perspective	449 varieties of 21 crops104 varieties identified for 15 cropping systems	71 varieties of 15 crops (Traditional, HYV, Speciality purpose)
Weed Management Packages for selected crops and systems	10 cropping systems for 10 States	3 cropping systems for 3 States
Insect-disease management package	12 cropping systems for 7 States	11 crops for 4 States
Natural Farming Practices evaluation in different agro-ecology	-	8 cropping systems in progress
Farmer participatory validation of natural and organic farming packages	-	5 cropping systems in 5 States

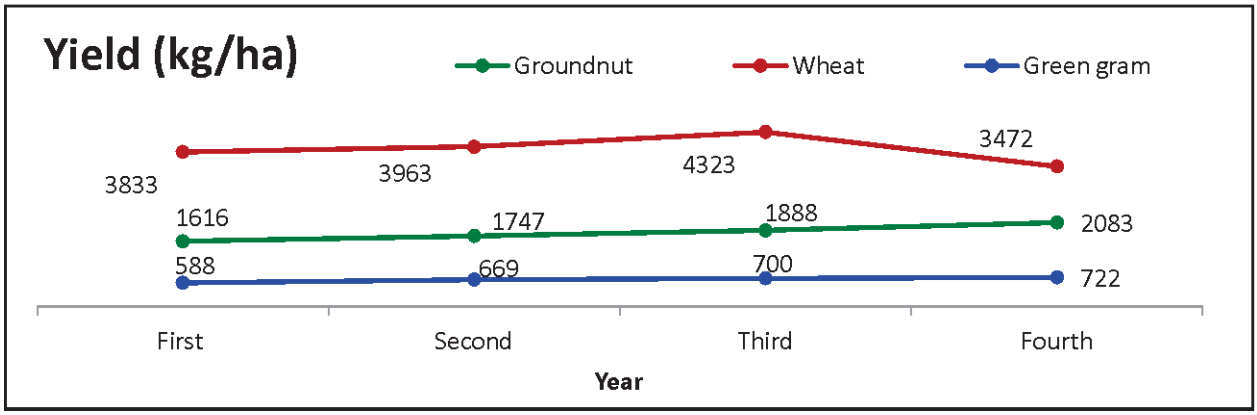


Fig 3: Yield trend of groundnut-wheat-greengram system (SK Nagar, Gujarat)

Table 7: Organic Farming Systems Assessment

Output parameter	Up to 2019-20	2020-21
One acre Integrated Organic Farming Systems Established	7	1 (3 are in progress)
States Covered	6 (Gujarat, Kerala, Meghalaya, Rajasthan, Sikkim, Tamil Nadu)	Chhattisgarh (Uttar Pradesh, Uttarakhand and Punjab in progress)
Major production systems covered	Hills, Rainfed and Irrigated Spices, Tubers	Diversified systems
Components	Field crops, horticulture crops, plantations, pest repellent plants, dairy, ducks, fish	Field crops, horticulture crops, plantations, pest repellent plants, dairy, ducks, fish
Net income range	0.78 to 1.23 lakhs /acre	Rs 0.59 to 2.16 lakhs/acre
Major Advantage	Quality and timely availability of organic inputs ensured	Reduction in market inputs

Table 8: Capacity building including policy support to Central and State agencies

Output parameter	Up to 2019-20	2020-21
Model value chain development	-	Initiated in 6 villages in 4 States
Action plan for reducing mineral fertilizers	-	7 States
Certified Farm Advisor (s) on Organic Farming	74 from 18 States	46 from 16 States
Policy input provided	2 central schemes (JKPY, MODI-Ladakh)	1 (Tamil Nadu State Government)
Input to Parliament questions	69	31
Mass Awareness Campaign	-	2 (11763 participants)
Registered groups	1 (Manar Vanadesa Organic Farmers group)	1 PGS group

Plate 3: Glimpses of experiments on development of Organic farming packages at Ajmer (Rajasthan, top) and SK Nagar (Gujarat, bottom)

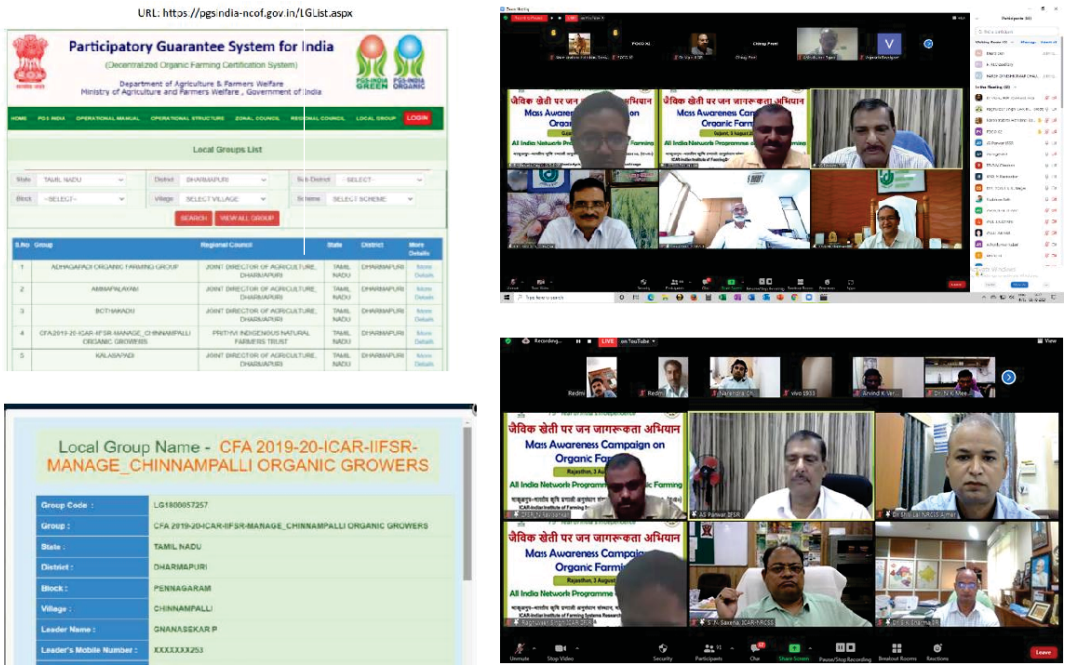


Plate 4: PGS Local group creation under Certified Farm Advisor on Organic Farming (left) and Mass Awareness campaign (right) Case Studies on IOFS models

Nine case studies developed and contributed from the AINP-OF scheme has been published on Nature Day event of UN-Climate Change Conference (UK 2021; COP26) on 6 November 2021. The conference was held in Glascow, UK. IOFS clusters developed by ICAR in Meghalaya and Sikkim, organic farming interventions made in Chhattisgarh, Himachal Pradesh, Kerala, Tamil Nadu and Rajasthan are highlighted.

Plate 5: Glimpse of Case studies highlighted in the UN Climate Change Conference during 2021

Project: All India- Network Programme on Organic Farming, Modipuram Centre

The major programmes covered under AI-NPOF, Modipuram Centre include geo-tagged characterization of organic and natural farmers; screening of different varieties of crops for organic production system; development of organic farming package of practices for crops and cropping systems and evaluation of concoctions of Natural Farming in Basmati Rice-Wheat system.

Geo-tagged characterization of organic and natural farmers: During geo-tagged characterization of organic and natural farmings, the productivity of different field crops (sugarcane, wheat and mustard) was found lower at farmer's field by 20.73-29.12% as compared to on-station crop yields. This was due to gap in package of practices being used by the farmers. Lack of marketing facilities; low premium price or no premium price; lower productivity of crops; high cost of weeding; lack of technical knowledge and advisory services were some of the major identified constraints for organic farming at farmer's field. 71.43% of surveyed farmers left organic farming mainly due lack of marketing facilities and no or low premium price of organic produce and higher yield reduction under organic farming.

Evaluation of different varieties of major crops for organic farming: Performance of different varieties of maize and mustard under organic production was evaluated. Among the different varieties of maize, highest grain yield was found under HQPM 1 followed by Pioneer hybrid 1866. Similarly highest gross return and net return was found under HQPM 1. Among the different varieties of mustard, growth, yield attributes, yield and profitability was found highest in NRCHB 506 followed DRMRIJ 31 variety under organic management. Therefore these varieties can be recommended for cultivation under organic farming in Upper Indo Gangetic Plains.

Evaluation of organic, inorganic and integrated production system: This is a long term experiment comprising six crop management systems i.e. 100 % organic nutrient sources; 75 % organic + Innovative practices (Cow urine and *Trichoderma*); 50% organic+ 50 % inorganic; 75 % organic + 25 % inorganic; 100 % inorganic nutrient sources and State recommendation (RDF + 2.5 t/ha FYM) and four cropping systems i.e. Basmati rice– Durum wheat - Sesbania green manure; Maize (pop corn) – Potato– Okra + Sesbania green manure; Coarse rice– Barley (malt) – Green gram and Maize (sweet corn) – Mustard– Sesbania green manure. The experiment was conducted in strip plot design and the salient achievements for the year are as follows:

Crop management practices significantly affected the performance of different cropping systems. Yield of basmati rice, Okra and green gram was recorded highest under 100% organic management system. However, yield of coarse rice, barley and mustard was

recorded highest under 50% organic +50% inorganic management followed by state recommendation. Yield of wheat was recorded maximum under state recommendation followed by 50% organic +50% inorganic management. Irrespective of cropping systems, highest system REY was found under 100% organic management if 25% premium prices are provided over normal prices. Among the different cropping system, highest REY was recorded under Maize (pop corn)-potato-okra +sesbania green manuring system followed by basmati rice-wheat-sesbania green manuring system (Table 9). Similarly system net return was also recorded highest under Maize (pop corn)-potato-okra +sesbania green manuring system and 100% organic management.

Evaluation of Carbon and nitrogen mineralization rate constant: Among the different nutrient management practice, higher values of KC (Carbon mineralizatin rate constant) and KN (Nitrogen mineralizatin rate constant) were recorded in integrated nutrient management practice. Soil with a higher half-life of C (52.9 and 34.0 days for Basmati rice (*Oryza sativa*)-wheat (*Triticum aestivum*)-sesbania (*Sesbania aculeata*) -CS1 and Coarse rice (*Oryza sativa*)-barley (*Hordeum vulgare*)-green gram (*Vigna radiata*) -CS2 respectively and N (34.9 and 27.5 days for CS1 and CS2, respectively) was recorded under organic management practice. In both the cropping systems, the mineralization rate constant and half-life of C and N are inversely related to each other.

Evaluation of concoctions of Natural Farming in Basmati Rice-Wheat system: This study was initiated in the year 2017 to study the effect of zero budget natural farming on productivity and economics of basmati rice and wheat. Six different management systems including control, scientific organic package, zero budget natural farming products, improved ZBNF products and integrated crop management were used in the study. Yield of basmati rice was reduced by 23.4%, 66.2% and 58.8% respectively during first, second and third year under zero budget natural farming (ZBNF) as compared to scientific organic farming package, (Table 10). However, yield gap between scientific organic farming package and Integrated crop management was reduced from 18.6% during first year to 14.6% during third year. Better net return was found under scientific organic farming package with premium prices.

Table 9: System REY (kg ha^{-1}) under different production systems.

Treatment	System REY (kg ha^{-1})*			
	Basmati Rice - Wheat -Sesbania	Maize (Popcorn)- Potato - Okra + Sesbania	Coarse Rice- Barley- Green gram	Maize (Sweet corn)- Mustard- Sesbania
100% Organic	13,084(10467)	13912(10928)	10230(8182)	5841(4673)
75% organic+ IP	11,690(9352)	11639(9127)	9308(7445)	5369(4295)
50% organic + 50% inorganic	10,935	12780	9720	5039
75% organic + 25% inorganic	10,017	10788	8511	4726
100% inorganic	10,110	12533	8475	4945
State Rec.	10,803	12674	9192	4523

** Value in parenthesis represents System REY (kg ha^{-1}) without premium price*

Table 10: Performance of basmati rice under organic, integrated crop management and natural farming.

Treatments	Grain yield (kg ha^{-1})			%changeover NPOF			% changeover ICM		
	2018	2019	2020	2018	2019	2020	2018	2019	2020
Control	2303	732	1026	-25.8	-70.5	-65.5	-39.6	-73.6	-70.5
NPOF package	3104	2481	2973	-	-	-	-18.6	-10.5	-14.6
ZBNF-G	2377	838	1224	-23.4	-66.2	-58.8	-37.7	-69.8	-64.8
ZBNF-GC	2452	869	1156	-21.0	-65.0	-61.1	-35.7	-68.7	-66.8
ZBNF-IG	2601	1230	1747	-16.2	-50.4	-41.2	-31.8	-55.6	-49.8
ICM	3813	2772	3482	22.8	11.7	17.1	-	-	-
CD (P=0.05)	275.2	191.3	217.5						

In wheat crop, highest grain yield and profit was recorded under integrated crop management followed by scientific organic farming package. Yield under ZBNF was reduced by 62.1% and 72.5% as compared to scientific organic farming package and integrated crop management during third years, respectively (Plate 5). Effect of ZBNF and other crop management systems on soil biological properties was also studied. Highest population of bacteria, fungi and actinomycetes were recorded under organic farming practices and least under control. Glomalin which is a thermo-stable protein, secreted by arbuscular mycorrhizal fungi, was found highest under organic farming practices and lowest in negative control plots. Higher glomalin content is an indicative of carbon and nitrogen sequestration along with good soil aggregation. Higher glomalin content under organic farming and integrated nutrient management practice is due to the addition of bulky organic matter which favors the fungal colonization into the soil. Organic farming practices also resulted in the highest activity of different soil enzymes namely dehydrogenase, phosphatase, urease and â-glucosidase which are crucial for soil nutrient mineralization.

Plate 6: Performance of wheat crop under natural faming and other management practices

Plate 7: Visit of Ex. DG, ICAR, Dr. Punjab Singh at Natural Farming Experiment

Project: Development of Integrated Organic Farming System (IOFS) models for different regions of India

The project aims for low external input based sustainable organic agriculture by ensuring cost effective quality inputs for organic farming. As an Inter-Institutional project involving 10 centres of All India Network Programme on Organic Farming and at Institute headquarters, the integrated organic farming system models are being established to study the rate of reducing external market inputs by various means. The details of the IOFS models being developed in different agro-climatic regions are given below in Table:

Table 11: IOFS models being developed in different regions of India.

S. No	ACZ	NARP None	Number of models	Location
1.	Eastern Himalaya	Sub tropical hill zone (ML-1)	1	Umiam (ML)
		Tropical to temperate with lower to higher hills, alpine zone and snow bound areas	1	Gangtok (SK)
2.	Upper Gangetic Plains	Western Plain zone (UP-1)	1	Modipuram (UP)
3.	Upper Gangetic Plains	Bhabar and Tarai zone (UK-2)	1	Pantnagar (UK)
4	Trans Gangetic plains	Central Plain zone (PB-3)	1	Ludhiana (PB)

S. No	ACZ	NARP None	Number of models	Location
5	Central Plateau and hills region	Sub-humid Southern Plain and Aravalli Hills (RJ-7)	1	Udaipur (RJ)
6	Southern Plateau and hills	Western zone (TN-3)	1	Coimbatore (TN)
7	West Coast Plains and Ghat	Northern zone (KE-1) Southern zone (KE-2)	1 1	Calicut (KL) Thiruvananthapuram (KL)
8	Gujarat Plains and Hills	North Gujarat zone (GJ-4)	1	SK Nagar (GJ)
		Total=	**10**	**9 States**

Development of IOFS model for Western Plain Zone of Uttar Pradesh: This IOFS model consists of one acre area which is divided into five different modules i.e. food systems (basmati rice-durum wheat-sesbania in 0.15 ha, basmati rice-mustard-green gram in 0.05 ha); fodder systems: sorghum + cowpea-maize+cowpea-oat and maize + cowpea- sorghum + cowpea-berseem) in 0.1 ha; kitchen garden in 0.026 ha; pest repellent plants in 0.024 ha and dairy unit (1 buffalo and 1 cow in 0.05 ha) (Fig. 4).

Performance of food crops under low input organic management: Performance of the basmati rice and wheat along with different varieties under organic production system indicates that the yield of the system and economics gets improved significantly over the years (Table12 and 13).

Performance of fodder module: Performance of fodder system indicated that growing of maize + copwpea, sorghum + cowpea during *kharif* and berseem and oat during *rabi* can meet the green fodder requirement for 2 animals from 0.10 ha area (Table 13).

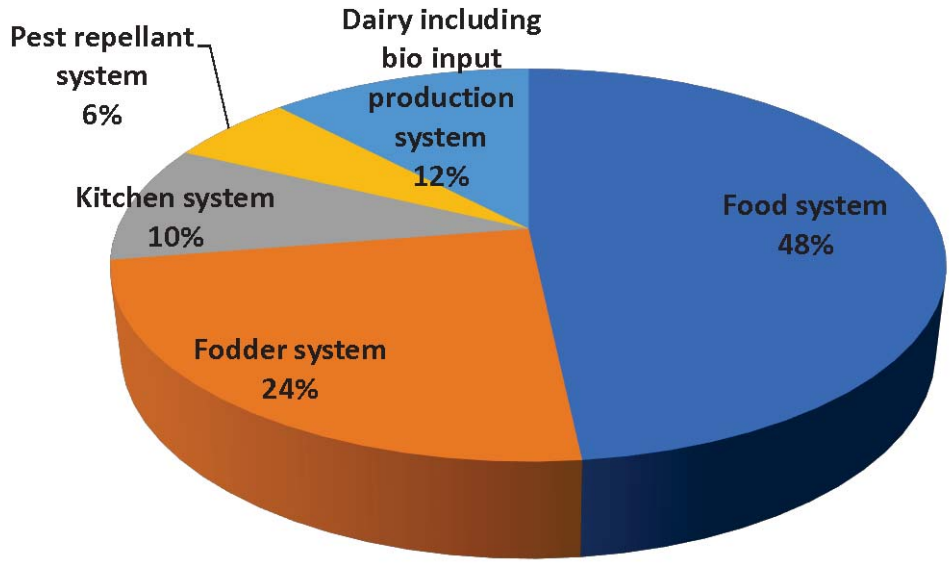


Fig. 4: Area allocation to different modules (dairy module establishment is in progress)

Table 12: Performance of wheat in basmati rice- wheat-sesbania system

Year andVariety	Grain yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Gross return (Rs. ha^{-1})	Net returns (Rs. ha^{-1})	NRPRI	B:C ratio
Durum wheat						
2016-17(MPO JW 1215)	2600	2700	65500	34720	1.1	2.1
2017-18(MPO JW 1215)	2624	3223	68597	41317	1.5	2.5
2018-19(MPO JW 1215)	2737	3312	79502	52222	1.9	2.9
Aestivum wheat (2019-20)						
HD 2067	4270	4510	125040	80680	2.8	1.8
JW 3288	4486	5056	159860	113640	3.5	2.5
HD 3086	4400	4996	130580	86220	2.9	1.9
Aestivum wheat (2020-21)						
HD 2067	4060	4304	117000	72800	1.6	2.6
JW 3288	4230	4852	149920	105560	2.4	3.4
HD 3086	4120	4792	122500	78080	1.8	2.8

Table 13: Yield performance of fodder module

Season	*Kharif*		Rabi	
Area	0.05 ha	0.05 ha	0.05 ha	0.05 ha
Cropping System	Maize + cowpea	Sorghum + cowpea	Berseem	Oat
2019-20				
Sowing	25 May 2019	26 May 2019	29 Oct 2019	2 November 2019
Harvesting	15-25 Aug 2019	25 August - 4 September 2019	1 Jan – 20 March 2020	15 Jan -10 Feb 2020
Yield (t ha^{-1})	53.3	55.3	43	31
2020-21				
Sowing	18 May 2020	18 May 2020	13 Nov 2020	13 Nov 2020
Harvesting	13 Sept 2020	27 July 2020		
Yield (t ha^{-1})	92.7	85.1		

Project: Estimation and valuation of ecosystem services from organic and natural farming systems in different Agro-ecology

This is on-going project at eight different locations namely Modipuram, Ludhiana, Pantnagar, Coimbatore, Dharwad, Bajaura, Gangtok and Almora under Maize, Cotton and Soybean based cropping systems with aim to monitor soil health, estimate and value the ecosystem services from organic and natural farming systems and to develop policy for scaling of organic and natural farming systems. All the parameters are being monitored under control,

complete Natural farming package, AI-NPOF package, and Integrated crop management (50 % nutrient application through organic manures and 50% nutrient application through inorganic sources with application of need based pesticides for pest management).

Project: Development of protocol for Value added products from Organic Sugarcane

Process protocol for immune boosting organic Jaggery: Present study was undertaken to identify and develop a suitable protocol for production of immune boosting organic jaggery during the month of March to June, 2021. Organically grown sugarcane viz. CoS 8272 was harvested from the ICAR-IIFSR research farm, Modipuram and different herbs and spices known to rich in phytochemical and antioxidant i.e. black pepper (B), dried ginger (G), cinnamon (C), mulethi (M), safedmusli (S) and tulsi oil (T) were procured from local market. In each experiment, 1.5-2 liters of filtered sugarcane juices and clarifying agent, wild okra (local name: suklai) @ 1% was used. Different treatment combinations considered for evaluation of quality of organic value added jaggery with different spices and medicinal herbs were:T1(B, 0.1%+ G, 0.2%+C,1.0%), T2 (M, 1%+S,0.1%+T, 0.1%), T3 (T1+M, 1%), T4 (T1+S, 0.1%), T5(T1+T,1%), T6 (T2+B,0.1%), T7 (T2+G,0.2%) and T8(T2+C,1.0%). Each treatment was replicated thrice and obtained organic immune boosting jaggery blocks. These products were evaluated for organoleptic score using nine points hedonic scale with different stakeholders including farmers, jaggery entrepreneurs and limited staffs of ICAR-IIFSR, Modipuram.

The effect of different spices (black pepper, ginger and cinnamon) and herbs (mulethi, safedmusli and tulsi) on sensory qualities of immune boosting jaggery prepared from organically grown sugarcane Cv. CoS 8272 presented in the Table 14. The results indicated that, among different treatments, the maximum overall organoleptic score (7.9±0.2) was recorded for sugarcane juice treated with T8 (T2+C, 1.0%) followed by (7.8±0.3) in T4 (T1+S, 0.1%). However, the minimum overall organoleptic score (6.2±0.2) was recorded for sugarcane juice treated with T1(B, 0.1%+ G, 0.2%+ C,1.0%) (Plate 5). The process protocol for production of optimized products were also demonstrated in the organic sugarcane farmers field and also at Jaggery units located in the villages of Muzaffarnagar districts of Uttar Pradesh during the months of April, 2021. Farmers reported

Table 14: Effect of different spices and herbs on sensory qualities of immune boosting jaggery prepared from organically grown sugarcane Cv. CoS 8272

Treatment	Sensory Qualities (9 points hedonic scale)			
	Taste	Texture	Flavour	Overall acceptability
T1	6.2±0.3	6.0±0.2	6.4±0.3	6.2±0.2
T2	6.4±0.3	6.6±0.2	7.4±0.1	6.7±0.2
T3	7.7±0.3	7.5±0.2	7.5±0.3	7.6±0.2
T4	7.8±0.2	7.9±0.3	7.7±0.3	7.8±0.3
T5	7.5±0.3	7. 6±0.2	7.8±0.3	7.7±0.2
T6	7.6±0.3	7.5±0.2	7.7±0.3	7.6±0.1
T7	7.5±0.3	7.9±0.2	7.8±0.3	7.7±0.3
T8	8.1±0.2	7.8±0.3	8.1±0.3	7.9±0.2

Plate 8: Training programme on organic immune boosting jaggery organized for farmers of Muzaffarnagar

that such value addition in jaggery; they could able to sell their produce @ Rs. 100 kg^{-1} and more, instead of regular selling price of Rs.35-40kg^{-1} in the local markets. Production of immune boosting jaggery using spices and herbs could be an alternate to enhance income and also generates new entrepreneurships.

Standardization of Process Protocol for Immune Boosting Organic Liquid Jaggery:

Organic liquid jaggeries were also prepared with different immune boosting herbs and spices. In these experiments, different herbs and spices known to rich in phyto-chemical and antioxidants such as black pepper oleoresin (B), ginger oleoresin (G), saffron (S), cardamom oil (C), rose oil (R) and tulsi oil (T) were used to enrich liquid jiggery. In each experiment, 1.5-2 liters of filtered sugarcane juices and clarifying agent, wild okra (local name: suklai) @ 1% and citric acid @ 0.1% were used. Out of 11 different treatments tested, the maximum overall organoleptic score (8.1±0.3) was recorded for sugarcane juice treated with C, 0.1%+ S, 0.01% followed by R, 0.1% + S,0.01% and T,1%+ S,0.01% (Plate 9). However, the minimum overall organoleptic score (6.2±0.3) was recorded for sugarcane juice without any treatment with spices and herbs.

Plate 9: Organic Immune Boosting Liquid Jaggery

CROPPING SYSTEMS AND RESOURCE MANAGEMENT

Project: **Adaptation and mitigation potential through Cropping System/Farming System approach (NICRA)**

A field experiment was laid out in 2020-21 at ICAR-IIFSR, Modipuram research farm under irrigated conditions to assess the quantum of green house gases emission from rice-wheat system in different soil organic carbon strata (Medium and High) under different establishment methods and different sources of nitrogen. The experiment was laid out in a split plot design with three replications. The gas samples (N_2O and CH_4) were collected using the close chamber method of GHG measurement. It was found that Global Warming Potential (GWP) reduced by 16.2 in DSR compared to transplanted rice under higher carbon strata. Significant yield reduction of 44.4 % noticed in DSR compared to transplanted rice under higher carbon strata, while it was 44.7 % reduction under medium carbon strata (Table 1).

