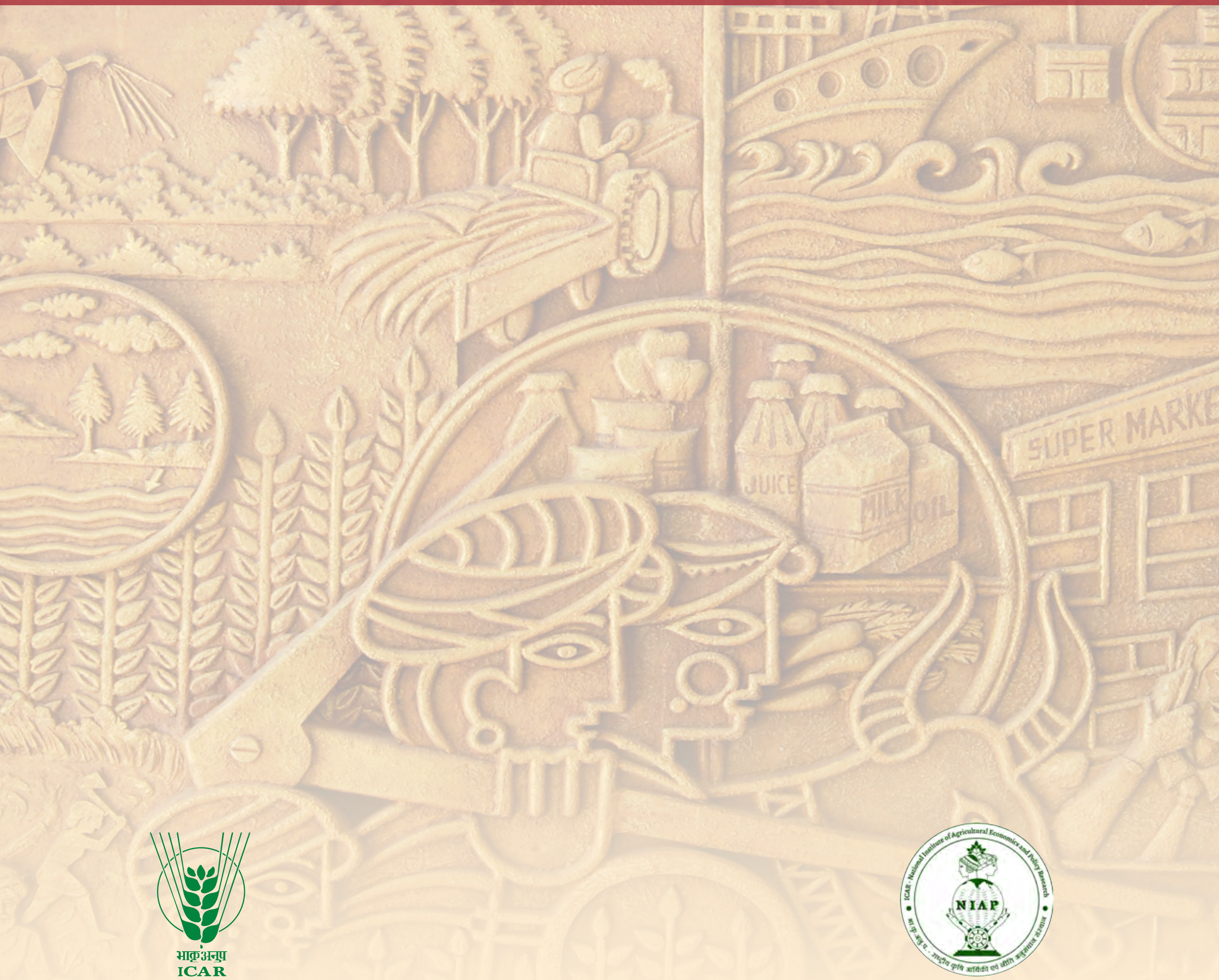
ANNUAL REPORT 2024-25



भाकृअनुप – राष्ट्रीय कृषि आर्थिकी एवं नीति अनुसंधान संस्थान

ICAR - National Institute of Agricultural Economics and Policy Research

(Indian Council of Agricultural Research)

New Delhi 110 012

Annual Report
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ICAR-NIAP Annual Report 2024-25

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Preface

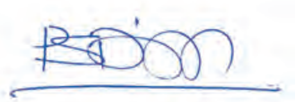
Over the next twenty-five years, India's agricultural landscape is poised for a significant transformation, driven by its ambitions to attain the status of a developed nation. Accordingly, rising per capita income and growing urbanization will lead to increased food demand accompanied by a notable shift in consumption patterns, favoring high-value food commodities. This change in demand patterns will enforce a corresponding transformation in agricultural production systems for the increased production and productivity of different food commodities.

Nevertheless, agricultural transformation is likely to encounter numerous interconnected biotic and abiotic challenges. As urbanization and industrialization progress, the availability of land for agricultural purposes is expected to decline. This trend, coupled with ever-fragmenting landholdings, places significant pressure on already-strained land and water resources. Climate change is likely to exacerbate these challenges, threatening the sustainability of agriculture and agriculture-dependent livelihoods.

Transformation of the agricultural sector depends on its capacity to innovate and adapt to changing challenges. This year's research at ICAR-NIAP highlights the crucial role of technologies and innovations in tackling emerging challenges and capitalizing on new opportunities. It emphasizes the role of resource conservation technologies, micro-irrigation systems, automated irrigation technologies, renewable energy sources, and animal waste recycling for energy production and fertilizers. More importantly, policies related to input subsidies, market support, investment in infrastructure, trade, and governance are key to turning innovation into tangible outcomes.

In addition to research, several training programs were conducted at the institute for agricultural economists and policymakers to enhance their analytical capabilities in comprehending and addressing the complex challenges facing the agricultural sector in a comprehensive manner.

I extend my sincere gratitude to Dr. Himanshu Pathak, Secretary, DARE, and Director General, ICAR, and Dr. R. C. Agrawal, Deputy Director General (Education), and Dr. Ajit Singh Yadav, Assistant Director General (Education), for their continuous guidance and support in ensuring the efficient functioning of the Institute. I also express my appreciation to the members of the Institute Management Committee and the Research Advisory Committee for their valuable guidance on administrative and research matters. I would like to express my gratitude to my colleagues, Dr. Khem Chand, Dr. Vinayak R. Nikam, Dr. Jaya Jumrani, Dr. Ankita Kandpal, Dr. Arathy Ashok, Dr. Anil Kumar, and Ms. Ravneet Kaur, for their contributions in bringing this report in its present shape.



Pratap Singh Birthal
Director

Dated: 10 July 2025

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साक्ष्य-आधारित नीतियाँ वांछित परिणाम प्राप्त करने हेतु प्रभावी शासन की नींव होती हैं। भाकृअनुप-राष्ट्रीय कृषि आर्थिकी एवं नीति अनुसंधान संस्थान (एनआईएपी) इस उद्देश्य के प्रति समर्पित है और कृषि नीति निर्माण को मार्गदर्शित एवं समर्थित करने के लिए अनुभवजन्य साक्ष्य प्रदान करता है। यह संस्थान राष्ट्रीय कृषि अनुसंधान प्रणाली में कृषि आर्थिकी एवं नीति अनुसंधान को आगे बढ़ाने में अग्रणी भूमिका निभाता है तथा भारतीय कृषि अनुसंधान परिषद (भाकृअनुप) के लिए एक नीति चिंतन मंच के रूप में कार्य करता है। संस्थान की शोध गतिविधियों को मुख्य तौर पर तीन विषयों में व्यवस्थित किया गया है जैसे कृषि वृद्धि एवं विकास, प्रौद्योगिकी एवं सतत कृषि तथा कृषि बाजार एवं व्यापार।

कृषि वृद्धि और विकास

अपनी स्वतंत्रता के 100वें वर्ष 2047 तक भारत एक विकसित राष्ट्र का दर्जा प्राप्त करने का लक्ष्य रखता है। इस दौरान सकल घरेलू उत्पाद (जीडीपी) में कृषि का योगदान वर्तमान 18% से घटकर 8% होने का अनुमान है, जबकि रोजगार में इसकी हिस्सेदारी धीरे-धीरे 46% से घटकर 29% हो जाएगी। अनुमानित जनसंख्या 1.6 अरब तक पहुँचने का अनुमान है जिसमें से आधी जनसँख्या शहरी क्षेत्रों में रहेगी। खाद्य पदार्थों की मांग में उल्लेखनीय वृद्धि होने की संभावना है। इन आर्थिक और जनसांख्यिकीय परिवर्तनों का खाद्य प्रणाली के परिवर्तन "थाली से हल तक" पर महत्वपूर्ण प्रभाव पड़ेगा।

पिछले चार दशकों में खाद्य पदार्थों के उपभोग प्रतिरूप में उल्लेखनीय रूप से महत्वपूर्ण बदलाव हुए हैं। आहार का चयन मुख्य रूप से अनाज आधारित से पोषक तत्व आधारित हो गया हैं। खाद्य व्यय में अनाज का अनुपात 1983 में 44% से घटकर 2022-23 में 10% हो गया है, जबकि पोषक तत्वों से भरपूर खाद्य पदार्थों का हिस्सा 28% से बढ़कर 48% हो गया है। हालाँकि, इस आहार परिवर्तन से पोषण संबंधी परिणामों में कोई सुधार नहीं हुआ है। भारत कुपोषण की जटिल चुनौती का सामना कर रहा है, जिसमें अल्पपोषण और अतिपोषण का विरोधाभासी सह-अस्तित्व है। बाल कुपोषण संकेतकों जैसे कि बौनापन, दुर्बलता और कम वजन में मामूली सुधार हुआ है, जबकि, विशेष रूप से महिलाओं में अधिक वजन और मोटापे के बढ़ने की चिंता है। इसके कारण एक ही घर के दायरे में दोहरे बोझ वाला कुपोषण उत्पन्न हो गया है जो कि दक्षिणी राज्यों जैसे केरल, तमिलनाडु और कर्नाटक में अधिक व्याप्त है जहां अधिक वजन वाली या मोटापे से ग्रस्त माताएं कुपोषित बच्चों के साथ रहती हैं।

सामान्य परिस्थितियों में, वर्ष 2050 तक खाद्यान्न की माँग में वर्ष 2019-20 की माँग की दोगुनी से भी अधिक वृद्धि होने की उम्मीद है और त्वरित आर्थिक विकास के चलते यह और भी अधिक तेज़ी से बढ़ सकती है। हालाँकि, भारत की कृषि-खाद्य प्रणाली जलवायु परिवर्तन से लेकर अकुशल मूल्य श्रृंखलाओं तक कई गंभीर चुनौतियों का सामना कर रही है। अन्य चुनौतियों में घटती कृषि भूमि, उर्वरकों और जल का अकुशल उपयोग, कृषि अनुसंधान में कम निवेश, कृषि ऋण का अपर्याप्त लक्ष्यीकरण और अपर्याप्त बाज़ार अवसंरचना शामिल हैं। सतत खाद्य उत्पादन और समावेशी विकास सुनिश्चित करने के लिए एक व्यापक और एकीकृत दृष्टिकोण आवश्यक है, जिसमें परिशुद्ध कृषि, जलवायु-प्रतिरोधी फसलें, उन्नत सिंचाई प्रणालियाँ और नवीकरणीय ऊर्जा जैसी नवीन तकनीकियां शामिल हों।

कृषि क्षेत्र में सतत परिवर्तन लाने के लिए निरंतर सार्वजनिक निवेश आवश्यक है। निवेश का स्तर 1990-91 में 498 अरब रुपये से बढ़कर 2022-23 में 4,415 अरब रुपये (2011-12 के मूल्यों पर) हो गया है, हालाँकि कुल विकास व्यय में इसके अनुपात में उल्लेखनीय परिवर्तन आया है। कुल कृषि निवेश में केंद्र सरकार का योगदान बढ़कर 60% से अधिक हो गया है।

प्रौद्योगिकी और सतत कृषि

भारत में कृषि क्षेत्र में हाल के दशकों में महत्वपूर्ण परिवर्तन हुए हैं, जिसका मुख्य कारण तकनीकी प्रगति और नीतिगत हस्तक्षेप हैं। इस विषयगत क्षेत्र में अनुसंधान गतिविधियाँ मुख्य रूप से सिंचाई अवसंरचना, ऊर्जा खपत, मशीनीकरण, फसल और पशुधन उत्पादकता, जलवायु लचीलापन और सामाजिक समावेशन पर इन पहलों के प्रभाव का मूल्यांकन करने पर केंद्रित रही हैं।

वर्ष 1950-51 से वर्ष 2022-23 तक भारत में सिंचाई का विस्तार एक उल्लेखनीय उपलब्धि है। सिंचित क्षेत्र 21 मिलियन हेक्टेयर से बढ़कर लगभग 79 मिलियन हेक्टेयर हो गया है, जिससे सिंचाई कवरेज 17.6% से बढ़कर 56.4% हो गया है। उल्लेखनीय रूप

से, 2015 के बाद नहर-सिंचित क्षेत्र में बढ़ोत्तरी हुई है, जिसका श्रेय त्वरित सिंचाई लाभ कार्यक्रम के तहत लंबे समय से लंबित परियोजनाओं के पूरा होने को दिया जा सकता है। इन प्रभावशाली उपलब्धियों के बावजूद, विभिन्न क्षेत्रों में सिंचाई विस्तार की असमान गति के लिए संसाधन आवंटन और बुनियादी ढाँचे के विकास हेतु अधिक संतुलित दृष्टिकोण की आवश्यकता है।

भूजल सिंचाई फसल उत्पादन बढ़ाने में महत्वपूर्ण भूमिका निभाती है । हालाँकि, इसका असंतुलित दोहन एक महत्वपूर्ण दीर्घकालिक खतरा प्रस्तुत करता है, खासकर उन क्षेत्रों में जहाँ भूजल का स्तर तेज़ी से घट रहा है। इस समस्या को कम करने के लिए स्तरीकृत बिजली मूल्य निर्धारण एक आशाजनक समाधान के रूप में उभरा है। यह दृष्टिकोण एक निश्चित सीमा तक भारी सब्सिडी वाली बिजली प्रदान करता है जिसके बाद किसानों को पूरी दरें चुकानी पड़ती हैं। उदाहरण के लिए, उत्तर प्रदेश ने एक योजना लागू की है जो छोटे पंपों के लिए ऊर्जा शुल्क पर एक निर्दिष्ट सीमा तक 100% सब्सिडी प्रदान करती है। सीतापुर, बागपत और जालौन जैसे विभिन्न भूजल गहराई वाले विभिन्न क्षेत्रों का विश्लेषण से जल संरक्षण प्रथाओं को बढ़ावा देते हुए छोटे किसानों का समर्थन करने में इस मॉडल की प्रभावशीलता उजागर होती है। फिर भी, स्तरीकृत बिजली मूल्य निर्धारण की सफलता सब्सिडी सीमाओं के सावधानीपूर्वक अंशांकन पर निर्भर करती है। यदि ये सीमाएँ बहुत ज़्यादा निर्धारित की जाती हैं, खासकर उथले भूजल वाले क्षेत्रों में, तो नीतियां जल के कुशल उपयोग को प्रभावी ढंग से प्रोत्साहित नहीं कर पाएंगी। यह स्थानीय जलविज्ञान और कृषि परिस्थितियों के साथ संरेखण सुनिश्चित करने के लिए क्षेत्र-विशिष्ट समायोजन और नियमित नीति समीक्षाओं के महत्व को रेखांकित करता है।

सौर ऊर्जा चालित सूक्ष्म सिंचाई प्रणालियाँ जीवाश्म ईंधन पर निर्भरता कम करने और जल उपयोग दक्षता में सुधार सहित अन्य महत्वपूर्ण लाभ प्रदान करती हैं। इनके तीव्र विकास के बावजूद, प्रधानमंत्री कृषि सिंचाई योजना (पीएमकेएसवाई) और सौर ऊर्जा पहल प्रधानमंत्री किसान ऊर्जा सुरक्षा एवं उत्थान महाभियान योजना (पीएम-कुसुम) के विखंडित कार्यान्वयन के कारण इनका उपयोग सीमित है। संस्थागत अभिसरण की सख़्त आवश्यकता है, जिससे पंजीकरण से लेकर उपकरण वितरण तक की पूरी प्रक्रिया का प्रबंधन एक ही एजेंसी कर सके। इस तरह के एकीकरण से संभावित रूप से 65 अरब घन मीटर भूजल का संरक्षण हो सकता है और कार्बन उत्सर्जन में सालाना 4.5 करोड़ टन की कमी आ सकती है। डीजल पंपों को बदलते समय यह बदलाव विशेष रूप से लागत प्रभावी हो सकता है। सब्सिडी के साथ, किसान दो साल के भीतर अपनी निवेश लागत की भरपाई कर सकते हैं, हालाँकि मौजूदा मुफ़्त या सब्सिडी वाली बिजली के कारण इलेक्ट्रिक पंपों को बदलना अभी भी कम व्यवहार्य है। बिजली सब्सिडी को सौर उपकरणों के लिए पूंजीगत सब्सिडी में बदलने से इस चुनौती का समाधान करने में मदद मिल सकती है।

मशीनीकरण टिकाऊ कृषि का एक अनिवार्य पहलू है, खासकर छोटे और सीमांत किसानों के लिए। कस्टम हायरिंग सेंटर (सीएचसी) कृषि उपकरणों तक किफ़ायती पहुँच प्रदान करते हैं और उत्पादन लागत कम करने और लाभ बढ़ाने में इनका उल्लेखनीय प्रभाव पड़ा है। उत्तर प्रदेश में, सीएचसी लाभार्थी किसानों द्वारा खेती की लागत में 4.5% की कमी और धान की खेती से लगभग 12% अधिक शुद्ध लाभ देखा गया है। हालाँकि, यह लाभ समान रूप से वितरित नहीं हैं। किराये की दरें निजी प्रदाताओं की तुलना में कम हैं, लेकिन सीएचसी संचालक अक्सर बड़े किसानों को प्राथमिकता देते हैं और मूल्य निर्धारण पारदर्शिता भी एक मुद्दा बनी हुई है।

ड्रोन संसाधन उपयोग दक्षता में उल्लेखनीय वृद्धि करते हैं। वर्तमान में ड्रोन का उपयोग मुख्य रूप से कीटनाशकों और उर्वरकों के छिड़काव के लिए किया जा रहा है, जिससे समय, पानी और श्रम की काफी बचत होती है। पारंपरिक तरीकों और ड्रोन-सहायता प्राप्त छिड़काव के बीच का अंतर स्पष्ट है: ड्रोन छिड़काव प्रति एकड़ केवल 10 लीटर पानी का उपयोग करता है और यह कार्य केवल 11 मिनट में पूरा हो जाता है। ये प्रगतियाँ विशेष रूप से धान और गन्ने जैसी श्रम-प्रधान फसलों के लिए लाभदायक हैं, जहाँ संसाधनों का अनुकूलन आवश्यक है। हालाँकि, फसल की पैदावार पर इनका प्रभाव अपेक्षाकृत कम रहता है, जो दर्शाता है कि समग्र कृषि उत्पादकता को बढ़ावा देने के लिए इन तकनीकों के उपयोग की अभी भी अप्रयुक्त क्षमता है।

जलवायु परिवर्तन पूर्वी उत्तर प्रदेश जैसे संवेदनशील क्षेत्रों में कृषि के लिए एक बड़ा खतरा प्रस्तुत करता है। एक ब्लॉक-स्तरीय जोखिम मूल्यांकन से पता चला है कि 28% ब्लॉक अत्यधिक जोखिम और सीमित अनुकूलन क्षमता के कारण उच्च से अत्यंत उच्च जलवायु जोखिम के अधीन हैं। इन चुनौतियों का प्रभावी ढंग से समाधान करने के लिए लक्षित हस्तक्षेपों को लागू

करना आवश्यक है जिसमें लचीले बुनियादी ढाँचे का विकास, सामुदायिक अनुकूलन कार्यक्रमों का क्रियान्वयन और स्थायी भूमि एवं जल प्रबंधन प्रथाओं को बढ़ावा देना शामिल है।

जलवायु संबंधी कृषि चुनौतियों से निपटने के लिए फसल किस्मों के विकास में उल्लेखनीय प्रगति हुई है। पंजाब कृषि विश्वविद्यालय, लुधियाना द्वारा विकसित गेहूँ की किस्मों जैसे PBW 826, PBW 766 और PBW 869 से पर्याप्त आर्थिक और पर्यावरणीय लाभ हुए हैं। इसी प्रकार, भारतीय चरागाह एवं चारा अनुसंधान संस्थान (आईसीएआर-आईजीएफआरआई) द्वारा विकसित उन्नत बरसीम चारा किस्मों जैसे BL-10, वरदान और BB-2 से चारा उपज और दुग्ध उत्पादन वृद्धि हुआ है। हालाँकि, जागरूकता की कमी और बीजों तक पहुँच की कमी के कारण इन किस्मों को अपनाने की दर सीमित है। यह विस्तार प्रणालियों को मजबूत करने और आपूर्ति श्रृंखलाओं में सुधार करने की महत्वपूर्ण आवश्यकता को रेखांकित करता है ताकि इन किस्मों के नवाचारों को प्रभावी ढंग से अपनाया जा सके, जिससे जलवायु परिवर्तन के मद्देनजर कृषि लचीलापन और उत्पादकता में वृद्धि हो सके।

इसी प्रकार, आईसीएआर-गन्ना प्रजनन संस्थान द्वारा उच्च उपज देने वाली गन्ने की किस्म Co 0238 की बुवाई से चीनी उत्पादन में उल्लेखनीय वृद्धि हुई है और खोई व इथेनॉल जैसे उप-उत्पादों के मूल्य में भी सुधार हुआ है। इथेनॉल उत्पादन 2016-17 के 700 मिलियन लीटर से बढ़कर 2022-23 में 4,500 मिलियन लीटर हो गया है। इस विकास से न केवल स्वच्छ ऊर्जा और उत्सर्जन में कमी आएगी, बल्कि किसानों की आय में वृद्धि और चीनी मिलों की वित्तीय व्यवहार्यता में भी वृद्धि होगी।

संसाधन संरक्षण प्रौद्योगिकियाँ विभिन्न पारिस्थितिकी सेवाएँ प्रदान करती हैं और कृषि स्थिरता में महत्वपूर्ण योगदान देती हैं। पंजाब में हुए एक अध्ययन से पता चलता है कि किसान लगभग 29,000 रुपये प्रति हेक्टेयर की क्षतिपूर्ति के लिए सीधी बुवाई और दलहनी फसलों की ओर रुख कर रहे हैं। ये पद्धतियाँ न केवल भूजल संरक्षण करती हैं, बल्कि पराली जलाने से होने वाले वायु प्रदूषण को भी कम करती हैं। जैव-उत्तेजक एक आशाजनक समाधान हैं और इनके प्रयोग से फसल की पैदावार, मृदा कार्बन और पोषक तत्वों के अवशोषण में उल्लेखनीय वृद्धि हो सकती है।

भारत में पशुधन की एक बड़ी आबादी है जो 1.2 अरब टन से अधिक गोबर का उत्पादन करती है। यह ऊर्जा सुरक्षा और कृषि स्थिरता को बढ़ाने का एक महत्वपूर्ण अवसर प्रदान करता है। गोबर को बायोगैस, बायो-सीएनजी (संपीड़ित प्राकृतिक गैस) और जैविक उर्वरकों में परिवर्तित किया जा सकता है, जिससे संभावित रूप से सालाना 2 ट्रिलियन रुपये तक का आर्थिक मूल्य उत्पन्न हो सकता है। यह रणनीति न केवल पशु अपशिष्ट के इर्द-गिर्द एक चक्रीय अर्थव्यवस्था को बढ़ावा देती है, बल्कि एक साथ कई पर्यावरणीय और कृषि चुनौतियों का भी समाधान करती है। महत्वपूर्ण बात यह है कि यदि इस क्षमता का पूर्ण उपयोग किया जाए, तो भारत एलएनजी और रासायनिक उर्वरकों पर अपनी निर्भरता कम कर सकता है।

कृषि के सतत विकास में पशुधन क्षेत्र का विशेष महत्व है। पशुधन क्षेत्र का पूरा लाभ उठाने के लिए डेयरी प्रजनन और स्वास्थ्य सेवाओं तक पहुँच अत्यंत महत्वपूर्ण है। एक अध्ययन से पता चलता है कि उत्तर प्रदेश और हरियाणा में डेयरी किसान परिवारों में कृत्रिम गर्भाधान (एआई) का व्यापक रूप से उपयोग हो रहा है। हालाँकि, उन्नत कृत्रिम गर्भाधान तकनीकों, जैसे कि सेक्स सॉर्टेड सीमेन (एसएसएस) एआई का उपयोग अभी भी सीमित है। एसएसएस एआई को अपनाने को प्रभावित करने वाले प्रमुख कारकों में शिक्षा का स्तर और संकर या विदेशी गायों की संख्या शामिल है, जो उन्नत प्रजनन सेवाओं तक पहुँच बढ़ाने के लिए लक्षित हस्तक्षेपों की आवश्यकता को रेखांकित करता है।

चावल उत्पादन में तकनीकी दक्षता (टीई) भारतीय राज्यों में व्याप्त क्षेत्रीय असमानताओं को दर्शाती है जिसका समग्र कृषि विकास पर महत्वपूर्ण प्रभाव पड़ता है। बिहार और छत्तीसगढ़ जैसे राज्यों जहाँ टीई 0.61 है, और पंजाब जहाँ यह लगभग पूर्ण 0.98 है, के बीच का अंतर कई क्षेत्रों में सुधार की अपार संभावनाओं को रेखांकित करता है। 0.71 का राष्ट्रीय औसत बताता है कि उन्नत दक्षता उपायों के माध्यम से चावल उत्पादन में उल्लेखनीय वृद्धि प्राप्त की जा सकती है। यदि टीई को अपने अधिकतम स्तर पर प्राप्त कर लिया जाए, तो चावल उत्पादन में 45.2 मिलियन टन की संभावित वृद्धि प्राप्त की जा सकती है।

हरियाणा, उत्तर प्रदेश और राजस्थान में किए गए एक अध्ययन में सामाजिक समता के एक महत्वपूर्ण मुद्दे को उजागर किया गया है जिसमे अनुसूचित जाति (एससी) और अनुसूचित जनजाति (एसटी) के किसानों की भूमि, सिंचाई और कृषि परिसंपत्तियों तक पहुँच उच्च जाति के किसानों की तुलना में काफी कम पाया गया है। इन असमानताओं के परिणामस्वरूप तकनीकी दक्षता और कृषि आय कम हो जाती है। नीतिगत हस्तक्षेपों में संसाधनों की

समान पहुँच, लक्षित सब्सिडी और समावेशी प्रौद्योगिकी प्रसार को प्राथमिकता दी जानी चाहिए।

कृषि बाजार और व्यापार

इस विषयगत क्षेत्र में विभिन्न अध्ययनों से भारत के कृषि बाज़ार को आकार देने वाली जटिल शक्तियों का खुलासा हुआ है, जिनमें सरकार द्वारा अनिवार्य मूल्य समर्थन और अंतर्राष्ट्रीय व्यापार गतिशीलता शामिल हैं। घरेलू मूल्य नीति के केंद्र में न्यूनतम समर्थन मूल्य (एमएसपी) है, जो किसानों को आवश्यक फसलों के लिए आधारभूत मूल्य की गारंटी देता है। शोध से पता चलता है कि धान को छोड़कर लगभग सभी प्रमुख फसलों के लिए एमएसपी में वृद्धि से कृषि उपज मूल्यों (एफएचपी) में तत्काल और निरंतर वृद्धि होती है। हालाँकि एफएचपी से एमएसपी को मिलने वाली प्रतिक्रिया कमज़ोर है, फिर भी यह दर्शाता है कि नीति निर्माता भविष्य की मूल्य सीमा निर्धारित करते समय बाज़ार की वास्तविकताओं के प्रति सजग हैं।

वार्षिक कारोबार के आधार पर वर्गीकृत एक हज़ार से अधिक किसान उत्पादक संगठनों (एफपीओ) का एक व्यापक राष्ट्रीय स्तर का विश्लेषण दर्शाता है कि उच्च प्रदर्शन करने वाली संस्थाएँ आम तौर पर पुरानी होती हैं, उनमे अधिक सदस्य होते हैं, ज़्यादा गाँवों तक उनकी पहुँच है, और उनकी समता पूँजी ज़्यादा होती है। उल्लेखनीय रूप से, अनुसूचित जाति/अनुसूचित जनजाति (एससी/एसटी) के सदस्यों के उच्च अनुपात वाले एफपीओ का प्रदर्शन थोड़ा कम होता है, जो दर्शाता है कि समावेशी शासन के लिए अनुकूलित रणनीतियों की आवश्यकता हो सकती है। इसके अलावा, कम निदेशकों और सुव्यवस्थित निर्णय लेने की प्रक्रिया वाले एफपीओ, अधिक जटिल बोर्ड संरचना वाले एफपीओ से बेहतर प्रदर्शन करते हैं, जो प्रभावी शासन के महत्व को रेखांकित करता है। इसके अतिरिक्त, जो एफपीओ अपनी बाज़ार पहुँच राज्य की सीमाओं से परे बढ़ाते हैं और राष्ट्रीय या अंतर्राष्ट्रीय बिक्री में संलग्न होते हैं, वे स्थानीय स्तर पर केंद्रित अपने समकक्षों से बेहतर प्रदर्शन करते हैं। ये निष्कर्ष सफलता में पैमाने, शासन और बाज़ार संबंधों की आवश्यक भूमिकाओं को रेखांकित करते हैं।

बासमती चावल के लिए भौगोलिक संकेत (जीआई) के मूल्यांकन पर एक अध्ययन से संकेत मिलता है कि औसतन जीआई स्थिति के परिणामस्वरूप खेत पर प्रति टन 1840 रुपये का प्रीमियम मूल्य और प्रति एकड़ लगभग 3,792 रुपये की अतिरिक्त शुद्ध आय प्राप्त होती है। ये आर्थिक लाभ उपभोक्ताओं की सत्यापन योग्य उत्पत्ति और गुणवत्ता के लिए भुगतान करने की इच्छा को दर्शाते हैं, जो न केवल छोटे किसानों की आय बढ़ाने बल्कि व्यापक ग्रामीण विकास को बढ़ावा देने के लिए जीआई की क्षमता को भी उजागर करते हैं।

बाजरा, जो अपनी जलवायु प्रतिरोधक क्षमता के लिए जानी जाती है, की खेती का बड़े पैमाने पर विस्तार करने से एक साथ कई चुनौतियों का समाधान हो सकता है। बाजरे की खेती को 1970 और 1990 के दशक के स्तर पर बहाल करने से देश को महत्वपूर्ण आर्थिक लाभ मिल सकते हैं, जिसमें खाद्य सब्सिडी में 622 करोड़ रुपये की संभावित बचत भी शामिल है। इसके अलावा, बाजरे की खेती की ओर बदलाव जलवायु परिवर्तन से निपटने की पहलों के अनुरूप है। चावल और गेहूँ की तुलना में कम पानी की आवश्यकता वाली सूखा-सहिष्णु फसल होने के कारण बाजरा विशेष रूप से उन क्षेत्रों के लिए उपयुक्त है जहाँ पानी की कमी बढ़ती जा रही है। इसकी खेती से ग्रीनहाउस गैस (जीएचजी) उत्सर्जन कम हो सकता है।