Application of DCDA reduced the GWP by 45.3 % and 55.8 % under higher carbon and medium carbon strata, respectively. The yield increase under DCDA application is 10.7% and 12.0% under higher and medium carbon strata, respectively under transplanted rice. Carbon equivalent emissions (CEE) of DSR (129 kg C ha^{-1}) was lower as compared to transplanted rice (154 kg C ha^{-1}) under RDF with respect to higher carbon strata (Table 2). The temporal CH_4 and N_2O fluctuated during the crop cycle are presented in Fig.

Table 1: Seasonal flux of GHG from the rice under different establishment methods Vs different source of nitrogen combinations 2021

Main plot treat-ments	Sub-plot Treat-ments	High Carbon				Medium Carbon			
		N_2O Emission (Kg ha^{-1})	CH_4 Emission (kg ha^{-1})	GWP (Kg CO_2 -eq ha^{-1})	Yield (t ha^{-1})	N_2O Emission (Kg ha^{-1})	CH_4 Emission (kg ha^{-1})	GWP (Kg CO_2 -eq ha^{-1})	Yield (t ha^{-1})
DSR	RDF	17.2	0.15	474	2.62	13.87	0.21	410	2.46
	Control	3.2	0.03	89.4	1.90	2.92	0.03	81.9	.920
	Organic	11.4	0.08	310	1.92	9.40	0.13	274	1.73
	RDF+ Inhibitors	7.47	0.06	204	2.86	6.91	0.08	197	2.75
	Zero budget	5.42	0.05	152	1.50	4.64	0.04	127	1.36
Transplanted	RDF	20.3	0.19	566	4.71	18.91	0.25	546	4.45
	Control	4.30	0.02	114	1.78	3.22	0.03	90.3	1.56
	Organic	14.0	0.17	400	3.89	13.73	0.09	371	3.62
	RDF+ Inhibitors	10.9	0.13	309	5.21	8.52	0.10	241	4.99
	Zero budget	7.04	0.06	193	2.28	5.88	0.08	171	2.02

1. From the results it can be concluded that direct seeded rice reported the lower global warming potential over the transplanted rice. Further, treatments under organic nutrient management showed lower GHG emission as compared to inorganic fertilizers applied treatments.

Table 2: Seasonal flux of GHG from the rice under different establishment methods Vs different source of nitrogen combinations 2021

Main plot treatments	Sub-plot Treatments	High Carbon			Medium Carbon		
		Carbon equivalent emissions (CEE) (kg C ha^{-1})	Total C fixed (kg ha^{-1})	Carbon efficiency ratio (CER)	Carbon equivalent emissions (CEE) (kg C ha^{-1})	Total C fixed (kg ha^{-1})	Carbon efficiency ratio (CER)
DSR	RDF	129	1256	9.71	112	1183	10.6
	Control	24.4	521	21.4	22.3	442	19.8
	Organic	84.7	924	10.9	74.6	831	11.1
	RDF+ Inhibitors	55.7	1370	24.6	53.6	1318	24.6
	Natural Farming	41.4	718	17.4	34.7	654	18.9
Transplanted	RDF	154	2259	14.6	149	2137	14.4
	Control	31.2	855	27.4	24.6	748	30.4
	Organic	109	1868	17.1	101	1735	17.1
	RDF+ Inhibitors	84.4	2501	29.6	65.8	2393	36.3
	Natural Farming	52.7	1096	20.8	46.7	968	20.7

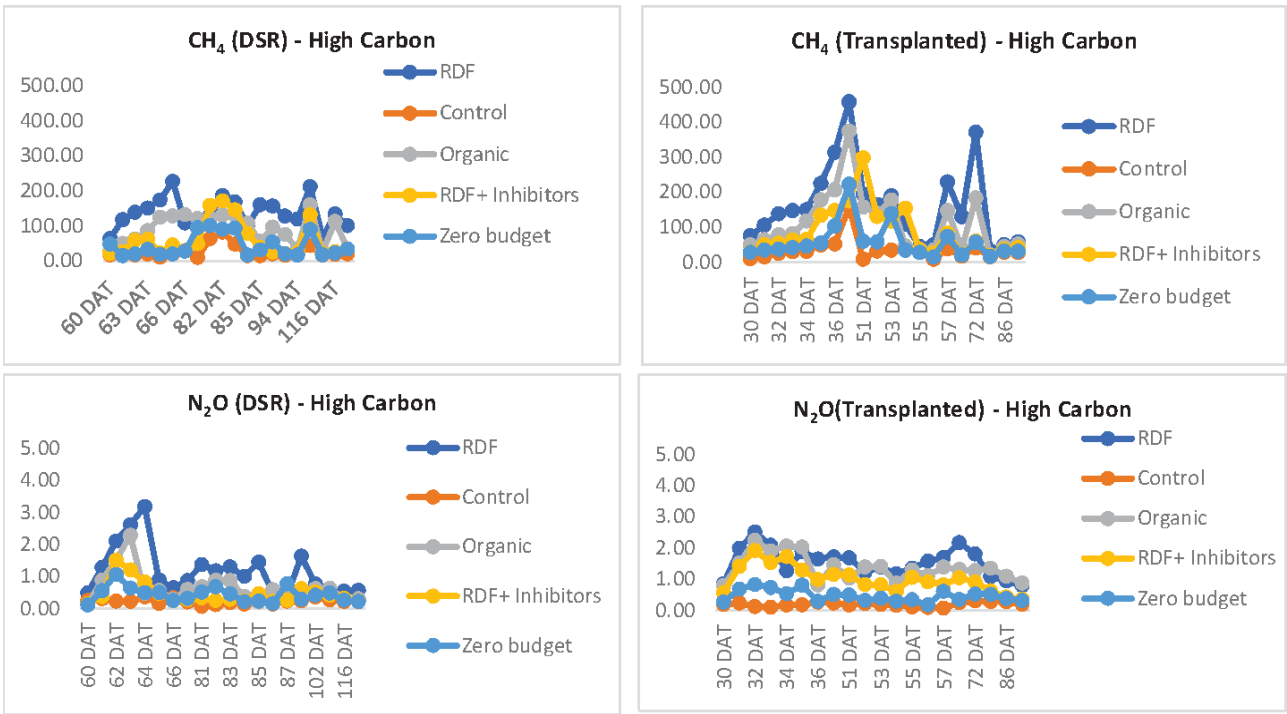


Fig 1: Temporal variation of CH4 and N2O flux (mg/m2/day) under different establishment methods Vs source of nitrogen with respect to high and medium soil carbon strata

Project: Evaluation of different cropping sequences for crop intensification under CA practices (Consortium Research Platform on Conservation Agriculture)

This experiment continues since 2015 under the umbrella of Consortium Research Platform on Conservation Agriculture (CRP on CA). A field experiment of eight cropping sequences i.e. rice-wheat (CP); rice-wheat-green gram (CA); maize-wheat (CP); maize-wheat-green gram (CA); maize (cob)-mustard-green gram (CA); rice-wheat-sesbania (CA); sugarcane-ratoon-wheat (CP); sugarcane+green gram-ratoon-wheat (CA) are grown under both conservation (CA) and conventional agriculture practices (CP). The experiment is laid out in randomized block design with three replications. Various soil biological properties were assessed in the soil samples collected at 0-15 and 15-30cm soil depths at the harvest of *Kharif* crops. The data related to various enzymatic activities in the collected soil samples are presented in tabel 3:

Table 3: Soil enzymes as influenced by different resource conservation practices

	DHA(µg TPF g^{-1} soil 24 h^{-1})	ACP (µg pNP g^{-1} soil h^{-1})	ALP (µg pNP g^{-1} soil h^{-1})	Urease µg (urea g^{-1} soil h^{-1})	Â-glucosidase (pNPG g^{-1} soil h^{-1})	FDA (µg F g^{-1} dry soil h^{-1})
Cropping Systems (CS)						
R-W (CP)	28.3	90.5	357	108	88.7	355
R-W-GRG (CA)	38.8	70.4	327	116	67.9	236
M-W (CP)	28.0	60.5	217	104	58.5	126
M(cob)-Must-GRG (CA)	32.0	78.2	234	102	59.5	191
M-W-GRG(CA)	36.7	123	297	106	94.4	466
R-W-Ses(CA)	36.9	71.4	209	102	77.7	263
S-R-W(CP)	24.5	114	269	103	64.7	379
S+GRG-R-W(CA)	41.8	61.0	177	101	77.9	177
Sem	2.62	13.6	29.7	2.87	6.48	48.4
C.D.	5.38	27.9	60.8	5.89	13.3	99.2
Soil Depth						
0-15 cm	37.5	104	340	105	89.0	366
15-30 cm	29.2	62.9	182	105	58.3	182
Sem	2.69	6.80	14.8	9.75	3.24	24.2
C.D.	1.31	14.0	30.4	NS	6.66	49.6

Where: DHA= dehydrogenase enzyme; ACP=Acid phosphatase enzyme; ALP=Alkaline phosphatase enzyme; FDA=Fluorescein diacetate. R-W=rice-wheat; R-W-GRG=rice-wheat-green gram; M-W=maize-wheat; M(cob)-must-GRG=Maize(cob)-mustard-green gram; M-W-GRG=maize-mustard-green gram; R-W-Ses-rice-wheat-sesbania; S-R-W=sugarcane-ratoon-wheat; S+GRG-R-W=sugarcane+green gram-ratoon-wheat cropping systems. CP=Conventional practices; CA=conservation agriculture.

All the enzymes which are related to carbon, nitrogen and phosphorus hydrolysis in soil were significantly influenced because of both resource conservation techniques and soil depths. The dehydrogenase (DHA) which is known as the respiratory enzyme in the soil varied 28.27 to 41.80 µg TPF g^{-1} soil 24 h^{-1} among the different cropping systems. At the same time, it was found superior in the surface soil (0-15cm) layer as compared to the sub-surface soil layer.

Phosphatases enzymes play a crucial role in mineralization of organic phosphate compounds and release inorganic phosphorus in soil. The acid phosphatases enzyme was found superior (122.6 µg pNP g^{-1} soil h^{-1}) in maize-wheat-green gram (CA) cropping system among all the adopted cropping systems followed by sugarcane-ratoon-wheat (CP) and rice-wheat (CP) cropping systems. At the same time, the highest alkaline phosphatase enzyme activity (356.9µg pNP g^{-1} soil h^{-1}) was found in rice-wheat (CP) followed by rice-wheat-green gram (CA) (326.5 µg pNP g^{-1} soil h^{-1}) and maize-wheat-green gram (CA) (297.0 µg pNP g^{-1} soil h^{-1}) cropping systems.

Urea hydrolysis into ammonia and carbon dioxide is catalyzed by the urease enzyme in the soil. In the present study both resource conservation techniques and soil depths significantly affected the urease enzyme activity. Rice-wheat-green gram cropping system under conservation agriculture practices (CA) recorded highest (115.8 urea $g^{"1}$ soil $h^{"1}$) urease enzyme activity among all the cropping systems. Whereas; sugarcane-ratoon-wheat cropping system both in conservation (CA) (101.3 urea $g^{"1}$ soil $h^{"1}$) and conventional practices (CP 102.9 urea $g^{"1}$ soil $h^{"1}$) were statically at par with in terms of urease enzyme activity (Table 3). â-glucosidase are key enzymes in the carbon cycle and play a crucial role in hydrolytic processes during organic matter decomposition. The hydrolysis products of â-glucosidase are an important source for soil microorganisms. Overall, the superior â-glucosidase enzyme activity was observed among the cropping systems under conservation agriculture (CA) practices as compared to conventional practices. Among all the cropping systems, maize-wheat-green gram (CA) produced significant highest (94.37µg pNPG g^{-1} soil h^{-1}) â-glucosidase enzyme activity followed by the other cropping systems. In case of soil depths, the surface soil (0-15cm) produced significant higher â-glucosidase enzyme over the sub-surface (15-30cm) layer.

To measure the total microbial activity in any soil, fluorescein diacetate activity (FDA) is an accurate and simple technique. Many free and membrane bound enzyme i.e. lipase, protease and esterase etc. are included as synonyms of FDA activity in soil. In the present research investigation, the FDA activity ranges from 177.3 µg F g^{-1} dry soil h^{-1} in sugarcane+green gram-ratoon-wheat cropping system to as high 466.5 (µg F g^{-1} dry soil h^{-1}) in maize-wheat-green gram cropping system (Table 3). Among all the cropping systems under study, the maized based cropping systems produced significant highest FDA activity over the other cropping systems both in surface and sub-surface soil layers. From the results it can be concluded that long-term adoption of resource conservation techniques under different cropping systems increase the soil biodiversity in-terms of various soil carbon, nitrogen and phosphorus cycling enzymes. Further, these enzymes enhance the nutrient availability in the root zone of the crops.

Project: Effect of rice straw retention, incorporation and residue decomposition on productivity, profitability, soil health and environment under RW system

A field experiment was started during *Kharif* 2021 to identify the effect of in-situ rice residue management practices on in-season nutrient cycling and soil health, productivity, profitability and environment under the predominant rice-wheat cropping system of upper Indo-Gangetic plain of India. The experiment has been laid out in randomized block design with 3 replications and a total number of 5 treatments. The treatments comprised Residue burning (T_1); full residue retention (T_2); full residue

Table 4: Impact of different in-situ rice residue management practices on different growth parameters of the experiment.

Treatments	Plant height 60DAS	No. of tillers 60DAS m^{-2}	NDVI 60DAS	Plant height 90DAS	No. of tillers 90DAS m^{-2}	NDVI 90DAS
T_1	107	402	0.870	109	592	0.460
T_2	108	417	0.876	116	599	0.451
T_3	104	383	0.854	108	558	0.487
T_4	104	408	0.861	105	552	0.514
T_5	105	374	0.853	110	514	0.407
Sem	3.46	25.37	0.08	3.49	27.49	0.09
CD	6.86	51.62	0.265	6.99	58.35	0.32

incorporation (T_3); full residue retention + pusa decomposer (T_4) and full residue incorporation+ pusa decomposer (T_5). Data related to different plant growth parameters during the *Kharif* crop of experiment are presented in the table 4.

The data related to various plant growth parameters showed highest plant height and number of tillers m^{-2} (108 and 116cm; 417 and 599) in full residue retention both at 60 and 90 DAS. The highest NDVI values were recorded (0.876) was observed in full residue retention at 60 DAS while it was highest in full residue incorporation at 90DAS. The result showed that in the initial years of experiment the treatment with full residue incorporation was found superior over the other treatments.

Project 3: Development and validation of microbial consortia for crop residue recycling

Crop residue burning is the serious problem causing damage to both soil and environment and ultimately human health. According to an estimate, over 5.7 million acres of paddy stubble is burned on the farm in Punjab and Haryana alone, leading to severe environmental issues, depletion of soil quality and loss of microbial diversity. Therefore, a consortium of microorganism is needed for *in vitro* residue decomposition. With this objective, 25 fungal isolates were obtained from different samples collected from decomposition pit, 100% organic plot, vermicompost, FYM, rotten fruits, decomposing bark, rhizospheric soil of pipal tree etc. These isolates were screened for cellulolytic (CMCase, FPase and â-glucosidase) and hemicellulolytic activities (xylanase) qualitatively by observing the growth on media containing carboxy methyl cellulose and xylan as sole carbon source and found some fungal isolates showing faster growth and sporulation on media containing carboxy methyl cellulose and xylan which is an indicative of hydrolytic enzyme secretion. Further confirmation was done by growing all the isolates on paddy straw (as a sole carbon source) where we observed similar trend of growth.

For quantitative screening, crude extract of cellulolytic and hemicellulolytic enzymes was produced by the selected fungal isolates (total 20) using chopped paddy straw as a substrate under solid state fermentation. For this, fugal isolates were grown on paddy straw supplemented with Reese's Mineral medium in 1 litre Erlenmeyer flask having substrate to moisture ration of 1:5. Cellulolytic and hemicellulolytic activities in crude enzyme extract were estimated using standard protocols. Quantitative screening (Table 5) showed that some isolates (4, 5, 6, 7, 8, 9, 10, 11 and 13) were having higher cellulolytic activity (FP activity e" 3.0 IU/g paddy straw) and hemicellulolytic activity (xylanase e" 200 IU/ g paddy straw). Fungal pathogens causing disease in tomato, brinjal and chick pea were also isolated for dual culture study to check the inhibitory potential of fungal isolates selected for microbial consortia (Plate 1).

Plate 1: Morphology of different fungal pathogens isolated from the field for dual culture study with selected fungal isolates

Table 5: **Total celluloytic (FPase) and hemicellulolytic activity of fungal isolates on paddy straw after 7 days' incubation at 30 °C.**

Fungal Isolate number	FPase activity (IU ml^{-1})	FPase activity (IU g^{-1} dry substrate)	Xylanase activity (IU ml^{-1})	Xylanase activity (IU g^{-1} dry substrate)
1	0.12	2.12	1.62	27.73
2	0.05	0.81	0.96	16.21
3	0.11	1.82	3.02	49.89
4	0.19	3.31	15.14	259.42
5	0.20	3.47	11.55	204.85
6	0.20	3.27	15.17	253.82
7	0.19	3.22	15.04	256.71
8	0.21	3.74	13.00	233.12
9	0.17	3.04	14.00	246.46
10	0.15	2.62	13.26	229.85
11	0.16	2.93	14.90	265.23
12	0.05	0.85	2.17	36.94
13	0.15	2.57	15.23	258.93
14	0.07	1.13	0.83	13.47
15	0.05	0.90	0.83	14.01
16	0.06	0.94	0.80	13.27
17	0.07	1.24	2.96	50.15
18	0.17	2.97	11.05	187.93
19	0.14	2.45	7.32	125.36
20	0.05	0.88	1.39	23.84

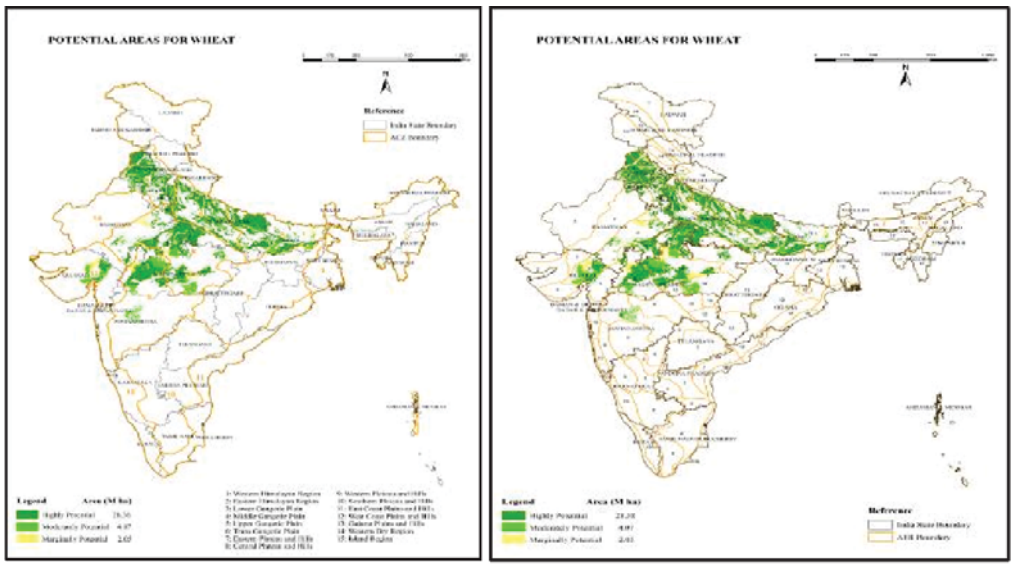
Project: Updating of Cropping System Atlas of India and Preparation of futuristic crop plan for 2030, 2040 and 2050

The previous cropping system atlas was developed by Yadav and Rao in 2001 while working in PDFSR (now IIFSR). At that time, they estimated a total of more than 250 double cropping system and 30 major cropping systems were spread throughout the country. The different government policies, depletion in natural resources, research activities, extension activities, extensions land improvement programmes, increases in purchasing power and food habits have played a crucial role in major changes in the cropping systems during the last two decades. Other than these factors, Government is giving emphasis on crop diversification, thus before implementation of any crop atlas there is need to study the present cropping system scenario of the country. For the development of futuristic crop plan for different cropps; various parameters *i.e.* relative spread index (RSI), relative yield index (RYI) and sustainabale yield index (SYI) were used in integration of soil-climate suitability index (SCSI). SCSI classification: Highly suitable (S_1), Suitable (S_2), marginally suitable (S_3) and Not suitable (N) (Tabel 6).

In the present project, futuristic crop plan (Agro-climatic zone crop plan, Agro-ecological region crop plan, State and District crop plan) were prepared for 14 crops *i.e.* rice, wheat, maize, sorghum, pearl millet, pigeon pea, chick pea, mustard groundnut, soybean, cotton, sugarcane, potato and onion. Further, the futuristic crop plan map was developed for all the cropping seasons *i.e. Kharif*, *Autum*, *Rabi* and *Summer*. Along with FCP maps, first major cropping system (FMCS) and second major cropping system (SMCS) were identified and maps were also developed for all major states of the country (Fig. 3). In the first step major cropping system of Haryana state were identified and presented in to (Fig. 4).

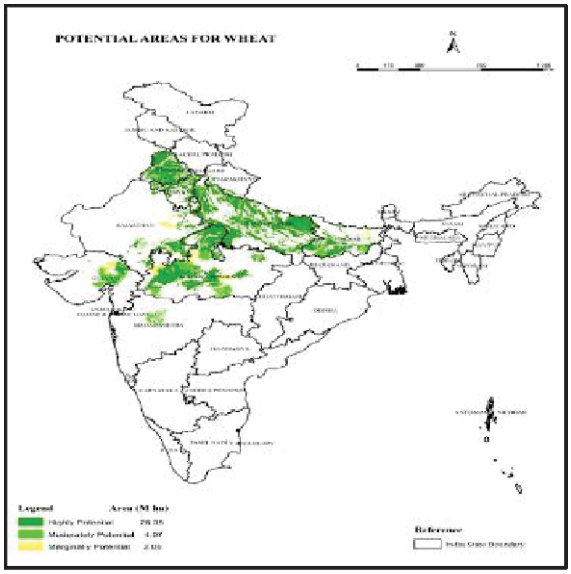
Table 6. Criteria for Potential areas

RSI, RYI & SYI	S_1	S_2
Most efficient areas (HS, HY, High SYI)	Potential Areas (Most Efficient)	
Efficient areas (HS, LY, Medium SYI)	Moderately Potential Areas (Efficient)	
Moderately efficient areas (LS, HY, Moderate SYI)	Marginally Potential Areas (Less Efficient)	
Other categories	Not suitable	



Agro-climatic zone (ACZ) crop plan Agro-ecological region (AER) crop plan

Fig 2: ACZ and AER wise crop plan



State and District crop plan

Fig 3: ACZ, AER and State and district wise FCP for wheat

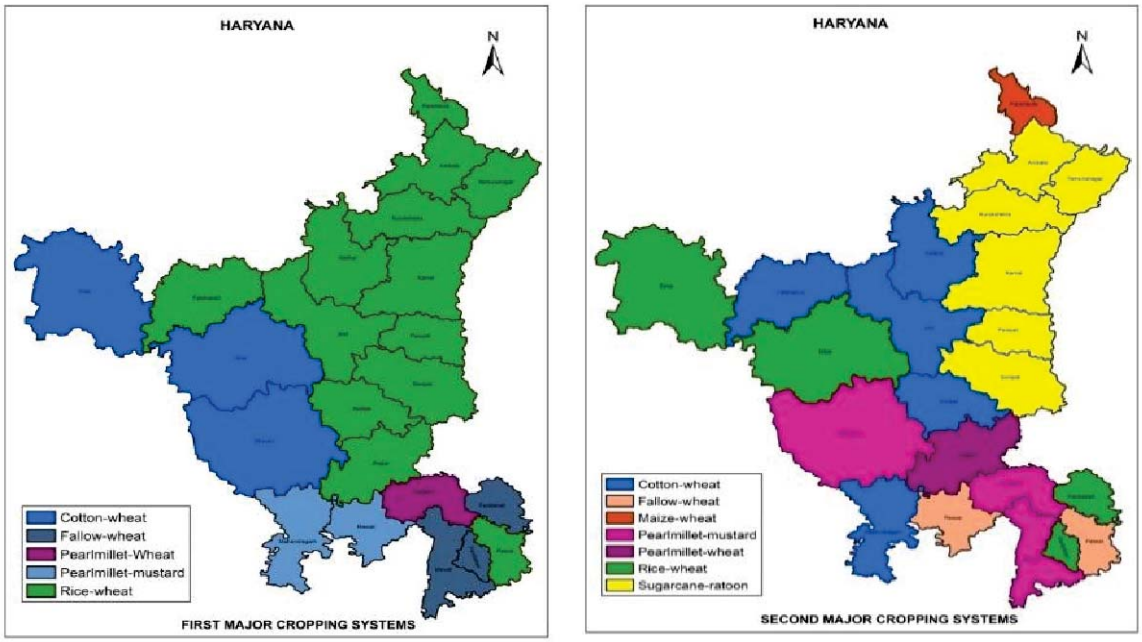


Fig 4: First and Second major cropping systems maps for Haryana state

It can be concluded that based on the potential criteria and indexes, the futuristic crop plan will be developed for different 14 crops by the institute and the first major cropping system and SMCS have been identified and maps will be developed for all major states of the country.

Project: Testing of Products for irrigation and Water management, Fertilizer and Pesticide

An experiment for testing of products for fertilizer (Haoda Organic Fertilizer 202) and pesticide (2 M Bio organic) has been conducted at Main

research farm of ICAR-Indian Institute of Farming Systems Research during *Rabi* 2020-21. Total 8 treatments of potato (Chipsona-1) and tomato (NTH-2829) crops were undertaken which were replicated thrice applying RBD experimental design. Further, a separate experiment on water management i.e., sprinkler irrigation systems (a product of Kyung Nong corporation) was conducted kinnow orchard in triplicated replication and it was compared with control. The objective of this project and methodological framework for the "Testing of Products for irrigation and water management, Fertilizer and Pesticide" would permit the information obtained from this study for incorporation in integrated farming systems related interventions for better water use efficiency, reducing bulky organic manures and agrochemical such as pesticides and chemical fertilizers.

Application of Potato-2M-Bio Pesticide recorded significant difference in disease severity between farmers practice alone and treatments applied with 2M-Bio pesticide. Lowest diseases severity (DS) was recorded with inorganic treatment applied with Mencozeb 75%. Among the treatments, higher DS was recorded under organic treatments however application of 2M-Bio pesticide significantly reduced the disease severity (Fig. 5). Significantly higher tuber yield (185.3 q ha^{-1}) was obtained with inorganic production system applied with Haoda Organic Fertilizer 202 among all the treatments. However, it was at par with inorganic production system alone. Among the organic treatments, the highest tuber yield (82.7 q ha^{-1}) was obtained from 100% NPK through organic sources + Haoda Organic Fertilizer 202+2 M Bio which was at par with 100% NPK through organic sources +2 M Bio (Fig. 6).

Significant difference in disease severity in tomato crop was recorded between farmers practice alone and applied with 2M-Bio pesticide which was the lowest one among all the treatments. However, it was at par with inorganic (T_3) and inorganic + application of Haoda Organic Fertilizer 202 (T_4). Among the organic treatments, higher DS was recorded under organic treatments (alone however application of 2M-Bio pesticide significantly reduced the severity in T_6, T_7 and T_8 (Fig. 7). Significantly higher fruit yield (382.3 q ha^{-1}) was obtained with inorganic production system applied with Haoda Organic Fertilizer 202 among all the treatments. However, it was at par with inorganic production system (alone). Among the organic treatments, the highest fruit yield (299.7 q ha^{-1}) was obtained from 100% NPK through organic sources +Haoda Organic Fertilizer 202+2 M Bio which was at par with 100%

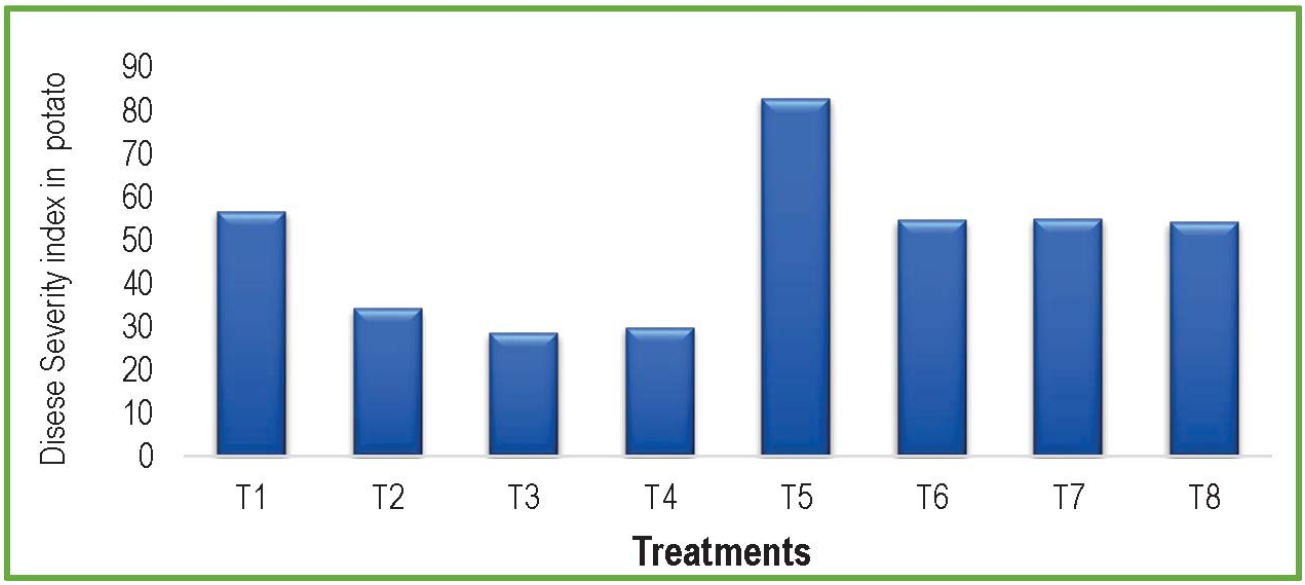


Fig. 5: Effect of various treatments on diseases severity index in potato during rabi 2020-21

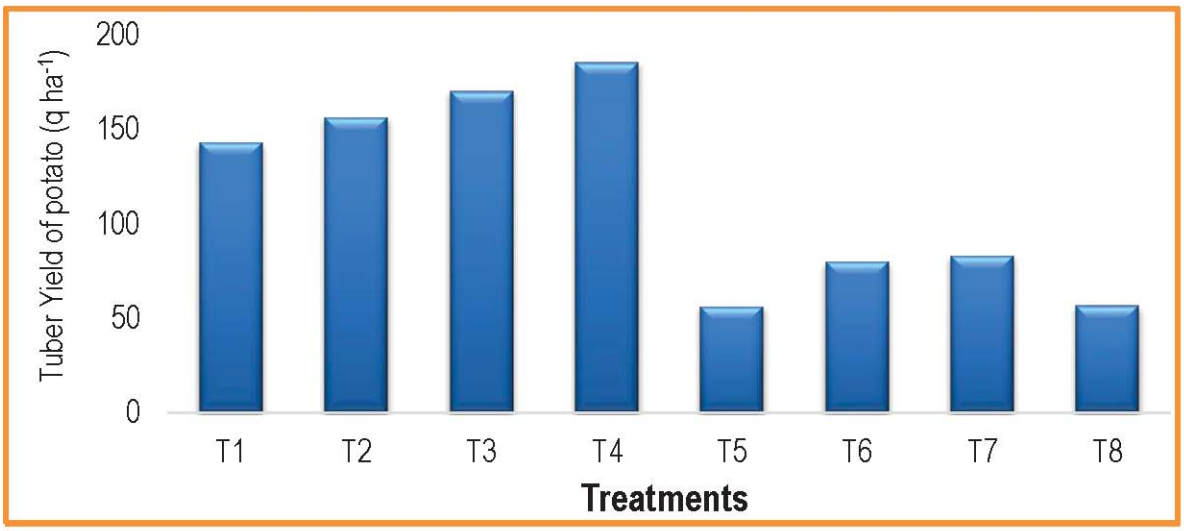


Fig. 6: Effect of various treatments on tuber yield of potato during rabi 2020-21

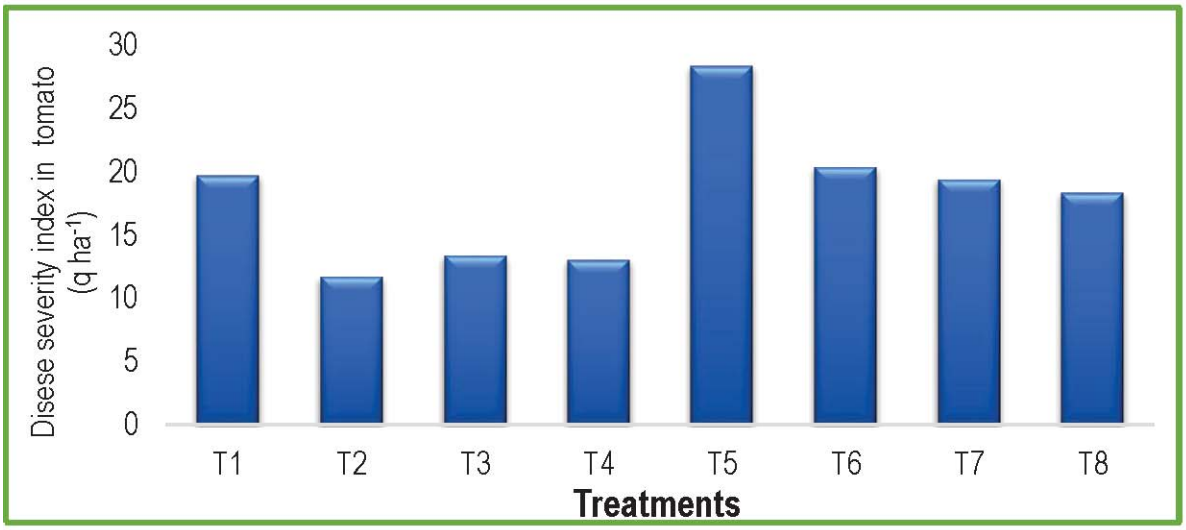


Fig. 7: Effect of various treatments on diseases severity index in tomato during summer 2020-21

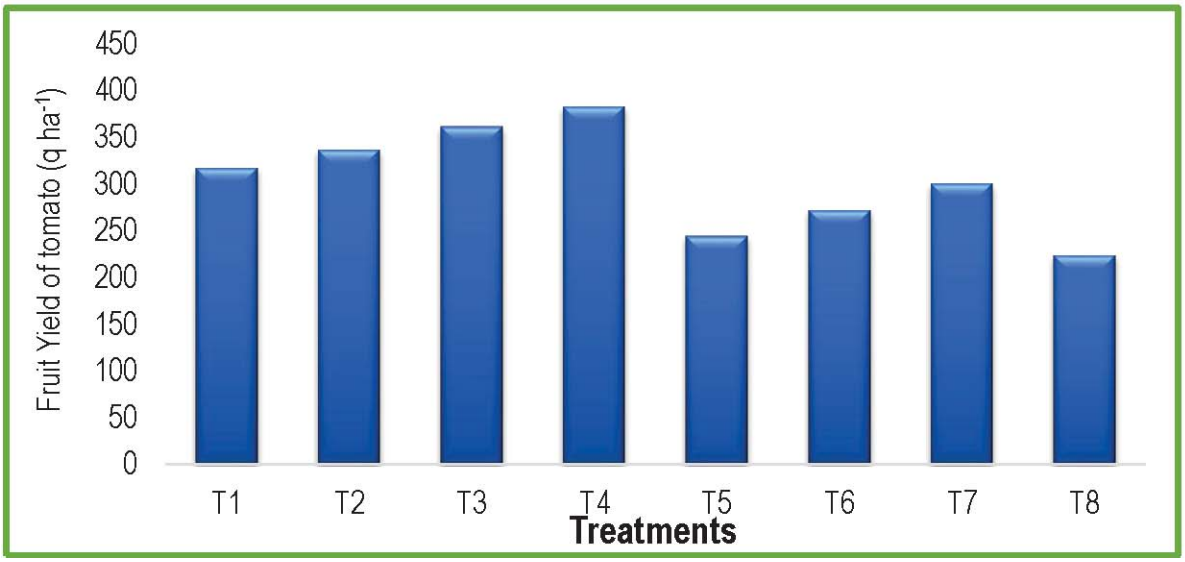


Fig. 8: Effect of various treatments on diseases severity index in tomato during summer 2020-21

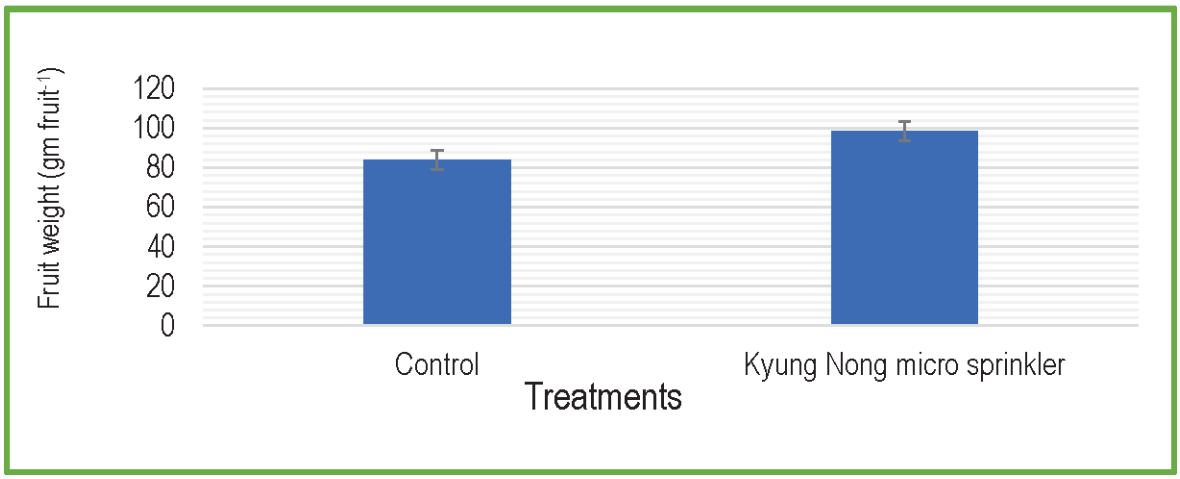


Fig. 9: Effect of Kyung Nong micro sprinkler on fruit weight of Kinnow

NPK through organic sources +2 M Bio and the lowest fruit yield was obtained from T_5 (organic) and T_8 (50% RDF (100% through organic sources) +application of Haoda Organic Fertilizer 202 +2 M Bio application (Fig. 8).

Difference in fruit weight of kinnow irrigated through Kyung Nong micro sprinkler (98.0 g fruit^{-1}) and flood irrigation (84.0 g fruit^{-1}) was recorded. However, it was statistically at par which might be due to good and fare distribution of rainfall during this monsoon season (Fig. 9).

TECHNOLOGY TRANSFER AND ASSESSMENT

Project: On-farm evaluation of farming system modules for profitability and livelihood improvement of different farmers categories of Western Plain Zone of Uttar Pradesh and Uttarakhand.

The project is envisaged for on-farm multiplication of location specific proven integrated farming system technology/approach based on recommendations of on-station experiments through holistic approach for enhanced productivity, profitability and livelihood to different farmers categories of Western Plain Zone of Utter Pradesh and Uttarakhand. The baseline information, census data and data related with socio-economic status of the farm families of Badhai Kalan, Sahajpur Kalan (Muzaffarnagar), Mandawali and Narsan Khurd (Haridwar) were collected. The data was analyzed to identify the research gaps to provide suitable interventions to improve the productivity, profitability and livelihood of farm families. Based on the primary and secondary data analysis, few problems like lack of knowledge about intercropping, balanced fertilization, weed control, backyard poultry and poor adoption of improved varieties were identified. The interventions given to the farmers were introduction of high yielding crop varieties (paddy, wheat, mustard, oat, berseem), intercropping of spices, vegetables with sugarcane, weed management in sugarcane, vegetable seed kit for kitchen gardening, feed supplement to animals, deworming kit etc.

Intercropping of spices (Fennel) in sugarcane (Plate 1) recorded higher SEY of 1297q/ha (1100 q sugarcane and 13.40 q Fennel/ha) as compared to sole crop (1100 q/ha) of sugarcane and this has given an additional income of Rs.80400/ha to the farmer. In the same way, addition of garlic as intercrop resulted in higher SEY (1341 q/ha) and provided additional income of Rs. 207000/ha. Cropping system

Table 1: Effect of technological interventions on net income of medium farm households.

Farming system (s)	No. of house holds (% of total)	Mean holding size (ha)	Mean family size (no's)	Mean net income (Rs in lakhs)
Existing System				
1. Sugarcane-ratoon-wheat+ dairy (2 buffalo or 1C + 1B)	42 (2.46)	3.02	5-6	4.08 (0.74 lakhs/ha)
2. Rice-Wheat-Sorghum + dairy (2 buffalo or 1C + 1B)				
Improved/Diversified system				
1. Sugarcane+ratoon-wheat + dairy (2 buffalos)	42 (2.46)	3.02	5-6	5.32 (1.05) lakhs/ha)
2. Rice-berseem/ mustard+dairy (2 cows or 1C + 1buffalos)				30% higher over existing
3. Rice-wheat-maize + dairy (2 cows)				
4. Maize/Jowar-wheat-cowpea + dairy (2 buffalos)				


Plate 1: Intercropping of sugarcane with spices (Fennel)

diversification, integrated crop management, inclusion of fodder component and proper feed management of dairy animals has resulted in 30% increase (from 0.74 lakhs/ha to 1.05 lakh /ha) in total income of the medium farmer over existing system (Table 1). Cropping system diversification with vegetable component, nutritional kitchen garden, improved fodder availability for dairy animals resulted in 32.21% increase in annual income of marginal farmers over existing system. Improved rearing practices like use of feed supplement to milch animals and inclusion of nutritional kitchen garden resulted in 46.15% increase in net income of landless farmers. Along with the family expenditure reduction, kitchen gardening has also ensured better nutritional security to the farm families. Weed management in sugarcane by the application of herbicide (Halosulfuran Methyl 75% WG) was found to control weeds up to 85-90% and also saved labor cost. Due to the timely control of weed farmer was able to get an additional income of Rs. 20000-25000/- per ha from increased yield of sugarcane. Therefore, it can be concluded that inclusion of components like fodder, kitchen garden, dietary supplements to milch animals and proper crop management in the existing farming system is beneficial for farmers in improving food, nutritional and livelihood security.

Project: Ensuring Food and Nutritional Security through Integrated Farming Systems in Western Plain Zone of Uttar Pradesh (Farmer FIRST).

Integrated Farming Systems can be a vital option that fulfills the objective of food and nutritional security and at the same time leading to greater production, environmental protection, employment generation and enhanced farm income. The integration of different enterprises such as livestock, poultry, fishery, duckery, horticulture, etc. with the crop component will help in achieving food and nutritional security to small and marginal farmers.

With this objective, during 2021-22, we focused our activities in two villages namely Bhaingi Bhangela and Satheri which are as follows:

1. Continuation of module wise intervention in IFS mode (a) Diversification of crop and cropping systems (b) Animal health management (Mineral mixture and Calcium supplement)

2. Detailed analysis of Production-consumption-nutrition continuum for food and nutritional security. (a) RDA vis-à-vis Supply/availability

3. Technology dissemination and awareness through whatsapp group (Farmer First) including COVID-19 preventive measures and awareness.

4. SMS based weather advisory through IIFSR-Kisan service (Hindi/English)

Socio economic Profile of farm households: Farm households of adopted villages have been categorized into different category of farmers namely based on land holding size. Small and landless farmers together constitute about 87.45 % of the farming community (Table 3). Highest number of landless farmers were found in Satheri village (49%) followed by Sounta (33.4%) and Bhangela (19.7). Highest marginal farmers were present in Bhangela. Medium farmers were 2.1% while large farmers were not found in the adopted villages.

Table 2: Socio-demographic and farm level characteristics in the study cluster.

Demographic and Socioeconomic characteristics	Western plain zone of Uttar Pradesh, India			
	Satheri (n=400)	Bhangela (n=238)	Sonta (n=398)	Total cluster (n=1036)
Household size (nos.)	4.69	5.65	3.65	4.77
Median age of HH head (Years)	45.00	48.00	46.50	46.00
Household headship (%)				
Male	96.00	97.06	97.74	96.93
Female	4.00	2.94	2.26	3.07
HH acquiring no education (%)	24.75	19.32	8.29	17.18
Average Landholding size (ha)	0.70	0.66	0.98	0.80
HH annual income (INR)	80792	55907	45587	61551(52072)
Annual income (INR) Per CU	13306	11367	22725	16497

Table 3. Farm characteristics in the study cluster.

Category of the farm	Farm Characteristics (%)			
	Satheri (n=400)	Bhangela (n=238)	Sonta (n=398)	Total cluster (n=1036)
Landless	51.50	24.79	33.17	36.49
Marginal (< -1 ha)	24.00	52.52	23.87	33.46
Small (1-2 ha)	14.50	13.45	28.39	18.78
Semi-Medium (2-4 ha)	6.50	8.40	11.81	8.90
Medium (4-8 ha)	3.50	0.84	2.76	2.37
Large (>8 ha)	-	-	-	-
Cropped area (ha)	0.70 (1.20)	0.78 (1.15)	0.97 (1.13)	0.82 (1.17)
Area under food crops (% of cropped land)	0.20 (28)	0.31 (29)	0.28 (39)	0.25 (33)
Area under commercial crops (% of cropped land)	0.41 (44)	0.56 (40)	0.66 (47)	0.54 (46)

Crops and cropping systems intervention: During 2021-22, in continuation of Crop intensification, sugarcane (autumn planting var CoPk 05191) with mustard (RH- 749) intercropping for enhanced income was carried out. Three interventions were put in place with an aim to double farmer's income:- (i) Introduction of new sugarcane variety CoPk 05191 in western plain zone of Uttar Pradesh. (ii) Shifting of sugarcane planting from summer to autumn in order to double farmer's income. (iii) Demonstration of intercropping (mustard) in autumn sugarcane. Exotic vegetables intervention was also continued to this year (Plate 3)

Variety CoPk 05191 displayed substantial superiority of 27.80 t ha^{-1} in terms of cane yield and 5.62 t ha^{-1} green top over most popular check variety Co 0238 which was planted in summer while average seed yield performance of intercrop mustard (RH 749) in autumn sugarcane across 6 demonstrations revealed that, farmers fetched average yield of mustard 1761.38 kg ha^{-1} from the intercrop grown with sugarcane in autumn planting. Additional cane yield (27.80 t ha^{-1}), green top yield (5.62 t ha^{-1}) and mustard seed (1761.38 kg ha^{-1}) were achieved by the farmers adopting autumn planting of sugarcane with intercrop of mustard besides additional income/ Improvement over check was around Rs. 150000/- per hectare. Balanced fertilization in sugarcane crop was followed in the cluster for improving soil health and productivity (Plate 2). Inclusion of improved mustard variety (RH 725) resulted in higher yield of 5.0 to 6.25 quintal per acre as compared local variety (4.0-4.5 q $acre^{-1}$).

Technological intervention in animal husbandry: Poultry layer birds (Char Brown) given to landless farmers (67 households) and each household obtained on an average 180-210 eggs adding to their livelihood. Mineral mixture supplementation given to 400 farmers resulted in 0.5 to 0.75 litre/day/animal of enhancement in milk production. Fodder supplementation and health management with mineral supplementation resulted in less incidence of abortion in cattle (Plate 4).

Plate 2: Balanced fertilization in sugarcane showing better growth and yield

Plate 3: Interventions related to the cultivation of exotic vegetables.

Plate 4: Distribution of improved fodder varieties seeds and mineral supplements

Scheme: AICRP on Integrated Farming Systems- On farm research (National)

On-Farm crop response to plant nutrients in predominant cropping systems: Increasing the nutrient use efficiency in major food production systems has always been a major concern due to escalating costs of production of crops, especially with regard to nutrient management. 'Researcher-designed farmer managed trials' were conducted during 2020-21 through farmer participatory research covering the major food production systems in India. A total of 456 trials; 24 in rice-rice, 216 in rice-wheat, 48 in maize-wheat, 36 in rice-musatrd, 24 each in rice-maize, rice-okra, pearl-millet-mustard, pearl-millet-wheat and soybean-wheat, 12 in maize-chikpea were conducted. Across various NARP zones and cropping systems, farmer's package resulted in lower yield compared to recommended package owing to the lower application of N, P_2O_5, K_2O and micronutrients. On-farm system yield gap between recommended dose of N, P_2O_5, K_2O, micronutrient and farmer's package were found to be higher in rice-rice, rice-wheat, maize-wheat, and rice-mustard cropping systems. Application of micronutrients based on soil test resulted in additional yield of in rice-rice, rice-wheat, maize-wheat, and rice-mustard systems. In all the NARP zones and systems, application of recommended N, P_2O_5, K_2O alone or N, P_2O_5, K_2O + micronutrient resulted in higher yield and nutrient use efficiency. Suboptimal application in terms of number and quantity resulted in significantly lower yield and use efficiency of nutrients especially nitrogen.

On-farm nutrient response trials (456 no's) were conducted in various NARP zones indicated, across the locations and systems, nutrient application gap of 25, 28, 58 and 88% in N, P_2O_5, K_2O and micro nutrient exists between farmers practice and recommended nutrient package. The same was also reflected in system yield of major cropping systems. It was recorded that except rice-rice application of NPK gave 1394, 1774 and 482 kg/ha higher yield over the farmer practice, which can be further increased up to 1979, 2242 and 1380 kg/ha in rice-wheat, maize-wheat, and rice-mustard systems respectively with the addition of soil test-based micronutrients. Agronomic Efficiency (AE) of N can be enhanced to 36, 23, 16 and 28 kg (grain yield /kg of N) from 6.5, 10, 7, 7.2 (grain yield /kg of N) in rice-rice, rice-wheat, maize-wheat, and rice-mustrad systems respectively by application of recommended dose of N with P and K instead of N alone. Mean economic response of cropping systems to applied nutrients indicate, a return of Rs 6.0, 3.0 and 7.0 per rupee invested on N, P_2O_5 and K_2O respectively.