स्थायी उपभोग पैटर्न में बढ़ती रुचि के मद्देनजर, 1991 से 2022 तक जैविक खाद्य उपभोग पर शोध के एक ग्रंथसूची विश्लेषण से पता चला है कि प्रकाशनों में लगभग 16% की वार्षिक वृद्धि हुई है जिसमें संयुक्त राज्य अमेरिका, भारत और जर्मनी सबसे आगे हैं। जैविक कृषि पर शोध का विषयगत मानचित्रण प्रारंभिक अवधारणा से उपभोक्ता दृष्टिकोण, भुगतान करने की इच्छा, और हरित विपणन एवं पर्यावरणीय चिंताओं के प्रभाव के अधिक गहन विश्लेषण की ओर बदलाव को दर्शाता है। प्रोसोपिस सिनेरिया (खेजड़ी) और कैप्परिस डेसीडुआ (कैर) जैसी देशी वृक्ष फसलें भारत के शुष्क क्षेत्रों में व्यापक रूप से खाई जाती हैं। इनके उपभोग पैटर्न के एक अध्ययन से पता चलता है कि ग्रामीण आबादी अधिक जानकार और नियमित उपभोक्ता है, जिसका श्रेय सांस्कृतिक संबंधों और घरेलू आपूर्ति को जाता है। इसके विपरीत, शहरी उपभोक्ता अपनी सीमित जागरूकता और इन फसलों की कम उपलब्धता के कारण कम उपभोग स्तर प्रदर्शित करते हैं। इन फसलों के प्रसंस्कृत रूप आम तौर पर अलोकप्रिय हैं और पारंपरिक तैयारी विधियाँ उपभोग की आदतों में प्रचलित हैं। यह अध्ययन इन देशी फसलों की व्यावसायिक व्यवहार्यता और संरक्षण में सुधार के लिए बाजार की पहुँच, पाक कला शिक्षा और लक्षित मूल्य निर्धारण रणनीतियों को बढ़ाने की सिफारिश करता है।

भारत के कृषि निर्यात में उल्लेखनीय वृद्धि हुई है, जो 2022-23 में 53.15 बिलियन अमेरिकी डॉलर तक पहुँच गया जो की कुल व्यापारिक खेप का लगभग 12% है। इस विस्तार को संचालित करने वाली प्रमुख वस्तुओं में चावल, चीनी, झींगा और मसाले शामिल हैं। कपास का योगदान 2000 के दशक की शुरुआत में 25% से घटकर लगभग 13% हो गया।

एक अन्य अध्ययन संभावित व्यापार अवसरों और चुनौतियों की जानकारी प्रदान करता है। स्मार्ट मॉडल का उपयोग करते हुए एक अनुकरणीय भारत-यूके मुक्त व्यापार समझौता बताता है कि टैरिफ हटाने से पेय पदार्थों, स्पिरिट्स और सिरके के द्विपक्षीय व्यापार में 408 मिलियन अमेरिकी डॉलर की अतिरिक्त वृद्धि हो सकती है, जिसका लाभ समुद्री उत्पादों और खाद्य पदार्थों को भी मिलेगा। हालाँकि, यह व्यापार सृजन को अधिकतम करने और साथ ही व्यपवर्तन हानि को न्यूनतम करने के लिए सावधानीपूर्वक बातचीत की आवश्यकता को रेखांकित करता है।

इस प्रगति और संभावित लाभों के बावजूद, निर्यात को खंडित खाद्य सुरक्षा प्रोटोकॉल, अपर्याप्त मूल्य संवर्धन और पुराने बुनियादी ढाँचे जैसी चुनौतियों का सामना करना पड़ रहा है, जो वैश्विक बाज़ारों में प्रतिस्पर्धात्मकता में बाधा डालते हैं। इन मुद्दों के समाधान और अंतर्राष्ट्रीय कृषि व्यापार में भारत की स्थिति को मज़बूत करने के लिए, यह अध्ययन आपूर्ति श्रृंखलाओं के आधुनिकीकरण, मानकों को संरेखित करने, ब्रांडिंग और पैकेजिंग में सुधार और मज़बूत द्विपक्षीय व्यापार समझौते स्थापित करने सहित व्यापक उपायों का प्रस्ताव करता है।

अन्य गतिविधियाँ

वर्ष 2024-25 की अवधि में, भाकृअनुप - एनआईएपी ने "एक सतत भविष्य के लिए विविधता, प्रौद्योगिकी और नवाचार का उपयोग" विषय पर केंद्रित छह नीति पत्र, छह नीति संक्षिप्त विवरण और कृषि विकास रिपोर्ट 2024 जारी की। संकाय ने 60 शोध लेख प्रकाशित किए, जिनमें से 45% से अधिक अंतर्राष्ट्रीय पत्रिकाओं में प्रकाशित हुए। इसके अलावा, कई लोकप्रिय लेख पत्रिकाओं और समाचार पत्रों में प्रकाशित हुए हैं। संकाय ने नीतिगत बहसों में भी सक्रिय रूप से भाग लिया है।

इस वर्ष भाकृअनुप - एनआईएपी ने कृषि अर्थशास्त्रियों के अंतर्राष्ट्रीय सम्मेलन की सह-मेजबानी की और भारतीय आर्थिक सेवा (आईईएस)-2024 के अधिकारी प्रशिक्षुओं के लिए एक सप्ताह का प्रशिक्षण कार्यक्रम आयोजित किया। इसके अतिरिक्त, इसने कृषि अर्थशास्त्रियों और सामाजिक वैज्ञानिकों के साथ-साथ हाशिए पर पड़े ग्रामीण समुदायों के लिए क्षमता निर्माण कार्यक्रम भी आयोजित किए हैं।

यह संस्थान कृषि एवं किसान कल्याण मंत्रालय और नीति आयोग के लिए एक ज्ञान भागीदार के रूप में कार्य करता है। इसके अलावा, यह अन्य मंत्रालयों और राज्य सरकारों के लिए साक्ष्य-आधारित नीतिगत सिफारिशें भी प्रदान करता है।

Executive Summary

ICAR-National Institute of Agricultural Economics and Policy Research (NIAP) is dedicated to this mission by providing empirical evidence to guide and support agricultural policy formulation. The Institute plays a leading role in advancing agricultural economics and policy research in the National Agricultural Research System (NARS) and serves as a policy think tank for the Indian Council of Agricultural Research (ICAR).

The Institute's significant research activities are categorized into three core themes: Agricultural Growth and Development, Technology and Sustainable Agriculture, and Agricultural Market and Trade.

Agricultural Growth and Development

India aspires to attain the status of a developed nation by its 100th year of independence in 2047. By that time, agriculture's contribution to the gross domestic product (GDP) is anticipated to decrease from the current 18% to 8%, while its share of employment is expected to decline slowly from 46% to 29%. With the population projected to reach 1.6 billion—half of whom will reside in urban areas—food demand is poised to increase significantly. These economic and demographic changes will have significant implications for the transformation of the food system from plate to plough.

Notably, food consumption patterns have undergone significant changes over the past four decades. Diets have shifted from being predominantly cereal-based to being more nutrient-dense. The proportion of cereals in food expenditure has decreased from 44% in 1983 to 10% in 2022-23, while the share of nutrient-rich foods has increased from 28% to 48%. However, this dietary transition has not translated into improved nutritional outcomes. India continues to face the complex challenge of malnutrition, with the paradoxical coexistence of undernutrition and overnutrition. While there have been marginal improvements in child malnutrition indicators, such as stunting, wasting, and underweight, there is concern about increasing overweight and obesity, especially among women. This has led to the emergence of intra-household double-burden malnutrition, where overweight or obese mothers live alongside malnourished children, particularly in southern states such as Kerala, Tamil Nadu, and Karnataka.

Under a business-as-usual scenario, food demand by 2050 is expected to more than double from 2019–20 levels and could increase even more rapidly with higher economic growth. However, India's agri-food system faces significant challenges ranging from climate change to inefficient value chains. Other challenges include decreasing agricultural land, inefficient use of fertilizers and water, underinvestment in agricultural research, poor targeting of agricultural credit, and inadequate market infrastructure. To ensure sustainable food production and inclusive growth, a comprehensive and integrated approach is essential, encompassing innovative techniques, such as precision agriculture, climate-resilient crops, improved irrigation systems, and renewable energy.

To facilitate sustainable transformation of the agricultural sector, consistent public investment is essential. Investment levels have risen from Rs. 498 billion in 1990–91 to Rs. 4,415 billion in 2022–23 (at 2011–12 prices), although there has been significant variation in its proportion of total development expenditure. The central government's contribution to the total agricultural investment increased, accounting for over 60%.

Technology and Sustainable Agriculture

Agriculture in India has experienced significant transformation in recent decades, primarily owing to technological advancements and policy interventions. In this thematic area, research activities have predominantly focused on evaluating the impact of these initiatives on irrigation infrastructure, energy consumption, mechanization, crop and livestock productivity, climate resilience, and social inclusion.

The expansion of irrigation in India from 1950-51 to 2022-23 is a remarkable achievement. The irrigated area increased from 21 million hectares to nearly 79 million hectares, significantly increasing the irrigation coverage from 17.6% to 56.4% of the cropped land. Notably, there was an increase in canal-irrigated area after 2015, attributed to the completion of long-pending projects under the Accelerated Irrigation Benefit Program (AIBP). Despite these impressive gains, the uneven pace of irrigation expansion across different regions requires a more balanced approach for resource allocation and infrastructure development.

Groundwater irrigation plays a crucial role in enhancing crop production; however, its unsustainable extraction presents a significant long-term threat, particularly in regions that experience rapid groundwater depletion. To mitigate this problem, tiered electricity pricing has emerged as a promising solution. This approach offers heavily subsidized electricity up to a certain threshold beyond which farmers are required to pay full tariffs. For example, Uttar Pradesh implemented a scheme that provides 100% subsidies on energy charges for small pumps, up to a specified limit. An analysis of various regions with differing groundwater depths, such as Sitapur, Baghpat, and Jalaun, illustrates the effectiveness of this model in supporting smallholders while promoting water conservation practices. Nevertheless, the success of tiered electricity pricing depends on the careful calibration of the subsidy thresholds. If these thresholds are set too generously, particularly in areas with shallow groundwater, the policy may not effectively incentivize efficient water use. This highlights the importance of region-specific adjustments and regular policy reviews to ensure alignment with the local hydrological and agricultural conditions.

Solar-powered micro-irrigation systems offer significant benefits, including reduced reliance on fossil fuels and improved water use efficiency. Despite their rapid growth, adoption remains limited due to the fragmented implementation of the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) and the solar energy initiative Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan Yojana (PM-KUSUM). There is a pressing need for institutional convergence, enabling a single agency to manage the entire process, from registration to equipment delivery. Such an integration could potentially conserve up to 65 billion cubic meters of groundwater and decrease carbon emissions by 45 million tons annually. This transition is particularly cost-effective when replacing diesel pumps. With subsidies, farmers can recoup their investment costs within two years, although replacing electric pumps remains less feasible owing to existing free or subsidized electricity. Redirecting electricity subsidies to capital subsidies for solar equipment may help to address this challenge.

Mechanization is an essential aspect of sustainable agriculture, especially for small and marginal farmers. Custom hiring centers (CHCs) provide affordable access to farm machinery and have had a measurable impact on lowering production costs and increasing returns. In Uttar Pradesh, CHC users saw a 4.5% reduction in cultivation costs and nearly 12% higher net returns from paddy cultivation. However, the benefits are not evenly distributed. Rental rates are lower than those of private providers, but

CHC operators frequently prefer large farmers and pricing transparency remains an issue.

Drones significantly enhance resource use efficiency. Currently, drones are primarily used to spray pesticides and fertilizers, leading to considerable savings in time, water, and labor. The stark difference between traditional methods and drone-assisted spraying is clear: drone spraying uses only 10 liters of water per acre and completes the task in only 11 minutes. These advancements are especially advantageous for labor-intensive crops, such as paddy and sugarcane, where resource optimization is essential. However, their impact on crop yields remains relatively modest, indicating that there is still an untapped potential for utilizing these technologies to boost overall agricultural productivity.

Climate change presents a substantial threat to agriculture in vulnerable regions such as eastern Uttar Pradesh. A block-level risk assessment identified that 28% of blocks are subject to high to very high climate risk due to significant exposure and limited adaptive capacity. To effectively address these challenges, it is essential to implement targeted interventions, including the development of resilient infrastructure, execution of community adaptation programs, and promotion of sustainable land and water management practices.

Significant advancements in crop varietal development have been made to combat climate-related agricultural challenges. Wheat varieties like PBW 826, PBW 766, and PBW 869, developed by Punjab Agricultural University, Ludhiana, have demonstrated substantial economic and environmental benefits. Similarly, improved berseem fodder varieties, such as BL-10, Wardan, and BB-2, developed by the Indian Grassland and Fodder Research Institute (ICAR-IGFRI), have contributed to increased forage yield and milk production. However, the adoption of these varieties remains limited due to a lack of awareness and access to seeds. This underscores the critical need to strengthen extension systems and improve supply chains to effectively scale up the adoption of varietal innovations, thereby enhancing agricultural resilience and productivity in the face of climate change.

Similarly, the introduction of Co 0238 by the ICAR-Sugarcane Breeding Institute, a high-yielding sugarcane variety, significantly enhanced sugar production and improved the value of by-products, such as bagasse and ethanol. Ethanol production has increased from 700 million liters in 2016-17 to 4,500 million liters in 2022–23. This development has implications not only for clean energy and reduced emissions but also for augmenting farmer incomes and enhancing the financial viability of sugar mills.

Resource conservation technologies offer various ecosystem services and contribute significantly to the sustainability of agriculture. A study in Punjab reveals that farmers are inclined to adopt direct seeding and switching to legumes to compensate for approximately Rs. 29,000 per hectare. These practices not only conserve groundwater but also mitigate the air pollution associated with stubble burning. Biostimulants are a promising solution, and their application can significantly enhance crop yields, soil carbon, and nutrient uptake.

India has a large livestock population producing over 1.2 billion tonnes of dung. This offers a significant opportunity to enhance energy security and agricultural sustainability. Dung can be converted into biogas, bio-CNG (compressed natural gas), and organic fertilizers, potentially generating an economic value of up to Rs. 2 trillion annually. This strategy not only fosters a circular economy around animal waste, but also addresses multiple environmental and agricultural challenges concurrently.

Importantly, India can reduce its reliance on LNG and chemical fertilizers if this potential is fully realized.

The livestock sector has critical significance in the sustainable development of agriculture. To harness the full benefits of the livestock sector, access to dairy breeding and health services is crucial. One study reveals the widespread adoption of artificial insemination (AI) among dairy farming households in Uttar Pradesh and Haryana. However, the utilization of advanced AI technologies such as Sex Sorted Semen (SSS) AI remains limited. Key factors influencing the adoption of SSS AI include education level and the number of crossbred or exotic cows, underscoring the need for targeted interventions to enhance access to advanced breeding services. Another underutilized resource with significant potential is bovine dung.

Technical efficiency (TE) in rice production demonstrates substantial regional disparities across Indian states with significant implications for overall agricultural growth. The stark contrast between states such as Bihar and Chhattisgarh, with a TE of 0.61, and Punjab, boasting a near-perfect 0.98, underscores the vast potential for improvement in many regions. The national average of 0.71, suggests that considerable gains in rice production are achievable through enhanced efficiency measures. A potential increase of 45.2 million tonnes of rice can be realized if the TE is achieved at its maximum level.

A study in Haryana, Uttar Pradesh, and Rajasthan highlights a critical issue of social equity: Scheduled Caste (SC) and Scheduled Tribe (ST) farmers have significantly less access to land, irrigation, and farm assets than their upper-caste counterparts do. These disparities result in lower technical efficiency and farm income. Policy interventions should prioritize equitable resource access, targeted subsidies, and inclusive technology dissemination.

Agricultural Market and Trade

In this thematic area, studies have revealed the complex forces shaping India's agricultural markets, including government-mandated price support and international trade dynamics. At the heart of the domestic price policy is the Minimum Support Price (MSP), which guarantees farmers a baseline price for essential crops. Research shows that for nearly all major crops, except paddy, increases in MSP consistently lead to immediate and sustained increases in farm harvest prices (FHPs). Although the feedback from FHPs to MSPs is weaker, it still suggests that policymakers are attentive to market realities when setting future price floors.

A comprehensive national-level analysis of over one thousand Farmer Producer Organizations (FPOs), categorized by annual turnover demonstrates that high-performing entities are typically older, possess larger memberships, cover a broader range of villages, and have greater equity capital. Notably, FPOs with a higher proportion of Scheduled Caste/ Scheduled Tribe (SC/ST) members exhibit slightly lower performance, suggesting that inclusive governance may require tailored strategies. Furthermore, FPOs with fewer directors and streamlined decision-making processes outperform those with more complex board structures, underscoring the significance of effective governance. Additionally, FPOs that extend their market reach beyond state boundaries and engage in national or international sales outperform their locally focused counterparts. These findings underscore the essential roles of scale, governance, and market linkages in the success.

A study on the valuation of Geographical Indication (GI) for Basmati rice indicates that, on average, GI status results in a premium price of Rs. 1840 more per ton at the farm gate and approximately Rs. 3,792 in additional net income per acre. These economic benefits reflect consumers' willingness to pay for a verifiable origin and quality, highlighting GI's potential not only to enhance smallholder incomes but also to promote broader rural development.

Expanding the cultivation of pearl millet, a crop known for its climate resilience, on a large scale could address multiple challenges simultaneously. Restoring pearl millet cultivation to the levels seen between the 1970s and 1990s could yield significant economic benefits for the nation, including potential savings of Rs. 6220 million in food subsidies. Furthermore, the transition towards pearl millet cultivation aligns with initiatives to combat climate change. As a drought-tolerant crop with lower water requirements than those of rice and wheat, pearl millet is particularly suited to regions facing increasing water scarcity. Its cultivation can reduce greenhouse gas (GHG) emissions.

In light of the increasing interest in sustainable consumption patterns, a bibliometric analysis of research on organic food consumption from 1991 to 2022 indicated an annual growth of approximately 16% in publications, with the United States, India, and Germany at the forefront. Thematic mapping of research on organic agriculture demonstrates a transition from initial conceptualization to more in-depth analyses of consumer attitudes, willingness to pay, and the influence of green marketing and environmental concerns. Indigenous tree crops such as Prosopis cineraria (khejri) and Capparis decidua (kair) are widely consumed in India's arid regions. A study of their consumption patterns reveal that rural populations are more knowledgeable and frequent consumers, attributed to cultural ties and homegrown supply. Conversely, urban consumers exhibit lower consumption levels because of their limited awareness and the poor availability of these crops. Processed forms of these crops are generally unpopular, and traditional preparation methods prevail in consumption habits. This study recommends enhancing market access, culinary education, and targeted pricing strategies to improve the commercial viability and conservation of these indigenous crops.

India's agricultural exports have shown significant growth, reaching US $53.15 billion in 2022-23 and comprising approximately 12% of total merchandise shipments. The key commodities driving this expansion include rice, sugar, prawns, and spices. Cotton's contribution decreased from over 25% in the early 2000s to approximately 13%.

Another study provides insights into potential trade opportunities and challenges. A simulated India-UK Free Trade Agreement using the SMART model suggests that eliminating tariffs could generate an additional US$ 408 million in bilateral trade for beverages, spirits, and vinegar, with marine products and edible preparations also benefiting. However, this highlights the need for careful negotiations to maximize trade creation while minimizing diversion losses.

Despite this progress and potential benefits, exports face challenges, such as fragmented food safety protocols, insufficient value addition, and outdated infrastructure, which impede competitiveness in global markets. To address these issues and enhance India's position in international agricultural trade, this study proposes comprehensive measures including modernizing supply chains, aligning standards, improving branding and packaging, and establishing stronger bilateral trade agreements.

Other Activities

In 2024-25 period, ICAR-NIAP released six Policy Papers, six Policy Briefs, and the

Agricultural Development Report 2024, centered on the theme "Harnessing Diversity, Technology, and Innovation for a Sustainable Future." The faculty published 60 research articles, of which over 45% were featured in international journals. In addition, numerous popular articles have appeared in magazines and newspapers. The faculty also participated actively in policy debates.

This year, the ICAR-NIAP co-hosted the International Conference of Agricultural Economists and organized a one-week training program for the Officer Trainees of the Indian Economic Service (IES)-2024. In addition, it has conducted capacity-building programs for agricultural economists and social scientists, as well as for marginalized rural communities.

The Institute serves as a knowledge partner for the Ministry of Agriculture and Farmers' Welfare and NITI Aayog. Furthermore, it provides evidence-based policy recommendations for other ministries and state governments.

1 ICAR-NIAP: An Overview

The National Institute of Agricultural Economics and Policy Research (NIAP), established in 1991 by the Indian Council of Agricultural Research (ICAR), stands as a cornerstone in advancing agricultural economics and policy research in the National Agricultural Research System (NARS). As a think tank for ICAR, it provides evidence-based insights to empower the Council to influence and shape agricultural policy decisions. The Institute's core mission is to meticulously evaluate the impact of agricultural research and spearhead policy research for science-driven agricultural growth and rural advancement. Furthermore, it provides robust, evidence-based inputs to NITI Aayog, the Ministry of Agriculture and Farmers Welfare, and other related ministries of the central government, as well as state governments, to feed into policies for the sustainable development of agriculture.

Vision

Leveraging innovations for attaining efficient, inclusive, and eco-friendly agricultural growth through agricultural economics and policy research

Mission

To strengthen agricultural economics research for providing economically viable, socially acceptable, and environmentally feasible policy options for science-led agricultural growth

Mandate

- Agricultural economics and policy research on markets, trade, and institutions
- Growth and development models for sustainable agriculture
- Technology policy, evaluation, and impact assessment

The Institute has made significant contributions to the advancement of the agricultural economics discipline in the country. It has played a crucial role in guiding the Council in prioritizing the nation's agricultural research agenda for improving the efficiency of research investments. Furthermore, the Institute has made substantial contributions in various research domains, including food system transformation, future demand and supply of food, intra-household malnutrition dynamics, public investment in agriculture, impact of agricultural technologies, policy repurposing, price policy, trade, market linkages, and circular economy.

The institute is committed to establishing partnerships with national and international organizations, as well as various ministries of the Government of India, to conduct research on shared economic and social issues. It aims to guide the trajectory of agricultural growth through policy-oriented research and effective communication.

Strategies

To achieve its vision, the Institute's strategies focus on conducting and promoting agricultural policy research, as well as implementing training and policy interfacing programs in the following areas:

1. Policy studies on agricultural development issues through in-house, collaborative, and consultancy research
   - Research and Development (R&D) policy and technology management
   - Natural resource and environmental economics
   - Agricultural development, markets, and trade
2. Strengthening agricultural economics and policy research

- Capacity development through facilitation and networking
- Training programs and collaborative research
- Enhance ICAR's participation in policy decisions through policy dialogues and institutional linkages

Institute Activities

Research activities

The scientific activities are organized under three broad themes:

- Agricultural Growth and Development
- Technological and Sustainable Agriculture
- Agricultural Market and Trade

Capacity building

The ICAR-NIAP is instrumental in enhancing the capabilities of human resources involved in agricultural economics, policy research, and administration. To achieve this, it has established formal connections both within and beyond the NARS, focusing on networking and training in advanced analytical skills and policy analysis.

Policy interface and communication

ICAR-NIAP plays a vital role in shaping policy by engaging its faculty in policy dialogues, debates, and committees at both the central and state government levels. The Institute consistently publishes policy papers and briefs addressing contemporary issues.

Organization and Management

The Director of the Institute is supported by several committees in the management of research and administrative functions. The Research Advisory Committee (RAC) provides guidance in research planning, capacity building, policy communication, and research evaluation. The Institute Management Committee (IMC) oversees the overall functioning of the Institute.

To aid the Director in managing the Institute effectively, several internal committees have been established. The Institute Joint Staff Council (IJSC) facilitates consultative decisions aimed at safeguarding and advancing the interests of the staff. The Institute also regularly meets with its scientific, technical, and administrative staff to discuss scientific and management issues.

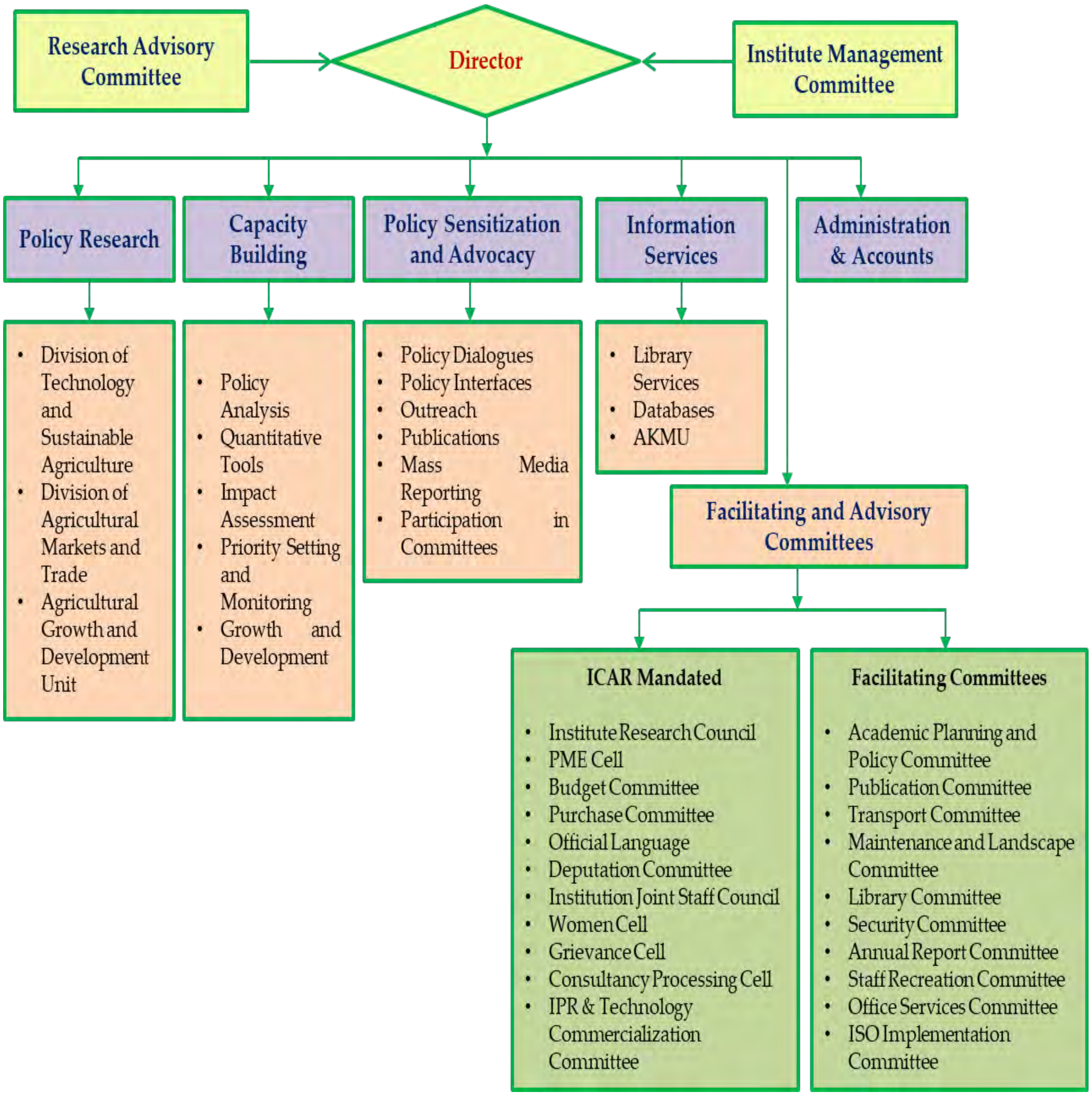
Information, Data and Facilitative Services

Agricultural Knowledge Management Unit (AKMU)

The Agricultural Knowledge Management Unit (AKMU) plays a pivotal role in fostering knowledge exchange, dissemination, and capacity-building within the agricultural sector. By organizing workshops, seminars, training programs, and outreach activities, AKMU effectively bridges the gap between research and practical application, ensuring that the latest advancements in agricultural economics and policy research reach a diverse audience of policymakers, researchers, farmers, and other stakeholders. The Unit's commitment to developing and maintaining digital repositories, databases, and information portals further enhances accessibility to valuable resources, promoting evidence-based decision-making and sustainable agricultural development.

AKMU's dedication to leveraging cutting-edge information technologies is evident in its implementation of advanced tools and systems. The Institute boasts state-of-the-art computing infrastructure, including 150 LAN (Local Area Network) points strategically distributed throughout the building, providing all staff members with essential computational resources. AKMU also manages various Management Information Systems (MIS) modules, such as the Financial Management System (FMS), Foreign Visit Management System (FVMS), Agricultural Research Management System (ARMS), and Electronic Human Resource Management System (e-HRMS), ensuring efficient operations across the Institute.

Figure 1.1. Organogram of ICAR-NIAP



Surveillance audit for ISO (International Organization for Standardization) 9001:2015

To maintain our commitment to the highest standards of quality and excellence, ICAR-NIAP has successfully completed the audit for ISO 9001:2015 and was awarded ISO certification, which is valid for another three years after annual surveillance. This reaffirms our dedication to adhering to internationally recognized quality management practices. We continue to prioritize systematic approaches to ensure consistent quality in our products and services, enhancing organizational efficiency and customer satisfaction.

ICAR-NIAP website: A Comprehensive Resource

ICAR-NIAP maintains a comprehensive website that serves as a central hub for disseminating information about the institute's activities and research. The bilingual website, available in English and Hindi, offers a wide array of resources for stakeholders, including detailed information on ongoing and completed research projects, an extensive collection of publications, and updates on employment opportunities. The site also provides access to tender notices, Right to Information (RTI) details, and information about the institute's infrastructure and staff profiles.

The website's key features encompass various aspects of ICAR-NIAP's work and operations. Visitors can explore research projects covering topics in agricultural economics, policy analysis, and agribusiness management. The publication section offers access to research papers, articles, annual reports, and policy briefs, providing valuable insights into agricultural sector trends and issues. Additionally, the website keeps users informed about job vacancies, fellowships, and training programs, supporting career advancement in the field. The inclusion of tender notices, RTI information, and details about infrastructure facilities further enhances transparency and showcases the institute's resources. By providing staff profiles, the website also offers insight into the expertise and specializations of ICAR-NIAP's research team, fostering potential collaborations and networking opportunities within the agricultural research community.

ICAR e-HRMS 2.0 at ICAR-NIAP

In accordance with ICAR directives, the institute has fully transitioned to the new e-HRMS 2.0 system. This comprehensive platform includes modules for Employee Information, HR Policies, Leave Management, and Performance and Appraisal Systems, all designed to enhance human resource management and promote a productive workforce. The system has significantly improved our HR (Human Resources) management capabilities.

Human resources

The staff position at the ICAR-NIAP during 2024-25 is shown in Table 1.1.

Table 1.1. Staff position at ICAR-NIAP during the year 2024-25 (as of 31.03.2025)

S. No.	Class of posts	Total posts sanctioned	Total employees in position
1	Research Management Position	1	1
2	Head of Division	2	1
	Scientific Posts		
3	Principal Scientist	1	2
4	Senior Scientist	6	5 #
5	Scientist	21	19*
	Technical Posts		
6	Technician (T-1)	3	1
7	Technical Assistant (T-3)	4	1
	Administrative Posts		
8	Administrative Officer	1	1^
9	Finance & Accounts Officer	1	1
10	Assistant Administrative Officer	1	1
11	Personal Secretary	1	1
12	Assistant	4	4
13	Upper Divisional Clerk	1	0
14	Personal Assistant	2	1
15	Lower Divisional Clerk	2	2
16	Multi-Tasking Staff	2	1
	Total	53	42

One Principal Scientist is working against the post of DR-Senior Scientist

* One Principal Scientist is working against the post of DR-Scientist

^ One Senior Administrative Officer is working against the post of Administrative Officer.

2 Research Achievements

Agricultural Growth and Development

Indian agriculture to 2047

P. S. Birthal, S. K. Srivastava, Raka Saxena, Samarth Godara, Prem Chand, Prabhat Kishore, Jaya Jumrani, Ankita Kandpal, Purushottam Sharma and Devesh Kumar Pant

India envisions achieving the status of a developed nation by the time it celebrates its centenary of independence in 2047. By then, agriculture's contribution to the gross domestic product (GDP) is expected to decrease to around 8% from the current 18%, and its share in the workforce will drop to 29% from 46% (Figure 2.1). The country's population will reach 1.6 billion, with nearly half of them residing in urban areas. This demographic shift, coupled with accelerated economic growth, will significantly boost food demand. According to a recent NITI Aayog report, under the business-as-usual scenario, India's overall food demand by 2047 will more than double compared to 2019-20. This demand will be even higher if economic growth accelerates to 7-8%.

Figure 2.1. Share in GDP and workforce

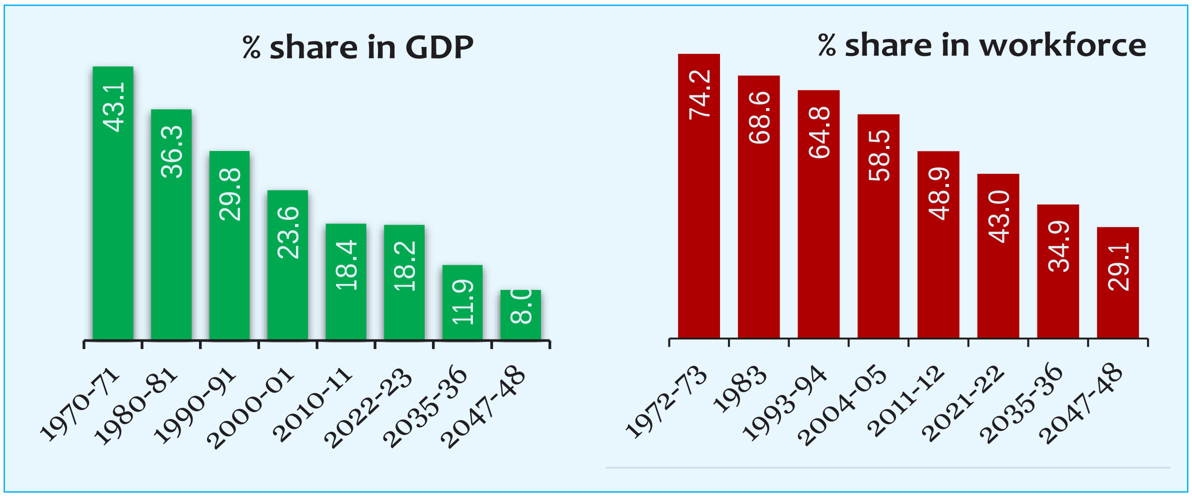
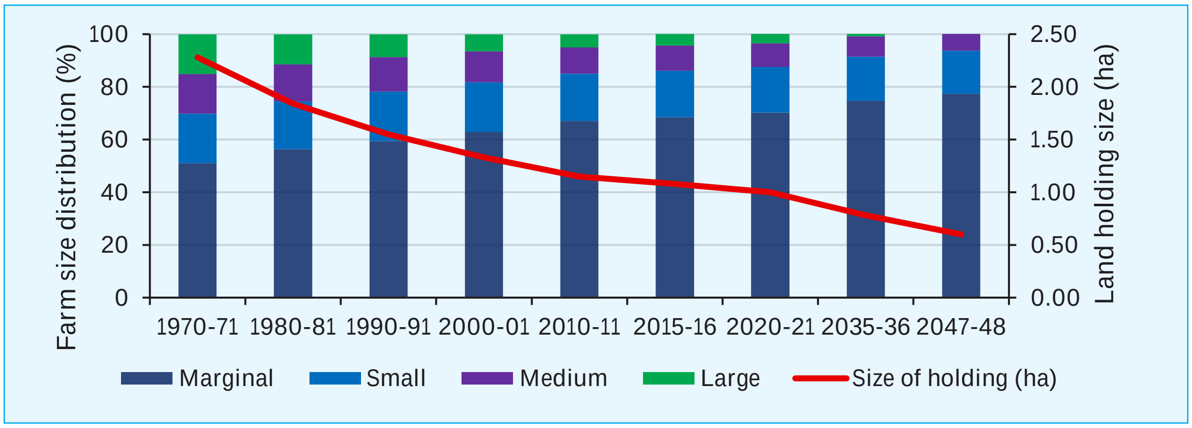


Figure 2.2. Agrarian structure



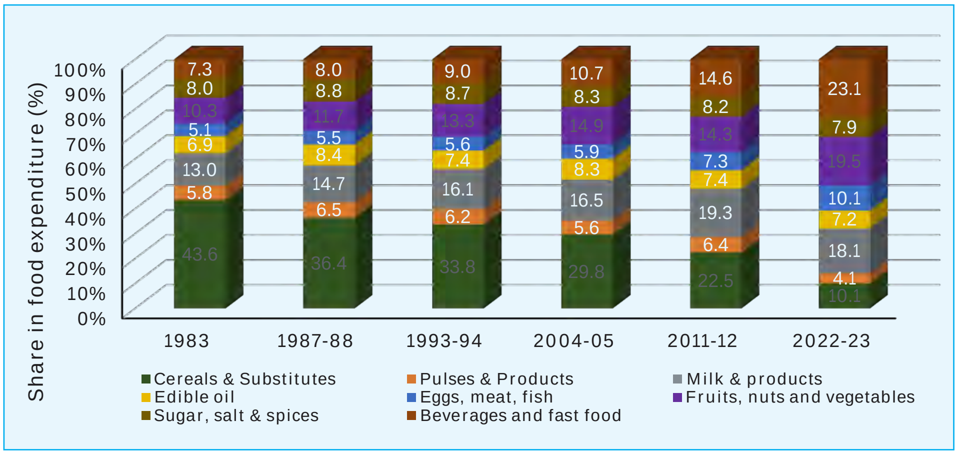
However, the agri-food system now faces critical challenges, including growing water scarcity, soil degradation, depletion of non-renewable energy sources, and climate change. Other significant challenges include decreasing agricultural land (Figure 2.2), low fertilizer and water use efficiency, insufficient funding for agricultural research and development (R&D), lack of targeting in agricultural credit, and underdeveloped markets and value chains. Addressing these interconnected challenges requires a comprehensive and integrated approach to ensure sustainable food production and distribution. Efficient management of land, water, and energy resources through innovative techniques such as precision agriculture, water-conserving irrigation systems, and renewable energy integration is crucial. Enhancing resilience to climate change through the development of drought-resistant crop varieties, implementation of climate-smart agricultural practices, and reinforcement of agricultural insurance mechanisms is imperative. Sustained investment in agricultural R&D and its prioritization across subsectors, along with improved targeting of agricultural credit, is essential. Expanding markets and value chains, reforming agricultural price policies, ensuring policy coherence across various sectors, and expanding the rural non-farm sector are also vital for creating a supportive ecosystem for sustainable food production and inclusive growth in the agri-food system.

Realigning agricultural policies to evolving consumer preferences

P. S. Birthal, S. K. Srivastava and Jaspal Singh

Over the past four decades, India's food consumption patterns have experienced a significant transformation, transitioning from a diet predominantly based on cereals to one enriched with nutrient-dense foods. The proportion of cereals in food expenditure has decreased markedly from 44% in 1983 to just 10% in 2022-23, while the share of nutrient-dense foods has increased substantially from 28% to 48% (Figure 2.3). This shift is particularly evident in the increased consumption of animal-source foods, horticultural products, beverages, and fast foods. These evolving consumption patterns have significant implications for India's agricultural sector and policy framework. It may necessitate the reallocation of existing incentives to support a transition from low-value, calorie-rich cereals to high-value, nutrient-dense, and labour-intensive food commodities. Furthermore, there is an increasing emphasis on promoting sustainable agricultural practices to meet the growing demand while mitigating the negative externalities associated with changing food consumption patterns.

Figure 2.3. Changes in household food consumption patterns in India



Source: Authors' estimates based on National Sample Survey - Consumption Expenditure Surveys data

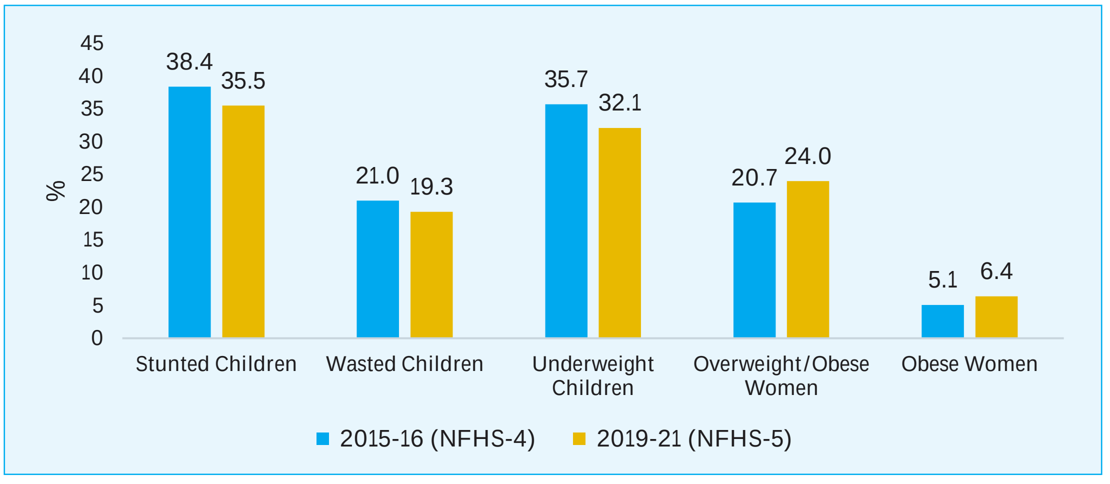
Untangling India's intra-household dual burden of malnutrition

Jaya Jumrani

The study evaluates the incidence of malnutrition in India, which continues to be a pressing public health concern. Using unit-level data from the National Family Health Survey (NFHS) rounds conducted during 2015-16 (NFHS-4) and 2019-21 (NFHS-5). The analysis estimates the incidence of malnutrition both at the individual and household levels with a specific focus on vulnerable population groups, i.e., women of reproductive age (15-49 years) and children under the age of five. Undernutrition in children is measured at the individual level using three anthropometric outcome indicators, i.e., stunting[1], wasting[1], and underweight[1]. The findings highlight that child malnutrition has decreased over time across all indicators, with the greatest gains noted for underweight and the smallest for wasting (Figure 2.4). However, there has been a concerning rise in overweight or obesity (BMI ≥ 25 kg/m²) and obesity (BMI ≥ 30 kg/m²) among women during the same period. The prevalence of overweight or obesity in women increased from 20.7% in 2015-16 to 24.0% in 2019-21, while obesity increased from 5.1% to 6.4%.

The study further analyzed the prevalence of intra-household DBM among mother-child pairs living in the same household, revealing a notable increase between 2015-16 and 2019-21. The most prevalent form of intra-household DBM was the combination of overweight or obese mothers with stunted children (OWOBM-SC), accounting for 4.03% in 2015-16, which rose to 5.18% in 2019-21. The second most prevalent form was overweight or obese mothers having underweight children (OWOBM-UC), which increased from 3.24% to 3.97% over the same period. Meanwhile, the incidence of overweight or obese mothers having wasted children (OWOBM-WC) only rose by 0.36 percentage points between 2015-16 and 2019-21. Consequently, the overall prevalence of intra-household DBM among mother-child pairs, encompassing overweight or obese mothers having either stunted, wasted, or underweight children (OWOBM-SWUC), increased from 5.96% to 7.57% over the five-year period (Table 2.1).

Figure 2.4. Prevalence of malnutrition (%) in India



Source: National Family Health Survey Round-4 (2015-16) and Round-5 (2019-21).

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[1] *Stunting - Height-for-age z-score (HAZ) <-2 standard devia*
[2] *Wasting - Weight-for-height z-score (WHZ) <-2 standard deviations (SD) of the WHO child growth standards median.*
[3] *Underweight - Weight-for-age z-score (WAZ) <-2 standard deviations (SD) of the WHO child growth standards median.*

Table 2.1. Prevalence of various forms of intra-household DBM in India

DBM form:	2015-16 (NFHS-4)		2019-21 (NFHS-5)		Change (in percentage points)
	Frequency	Weighted proportion (%)	Frequency	Weighted proportion (%)	
Overweight/Obese Mother - Stunted Child	7360	4.03	9151	5.18	1.15
Overweight/Obese Mother - Wasted Child	3575	2.12	4305	2.48	0.36
Overweight/Obese Mother - Underweight Child	5499	3.24	7159	3.97	0.73
Overweight/Obese Mother - Undernourished (Stunted/ Wasted/Underweight) Child	10634	5.96	12978	7.57	1.61

Source: Author's estimation using unit-level data from the National Family Health Survey Round-4 (2015-16) and Round-5 (2019-21).

The prevalence of intra-household DBM in the form of OWOBM-SWUC shows notable variation across states and union territories in 2019-21. Kerala, Goa, Tamil Nadu, and the NCT of Delhi stand out with a high prevalence (>13%) of OWOBM-SWUC. A closer examination of the regional intra-household DBM reveals that the southern region, comprising Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, and Telangana, has significantly higher rates of intra-household DBM of OWOBM-SWUC than the national average of 7.57%. In contrast, states like Rajasthan, Jharkhand, and Chhattisgarh had the lowest prevalence of OWOBM-SWUC (ranging between 3-4%) in 2019-21.

While improvements in child malnutrition indicators are encouraging, the concurrent rise in maternal overweight and obesity poses a significant public health challenge. Furthermore, the rapidly rising incidence of intra-household DBM highlights the paradox of economic progress and nutritional imbalance, necessitating holistic and inclusive policies.

Food system transformation in India

Balaji S. J., Purushottam Sharma, S. K. Srivastava and Kingsly Immanuelraj T.

A study was conducted to prepare agri-food system development scenarios for India between 2023 and 2050, and to analyze the economy-wide implications of anticipated changes in the agri-food system. Three different growth scenarios, namely progressive, aggressive, and retreating growth states, were developed for the economy, following the neoclassical growth framework, and growth projections were made until 2050. Detailed consumption, production, and trade estimates were projected for major commodities and commodity groups. In addition, the environmental implications for water and carbon footprints were projected for 2050. The results reveal that, with the right development strategies in place, India has the potential to reach the status of a developed country by 2050, driven by targeted economic policies and investments. Food demand projections indicate a substantial increase in household consumption demand in 2050 for fruits, vegetables, milk, meat, and fish, with changing dietary patterns and income growth. However, total food demand in the economy stands apart from household demand, with a sizeable portion absorbed by food processing and consumption linked to industrial and service sector activities.

Supply projections suggest that the country can meet its food demand through domestic production-enhancing strategies, with a few exceptions. Trade could play a crucial role in bridging the gap between demand and supply constraints, facilitating access to imports to complement local production. Projected estimates highlight concerns over managing critical resources such as water for irrigation and addressing climatic disruptions to ensure resilience. These challenges underscore the need for greater efficiency in resource management and the promotion of innovative solutions.

Public investment in Indian agriculture

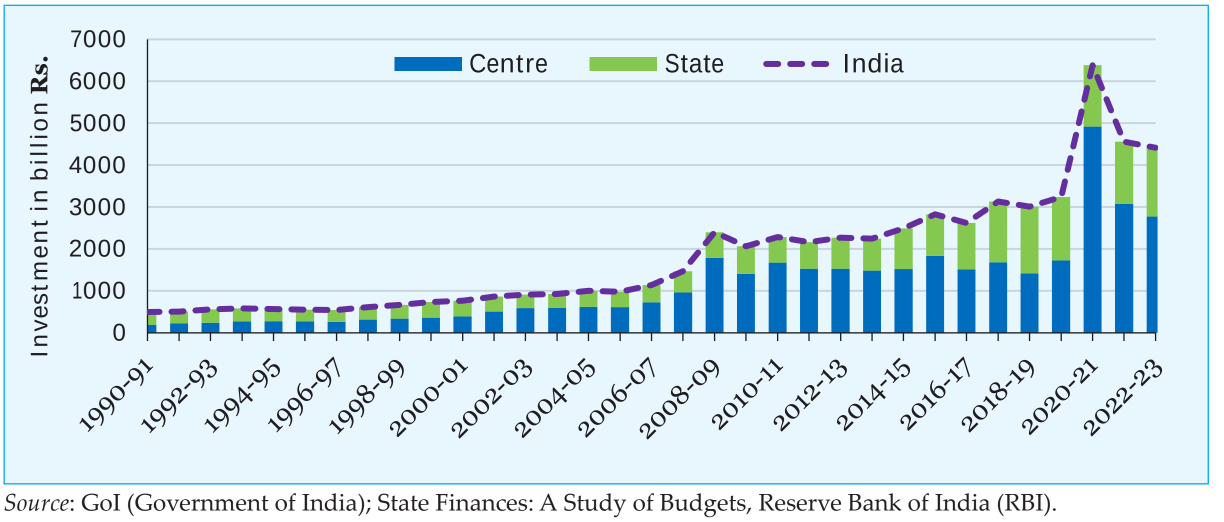
Ankita Kandpal, P. S. Birthal and Kiran Kumara T. M.

Since 1990-91, public investment in agriculture and allied activities has expanded eightfold, rising from Rs. 498 billion to Rs. 4415 billion in 2022-23 at 2011-12 prices (Figure 2.5). While the early 1990s witnessed a nearly even contribution of central and state governments in public investment in Indian agriculture, the central government's share increased significantly during the subsequent years, reaching up to more than 60% in the most recent decade.

The proportion of public expenditure allocated to agriculture has fluctuated over the past 3 decades, declining from an average of 5.4% between 1990–91 and 2002–03 to 2.7% during 2003–04 to 2007–08, thereafter witnessing a brief rise to 5.28% in 2020–21 before settling at 4.22% in 2022–23. Concurrently, agriculture's share in India's Gross Value Added (GVA) decreased from 29.8% in 1990–91 to 18.2% in 2022–23, primarily due to the rapid expansion of the industrial and service sectors.

The Central and state governments in India allocate their agricultural development funds based on their respective priorities, with the Central government primarily funding sectors like agricultural finance institutions and food storage, while states focus more on areas such as animal husbandry and soil conservation. Over time, there have been shifts in this expenditure composition, notably an increase in the Central share for dairy development and a decrease in its share for fisheries and other agricultural programmes (Table 2.2).

Figure 2.5. Public investment in agriculture and allied activities (at 2011-12 prices)



Source: GoI (Government of India); State Finances: A Study of Budgets, Reserve Bank of India (RBI).

Table 2.2. Source of funds under major activities of agriculture and allied sector

Activities	Share in total expenditure (%)			
	Centre		State	
	1993-94 to 2002-03	2013-14 to 2022-23	1993-94 to 2002-03	2013-14 to 2022-23
Crop Husbandry	47.35	46.12	52.65	53.88
Soil and Water Conservation	2.17	0.46	97.83	99.54
Animal Husbandry	2.62	5.65	97.38	94.35
Dairy Development	13.10	23.75	86.90	76.25
Fisheries	12.41	5.92	87.59	94.08
Forestry and Wildlife	4.61	3.02	95.39	96.98
Plantations	90.47	97.54	9.53	2.46
Food Storage and Warehousing	89.76	87.96	10.24	12.04
Agricultural Research and Education	47.26	43.64	52.74	56.36
Agricultural Financial Institutions	100.00	100.00	0.00	0.00
Co-operation	4.29	1.57	95.71	98.43
Other Agricultural Programmes	33.14	13.40	66.86	86.6

Source: Estimates computed using data sourced from State Finances: A Study of Budgets, Reserve Bank of India.

Impact of fertilizer subsidy removal on foodgrain production

Sant Kumar and Kingsly Immanuelraj T.

Subsidies are often blamed for the mounting fiscal burden and imbalance in nutrient use. Both for and against views have been expressed about the adverse impacts on production if subsidies are removed. This study assesses the likely impact of a decline in fertilizer subsidy on foodgrain production by employing a three-stage least squares (3SLS) regression model using data for 52 years derived from the Directorate of Economics and Statistics, GoI, and Fertilizer Statistics. The estimates highlight that a 1% increase in fertilizer use enhances foodgrain output by 0.16%. The elasticity of foodgrain with respect to its own price and gross irrigated area are 0.21 and 0.76, respectively. While a 1% increase in fertilizer prices (real) reduces its use by 0.68%. The elasticity of foodgrains with respect to fertilizer price (real) comes to -0.106, and concludes that a 1% change in fertilizer price causes a decline in foodgrain production by 0.11%. These estimates have been used to examine the change in fertilizer subsidy on fertilizer use and its likely impact on foodgrain production (Table 2.3).

Table 2.3. Impact of fertilizer subsidy removal on foodgrain production

Particulars	Dimension
Elasticity of foodgrain production with respect to fertilizer use	0.16
Elasticity of fertilizer use with respect to its own price	-0.68
Elasticity of foodgrain production w.r.t fertilizer price (real)	-0.11
Weighted price NPK (2021-22) Rs. /kg	48.20
Fertilizer subsidy during TE 2021-22 (Rs. billion)	1209.35
Fertilizer use during TE 2021-22 (million tonnes)	30,5.68
Fertilizer subsidy on NPK (Rs. /kg)	29.40
Increase in fertilizer price due to removal of subsidy (%)	63.87
Impact of removal of fertilizer subsidy on foodgrain production (%)	-6.79

Note: Authors' estimate

The average price of fertilizers (weighted for Nitrogen (N), Phosphorus (P), and Potassium (K)) has been at Rs. 48.20 per kg, and the subsidy is estimated to be Rs. 29.40 per kg. If the subsidy on fertilizer is removed completely, then the price of fertilizer would increase by 64%. This would cause a decline in foodgrain production by 6.8%. In monetary terms, the value of fertilizer subsidy was Rs. 1209 billion during Triennium Ending (TE) 2021-22.

Technology and Sustainable Agriculture

Performance of irrigation infrastructure in India

S. K. Srivastava, Prabhat Kishore, P. S. Birthal, P. S. Brahmanand and Monalisha Pramanik

With massive public and private investment, the net irrigated area in the country has expanded 3.7 times from 21 million ha in 1950-51 to 79 million ha in 2022-23, making India the global leader in irrigation infrastructure. Irrigation coverage has improved from 17.6% to 56.4% during this period at the national level. Nevertheless, the pace of improvement in irrigation infrastructure has remained uneven over time and across states, though there has been an acceleration in recent years. The irrigation coverage (share of net irrigated area in the net sown area) has improved at an annual rate of 0.90 percentage points from 2015-16 to 2022-23, as compared to 0.60 percentage points from 2005-06 to 2015-16.

Table 2.4 compares the performance of the irrigation infrastructure from 2015-16 to 2022-23 with the previous period, 2005-06 to 2015-16. Reliability of water varies across different sources of irrigation, with groundwater exhibiting the least level of instability. Instability in net irrigated areas has decreased in recent years. Canal-irrigated areas have witnessed the highest improvement in stability in incremental areas. The irrigation intensity has improved from 0.57 percentage points per annum during the earlier period to 1.44 percentage points during the later period. Improvement in irrigation infrastructure also brings fallow land under cultivation, which can be termed as 'area effect.' This is estimated as the ratio of the percentage change in area sown more than once to the percentage change in net irrigated area and indicates horizontal expansion in cultivated land on account of incremental irrigation infrastructure. The evidence shows improvement in the area affected by irrigation infrastructure after 2015-16 as compared to the earlier period. These changes correspond to the convergence approach in implementing irrigation schemes under the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) initiated during 2015-16.

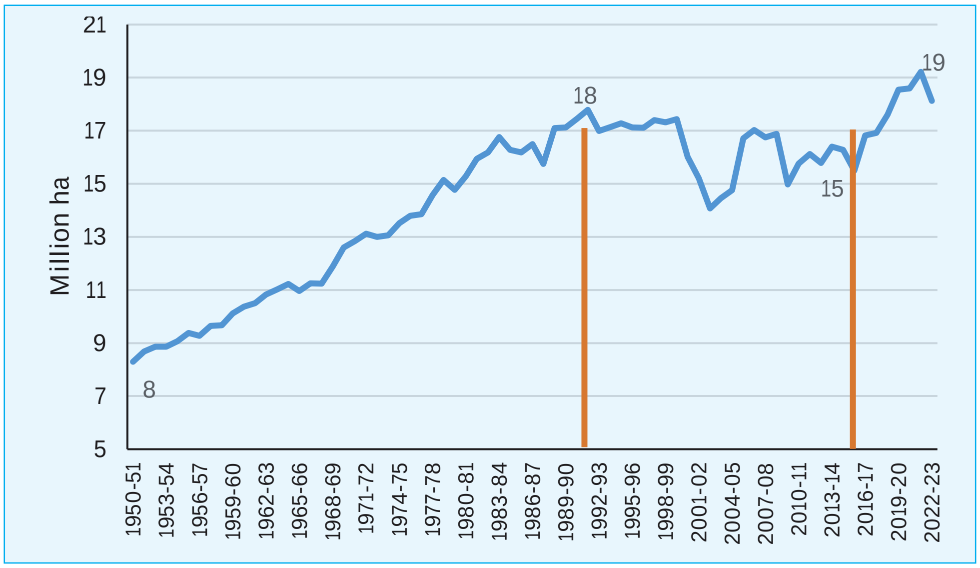
Table 2.4. Performance of irrigation infrastructure in India

Particulars	2005-06 to 2015-16	2015-16 to 2022-23
Annual change in irrigation coverage (basis points)	0.60	0.90
Instability in net irrigated area (%)	1.96	1.73
Canal	6.14	4.85
Groundwater	1.46	1.94
Other sources	5.58	5.57
Annual improvement in irrigation intensity (basis points)	0.57	1.44
Canal	0.40	1.28
Groundwater	0.53	1.21
Other sources	0.43	2.38
Area effect (%)	1.29	1.94

Source: Authors' estimation based on data from Land Use Statistics, Ministry of Agriculture & Farmers' Welfare (MoA&FW), GoI

One noteworthy trend in the irrigation sector is the reversal of long stagnation in the canal-irrigated area in 2016-17 (Figure 2.6), raising concerns over the huge public investment. After a significant increase from 8 million ha in 1950-51 to 18 million ha in 1990-91, the canal irrigated area in the country declined to 15 million ha in the year 2015-16. After 2015-16, the canal irrigated area began to increase and reached 19 million ha in 2021-22. One of the reasons for this trend reversal could be the prioritized approach to completing the projects under the Accelerated Irrigation Benefit Program (AIBP), which are nearing completion. As of January 2025, 62 out of the 99 prioritized irrigation projects brought under the aegis of PMKSY-AIBP have been completed, adding irrigation potential of 3.35 million ha in the country.

Figure 2.6. Trend in canal irrigated area in India



Source: Land Use Statistics, Ministry of Agriculture & Farmers' Welfare (MoA&FW), GoI

Tiered electricity pricing for irrigation for the long-term sustainability of groundwater resources

S. *K. Srivastava, Prabhat Kishore, P. S. Birthal, J. Singh and R. R. Sethi*

The tiered pricing of electricity can serve as an effective mechanism to address the twin objectives of enhancing farmers' affordability of electric power while promoting sustainable groundwater use. This involves a graduated pricing structure in which the price of electricity increases when its consumption crosses the established thresholds. The appropriate consumption thresholds and tariffs for electricity can ensure farmers have affordable access to it. Higher prices for the subsequent use of electricity may compel farmers to adopt water-saving practices.

In March 2024, Uttar Pradesh announced an electricity pricing scheme wherein farmers are provided a 100% subsidy on monthly fixed charges for pumps up to 10 Horsepower (hp) (7.46 Kilowatt) and on energy charges up to 1,045 units per month (140 units/kW per hp). Beyond this, electricity use is subject to full tariffs. For pumps above 10 hp, the subsidy for fixed charges is reduced to half. For Bundelkhand, an agriculturally backward region, the thresholds are fixed at 12.5 hp (9.32 kW) for pumps and 1,300 units per month for electricity use.

This study evaluated how tiered electricity pricing can optimize the trade-off between affordable access and sustainable use of groundwater, focusing on diverse groundwater endowments. This has been investigated by comparing the electricity required to meet the peak-season irrigation demand of the existing cropping pattern with freely available electricity in Sitapur district in the central region, Baghpat district in the western region, and Jalaun district in the Bundelkhand region.

Table 2.5 presents the electricity required for pumping the required quantity of groundwater on a representative farm to meet the peak-season irrigation demand. In Sitapur, where groundwater is shallow, approximately 393 units of electricity per month are sufficient to pump the required quantity of groundwater for a farm of 1.2 ha, or 330 units per ha. In Baghpat, where the groundwater level is deeper, 869 units of electricity per month can fulfil the peak-season irrigation demand on a farm size of 1.45 ha, or 599 units per ha. In contrast, the electricity requirement in Jalaun is 1024 units for a farm size of 4.41 ha, or 232 units per ha. This means that the threshold set for free electricity is higher by 20% in Baghpat, 27% in Jalaun, and 166% in Sitapur. Thus, at the established thresholds of free electricity, the scheme effectively covers all smallholders who need policy support.

The free electricity exceeding the peak season requirement, however, does not reflect the scarcity value of groundwater and potentially undermines the objective of changing farmers' behaviour towards its efficient use. In particular, in shallow water regions, it might fail to incentivize farmers to adopt water-saving technologies and practices, potentially leading to a cycle of increased groundwater extraction. A simple implication of this analysis is the need to recalibrate subsidy thresholds for different regions and farm sizes. These thresholds should be periodically reviewed and adjusted to reflect the changing hydrological conditions and farm characteristics.

Harnessing the potential of solar-powered micro-irrigation for sustainable intensification of agriculture

S. K. Srivastava, Prabhat Kishore, P. S. Birthal and P. B. Shirsath

Although micro-irrigation and solar energy are complementary technologies, these are being promoted under two different schemes, i.e., Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) and Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan Yojana (PM-KUSUM). This

Table 2.5. Electricity requirement for irrigation

Particulars	Sitapur	Baghpat	Jalaun
Rainfall (mm)	692	566	910
Farm size (ha)	1.19	1.45	4.41
Irrigation water required (m^3/farm/year)	14242	24386	28386
Irrigation water required (m^3/ha/year)	11968	16818	6437
Maximum electricity required (units/farm/month)	393	869	1024
Marginal (<1 ha)	199	619	377
Small (1-2 ha)	457	848	555
Semi medium (2-4 ha)	812	1290	774
Medium (4-10 ha)	1427	1791	1377
Large (>10 ha)	-	-	2665
Maximum electricity required (units/ha/month)	330	599	232
Freely available electricity (units/month)	1045	1045	1300
Sample size	371	351	300

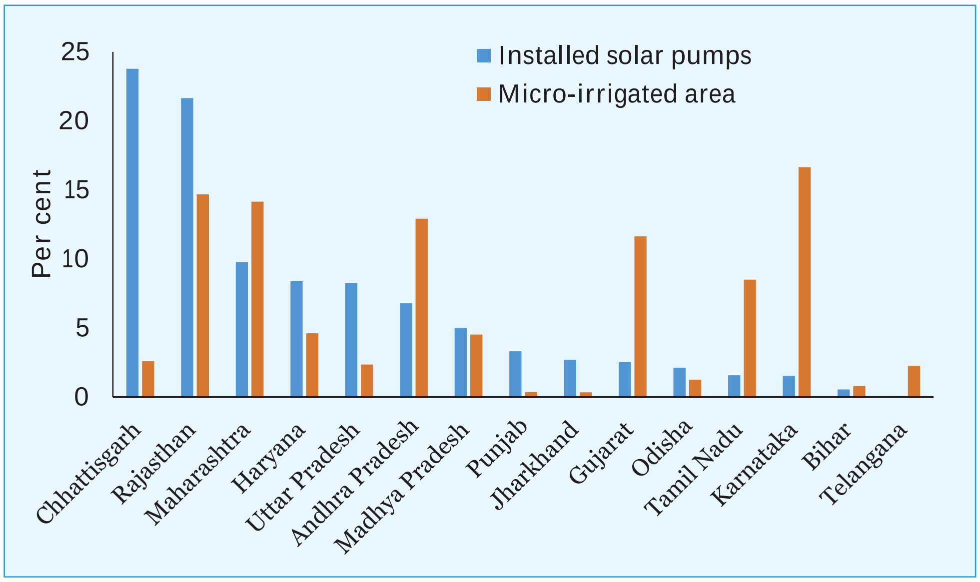
Source: Authors' estimation using primary survey data study investigated the techno-economic feasibility of the convergence of the two technologies and suggested policy measures and an institutional framework to achieve convergence between PMKSY and PM-KUSUM.