Project: AICRP- IFS OFR, Modipuram Centre

The new location in district Baghpat was selected in 2021 with two objectives (i) to assess the response of nutrients in major crops and cropping systems in different agro - climatic zones/ ecosystems and (ii) to estimate the impact of nutrients application on soil health status. Under this four blocks were selected i.e. high productive (Chaprauli) and low productive (Binauli); In case of high productive block Lum, Kakaripur and Ramala and Idrishpur, Adampur and Kanad villages from Binauli block were selected. Total 10 farmers were selected for OFR experiment from each village. In this experiment, two cropping systems i.e. Sugarcane–ratoon–wheat system and Rice – Wheat were selected with 6 nutrient management practices and compared with farmers practice. In Sugarcane–ratoon–wheat system, application of 120:60:60 kg NPK/ha along with 25kg $ZnSO_4$ gave highest grain yield (4.78 t ha^{-1}) as compared to farmers practice (3.18 t ha^{-1}). Similarly, in rice-wheat system, application of 120:60:60 kg NPK/ha + 25kg $ZnSO_4$ +25 kg Boron in rice and 120:60:60 kg NPK/ha + 25kg $ZnSO_4$ (13.76 t ha^{-1}) in wheat gave significantly higher system productivity as compared to farmer practice (8.56 t ha^{-1}). The same treatment gave 68.6% higher net returns as compared to farmer practice.

Diversification of existing Farming Systems under marginal household conditions: Experiment was conducted with the objectives (i) to enhance the productivity and profitability of marginal farmers

households through IFS approach. (ii) to improve the livelihood and nutritional security through diversification approach and (iii) to estimate the impact of capacity building on diversification of crop + livestock system. The average land holding size of 24 households is 0.91 ha. Diversification in the existing farming systems among the 24 households' consequences income was increased up to Rs. 173250/ household as against of Rs. 96450/household (at the time of bench mark survey). Thus, additional net profit was obtained of Rs. 76800/household after implementation of IFS program. 42% farmers are being adopted crop + dairy component. Maximum mean net return was received from crop + dairy component (Rs. 195000/annum) followed by crop+ dairy + vegetable component (Rs. 185000/annum).

Project: Cluster based on-farm participatory research in Farming Systems under Tribal Sub plan

The study area comprised of tribal farming systems of Tarai and Bhabhar zone, Uttarakhand of Western Himalayan Region, India which is located at (29°15'30 N to 29°16'0.07 N, 79°2'39E to 79°3'0 E) in Ramnagar (Nainital). It is characterized by the average altitudes ranging from 195 to 268 m msl. A total of 100 tribal farm families comprising of a cluster of three tribal villages having more than 40 % tribal population viz. Thari, Veerpur Tara and Mallapuri were selected using a clustered sampling frame. The survery instrument was organized into (i) general farm and household characteristics (ii) household dietary diversity, food consumption pattern and chronic energy deficiency status, (iii) farm input and labour use (iv) field crop and horticultural production technologies and practices (v) Dairy and other livestock production (vi) crop residue management including use as animal feed (vii) off farm income sources and expenditure.

Tribal Farming Systems Interventions: Suitable farming system interventions for improving nutritional status, livelihood and optimum resource utilization were planned and implemented according to the different tribal Farm types.

Effect of Mechanization on different farm types: The demonstration of improved tools and implements showed a significant effect in tribal farming systems. The study amongest different farm types showed that the highest percentage increase (15.38%) in terms of tractor operated seed drill over broadcasting was noticed amongst farm type 1 as they had Rice-wheat) intensive farming system whereas lowest percentage increase (3.33%) was noticed in farm type 3 due their efficient resource ownership in terms of land and mechanization and were already using tractor operated seed drill. Likewise, trend in terms of percentage reduction in labour was noticed. Labour requirement of tractor operated seed drill was noticed to be (4.94 man hr ha^{-1}) as compared to traditional broadcasting (15 man hr ha^{-1}). Use efficiency of tractor operated seed drill was on an average 3.2 ha day^{-1}. However, the highest percentage increase (46.6%) in terms of manually operated seed drill over traditional dibbling was noticed in farm type 3 followed by farm type 2, whereas the highest adoption was noticed amongst farm type 2 followed by farm type 3. Labour requirement of manually operated seed drill was noticed to be 30 man hr/ha whereas in traditional dibbling it was 256 man hr ha^{-1} Use efficiency of manually operated seed drill was 0.264 ha day^{-1}. Similarly, the highest percentage increase (28.5%) in terms of wheel hoe over traditional hoe was noticed in farm type 2 followed by farm type 4, however cent percent adoption was noticed across all farm types. Labour requirement of wheel hoe was noticed to be 22 man hr ha^{-1} whereas in traditional hoe it was 120 man hr ha^{-1}. Use efficiency of Single wheel hoe (manual weeder) was found to be 0.38ha day^{-1}.

Women and Youth Empowerment through group mobilization: Tribal women of the adopted cluster are mobilized into two self-help groups and motivated to develop/process for the already known products for self-employment by giving the technical guidance into the area of improving the shelf life, packaging, labelling etc (Plate 5a, 5b). Custom Hiring Centre has been established in the adopted cluster for enhancing the mechanization level, reducing the cost of operation vis a vis improving the benefit (Table 4). Implements

demonstrated and used on custom hiring basis are manually operated seed drill, wheel hoe, seedling transplanter. Besides this state government link up for getting funds under different schemes of Central and state govt for strengthening of Custom hiring Centre (CHC) is under progress.

Table 4: Details of SHG/CHC created/promoted in the adopted cluster.

S. No.	Name of SHG/ CHC	Registration details of SHGs	Year of formulation	No of persons registered	Village
1.	Mahila Krishi Ajeevika Svayam Sahayta Samuh	Account No. 001734005100171 Nainital District Co-Operative Bank Ltd, Haldwani	2021	12	Thari, Ramnagar, Nainital
2.	Prayas Svayam Sahayta Samuh	Account No. 001734005100170 Nainital District Co-Operative Bank Ltd, Haldwani	2021	11	Veerpur Tara, Ramnagar, Nainital
3.	TSP-KAYAS	Reg No. UK06608112021007322	2021	100	Thari, Veerpur Tara, Mallapuri, Block Ramnagar, Nainital

(b) Basket making by using local leaves

S.No	Farming System Intervention	Remarks
1	Varietal Change (N:100) • Wheat o HD 3086 (10%) o DBW 173 (65%) o WB2 (6%) • Paddy o PB1121, PB1728), PB1509), (PB 1637, PB 1718) : 35-40%	Reason for under adoption: -Non availability of good quality seed at local level, non-timely payment by Govt. Mandies, specific seed (varietal) requirements by the seed plants. Adoption of WB2 was only by women farmers due to its better nutritional quality and taste. Underrated payment of Basmati Rice by Govt/Semi Govt. Mandies (Rs 1850/Q to 1950 Rs/Q).Solution: Cluster based farming through collective actions by developing Farmer Producer Organisations(FPO's)/custom hiring centers (CHC's) as a convergence model is desired for production, pre-processing and marketing activities
	Crop Diversification 1. Pulses (blackgram PU 31 (65%), Lentil (PL6, PL8) (70%): (N:80) Mustard (RH 749, RH 725): 65% (N:30)	Crop diversification adoption is better (65-70%). It can be improved through enhancing the farm mechanization as the timeliness of operation and labour productivity will enhance. Action already been taken by registering CHC for the tribal cluster.
2	Nutritional Kitchen gardening Year round seasonal vegetables including GLV's, roots and tubers, other vegetables (high yielding and genetically bio-fortified varieties) : 75 -85%Fruits (lemon, guava, litchi and mango)	Better adoption (75-85%) Could be improved through cluster based processing/value addition and application of drudgery reduction improved tools for production, pre-processing, processing, value addition and marketing activities.Action already been taken by registering CHC for the tribal cluster and two self help groups in Thari and Veerpur Tara village
3	Diet nutrient and health management in animals through mineral mixture, vitamin mixture medicine etc. 50-60% (N :90)	More awareness programmes are desired for enhancing the adoption rates.
	Vermicomposting 10-20% (N:15)	Underadoption due to not able to manage the inputs. Cluster based farming approach will be helpful in enhacing the adoption
	IPM practices (trichocards/pheromone traps) 30-40% partial adoption (N:100)	Farmers modified the traps with indigenous structure due to non availability of desired inputs at local level.
	Year round mushroom Production (25%) (N:8)	Not able to manage the inputs. Less marketability of oyster and milky mushrooms. Cluster based mushroom cultivation, processing, value addition, packaging and marketing approach will be helpful in enhancing the adoption.Action already been taken by registering CHC for the tribal cluster and two self help groups in Thari and Veerpur Tara village

Mechanization level (3-46%), use efficiency (0.26 ha day^{-1} -3.2 ha day^{-1}) have been increased whereas labour requirement have been reduced (30 man hr ha^{-1} - 4.99 man hr ha^{-1}) in different farm types by using improved tools and implements viz. tractor operated seed drill, manually operated seed drill, wheel hoe etc through establishing custom hiring centre. Tribal women of Thari and Veerpur Tara village of adopted cluster were mobilized into the self help groups for alternate income generation and self employment. Around 10 to 85% adoption of various interventions was observed by the adopted farmers in the year 2021 without input support.

Project: On-farm Participatory Research in Farming Systems Perspective under Schedule Caste Sub-plan (SCSP) in Laldhang cluster under Bahadrabad block, District Haridwar (Uttarakhand)

The project has been initiated in the Laldhang cluster, Bahadrabad block of Haridwar district since *Kharif* 2020 to improve the livelihood of the farmers belonging to the Scheduled caste category. A total number of 300 farmers from Dalupuri, Mithiberi and

Table 6: Social and economic status of the sampled scheduled caste farmers of Dalupuri village.

Particulars	Landless farmers	Marginal farmers (<1 ha)	Small farmers (<1 ha)	Medium and large farmers (>2 Ha)	Overall
Farmers (No.)	76	88	22	14	200
Percent (%)	38	44	11	7	100
Average family size (Nos.)	5.07	4.50	5.09	5.43	5.0
Average age (Years)	42.7	44.7	49.9	49.6	46.7
Education (number of years of schooling)	5.3	6.7	8.8	9.7	7.6
Farming experience	-	32.0	35.3	33.0	33.4
Non-farm income					
Wage days	148	175	148	160	157.8
Wage rate	185	252	311	395	285.8
Non-farm income (Rs.)	49051	70633	88773	246789	113812
Mean land holding (ha)					
Owned land	-	0.306	0.871	1.637	0.93
Leased-in land	-	0.116	0.511	1.458	0.69
Leased-out land	-	-	-	0.964	0.96
Operational holding	-	0.423	1.38	3.09	1.63
Possession of Kisan Credit Cards (KCC %)	-	70.6	76.7	79.5	75.6
Membership in organizations					
Gram Panchayat (%)	30.2	31.3	22.1	22.5	26.53
Co-operative society (%)	12.3	40.5	38.7	38.3	32.45
Marketing society (%)	5.1	34.3	44.2	41.8	31.35
SHG's (%)	66.3	55.6	36.3	22.9	45.28
Adoption of micro-irrigation (%)	-	-	5.6	11.4	8.50
Adoption of crop insurance (%)	-	-	9.8	17.9	13.85
Cropping intensity (%)	-	157.9	162.7	171.3	164.0

Chamariya villages of Laldhang cluster have been adopted under the project. The basic data related to socio-economic status of the adopted farmers were collected using the standard survey proforma. The analysis of socio-economic pattern of the sampled farmers helps in providing an insight to the background and farm situation regarding the decision-making pattern of the farmers of selected village. Details of the economic and social characteristics of the farm households of selected village are given in table 6.

As per the above mentioned table, the selected village is dominated by the marginal farmers' category (44%) owning <1ha land followed by landless farmers (38%) and small farmers (11%). The mean age of farmers belonging to different category is in the range of 42.7 to 49.9 years and the average family size ranged from 4.5 to 5.43 members in all the categories. The mean number of education years is 7.6 among all the sampled farmers, indicating a junior high school education level among most of the farming community. Thus, the sampled farmers can be targeted for application of integrated farming system approaches along with adoption of modern farming practices.

The average operational land holding among the marginal farmers is 0.42 ha, 1.38 ha for small farmers and 3.09 ha for medium and large farmers. On an average, 75.6% farmers availed the Kisan Credit Card (KCC) scheme once or twice during their farming experiences. The landless and small farmers are numerically more in membership of gram Panchayat and co-operative societies. In adoption of crop insurance scheme, 17.9% of medium and large farmers have adopted this scheme, at the same time 11.4% medium and large farmers have adopted the micro-irrigation facilities in the sampled farm families. Most of women of the adopted village have registered them with different self-help groups and among the different categories of the farming communities the members of self-help group are in the order of 66.3% landless >55.6%marginal >36.3% small farmers >22.9% medium and large farmers. The mean level of cropping intensity in Dalupuri village is 164%, with the medium and large farmers with a significantly higher level. Therefore, based on the survey data it can be concluded that most of the households of the adopted village are dominated by marginal and small farmers category. And therefore, implementation of various IFS interventions through SCSP scheme will have positive impact on upliftment of poorer section of the society.

Project: Improvement of existing farming systems of underprivileged households through SCSP

More than 80%, India as well as worldwide farmers fall under the small and marginal (less than 2 ha) category. India alone has one-fourth of the small and marginal farms of the total world. Small land holding does not support farmers to fulfill the basic requirement like nutritious food, quality education, health etc. One-fifth of rural households whose principal occupation is agriculture are having income below the poverty line in the country. Raising the income of smallholders as well as marginal farmers is a big question for researchers, policymakers, and the government. Maximum numbers of small land holder belong to the Schedule caste community, and they are impoverished to uplift their life through farming system. Therefore keeping this fact in mind this project was formulated. The details of the areas covered under different schemes are given in Table 7.

For improvement of existing farming systems module wise intervention were made at SCSP household which brings lot of changes and increase the overall farm productivity with the introduction of wheat variety DBW-173 (late sown) with improved package & practices (Zink sulphate and weed control). This increased the wheat yield by 45.1% (additional yield of 15.7 q/ha). Livestock diversification with BNH (Co-5), mineral mixture (50 g/animal for 60 days) as feed supplement, Fenbendazole tablet for deworming and Animal mat for animal comport has increased the milk productivity (Plate 5). The improvement in the net income of the farmer after intervention is given in Table 8.

Table 7: Details of districts covered under scheme.

	Schemes ICAR-IIFSR, Modipuram	AICRP on IFS	AINP on Organic Farming
Districts covered	Meerut (UP)*	Kanker (CG), Bilaspur (HP), Jammu (J&K), Chikkaballapura (Karnataka), Anuppur (MP), Dausa (Raj), Yethapur and Erode (TN), Medak (TA), Nadia (WB)	Bajaura (HP), Ranchi (JK) Thiruvananthapuram (KA) Udaipur (Raj), Coimbatore (TN)

Table 8: Economics of low-cost IFS over base year.

Parameters	Benchmark (Before intervention)	After intervention 1ST Year
Cost of cultivation (Rs/year)	80,755	84,575
Gross Return (Rs/year)	1,37,922	1,58,840
Net income (Rs/year)	57,167	74,265
B: C ratio	1.70	1.88

Plate 5: Intervention made at SC farmers field during the year 2021.

Project: Sustainable livelihood improvement of SC farmers through IFS Approach

To ensure the economic, educational and human development as well as the security and social dignity of the Scheduled Castes in achieving equality with the non-Scheduled Caste population in a time bound manner the said program was initiated in 11 villages of three adjoining districts *viz.*, Muzaffarnagar, Meerut and Bagpat. The villages were selected as per SCSP project norms i.e. having SC community population >30% in villages. Depending on village population a total of 784 numbers of farmers of different categories viz., landless, marginal, small and medium were selected from the selected villages of four distinct blocks of the three districts.

Base line Survey: From the survey, it was noticed that on an average nearly 60-75 % farmers of SC category possess land and out of them nearly 80% farmers belongs to marginal or sub marginal category (0.3-0.6 ha/farm family), 10-12% small farmers (1.2-1.6 ha/farm family), 3-4% medium farmers (2.5-3.5 ha/farm family) and 25- 40% are landless farmer. The detail results of some of the important socioeconomic aspects of this category of farmers are presented in Table 9.

Table 9: Base line information of the selected villages.

Village	Farmer family and (farmers having land in hectares)	SC Farmer farmers family	% of SC in village	Major crops and livestock
% of SC families, major crops and livestock in villages				
Khanuda	700 (450)	370 (80)	80	Sugarcane, wheat, mustard, fodder crops, rice, milk animals, poultry, piggery etc.
Eklota	320 (200)	85 (50)	27	
Dhanju	800 (300)	420 (80)	55	
Bhalwa	300 (200)	162 (85)	53	
Livelihood dependence (% income from different occupations)				
Farmer category	Agriculture	Wages	Animal	Other off farm activities
Marginal	40-50	10-20	30-40	10-30
Small	50-60	-	20-30	10-30
Semi medium	70-80	-	20-30	<10
Medium	>80	-	10-20	-
Large	Not found			
Landless	-	60-80	20-30	<10
Base line production and productivity of IFS components				
IFS component	Crop/ Livestock	Productivity		
Agriculture	Sugarcane	750-900 (q ha^{-1})		
	Wheat	35-40(q ha^{-1})		
	Rice	40-45 (q ha^{-1})		
	Fodder	400-500 (q ha^{-1})for sorghum 400-500 (q ha^{-1})for berseem in 5 cuts		
	Mustard	10-12 (q ha^{-1})		
Milk production	Cow	1200-1800 liters/ lactation		
	Buffalo	1500-1700 liters/ lactation		
Egg production	Native poultry bird	eggs/bird/year		

Intervention implemented: As crop module, the impact of improved and high yielding varieties of wheat and mustard during rabi season was demonstrated to the farmers. Urea and DAP were supplied to resource poor farmers at the time of sowing to ensure proper nutrition to the crops. For animal component mineral mixture, Calcium, fendokit plus tablets etc. were given to the farmers to increase milk quality, productivity and the health of the animal**.** Farmers were also educated through various training programs and scientific interactions about the feed and fodder management round the year by following cropping systems diversification approaches. For supporting the livelihood as well to ensure proper nutrition to the farm families especially of landless farmers about 1725 number of poultry chicks were distributed among 115 farmers (15 chicks/farmer) of this category in three villages. Vegetable kits were also being given to farmers to raise seasonal vegetables for balance nutrition.

Performance of mustard demonstration: Mustard (variety RH 725) variety was provided to 125 farmers and grown on a total area of 25 hectares. Most of the farmers (> 95%) reported significantly higher yield ranging from7-50% as compared to the previous year with other variety.

Performance of wheat demonstrations: A total number of 342 farmers of eight villages' i.e. Dhanju, Eklota, Khanuda, Kasiara, Idrishpur, Adampur, Kanhad and Tamelagarhi were given seeds of different varieties i.e. DBW-187, DBW-222, DBW-71, DBW-90 (early) and HD-3086 (timely) of wheat. At farmers field both (early and timely) wheat varieties performed better (10-34% increased yield) as compared to the other varieties. The order of increase in wheat yield as compare to other varieties of wheat via our varietal interventions in villages Khanuda, Dhanju, Eklota and Kasira was respectively found by 30, 21, 33 and 23%.

Poultry intervention: Data collected approximately 135 days of distribution revealed a significant weight gain in birds depending on farmer to farmer performance. Weight of 700 birds was found in the range of 700-1500 g. Some of the healthiest birds also started egg laying and the difference between male and female birds become visible. During the visit at the end of July, 2021, farmers were receiving nearly 197 eggs from a herd of 250 female birds. The egg productivity (0.8 egg/bird/day) of this breed of bird is high as compare to native breed (0.4-0.5 egg/day/bird). A herd of total 375 birds (with 250 female) was giving eggs of worth of Rs. 1970/day while among the male nearly 60 were sold and farmers received an amount of Rs. 30350/- and remaining male birds (worth Rs. 18050/-) were being consumed by farmer's family as food.

Performance of Livestock intervention: The use nutrient and health supplements viz., mineral mixtures, Ca-bottle (balance nutrition) and Fendokit Plus Tablets (animal health) have resulted in 10-15% increase in milk productivity.

Another set of four villages' namely Kanoda, Jangethi, Khirva Jalalpur and Khirva Nauabad of Meerut district were adopted under SCSP program of Institute and CRP on CA for distribution of farm inputs and technological interventions. Total 277 farmers from these villages were selected and provided seeds of improved varieties of rice, wheat, maize, mustard, berseem and sorghum for enhanced production and ferterra (insecticide) for plant protection in sugarcane crop. Small farm implements likewise power sprayer machines were given to beneficiaries for reduced drudgery and increase working efficiency. It was also found that there was overall increase in yield of crops due to interventions of improved crop varieties and side by side other technological interventions. Rice and wheat yield increased to the tune of 10-15%. Fodder yield enhanced between 15-50%. The details of input distributed and increase in crop yield is presented in Table 10.

Under the SCSP Scheme, a total of 124 farmer beneficiaries were selected from 2 villages namely Hastinapur-63 (under NICRA), Kishorpur-61 (Institute) in Meerut District.The following interventions were made as per the farming requirement/resource availability with the farmers (Table 11).

Table 10: Details of Input distributed in each village and their performance

Input distributed (Kg/Number)	Name of Villages				Total	Increase in crop yield (%)
	Kanoda	Jangethi	Khirva Jalalpur	Khirva Nauabad		
Rice (Pusa Basmati 1509)	150	220	130	100	600	10-15
Sorghum Kanpuri White)	250	250	320	180	1000	15-25
Maize (Hybrid Poineer),	5	11	-	-	16	5-12
Wheat (HD 3226)	1500	800	680	520	3500	10-15
Mustard(RH725)	5	5	-	-	10	15-20
Berseem (Farm Sona)	10	10	-	-	20	25-50
Ferterra	45.0	72.5	40.0	40.0	197.5	
Sprayer	2	2	1	1	6	

Table 11: Details of interventions made in farming system.

IFS Module	Interventions	Details of interventions
Field crop	Demonstration of improved rice, wheat and mustardvarieties of crops	Rice: PB 1509; Wheat:DBW-173; HD-2967; PBW-226 (@40.0 kg/household in Kishorepur and @50.0 kg/household in Hastinapur); Mustard: RH 725 (@1.5 kg/household)
	Integrated weed management	Herbicides e.g. Sulfosulfuron application in wheat crop
	Small implements to support their agricultural operations	Multi-functional sprayer, Sickle, Spade, sugarcane cutter etc.
Fodder	Demonstration of berseem, maize, jowar	Jowar – Kanpuri
Vegetable cauliflower	Demonstration of 7 vegetables	Chilly, tomato, brinjal, spinach, coriander, radish,
Livestock	Mineral mixture, Calcium Suspension	Mineral mixture (1 kg packet/household), Calcium Suspension (1 litre/household)

Based on the survey, it was found that use of improved varieties and application of recommended management practices, an increase of yield in the range of 5-15 % were noticed over existing farming, and thereby interventions increased livelihood by 5-10 %. The complete details are given in Table 12.

Survey data on socio economic aspects revealed that SC farmers are very poor and they are either landless or possess medium holdings. These farmers were also devoid of other income sources. Interventions implemented an average increase in their income by 20-30%. Poultry intervention was beneficial with

effect on their nutritional security and additional income. Livestock interventions also provide beneficial impact on milk yield, quality and animal health.

Table 12: Details of each farming interventions, number of farmer beneficiaries, average yield and % increase/decrease over baseline.