Micro-irrigation and solar pumps have expanded rapidly, yet their coverage remains limited. Although the area under micro-irrigation has accelerated from 0.4 million ha per annum between 2005 and 2010 to 1 million ha per annum between 2015 and 2023, it accounted for only 12.95% of the total irrigated area. Similarly, solar pumps comprise only 2.33% of the total 21.5 million electric and diesel-operated groundwater extraction devices (GEDs), despite significant growth in its adoption during recent years. The solarization of all electric- and diesel-operated GEDs has the potential to generate 102 gigawatts (GW) of solar power.

Significant disparities exist in the adoption of micro-irrigation and solar pumps. Karnataka, Rajasthan, Maharashtra, Andhra Pradesh, Gujarat, and Tamil Nadu are the predominant states, accounting for 79% of the total micro-irrigated area in the country. Similarly, adoption of solar pumps is concentrated in a few states: Chhattisgarh, Rajasthan, Maharashtra, Haryana, and Uttar Pradesh (Figure 2.7). There is no significant correlation between the adoption of micro-irrigation and solar pumps. Micro-irrigation enhances conveyance efficiency, and its integration with solar pumps can minimize the risk of over-extraction of groundwater resulting from unrestricted access to solar energy. The solarization of a single fossil-fuel (electric/diesel)-based GDE (Gross Domestic Energy) reduces diesel consumption by 911 litres, electricity usage by 2875 units, and CO_2 emissions by 2.1 tonnes per well per annum.

Substituting diesel pumps with solar-powered micro-irrigation systems is more attractive. Even in the absence of capital subsidies, the investment in a solar-powered micro-irrigation system can be recovered in five years solely from the savings in diesel costs. With capital subsidies of 45-55% on micro-irrigation and 60% on solar pumps, the payback period is reduced to less than two years. Conversely, the replacement of an electric pump with a solar-powered micro-irrigation system is not economically feasible because of the provision of free or heavily subsidized electricity for irrigation. Reallocating electricity subsidies as capital subsidies for solar pumps and increasing the subsidy from 60% to 80% may enhance the

Figure 2.7. States' share in micro-irrigated area and installed solar pumps, 2023



economic viability of replacing electric pumps with solar-powered micro-irrigation systems.

The guidelines of PMKSY and PM-KUSUM advocate for their joint implementation by a single state agency (i.e., convergence) or, alternatively, through effective coordination between different agencies (i.e., synergy). However, in most states, these programmes are implemented independently. To achieve convergence, all processes, from registration to the supply of solar power and micro-irrigation systems, must be synchronized and executed by the same agency. Fluctuating water pressure resulting from variable weather conditions leads to inconsistent water flow from solar pumps, which is incompatible with the high and consistent pressure required for the efficient operation of micro-irrigation systems, particularly sprinklers. Hence, there is also a need to develop location-specific solar-powered micro-irrigation systems. Innovative financial products to facilitate the joint adoption of micro-irrigation and solar pumps by resource-poor farmers are necessary. The promotion of more lucrative crops, such as fruits and vegetables, which are particularly suited for micro-irrigation systems, can significantly enhance the internal rate of return and decrease the payback period. Overall, if the full potential of both solar power and micro-irrigation is realized, groundwater can be saved to the extent of 65 billion cubic metres, and carbon emissions can be reduced by up to 45 million tonnes per annum.

Determinants of farmers' decisions to use farm machinery services from Custom Hiring Centres (CHCs)

Nalini Ranjan Kumar and Prakash Athare

Using a logistic regression framework, factors influencing farmers' decisions to use farm machinery services from government-supported Custom Hiring Centres (CHCs) in Uttar Pradesh were identified (Table 2.6). The

Table 2.6. Factors influencing farmers' decisions to use farm machinery services from CHCs

Parameter	Coefficient	Std. Error	t-value
Age	0.018**	0.008	2.30
Education Level			
Primary	-0.936***	0.318	-2.94
Secondary	0.041	0.339	0.12
Higher Secondary	-0.002	0.376	-0.01
Graduation	-0.040	0.390	-0.10
Post-graduation	0.250	0.508	0.49
Family size	0.010	0.026	0.39
Operational land holdings	-0.089	0.164	-0.54
Cost of seeds	-0.0003	0.000	-1.53
Cost of fertilizer	0.0001**	0.000	2.53
Cost of irrigation	-0.0001**	0.000	-1.94
Cost of machine hiring	-0.0002***	0.000	-6.17
N	196		
LR (Likelihood Ratio) chi^2 (12)	68.24		
Prob > chi^2	0.00001		
Pseudo R^2	0.1084		

Note: ** and *** indicate significance at 5% and 1%, respectively.

Source: Authors' estimation using primary survey data age of the household head positively influences access to services from CHCs. Primary-educated household heads, as compared to illiterate heads, showed a negative influence on access to services from CHCs, which indicates that illiterate farmers were accessing more CHC services. Expenditure on seeds, irrigation, and hiring charges of machines negatively influenced the probability of farmers accessing services from CHCs. Farmers with higher incomes often possess farm machinery, resulting in a lower likelihood of using CHC services. This also indicates the use of CHCs by poor farmers who do not own irrigation machinery or irrigation sources. However, higher expenditure on fertilizers significantly increased access to services from CHCs. This shows that poor farmers who use cheaper farm machinery services from CHCs spent more on fertilizers to achieve better yields. Family size, operational land holdings, and seed cost do not significantly influence the use of CHC services.

Impact of custom hiring centres on paddy cultivation in Uttar Pradesh

Nalini Ranjan Kumar and Prakash Athare

The impact of the government-supported custom hiring centres (CHCs) on the affordability, cost of production, net returns, and paddy yield was assessed using the propensity score matching (PSM) method. Data for the study were collected on the socioeconomic characteristics of farm households, input use patterns, and marketing of farm produce from 464 farmers in Lucknow and Deoria districts of Uttar Pradesh. Affordability was examined in terms of hiring charges for different farm machines. The rental rates for services like harrowing, field preparation, and harvesting are 10-25% cheaper from CHCs than from independent service providers. This encourages farmers who might otherwise be unable to afford expensive machinery to use farm machines. Nonetheless, there is a concern about the potential for price discrimination in the absence of fixed rental rates and sufficient competition. Farmers also reported that CHC operators favour large farms due to their ease of operation.

Accessing services from the government-supported CHCs, compared to independent service providers, has a notably positive impact on crop economics (Table 2.7). The more substantial effect of CHC came from a 4.5% reduction in cultivation costs. Together, the yield (a modest 2%) and cost differential effect resulted in an impressive 11.8% higher

Table 2.7. Impact of custom hiring centres on paddy cultivation

Outcome variable	Test	Users	Non-users	Difference	Std. Err.	t value	% change
Cost of cultivation (Rs./ha)	t-test	41570	42361	-791*	461.63	-1.71	-1.90
	CM	40243	42310	-2067***	716.54	-2.88	-5.14
	KM	40094	42215	-2121***	559.91	-3.79	-5.29
	NNM	40094	42270	-2176***	739.35	-2.94	-5.43
Yield (q/ha)	t-test	35.33	34.45	0.88**	0.41	2.15	2.49
	CM	35.25	34.58	0.67	0.65	1.03	1.90
	KM	35.33	34.76	0.57	0.50	1.14	1.61
	NNM	35.33	34.59	0.74	0.67	1.10	2.09
Net Income (Rs./ha)	t-test	23383	21156	2227**	911.65	2.44	9.52
	CM	24906	22023	2883**	1432.90	2.01	11.58
	KM	25336	22951	2385**	1105.78	2.16	9.41
	NNM	25336	22131	3205**	1484.51	2.16	12.65

Note: *** and ** represent significance levels at 1% and 5%, respectively. CM: Calliper matching; KM: Kernel matching; NNM: Nearest Neighbour Matching net return for CHC service users. The primary mechanism driving these economic gains appears to be the lower rental rates offered by the CHCs for machinery and equipment. As CHC does not show any significant impact on paddy yield, it underscores the need to provide advanced farm machinery to utilize resources efficiently. Results also suggest that adopting services from CHCs makes farm mechanization more affordable, besides improving farm income.

Impact of zero tillage technology in wheat cultivation

Nalini Ranjan Kumar and Prakash Athare

The impact of zero tillage technologies in wheat cultivation in Uttar Pradesh on the cost of production, net returns, and paddy yield was assessed using the with and without approach. The data was collected from 464 farmers in the Lucknow and Deoria districts of Uttar Pradesh. About 17% of the studied farmers adopted zero tillage operations for wheat cultivation (Table 2.8). The adopters of zero tillage practices realized a significant reduction in cultivation costs by Rs. 1362 per ha compared to non-adopters. Additionally, zero tillage practices increased the wheat yield and net income per ha by 1.53 q and Rs. 2794, respectively.

Harvesting the benefits of drone technology in agriculture

Rajni Jain, Arathy Ashok, Nisha and Vikas Kumar

The drones, unmanned aerial vehicles equipped with advanced sensors and imaging technologies, have significant potential to transform the agri-food systems. The study is based on responses from 22 Namo Drone Didis (NDD) and about 150 farmers in Uttar Pradesh. Currently, the use of drones is mainly confined to spraying liquid fertilizers, pesticides, and weedicides, underscoring the significant potential for wider adoption of drones through training and awareness programmes. Drones are most frequently used in paddy cultivation, as reported by over 95% of farmers, followed by sugarcane, at 59%. In these crops, manual application of fertilizers and pesticides presents considerable challenges. Broadening the use of drones to include crop health monitoring and land mapping could significantly increase their use across a wider range of crops.

Table 2.8. Impact of zero tillage operation in wheat cultivation

Variables	Non-Adopter (n= 386)	Adopter (n=78)	Mean difference (t-test)
Seed (Rs. /ha)	4060	4127	66
Fertilizer (Rs. /ha)	5279	5102	-177
Chemicals (Rs. /ha)	518	629	110
Irrigation (Rs. /ha)	9375	9368	-7
Machine (Rs. /ha)	13742	13096	-646
Labour (Rs. /ha)	9888	9179	-709
Cost of cultivation (Rs. /ha)	42862	41500	-1362**
Yield (q/ha)	38.34	39.87	1.53***
Net Income (Rs. /ha)	30748	33542	2794**

Note: *** and ** represent significance levels at 1% and 5%, respectively.

Table 2.9. Resource-use efficiency and crop yield

Particulars	Drone sprays	Other sprays	% difference
Average time for spraying (minutes/ acre)	11	120	90.80
Water use (litres/ acre)	10	200	95.00
Labour cost of spraying (Rs. /acre)	300	437	31.40
Paddy yield (q/ha)	20.43	19.63	4.10
Sugarcane yield (q/ha)	320	315	1.60

Source: Telephonic survey from the farmers

The use of drones for spraying chemicals offers significant advantages, particularly in terms of soil health, time, and water savings (Table 2.9). For instance, drone-based pesticide or herbicide application in crops such as sugarcane and paddy requires only 11 minutes on average per acre, whereas conventional spraying takes almost 10 times more. Additionally, drone spraying utilizes only 10 litres of water per acre, which is almost 20 times less than that required for traditional spraying. Drone-based spraying costs Rs. 300 per acre, whereas the average labour cost of conventional spraying is almost 1.5 times more. Furthermore, drone-based spraying ensures precise chemical application, targeting only the affected crops and minimizing contact with the soil. Reducing the cost of application is likely to contribute to yield improvement. However, the difference in yield was not statistically significant, being 4.1% higher for paddy and 1.6% higher for sugarcane. Thus, drone services enhance resource-use efficiency and save time in labour-intensive crops like sugarcane and paddy, though yield impacts are still evolving. To scale up adoption, expanding crop coverage, promoting stakeholder collaboration, designing women-friendly drones, standardizing chemical dosages, building farmer capacity, and offering financial support to manufacturers and operators are essential steps.

Impact assessment of wheat varieties in Punjab

Kamal Vatta, Baljinder Sidana, Laishram Priscilla, Rajni Jain, Ankita Kandpal and Gurleen Kaur

PBW 826 (released in 2020), PBW 766 (released in 2018), and PBW 869 (released in 2023) are high-yielding wheat varieties developed for the North-Western Plains Zone under timely sown irrigated conditions. These varieties offer excellent resistance to major rust diseases, particularly yellow rust, and exhibit good grain quality and agronomic performance. Their adoption is expected to enhance wheat productivity and ensure stable returns for farmers in the region. The study assessed the potential economic impact of these varieties using the economic surplus method. Current adoption rates stand at 13% for PBW 826, 4.31% for PBW 766, and 1.77% for PBW 869. PBW 826 is projected to reach a maximum adoption rate of 35% by 2035, while PBW 766 and PBW 869 are each expected to reach up to 30%. The *ex-ante* assessment for the period 2022–2035 indicates that PBW 826 is likely to generate a total economic surplus of Rs. 135.86 billion (Rs. 9700 million annually), comprising Rs. 52.78 billion in consumer surplus and Rs. 83.08 billion in producer surplus (Figure 2.8). Similarly, PBW 766 is projected to generate a cumulative surplus of Rs. 11.47 billion (Rs. 0. 72 billion per year), while PBW 869 is expected to contribute Rs. 26.11 billion between 2021 and 2035 (Rs. 1.74 billion annually). In addition to productivity gains, these climate-resilient varieties offer risk reduction benefits to farmers by mitigating losses due to climate variability (Figure 2.9).

Figure 2.8. Producer and consumer surplus for climate-resilient wheat varieties for the North-Western plains

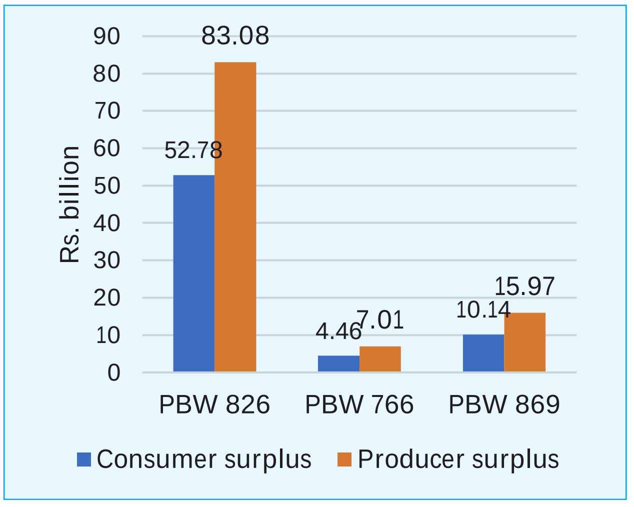
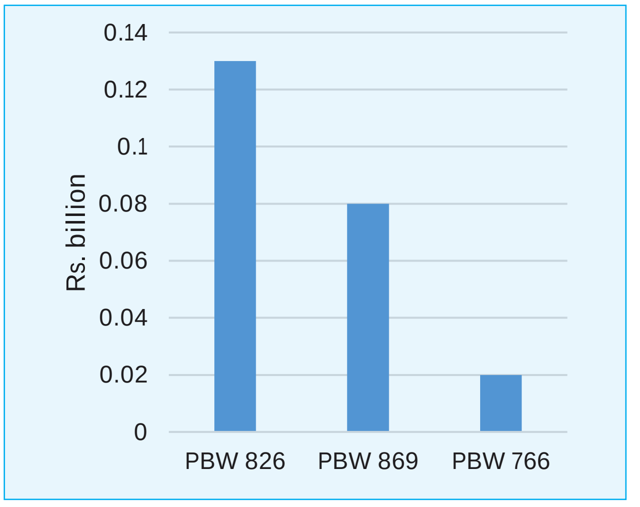


Figure 2.9. Estimates of producer benefits due to risk reduction from adopting climate-resilient wheat varieties in Punjab



Impact assessment of leading berseem varieties

B. B. Choudhary, Purushottam Sharma, V. K. Yadav, A. K. Roy, P. S. Birthal, Ankita Kandpal and Rajni Jain

The impact of three major berseem (*Trifolium alexandrinum*) varieties—Wardan, BL-10, and BB-2—was evaluated based on forage yield and their contribution to livestock productivity. Among these, Wardan and BB-2 were developed by the ICAR-Indian Grassland and Fodder Research Institute, Jhansi, while BL-10 is a high-yielding variety (95 tonnes/ha) released by Punjab Agricultural University, Ludhiana. BL-10 is a late-maturing variety preferred by dairy farmers in North-Western India, especially in Punjab, Haryana, and Himachal Pradesh, as it provides green fodder until mid-June. For the impact assessment, Mescavi (yield potential: 80 tonnes/ha) was used as the check variety for both Wardan and BL-10, while Wardan (yield potential: 90 tonnes/ha) served as the check for BB-2, following comprehensive focus group discussions and expert evaluations.

The adoption of these varieties was estimated using breeder seed production data. Currently, Wardan has an adoption rate of approximately 22%, while BB-2 and BL-10 are adopted by around 20% of farmers each. However, these rates remain below their estimated maximum adoption potential, indicating constraints such as limited awareness, access issues, and inadequate local support mechanisms. The average annual forage biomass produced from each variety is estimated at about 4 million tonnes (Mt), which corresponds to an increase in equivalent milk output ranging between 0.1516 and 0.1650 million tonnes. The total economic surplus derived from these varieties is valued at approximately Rs. 22,984 million, with the highest contribution from BL-10 (Rs. 12,106 million), followed by Wardan (Rs. 7890 million), and BB-2 (Rs. 2988 million) (Table 2.10). The distribution of benefits reflects a 60:40 split between consumer and producer surplus, suggesting that while producers significantly benefited from these innovations, consumers realized even greater gains in terms of enhanced milk availability and affordability. Thus, there is a need for targeted policy support to scale up the adoption of high-yielding berseem varieties by improving farmer awareness, seed availability, and extension services to enhance forage productivity and milk output in the livestock sector.

Table 2.10. Net economic surplus from selected berseem varieties (Rs. million)

Variety	Assessment period	Forage biomass (Mt)	Milk output (Mt)	Total economic surplus	Annual economic surplus
Wardan	1999–2022	4.66	0.16	7890	343
BB-2	2002–2022	4.36	0.15	2987	149
BL-10	1999–2022	4.74	0.17	12106	526
Total				**22984**	**1019**

Source: Authors' estimate

Economic impact of sugarcane variety and its related technologies in India

P. Murali and Rajni Jain

Sugarcane's strategic importance extends beyond its primary role in sugar production, encompassing a diverse range of products and economic activities. The crop's versatility is evident in its contribution to traditional sweeteners like *gur* and *khandsari*, which maintain their significance in rural economies. The introduction of high-yielding varieties such as Co 0238 has substantially impacted both traditional and commercial value chains, accounting for nearly half of the output since 2020-21. This varietal innovation has not only boosted sugar production but also enhanced the yield of valuable by-products like bagasse.

The sugarcane industry's economic footprint has expanded significantly through the utilization of by-products, particularly in energy generation and biofuel production. Bagasse, once considered waste, has become a crucial resource for the cogeneration of electricity, improving the economic viability of sugar mills and contributing to clean energy production. Similarly, the government's biofuel policy has catalyzed a dramatic increase in ethanol production from sugarcane, rising from 700 million litres in 2016-17 to 4,500 million litres in 2022-23 (Table 2.11). This surge in ethanol production has multiple benefits, including enhanced energy security, reduced emissions, and increased farmer income. The comprehensive approach to value chain development, driven by ICAR-Sugarcane

Table 2.11. Total value of ethanol produced from different sources (2013-14 to 2022-23)

Year	Ethanol produced (million litres)			Total quantity of ethanol supplied (million litres)	Share of fuel ethanol by sugarcane (%)	Total value (Rs. million)
	Juice	B-Heavy molasses	C-Molasses			
2013-14	0.0	0.0	400.0	-	-	15200
2014-15	0.0	0.0	700.0	-	-	28700
2015-16	0.0	0.0	1100.0	-	-	46200
2016-17	0.0	0.0	700.0	-	-	27300
2017-18	0.0	0.0	1505	-	-	61480
2018-19	7.5	343.2	1534.9	1885.6	100.0	85150
2019-20	148.3	681.4	741.2	1570.9	90.8	78230
2020-21	459.5	1949.8	613.7	3023	86.5	169160
2021-22	793.3	2701.6	126.7	3621.6	83.5	215860
2022-23	1012.5	3375	112.5	4500	89.6	276950

Note: Values are in current prices

Source: Computed by the authors based on data from the Ministry of Petroleum & Natural Gas, New Delhi

Breeding Institute technologies, has strengthened the resilience and profitability of the entire sugarcane sector, benefiting stakeholders across the agricultural and industrial spectrum.

Climate change-induced risk at the sub-district level in Uttar Pradesh

Nalini Ranjan Kumar and Abdulla

The climate change-induced risk indices at the sub-district (block) level in the state of Uttar Pradesh were estimated by combining block-specific indicators of all components, including hazard, exposure, sensitivity, and adaptive capacity, using a cutting-edge methodology as mentioned in the IPCC's (Intergovernmental Panel on Climate Change) Fifth Assessment Report (AR5). Based on the developed indices values, the blocks were categorized as shown in Table 2.12. Out of 821 rural blocks of Uttar Pradesh, about 9.7% had a very high risk due to climate change, while about 2% had a very low risk. Most of the blocks had medium (36.9%) to low (33.1%) risk. About 28% of blocks depict high to very high risk owing to climate change.

The mapping of all the indices based on severity classification indicated that though most of the blocks are under the low- to medium-risk category, the blocks falling in the eastern region of the state depict a very high to high risk owing to climate change. This is mainly due to high exposure and sensitivity, on the one hand, and low adaptive capacity, on the other hand. To mitigate these risks, priority interventions such as bolstering infrastructure resilience, promoting community resilience programmes, and encouraging sustainable land and water management practices are required to improve their adaptive capacity.

Interdependence between agro-ecosystem and groundwater ecosystem

S. K. Srivastava and Minam Gamoh

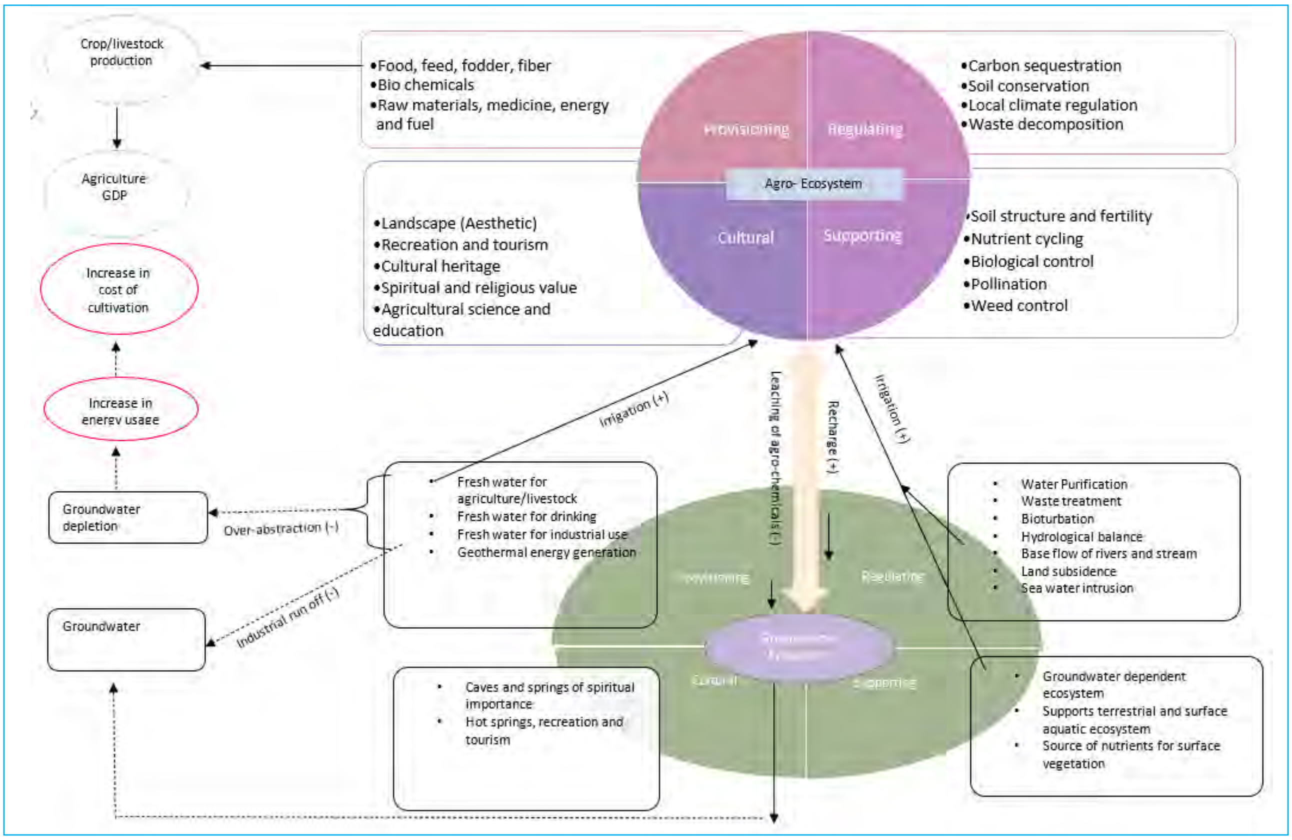
The groundwater ecosystem and agro-ecosystem are inextricably linked through a variety of provisioning, regulating, cultural, and supporting services (Figure 2.10). Among other services, the groundwater ecosystem provides fresh water to meet crop irrigation water demand, which can be considered a provisional service of the groundwater ecosystem to the agro-ecosystem. In India, the agricultural sector uses approximately 87% of the groundwater extracted. Thus, by supplying fresh water for irrigation, the groundwater ecosystem is inextricably linked to the agro-ecosystem. Agriculture has an impact on the groundwater ecosystem, both positively and negatively. Irrigation supplied to agriculture from any source returns to the ground in the form of irrigation return flow. Thus, augmenting groundwater recharge is one of the major services that the agro-ecosystem provides to the groundwater ecosystem.

Table 2.12. Distribution of blocks as per severity classification of each index (%)

Category labels	Index value	Exposure	Hazard	Sensitivity	Adaptive capacity	Vulner-ability	Risk
Very High	> 1.5. SD	6.5	10.1	9.0	7.2	8.4	9.7
High	0.5 SD to 1.5 SD	24.5	14.3	22.9	20.0	23.1	18.2
Medium	- 0.5 SD to + 0.5 SD	37.8	42.6	32.4	41.8	34.0	36.9
Low	- 1.5 SD to - 0.5 SD	25.5	29.6	31.3	26.3	28.9	33.1
Very low	< - 1.5 SD	5.9	3.4	4.4	4.8	5.6	2.1

Source: Authors' estimate

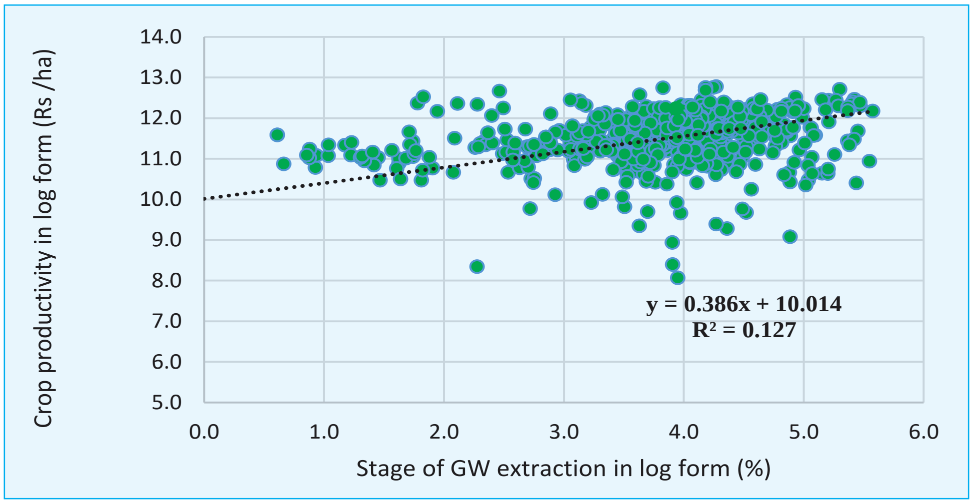
Figure 2.10. Inter-dependency between groundwater ecosystem and agro-ecosystem



Contribution of groundwater to agriculture

The contribution of groundwater to Indian agriculture has been assessed by analyzing the association between the stage of groundwater extraction (the share of groundwater extraction in annual availability) and crop productivity at the district level. The crop productivity (Rs. /ha) has been calculated by dividing the estimated value of crop output (summation of the product of yield and prices) by the net sown area for the year 2022-23. Figure 2.11 presents the

Figure 2.11. Association between stage of groundwater extraction and crop productivity at district level in India (2022-23)



Source: Authors' estimation based on data from the Directorate of Economics & Statistics, MoA&FW, GoI and the Central Groundwater Board association between the stage of groundwater extraction and crop productivity in logarithmic form. The elasticity of crop productivity with respect to the stage of groundwater extraction has been estimated at 0.38, which implies that a one percentage point improvement in the stage of groundwater results in a 0.38% increase in crop productivity. The marginal contribution of groundwater use in crop productivity has been estimated at 23% at the national level. In other words, about a quarter of the output is contributed by groundwater in the country.

Incentivizing farmers to adopt resource conservation practices in India

Kiran Kumara T. M., P. S. Birthal, P. C. Veettil, D. C. Meena and Anjani Kumar

Following the Discrete Choice Experiment approach, this study quantifies the incentives required for adopting direct seeding of rice (DSR) instead of puddled transplanting and reallocating rice area to legumes in Punjab to manage the negative externalities of intensive rice cultivation. A total of 500 participants were included in the study. The findings reveal that farmers are willing to adopt these practices primarily for their potential to save groundwater resources and reduce air pollution. The study estimates almost equal levels of compensation for both practices, i.e., Rs. 29223/ha for direct seeding and Rs. 29178/ha for crop switching from rice to legumes (Table 2.13). These findings are crucial for policymakers in restructuring the existing incentive structure to accelerate the adoption of resource conservation practices.

Valuation of the impact of biostimulants on agro-ecosystem services: a meta-analysis

D. C. Meena, Kiran Kumara T. M. and P. S. Birthal

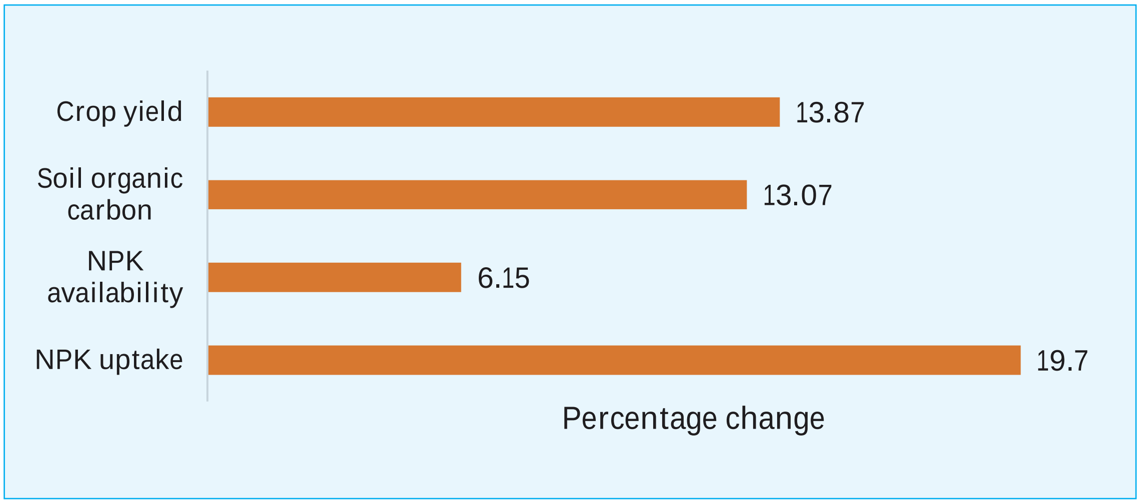
A meta-analysis was conducted to assess the effects of biostimulants on selected ecosystem services to provide concrete evidence that can inform their integration into agricultural practices for sustainable agricultural food production systems. Figure 2.12 shows that the application of biostimulants increases crop yield (13.87%), soil organic carbon (SOC: 13%), NPK (Nitrogen, Phosphorus, and Potassium) availability (6.15%), and NPK uptake (19.7%). Their application also improves product quality traits such as total soluble sugar (TSS), sugar content, ascorbic acid levels, and the micronutrient profile of the products. However, the efficacy of biostimulants varies depending on their type, crop, and agro-ecology. The economic value of the ecosystem services associated with the application of biostimulants was evaluated for agricultural and horticultural crops. Biostimulant application provides an additional economic value of ecosystem services, including yield, carbon sequestration, and soil fertility, of Rs. 12,400 per ha for agricultural crops and Rs. 82,163 per ha for horticultural crops.

Table 2.13. Estimates of incentive payment (Rs./ha)

Practice	Coefficient	Std. Error
Basic Random parameter logit model		
Direct seeded rice	16031***	524
Diversification	15660***	550
Extended Random parameter logit model		
Direct seeded rice	29223***	539
Diversification	29178***	762

Note: *** indicates significance at 1%.
Source: Authors' estimate

Figure 2.12. Impact of biostimulants on agro-ecosystem services



Source: Authors' estimate

Potential of dung for energy security and sustainable agriculture

Anil Kumar, P. S. Birthal and Khem Chand

Bovine dung has long been used as a source of renewable energy for domestic purposes and organic fertilizers for crop production in rural areas. Post-green revolution, the utility of dung, both as a source of energy and fertilizers, has diminished owing to the increasing use of chemical fertilizers and fossil fuels, rendering it a less essential resource and a potential environmental contaminant. However, a new perspective has emerged on the utility of dung as biogas and bio-compressed natural gas (CNG), while maintaining its traditional use as an organic fertilizer. An estimate of dung production in the country from cattle and buffalo was made considering their population and age categories, which indicated that approximately 1271 million tonnes of wet dung is annually produced in the country. About 35% of the dung produced in India is converted into dung cakes for use as domestic fuel. The remaining 65% is used as manure in crop production.

The potential of dung as a substitute for fossil fuels and chemical fertilizers was assessed under three scenarios (Table 2.14). First, in the business-as-usual scenario (65% for manure and 35% for domestic fuel), 6.28 million tonnes of fertilizer nutrients (N: 2.64, P: 1.16 and K: 2.48) are made available through manure (valued at Rs. 530 billion) and 89 million tonnes of dung cake (valued at Rs. 222 billion), making a total potential of Rs. 752 billion. In the second scenario (35% for domestic fuel and 65% for biogas production and further processed to bio-CNG), fertilizer nutrients and dung cake will be available in the same quantity as in the first scenario, with an additional 14.20 million tonnes of bio-CNG valued at Rs. 773 billion, making a total of Rs. 1525 billion. In the third scenario (100% for biogas and bio-CNG production), a total of 9.66 million tonnes of fertilizer nutrients (N:4.07, P:1.78, K:3.81) will potentially be available (valued at Rs. 815 billion), besides producing 21.80 million tonnes of bio-CNG (valued at Rs. 1189 billion), making a total of Rs. 2004 billion. Thus, the dung from cattle and buffalo has the potential to generate 2.0 to 2.7 times the economic value of the current use pattern of dung. Moreover, if the full potential of dung is harnessed, it can largely meet the country's demand for CNG in the transportation sector, or biogas for domestic fuel, and the demand for essential plant nutrients. Further, economic analysis is needed to factor in the cost of bio-CNG production, as well as the proportion of dung that can be brought into the dung-bio-CNG value chain.

Table 2.14: Estimated potential of dung as a source of bio-CNG and organic fertilizers

Particulars	Dung use scenarios		
	65%: manure, 35%: cake	65%: bio-CNG, 35%: cake	100%: bio-CNG
Biogas produced (billion m^3)	--	30.98	47.70
Bio methane/Bio-CNG produced (million tonnes)	--	14.20	21.80
Fertilizer nutrients (NPK) (million tonnes)	6.28	6.28	9.66
Dung cake (million tonnes)	89	89	
Economic value (Rs. billion)			
Bio methane/ Bio-CNG	--	773	1189
Fertilizers	530	530	815
Dung cake	222	222	-
Total	752	1525	2004
Value addition (Rs. billion)	--	773	1,474

Source: Authors' estimation using primary survey data

Access to dairy breeding and health services in Uttar Pradesh and Haryana

Arathy Ashok, Vikas Kumar and Vinayak Nikam

A study was conducted in two major milk-producing states, Uttar Pradesh and Haryana, to analyze access to dairy breeding and health services, with a particular focus on the adoption of advanced technologies for breeding and disease management. The study highlights the widespread adoption of artificial insemination (AI) as a breeding method for dairy animals in both states, with over 90% of households having access to AI services. However, the adoption of advanced AI techniques, such as Sex Sorted Semen (SSS) AI, which is designed to produce progeny of the desired sex, remains low. In Uttar Pradesh, only 1.29% of sampled households had access to SSS AI services. Access to vaccination services varied across the two states, with Haryana demonstrating better access, though vaccination efforts were primarily focused on preventing the Foot and Mouth Disease (Table 2.15). The study also found that private para-veterinary service providers played a key role in AI service delivery in both states, whereas government agencies, such as the Department of Animal Husbandry, led the provision of healthcare services, particularly in Haryana.

Table 2.15. Household access to dairy services in Uttar Pradesh and Haryana (%)

Type of service	Uttar Pradesh	Haryana
Artificial Insemination (AI)	94.17	96.03
Normal AI	98.71	84.48
Sex Sorted Semen AI	1.29	15.52
Vaccination services	47.57	97.35
Foot and Mouth Disease vaccine	96.64	96.69
Brucellosis vaccine	0.00	30.46
Black Quarter vaccine	16.10	17.22
Haemorrhagic Septicemia vaccine	38.25	50.00
Other vaccines	2.68	0.00

Further, major factors affecting the adoption of SSS AI were estimated through logistic regression (Table 2.16). Results indicate that the odds of adoption of SSS AI significantly increase with higher education of the household head. Households with a higher number of crossbred or exotic cows were also more likely to adopt SSS

AI, possibly due to the lower value of crossbred males in agriculture and cultural norms associated with the disposal of male cattle. State-level differences also persist, with Uttar Pradesh having significantly lower odds of adopting the technology compared to Haryana. To fully leverage the potential of the dairy sector, policies should focus on improving access to advanced breeding techniques, expanding veterinary health services, and promoting awareness programmes among dairy farmers.

Table 2.16. Factors affecting the adoption of sex-sorted semen-based AI

Variables	Odds ratio
Age of household head (years)	0.96 (0.03)
Education of household head (years)	1.13** (0.05)
Experience in livestock farming (years)	1.02 (0.03)
Training in livestock management	1.37 (0.96)
Owned agricultural land (Acres)	1.03 (0.03)
Extension contacts (=1 if there is access; 0 otherwise)	1.42 (0.85)
Herd size of crossbred/ exotic cows (SLU)	1.14*** (0.05)
State (=1 if state is Uttar Pradesh; 0 otherwise)	0.05*** (0.03)
Constant	0.16 (0.18)
n	609
Pseudo R^2	0.23

Note: *** and ** indicate significance at 1% and 5% levels, respectively. Standard errors are given in parentheses. SLU: Standard Livestock Unit

Source: Authors' estimation using primary survey data

Economic impact of indigenous feed technology

Geetha R., Abhinaya D., Ravisankar T., Kailasam M., Jayakumar R., Subburaj R., Shinoj Parappurathu, Rajni Jain, Lal K. K. and Patil P. K.

The economic impact assessment of the indigenous feed technology, 'Vanami Plus,' developed by the ICAR-Central Institute of Brackishwater Aquaculture, was undertaken across major shrimp-producing states in India, including Andhra Pradesh (AP) and inland saline areas of Punjab, Haryana, and Rajasthan. The study, conducted in 2023, involved primary data collection from 87 adopters and 114 non-adopters of this technology. Adopters of 'Vanami Plus' demonstrated superior performance across all major production and economic parameters compared to the non-adopters.

Table 2.17. Impact of feed technology using PSM

Matching estimators	ATT estimate	
	Yield (T ha^{-1})	FCR
Radius matching (caliper=2.1)	3.39* (1.51)	-0.17* (0.08)
Nearest Neighbor match	1.80* (0.58)	-0.10* (0.03)

Note: FCR-Feed Conversion Ratio. ATT estimates of matching estimators were obtained using MatchIt and Matching package from R. Figures in the parentheses are analytical standard errors for radius matching and nearest neighbour match estimators. The matched sample includes 87 adopters and 114 non-adopters.

The study used impact estimation using Propensity Score Matching (PSM). Two methods of PSM were used to estimate the treatment effect of adoption, where Nearest Neighbour Matching (NNM) estimated a 0.10 reduction in Feed Conversion Ratio (FCR) among adopters, and Radius Matching estimated a 0.17 reduction in FCR (Table 2.17). Thus, there is a strong case for expanding awareness and accessibility of cost-effective, indigenous feed technologies like 'Vanami Plus' to boost sustainable and profitable shrimp farming in India.

The potential economic impact of goat mineral supplement technology

Dwaipayan Bardhan, A. K. Dixit, Ravindra Kumar and Rajni Jain

BRIJMIN is a mineral supplement developed by the ICAR-Central Institute for Research on Goats, Makhdoom, which contains essential minerals that promote growth, enhance immunity, and productivity in goats. BRIJMIN can be administered directly or mixed into feed at a 2% ratio. The technology has been disseminated to resource-poor goat-rearing households through the Scheduled Caste Sub-Plan, Tribal Sub-Plan, and NABARD (National Bank for Agriculture and Rural Development)-supported schemes. A primary survey was conducted in Agra and Mathura districts (Uttar Pradesh), covering 200 goat-rearing households—100 beneficiaries and 100 comparable non-beneficiaries. These households consisted of a total of 1,531 goat-rearing households from beneficiaries and 1,012 from non-beneficiary households.

To assess the impact of BRIJMIN, the Propensity Score Matching (PSM) method was employed to reduce selection bias. The analysis revealed that BRIJMIN supplementation led to a statistically significant increase in live body weight, 3.71 kg per goat (18% increase) compared to non-users. The economic surplus method was used to estimate the broader economic impact under three scenarios from 2023–24 to 2034–35 (Table 2.18).

Reducing enteric methane emissions in livestock through adoption of anti-ethanogenic feed supplement 'Harit Dhara'

D. Bardhan, P. K. Malik and Rajni Jain

Enteric methane emissions from ruminants are a major source of agricultural greenhouse gases (GHGs), contributing significantly to climate change. 'Harit Dhara', developed by ICAR-National Institute of Animal Nutrition and Physiology, Bengaluru, is an indigenous anti-methanogenic feed supplement designed to reduce these emissions up to 20% when fed to ruminants at the recommended dosage. Historical data from the Food and Agriculture Organization (FAO) and ARIMAX (Auto-Regressive Integrated Moving Average with exogenous inputs) models were used to analyze methane emissions trends from various livestock species, including cattle, buffaloes, sheep, goats, and others, incorporating livestock population as an exogenous variable. These models were employed to forecast methane emissions up to 2031.

A cost-benefit analysis was conducted assuming a 1% initial adoption rate in 2022, with annual growth rates of 10% and 20%, and methane reductions converted into CO_2-equivalent using standard global warming potential (GWP) values (Table 2.19). The GWP is a measure of how much energy the emission of 1 tonne of a gas will absorb over a given period of time, relative to the emission of 1 tonne of carbon dioxide (CO_2). Monetary benefits were estimated using a social cost of carbon of US$ 86 per Kilotonne CO_2, with a 2% annual increase in social cost of carbon. The cost of the technology was considered at Rs. 6/kg.

From the stream of benefits and costs, from 2022 to 2031, economic feasibility criteria, viz.

Table 2.18. Economic impact under three different scenarios

Indicator	Scenario I 20% annual increase in BRIJMIN sales	Scenario II 50% annual sales growth from 2027–28 due to private sector participation	Scenario III Scenario II + price drop to Rs. 100/kg due to economies of scale
Total Economic Surplus (Rs. million)	5.54	13.75	14.28
Net Present Value (NPV) (Rs. million)	1.76	4.92	6.62
Benefit-Cost Ratio (BCR)	1.47:1	1.56:1	1.86:1
Internal Rate of Return (%)	28	37	41

Table 2.19. Annual estimated benefits (Rs. million) of methane reduction (2022–2031)

Species	1% adoption (2022) with 10% increase every year		1% adoption (2022) with 20% increase every year	
	CH_4 (20 yrs. GWP)	CH_4 (100 yrs. GWP)	CH_4 (20 yrs. GWP)	CH_4 (100 yrs. GWP)
Cattle	26.4	8.8	42.6	14.2
Buffalo	13.4	4.5	22.0	7.4
Sheep	0.6	0.2	1.0	0.3
Total	40.4	13.5	65.6	21.9

Net Present Value (NPV), Benefit-Cost Ratio (BCR), and Internal Rate of Return (IRR) were calculated. Based on projected costs and benefits over a 10-year period, the economic feasibility of adopting 'Harit Dhara' is highly favourable with 203% IRR and Rs. 164.2 million in net benefits over 10 years.

Inclusion of 'Harit Dhara' in livestock feeding programmes under national climate-smart agriculture schemes can significantly reduce GHG emissions while enhancing farmers' economic returns. Further, its promotion and wider dissemination among livestock farmers can meet India's climate goals and sustainable development targets.

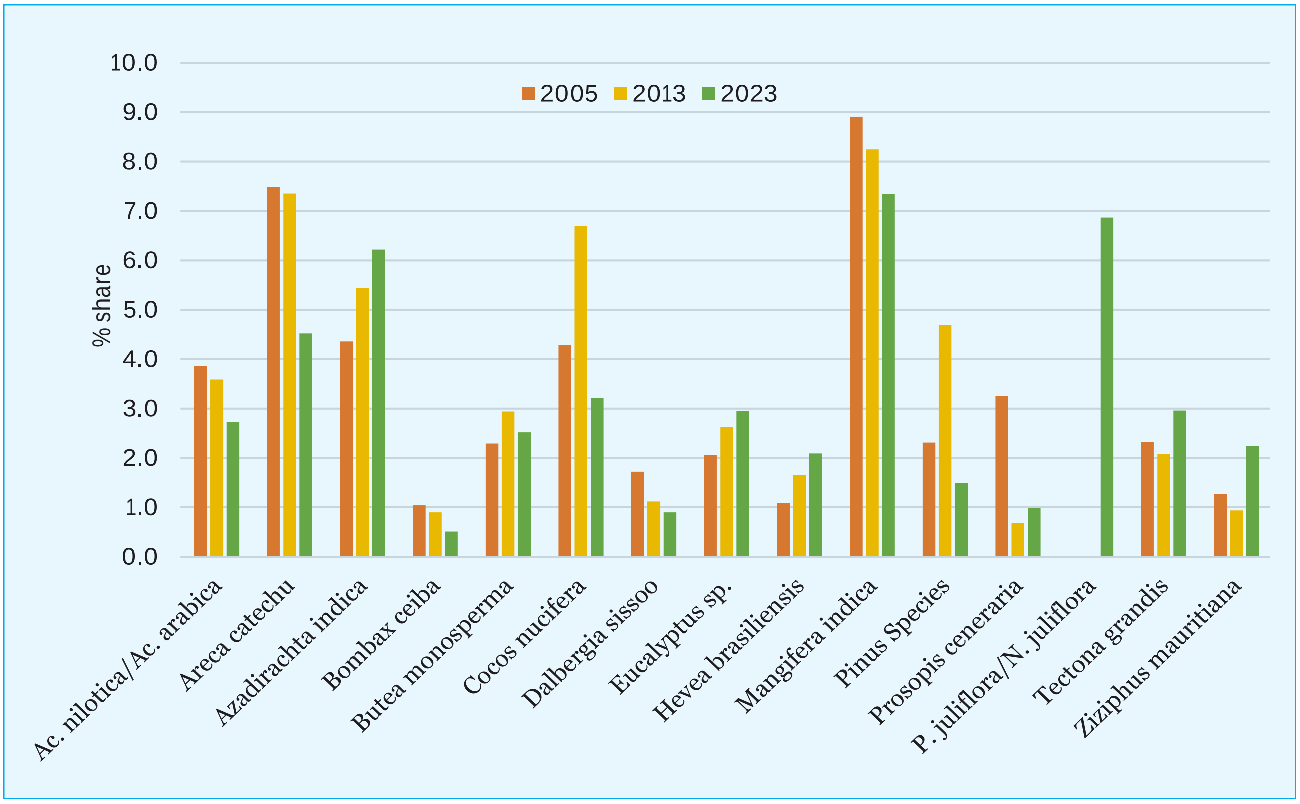
Changes in area and composition of Trees Outside Forests (TOF) in India

Prem Chand, Kiran Kumara T. M., Diksha Bali and Pardeep Mahal

Trees outside forests (TOF) encompassing all trees located outside the officially recorded forest areas, regardless of patch size, are crucial given the goal of achieving 33% area under green cover envisioned in India's National Forest Policy 1988 and other official documents. Based on data from the Forest Survey of India, this study analyzes changes in the area and composition of TOF at the national and sub-national levels. The findings revealed that though the area under TOF has increased by 12 million ha during the past two and a half decades, the quality of TOF has been a matter of concern, as the increase in area is largely under low-density (<40%) TOF cover. This affects biodiversity and carbon sequestration. Therefore, there is a need to prioritize species at the agro-climatic zonal level using multi-criteria modelling with dimensions like suitability in local climate, soil conditions, biodiversity, and the needs and interests of the communities.

The species composition has significantly shifted in favour of exotic and invasive species, replacing climate-resilient and multipurpose indigenous species like *Prosopis cineraria* and *Acacia nilotica/ A. arabica*. The decline in the latter-mentioned species is more concerning, as the share of younger trees with a diameter at breast height (DBH) ≤ 30cm has been declining very fast. The *Neltuma juliflora*, one of the world's worst 100 invasive alien species, which was not among the 40 species reported in India State of Forest Reports (IFSRs) even up to 2017, has become the second dominant species after mango in 2023, constituting almost 7% of the total trees in TOF (Figure 2.13). This requires a comprehensive approach in mission mode to control the spread of the species, including aggressive use of *juliflora* for alternatives like biochar production and briquette making, plantation of fast-growing indigenous species, creating mass awareness, etc.

Figure 2.13. Relative share of prominent 15 tree species in TOF, India



Potential to augment the supply of rice in India

Sant Kumar and Kingsly Immanuelraj T.

Improving technical efficiency (TE) is an important pathway to increase crop production. This becomes critical when natural resources like land and water are scarce and have competing demands. This study has estimated TE scores of paddy production using cost of cultivation data for 1980-2022 by applying the translog production function. The overall TE score is 0.71, ranging from 0.61 (each) in Bihar and Chhattisgarh to 0.98 in Punjab (Table 2.20). A comparison of the TE scores with observed yields shows a positive relationship, implying that states with higher yields have higher technical efficiency. TE scores have been used to compute the potential yield and production at the existing level of technology. Data shows that Bihar has the highest yield gap (1.58 tonnes/ha), followed by Chhattisgarh (1.53 tonnes/ha), Madhya Pradesh (1.35 tonnes/ha), and below 1 tonne in the western states. The overall yield gap is 1.85 tonnes/ha. Bridging the yield gap can produce an additional 45.2 million tonnes of rice. It is noted that 64% of the attainable production will come from the eastern states of Uttar Pradesh, West Bengal, Bihar, Chhattisgarh, and Odisha.

Table 2.20. Technical efficiency and possible additional production of rice in India

State	TE score	Yield (tonnes/ha)			Attainable production (000 tonnes)	% share
		Average	Potential	Gap		
Andhra Pradesh	0.76	3.53	4.62	1.09	7061.40	15.60
Bihar	0.61	2.50	4.08	1.58	4804.90	10.60
Chhattisgarh	0.61	2.43	3.96	1.53	5796.30	12.80
Haryana	0.80	3.72	4.62	0.90	1239.00	2.70
Karnataka	0.77	3.16	4.09	0.93	1161.50	2.60
Madhya Pradesh	0.62	2.17	3.52	1.35	4041.70	8.90
Odisha	0.66	2.15	3.26	1.11	4466.70	9.90
Punjab	0.98	4.37	4.47	0.10	317.20	0.70
Tamil Nadu	0.75	3.44	4.56	1.12	2435.20	5.40
Uttar Pradesh	0.69	2.73	3.96	1.23	7165.80	15.80
West Bengal	0.70	3.04	4.32	1.28	6745.50	14.90
Overall (India)	0.71	2.47	4.32	1.85	45235.30	100.00

Source: Cost of cultivation data, DES from 1980 to 2022

Fertilizer use efficiency in paddy production in India

Sant Kumar and Kingsly Immanuelraj T.

Fertilizer use efficiency (FUE) is an important indicator to assess the effective use of fertilizers. It is the ratio of the minimum quantity of fertilizer required to the observed quantity. The FUE in paddy production has been assessed using real farmers' field condition data for the major states of India. Paddy is a staple food crop and covers about one-fifth (21%) of the gross cropped area (TE 2021-22) and utilizes over one-third of total fertilizers (35%) used in the country (average use 136 kg/ha).

Data evinced wide variability in the FUE score, being highest in Madhya Pradesh and Bihar (0.44 each) and lowest in Karnataka (0.23), with an overall mean score of 0.37 at all-India in TE 2021-22 (Table 2.21). It is seen that FUE improved over time across states of India.

Table 2.21. State-wise FUE scores in paddy production during different points of time

State	Fertilizer use efficiency score				
	TE 1992	TE 2002	TE 2012	TE 2022	Overall (1990-2022)
Andhra Pradesh	0.14	0.24	0.24	0.28	0.23
Bihar	0.35	0.37	0.41	0.44	0.40
Haryana	0.22	0.25	0.35	0.42	0.30
Karnataka	0.20	0.24	0.24	0.23	0.24
Madhya Pradesh	0.39	0.48	0.44	0.44	0.44
Odisha	0.30	0.31	0.36	0.37	0.33
Punjab	0.08	0.16	0.21	0.33	0.19
Tamil Nadu	0.14	0.22	0.25	0.35	0.24
Uttar Pradesh	0.24	0.30	0.34	0.43	0.33
West Bengal	0.24	0.31	0.36	0.40	0.34
Overall (India)	0.22	0.28	0.31	0.37	0.30

Source: Fertilizer Association of India (various years)

Among regions, the mean FUE was highest in the eastern region (0.35), lowest in the northern region (0.22), and the overall mean was 0.30 in India during 1990-2022. The conducive agro-climatic conditions coupled with crop production practices led to this difference. Fertilizer use can be reduced by 70% without compromising production with existing technology and given inputs. To achieve this, both technological and policy options, like legumes in cropping systems, integrated nutrient management, the use of organic and biofertilizers, precision agriculture, and the use of customized fertilizers need to be promoted.

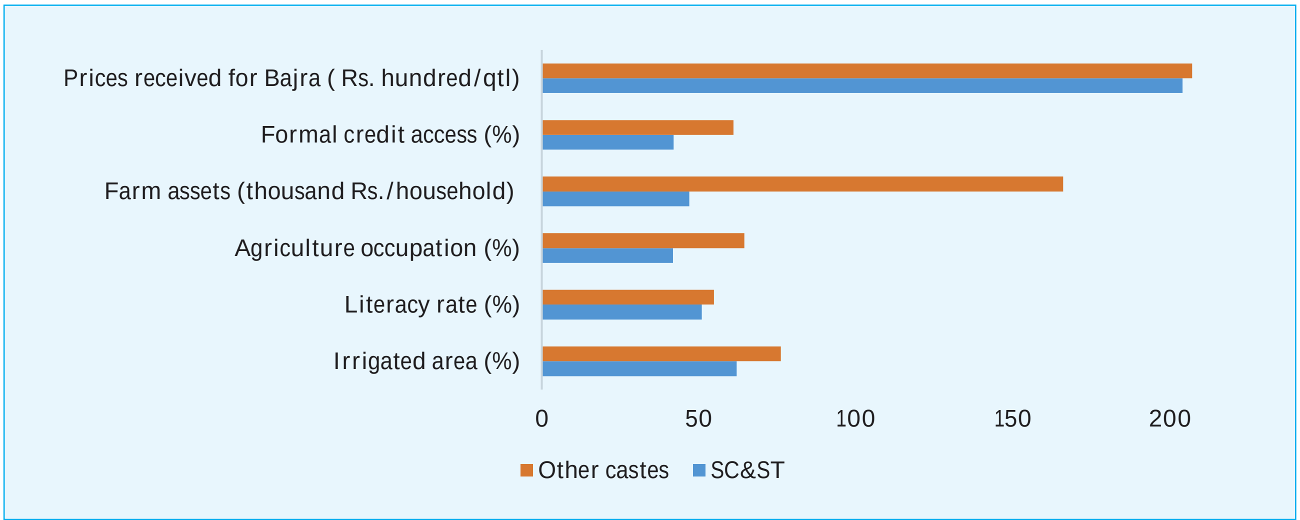
Database development for agricultural rural households with a special focus on weaker sections

Subhash Chand, Rajni Jain, D. C. Meena, Dilip Kumar, Khyali Ram Chaudhary, M. S. Chauhan and Arvind Kumar

A longitudinal database is being developed to gather information on rural households, focusing on disadvantaged sections from six villages across three districts: Panipat in Haryana, Bulandshahr in Uttar Pradesh, and Jaipur in Rajasthan. The database includes socio-economic parameters, an inventory of assets, crop and livestock data, information on agricultural sources, awareness of government schemes, and food consumption patterns.

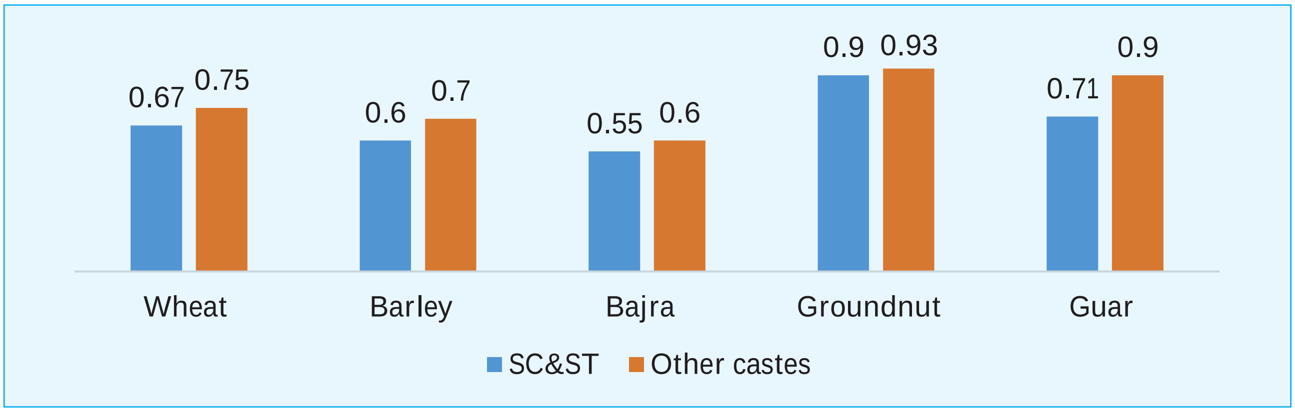
Effect of social castes on farm resource endowments, technical efficiency, and farm income: A cost-return analysis was performed using data from 200 households in Jaipur, Rajasthan, to examine the differences in profitability and input usage among households of various castes. The study employed data input-oriented envelopment analysis (DEA), a non-parametric method, to evaluate farmers' technical efficiency in crop production across social groups. Farmers from socially marginalized groups have statistically significantly lower resource endowments, such as landholdings, irrigation facilities, farm assets, and credit access, compared to farmers from upper castes (Figure 2.14). Farmers are more technically efficient in producing high-value crops, such as groundnut and guar (Figure 2.15). However, Scheduled Caste & Scheduled Tribe (SC & ST) farmers are less technically efficient in crop production than farmers from other castes, resulting in lower net returns compared to other farmers (Figure 2.16).

Figure 2.14. Socio-economic pattern of households across social castes



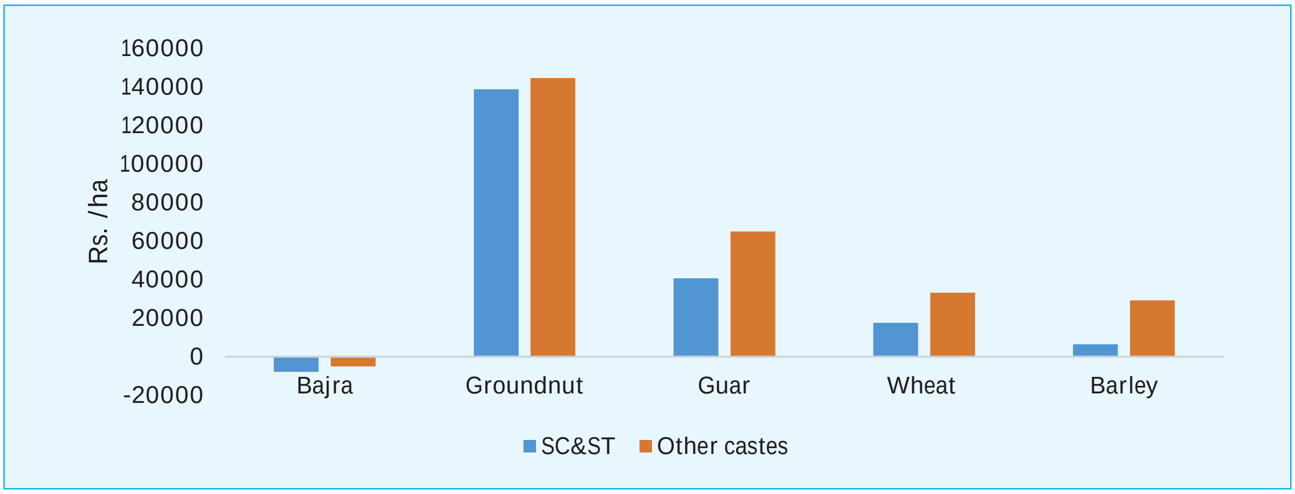
Source: Authors' estimate

Figure 2.15. Technical efficiency level of Rabi and Kharif crops across social castes



Source: Authors' estimate

Figure 2.16. Farm net income of major crops across social castes



Source: Authors' estimate

Economic valuation of of Common Property Resources (CPRs) in Arid Rajasthan

Khem Chand, Kiran Kumar, Prem Chand, Ravinder Singh Shekhawat and Manjunath

The status of Common Property Resources (CPRs) in Agro-Climatic Zone IIB: Transitional Plain of the Luni Basin, Pali district was assessed during 2024-25. The study covered six villages (Charwas, Dhangarwas, Bhagwanpura, Bithura Kalan, Chenda & Mandawas) across three tehsils—Sojat, Marwar Junction, and Rohat of Pali district. Sojat tehsil recorded highest CPR share (8.4–17.8%), followed by Marwar Junction (6–12.6%) and Rohat (4.23 to 5.68%). CPRs play a vital role in sustaining rural households, particularly as a major source of livestock fodder. The study indicates that CPRs contribute 17–42% of the fodder requirement for non-milking livestock and 9–26% for milking livestock across seasons, averaging ~23.5% annually. Seasonally, CPRs meet ~13% of fodder needs in summer, 23.5% in winter, and 34% during the rainy season. CPRs in the region comprising pastures, orans, and wastelands also provide fuelwood, fruits, mushrooms, thatching materials, and critical ecological services, with fodder and fuelwood being the most important.