Interventions	Number of farmers	AverageYield Kg/ha	BaselineKg/ha	% increase
Rice (PB 1509)	24*	Completely damaged due to floods and the water level of Ganga crossed danger mark and inundated the rice fields for 10-15 days, which are ready for harvest.		
Wheat (DBW 173, HD 2967, PBW226)	80	5600	4400	27.3
Mustard(RH 725)	58	1000	900	11.1
Livestock (Mineral mixture and calcium suspension)	70	7-8 lit/day	8-9 lit/day	
Fodder seed	53	Increased the number of cuts		5 %

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Technology/product assessed and transferred

S. No.	Name of the project	Technology Generated	Name of Scientist/s	Relevant stakeholder
1.	Sustainable resource management for climate smart IFS under AICRP on Integrated Farming Systems	Sustainable integration of banana in farming systems for enhanced income and nutritional security	Poonam Kashyap N Ravisankar A S Panwar P C Ghasal Amit Nath S Malik A K Prusty Chandra Bhanu M Shamim D Dutta	Marginal Farmers
2.	Development of pest and disease management package for organic farming	Organic nutrient and pest management package for cauliflower	Chandra Bhanu D. Dutta Jairam Choudhary P.C. Ghasal A.L. Meena	Organic grower
3.	Development of pest and disease management package for organic farming	Organic nutrient and pest management package for brinjal	Chandra Bhanu D. Dutta Jairam Choudhary P.C. Ghasal A.L. Meena	Organic grower
4.	Development of pest and disease management package for organic farming	Organic nutrient and pest management package for summer tomato	Chandra Bhanu D. Dutta Jairam Choudhary P.C. Ghasal A.L. Meena	Organic grower
5.	Development of pest and disease management package for organic farming	Organic nutrient and pest management package for *rabi* tomato	Chandra Bhanu D. Dutta Jairam Choudhary P.C. Ghasal A.L. Meena	Organic grower
6.	NAIF funded ABI Centre, ICAR-IIFSR, Modipuram, Meerut	Spawn production technology of mushroom under ABI Scheme of ICAR-IIFSR	Chandra Bhanu Amit Nath	Farmer and Entre-preneurs

7.	Ensuring Food and Nutritional Security through Integrated Farming Systems in Western Plain Zone of Uttar Pradesh" (Farmer FIRST)	Crop, horticulture, poultry, livestock and value addition based IFS approach for Food and Livelihood Security and Enhancing Profitability of landless, marginal and small farmers of Western Uttar Pradesh	A.S. Panwar A.K. Prusty Poonam Kashyap P.C. Jat Nisha Verma Sunil Kumar	Landless, marginal and small farmers
8.	Ensuring Food and Nutritional Security through Integrated Farming Systems in Western Plain Zone of Uttar Pradesh" (Farmer FIRST	Multi-Tier farming for higher land use efficiency, resource optimization and higher benefits for small farmers	Poonam Kashyap A.S. Panwar A.K. Prusty P.C. Jat Nisha Verma Sunil Kumar	Small farmers
9.	Ensuring Food and Nutritional Security through Integrated Farming Systems in Western Plain Zone of Uttar Pradesh" (Farmer FIRST	Intercropping papaya, strawberry, vegetables and pulses in orchard for higher profitability	Poonam Kashyap A.S. Panwar A.K. Prusty P.C. Jat Nisha Verma Sunil Kumar	Small farmers
10.	Cluster based on farm participatory research in farming systems perspective under tribal sub plan in Uttrakhand	Designed Wheel Hoe to improve working efficiency of field workers	V.P. Chaudhary Nisha Verma	Field Labours
11.	Cluster based on farm participatory research in farming systems perspective under tribal sub plan in Uttrakhand	Designed Seed cum fertilizer drill to improve working efficiency of field workers	V.P. Chaudhary Nisha Verma	Field Labours

Seminars/symposia/workshop/Meetings attended

Title of training/seminar/ symposia/ workshop/Meeting	Period	Venue	Name of participant
App development for Alternate crop recommendation, NIC, New Delhi	5 January 2021	Virtual	N. Ravisankar
ICAR-IIFSR-ICRAF Joint workplan meeting on Natural Farming	16 January 2021	Virtual	N. Ravisankar
Certified Farm Advisors by MANAGE, Hyderabad	22 January 2021	Virtual	N. Ravisankar
Panchgvaya Research and possibilities in present scenario.	28 January, 2021	ICAR-CIRC, Meerut	Suresh Malik
ITMU chaired by DDG NRM by Zonal ITMU NEH	03 February 2021	Virtual	PeyushPunia
Alleviating malnutrition and promoting gender equity in the rural poultry production in India organized by ICAR-CIWA, Bhubaneswar, Orissa	03 February 2021	Virtual	Suresh Malik
Institute Management Committee (IMC) meeting of ICAR-RC-ER, Patna	5 February 2021	Virtual	N. Ravisankar
4th International Conference on Global Approaches in Natural Resource management for Climate Smart Agriculture (GNRSA-2020) during Pandemic Era of Covid-19 26-28	February 2021	Shobhit University, Modipuram, Meerut	P.C. Ghasal
XXVI Meeting of ICAR Regional Committee - VI	13 March 2021	Virtual	M Shamim
strategic reorientation for climate smart agricultureV-Agmet 2021	17-19 March 2021	Virtual	N. Subash
TEEB Agrifood Asia symposium	24-26 March 2021	Virtual	N. Ravisankar M. Shamim
Hindi workshop at IIFSR	25 March 2021	Virtual	PeyushPunia
Global symposium on soil biodiversity -GSOBI21 organized by Food & Agriculture Organization, United Nations	19-22 April 2021	Virtual	N. Subash
“World Earth Day, 2021 Restore Our Earth organized by SKN Agriculture University Jaipur, Rajasthan	22 April 2021	Virtual	A.L. Meena

Agro-forestry for Entrepreneurship	10 May 2021	Virtual	A.L. Meena
Mass awareness programme in 16 stateson organic farming	13-25 May 2021	Virtual	PeyushPunia
Natural Farming by Ministry of Rural Development, New Delhi	27 May 2021	Virtual	N. Ravisankar
Food and Dietary concepts of Ayurveda-Indian traditional wisdom of food for better nutrition and Health	01 June 2021	Virtual	Vipin Choudhary
Our Solutions are in Nature	03 June 2021	Virtual	A.L. Meena
Environmental Ethics & Ecological Restoration: Issues and Strategies	05 June 2021	Virtual	A.L. Meena
Loss of Biodiversity: Global Environment & Health Challenges	05-07 June 2021	Virtual	N. Subash
Start up opportunities in Hydroponics and Vertical Farming organised by EDI PerikulyamHortBuisness Incubation Forum	11 June 2021	Virtual	Poonam Kashyap
V International Agronomy Congress	12 June 2021	Virtual	N. Ravisankar
Cold chain technologies, convergence and Capacity Buidling organized by ASSOCHAM, New Delhi	17 June 2021	Virtual	Poonam Kashyap
Water Budgeting: An approach for sustainable water resources management in Rajasthan organized by MPUAT, Udaipur	21 June 2021	Virtual	A.L. Meena
National dialogue an Innovative food for hospitality Industry by IPTM, ICAR	22 June 2021	Virtual	PeyushPunia
Building A Disease Free: Indian Poultry Industry organized by All India Poultry Breeders Association, DUVASU V eterinary University, Mathura (U.P.)	22 June 2021	Virtual	Suresh Malik
Kick-off workshop of the Circular Food Systems network	22-23 June 2021	Virtual	N. Subash
Midterm review of the xxv meeting of ICAR regional committee No iv	25 June 2021	Virtual	PeyushPunia
Regenerative Agriculture for Soil Health, Food and Environmental Security	26 June 2021	Virtual	N. Ravisankar
DDP programme Meeting chaired by Dr. Surash Prabhu, Mosindenty for Ratnagiri & Sindlndurg districts	28 June 2021	Virtual	PeyushPunia

Breeding for Sustainable Growth of Poultry Industry organized by Venkateshwara Hatcheries Group, Hyderabad	28 June 2021	Virtual	Suresh Malik
Versharitu me Kukkut Parbandh organized by ICAR-Directorate on Poultry Research, Hyderabad, Telengana	29 June 2021	Virtual	Suresh Malik
HLMC Meeting on promotion of Agricultural mechanization for in satin Management of crop residue by DDG(NRM)	29 June 2021	Virtual.	N. Ravisankar
Strategies for implementation of Natural Farming in Uttar Pradesh	30 June 2021	Virtual	M Shamim
Hindi Nagar Kriyanvan samiti six monthly meeting	30 June 2021		PeyushPunia
Water productivity for profitable agriculture	16 July 2021	Virtual	N. Subash
Agro biodiversity for food security	16 July 2021	Virtual	A.L. Meena
Role of legume and pulses in sustainable cropping systems of hot arid zone" organized by Swami Keshwanand Rajasthan Agriculture University, Bikaner	17 July 2021	Virtual	A.L. Meena
Bio-Decomposer: Wealth from Waste in Farming Systems	20 July 2021	Virtual	Peyush Punia Sunil Kumar
Rural Poultry Farming: A Suatainable Approach Towards Atma Nirbhar Bharat organized by Nanaji Deshmukh Veterinary Science University, Jabalpur (M.P.)	20 July 2021	Virtual	Suresh Malik
Artificial Intelligence for Smart Agriculture	22 July 2021	Virtual	A.L. Meena
Ecosystem for sustainable farmer producer organisationorganised by ICAR-RCER, Patna	30 July 2021	Virtual	Poonam Kashyap
Integrated Farming System for Sustainable Livelihood and Nutritional Security	12 August 2021	ICAR-IIFSR, Modipuram. Meerut	Devendra Kumar Vipin Choudhary Raghavendra KJ
XXVI Meeting of ICAR Regional Committee No. VII	25 August 2021	Virtual	M Shamim

Interaction meet with Director, Horticulture, Government of Odisha for Model Farm cum Agro-tourism development	25 August 2021	Virtual	N. Ravisankar
Winning the game of publishing research papers, raising your profile, and extending the impact of your publications by Asia-Pacific, WILEY	07 September 2021	Virtual	A.L. Meena
4th Global Meet on Science and Technology for Staying Healthy & Feeding Ever-growing Population World -Wide	12-13 September 2021	SVP University of Agriculture and Technology Meerut (UP)	A. K. Prusty M Shamim Sunil Kumar
XXVII meeting of the Regional Committee No. VIII scheduled to be organised by ICAR-CMFR, Kochin	15 September 2021	Virtual	M Shamim
National level stakeholder consultation for a new global initiative of one CGIAR on transformational agroecology across food, land and water systems	23 September 2021	Virtual	N. Ravisankar
Mid-term review of the XXVth Meeting of ICAR Regional Committee No. IV (Virtual)	25 September 2021	Virtual	M Shamim
XI meeting of Agricultural Systems and Management Sectional Committee of BIS, GoI, New Delhi	30 September 2021	Virtual	N. Ravisankar
Alternate cropping systems for climate change and resource conservation	29 September to 1 October 2021	Virtual	All scientists
Implementation and Use of Agricultural Research Management System (ARMS)	05 October 2021	Virtual	Vipin Choudhary
Integrated Farming Systems: A Tool for Enhancing Income and Nutritional Security	05-07 October 2021	ICAR-RCER, Patna	A.L. Meena P.C. Ghasal Raghavendra KJ
7thGo Green Summit: Unfolding the concepts of green technology to achieve zero emission	14-15 October 2021	Virtual	N. Subash
Implementation and Use of Agricultural Research Management System	22 October 2021	Virtual	N. Ravisankar Raghavendra KJ
Crop Diversification: A way towards Nutritional Security	28 October 2021	Virtual	P.C. Ghasal

2nd International web-conference of ANCRM on Smart Agriculture for Resource Conservation and Ecological Stability	29-30 October 2021	Virtual	N. Subash
V International Agronomy Congress on Agri-innovations to combat food and nutrition challenges	23-25 November 2021	PJTSAU, Hyderabad/ Virtual	L.R. Meena N. Ravisankar Amit Nath R.P. Mishra P.C. Jat A.K. Prusty M.A. Ansari P.C. Ghasal Yogendra Singh
Tropical Meteorology (INTROMET 2021) on Changing Climate: Consequences and Challenges	23-26 November 2021	Cochin University of Science and Technology, Cochin, Kerala	N. Subash
Empowerment of farmers of North-Eastern Hilly Region through Information and Communications Tools and Techniques	30 November 2021	Virtual	Sunil Kumar
Annual Group Meeting (AGM) of AI-NPOF	03-04 December 2021	ICAR-IIFSR, Modipuram	N Ravisankar R.P. Mishra D. Dutta Poonam Kashyap A. K. Prusty M Shamim MA Ansari Raghuveer Singh P.C. Ghasal Jairam Choudhary Raghavendra KJ Vipin Kumar D Tripathi
XXV meeting of ICAR Regional Committee -III	11 December 2021	Virtual	M Shamim
30th National Web Conference on Soil and Water Management Technologies for Climate Resilience, Agricultural and Environmental Sustainability	14-16 December 2021	Virtual	N. Subash

Greenhouse gases (GHG-3) observation and Inverse Modelling on Indian Regional Perspective	14-17 December 2021	Virtual	N. Subash
Annual group meeting of AICRP on integrated farming system in hybrid mode	18-20 December 2021	ICAR-IIFSR, Modipuram	L.R. Meena Amit Nath D. Dutta P.C. Jat Chandra Bhanu Poonam Kashyap A.K. Prusty Nisha Verma P.C. Ghasal
Agro-Biodiversity Conservation and Use for Climate Resilience and Livelihood improvement of small holder farmers	23 December 2021	ICAR-VPKAS, Almora	Nisha Verma
INTROMET 2021: International Symposium on Tropical Meteorology – Changing Climate- Consequences and Challenges	23-26 December 2021	Virtual	N. Subash
Recent trends in Agriculture for sustainable food and nutritional security	23-27 December 2021	Virtual	L.R. Meena
Framing Organic Farming policy for Tamil Nadu, Government of Tamil Nadu	27 December 2021	Virtual	N. Ravisankar
Integrating the capabilities of Agricultural Scientists and their suggestions in Agriculture sector: Sustainable Agriculture and Organic farming	31 December 2021	Virtual	N. Ravisankar

Lectures delivered in trainings /PG Students

Name of Programme	Venue (Organized by)	Title of lecture	Date of lecture	Resource person
Farmers Awareness Programme on Organic Farming	Virtual (MPUAT, Udaipur)	Organic inputs	22 January 2021	N. Ravisankar
NAHEP lecture series on IFS	Virtual (GBPUA&T, Pantnagar)	Quantitative analysis of farming systems: Farm Typology	25 and 26 January 2021	A. K. Prusty
Customized training on IFS for NABARD officials	Virtual (ICAR-IIFSR, Modipuram)	Concept and design of prototype and low-cost integrated farming system	27 January 2021	N. Ravisankar
Customized training on IFS for NABARD officials	Virtual (ICAR-IIFSR, Modipuram)	Orchard Module in Integrated Farming systems	28 January 2021	Poonam Kashyap
Training programme on Integrated Farming System for DDMs and Staff members of NABARD, Madhya Pradesh Regional Office (MPRO)	Virtual (ICAR-IIFSR, Modipuram)	Concept and design of prototype and low-cost integrated farming system	28 January 2021	N. Ravisankar
Customized training on IFS for NABARD officials	Virtual (ICAR-IIFSR, Modipuram)	Agriculture Transformation through integrated farming system in Uttar Pradesh	28 January	L.R. Meena
Training programme on Integrated Farming System for DDMs and Staff members of NABARD, Madhya Pradesh Regional Office (MPRO)	Virtual (ICAR-IIFSR, Modipuram)	Integration of poultry in Farming Systems	28 January 2021	Suresh Malik
Customized training on IFS for NABARD officials	Virtual (ICAR-IIFSR, Modipuram)	Development of bankable scheme on Integrated Farming Systems	29 January 2021	N. Ravisankar
Customized training on IFS for NABARD officials	Virtual (ICAR-IIFSR, Modipuram)	Integrated fish farming	29 January 2021	PeyushPunia
Certified Farm Advisor on Organic Farming-Batch-1	ICAR-IIFSR, Modipuram	Different Forms of organic agriculture	2 February 2021	N. Ravisankar

Certified Farm Advisor on Organic Farming-Batch-1	ICAR-IIFSR, Modipuram	Identification of green manures and its utilization in organic production system	03 February 2021	Raghuveer Singh
Certified Farm Advisor on Organic Farming-Batch-1	ICAR-IIFSR, Modipuram	Study tour/visit to progressive farmer /commercial vermicompost unit at Bulandsahar/Meerut	04 February 2021	Raghuveer Singh
Certified Farm Advisor on Organic Farming-Batch-1	ICAR-IIFSR, Modipuram	Horticulture based farming systems for food and nutritional security of farmers	07 February 2021	Poonam Kashyap
Certified Farm Advisor on Organic Farming-Batch-1	Sardhana, Meerut	Visit to organic farm at Sardhana, Meerut (Sh. Vinod Saini, Progressive farmer's field)	07 February 2021	Raghuveer Singh
Certified Farm Advisor on Organic Farming-Batch-1	ICAR-IIFSR, Modipuram	Integration of agro-forestry in organic farming and benefits.	07 February 2021	Nirmal
CFA on Organic Farming training for the first batch	PatanjaliYogpeeth/PBRI, Haridwar	Visit to herbal garden, Goshala (biogas and different composting units), processing and packaging unit at PatanjaliYogpeeth/PBRI, Haridwar	09 February 2021	Raghuveer Singh
Promotion of Climate Change Adaptation and Climate Resilient agriculture	Virtual (Extension Education Institute, Hyderabad)	Role of Integrated Farming System in building resilient to Climate Change	10 February 2021	N. Ravisankar
Certified Farm Advisor on Organic Farming-Batch-1	ICAR-IIFSR, Modipuram	NSOP/PGS standards (crop, livestock, aquaculture, bee keeping mushroom etc): An over view	12 February 2021	N. Ravisankar

Certificate course on Climate Smart Organic Farming	Virtual (NAHEP-CAAST, MPKV, Rahuri)	Organic farming Concept	16 February 2021	N. Ravisankar
Certificate course on Climate Smart Organic Farming	Virtual (NAHEP-CAAST, MPKV, Rahuri)	Forms of organic agriculture	16 February 2021	N. Ravisankar
Financing sustainable agriculture practices including integrated farming system	Virtual (National Bank Staff College, Lucknow)	Integrated Farming System models for doubling farmers' income	18 February 2021	N. Ravisankar
Skill Development Training For Organic Growers	ICAR-IIFSR	Role of biofertilizers in organic farming (Theory)	18 February 2021	A.L. Meena
Financing sustainable agriculture practices including integrated farming system	Virtual (National Bank Staff College, Lucknow)	Bankable projects on IFS for doubling of farmers' income	19 February 2021	N. Ravisankar
Skill Development Training For Organic Growers	ICAR-IIFSR	Method of seed treatment with biofertilizers (Practical)	22 February 2021	A.L. Meena
Certified Farm Advisor on Organic Farming-Batch-2	ICAR-IIFSR, Modipuram	Different Forms of organic agriculture	23 February 2021	N. Ravisankar
Certified Farm Advisor on Organic Farming-Batch-2	ICAR-IIFSR, Modipuram	Identification of green manures and its utilization in organic production system	24 February 2021	Raghuveer Singh
Capacity building for KVK staff	SVPUAT, Modipuram	Organic Farming and Natural Farming	25 February 2021	N. Ravisankar
Certified Farm Advisor on Organic Farming-Batch-2	ICAR-IIFSR, Modipuram	Study tour/visit to progressive farmer /commercial vermicompost unit at Bulandsahar/Meerut	25 February 2021	Raghuveer Singh
Certified Farm Advisor on Organic Farming-Batch-2	ICAR-IIFSR, Modipuram	Different Forms of organic agriculture	26 February 2021	N. Ravisankar

Certified Farm Advisor on Organic Farming-Batch-2	ICAR-IIFSR, Modipuram	Different method of composting for organic farming	27 February 2021	A.L. Meena
Certified Farm Advisor on Organic Farming-Batch-2	ICAR-IIFSR, Modipuram	Horticulture based farming systems for food and nutritional security of farmers (Theory and Practical demonstration of components)	28 February 2021	Poonam Kashyap
Certified Farm Advisor on Organic Farming-Batch-2	ICAR-IIFSR, Modipuram	Organic production packages for fruits and vegetables	28 February 2021	Poonam Kashyap
Certified Farm Advisor on Organic Farming-Batch-2	ICAR-IIFSR, Modipuram	Government schemes and policies for development of organic farming	01 March 2021	Raghavendra KJ
Certified Farm Advisor on Organic Farming-Batch-2	ICAR-IIFSR, Modipuram	Analysis of nutrient content in various composts and calculation manure requirement (Practical)	01 March 2021	A.L. Meena
Certified Farm Advisor on Organic Farming-Batch-2	PatanjaliYogpeeth/PBRI, Haridwar	Visit to herbal garden, Goshala (biogas and different composting units), processing and packaging unit at PatanjaliYogpeeth/PBRI, Haridwar	03 March 2021	Raghuveer Singh
Certified Farm Advisor on Organic Farming-Batch-2	ICAR-IIFSR, Modipuram	Nursery management of fruits and vegetables in skill India Programme	09 March 2021	Poonam Kashyap
मत्सय पालको की आय बढाने के लिये बेंहतर प्रबंधन College of fisheries science	Virtual (JNKVV, Jabalpur)	मीठे पानी में पायी जाने वाली कुछ प्रमुख प्रजातियां	10 March 2021	Peyush Punia

HRD Training	SVPUAT, Modipuram, Meerut	Advances in Organic Farming with particular reference to nutrient and pest management	13 March 2021	Chandra Bhanu
Climate change adaptation in agriculture	Virtual (MANAGE, Hyderabad)	Organic farming and IFS for climate resilience	25 March 2021	N. Ravisankar
Organic Farming for Sustainable Agriculture	Virtual (Extension Education Institute, Hyderabad)	Integrated Farming System models for Sustainable Agriculture	3 June 2021	N. Ravisankar
Kudarti Kheti Gyan Pakhwara	Virtual (Kheti Virsaat Mission, Punjab)	Scientific Organic Farming Systems	9 June 2021	N. Ravisankar
Organic farming training for farmers	Virtual (NCOF, Ghaziabad)	Scientific Organic Farming Systems	17 June 2021	N. Ravisankar
B.Sc (Ag.) Final year students for the credit course AGR 452	Virtual (ADAC&RI, Trichy, TNAU)	Organic manures preparation	17 June 2021	A.L. Meena
Climate Resilient Agriculture and Livelihood for NGOs and FPOs	Virtual (BIRD, Lucknow)	Impact of Climate Change on Indian Agriculture and Livelihood	22 June 2021	N. Ravisankar
Organic farming training for farmers	Virtual (NCOF, Ghaziabad)	Scientific Organic Farming Systems	28 June 2021	N. Ravisankar
Invited lecture to UG students	Virtual (JKK Munirajah College of Agricultural Sciences, Tamil Nadu)	Integrated Farming Systems: Concept, Design and Developed models for Sustainable Livelihood in India	14 July 2021	N. Ravisankar
NABARD Foundation day celebrated by NBARD, Jaipur, Rajasthan.	Virtual	IFS models at National level and Rajasthan	16 July 2021	A. K. Prusty
Webinar on “Artificial Intelligence for Smart Agriculture” organized by ICAR-RCER, Patna	Virtual		22 July 2021	A. K. Prusty

Climate Resilient Agriculture and Livelihood for NGOs and FPOs	Virtual (BIRD, Lucknow)	Impact of Climate Change on Indian Agriculture and Livelihood	26 July 2021	N. Ravisankar
Training of Extension Officials on Upscaling of organic farming technology and Natural farming practices through BPKP for Sustainable Agriculture sponsored by SAMETI, Kerala	Virtual (ICAR-IIFSR, Modipuram)	Natural Farming: Aspects and Practices	27 July 2021	N. Ravisankar
Certificate Course on Organic Certification	Virtual (NAHEP, UAS, Dharwad)	Technological advancement in organic production of crops for Certification	27 July 2021	N. Ravisankar
Webinar for SAMETI, Kerala on Upscaling of Organic farming technology and natural farming practices through Bhartiya Prakruthi Krishi Paddhathi	ICAR-IIFSR (Virtual)	Preparation and application of organic manures	28 July 2021	A.L. Meena
Agronomic tools for organic/natural farming systems	Virtual (SAMETI, Kerala)	Upscaling of Organic Farming Technology and Natural Farming Practices through BPKP for Sustainable Agriculture for State extension officials of Kerala	28 July 2021	Raghuveer Singh
Knowledge Sharing for Farmers	Virtual (Knowledge Sharing Platform, The Nilgiris)	Importance of Scientific Organic Farming Practices	31 July 2021	N. Ravisankar
SCSP programme of AINP-OF centre	Virtual (ICAR-CTCRI, Thiruvananthapuram)	Importance of Organic farming and support under SCSP	12 August 2021	N. Ravisankar
Agri Business Incubation Centre Capacity building programme	Virtual (ICAR-IIFSR, Modipuram)	Entrepreneurship options in Organic farming	16 August 2021	N. Ravisankar

Agri Business Incubation Centre Capacity building programme	Virtual (ICAR-IIFSR, Modipuram)	Decomposition: Composting and vermicomposting methods in organic farming	17 August 2021	A.L. Meena
Climate Change Adaptation in Agriculture	Virtual (MANAGE, Hyderabad)	Integrated Farming System to minimize the climate induced risk	26 August 2021	N. Ravisankar
Lecture for Post Graduate Students	Virtual (ICAR-IARI, New Delhi)	Organic farming: Status, Challenges and Research approach	30 August 2021	N. Ravisankar
Climate Resilient Agriculture and Livelihood for NGOs and FPOs	Virtual (BIRD, Lucknow)	Impact of Climate Change on Indian Agriculture and Livelihood	31 August 2021	N. Ravisankar
International Year of Millets 2023	Sikheda, Muzzafarnagar	Poshan Anaaj Evam Maanav/Mahilaa Swasthya Hetu Unka Mahatva	17 September 2021	Nisha Verma
International Year of Millets 2023	Sikheda, Muzzafarnagar	Tikau Krishi evam gramin ajivika hetu paudhropan ka mahatv	17 September 2021	Poonam Kashyap
Scientist-Farmer's Interaction Meet on Integrated farming system	Johri, Baghpat	Role of fruits and vegetables on sustainable agricultural and rural livelihood	28 September 2021	Poonam Kashyap
Scientist-Farmer's Interaction Meet on Integrated farming system	Johri, Baghpat	Balanced food nutrition and human health	28 September 2021	Nisha Verma
National Training Programme entitled "Production and Post Production Technologies of Mushrooms for entrepreneurship development under ABI Scheme"	ICAR-IIFSR, Modipuram	Nutritional and medicinal benefits of mushroom	05 October 2021	Nisha Verma

Integrated Farming System for Sustainable Development	Virtual (Extension Education Institute, Nilokheri, Haryana)	Crop based Integrated farming systems for different agro-climatic conditions	11 October 2021	N. Ravisankar
Integrated Farming Systems for Sustainable Development organized by EEI, Nilokheri, Haryana.	Virtual	Fish based farming systems typology and farm design	13 October 2021	A. K. Prusty
World Food Day on Growth, Nourish, Sustain together and Rural Developmentt.	Khanauda, Meerut	Women Empowerment, overall health and drudgery reduction	16 October 2021	Nisha Verma
3 days training programme on GAP	ICAR-IIFSR, Modipuram	Application of Information technologies in modern agriculture	21 October 2021	Sunil Kumar
3 days training programme on GAP	ICAR-IIFSR, Modipuram	Recent advances in horticulture based integrated farming systems	21 October 2021	Poonam Kashyap
Short course on Organic farming in Practice	Virtual (ANGRAU, Lam)	Organic farming: Concepts and Principles	22 October 2021	N. Ravisankar
Short course on Organic farming in Practice	Virtual (ANGRAU, Lam)	Package of Practices for Cereals & Pulses under Organic production system	26 October 2021	P.C. Ghasal
Training to KVK personnel on IFS	Virtual (TNAU, Coimbatore)	Preparation of bankable projects on integrated farming system	23 November 2021	Raghavendra KJ
Promotion and Development of Strategies for Doubling the Income of Farmers in Agriculture and Allied Sectors	Virtual (Extension Education Institute, Hyderabad)	Integrated Farming System approach for Doubling of Farmers' Income	15 December 2021	N. Ravisankar

Training attended

Title of training	Venue	Period	Name of participants
Generic online Training in Cyber Security	Virtual	25 February 2021	Vipin Choudhary
Cyber security (DIAT certified Information Assurance participation)	Virtual	28 February - 31 May 2021	Vipin Choudhary
Applications of Artificial Intelligence and Cloud Computing in Agriculture	Virtual	15-20 March 2021	N. Subash
9th Regional Training Course on The New Concept of Weeds and Their Management (Online)	SEAMEOBIOTROP, Indonesia (Virtual)	29-31 March 2021	P.C. Ghasal
Agroforestry for environmental sustainability and climate resilience	ICAR CAFRI, Jhansi and NIAM, Hyderabad (Virtual)	10-12 May 2021	Nirmal
Management Development programme (MDP) on Biodiversity and environmental Laws	ICAR-NAARM, Hyderabad (Virtual)	7-9 June 2021	PeyushPunia
Online Management Development programme on Leadership development	ICAR-NAARM, Hyderabad (Virtual)	14-25 June 2021	Deevendra Kumar
Enhancing Agricultural Resilience through Index Based Flood Insurance and Postflood Management Interventions in India jointly organized by ICAR -IIWM, Bhubaneswar, and IWMI, New Delhi	Virtual	29-30 June 2021	N. Subash M Shamim
3 days collaborative training programme on Extension of Horticultural technologies organised by ICAR -IIHR, Bangalore and MANAGE, Hyderabad	Virtual	27-29 July 2021	Poonam Kashyap
Data Analysis in Social Sciences Research	ICAR-NAARM, Hyderabad (Virtual)	04-08 October 2021	A.L. Meena P.C. Ghasal Raghavendra KJ
Analysis of Multi-Location Experiments	ICAR-NAARM, Hyderabad (Virtual)	28 October - 1 November 2021	P.C. Ghasal
Mechanized weed managementin different field crops	ICAR-DWR, Jabalpur(Virtual)	01-03 November 2021	P.C. Ghasal

Training/workshop/schools/meetings organized

Title of Training/workshop/ schools organized	Venue	Period	Number of participants	Name of Organizers
Online training programme on Custom Hiring evam khadya prasanskaran Kendra sthapit evams anchaalan karne hetu online jagrookta prashikshan kaaryakram	Virtual	11-12 January 2021	70	Nisha Verma
Customized training programme on Integrated Farming System for NABARD officials (Sponsored by BIRD, Lucknow)	Virtual	27-29 January 2021	22	N. Ravisankar A.K. Prusty M. Shamim Raghuveer Singh
Training programme on Integrated Farming System for DDMs and Staff members of NABARD, Madhya Pradesh Regional Office (MPRO)	Virtual	28 January 2021	40	N. Ravisankar
Certified Farm Advisor on Organic Farming (Module-II)-First Batch sponsored by MANAGE, Hyderabad	ICAR-IIFSR, Modipuram	2-16 February 2021	21	N. Ravisankar Chandra Bhanu M. Shamim Raghuveer Singh P.C. Ghasal Jairam Choudhary
Skill Development training on Organic Growers	ICAR-IIFSR, Modipuram	18 February – 14 March 2021	20	L.R. Meena Suresh Malik Chandra Bhanu P.C. Ghasal A.L. Meena
Training on “Improvement in the working efficiency of skilled supporting staff”	ICAR-IIFSR, Modipuram	22-26 February 2021	15	Suresh Malik Sunil Kumar A.L. Meena Raghavendra KJ
Certified Farm Advisor on Organic Farming (Module-II)-Second Batch sponsored by MANAGE, Hyderabad	ICAR-IIFSR, Modipuram	23 February - 9 March 2021	25	N. Ravisankar Chandra Bhanu M. Shamim Raghuveer Singh P.C. Ghasal Jairam Choudhary

Training on "Skill Development Training on Organic Grower"	ICAR-IIFSR, Modipuram. Meerut	01-25 March 2021	20	L.R. Meena Suresh Malik Chandra Bhanu P.C. Ghasal A.L. Meena Raghavendra KJ
Kisan Goshti and animal health awareness programme & Demonstration of windrow method of vermicomposting	Bhadurpur village, Meerut, Uttar Pradesh	12 March 2021	30	Raghuveer Singh
Bharat ka Amrut Mahotsav-Mass Awareness Campaign on Organic Farming	Virtual	13, 15, 17, 18, 20, 24 and 26 May 2021	7873	N. Ravisankar A.K. Prusty M. Shamim Raghuveer Singh Vipin Kumar
9th RAC Meeting	Virtual	24-25 June 2021	All Scientists of Institute	PeyushPunia
National Webinar on Bio-Decomposer: Wealth from Waste in Farming Systems	Virtual	20 July 2021	225	Amit Nath R.P. Mishra Chandra Bhanu P.C. Ghasal Jairam Choudhary
Training of Extension Officials on Upscaling of organic farming technology and Natural farming practices through BPKP for Sustainable Agriculture sponsored by SAMETI, Kerala	Virtual	27-29 July 2021	36	N. Ravisankar Chandra Bhanu A.K. Prusty Raghuveer Singh P.C. Ghasal
Bharat ka Amrut Mahotsav-Mass Awareness Campaign on Organic Farming	Virtual	2-7 August 2021	3890	N. Ravisankar A.K. Prusty M. Shamim Meraj A. Ansari Raghuveer Singh Raghavendra, KJ Vipin Kumar
National Webinar on Integrated farming system for Sustainable livelihood and Nutritional Security.	Virtual	12 August 2021	105	L.R. Meena Amit Nath Devendra Kumar Nirmal Ragavendra KJ

Training on Entrepreneurship Development through Organic Farming	Virtual	16-18 August 2021	22	Amit Nath Chandra Bhanu P.C. Ghasal Sunil Kumar A.L. Meena
Divisional IRC of Project Coordination Unit	ICAR-IIFSR, Modipuram	13 September 2021	6	N. Ravisankar A.K. Prusty M. Shamim Meraj A. Ansari Raghuveer Singh Raghavendra, KJ
International Webinar Conference on "Alternate cropping systems for climate change and resource conservation"	ICAR-IIFSR, Modipuram. Meerut	29 September - 01 October 2021	418	PeyushPunia L.R. Meena N. Subash Nirmal A.L. Meena Lalit Kumar P.C. Ghasal Raghavendra KJ
National Training Programme entitled "Production and Postproduction Technologies of Mushrooms for entrepreneurship development under ABI Scheme"	Virtual	05-06 October 2021	60	Amit Nath Chandra Bhanu Nisha Verma
Interface meeting on "Quality production of micro-nutrients and organic fertilizers through incorporation of modern techniques vis-a-vis challenges of current agricultural environment" jointly by ICAR-IIFSR & Department of Agriculture, Meerut	ICAR-IIFSR, Modipuram	11 October 2021	120	N. Ravisankar A.K. Prusty
Good Agricultural Practices (GAP) for dissemination of Improved IFS technologies under Farmer First	ICAR-IIFSR, Modipuram	21-23 October, 2021	05	A. K. Prusty Poonam Kashyap P.C. Jat M. Shamim Nisha Verma Sunil Kumar
Crop diversification and remunerative cropping systems involving oilseeds (Mustard)	Bhadurpur village, Meerut, Uttar Pradesh	26 October 2021	120	Raghuveer Singh
Technical session on "Success stories on implementation of organic farming technologies"	Virtual	31 October 2021	250	M. Shamim

XVI Annual Group Meeting of All India Network Programme on Organic Farming	Hybrid mode (Modipuram)	3-4 December 2021	40	N. Ravisankar A.K. Prusty M. Shamim MerajAlam Ansari Raghuveer Singh Raghavendra, KJ
Annual Group Meeting of AICRP on Integrated Farming Systems	Hybrid mode (Modipuram)	18-20 December 2021	94	N. Ravisankar A.K. Prusty M. Shamim MerajAlam Ansari Raghuveer Singh Raghavendra, KJ
Webinar on Composting and vermicomposting	ICAR- Head quarters ,New Delhi	18 December 2021	150	L.R. Meena
Total			13927	

Radio/Televisions talk / social media

Topic	Broadcasted/ telecasted in	Date	Name of speaker
Tauktae cyclone ne UP men di dastak. (https://youtu.be/h4NnQjdapjs)	News 18	19 May 2021	M Shamim
Benefits and uses of vermicompost in agriculture	DD-Kisan	01 July 2021	Raghuveer Singh

Other programmes organized

Name/ of events	Venue	Duration and date	No. of participants	Name of Organizers
International Women's day	Sathedi, Meerut	8 march 2021	350	PeyushPunia Lalit Kumar Suresh Malik Nirmal Raghavendra KJ
Field day on Integrated farming system for food security and livelihood	Bhalwa, Ramnagar and Ladpur, block-Khatauli, Muzarffarnagar	22 March 2021	240	L.R. Meena
World Water Day on under ground water management for irrigation in crops	Paldi, block-Khatauli, district Muzaffarnagar	23 March 2021	211	L.R. Meena
विश्व जल दिवस	Kishorpur, Meerut	23 March 2021	100	N. Subash D.K. Singh
Kisan Gosthi on animal health and crop management for higher production in farming system.	Dhanju, Meerut	26 March 2021	150	PeyushPunia L.R. Meena Suresh Malik Lalit Kumar Poonam Kashyap
Kisan Gosthi on animal health and crop management for higher production in farming system.	Iklota, Meerut	27 March 2021	150	PeyushPunia Suresh Malik Lalit Kumar Poonam Kashyap
Kisan Gosthi on Integration of poultry in farming systems	Haridwar	27 March 2021	250	R.P. Mishra D. Dutta Chandra Bhanu A.L. Meena P.C. Ghasal Jairam Choudhary
One-day Entrepreneurship Development Program (EDP) on "Value addition in Organic Jaggery Production"	Luni Khera Nagla, Muzaffarnagar	16 April 2021	10	Amit Nath

Regional awareness programme on balanced nutrient management	West U.P (Virtual)	18 June 2021	250	Peyush Punia Chandra Bhanu
Van Mahatsav	Siwaya Farm, ICAR-IIFSR, Modipuram	17 July 2021	IIFSR staff	Peyush Punia L.R. Meena Suresh Malik Lalit Kumar
Scientist and farmer interaction on animal nutrition and health management aspects during rainy season under Azadi Ka Amrit Mahotsav	Khanoda, Meerut	03 August 2021	100	Peyush Punia Lalit Kumar Suresh Malik Poonam Kashyap Sunil Kumar
Plantation program and Kisan Gosthi under "Azadi Ka Amrit Mahotsav" and Mass awareness for Agri-entrepreneurship (ABI)	Johdi, Baghpat	24 August 2021	40	Amit Nath R.P. Mishra Chandra Bhanu
Kisan Ghosti on the eve of 75 years Azadi Ka Amrit Mahotsav	Bhaingi-Bhangela, Muzaffarnagar	26 August 2021	250	P. C. Jat Poonam Kashyap A. K. Prusty M. Shamim
Kisan Gosthi and input distribution in SCSP	Paldi, Muzaffarnagar	4 September 2021	50	L.R. Meena Devendra Kumar P.P. Singh Nirmal
Scientist and farmer interaction on animal nutrition and health management aspects during rainy season under Azadi Ka Amrit Mahotsav	Kasiara and Rasoolpur, Muzaffarnagar	10 September 2021	125	Lalit Kumar Suresh Malik
Hindi Pakhwara	ICAR-IIFSR, Modipuram	14-28 September 2021	All the Staff of IIFSR, Modipuram	Sunil Kumar
Mass Awareness Program for entrepreneurship development and creation of Shelf Help Group (SHG) during the programme of *PoshanVatika* Maha Abhiyan & Tree Plantation campaign under International Year of Nutri-Cereals 2023	Jansath, Muzaffarnagar	17 September 2021	349	Peyush Punia Amit Nath R.P. Mishra P.C. Jat D. Dutta Chandra Bhanu Poonam Kashyap A.K. Prusty A.L. Meena P.C. Ghasal Jairam Choudhary

Kisan Ghosti & Chicks distribution on 75 years Azadi Ka Amrit Mahotsav	Sathedi, Muzaffarnagar	18 September 2021	150	P.C. Jat Poonam Kashyap A.K. Prusty
Scientist-Farmer's Interaction Meet on Integrated farming system	Johadi Village, Baghpat	28 September 2021	350	A.S. Panwar R.P. Mishra P.C. Jat Chandra Bhanu Poonam Kashyap Sunil Kumar Nisha Verma A.L. Meena P.C. Ghasal Jairam Choudhary
Mahatama Gandhi Birth Anniversary	ICAR-IIFSR, Modipuram	02 October 2021	All the Staff of IIFSR, Modipuram	Suresh Malik Chandra Bhanu Poonam Kashyap Sunil Kumar
Kisan Gosthi on rabi preparation and seed and other input distribution under Azadi Ka Amrit Mahotsav	Khanoda and Dhanju, Meerut	05 October 2021	130	Lalit Kumar Suresh Malik
Kisan Gosthi and input distribution in SCSP	Rasoolpur and Ramnagar, Muzaffarnagar	06 October 2021	50	Nirmal
Kisan Gosthi on Food and Nutritional security through Integrated farming system	Paldi, Ramnagar, Bhalwa and Ladpur), Khatauli block of Muzaffarnagar	06 October 2021	104	L.R. Meena Deevendra Kumar Nirmal
Kisan Gosthi on rabi preparation and seed and other input distribution under Azadi Ka Amrit Mahotsav	Kasiara and Rasoolpur, Muzaffarnagar	07 October 2021	125	Lalit Kumar Suresh Malik
Interface meeting on Quality production of micro-nutrients and organic fertilizers through incorporation of modern techniques vis-à-vis challenges of current agricultural environment	ICAR-IIFSR, Modipuram	11 October 2021	210	P.C. Jat Poonam Kashyap P.C. Ghasal

National Swachhta Campaign on Waste to Wealth	Hastinapur, Meerut	12 October 2021	200	L.R. Meena D.K. Singh N. Subash
Mahila Kisan Diwas and mass awareness for SHG creation and entrepreneurship development in the women farmer	Angadpur, Baraut, Bagpat	15 October 2021	250	Amit Nath R.P. Mishra P.C. Jat Poonam Kashyap Nisha Verma
World Food Day on Growth, Nourish, Sustain together and Rural Developmentt.	Khanoda, Meerut	16 October 2021	101	Peyush Punia L.R. Meena Lalit Kumar Suresh Malik Devendra Kumar Sunil Kumar Nisha Verma
Training for Farmers on Good Agricultural Practices (GAP) for dissemination of Improved IFS technologies under Farmer First	ICAR-IIFSR, Modipuram	21-23 October 2021	30	M. Shamim A.K. Prusty
Vigilance Awareness Week	ICAR-IIFSR, Modipuram	26 October 2021	70	Peyush Punia Sunil Kumar
Vigilance awareness week on theme of Independent India @75: Self reliance with integrity	Primary School, Budgana, Muzaffarnagar	30 October 2021	1000	Peyush Punia Suresh Malik Lalit Kumar A.L. Meena Jairam Choudhary Sunil Kumar Nirmal Vipin Kumar
Kisan Gosthi and Input distribution under SCSP programme	Iklota, Dhanju and Khanuda, Meerut	12 November 2021	125	Lalit Kumar Suresh Malik
Institute Annual Day	ICAR-IIFSR, Modipuram	27 November, 2021	All the Staff of IIFSR, Modipuram.	Suresh Malik Chandra Bhanu A.K. Prusty Poonam Kashyap M. Shamim Nirmal R.B. Tewari Anju Verma

International Soil Day	Ghasauli, Meerut	05 December, 2021	500	D. Dutta A.L. Meena P.C. Ghasal
Demonstration of IFS technologies including value added products developed under ABI Scheme and Farmer FIRST Scheme by Devanjali Mahilaa Svayam Sahaytaa Samuh	CCS University, Meerut	15 December 2021	Mass Level Programme	Amit Nath R.P. Mishra Nisha Verma
Web casting of Hon. PM Speech on Natural Farming	Sikheda, Muzaffarnagar	16 December, 2021	500	R.P. Mishra P.C. Jat D. Dutta Chandra Bhanu A.L. Meena P.C. Ghasal Jairam Choudhary
Farmers-Scientists interaction meet on Natural Farming	ICAR-IIFSR, Modipuram	16 December, 2021	50	L.R. Meena D.K. Singh N. Subash
Sawchchata Pakhwara	ICAR-IIFSR, Modipuram	16-31 December, 2021		L.R. Meena P.C. Ghasal
Kisan Samman Divas and motivation meeting with women farmers for the formation of SHG	Dalupuri, Mithiberi and Chamariya Haridwar	23 December, 2021	60	A.S. Panwar Amit Nath R.P. Mishra A.L. Meena
किसान दिवस पर स्वच्छता अभियान जागरूकता कार्यक्रम एवं किसान गोष्ठी	Kishorpur, Meerut	23 December, 2021	60	L.R. Meena D.K. Singh N. Subash Devendra Kumar Nirmal
Swachch Bharat Abhiyan	Uldepur, Meerut	24 December 2021	115	Suresh Malik Lalit Kumar Devendra Kumar Brijesh Sharma
Swachta hi Sewa programme 2021	Pallavpuram Phase –II Colony, Modipuram	29 December 2021	50	L.R. Meena Sunil Kumar Nisha Verma Raghuveer Singh
Total			**6855**	

Awards/Honours/Recognitions

Awards

Name of Award	Received by
International Potash Institute-Fertilizer Association of India (IPI-FAI) award 2021 for promoting balanced and Integrated Fertilizer Use with emphasis on Potassium from Fertilizer Association of India	A.S. Panwar N. Ravisankar M. Shamim Raghuveer Singh A.K. Prusty M. A. Ansari
1st Prize Award for ICAR-IIFSR Stall during Technical Session Symposium XI: Perspective in Organic Agriculture during Fifth International Agronomy Congress organized at PJTSAU, Hyderabad during 23-27 November, 2021.	ICAR-IIFSR
Young Agronomist Award-2020 by Agricultural Technology Development Society (ATDS), Ghaziabad, Uttar Pradesh, India	P.C. Ghasal
2nd prize of best oral presentation during 4th International Conference on Global Approaches in Natural Resource management for Climate Smart Agriculture (GNRSA-2020) during Pandemic Era of Covid-19 held during 26-28 February 2021	P.C. Ghasal
Editorial excellence award 2021 from Agricultural Science Digest, Agricultural Communication Centre (ARCC) Karnal, Haryana	L.R. Meena
Certificate of Appreciation "Two weeks professional Development programme on recent trends in Agricultural for sustainable food and nutritional security organized by Integral Institute of Agricultural Science and Technology (IIAST) Integral University Lucknow held from 23.112021to 7.12.2021	L.R. Meena
SRDA Gold Medal Award in recognition of outstanding contribution in field of Aquaculture during GMST 2020 held during 12-13 September 2021	A.K. Prusty
First prize in poster presentation session in Hindi Pakhwara at ICAR-IIFSR, Modipuram on 27 September, 2021	P.C. Ghasal N. Ravisankar D.Dutta Suresh Malik Amit Nath A K Prusty Poonam Kashyap M. Shamim Sunil Kumar A S Panwar
First Prize for Oral paper presentation in 4th Global Meet on Science and Technology for Staying Healthy & Feeding Ever-growing Population World -Wide organized by Hi-Tech Horticultural Society, Meerut during 12-13 September, 2021	M. Shamim

Third best poster presentation award during vaigyanik Hindi Karyashala (shodhpatra poster prastutikaran) organized on 27.09.2021 during Hindi Pakhwada Karyakram during 14-28 September, 2021	M. Shamim
Dr. P. S. Deshmukh Young Agronomist Award-2020: for significant research contribution in the field of Agronomy by Indian Society of Agronomy, New Delhi.	M. A. Ansari
SRDA Gold Medal Award in recognition of outstanding contribution in field of Horticulture during GMST 2020 held during 12-13 September 2021	Poonam Kashyap
Young Achiever Award for outstanding contribution in field of science, Technology & Social Development on the auspicious occasion of International Conference on Research Initiatives for Agriculture, Biotechnology and Allied Sciences (ICRIABAS-2021) on 24 and 25 April 2021. Organized by New Age Mobilization Society, New Delhi. IIMT University, Meerut, UP.	Sunil Kumar
Best Article Award for Article ID 10086 entitled Gender Discrimination in Labour Markets in India. Agriculture & Food: e-NewletterVolume 03 issue 01. ISSN: 2581- 8317.	Udita Sunil Kumar A.L. Meena Poonam Kashyap P. Punia A.S. Panwar
Young Researcher Award 2020 from Institute of Scholars, Bengaluru	Nisha Verma

Recognitions

Name of recognition	Name of Scientist
Convener of Symposium on Integrated Farming Systems for Sustainable peasant Economy during the V International Agronomy Congress on Agri-innovations to combat food and nutrition challenges held during 23-27 November 2021	N. Ravisankar
Co-chairman during technical session review of tribal sub-plan (STC) activities in Annual group meeting of AICRP on integrated farming system in hybrid mode held from 18-20 December, 2021	L.R. Meena
Member of Publication committee for the V International Agronomy Congress on Agri-innovations to combat food and nutrition challenges held during 23-27 November 2021	N. Ravisankar
Nominated as Member of Institute Management Committee (IMC) for ICAR-Research Complex for Eastern Region, Patna, ICAR-Indian Institute of Soil Science, Bhopal, ICAR-Central Arid Zone Research Institute, Jodhpur and ICAR-NRC on Orchids, Gangtok	N. Ravisankar

Served as Member of Individual Technical Expert Group (ITEG) of Department of Biotechnology for the thematic area "Scientific research on prime-products from indigenous cows for agricultural applications	N. Ravisankar
Acted as reviewer for Legume Research Journal	L.R. Meena
Serving as Member of Committee constituted for preparing the course curriculum on Natural Farming at Under and Post Graduate level	N. Ravisankar
Editor of NAAS rated Journal (Indian Journal of Agronomy)	N. Ravisankar
Compiled proceedings of 4th Global Meet on Science and Technology (International Web Conference) held during 12-13 September, 2021 and organized by Hi-Tech Horticultural Society and Prerna Foundation, Meerut	A.K. Prusty
Consultancy visit to Odisha Govt for DPR preparation of Model Agri-tourism farms in 4 locations	N. Ravisankar, A. K. Prusty, M. A. Ansari, Raghavendra. K. J.
Acted as reviewer of International Journal of Agriculture Innovations and Research	M. Shamim
Evaluated Ph.D. thesis on "Evaluation of CROPSYST Model for rainfed groundnut under middle Gujarat Agroclimatic zone submitted to Anand Agricultural University, Anand (Gujarat)	M. Shamim
Acted as reviewer of Indian Journal of Agronomy	P.C. Ghasal
Acted as reviewer of Indian Journal of Agricultural Research	L.R. Meena
Acted as Reviewer of Indian Journal of Agricultural Sciences	P.C. Ghasal A.L. Meena
Acted as Panelist in webinar on Debating Sustainability futures: small farms in US, India, and Ghanaon 21st October, 2021 at M.S. Chadha Center for Global India (CGI), Princeton Institute for International and Regional Studies (PIIRS), Princeton University	N. Subash
Acted as Panelist in stakeholders consultation on climate change and its effect on food security and nutrition organized by UN World Food Programme (WFP) India and ICRISAT during 14-15th December, 2021 (Virtual Mode)	N. Subash
Chaired the Technical session XI: Role of Agromet advisories to boost the livelihood security of rural masses in Virtual National Conference on "Strategic Reorientation for Climate Smart Agriculture (V-AGMET 2021)"	N. Subash

during March 17-19, 2021 held at Punjab Agricultural University, Ludhiana, Punjab	
Acted as member of National Organizing Committee of Virtual National Conference on Strategic Reorientation for Climate Smart Agriculture (V-AGMET-2021) held during 17-19th March, 2021, held at Punjab Agricultural University, Ludhiana, Punjab	N. Subash
Co-organizing Secretary of Global Approaches in Natural Resources Management for climate smart agriculture (GNRSA-2020) during pandemic Era of COVID-19, held at conference hall, Shobhit Deemed University, Modipuram, Meerut, UP, India during 26-28 February, 2021	Sunil Kumar
Acted as an Editor of Annals of horticulture and Progressive Agriculture published by Hi-Tech Horticultural Society, U.P.	Poonam Kashyap
Reviewer of Journal of Food Measurement and Characterization an International Journal by Springer Nature	Nisha Verma
Member of Global Forum on Food Security and Nutrition, FAO, United Nations	Nisha Verma
Member, Editorial Board, for the Hindi Magazine Pragati sheel Kheti. ISSN No: 2583-2204.	Nisha Verma
Associate Editor in the magazine Agri Journal World, New Delhi.	Nisha Verma
Reviewer for the International Journal of Basic and Applied Sciences, Bengaluru (Karnataka)	Nisha Verma