In this zone, the pastures and wastelands recorded an average productivity of Rs. 6,803 per ha, whereas in oran it was higher at Rs. 8,882 per ha (Table 2.22). Fodder is the major product from CPRs, contributing 60.4% of total output, followed by fuelwood (35.5%), food (3.8%), and thatching material (0.3%). However, in economic terms, food dominates with a 74.8% share, while fuelwood, fodder, and thatching/fencing materials contribute 19%, 6.1%, and 0.2%, respectively. In Orans, physical output is led by fodder (74.8%), followed by fuelwood (21.5%), food (3.6%), and thatching/fencing material (0.1%). Monetarily, food contributes 68.9%, fodder 27.8%, and fuelwood 3.2%. Historical analysis of last thirty-year revealed a sharp decline in household dependence on CPRs. The proportion of households engaged in CPR-based activities year-round fell from 43% to 5%, an 88% reduction. Similarly, households involved in CPR activities seasonally declined from 53% to 9%, reflecting an 83% decrease.

Further, CPRs in study zone are undergoing rapid degradation due to population pressure, shrinking area, overgrazing, and the spread of *Prosopis juliflora*. The decline of traditional management systems, weak gram panchayat, and limited community participation have further aggravated the problem. Although income from *Prosopis juliflora* auctions supports Panchayat-level development, strict restrictions in Orans have also led to severe degradation, reducing both biodiversity and productivity. Such overregulation, without adaptive management, can be counterproductive. Orans nevertheless retain systems such as watchmen and water levies for upkeep. Sustainable CPR governance demands active community involvement, balanced regulation, and investment in management to restore productivity and ecological health.

Agricultural Market and Trade

Price transmission from minimum support prices to farm harvest prices

Purushottam Sharma and D. C. Meena

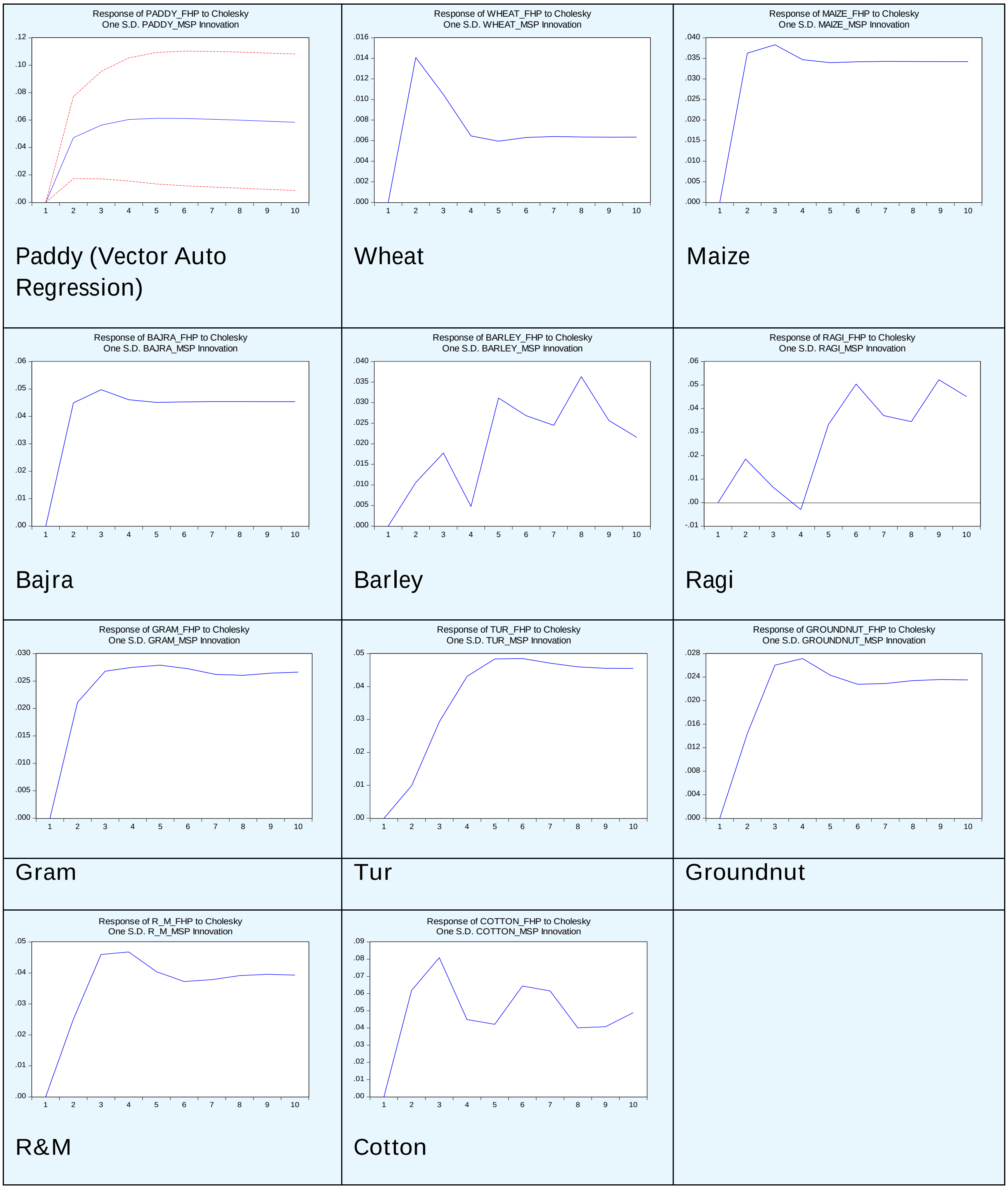
The study revealed a significant long-run relationship between minimum support prices (MSPs) and farm harvest prices (FHPs) for selected crops, except for paddy, with the minimum support price (MSP) playing a dominant role in influencing the farm harvest price (FHP). However, the feedback from FHP to MSP, although weaker, highlights the influence of market conditions on policy adjustments. This indicates that while MSP is a key price driver, market dynamics are considered when designing policy interventions. The impulse response function (IRF) analysis across crops revealed a consistent pattern in which a one-time positive shock to the MSP results in an immediate and significant increase in FHP, underscoring the role of MSP in boosting farm incomes. These insights are crucial for policymakers involved in planning interventions that address market disparities and foster integration across regions,

Table 2.22: Economic valuation of CPRs in Transitional plain of Luni basin (ACZ-IIB) of Rajasthan

Product	Pasture and wasteland		Oran	
	Production (kg per ha)	Value (Rs per ha)	Production (kg per ha)	Value (Rs per ha)
Food	28.89	5085	31.44	6120
Fodder	464.70	1292	658.80	2472
Fuel wood	273.20	414	189.40	287
Thatching & fencing materials	2.35	12	0.65	3

ultimately stabilizing prices and enhancing market efficiency. FHP of wheat, maize, bajra, gram, tur, groundnut, and rapeseed increased sharply with an increase in MSP (Figure 2.17).

Figure 2.17. Impulse response function



Source: Authors' estimate

Impact of Geographical Indication on price and net income of basmati paddy

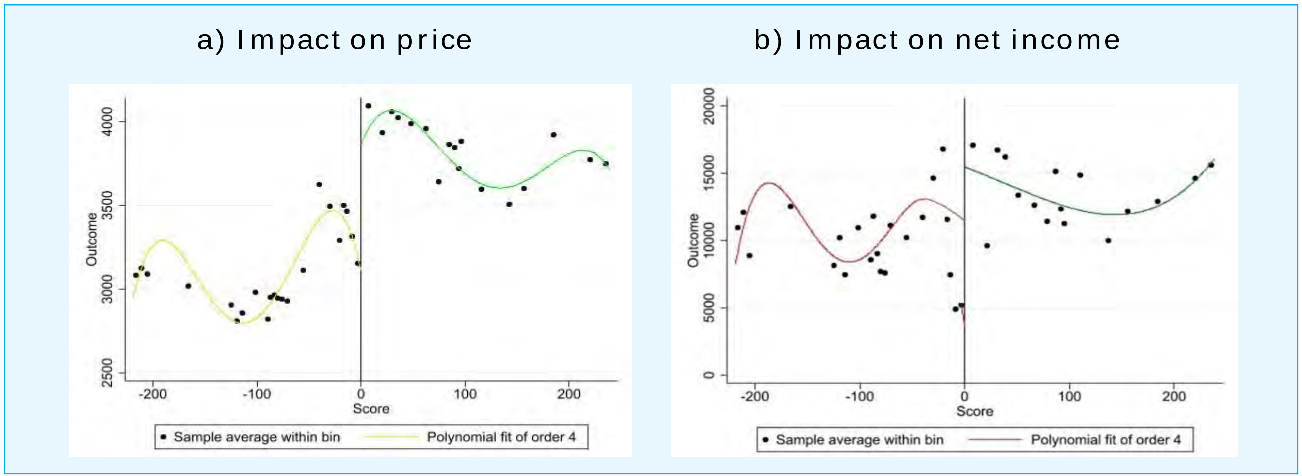
M. S. Jagdeesh and Shiv Kumar

The study employs an advanced methodology to assess the impact of Geographical Indication (GI) on basmati rice prices and net income. Using a multi-stage simple random sampling technique and Geographical Regression Discontinuity (GRD) design, primary surveys were conducted in GI and non-GI basmati areas across three districts. The sampling strategy involved stratifying the GI-demarcated area into three zones based on distance from the GI boundary, with a similar approach applied to non-GI areas. This method allowed for a comprehensive comparison between GI and non-GI basmati production, with particular emphasis on areas near the GI boundary. The results of the study demonstrate significant economic benefits associated with GI certification for basmati rice. GI-certified basmati commanded a price premium of approximately Rs. 184/q compared to non-GI basmati. Additionally, GI certification led to a substantial increase in net income, with GI-certified farmers earning about Rs. 3792 more per acre than their non-GI counterparts (Table 2.23). These findings highlight the tangible economic advantages of GI certification, attributing the premium pricing to the perceived quality and authenticity of GI-certified products. The study concludes that GI certification not only results in higher prices for farmers but also contributes to increased overall profitability and financial well-being, underscoring the importance of GI as a tool for rural economic development in basmati-producing regions of the country (Figure 2.18).

Table 2.23: Impact of Geographical Indication on the price and net income of basmati rice

Particulars	Coefficient	Std. Err.	z	P>z	[95% Conf. Interval]	
A) Impact on price						
Conventional	224.80	60.00	3.70	0.000	107.20	342.30
Bias-corrected	183.70	60.00	3.10	0.002	66.10	301.20
Robust	183.70	79.00	2.30	0.020	28.90	338.40
B) Impact on net income						
Conventional	3449	403.20	8.55	0.000	2658.20	4239.10
Bias-corrected	3792	403.20	9.40	0.000	3001.60	4582.50
Robust	3792	440.40	8.61	0.000	2928.90	4655.30

Figure 2.18. Impact of GI on the price and net income of basmati paddy



Improving the performance of Farmer Producer Organizations: Insights from national-level data

Vinayak Nikam, Samarth Godara, Kiran Kumara T. M. and P. S. Birthal

Key factors influencing the performance of Farmer Producer Organizations (FPOs) were identified using national-level data from approximately 1,069 FPOs. These organizations were categorized into three groups, employing a quantile approach, based on their annual turnover. The lower, middle, and upper thirds correspond to low-performing, moderately-performing, and high-performing FPOs, respectively. As shown in Table 2.24, the performance of an FPO improves with age, as they have more time to mobilize members, expand operations, and secure financial resources and innovations in their activities.

The scale of FPOs, in terms of both membership and the area of operations (number of villages covered), was greater in high-performing FPOs, highlighting the importance of economies of scale for enhanced performance. The proportion of SC/ST members within FPOs significantly influenced their performance. As their proportion increased, performance declined, suggesting a trade-off between inclusivity and performance. This necessitates segment-specific strategies for FPOs, such as focusing on improving and redesigning indigenous tribal products to generate more income through collective actions. Financial support to FPOs, in the form of equity capital and credit, plays a crucial role in their performance. A larger membership base helps in mobilizing more equity capital, which in turn enables FPOs to secure additional loans and grants from the government to initiate processing or value-addition activities. A smaller number of directors in FPOs is linked to higher performance, as it may facilitate cohesion and quick decision-making with fewer conflicts. Additionally, FPOs sell their produce over longer distances tend to perform better, indicating the need for more market exploration beyond state boundaries and exporting the produce.

Table 2.24. Variation in key performance indicators as per the performance of FPOs

Variables	Low performing	Moderately performing	High performing	Total
Number of FPOs	357	357	355	1069
Turnover/FPO (Rs. million/year)	1.05	3.57	15.64	6.74
Age of FPOs (years)	5.30	5.40	6.10	5.60
Number of members/FPO	504	561	772	612
Female members in FPOs (%)	30.40	34.50	31.20	32.00
Small and marginal farmer members in FPOs (%)	82.10	85.50	79.60	82.40
Members of SC/ST group (%)	36.80	31.80	24.40	31.10
Number of villages covered/FPO	12.60	16.30	21.70	16.90
Number of activities/ FPO	1.70	2.00	2.20	1.90
Equity mobilized (Rs. million/FPO)	0.56	0.66	1.15	0.79
Credit accessed (Rs. million/FPO)	1.40	1.61	4.82	2.84
Average market distance from location of FPO (km)	21.20	22.60	28.70	24.20
Number of board directors/FPO	7.90	7.50	7.40	7.60
Female directors on FPO board (%)	26.00	27.20	26.30	26.50

Source: Authors' estimates using NABARD's database of FPOs

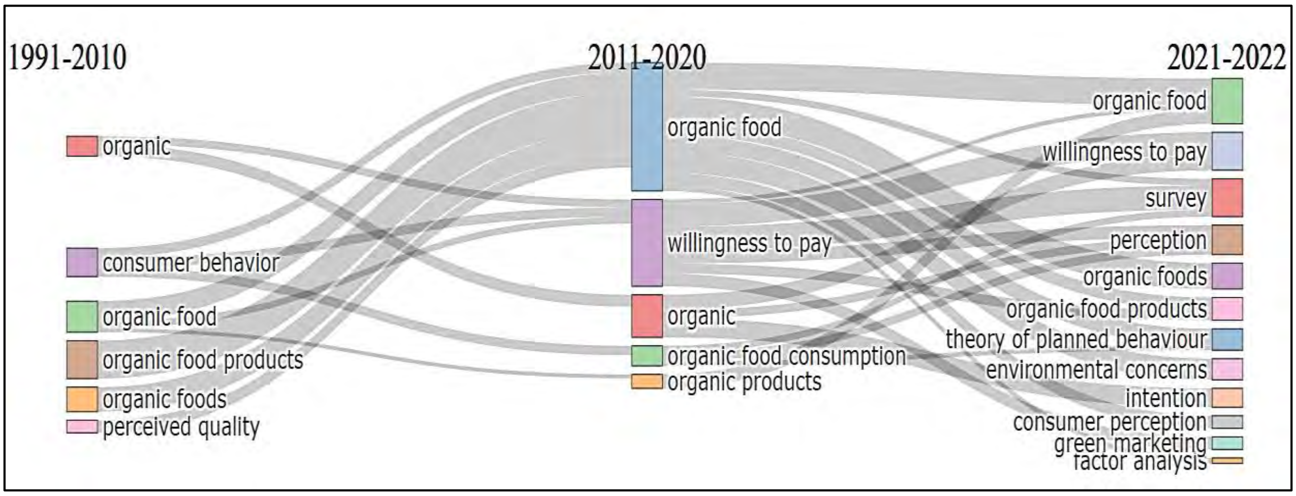
Organic food consumption: A bibliometric-content analysis

Satish Chandra Pant, Raka Saxena and Devesh Kumar Pant

The bibliometric analysis of global research on organic food consumption (OFC) reveals significant growth and evolution in the field from 1991 to 2022. With an annual increase of nearly 16% in research output, the study demonstrates a rising scholarly interest in OFC. The United States emerges as the leading contributor, followed by India and Germany, highlighting the global nature of this research area. The thematic evolution of OFC research over three decades shows a progression from conceptual foundations to consumer-centric insights, with recent focus on themes such as the theory of planned behaviour, green marketing, environmental concerns, and consumer perceptions and intentions.

Cluster analysis identified dominant themes across all clusters, including consumer attitudes and purchase intentions, willingness to pay (WTP), health-conscious purchasing behaviour, and ethical considerations. These findings provide a comprehensive overview of the current state of OFC research and point to areas of concentrated scholarly interest (Figure 2.19).

Figure 2.19. Thematic evolution in OFC



Consumption behaviour for fruits of lifeline tree crops in an arid region

Prem Chand, Kiran Kumara T. M., Kamlesh Acharya and Kalu Naik

Indigenous tree species like Prosopis cineraria (*khejri*) and Capparis decidua (*kair*) are vital components of arid ecosystems, providing multiple benefits such as fodder, fuelwood, medicinal properties, and shade. These species are well-adapted to local climatic conditions and socio-economic settings. However, they face threats due to limited research attention, particularly in value addition and market development. A study analyzing consumer behaviour and willingness to pay for *khejri* pods (*sangri*) and *kair* fruits revealed interesting insights into awareness, consumption patterns, and market potential. Rural respondents showed higher awareness and consumption rates due to cultural connections and reliance on home-grown sources. Urban consumers faced barriers such as limited market access and a lack of culinary knowledge. Processed forms of these products were unpopular, with traditional cooking methods dominating. The environmental benefits of *sangri* and *kair* were recognized, but *kair's* ecological significance was less understood.

Despite price sensitivity, the study revealed a market potential for these traditional products, with most respondents preferring a price point of Rs. 1000/kg. These findings highlight the need for better information dissemination, improved market access, and targeted pricing strategies to promote the conservation and sustainable use of these important indigenous species.

Farm subsidy savings with millet cultivation

Balaji S. J.

A study was conducted to investigate how climate-sensitive crop selection could assist the government in reducing farm subsidies, which could subsequently be reinvested in climate initiatives, while simultaneously decreasing greenhouse gas emissions in crop cultivation. The research considered a modest, rather than large-scale, shift from heavily subsidized, energy-intensive crops to more nutritious, cost-effective, and environmentally sustainable alternatives. Specifically, the study examined the potential reintroduction of pearl millet and sorghum cultivation to levels observed in the early reform period. Two scenarios were developed (Table 2.25). The first scenario, based on the consumption approach, assumed that households would revert to their per capita millet consumption rates from 1993–94, substituting rice and wheat in their diet. The second scenario, production approach, assumed that farmers would expand their pearl millet and sorghum cultivation areas to previous levels, using 1990–91 and 1970–71 as the reference periods.

The findings indicated that expanding pearl millet cultivation offers greater benefits to the government compared to sorghum expansion (Table 2.26). When households consumed pearl millet at early reform levels, it was found to save the government Rs. 6220 million. In contrast, sorghum expansion led to increased subsidy expenses. However, when both millets were expanded simultaneously, the overall subsidy savings remained positive, as the benefits of pearl millet outweighed the losses associated with sorghum. From a climate perspective, sorghum expansion was found to result in higher greenhouse gas emissions compared to pearl millet. The study concluded that transitioning from cereals to millets benefits governments by reducing farm subsidy expenses while also lowering greenhouse gas emissions.

Table 2.25. Consumption and production scenarios

Approach		Sorghum	Pearl millet
Consumption shift			
A.	To the early-reforms level		
C Consumption quantity in 1993-94 (kg/person/month)		0.72	0.39
C Consumption quantity in 2011-12 (kg/person/month)		0.18	0.19
R Required consumption shift		+ 306%	+ 105%
Crop area shift			
B.	To the early-reforms level		
	Cultivated area in 1990-91 (million ha)	14.36	10.48
	Cultivated area in 2020-21 (million ha)	4.24	7.57
	Required area expansion	+ 239%	+ 38%
C.	To the early-green revolution level		
	Cultivated area in 1970-71 (million ha)	17.37	8.11
	Cultivated area in 2020-21 (million ha)	4.24	7.57
	Required area expansion	+ 310%	+ 71%

Source: Ministry of Statistics and Programme Implementation (2014); MoA&FW (2022)

Table 2.26. Farm subsidy savings in alternate scenarios

Commodity	Change in Private Final Consumption Expenditure (PFCE) (Rs. Billions)								
	Consumption shift			Production shift I			Production shift II		
	ΔF_S	ΔF_P	ΔF_{SP}	ΔF_S	ΔF_P	ΔF_{SP}	ΔF_S	ΔF_P	ΔF_{SP}
Pearl millet		118.69	118.69		42.95	42.95		80.26	80.26
Sorghum	553.72		553.72	432.48		432.48	560.96		560.96
Paddy	-199.46	-42.75	-242.21	-155.79	-15.47	-171.26	-202.07	-28.91	-230.97
Wheat	-354.26	-75.94	-430.20	-276.70	-27.48	-304.18	-358.89	-51.35	-410.24
	Change in farm subsidies (Rs. million)								
Fertilizer	5400	-5160	250	4220	-1870	2350	5480	-3490	1990
Electricity	-3940	-1060	-5010	-3080	-380	-3470	-4000	-720	-4710
Credit	27	-40	23	21	-1.0	20	27	-02	25
All	1490	-6220	-4740	1160	-2250	-1090	1510	-4210	-2700

Notes: Production shifts I and II refer to the shift to the early-reforms level and early-green revolution level, respectively. ΔF_P is the change due to a shift in pearl millet consumption/production alone; ΔF_S change due to a shift in sorghum consumption/production alone; and ΔF_{PS} is the change due to a shift

Source: Authors' estimate

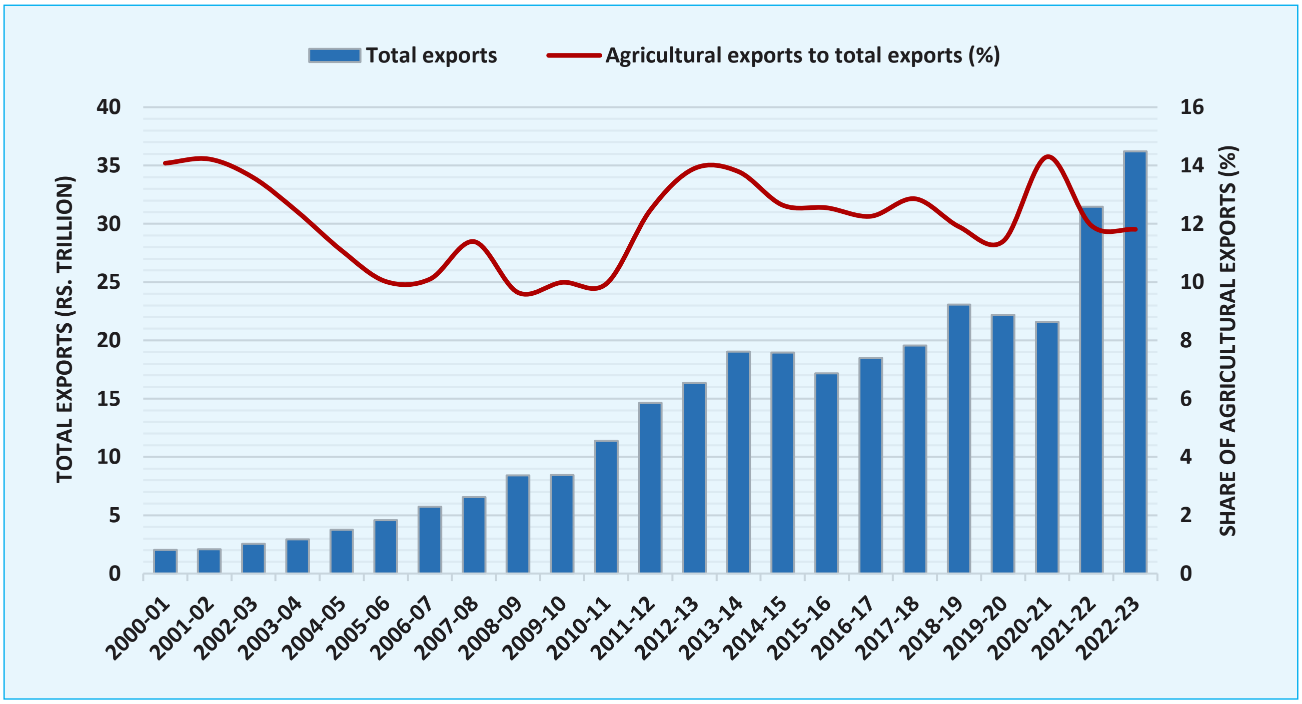
Opportunities to accelerate agricultural exports from India

Raka Saxena, P. S. Birthal, R. C. Agrawal, Purushottam Sharma, Ranjit K. Paul, Balaji S. J., Devesh Kumar Pant and Neha Joshi

The study's findings highlight India's significant progress in agricultural exports, which now constitute 12% of the country's merchandise exports and reached $53.15 billion in 2022-23 (Figure 2.20). This growth is primarily driven by commodities such as rice, sugar, shrimp & prawns, and spices, reflecting increased global demand for Indian agricultural products. This achievement can be attributed to effective governance, product diversification, and market expansion strategies. However, the export landscape has evolved over time, with notable shifts in commodity composition. For instance, cotton exports have declined from 26.4% in 2001 to 13% in 2022, while cereals have emerged as a primary export item, increasing from 11% to 26% during the same period for agricultural exports.

Despite these positive trends, the study identifies several challenges that hinder further growth in India's agricultural exports. These include inconsistent food safety standards, insufficient value addition, and outdated infrastructure. Additionally, the concentration of exports across a limited number of commodities and destinations creates vulnerabilities in the export market (Table 2.27). To address these issues and capitalize on emerging opportunities, the study recommends modernizing supply chains, implementing good agricultural practices, and enforcing rigorous quality controls. Furthermore, investments in branding, value addition, and market intelligence, coupled with trade diversification through stronger bilateral agreements, could help India strengthen its position as a major agricultural exporter and seize unrealized opportunities in the global market.

Figure 2.20. Trends in India's agricultural exports



Source: Directorate General of Commercial Intelligence & Statistics, Ministry of Commerce and Industry, GoI

Table 2.27. Self-transitioning probabilities and projected shares for Indian exports

	Probability	Projected shares (%)		
		2022	2030	
Semi-milled rice	0.72	38.90	38.40	↔
Shrimp and prawns	0.39	21.30	16.30	↓
Bovine meat	0.74	8.10	17.50	↑
Sugar	0.83	19.10	24.00	↑
Cotton	0.46	5.50	13.40	↑
Wheat	0.14	3.50	0.20	↓
Broken rice	0.64	38.30	29.90	↓
Castor oil	0.91	85.90	85.00	↔
Dried capsicum	0.72	62.10	61.00	↔
Groundnuts	0.11	19.30	20.70	↑
Nutmeg	0.56	12.70	12.00	↔
Cumin	0.88	82.30	81.60	↔
Cashew nuts	0.73	8.80	7.20	↓
Grapes	0.35	3.20	3.20	↔
Turmeric	0.86	62.70	66.30	↑

Source: Authors' estimate

Ex-ante impact analysis of the India-United Kingdom free trade agreement on Indian agriculture

Shiv Kumar and Harshit Gupta

The potential free trade agreement (FTA) between India and the United Kingdom (UK) offers significant opportunities for enhancing agricultural trade, particularly in sectors where India has a comparative advantage. This study employs the Static and Multi-country Analysis of Remaining Tariffs (SMART) simulation model within the World Integrated Trade Solution (WITS) framework to analyze the effects of total tariff elimination on bilateral trade dynamics. The analysis reveals that full liberalization would have the most substantial impact on beverages, spirits, and vinegar, with a total trade effect of US$ 408 million (Table 2.28). This significant increase is attributed to the initial high tariff rates, which previously made these commodities unaffordable for many consumers.

The study also highlights the balance between trade creation and diversion across various product categories. While India experiences significant trade creation post-liberalization, there is also notable trade diversion from other countries to the UK due to the free trade pact. Products such as rubber and miscellaneous edible preparations show a balanced increase in both trade creation and diversion, indicating moderate growth potential. Marine products, in particular, demonstrate a strong positive response to tariff liberalization with minimal trade diversion. These findings underscore the importance of careful negotiation to ensure favourable terms for Indian exporters and the need for continuous monitoring of the FTA's impact to address emerging challenges and make timely adjustments.

Table 2.28. Total trade effect of tariff elimination under the India-UK Free Trade Agreement on major agricultural commodities

Agricultural Products	Old Duty (%)	New Duty (%)	Trade Total effect (million US$)	Trade Creation (million US$)	Trade Diversion (million US$)
Beverages, spirits and vinegar	115.79	0.00	408.00	346.00	62.00
Rubber and articles thereof	10.79	0.00	16.00	7.00	9.00
Miscellaneous edible preparations	40.83	0.00	13.00	6.00	7.00
Marine Products	30.00	0.00	9.00	8.00	1.00
Dairy produce; birds' eggs; natural honey	42.00	0.00	3.00	3.00	0.48
Products of the milling industry	30.00	0.00	2.00	2.00	0.44
Residues from the food industry	16.00	0.00	2.00	1.00	1.00
Coffee, tea, mate and spices	46.62	0.00	2.00	1.00	1.00
Animal fats	36.37	0.00	1.00	1.00	0.46
Sugar and sugar confectionery	46.54	0.00	1.00	1.00	1.00
Preparation of cereal, flour, or starch	30.00	0.00	1.00	0.36	1.00

Source: Authors' calculation based on UNCOMTRADE (United Nations Commodity Trade Statistics Database) Database

Harnessing India's export potential in rice: Evidence from a stochastic frontier gravity model

Raka Saxena, Devesh Kumar Pant, Alka Singh and Purushottam Sharma

The study's analysis of India's rice exports using the stochastic frontier gravity model (SFGM) provides valuable insights into the factors influencing the country's trade performance. By examining data from 22 major export destinations over nearly two decades, the research offers a comprehensive view of the dynamics shaping India's rice export market. The findings highlight the positive impact of economic growth, both in India and importing countries, on rice exports (Table 2.29). This suggests that as economies expand, the demand for Indian rice increases, potentially due to rising incomes and changing consumption patterns.

However, the study also identifies significant barriers to India's rice exports, including geographical distance and tariffs imposed by importing countries. These factors underscore the importance of efficient logistics and trade negotiations in maintaining and expanding India's market share. The minimal impact of regional trade agreements on rice exports is particularly noteworthy, indicating that current agreements may not be fully leveraging India's export potential in this sector. The research emphasizes the existence of untapped export opportunities, suggesting that targeted improvements in trade facilitation, logistics, and bilateral agreements could substantially boost India's rice exports. To capitalize on this potential, the study recommends focusing on quality compliance, regulatory streamlining, infrastructure development, and research into rice cultivars. Additionally, the implementation of policies like the New Agricultural Export Policy could play a crucial role in enhancing India's competitiveness in the global rice market.

Figure 2.21. Share of major destinations in India's rice exports - TE 2021 (%)

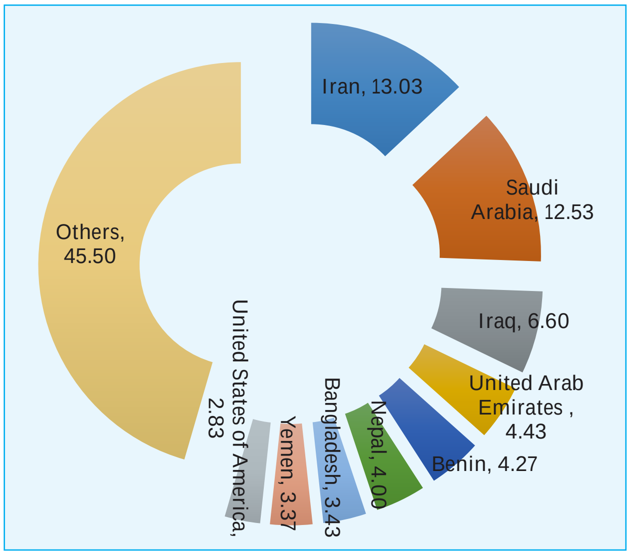


Table 2.29. Determinants of India's rice exports

Dependent variable (Rice Exports)	Stochastic Frontier Gravity Model (SFGM)			
	Coefficient	Std. error	Z	P-value
India's GDP	1.34	0.14	-6.38	0.000
GDP of trading partners	0.23	0.08	9.43	0.006
Distance	-1.00	0.16	1.83	0.000
Population (trading partners)	0.28	0.16	2.76	0.067
Tariff	-3.68	0.79	2.52	0.000
Exchange rate	0.12	0.05	-4.68	0.012
Regional trade agreement	-1.97	0.35	2.68	0.000
Common language dummy	0.58	0.22	-5.65	0.007
Constant	-14.58	3.16	-4.61	0.000
Log-likelihood	-865.44			
Number of observations	418			
Wald Chi-square	353.46			
p-value* (Prob > chi2)	0.00			

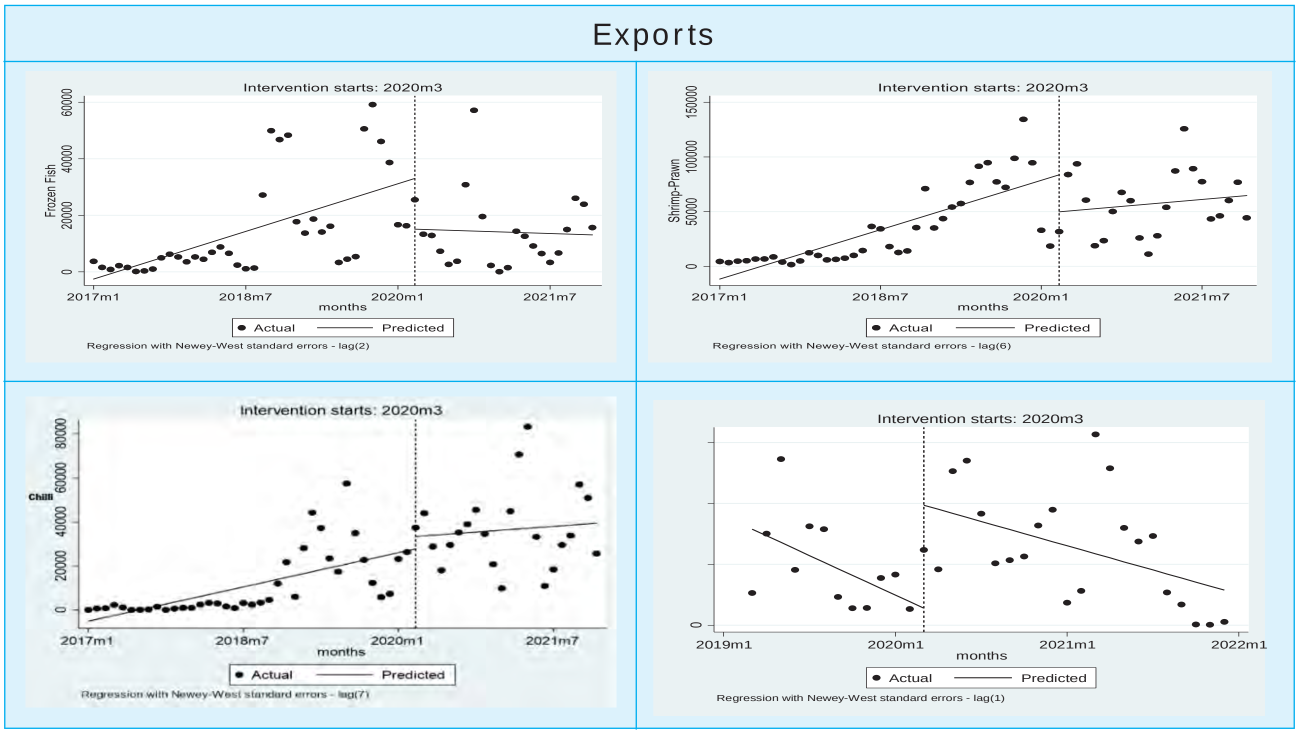
Note: LR test of σ_u=0: (01) =1.8e+02, Prob>= =0.000
Source: Authors' estimate

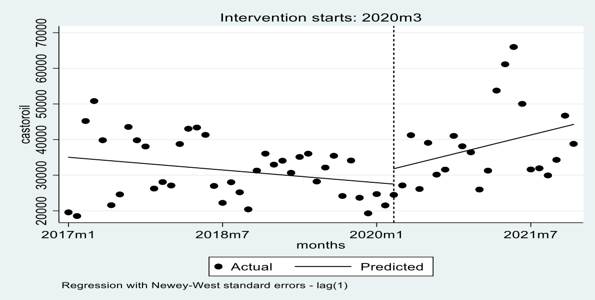
Impacts of global uncertainties on agricultural trade between India and China

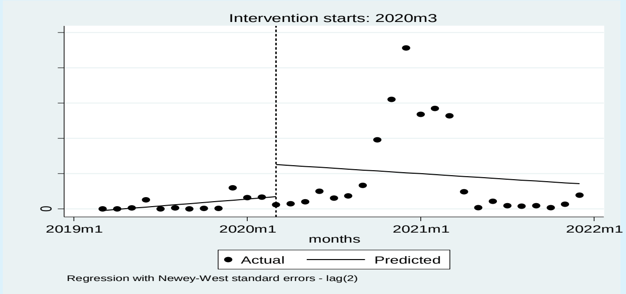
Raka Saxena, Purushottam Sharma, Devesh Kumar Pant and Neha Joshi

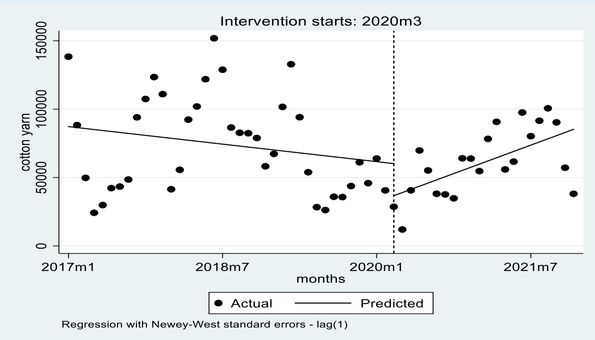
This study examines the impact of the COVID-19 pandemic on bilateral agricultural trade between India and China between January 2017 and December 2021, using the Interrupted Time Series Analysis (ITSA) method. The study focused on seven key export-oriented agricultural commodities, including frozen fish, shrimps & prawns, chilli, cumin, castor oil, groundnut oil, and cotton yarn, as well as fertilizer imports such as urea and Di-ammonium Phosphate (DAP). Results indicated a notable increase in India's agricultural exports to China post-pandemic, primarily driven by heightened demand for health-related products. Spices like cumin and chilli, edible oils such as castor and groundnut, and seafood items including frozen fish, shrimp, and prawns experienced substantial growth in export volumes (Figure 2.22). The pandemic's impact on fertilizer imports initially led to a decline due to supply chain disruptions. However, the import levels of urea and DAP quickly stabilized, demonstrating the resilience of the agricultural trade sector. This study underscores the importance of developing robust contingency plans and diversifying export markets to protect agricultural trade from external shocks. Such measures would help mitigate the adverse effects of unforeseen events like pandemics, conflicts, and sudden policy changes, ensuring greater stability and sustainability in bilateral agricultural trade between India and China.

Figure 2.22. Effect of COVID-19 on India's agricultural trade with China

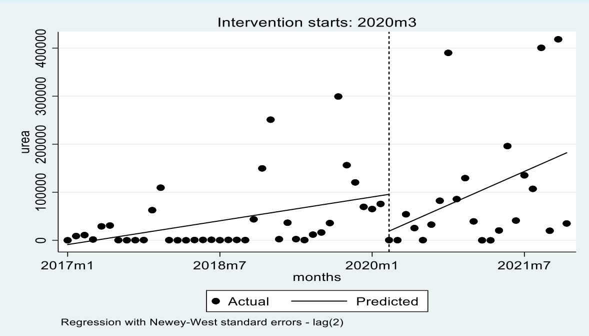


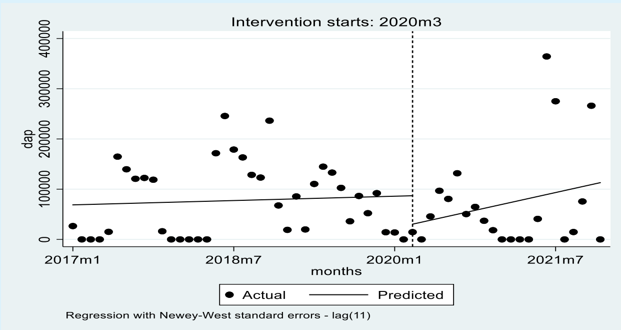






Imports





Source: Authors' estimate

List of Research Projects

Table 2.30. Completed and ongoing research projects

Title	Theme	Project duration	Project team	Project status
Network Project (Ecosystems, agribusiness and institutions)				
Component I: Inclusive agricultural development (Hill and arid agriculture)	Technology and Sustainable Agriculture	April 2021-March 2026	Prem Chand, Khem Chand and Kiran Kumara T.M.	Ongoing
Component II: Impact of agricultural technology	Technology and Sustainable Agriculture	April 2021-March 2026	Rajni Jain, Ankita Kandpal and Vinayak R. Nikam	Ongoing
Component III: Agricultural market intelligence and commodity outlook	Agricultural Market and Trade	April 2021-March 2026	Purushottam Sharma, D. C. Meena and Kingsly I. T.	Ongoing
Component-IV: Farmers' income, governance impacts and agricultural trade	Agricultural Growth and Development	April 2021-March 2026	Raka Saxena and Balaji S.J.	Ongoing
Externally funded projects				
Trees outside forests in India	Technology and Sustainable Agriculture	November 2021-March 2025	Prem Chand, Kiran Kumara T.M. and Vinayak R Nikam	Completed
Strategic research component of National Innovations on Climate Resilient Agriculture (NICRA)	Technology and Sustainable Agriculture	April 2017-March 2026	Nalini Ranjan Kumar, S. K. Srivastava and N. P. Singh	Ongoing
Improving groundwater sustainability through analysing groundwater-energy nexus	Technology and Sustainable Agriculture	April 2021-March 2026	S. K. Srivastava, Subhash Chand, Prabhat Kishore, Ranu Rani Sethi and Ankhila R.H.	Ongoing
Management and impact assessment of farmer FIRST project	Technology and Sustainable Agriculture	February 2017-March 2026	Shiv Kumar, Rajni Jain, Vinayak R Nikam, Ankita Kandpal and Kingsly I. T.	Ongoing
The South Asia agriculture adaptation atlas: interconnections between climate risks, practices, technologies, and policies	Technology and Sustainable Agriculture	April 2023-August 2025	Prem Chand and Prabhat Kishore	Ongoing
R & D investment and innovation outcomes in Indian agriculture	Technology and Sustainable Agriculture	August 2020-March 2025	Ankita Kandpal and P. S. Birthal	Ongoing

Title	Theme	Project duration	Project team	Project status
Vulnerability assessment and adaptation measures for groundwater department agro-ecosystems in India	Technology and Sustainable Agriculture	April 2023-March 2026	S.K. Srivastava	Ongoing
Institute funded projects				
Farm mechanization-the role of custom hire services and rural labour market	Technology and Sustainable Agriculture	April 2020-March 2024	Nalini Ranjan Kumar and S. K. Srivastava	Completed
Economic valuation of ecosystem service from sustainable agricultural practices in India	Technology and Sustainable Agriculture	July 2022-June 2024	Kiran Kumara T. M., D. C. Meena and P. S. Birthal	Completed
Impact analysis of farmers' Innovations on agro-economic development in rural areas	Technology and Sustainable Agriculture	July 2022- June 2024	Vikas Kumar, Arathy Ashok and Dilip Kumar	Completed
Research priorities in Indian agriculture	Technology and Sustainable Agriculture	July 2022 - June 2024	S.V. Bangararaju Tatipudi, Raka Saxena and P. S. Birthal	Completed
Welfare gains to the farm households with access to minimum support price and its effect on groundwater depletion	Agricultural Market and Trade	April 2022-March 2024	Prabhat Kishore, P. S. Birthal, and S. K. Srivastava	Completed
Agricultural price analysis and forecasting	Agricultural Market and Trade	April 2020-March 2025	Purushottam Sharma, D.C. Meena, Kingsly I. T. and Shiv Kumar	Completed
Re-examining farm size – productivity relationships in Indian agriculture	Agricultural Growth and Development	December 2023 – November 2025	Balaji S. J., Jaya Jumrani and P. S. Birthal	Ongoing
Gendered challenges in academia: recent evidence from social science in Indian agricultural institutions	Agricultural Growth and Development	September 2024-October 2026	Jaya Jumrani	Ongoing
Reinforcing transformation dynamics: a deep dive into India's food system' problems and social optimum	Agricultural Growth and Development	January 2025-December 2027	Balaji S.J.	Ongoing

Title	Theme	Project duration	Project team	Project status
Database development for agricultural rural households with special focus on weaker sections	Technology and Sustainable Agriculture	April 2020-March 2025	Subhash Chand, Rajni Jain, Vikas Kumar, Dilip Kumar, D. C. Meena, K. R. Chaudhary and M. S. Chauhan	Ongoing
Institutions and technology for agricultural water management	Technology and Sustainable Agriculture	April 2021-April 2025	S.K. Srivastava, Subhash Chand and Prabhat Kishore	Ongoing
Performance and Impact of Farmer Producer Organizations (FPOs)	Technology and Sustainable Agriculture	April 2021-September 2025	Vinayak R Nikam and Prem Chand	Ongoing
AI and machine learning for supply forecasts	Technology and Sustainable Agriculture	April 2021-March 2026	Rajni Jain, Dilip Kumar, Anshu Bharadwaj and Sapna Nigam	Ongoing
Regional disparity in use of fertilizers in India: Causes and impacts	Technology and Sustainable Agriculture	September 2022-August 2025	Sant Kumar and Kingsly I.T.	Ongoing
Appraisal of dairy services: Access, preferences and impacts	Technology and Sustainable Agriculture	January 2023-June 2025	Arathy Ashok, Vikas Kumar and Vinayak R Nikam	Ongoing
Value chain study on non-bovine milk in India	Technology and Sustainable Agriculture	November 2023-October 2025	Khem Chand	Ongoing
Digital innovations in agriculture	Technology and Sustainable Agriculture	January 2023-March 2026	Rajni Jain, Vikas Kumar and Arathy Ashok	Ongoing
Economic valuation of impact of bio stimulants on agricultural ecosystem services	Technology and Sustainable Agriculture	January, 2024-December, 2025	D. C. Meena Kiran Kumara T. M. and P. S. Birthal	Ongoing
Carbon sequestration potential and economic feasibility of carbon credit projects in Indian agriculture	Technology and Sustainable Agriculture	August 2024 - July 2026	Kiran Kumara T.M.	Ongoing
Converting waste into wealth : Dung for bio-energy and bio-CNG	Technology and Sustainable Agriculture	July 2024- June 2026	Anil Kumar, Khem Chand, Vikas Kumar and P.S. Birthal	Ongoing
Groundwater market in India: Efficiency and equity assessment	Technology and Sustainable Agriculture	January 2025-December 2026	I. Sekar and Shiv Kumar	Ongoing

Title	Theme	Project duration	Project team	Project status
Evaluating benefits of Western Yamuna canal command irrigation system in northern India	Technology and Sustainable Agriculture	July 2024-December 2026	Subash Chand, Prabhat Kishore and Khem Chand	Ongoing
Untangling India's dual malnutrition burden: Analyzing spatial and socio-demographic patterns under changing climatic conditions	Agricultural Market and Trade	December 2023 to December 2026	Jaya Jumrani	Ongoing
Trade policies of oilseed complex : Effects on consumption, processing, import and welfare of India	Agricultural Market and Trade	July 2024 – December 2026	Kingsly I.T. and Balaji S.J.	Ongoing
An Evaluation of effects of geographical indications (GIs) on Prices and Exports of Agricultural Commodities	Agricultural Market and Trade	July 2024- July 2026	Pavithra S, S.V.Bangararaju Tatipudi and Shiv Kumar	Ongoing

Table 2.31. Consultancy and contract research projects

Area of consultancy/ contract research	Funding agency	Scientists involved
Post-harvest profile of Millets	Directorate of Marketing and Inspection, Ministry of Agriculture and Farmers Welfare, Government of India	Shiv Kumar, Purushottam Sharma, Prem Chand, D. C. Meena, Pavithra S., Kiran Kumara T.M., Ankita Kandpal, and S.V. Bangararaju Tatipudi
Evaluation of Irrigation Projects under LTIF of NABARD	NABARD	S.K. Srivastava, Prabhat Kishore, P.S. Bramhanand, Monalisha Pramanik, and P. S. Birthal
Foresight and metrics to accelerated food, land and water system transformation (Foresight)	Bioversity International	Balaji S.J., Purushottam Sharma, S. K. Srivastava, and Kingsly I.T.

3 Capacity Building

Seminars, Conferences and Workshops

32nd International Conference of Agricultural Economists (ICAE)

ICAR-NIAP co-organized the 32nd International Conference of Agricultural Economists (ICAE) at the National Agricultural Science Complex (NASC), New Delhi, from August 3-7, 2024. The conference's theme was "Transformation Towards Sustainable Agri-Food Systems." The event was inaugurated by the Honourable Prime Minister of India and was attended by approximately 1,000 delegates from around 75 countries. Scientists and staff from NIAP actively participated in various capacities, including as presenters, participants, chairpersons, and committee members.

Inaugural ceremony of the 32nd ICAE

Conference on 'Harnessing the Potential of Solar-Powered Micro Irrigation for Accelerating Sustainable Agriculture'

ICAR-NIAP, jointly with the International Copper Association India, organized a conference on 'Harnessing the Potential of Solar-Powered Micro Irrigation for Accelerating Sustainable Agriculture' in New Delhi on January 22, 2025. The event was an outreach activity to disseminate findings of the study on solar-based micro irrigation, which analyzed the rationale, feasibility, and institutional arrangements required to jointly promote the complementary technologies, such as solar power and micro irrigation. The event was marked by the launch of a Policy Paper and panel discussions on policy perspectives, market needs, and industry inputs on the convergence of solar & micro-irrigation.

Launch of policy paper in the conference on solar-powered micro-irrigation

Workshop on Solar-Powered Micro-Irrigation

ICAR-NIAP, jointly with the International Copper Association India, organized a workshop at NIAP to discuss various aspects of the promotion of micro-irrigation and solar pumps in the country on July 24, 2024. The workshop was co-chaired by Dr. S.K. Chaudhary, DDG (Natural Resource Management), and Dr. S.K. Ambast, Chairman, Central Ground Water Board (CGWB). The stakeholders discussed the potential and adoption of micro-irrigation and solar pumps across the states, benefits of bundling, and joint promotion of these technologies through an institutional framework to converge Pradhan Mantri Krishi Sinchayi Yojana (PMKSY) and Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (PMKUSUM) schemes.

Workshop on Solar-Powered Micro-Irrigation

Workshop on Strategies for Crop Residue Management in India

ICAR–NIAP, in collaboration with the International Water Management Institute (IWMI), organized a one-day workshop on "Strategies for Crop Residue Management in India" on December 16, 2024. The workshop was coordinated by Dr. Deepak Varshney, Regional Researcher, at IMWI, and Dr. Kiran Kumara T.M., Scientist at ICAR-NIAP. More than 50 stakeholders from various organizations participated in the workshop. The inaugural session featured opening remarks by Dr. Alok Sikka, Country Representative – India, IWMI; Dr. P.S. Birthal, Director, ICAR-NIAP; and Dr. Rajbir Singh, Assistant Director General, ICAR. The workshop included presentations on recent research findings from Haryana and Punjab, covering topics such as incentives in rice farming, grain procurement, and seasonal air pollution, adoption of resource-conserving technologies, and farmers' perspectives on crop residue management, followed by an engaging panel discussion.

Participants of the Workshop on Strategies for Crop Residue Management in India

Review Workshops on network project Ecosystems, Agribusiness and Institutions

The review of the network project "Ecosystems, Agribusiness and Institutions" was conducted through a series of structured meetings and workshops in both online and offline modes to assess the progress of all project components. The first major review workshop of all components was held in hybrid mode on September 11, 2024. During the workshop, progress was reviewed for each partner, and suggestions were made for refinement of the outputs. Target plans for each partner for the year 2024-25 were also envisaged under the guidance of the Director, NIAP. The second major workshop was held

Network project review workshop

on December 10, 2024, at Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur, with a focus on evaluating current achievements and outlining future deliverables.

Trainings

Training Programme for Officer-Trainees of the Indian Economic Service

ICAR-NIAP conducted a one-week Probationary Training programme for the Officer Trainees of the Indian Economic Service (IES)-2024 batch, during May 6-10, 2024. Training familiarized the officers with emerging issues in India's agricultural and rural economy. A total of 17 officer-trainees attended this programme. Dr. Raka Saxena, Dr. Purushottam Sharma, Dr. Balaji, S.J., and Dr. Prabhat Kishore coordinated the training programme. Prof. Ramesh Chand, Member, NITI Aayog, and Dr. P.S. Birthal, Director, ICAR-NIAP, inaugurated the training programme. Different core issues of agriculture were deliberated in 29 sessions by different in-house and outside experts. Sh. Arun Kumar, Sr. Economic and Statistical Advisor, Department of Agriculture and Farmers Welfare, was the chief guest during the valedictory session of the training program.

Participants of the IES training programme

Training on Geospatial and Advanced Analytical Tools in Agriculture

The Institute organised a training on "Geospatial and Advanced Analytical Tools in Agriculture" with Experts from Environmental Systems Research Institute (ESRI), GIS (Geographical Information System) on December 18, 2024, at ICAR-NIAP in a hybrid mode. Dr Rajni Jain coordinated the event, which was attended by the scientists, staff, and students of the IARI (Indian Agricultural Research Institute) and IASRI (Indian Agricultural Statistics Research Institute).

Training on Geospatial and Advanced Analytical Tools in Agriculture

Trainings under the SC Sub-Plan program

Institute organized training programmes on tailoring for the empowerment of women belonging to the SC community (Table 3.1). In addition, the following interaction meetings and distribution of inputs were also undertaken as a part of the SC Sub-Plan programme:

- Distribution of improved variety seeds of vegetables and paddy among farmers belonging to weaker sections in Dhamrawali, Bulandshahr, Uttar Pradesh, on November 4, 2024

- SCSP (Scheduled Castes Sub Plan) beneficiaries-scientists' interaction meetings at Narsinghpura village, Jaipur district, Rajasthan, on November 11, 2024, and at Kaloo Ka Bas, Jaipur district, Rajasthan, on November 12, 2024.

Table 3.1. Details of the trainings on tailoring

S. No.	Venue	Duration	No. of participants
1.	Basada, Samalkha block, Panipat, Haryana	September 5 to October 5, 2024	27
2.	Dhamrawali, Bulandshar, UP	September 17 to October 18, 2024	27
3.	Kalukabas, Jaipur, Rajasthan	October 18 to November 17, 2024	39
4.	Rakseda, Samalkha block, Panipat, Haryana	October 21 to November 21, 2024	21
5.	Dhamravali, Bulandshar, UP	November 5 to December 4, 2024	25
6.	Kalukabas, Jaipur, Rajasthan	November 12 to December 11, 2024	35

Training cum distribution programmes under SC Sub-Plan

Lectures Organized

ICAR Lecture Series

Dr P. S. Birthal, Director, ICAR-NIAP, delivered a lecture on 'Reshaping agricultural policies for sustainable transformation of agri-food system' on January 17, 2025 (Online) as a part of a Lecture series organized by the Education Division, ICAR. The lecture was attended by the agricultural experts and vice-chancellors of the State Agricultural University in the NARS. The

Director, ICAR-NIAP delivering a lecture in the ICAR Lecture Series

lecture was well received by the dignitaries and the participants.

Lecture on IP (Intellectual Property) Prospects in Social Science Research

ICAR-NIAP organized a lecture on 'IP Prospects in Social Science Research' by Mr. Rahul Bagga, Founder and MD, Aumirah, to celebrate World IP Awareness Week on April 29, 2024.

Field Activities

Focus Group Discussions with camel pastoralists and other stakeholders

Focus Group Discussions (FGDs) were conducted with camel pastoralists and stakeholders involved in the camel milk value chain in Grandhi (Bikaner) and Nokh & Motai Rai ka Bag (Phalodi) districts of Rajasthan from May 7 to 11, 2024. Camel pastoralists highlighted critical issues, including the need for regular milk collection from forest/common property resource (CPR) sites and the increasing instances of grazing animal fatalities caused by electric fencing on farms. Stakeholders shared insights into the challenges and obstacles they face in camel rearing and the camel milk value chain, fostering a deeper understanding of the sector's pressing concerns. Different stakeholders, including NIAP scientists, Farmers, Camel pastoralists, and Urmul Seemant Samiti (NGO), were involved in the FGDs.

Interaction programmes with field coordinators and beneficiaries of the digital soil testing initiative

Scientists of ICAR-NIAP, in collaboration with PANI (People's Action for National Integration) Sansthan, Lucknow, organized an interactive program on March 3, 2025, to engage with field coordinators and beneficiaries of digital soil testing initiatives in Uttar Pradesh. The objective was to assess the role and impact of these initiatives on farmers' fields and agricultural production, fostering insights into their effectiveness and potential for sustainable farming practices.

Another interaction programme was organized in collaboration with the HCL (Hindustan Computer Limited) Foundation in Hardoi on March 4, 2025, to evaluate the role and impact of digital soil testing initiatives on farmers' fields, focusing on their contribution to enhancing agricultural productivity and promoting sustainable farming practices.

Teaching and Student Guidance

Table 3.2. Teaching activities undertaken by ICAR-NIAP Scientists

Name of the scientist	Course Name	Credit hours	Role (Course Leader/ Associate)	Division
Rajni Jain	Spatial Informatics, GIS and Remote Sensing	1+1	Course Leader	Computer Applications and IT (Information Technology), ICAR-IASRI, New Delhi
	AI and Machine Learning	2+1	Course Leader	Computer Applications and IT, ICAR-IASRI, New Delhi
Nalini Ranjan Kumar	Macroeconomics and Policy (AEC 504)	2+0	Associate	Agricultural Economics, ICAR-IARI, New Delhi
	Advanced Macroeconomic (AGECON 602)	2+0	Associate	Agricultural Economics, ICAR-IARI, New Delhi
Vinayak R. Nikam	Nutrition Policy and Agriculture	2+0	Course Leader	Agricultural Extension, ICAR-IARI, New Delhi
Kingsly I. T.	Operation Research (AGECON 605)	1+ 1	Course Leader	Agricultural Economics, ICAR-IARI, New Delhi

Table 3.3. Student guidance as chairperson of the advisory committee

Name of scientist	Name of student	Degree	Division	Thesis Topic
Shiv Kumar	Ms. Ragini P. Jambagi	Ph.D.	Agricultural Economics, ICAR- IARI, New Delhi	A Comparison on Karnataka's APMC (Agricultural Produce Market Committee) and Agricultural Markets of Kerala: An Economic Investigation
	M.S. Jagdeesh	Ph.D.	Agricultural Economics, ICAR- IARI, New Delhi	Economic Impact Of Geographical Indication-A Case Study of Basmati Rice in India
	J.U. Aryakrishanan	Ph.D.	Agricultural Economics, ICAR- IARI, New Delhi	Impact of labour bank on performance of agriculture sector in Kerala-An economic analysis
	P. Neelakantappa	Ph.D.	Agricultural Economics, ICAR- IARI, New Delhi	An Economic Analysis of Farmer Producer Organizations - A Case of Tomato Based production system in Karnataka
	Harshit Gupta	M.Sc.	Agricultural Economics, ICAR- IARI, New Delhi	Potential impact of free trade agreement between India and UK on Indian agriculture
Kingsly I.T.	Neha Sannyasi	M.Sc.	Agricultural Economics, ICAR-IARI, New Delhi	India's Trade Policies on Cereals: Economic Assessment of its Effects On Export and Welfare
	Seema Arya	Ph.D.	Agricultural Economics, ICAR-IARI, New Delhi	A Study on Energy, Food and Bio-ethanol in India
Nalini Ranjan Kumar	Rohith S.	Ph.D.	Agricultural Economics, ICAR- IARI, New Delhi	Evaluation of Some Innovative Custom Hiring Models of Farm machinery
	Soumya Cheela	Ph.D.	Agricultural Economics, ICAR- IARI, New Delhi	Impact assessment of National Rural Livelihood Mission (NRLM) on mitigation of climate change-induced risk
Vinayak R. Nikam	Suresh Kumar Bishnoi	M.Sc	Agricultural Extension, IARI, New Delhi	A Study of Social Networks and Stakeholders in Farmer Producer Organization
Jaya Jumrani	Mriganka Barman	Ph.D	Agricultural Economics and Farm Management, Assam Agricultural University, Jorhat	Climate-induced migration among farm households: recent evidence from Assam

Student Visits

During the year, students from various Agricultural Universities visited the institute. Around 100 Students of the third-year B.Sc. (Hons.) Agriculture, College of Agriculture-Vellayani, Kerala Agricultural University, Kerala, visited the institute on February 22, 2025. About 100 students from SRSIAT, College of Agriculture, Dindigul, Tamil Nadu, visited the institute on March 3, 2025. About 85 students of the second-year B.Sc. Agriculture, DY Patil College of Agriculture, Pune, Maharashtra, visited the institute on March 19, 2025. About 109 students from Rathinavel Subramaniam (RVS) Agricultural College, Thanjavur, Tamil Nadu, visited the institute. Students were briefed about the institute's activities by Dr. Vinayak Nikam.