Press and Media

समेकित कृषि प्रणाली से बढ़ेगी किसानों की आय

मोदीपुरम। रुड़की रोड स्थित भारतीय कृषि अनुसंधान संस्थान में 18 से 20 दिसंबर तक चलने वाले तीन दिवसीय समेकित कृषि प्रणाली परियोजना अखिल भारतीय समन्वित शोध परियोजना की वार्षिक बैठक का रविवार को दूसरा दिन रहा। कोविड महामारी को देखते हुए बैठक का आयोजन आभासी एवं साक्षात दोनों तरीकों से किया गया।

संस्थान के निदेशक डॉ. आजाद सिंह पंवार ने बताया कि विकसित समेकित कृषि प्रणाली मॉडल देश की खाद्य पोषण एवं आजीविका सुरक्षा सुनिश्चित करने में अहम भूमिका निभा रही है। किसानों की आय दोगुना करने के लिए सरकार का जोर भी इसी मॉडल पर है। 74 शोध केंद्रों के माध्यम से देश के 15 कृषि जलवायु क्षेत्रों के लिए 60 समेकित कृषि प्रणाली मॉडल विकसित कर दिए हैं।

इनमें किसानों की आय 3 से लेकर 5 गुना तक बढ़ाने की क्षमता है। कार्यक्रम समन्वयक डॉ. एन रवि शंकर ने तीन दिनों तक चलने वाली इस बैठक की विस्तृत रूपरेखा के बारे में बताया।

जैविक खेती करने वाले किसान भारत में सबसे ज्यादा

मोदीपुरम। भारतीय कृषि प्रणाली अनुसंधान संस्थान में जैविक खेती पर अखिल भारतीय नेटवर्क परियोजना की 16वीं वार्षिक बैठक हुई। बैठक का शुभारंभ भारतीय कृषि अनुसंधान परिषद उप-महानिदेशक डॉ. एसके चौधरी ने किया। डॉ. चौधरी ने अपने संबोधन में बताया कि देश जैविक किसानों की संख्या के मामले में विश्व में पहला स्थान रखता है और यहां पर विश्व के 40 प्रतिशत से अधिक किसान जैविक खेती करते हैं। डॉ. यस भास्कर, डॉ. आजाद सिंह पंवार, डॉ. एन रविशंकर, डॉ. पूनम कश्यप, डॉ. आशीष पुष्टि आदि मौजूद रहे। संवाद

जैविक खेती को दें बढ़ावा, किसानों तक पहुंचाएं तकनीकी ज्ञान : डॉ. महापात्र

संवाद न्यूज एजेंसी

आईसीएआर के महानिदेशक डॉ. त्रिलोचन महापात्र

प्रयोगशाला और शीतगृह का किया शिलान्यास

मेडल मिले तो खुशी मे झूमे टॉपर्स

प्राकृतिक खेती अपनाएं, भूमि की उर्वरा शक्ति बढ़ाएं

मुजफ्फरनगर जागरण — मेरठ, 17 दिसंबर, 2021 दैनिक जागरण 5

प्रधानमंत्री नरेंद्र मोदी ने किसानों से किया वर्चुअल संवाद, ब्लाक कार्यालयों में लगाई एलईडी, मोदी ने किसानों को दिए टिप्स

कृषक वैज्ञानिक परिचर्चा का आयोजन किया

कृषि अनुसंधान संस्थान में भारत की उपलब्धियों को गिनाया

मोदीपुरम: भारतीय कृषि प्रणाली अनुसंधान संस्थान मोदीपुरम में ग्लास्गो ग्रेट ब्रिटेन में 31 अक्टूबर से 12 नवंबर तक आयोजित की जा रही कॉप-28 संयुक्त राष्ट्र जलवायु परिवर्तन सिखर सम्मेलन के दौरान भारत की उपलब्धियों को लेकर प्रेसवार्ता का आयोजन किया गया। जिसमें संस्थान के निदेशक डा. आजाद सिंह पंवार ने बताया कि मुख्य उदेश्यों में विश्व बैंक द्वारा निर्देशित कृषि के वैश्विक रुपांतरण एवं समुचित भूमि उपयोग को प्रोत्साहित करना है। आजाद सिंह पंवार ने बताया कि भारत के पूर्वोत्तर राज्य सिक्किम के लिए विकसित समेकित कृषि प्रणाली मॉडल जो कि किसानों की आय को दोगुना करने एक समग्र दृष्टिकोण मॉडल है। सन् 2030 तक देश में जैविक खेती के क्षेत्रफल को कुल खेती के क्षेत्रफल का चार प्रतिशत तक बढ़ाना है। संयुक्त राष्ट्र ने संस्थान की इन्ही तकनीकों को टिकाऊ खेती एवं कार्बन न्यूट्रल खेती के रुप में अपने डॉक्टयूमेंट में प्रमुख स्थान दिया है।

पर्यावरण बढ़ाने के लिए अधिक पौधरोपण करें

संवाद न्यूज एजेंसी

भारतीय कृषि प्रणाली अनुसंधान केंद्र में पौधे लगाते अधिकारी। संवाद

मोदीपुरम। भारतीय कृषि अनुसंधान परिषद, नई दिल्ली के 93वें स्थापना दिवस पर कृषि प्रणाली अनुसंधान संस्थान मोदीपुरम में पौधरोपण कार्यक्रम आयोजित किया गया।

1929 में इस दिन देश में कृषि शोध एवं शिक्षा के समन्वयन के उद्देश्य से भारतीय कृषि अनुसंधान परिषद की नई दिल्ली में स्थापना की गई थी। मुख्य अतिथि राजेश कुमार, जिला वन अधिकारी रहे। संस्थान के निदेशक डॉ. आजाद सिंह पवार ने अतिथियों का स्वागत किया। विशिष्ट अतिथि डॉ. मनोज कुमार प्रभारी निदेशक, केंद्रीय आलू अनुसंधान संस्थान शिमला ने कृषि प्रणालियों के विकास एवं प्रसंस्करण पर शोध कार्यों की सराहना की। डॉ. वीके सिंह, निदेशक केंद्रीय बरानी कृषि अनुसंधान संस्थान हैदराबाद एवं जिला कृषि अधिकारी प्रमोद सिरोही ने भी विचार रखे। संस्थान के सिवाया शोध फार्म पर भी पौधरोपण किया गया। संचालन डॉ. आरपी मिश्रा ने किया। डॉ. अमितनाथ, डॉ. देबाशीष दत्ता, डॉ. पीसी जाट, डॉ. चंद्रभानु, डॉ. एम शमीम, डॉ. अमृतलाल मीना, डॉ. केजे. राघवेंद्रा, आरबी तिवारी आदि का सहयोग रहा।

दुष्कर्म पीड़िता को मिली धमकी

गोष्ठी में किसानों को दी खेती की जानकारी

घसौली गांव में मृदा दिवस पर कार्यक्रम का आयोजन

मोदीपुरम : भारतीय कृषि प्रणाली अनुसंधान संस्थान के तत्वावधान में रविवार को विश्व मृदा दिवस पर घसौली गांव में कार्यक्रम का आयोजन किया गया। कार्यक्रम में मुख्य अतिथि ग्राम प्रधान प्रदीप रहे। जैविक कृषि अनुभाग विभाग के अध्यक्ष डा. आरपी मिश्र ने मृदा स्वास्थ्य कृषि का आधार विषय पर अपना व्याख्यान दिया। डा. देवाशीष दत्ता ने फसल उत्पादन में मृदा स्वास्थ्य एवं मृदा स्वास्थ्य कार्ड के महत्व के बारे में किसानों को जानकारी दी। डा. चंद्रभानु ने किसानों को सरसों, गन्ने एवं समसामयिक फसलों में संतुलित पोषण प्रबंधन एवं समेकित नाशीजीव प्रबंधन द्वारा मृदा एवं कृषि पर्यावरण के स्वास्थ्य को संतुलित रखने की जानकारी दी। डा. अमृत लाल मीणा ने मृदा स्वास्थ्य कार्ड के लिए मिट्टी के नमूने लेने के तरीकों के बारे में किसानों को जानकारी दी। डा. जयराम चौधरी ने मृदा स्वास्थ्य में सूक्ष्म जीवों के महत्व एवं केंचुआ पालन पर प्रकाश डाला। आरबी तिवारी ने मृदा स्वास्थ्य के लिए संतुलित पोषण प्रबंधन के बारे में जानकारी दी। कार्यक्रम का उद्देश्य किसानों एवं आम जनों को कृषि एवं पशुपालन के आधार मृदा के स्वास्थ्य के बारे में सचेत करना एवं भविष्य की पीढ़ियों के लिए उसे सुरक्षित बनाने का रहा। कार्यक्रम में घसौली गांव के 120 से अधिक किसानों ने भाग लिया। कार्यक्रम को आयोजित करने में गांव के जागरूक किसान पिंटू का विशेष योगदान रहा। कार्यक्रम का संचालन डा. चंद्रभानु ने किया। प्रधान प्रदीप ने कृषि प्रणाली संस्थान के वैज्ञानिकों द्वारा गांव के किसानों को मृदा स्वास्थ्य के प्रति जागरूक करने एवं कृषि प्रणाली एवं जैविक खेती की आधुनिक तकनीकों के ज्ञान से परिचित कराने के लिए आभार व्यक्त किया।

कृषक वैज्ञानिक परिचर्चा का आयोजन

सिखेडा। भारतीय कृषि प्रणाली अनुसंधान संस्थान मोदीपुरम द्वारा प्राकृतिक एवं जैविक खेती पर सिखेडा गांव में एक कृषक वैज्ञानिक परिचर्चा का आयोजन किया गया। कार्यक्रम में सिखेड़ा एवं आसपास गांवों के 350 से अधिक किसानों ने भाग लिया। परिचर्चा के दौरान प्रधानमंत्री नरेंद्र मोदी व केंद्रीय कृषि मंत्री नरेंद्र सिंह के प्राकृतिक खेती के ऊपर दिए गए व्याख्यान का किसानों के समक्ष सीधा प्रसारण किया गया। क्षेत्र की कृषि प्रणाली विविधीकरण द्वारा किसानों की खाद्य पोषण एवं आजीविका सुरक्षा हेतु चलाए गए विभिन्न शोध एवं प्रसार कार्यक्रमों के बारे में विस्तार से बताया। वैज्ञानिक डॉक्टर आरपी मिश्र एवं डॉक्टर देवाशीष देवाशीष दत्ता,डॉ प्रकाश चंद्र ने विभिन्न जानकारी दी। डा. शंभू दत्त धीमान, डॉ अमित नाथ, डा. जय राम चौधरी, अंकुर , संस्थान के निदेशक एवं कार्यक्रम अध्यक्ष डॉ. आजाद सिंह पंवार आदि मौजूद रहे। संचालन डॉक्टर अमृत लाल मीणा ने किया। संवाद

किसानों को स्वास्थ्य के प्रति किया जागरूक

मोदीपुरम। भारतीय कृषि प्रणाली अनुसंधान संस्थान में अंतरराष्ट्रीय पोषक अनाज वर्ष 2023 के परिपेक्ष्य में पोषण वाटिका महाभियान एवं पौधरोपण कार्यक्रम हुआ। किसानों एवं बच्चियों के स्वास्थ्य को सही रखने के लिए पोषण वाटिका के प्रति जागरूक किया गया।

मुख्य अतिथि मुजफ्फरनगर के जिला पंचायत अध्यक्ष वीरपाल निर्वाल ने कहा कि आधुनिक और वैज्ञानिक तरीकों से खेती कर किसान लाभ कमा सकते हैं। प्रधानमंत्री नरेंद्र मोदी के नेतृत्व में देश उन्नति की ओर बढ़ रहा है। कृषि प्रणाली संस्थान के निदेशक डॉ. आजाद सिंह पंवार ने अंतरराष्ट्रीय पोषक अनाज वर्ष 2023 के उपलक्ष्य में पोषण वाटिका महाभियान एवं पौधरोपण कार्यक्रम के बारे में जानकारी दी। दैनिक भोजन में पोषक अनाजों को शामिल करने से लोगों का स्वास्थ्य अच्छा रहेगा। विशिष्ट अतिथि परविंदर भड़ाना रहे। डॉ. निशा वर्मा ने पोषण अनाज एवं मानव एवं महिला स्वास्थ्य के लिए महत्व पर प्रकाश डाला। डॉ. पूनम कश्यप ने टिकाऊ कृषि एवं ग्रामीण आजीविका के लिए पौधरोपण का महत्व बताया। गांव में पोषण वाटिका को बढ़ावा देने के लिए सब्जियों के बीज, किट एवं फल के पौधे किसानों एवं कन्याओं को वितरित किए। डॉ. पीयूष पुनिया, राकेश, इलम चंद, डॉ. ज्ञान, रवि शंकर, डॉ. एलआर मीणा, डॉ. आरपी मिश्रा, डॉ. अमित नाथ, डॉ. पीसी जाट, अंकुर कुमार, डॉ. चंद्रभानु मौजूद रहे। संवाद

बढ़ती जनसंख्या से घट रहे प्राकृतिक संसाधन : डॉ. रतन

मोदीपुरम। अमेरिका की ओहियो यूनिवर्सिटी में प्रोफेसर विश्व खाद्य पुरस्कार विजेता पद्मश्री भारतीय-अमेरिकी मृदा वैज्ञानिक डॉ. रतन लाल ने कहा कि देश की बढ़ती जनसंख्या एवं तकनीकी कुप्रबंधन प्राकृतिक संसाधनों के क्षीण होने का प्रमुख कारण है।

भारतीय कृषि प्रणाली अनुसंधान संस्थान मोदीपुरम में आजादी के अमृत महोत्सव के तहत 'जलवायु परिवर्तन और संसाधन संरक्षण के लिए वैकल्पिक फसल प्रणालियां' विषय पर तीन दिवसीय अंतरराष्ट्रीय वेबिनार का शुक्रवार को समापन हो गया। अंतिम सत्र का शुभारंभ डॉ. पीयूष पुनिया ने किया। डॉ. रतन लाल ने प्राकृतिक संसाधनों के संरक्षण और वैश्विक मुद्दों के समाधान के लिए वैकल्पिक खाद्य फसल प्रणालियां विषय पर व्याख्यान दिया। बदलते जलवायु परिवेश में देश के कृषि उत्पादन को बढ़ाने के लिए प्राकृतिक संसाधनों के संरक्षण पर जोर दिया। राष्ट्रीय अजैविक तनाव प्रबंधन संस्थान बारामती के निदेशक डॉ. हिमांशु पाठक, डॉ. एसएन सुधाकर बाबू और डॉ. टीके श्रीवास्तव ने वैकल्पिक फसल प्रणालियों के साथ पारिस्थितिकी तंत्र सेवाओं को बढ़ाना, तिलहन आधारित फसल प्रणालियां एवं गन्ना आधारित फसल प्रणालियों पर सुझाव दिए। संवाद

गन्ना-गेहूं पर निर्भर न रहें किसान

जैविक उर्वरकों का करें गुणवत्ता युक्त उत्पादन

मोदीपुरम। उत्तर प्रदेश कृषि अनुसंधान परिषद मोदीपुरम के अध्यक्ष कैप्टन विकास गुप्ता ने कहा कि केवल यूरी के किसान पेड़ पानी और खाद की जरूरतों पर ही निर्भर न रहें। उन्होंने भारतीय कृषि प्रणाली अनुसंधान संस्थान के अध्यक्ष कैप्टन विकास गुप्ता ने दी सलाह

mycity न्यूज कैप्सूल

कृषि में रसायन का प्रयोग हो कम

मोदीपुरम। भारतीय कृषि प्रणाली अनुसंधान संस्थान मोदीपुरम में 11 अक्तूबर को कृषि विभाग के सहयोग से बैठक का आयोजन किया जाएगा। बैठक में उत्तर प्रदेश कृषि अनुसंधान परिषद के अध्यक्ष कैप्टन विकास गुप्ता मुख्य अतिथि रहेंगे। संस्थान के निदेशक डॉ. आजाद सिंह पंवार ने बताया कि बैठक में कृषि में रसायनों के प्रयोग को घटाने, जैविक उपयोग बढ़ाकर उत्पादन लागत कम करने और उत्पादों की गुणवत्ता बढ़ाने पर मंथन किया जाएगा। संवाद

Programmes under Azadi ka *Amrit Mahotsav*

S. No.	Name of event	Period/Date	Place where events conducted	No. of participants
1.	Protection from COVID-19 dreaded virus	12-17 July 2021	IIFSR Campus	45
2.	National Webinar on Bio-Decomposer	19-24 July 2021	IIFSR Campus	110
3.	Azadi ka Amrit Mahotsav, Mass Awareness Campaign on Organic Farming by virtual mode	2 - 7 August 2021	IIFSR Campus	1776
4.	National Webinar on'Integrated farming system for sustainable livelihood and nutrition security by Zoom link	12 August 2021	IIFSR Campus	154
5.	Inter-Institutional Sports and Cultural Programmes, National Webinar and National Anthem programme	10 - 15 August 2021	IIFSR Campus	1005
6.	किसानों के लिए भोजन और पोषण	26 August 2021	Bhangi-Bhangella, Distt-MZN	90
7.	Food and nutritional security through Integrated farming system	04 September 2021	Paldi, Distt-MZN	85
8.	Scientist- Farmer interaction meeting on animal nutrition and health management	10 September 2021	Kasiara-Rasoolpur, Distt-MZN	125
9.	*Poshan Vatika Mahabhiyan evam Vriksha ropan Programme*	17 September 2021	IIFSR Campus	349
10.	"Yog evam pranayam-swasth shareer ka Adhar" under Fit India Run 2.0	25 September 2021	IIFSR Campus	50
11.	हिंदी पखवाड़े का आयोजन	14-28 September 2021	IIFSR Campus	65
12.	Special Swachhta campaign and food & nutritional security through IFS model of Agriculture	06 October 2021	Rasoolpur-Kailora, Distt-MZN	185
13.	Interface meeting beyween Scientists and Deptt of agriculture	11 October 2021	IIFSR Campus	98

14.	Special National Swachhta Campaign	12 October 2021	Hastnapur, Distt-Meerut	357
15.	Mahila Kisan Gosthi at Angadpur village, Distt-Baghpat	15 October 2021	Angadpur, Disstt-Baghpat	250
16.	World Food Day Celebration in regard to Safe and nutritious food now for a healthy tomorrow	16 October 2021	Khanaudda, Distt-Meerut	101
17.	Kisan Gosthi On Vigilance Awareness Week	26 October- 01 November 2021	IIFSR Campus	1050
18.	Organizing a motivation meeting with the women farmers of Dalupuri village	01 November 2021	Dalupuri, Distt-Haridwar	28
19.	Scientific and farmer interaction meeting on Rabi crop sowing and wheat seed distribution in Dhanju and Khanauda village, Distt-Meerut.	12 November 2021	Dhanju & Khanaudda, Distt-Meerut	120
20.	Scientific and farmer interaction meeting on Rabi crop sowing and wheat seed distribution in Kasiara and Rasoolpur village, Distt-Muzaffarnagar	20 November 2021	Kasiara & Rasoolpur, Distt-MZN	125
21.	XII Annual Group Meeting (All India Network Programme on Organic Farming	3-4 December 2021	IIFSR Campus	65
22.	Celebration of Swachhata Pakhwada under AKAM	21 December 2021	IIFSR, Research Farm	20
23.	Celebration of Swachhata Pakhwada under AKAM	24 December 2021	Uldepur, Distt-Meerut	110
24.	Celebration of Kisan Divas amidst Swachhata Pakhwada under AKAM	16-31 December 2021	Rasoolpur-Kaillora, Distt-Meerut	306
Total				**6669**






Various events organized under Bharat Ki Azadi ka Amrit Mahostav

Distinguished Visitors

Dr. Trilochan Mahapatra, Secretary, DARE and DG, ICAR, Dr. A.K. Singh, DDG (Horticulture) and Dr. B.N. Tripathi, DDG (Animal Science) laid foundation stone of Organic Farming Laboratory on 09 March 2021

Dr. S.K. Chaudhari, DDG (NRM), ICAR, New Delhi Inaugurated Gas Chromatography Laboratory on 09 March 2021

Swachhta Programme/Activities

Date	Activates	Location	No. of participants
12 October 2021	National Cleanliness Programme and residue recycling	Hasthinapur	200
16 December 2021	Inaugural function and pledge of "**Swachhta Pakhwara"**	ICAR-IIFSR	All staff
17 December 2021	Disposing of old records & cleanliness in the main building	Stores, workshop, godowns of the Institute	15
18 December 2021	Cleanliness and sanitation drive in residential colonies, common market places, collection biodegradable and non-biodegradable waste materials.	Residential quarters of Institute, Modipuram	20
19 December 2021	Cleanliness and sanitation drive in main campus (IIFSR)	Main campus and farm roads of IFS Model	25
20 December 2021	Stock taking of waste management & other activities including utilization of organic wastes/generation of **wealth from waste**.	Siwaya farm of IIFSR	25
21 December 2021	Campaign on cleaning of sewerage & water nala, awareness on recycling of waste water in agriculture and weeding out of Parthenium around roads	Siwaya farm of IIFSR	20
22 December 2021	Workshop on "**Swachhta hi Manav Sewa**"	Main ICAR-IIFSR	105
23 December 2021	Celebration of Kisan Diwas	Rasulpur Killara (Muzaffarnagar), Haridwar ,	406
24 December 2021	Create awareness about sanitation among farmers, woman and village youth in villages	Uldepur	115
25 December 2021	Cleaning drive at tourist sports/ places	Sardhana	75

26 December 2021	Fostering healthy competition/drawing competition for school student	Dedeuwa village	65
27 December 2021	Cleaning of Farm roads and office premises	ICAR-IIFSR	28
28 December 2021	Compagain on importance of organic kitchen gardening in residential colonies	Pallavpuram Phase-II	35
29 December 2021	Create awareness among farmers about farm base waste disposal for preparing of compost.	Pavarsa, Meerut	50
30 December 2021	Invitation of VIP/VVIP in the Swachhta program	ICAR-IIFSR	All staff
31 December 2021	Organization of press conference for highlighting the activities of Swachh Bharat Pakhwada by involving all stake holders including farmers/VIPs/press and electronic media.	ICAR-IIFSR	15
		Total	**1199**


किसान सम्मान दिवस

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राजभाषा कार्यान्वयन समिति की बैठकों में राजभाषा विभाग, गृह मंत्रालय, भारत सरकार एवं भारतीय कृषि अनुसंधान परिषद के राज्यभाषा अनुभाग द्वारा निर्देशित वार्षिक कार्यक्रम के लक्ष्यों की प्राप्ति हेतु विचार विमर्श किया जाता है। संस्थान में अन्य परियोजनाओं की भांति इस ओर भी पूर्ण सजगता के साथ कार्य किया जाता है। यह बैठकें नियमित रूप से आयोजित की गयी, जिसका वर्णन निम्न है।

वैज्ञानिक गण, तकनीकी अधिकारी एवं कार्यालय में कार्यरत सभी व्यक्तियों ने हिन्दी के इन विभिन्न पहलुओं पर जानकारी एकत्रित की तथा अपने हिन्दी ज्ञान में वृद्धि पाई। साथ ही अपने– अपने दैनिक कार्यों में राजभाषा को ससम्मान स्थान दिया, जिसमें दैनिक पत्राचार एवं शोध–पत्रों के लेखन का उल्लेख महत्व पूर्ण पाया गया है। दैनिक कार्यों में हिन्दी शब्दों के प्रचलन को बढावा देने के लिए स्वागत कक्ष में श्यामपट पर नित नए सामान्य शब्दों की जानकारी दी जाती है, जिससे संस्थान में कार्यरत वैज्ञानिक एवं प्रशासनिक व्यक्तियों के हिन्दी ज्ञान में वृद्धि हो सके।

सारणी–1 बैठकों का आयोजन एवं निर्णय (वर्ष 2021)

क्रमांक	विषय	दिनांक
1	मानक कृषि शब्दावली हेतु कृषि शब्दों की श्रृंखला तैयार करने का निर्णय ।	17/03/2021
2	त्रैमासिक हिन्दी कार्यशाला	25/03 /2021
3	पत्रावलियों पर टिप्पणियां हिंदी मे लिखने के लिए प्रोत्साहित करने संबंधी आग्रह।	19/05/2021
4	त्रैमासिक हिन्दी कार्यशाला	22/05/2021
5	छमाही विचार विनिमय	30 /06/ 2021
6	हिंदी पखवाड़े में आयोजित किए जाने वाले कार्यक्रम एवं प्रतियोगिताओं की रूपरेखा एवं पुरस्कार राशि का निर्णय ।	28/08/2021
7	त्रैमासिक हिन्दी कार्यशाला	25/09/2021
8	राजभाषा दिवस	14/09/2021
9	हिन्दी पखवाड़े का आयोजन	15–28/11/2021
10	छमाही विचार विनिमय	27 /10/2021
11	त्रैमासिक हिन्दी कार्यशाला	30/11/2021
12	प्रक्षेत्र पर लगाए जाने वाले साइन बोर्ड पर विवरण द्विभाषी लिखने हेतु निर्णय लिया गया।	16/12/2021

मैं भाषा हूँ, संस्कृति हूँ, उन्नति हूँ, माध्यम हूँ ।

इस राष्ट्र की मैं धड़कन हूँ, जन–जन की मैं वाणी हूँ ।।

Research Projects

Institute funded projects

Project title	Duration	Principal Investigator	Co-PIs
Integrated Farming Systems			
Exploratory study on establishment of ornamental and biofloc fisheries modules for farm livelihood improvement	Dec. 2020-March 2022	Peyush Punia	A.K. Prusty Sunil Kumar Jairam Choudhary
Development of Sustainable IFS Model for Western Plain Zone of Uttar Pradesh	June 2017-June 2022	L.R. Meena	Suresh Malik Amit Nath Devendra Kumar Chandra Bhanu Peyush Punia A.L. Meena Raghvendra K.J.
Sustainable livelihood generation through IFS involving uneconomic cattle	June 2019-Oct. 2024	Suresh Malik	Raghuveer Singh Lalit Kumar S.K. Dhoop Singh A.S. Sirohi H.L. Singh
Development of regenerative agroforestry based IFS model for sustainable production and livelihood	July 2020-June 2025	Nirmal	L.R. Meena
Sustainable livelihood improvement of SC farmers through IFS Approach (SCSP)	June 2020 – May 2023	Lalit Kumar	Suresh Malik Peyush Punia P.C. Jat Poonam Kashyap Nisha Verma
Development of protocol for value added products from organic sugarcane	Oct. 2018-Sept. 2021	Amit Nath	R.P. Mishra Devendra Kumar
Evaluation and Identification of Farm Implements under Different Farming Systems	Oct. 2018 – Sept. 2024	V.P. Chaudhary	Nisha Verma P.P. Singh L.R. Meena
Development of an intelligent model for predicting mango yields using Artificial neural networks	Aug. 2020 – Dec. 2024	Vipin Kumar Chaudhary	

Development of fruit crop based integrated farming system for western plain zone of U.P	July 2020 – June 2025	P.P. Singh	L.R. Meena Suresh Malik Amit Nath A.L. Meena Raghavendra K.J.
Cropping System and Resource Management			
Measurement and Estimation of Greenhouse Gases (GHG) emission and carbon footprint in sustainable Integrated Farming System (IFS) models of Western Plain Zone of Uttar Pradesh	2019-2021	N. Subash	Debashis Dutta Suresh Malik
Status of Organic Agriculture in Jammu division of Western Himalayan Regions	Aug. 2018-Aug. 2023	Sunil Kumar	L.K. Meena Chethan Kumar G. A.L. Meena
On-farm Participatory Research in Farming Systems Perspective under Schedule Caste Sub-plan (SCSP) in Laldhang cluster under Bahadrabad block, District Haridwar (Uttarakhand)	July 2020 – Aug. 2023	A.L. Meena	R.P. Mishra Debashis Dutta Chandra Bhanu P.C. Ghasal Jairam Choudhary
Effect of rice straw retention, incorporation and residue decomposition on productivity, profitability, soil health and environment under rice-wheat systems	April 2021 – May 2025	A.L. Meena	L.R. Meena N. Subash Lalit Kumar P.C. Jat Jairam Choudhary
Organic Agricultural Systems			
Nutrient management in different cropping systems under organic production systems	Oct. 2018-Dec. 2023	P.C. Ghasal	Amit Kumar Chandra Bhanu Jairam Choudhary A.L. Meena Lalit Kumar Chathan Kumar G.
Development of pest and disease management package for organic farming	May 2018 – June 2022	Chandra Bhanu	A.L. Meena Jairam Choudhary
Development and validation of microbial consortia for crop residue recycling	Jan. 2019 – Dec. 2023	Jairam Choudhary	Debashis Dutta
Crop Improvement for organic production system	Oct. 2018-April 2022	Devendra Kumar	L.R. Meena Raghavendra K.J. K.H. Singh

Technology Transfer and Assessment			
On-farm evaluation of farming system modules for profitability and livelihood improvement of different farmers categories of Western Plain Zone of Uttar Pradesh and Uttarakhand	Jan. 2018-March 2022	P.C. Jat	Peyush Punia Poonam Kashyap Sunil Kumar
Characterization of Existing Farming Systems of Uttarakhand	2018-2023	Nisha Verma	V.P. Chaudhary Amit Nath Vipin Choudhary
Refinement of Vegetable Based Farming System Models for Food and Nutritional Security of Farmers of Western Uttar Pradesh	Jan. 2018-Jan. 2022	Poonam Kashyap	A.K. Prusty Sunil Kumar Lalit Kumar Jairam Choudhary Debashis Dutta
Project Coordination Unit			
Development of Integrated Organic Farming System (IOFS) models for different regions of India	Nov. 2016 - March 2023	N. Ravisankar	Meraj Alam Ansari P.C. Jat Suresh Malik Poonam Kashyap Lalit Kumar Chandra Bhanu & CC-PI from AINP-OF centres
Influence of pesticides application in IFS model on fisheries module and measurement of GHGs emission from aquaculture ponds	Nov. 2019-Nov. 2022	A.K. Prusty	Peyush Punia Debashis Dutta & CC-PIs from AICRP-IFS centres
Updating of Cropping System Atlas of India and Preparation of futuristic crop plan for 2030, 2040 and 2050	Oct. 2019 - Dec. 2023	Raghuveer Singh	N. Subash N. Ravisankar V. Ramamurthy C.A. Rama Rao B.M.K. Raju
Identification of climate resilient production system for different ecology (Institute-AI-NPOF linked)	Nov. 2016 – Nov. 2022	M. Shamim	CC-PIs from AINP-OF centres
Weather based on-farm technological interventions in farming systems perspective for improving livelihood of farm households	June 2018 - May 2021	M. Shamim	Poonam Kashyap Sunil Kumar

Improvement of existing farming systems of underprivileged households through SCSP	May 2020-April 2023	Raghuveer Singh	M. Shamim A.K. Prusty N. Ravisankar M.A. Ansari Raghavendra K.J.
Estimation and valuation of ecosystem services from organic and natural farming systems in different Agro-ecology	April 2021-March 2026	M.A. Ansari	N. Ravisankar M. Shamim Jairam Choudhary Raghavendra K.J. & CC-PIs from AINP-OF centres
Scaling and Impact Assessment of Integrated Farming System for Livelihood of Farmers	Sept 2021-Aug 2024	Raghavendra K.J.	A.K. Prusty M. A. Ansari Nirmal Peyush Punia Rajendran Jacob Alibaba
Assessing the role and contribution of Integrated Farming Systems for addressing one health at household and landscape level	Nov. 2021 – Oct.2026	M. Shamim	N. Ravisankar M.A. Ansari A.K. Prusty Peyush Punia

Externally funded project

Project title	Duration	Principal Investigator	Co-PIs	Source of fund	Budget
ICAR funded					
Ensuring Food and Nutritional Security through Integrated Farming Systems in Western Plain Zone of Uttar Pradesh" (Farmer FIRST)	Nov.2026 – March 2022 (First phase completed)	A.S. Panwar	A.K. Prusty Poonam Kashyap M. Shamim Nisha Verma Sunil Kumar P.C. Jat Devendra Kumar	ICAR-ATARI, Kanpur	19.20 Lakh/year (2021-22)
All India Network Programme on Organic Farming (National)	April 2017-March 2026	N. Ravisankar	M. Shamim Raghuveer Singh M.A. Ansari Raghavendra K.J.	NRM Division, ICAR	251.42 Lakh/year (2021-22)

Sustainable resource management for climate smart IFS under AICRP on Integrated Farming Systems	April 2017-March 2026	N. Ravisankar	P.C. Ghasal Debashis Dutta Suresh Malik Amit Nath A.K. Prusty Poonam Kashyap M. Shamim Chandra Bhanu	ICAR-IIFSR, Modipuram	18.01 Lakh/year (2021-22)
All India- Network Programme on Organic Farming, Modipuram Centre	2004-2026	R.P. Mishra	Debashis Dutta Chandra Bhanu P.C. Ghasal Jairam Choudhary	ICAR-IIFSR, Modipuram	7.41 Lakh/year (2021-22)
Developing Precision nutrient management protocols for rice-wheat and rice-maize systems in Indo-Gangetic plains (NASF)	March 2020 – Feb. 2023	R.P. Mishra	-	NASF, ICAR	29.06 Lakh
On-farm Participatory Research in Farming Systems Perspective under Tribal Sub Plan in Haridwar (TSP)	May 2018-March 2022	Chandra Bhanu	R.P. Mishra Debashis Dutta A.L. Meena Jairam Choudhary	ICAR-IIFSR, Modipuram	6.37 Lakh/year (2021-22)
AICRP on Integrated Farming Systems (On-station National)	2021-2026	A.K. Prusty	R.P. Mishra M. Shamim Debashis Dutta N. Ravisankar Raghuveer Singh	NRM Division, ICAR	1682.70 Lakh/year (2021-22)
AICRP on Integrated Farming Systems: On-Farm Research (National)	2021-2026	Raghuveer Singh	N. Ravisankar M.A. Ansari Raghavendra K.J. Sunil Kumar	NRM Division, ICAR	1121.80 Lakh/year (2021-22)
NAIF funded ABI Centre, ICAR-IIFSR, Modipuram, Meerut	March 2020- Sept. 2022	Amit Nath	R.P. Mishra Debashis Dutta	IPTM Unit, ICAR	11.09 Lakh/year (2021-22)

Adaptation and mitigation potential through Cropping System/Farming System approach (NICRA)	2020-2025	N. Subash	Debashis Dutta P.C. Ghasal	ICAR-CRIDA, Hyderabad	16.05 Lakh/year (2021-22)
Evaluation of different cropping sequences for crop intensification under CA practices (Consortium Research Platform on Conservation Agriculture)	July 2015 – March 2025	A.L. Meena	L.R. Meena P.C. Jat D.K. Singh Sunil Kumar Jairam Choudhary	ICAR-IISS, Bhopal	16.05 Lakh/ year (2021-22)
On Farm Research (OFR), AICRP-IFS, Modipuram Centre	April 2020-March 2026	P.C. Jat	P.C. Ghasal, Meraj Alam Ansari	ICAR-IIFSR, Modipuram	12.01 Lakh/year (2021-22)
Cluster based on farm participatory research in farming systems perspective under tribal sub plan in Uttrakhand (TSP)	2017-2022	Nisha Verma	V.P. Chaudhary Chandra Bhanu Suresh Malik Amit Nath	ICAR-IIFSR, Modipuram	0.84 Lakh/year (2021-22)
Outside ICAR funded					
Development of climate resilient sustainable integrated farming system models for optimizing farm productivity (NMSA)	Oct. 2017-March 2021 (Complted)	A.S. Panwar	M.P. Singh A.K. Prusty Chandra Bhanu Debashis Dutta M. Shamim P.C. Jat	NMSA, Govt. of India	234.24 Lakh
Economics of ecosystems and biodiversity for agriculture and food initiative in Uttar Pradesh, India	Nov. 2021-June 2023	N. Ravisankar	M.A. Ansari M. Shamim A.K. Prusty Raghavendra K.J. Raghuveer Singh	UNEP, Nairobi, Kenya	112.0 Lakh
Co-creating sustainable water use in the Hindon sub-basin: A multiscale participatory approach (Funded by DST, India under Indo-Dutch collaboration)	Feb. 2022-March 2027	N. Ravisankar	A.K. Prusty M. Shamim Raghavendra K.J. M.A. Ansari Raghuveer Singh Poonam Kashyap	DST, Govt. of India	78.58 Lakh

Contract Research project

Project Title	Duration	Principal Investigator	Co-PIs	Source of fund	Budget
Testing of products for irrigation and water management , Fertilizer and pesticide at ICAR-IIFSR, Meerut	Nov. 2019-June 2021	M. Shamim	Poonam Kashyap Raghuveer Singh N. Ravisankar A.S. Panwar	BTN Insulo India Pvt.Ltd. Ghaziabad	12.69 Lakh
Testing of Products for irrigation and Water management, Fertilizer and Pesticide in cabbage	April 2020-March 2021	P.C. Ghasal	R.P. Mishra Chandra Bhanu Raghuveer Singh A.S. Panwar	BTN Insulo India Pvt. Ltd. Ghaziabad	11.47 Lakh
Testing of Products for seed, Fertilizer and Pesticide in chilli	April 2021-March 2022	P.C. Ghasal	R.P. Mishra Chandra Bhanu Jairam Choudhary A.S. Panwar	BTN Insulo India Pvt. Ltd. Ghaziabad	10.56 Lakh
Evaluation of Poly 4 application on productivity, quality and soil sustainability of basmati rice-potato under organic farming system	Oct 2020-Dec. 2022	R.P. Mishra	A.S. Panwar Debashis Dutta P.C. Ghasal N. Ravisankar	Sirius Minerals India Pvt. Ltd., New Delhi	40.00 Lakh

Consultancy projects

Project Title	Duration	Principal Investigator	Co-PIs	Source of fund	Budget
Preparation of detailed project report (DPR) and providing technical backstopping for establishment of model IFSs including Agro-Ecotourism at identified agricultural farms (4 farms) in Odisha	Oct. 2021-Sept. 2023	A.K. Prusty	N. Ravisankar Raghavendra K.J. M.A. Ansari Raghuveer Singh M. Shamim A.S. Panwar	Govt. of Odisha	44.4 Lakh

Personnel

Scientific Staff

#	Name	Designation
1.	Dr. Azad Singh Panwar	Director
	Division of Integrated Farming Systems (IFS)	
2.	Dr. Peyush Punia & Head (Acting)	Principal Scientist (Fisheries Resource Management)
3.	Dr. Suresh Malik	Principal Scientist (Poultry Science)
4.		Dr. Amit Nath Principal Scientist (Food Technology)
5.	Dr. V. P. Chaudhary	Principal Scientist (Farm Machinery & Power)
6.	Dr. Pushpendra Pratap Singh	Principal Scientist (Vegetable Science)
7.		Mr. Nirmal Khatri Scientist (Agroforestry)
8.		Mr Kamlesh Kumar Scientist (Agronomy)
	Division of Organic Agricultural Systems (OAS)	
9.	Dr. Rajendra Prasad Mishra	Principal Scientist (Agronomy) & Head (Acting)
10.	Dr. Devendra Kumar	Principal Scientist (Plant Breeding & Genetics)
11.	Dr. Debashis Dutta	Principal Scientist (Agricultural Chemicals)
12.	Dr. Chandra Bhunu	Principal Scientist (Plant Pathology)
13.	Dr. Prakash Chand Ghasal	Scientist (Agronomy)
14.	Dr. Jairam Choudhary	Scientist (Agricultural Microbiology)
	Division of Cropping Systems and Resource Management (CSRM)	
15.	Dr. Lxman Ram Meena	Principal Scientist (Agronomy) & Head (Acting)
16.	Dr. D.K. Singh Engineering)	Principal Scientist (Soil and Water Conservation
17.	Dr. Lalit Kumar	Principal Scientist (Agricultural Chemicals)
18.	Dr. N. Subash	Principal Scientist (Agricultural Meteorology)
19.	Shri Vipin Kumar Choudhary	Scientist (Computer Applications & Information Technology)
20.	Dr. Sunil Kumar	Scientist (Agricultural Statistics)
21.	Dr. Amrit Lal Meena	Scientist (Soil Science)

Project Coordination Unit (PCU)		
22.	Dr. N. Ravisankar (Acting)	Principal Scientist (Agronomy) & Project Coordinator
23.	Dr. Ashisa K. Prusty	Senior Scientist (Aquaculture)
24.	Dr. Mohammad Shamim	Senior Scientist (Agricultural Meteorology)
25.	Dr. Meraj Alam Ansari	Senior Scientist (Agronomy)
26.	Dr. Raghuveer Singh	Scientist (Agronomy)
27.	Mr. Raghavendra KJ	Scientist (Agricultural Economics)
Technology Transfer and Assessment		
28.	Dr. Phool Chand Jat	Principal Scientist (Agronomy) & Section-in-charge
29.	Dr. Poonam Kashyap	Senior Scientist (Fruit Science)
30.	Dr. Nisha Verma	Scientist (Home Science)

Technical staff

31.	Dr. Yogendra Singh	Chief Technical Officer
32.	Sh. Dhanjay Tripathi,	Chief Technical Officer
33.	Dr. Vipin Kumar	Chief Technical Officer
34.	Dr. S.P. Singh	Chief Technical Officer
35.	Dr. Om Kumar Tomar	Chief Technical Officer
36.	Sh. Rash Behari Tewari	Chief Technical Officer
37.	Sh. Krishan Kumar	Asstt. Chief Technical Officer
38.	Sh. Satish Kumar Duhoon	Senior Technical Officer
39.	Sh. Uma Shankar Pandey	Driver (T-5)
40.	Sh. Ashok Kumar	Driver (T-5)
41.	Smt. Anju Verma	Sr. Technical Asstt.
42.	Sh. Raj Kumar Meena	Driver (T 2-3)

Administrative staff

43.	Sh. Ram Niwas Panchal	Senior Administrative Officer
44.	Ms. Neha	Senior Finance and Accounts Officer
45.	Sh. Surya Kant,	Private Secretary
46.	Sh. Raibahadur,	Private Secretary
47.	Smt. JaiLata Sharma,	Personal Assistant
48.	Smt. Alka Jain,	Assistant Administrative Officer
49.	Sh. S.K. Gupta,	Assistant Administrative Officer

50.	Smt. Sheela Devi,	Assistant
51.	Sh. S.K. Bansal,	Personal Assistant
52.	Sh. Rajesh Kumar,	Stenographer
53.	Sh. Ravi Kant,	Assistant
54.	Sh. Prem Singh,	Assistant
55.	Sh. Rajendra Kumar,	Upper Division Clerk
56.	Sh. Parmanand,	Upper Division Clerk
57.	Sh. Prashant Panwar	Upper Division Clerk
58.	Sh. Prem Kumar,	Lower Division Clerk
59.	Sh. Rakesh Kumar	Lower Division Clerk

Skilled Supporting Staff

60.	Sh. Ashok Kumar	Skilled Supporting Staff
61.	Sh. Vijay Shankar Pandey	Skilled Supporting Staff
62.	Sh. Kamal Singh	Skilled Supporting Staff
63.	Sh. Naresh Kumar Chauhan	Skilled Supporting Staff
64.	Sh. Narender Pal Singh	Skilled Supporting Staff
65.	Sh. Ram Gopal	Skilled Supporting Staff
66.	Sh. Rakesh Kumar Sharma	Skilled Supporting Staff
67.	Sh. Yogendra Kumar Tyagi	Skilled Supporting Staff
68.	Sh. Sunil Kumar Sharma	Skilled Supporting Staff
69.	Sh. Devendra Kumar	Skilled Supporting Staff
70.	Sh. Subodh Kumar Tyagi	Skilled Supporting Staff
71.	Sh. Subhash Chand Sharma	Skilled Supporting Staff
72.	Sh. Brijesh Sharma	Skilled Supporting Staff
73.	Sh. Kripa Shankar Tewari	Skilled Supporting Staff
74.	Sh. Anand Singh	Skilled Supporting Staff
75.	Sh. Harsh Nath	Skilled Supporting Staff
76.	Sh. Prem Shankar	Skilled Supporting Staff
77.	Sh. Mahaveer Singh	Skilled Supporting Staff
78.	Sh. Ayodhya Prasad Dubey	Skilled Supporting Staff
79.	Sh. Kirpa Shankar Pandey	Skilled Supporting Staff
80.	Sh. Siddh Kumar Yadav	Skilled Supporting Staff
81.	Sh. Sada Ram	Skilled Supporting Staff

Promotion/Transfer/Retirement

Promotion

SN	Name	Promoted to
1.	Dr Chandra Bhanu	Principal Scientist
2.	Mr Nirmal	Scientist (RGP 7000)
3.	Sh. S.K. Gupta,	Assistant Administrative Officer
4.	Smt. Alka Jain	Assistant Administrative Officer
5.	Sh. Prem Singh	Assistant
6.	Sh. Parmanand	Upper Division Clerk
7.	Sh. Prashant Panwar	Upper Division Clerk
8.	Sh. Prem Kumar	Lower Division Clerk
9.	Sh. Rakesh Kumar Tyagi	Lower Division Clerk
10.	Sh. Devender Kumar	Skilled Supporting Staff
11.	Sh. Ashok Kumar	Skilled Supporting Staff
12.	Sh. Vijay Shankar	Skilled Supporting Staff
13.	Sh. Ram Gopal	Skilled Supporting Staff
14.	Sh. Rakesh Kumar	Skilled Supporting Staff
15.	Sh. Yogendr KumarTyagi	Skilled Supporting Staff
16.	Sh. Kamal Singh	Skilled Supporting Staff
17.	Sh. Kirpa Shankar Tewari	Skilled Supporting Staff
18.	Sh. N.P. Singh	Skilled Supporting Staff
19.	Sh. N.K. Chauhan	Skilled Supporting Staff
20.	Sh. Subhash Chand Sharma	Skilled Supporting Staff
21.	Sh Subodh Kumar	Skilled Supporting Staff
22.	Sh. Sunil Kumar Sharma	Skilled Supporting Staff
23.	Sh. Brijesh Sharma	Skilled Supporting Staff

Superannuation

#	Name	Designation	Date of Retirement
1.	Dr. M. P. Singh	Principal Scientist	31.01.2021
2.	Dr. Prem Singh	Principal Scientist	28.02.2021
3.	Sh. Prem Prakash Mishra	Ex-CTO	31.03.2021
4.	Dr. Devendra Pal Singh	Ex- STO	31.03.2021
5.	Dr. Vinod Kumar	Ex-CTO	31.10.2021
6.	Sh. Ajay Prakash Dwivedi*	Ex-ACTO	01.06.2021
7.	Sh. D.K. Pandey	Ex-CTO	31.01.2022
8.	Sh. Brij Veer Singh	Stenographer	31.03.2021
9.	Sh. Attar Singh	P.S.	31.08.2021

*Heavenly abode

New Joining

#	Name & Designation	From
1.	Dr. Meraj Alam Ansari, Scientist	Regional centre, ICAR Research Complex for NEH Region, Imphal

Transfer

#	Name & Designation	To
1	Dr. Amit Kumar, Scientist	ICAR-VPKAS, Almora
2	Shri Ravinder Singh, SAO	ICAR-IARI, New Delhi
3	Shri D. S. Verma, F&AO	ICAR-CIRC, Meerut Cantt.

Institute Management and Research Advisory Committees

Institute Management Committee (2021)

1.	Dr. A.S. Panwar	Director, IIFSR, Modipuram, Meerut	Chairman
2.	Director (Agriculture)	Government of Uttar Pradesh, Lucknow	Member
3.	Director (Agriculture)	Government of Uttarakhand, Dehradun	Member
4.	Director (Research)	SVPUAT, Modipuram	Member
5.	Shri Heera Singh	4-Deep Nagar, Manas Nagar (near water tank) Maholi Road, Mathura	
6.	Dr. Momraj Gurjar	S/O Jairam Singh Brilliant Scholar Public School in front of Katai Mill, Bijnor Road, Amroha	Member
7.	Dr N. Ravisankar	Principal Scientist, ICAR-IIFSR, Modipuram	Member
8.	Dr A.K. Handa	Principal Scientist, ICAR-CAFRI, Jhansi	Member
9.	Dr Ramesh Kumar Kaul	Principal Scientist, ICAR-CAZRI, Jodhpur	Member
10.	Dr Rajendra Hegde	Head, ICAR-NBSSLUP, Regional Centre, Bengaluru	Member
11.	Dr S. Bhaskar	ADG (AAFCC), ICAR, New Delhi	Member
12.	Finance and Accounts Officer	ICAR-Central Soil Salinity Research Institute, Karnal	Member
13.	Shri Ram Niwas Panchal	Senior Administrative Officer	Member Secretarty

Research Advisory Committee (2021)

1.	Dr.S.S. Magar	Former Vice Chancellor, BSKKV, Dapoli, Maharashtra	Chairman
2.	Dr. P.K. Mahapatra	Ex Dean, OUA&T, Bhubaneswar	Member
3.	Dr. A. K. Yadav	Ex-Director, National center on Organic Farming, CGO Complex-II, Kamla Nehru Nagar Ghaziabad	Member
4.	Dr. S.P.S. Ahlawat	Ex-Director, ICAR-CIARI, Port Blair and ICAR-IVRI, Bareilly	Member
5.	Dr. S.K. Dhyani	Former Director, CAFRI, Jhansi	Member
6.	Dr. S. Bhaskar	ADG(AAF&CC), ICAR, Krishi Anusandhan Bhawan-II, New Delhi	Member
7.	Dr. A.S. Panwar	Director, IIFSR, Modipuram, Meerut	Member
8.	Shri Heera Singh	4-Deep Nagar, Manas Nagar (near water tank) Maholi Road, Mathura	Member
9.	Dr. Momraj Gurjar	S/O Jairam Singh Brilliant Scholar Public School in front of Katai Mill, Bijnor Road, Amroha	Member
10.	Dr. Lalit kumar	Principal Scientist, ICAR-IIFSR, Modipuram, Meerut	Member Secretarty


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Amrit Mahotsav