Student visits to ICAR-NIAP

4 Policy Interactions

- Provided inputs through a policy report on Incentives in Rice Farming in Punjab and Haryana for the Ministry of Agriculture and Farmers Welfare, Government of India. The report provides existing incentives/subsidies for agriculture and their distribution across crops in Punjab and Haryana. It also explores possibilities of their re-purposing to sustainable agricultural practices, which have the potential to reduce paddy area, restore soil and water health, and minimize air pollution.
- Provided inputs on the draft note for the Cabinet Committee on Economic Affairs (CCEA) on Price Policy for Copra for the 2024-25 season. The Institute also provided inputs on fixation of MSP of Copra to the MSP Unit, Economics, Statistics and Evaluation Division, Ministry of Agriculture and Farmers Welfare, Krishi Bhawan, New Delhi.
- Provided inputs during the preparation of Economic Survey 2024-25, on the initiatives, performance, achievements (actual and expected), and measures taken in R&D to improve the quality of research inputs and to facilitate sustainable agriculture.
- Provided inputs for the Finance Minister's Budget Speech for 2025-26 to increase investment and productivity, improve efficiency and Effectiveness of the policies/schemes/programs implemented by the Ministries/Departments.
- Provided justification on the list of points raised on Examination of Demands for Grants (2021-25) by the Chairman, Standing Committee on Agriculture, Animal Husbandry and Food Processing Branch (2024-25), Lok Sabha Secretariat.
- Provided inputs on Draft Cabinet Note on Nutrient Based Subsidy (NBS) rates for Rabi 2024-25 received from the Department of Fertilizers, Ministry of Chemicals & Fertilizers.
- Provided inputs on the Draft reservation list (Horizontal Carve-outs) in the investment chapter Free Trade Agreement (FTA) received from the Department for Promotion of Industry and Internal Trade (DPIIT).
- Submitted a post-harvest profile of millet, including foxtail and pearl millet, to the Directorate of Marketing and Inspection, Ministry of Agriculture and Farmers Welfare, GOI.
- An Interaction Meeting was held with Ms. Alka Upadhyaya, Secretary, Ministry of Fisheries, Animal Husbandry & Dairying, for exploring the livestock development research at ICAR-NIAP.

5 Research Outputs

Agricultural Development Report

1. ICAR-NIAP. (2025). Agricultural Development Report, 2024. ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi (Editors: P.S. Birthal, Naveen P. Singh, and Purushottam Sharma).

Policy Papers

1. Sharma, P., Yeasin, M., Paul, R.K., Meena, D.C., and Anwer, M.E. (2024). Food Price Volatility in India. Policy Paper 45, ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi.
2. Srivastava, S.K., Kishore, P., Birthal, P.S., and Shirsath, P.B. (2024). Harnessing the Potential of Solar-Powered Miro-irrigation for Sustainable Intensification of Agriculture. Policy Paper 46, ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi.
3. Saxena, R., Birthal, P.S., Agrawal, R.C., Sharma, P., Paul, R.K., Balaji, S.J., Pant, D.K., and Joshi, N. (2024). From Local to Global: Opportunities to Accelerate Agricultural Exports from India. Policy Paper 47, ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi.
4. Kishore, P., Birthal, P.S., and Srivastava, S.K. (2025). The Dilemma of Agricultural Price Policy Reforms: Balancing Food Security, Farmers' Interests, and Sustainability of Natural Resources. Policy Paper 48, ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi.
5. Kumar, S., Birthal, P.S., Kumar, S., and Yadav, R.K. (2025). Economic Impact of Subsurface Drainage Technology. Policy Paper 49, ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi.
6. Birthal, P.S., Srivastava, S.K., Saxena, R., Godara, S., Chand, P., Kishore, P., Jumrani, J., Kandpal, A., Sharma, P., and Pant, D. K. (2025). Indian Agriculture to 2047: Reshaping Policies for Sustainable Development. Policy Paper 50, ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi.

Policy Briefs

1. Vatta, K., Sidana, B.K., Jain, R., Priscilla, L., Kandpal, A., and Kaur, G. (2024). Is DSR Economically Viable? Policy Brief 58, ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi.
2. Kumara, K.T.M. and Birthal, P.S. (2024). Re-purposing Agricultural Subsidies to Ecosystem Services. Policy Brief 59, ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi.
3. Kumar, N.R. and Athare, P.G. (2025). Farm Mechanization in India-The Crucial Role of Custom Hiring Services. Policy Brief 60, ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi.
4. Birthal, P.S., Srivastava, S.K., and Singh, J. (2025). From Cereals to High Value Food: Realigning Agricultural Policies to Evolving Consumer Preferences. Policy Brief 61, ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi.
5. Kumar, A. and Birthal, P.S. (2025). Leveraging Potential of Dung for Energy Security and Sustainable Agriculture. Policy Brief 62, ICAR-National Institute

of Agricultural Economics and Policy Research, New Delhi.

6. Srivastava, S.K., Kishore, P., Birthal, P.S., Singh, J., and Sethi, R.R. (2025). Tiered Electricity Pricing for Sustainable Groundwater Use for Irrigation. Policy Brief 63, ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi, India.

Research Papers

1. Agrawal, R.C., Das, L., Jain, R., Kishore, P., Nikam, V., and Devi, M. (2024). Nutri-garden for nutritional security and diversity: Some insights from Poshan Abhiyan. *Agricultural Economics Research Review*, 36 (2): 227-235. https://doi.org/10.5958/09740279.2023.00035.6.
2. Athare, P.G., Singh, D.R., Kumar, N.R., Jha, G.K., and Venkatesh, P. (2024). Spatial assessment of agricultural vulnerability to climate change using multidimensional data in Maharashtra state of India. *Indian Journal of Agricultural Sciences*, 94 (11): 1246–1252. https://doi.org/10.56093/ijas.v94i11.152381.
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learning. *Journal of the Indian Society of Agricultural Statistics*, 78 (1): 69-74. http://dx.doi.org/10.56093/JISAS.V78I1.9.

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6. Providing the tailoring training under scheduled caste sub plan. Punjab Kesari. October 7, 2024 (Participants: Subhash Chand and Arvind Kumar). https://haryana.punjabkesari.in/search/samalkha
7. Seeds were distributed to land less women for growing vegetables in the garden. October 21, 2024 (Participants: Subhash Chand and Arvind Kumar). https://haryana.punjabkesari.in/search/samalkha
8. Women empowerment is a power of Nation. Punjab kesari, March, 13, 2024 (Participants: Subhash Chand and Arvind Kumar). https://haryana.punjabkesari.in/search/samalkha
9. Distribution of tailoring machine to women. Rajasthan Patrika, February 16, 2024 (Participants: Subhash Chand, D.C. Meena, K.R. Chaudhary and Arvind Kumar). https://epaper.patrika.com/JaipurCity?eid=20&edate=08/04/2025&pgid=2247419&device=desktop&view=3
10. Inauguration of tailoring training. Rajasthan Patrika, October 18, 2024 (Participants: Subhash Chand, D.C. Meena, K.R. Chaudhary and Arvind Kumar).
11. Agriculture inputs distribution. Rajasthan Patrika, February 16, 2024 (Participants: Subhash Chand, D.C. Meena, K.R. Chaudhary and Arvind Kumar). https://epaper.patrika.com/JaipurCity?eid=20&edate=19/02/2024&pgid=1502636&device=desktop&view=3
12. Debate: Have the paddy planting laws fulfilled their purpose? Business Standard, May 27, 2024. https://www.business-standard.com/industry/agriculture/the-debate-have-the-paddy-planting-laws-fulfilled-their-purpose-124052701426_1.html
13. Distribution of vegetables seeds and inauguration of tailoring training in Dhamrawali village for women empowerment. November 5, 2024 (Participants: Rajni Jain and Subhash Chand). amarujala.com/uttar-pradesh/bulandshahr
14. 15% Paddy, 9.6% wheat farmers benefit from MSP. Business Standard, March 5, 2025. https://www.business-standard.com/industry/agriculture/only-15-paddy-9-6-wheat-farmers-benefit-from-msp-system-says-paper-125030400661_1.html


सिलाई प्रशिक्षण का समापन
महिलाओं को सिलाई मशीन का वितरण

16/02/2024
(Rajasthan Patrika-01)


कृषि उपकरणों का किया वितरण

19/02/2024
(Rajasthan Patrika-2)


महिलाएं किसी एक घर और परिवार की ही नहीं बल्कि राष्ट्र की हैं अमूल्य धरोहर : रामधन सैनी

13/03/2024
(Punjab Kesri 03)


किसानों को वितरित किए खेती संबंधी उपकरण

14/03/2024
(Punjab Kesri 04)


शिक्षित महिलाएं 2 परिवारों में लाती हैं उजाला : रामधन

23/03/2024
(Punjab Kesri 05)


अनुसूचित जाति उत्थान योजना के तहत महिलाओं को किया जाएगा प्रशिक्षित : डॉ. सुभाष चंद

7/09/2024
(Punjab Kesri 06)


सिलाई प्रशिक्षण कार्यक्रम शुरू

18/10/2024
(Raj. Patrika-07)


भूमिहीन महिलाओं के लिए वाटिका में सब्जी उगाने के लिए किया गया बीजों का वितरण

21/10/2024
(Punjab Kesri 08)


गरीब परिवारों के लिए चलाई गई योजनाओं का सभी महिलाएं उठाएं फायदा : रामधन सैनी

22/10/2024
(Punjab Kesri 09)


धमरावली में उन्नत किस्म के बीज डिस्ट्रीब्यूशन व महिला सशक्तिकरण हेतु सिलाई प्रशिक्षण कार्यक्रम का शुभारंभ

5/11/2024
(Varun Doot 10)


अनुसूचित जाति की महिला किसानों को मिनी पावर ट्रैक्टर देकर उनको आत्मनिर्भर बनाने के लिए सम्मान समारोह आयोजित

19/03/2025
(Punjab Kesri 11)


अनुसूचित जाति उप योजना के तहत ग्रामीणों को बांटे घरेलू उपयोग और ट्यूबवेल संबंधी टूल

03/04/2025
(Punjab Kesri 12)

Other Publications

1. Bouis, H., Foley, J., Lividini, K., Jumrani, J., et. al. Biofortification: Future Challenges for a Newly Emerging Technology to Improve Nutrition Security Sustainably. January 21, 2025, https://www.harvestplus.org/biofortification-future-challenges-for-a-newly-emerging-technology-to-improve-nutrition-security-sustainably/
2. Chand, P. (2024). Rapporteur's Report on Innovations in Agri-Input and Services Market Towards Sustainable Agriculture. *Indian Journal of Agricultural Economics*, 79 (3): 888-896. https://doi.org/10.63040/25827510.2024.03.037
3. Report on 'Millets Post-Harvest Commodity Profiles' for nine millets, namely Bajra, Sorghum, Ragi, Kodo Millet, Barnyard Millet, Foxtail Millet, Brromcorn Millet, Little Millet, and Foxtail Millet. (available on https://dmi.gov.in/ComProfiles.aspx)

Technologies/Products Developed

Table 5.1. Technologies/ products certified by ICAR

S.No.	Type of Innovations/ Developments	Title of Innovations/ Developments	Name of Scientist(s)
1.	Model	A methodological approach for farm income convergence measurement across distribution over space with spatial interactions	Balaji, S.J. and Gopinath, M.
2.	Policy	The Ukraine war and its food security implication for India	Balaji, S.J. and Suresh Babu
3.	Policy	Technology and policy options for reducing India's import dependence on edible oils	Balaji, S.J., Purushottam Sharma, Venkatesh, P. and Shreya, K.
4.	Policy	Technology and policy options for sustaining pulses revolution	Purushottam Sharma, Barun Deb Pal and P. S. Birthal
5.	Methodology	Bibliometric mapping of agri-food systems and nutritional security	Raka Saxena, Devesh K. Pant and Satish C. Pant
6.	Policy	India's agricultural exports during the covid-19 pandemic	Raka Saxena, Ranjit K. Paul, Balaji, S.J. and Rohit Kumar
7.	Policy	India's Food Demand and Supply to 2047	Shivendra K. Srivastava, N. Sivaramane, P. S. Birthal, Ranjit K. Paul and Raka Saxena
8.	Policy	Indian agriculture in transition: household-level evidence	Raka Saxena, Shivendra K. Srivastava, Balaji, S.J. and Abhimanyu Jhajhria.
9.	Policy	Assessment of effectiveness of a fiscal policy instrument (i.e., fat subsidy) in influencing consumption patterns	Jaya Jumrani and J. V. Meenakshi
10	Model	Sustainable entrepreneurship in Mushroom Cultivation Model	Sabita Mishra, Mridula Devi and Anil Kumar

S.No.	Type of Innovations/ Developments	Title of Innovations/ Developments	Name of Scientist(s)
11.	Model	Multi Agency Participatory Extension Model (MAPEM) For Sustainable Backyard Poultry by Farm Women	Sabita Mishra, Mridula Devi and Anil Kumar
12.	Model	Targeting Micro-Irrigation Subsidies for Efficient Water Use and Higher Incomes	Prabhat Kishore and P. S. Birthal
13.	Policy	Farmer producer organizations in India: challenges and prospects	Vinayak R. Nikam, Haripriya Veesam, Kiran Kumara T.M. and Prem Chand
14.	Model	Technology Impactful model for farmer FIRST programme implementation	Udham Singh Gautam, Ved Parkash Chahal, Rajarshi Roy Burman and Shiv Kumar
15.	Model	Agro-silvipasture based rainfed IFS (Integrated Farming System) model for goat farmers of Bundelkhand region	Sunil Kumar, M.M. Das, T. Kiran Kumar, Sunil Kumar, Manoj Chaudhary, Khem Chand, S.K. Rai, Akram Ahmed and C.S. Sahay
16.	Model	Multi-enterprise IFS model for irrigated smallholder farmers in peri-urban area of Bundelkhand region	Sunil Kumar, M.M. Das, T. Kiran Kumar, Sunil Kumar, Manoj Chaudhary, Khem Chand, S.K. Rai, Akram Ahmed and C.S. Sahay
17.	Model	Dairy based IFS model for irrigated small and marginal farmers of Bundelkhand region	Sunil Kumar, M.M. Das, T. Kiran Kumar, Sunil Kumar, Manoj Chaudhary, Khem Chand, S.K. Rai, Akram Ahmed and C.S. Sahay

6 Awards and Recognitions

Awards

S.K. Srivastava

- Selected as a named scholar for the Fulbright Scholar-in-Residence program of the Institution of International Education (IIE), Washington, DC for the academic year 2025-26 at Oklahoma State University, USA

Kiran Kumara T.M.

- Young Agriculture Economist 2024 Award by Agricultural Economics Research Association (AERA), India
- 2025 Young Agricultural Scientist Award by the National Academy of Agricultural Sciences (NAAS), India
- International Research Symposium participation grant-2024 by German Federal Ministry of Food and Agriculture, Global Research Alliance on Agricultural Greenhouse Gases (GRA), and Consortium of International Agricultural Research Centers (CGIAR)
- International Conference participation grant-2024 by the International Association of Agricultural Economists (IAAE) and the Agricultural Economics Research Association (India)

Dr Kiran Kumara T. M. receiving the Young Agriculture Economist 2024 Award by AERA, India

Prem Chand

- Dr. R.T. Doshi First Prize for the paper "Resource conservation technologies for sustainable development of agriculture; a case study in Indian Punjab" authored by J.M. Singh, Jatinder Sachdeva, Prem Chand, Jasdev Singh, and Baljinder Kaur, published in Volume 36 of the Agricultural Economics Research Review.

Sant Kumar

- IPA (Indian Potato Association) Gold Medal for the best paper published in volume 49 of Potato Journal- "Returns to Potato Research in India: A Case of Kufri Pukhraj".

Recognitions

P.S. Birthal

- Member, II Sub-group on Agricultural Commodities constituted by the Ministry of Commerce and Industry, Department for Promotion of Industry and Internal Trade, Office of the Economic Adviser (Wholesale Price Division)
- Member, Technical Expert Group for Forecasting Agricultural Output using Space, Agro-Meteorology and Land Based Observations (FASAL), Ministry of Agriculture & Farmers Welfare, Department of Agriculture & Farmer's Welfare, Economic, Statistics & Evaluation Division (Agriculture Statistics)
- Member, Committee to recommend Maximum Sale Price (MSP) of Bt. Cotton under Cotton Seed for the Financial Year (FY) 2025-26, Ministry of Agriculture and Farmer's Welfare, Department of Agriculture, Cooperation & Farmer's Welfare

- Chairman, Selection Committee for NAAS Fellows, Associates, Young Scientists and NAAS Recognition Award in Social Sciences
- Chairman, Assessment Committee under CAS in the discipline of Agricultural Statistics of the ICAR-CIRB (Central Institute for Research on Buffaloes), Hisar, Haryana
- Member, IVth QRT (Quinquennial Review Team) of ICAR-CIRC (Central Institute for Research on Cattle), Meerut
- Editor, Journal of Economic Perspectives, Journal of American Economic Association

Shiv Kumar

- Editorial Board Member, Economic Affairs, Kolkata
- Co-opted Member, ITMC-Cell, ICAR-IASRI for giving suggestions on the proposed MoU between SKUAST-Jammu and ICAR-IASRI
- Co-opted Member, provided suggestions/ comments on: Draft MoU and work plan between Dr. Rajendra Prasad Central Agricultural University, Pusa, Bihar (RPCAU) and Indian Agricultural Statistics Research Institute, New Delhi (ICAR-IASRI)
- Member, Committee on Course Structure of Four-Year B.A. Economics (Honours/ Research) Program for Semesters 1 & 2, Chaudhary Charan Singh University, Meerut, UP
- Member, Committee to recommend maximum Sale Price of Bt Cotton seed under Cotton Seeds Price Order (2015) at the Ministry of Agriculture and Farmers Welfare, Krishi Bhawan, New Delhi

Raka Saxena

- Associate Editor, Journal 'Agricultural Economics Research Review' for the year 2024.

N.R. Kumar

- Member, IMC, ICAR-Central Coastal Agricultural Research Institute, Goa for 2024-2027
- Elected editor, Bihar Agriculture Science Academy, RPCAU, Pusa, for 2024-2025
- Member, Editorial Board, *Potato Journal* (Journal of Indian Potato Association), ICAR-CPRI (Central Power Research Institute), Shimla
- Chair, Technical session on "Climate Change and Resilience" at 32nd Annual Conference of Agricultural Economics Research Association (AERA), New Delhi, organized by IGKV Raipur at Raipur
- Chairperson, Food and Hospitality Committee, 32nd International Conference of Agricultural Economists (ICAE)

Khem Chand

- Member, Technical Committee on 21st Livestock Census, Department of Animal Husbandry and Dairying (DAHD), New Delhi
- Member, Quinquennial Review Team (QRT), ICAR-NBAGR (National Bureau of Animal Genetic Resources), Karnal
- Member Secretary, Quinquennial Review Team (QRT), ICAR-NIAP, New Delhi
- Member, Technical Committee of Direction for Improvement of Livestock Statistics, DAHD, New Delhi
- Member, Expert Committee of the "Integrated Sample Survey (ISS) Scheme under the chairmanship of Dr. G.C. Manna (Ex. DG, M/o Statistics & PI), DAHD, New Delhi
- Expert, Livestock Policy in 2nd Annual Meeting of the Halari Pashu Uchherak Maldhari Trust, organized by Sahjeevan (NGO) and ICAR-NRC on Equines Regional Station, Bikaner at Kolaki village, Upleta (Gujarat) on March 19, 2025

- Expert, Consultation on Review of Milestone Setting for Sustainable Development Goal (SDG) National Indicators, Organized by the Ministry of Statistics and Program Implementation, GoI at Hall No. 4, Vigyan Bhawan, New Delhi on August 16, 2024
- Expert- Agriculture Policy Analyst in "Megatrends Shaping Cotton Textile Value Chain", on October 7, 2024, organized by the Ministry of Textiles and Cotton Corporation of India, New Delhi
- Policy expert in Program for the launch of CITI (Confederation of Indian Textile Industry)-ILO (International Labour Organisation) project on 'Fundamental Principle and Rights at Work (FPRW)', organized by ILO, New Delhi at Magnolia, Indian Habitat Centre, New Delhi, August 13, 2024
- Policy expert in "Celebration of International Year of Camelids 2024 and Way forward for Strengthening of Camel Milk Value Chain in India", Organized by FAO and ICAR-NRCC (National Research Centre on Camel), Bikaner, December 20, 2024
- Expert, Agricultural Economics in DD Kisan, Viksit Bharat Ka Budget -2024 (pre & post budget session), July 23, 2024
- Expert-Agricultural Economics in DD Kisan, Agricultural Budget, Feb 1 & 3, 2025
- Chairman, Review Workshop of ICAR-NIAP Network Project on Ecosystems, Agribusiness and Institutions, IGKV Raipur, December 10, 2024

Rajni Jain

- Member, Executive Committee, Indian Society of Agriculture and Information Technology (INSAIT) for the year 2024-25
- Member (DDG Nominee), DPC, ICAR-NCIPM (National Research Centre for Integrated Pest Management) for Assessment promotion of Scientists under CAS from scale 10 to Scale 11 in the discipline of Agricultural Statistics
- External Expert, M.Sc. Thesis evaluation and conduct of Offline viva, SKUAST, Jammu
- External expert, recruitment committee for the posts of YP1, YP2, RA, and various categories of IT professionals (multiple occurrences), IASRI
- External Expert, Probation Clearance and Confirmation Meeting for Scientists, IASRI
- Member of Technical Committee and Reviewer, Conference on Generative AI for Nurturing Sustainable Agriculture (GRAINS) 2024, Ahmedabad University, Ahmedabad, Gujarat

Sant Kumar

- Member, Research Advisory Committee, ICAR-National Research Centre for Integrated Pest Management, Pusa, New Delhi (2023-2026)
- Member, Research Advisory Committee, Directorate of Onion and Garlic Research, Pune (Maharashtra) (2024-2027)

Prem Chand

- Member of research programmes committee, Indian Society of Agricultural Economics, Mumbai.
- Joint Secretary, Agricultural Economics Research Association, New Delhi
- Member, Institute Management Committee, Agricultural Technology Application Research Institute (ATARI), Pune
- Expert Member, Zonal Programme Management Committee (ZPMC), Farmer FIRST Programme (FFP) of ICAR-ATARI, Zone-I, Ludhiana

S.K. Srivastava

- Member, Committee for developing the roadmap for research on the Water-Energy-Food-Ecosystem Nexus for the National Academy of Agricultural Sciences (NAAS)

- Resource person for projecting the supply of major food commodities till 2070 for the working group on 'Net Zero@2070 emission' constituted by NITI Aayog
- Member, working group on 'Water Resources Supply & Demand Scenario' under 'National Task Force for Integrated Water Resources Development and Management (NTFIWRDM), 2024, constituted by the Department of Water Resources, River Development & Ganga Rejuvenation (RD & GR), Ministry of Jal Shakti, Government of India
- Member, "FAD 34/Panel VIII Market Linkages" of Food and Agriculture Division Council (FADC) constituted by the Bureau of Indian Standards (BIS) for developing the National Agricultural Code (NAC) in the area of Market Linkages

7 Participation in Scientific Activities

Lectures Delivered by Scientists

Table 7.1. Lectures delivered by scientists

Name of the scientist	Topic	Occasion/Venue and date
P.S. Birthal	Lecture in a one-day training program of the IFPRI-South Asia office on IMPACT (International Model for Policy Analysis of Agricultural Commodities and Trade) model	ICAR-NIAP, New Delhi, August 01, 2024
	Building resilience in smallholder agriculture	IEG (Institute of Economic Growth) Symposium on Towards a Resilient Economy, December 6, 2024
	Presidential Address, 32nd Annual Conference of the Agricultural Economics Research Association (AERA)	IGKV, Raipur, Chhattisgarh, December 11, 2024
	Reshaping agricultural policies for sustainable transformation of agri-food system	Lecture series, Education Division of ICAR, January 17, 2025
Shiv Kumar	Reforms in agricultural markets: Performance and needs	Training programme for Officer-Trainees of Indian Economic Service at ICAR-NIAP, New Delhi, May 6, 2024
	Risk and uncertainty in life of entrepreneur	Training on Entrepreneurship Development for SC/ST students, Chaudhary Charan Singh Haryana Agricultural University (CCSHAU), Hisar, March 30, 2025
Raka Saxena	Trajectory of agricultural exports and prospects	Training programme for Officer-Trainees of Indian Economic Service at ICAR-NIAP, New Delhi, May 6, 2024
	Examining export advantages in Indian horticulture	NAAS Brainstorming session on "Promotion of Agricultural Exports: Prospects and Challenges, New Delhi, October 10, 2024
	Policies for harnessing potential of agricultural exports	XVII Agricultural Science Congress, Pantnagar, February 21, 2025
Khem Chand	Risk management in agriculture through crop insurance	Training Programme for Officer-Trainees of Indian Economic Service at ICAR-NIAP, New Delhi, May 6, 2024
	Economic importance and stakeholders role in development of common pasture lands in Rajasthan	Workshop on Charagah Vikas: Viksit Rajasthan ka aadhar, organized by Shri Karan Narendra Agriculture University, Jobner, Rajasthan and Foundation for Ecological Security (FES) India at Rajasthan Agriculture Research Institute (RARI), Durgapura, Jaipur, September 25, 2024

Name of the scientist	Topic	Occasion/Venue and date
	Decent work deficits in the cotton sector in India – Policy analysis	World Cotton Day 2024, Theme: Megatrends shaping cotton textile value chain, New Delhi, October 7, 2024
Anil Kumar	Profiling and benchmarking of vulnerable households in India	Training programme for Officer-Trainees of Indian Economic Service at ICAR-NIAP, New Delhi, May 9, 2024
Rajni Jain	Transforming agriculture: AI-driven solutions from emerging agri-tech ventures	Training program by ICAR-DOGR (Directorate of Onion & Garlic Research), Pune and MANAGE, Hyderabad, June 6, 2024 (Online)
	Policies supporting digital agriculture: Inclusivity and affordability	Workshop on Agriculture in Digital Era, organised by the Indian Mycological Society, August 24, 2024
	AI in Geospatial analysis	Winter school organised by ICAR-Indian Agricultural Statistics Research Institute (IASRI), New Delhi, February 10, 2025
	Model evaluation parameters	Winter school organised by ICAR-Indian Agricultural Statistics Research Institute (IASRI), New Delhi, February 3, 2025
	Data pre-processing techniques and evaluation measures	Centre for Advanced Faculty Training (CAFT) organised by ICAR- IASRI, New Delhi, March 10, 2025
Rajni Jain & Arathy Ashok	AI and ML (Machine Learning) applications in agriculture	Training programme for Officer-Trainees of Indian Economic Service at ICAR-NIAP, New Delhi, May 9, 2024
Subhash Chand	Importance of capacity building programme under SC/SP for rural women	Basada, Haryana, September 06, 2024
	Process and practice of community organization development in rural areas	Basada, Haryana, October 21, 2024, Kalukabas, Rajasthan, January 28, 2025
	High-value vegetable cultivation in backyard for nutritional security	Raksada, Haryana, October 21, 2024, Basada, Haryana, November 5 &11, 2024, Kalukabas, Rajasthan, December 19, 2024
	Importance of rural development flagship government programs and impacts	Basada, Haryana, November 5, 2024, Raksada, Haryana, November 12, 2024, Narsighpura, Rajasthan, December 20, 2024 & January 27, 2025
Nalini Ranjan Kumar	Mechanizing agriculture: Innovative solutions	Training programme for Officer-Trainees of Indian Economic Service at ICAR-NIAP, New Delhi, May 10, 2024
Sant Kumar	Fertilizer use efficiency in Indian agriculture	Training programme for Officer-Trainees of Indian Economic Service at ICAR-NIAP, New Delhi, May 7, 2024
	VAC on fertilizer use in Indian agriculture: Progress, distribution pattern and strategy for improving efficiency	Deen Dayal Upadhyay Gorakhpur University (DDU) of Gorakhpur University, Gorakhpur, May 30, 2024

Name of the scientist	Topic	Occasion/Venue and date
Sant Kumar & Kingsly I.T.	Transformation towards sustainable agri-food systems	NASC Complex, New Delhi, August 2-7, 2024
Purushottam Sharma	Pattern & determinants of food price volatility in India	Training programme for Officer-Trainees of Indian Economic Service at ICAR-NIAP, New Delhi, 2024 May 7, 2024
Prem Chand	Sustainability issues in agriculture and the way forward	Training programme for Officer-Trainees of Indian Economic Service at ICAR-NIAP, New Delhi, May 8, 2024
	Food systems for nutrition: Converging economic, social and environmental sustainability goals	PAJANCOA & RI, Karaikal, Puducherry, November 11, 2024
Vikas Kumar	Markets for smallholder farmers: challenges and solutions	Online training programme, Rani Lakshmi Bai Central Agricultural University (RLBCAU) and MANAGE on Agricultural Market Information Systems in modern era, March 19, 2025
	Forages production and economic trends: A global and national perspective	Conference jointly organized by IIMR (Indian Institute of Millets Research) and MANAGE, Hyderabad, January 6-10, 2025
S.K. Srivastava	Adoption and outreach of micro-irrigation and solar pumps in India	Biennial workshop of All India Coordinated Research Project (AICRP) on Irrigation Water Management, Narendra Deva University of Agriculture and Technology (NDUAT), Ayodhya, July 2-4, 2024
	Policy prescription for sustainable water management for rainfed and irrigated Agriculture	National Workshop organized by Water Technology Centre, ICAR-IARI, September 19, 2024
	Promoting nutri-cereals (Sri Anna): Technological and policy imperatives	National Consultation in association with the Government of Uttar Pradesh and ICAR-IIMR Hyderabad, RLBCAU, Jhansi, October 5-6, 2024
	Demand projection for milk production in India by 2047	Symposium during 32nd Annual Conference of AERA, Raipur, Chhattisgarh, December 12, 2024
	Harnessing potential of solar-powered micro irrigation system	Training program organized by Water Technology Centre, ICAR-IARI, February 2-7, 2025
	Improving groundwater sustainability through analysing groundwater energy nexus & future research pathways	National Brainstorming Workshop, ICAR-Indian Institute of Water Management, Bhubaneswar, March 22, 2025
Jaya Jumrani	Food and nutritional security in India	Training Programme for Officer-Trainees of Indian Economic Service at ICAR-NIAP, New Delhi, May 6, 2024
Pavithra S.	Credit in agriculture	Training Programme for Officer-Trainees of Indian Economic Service at ICAR-NIAP, New Delhi, May 9, 2024

Name of the scientist	Topic	Occasion/Venue and date
Vinayak Nikam	Essential management skills for the extension personnel	IVRI (Indian Veterinary Research Institute), Pune, May 1, 2024 (Online)
	Policy guidelines for Farmer Producer Companies	Extension Education Institute (EEI) Nilokheri, May 15, 2024 (Online)
	Enabling agro-business ecosystem for Farmer Producer Companies (FPCs)	ICAR-DOGR, Pune and MANAGE, Hyderabad, June 8, 2024 (Online)
	Impact assessment of mobile journalism	Prof. Jayashankar Telangana State Agricultural University, Rajendranagar Hyderabad, August 23, 2024 (Online)
	Extension system in India and innovative farmers' institutions	Training Programme for Officer-Trainees of Indian Economic Service at ICAR-NIAP, New Delhi, May 10, 2024
D.C. Meena	Fundamentals of the economics of natural farming	Training Programme at ICAR-NCIPM, New Delhi, January 08, 2025 (Online)
Ankita Kandpal	R&D investment in Indian agriculture and its impact	Training Programme for Indian Economic Service at ICAR-NIAP, New Delhi, May 7, 2024
Kiran Kumara T.M.	Methodological approaches for valuation of agricultural ecosystem services	Short-term training at ICAR-IIFSR (Indian Institute of Farming Systems Research), Modipuram, Meerut, Feb 10-19, 2025
	Role of ecosystem services in sustainable Agri-food transformation in India- Building climate resilient and ensuring food security	HRD Programme at ICAR-ATARI, Zone VII, Umiam, March 03-13, 2025
	Economic valuation of ecosystem services	Training Programme for Indian Economic Service at ICAR-NIAP, New Delhi, May 10, 2024

Training Attended by Scientists

Table 7.2. Training attended by scientists

Name of the scientist	Name of the event	Venue and duration
Prem Chand	Vigilance perspectives for ICAR officers	ICAR-NAARM (National Academy of Agricultural Research Management), Hyderabad, November 6- 8, 2024
	Integrating gender in cost-benefit analysis of innovations to enhance smallholder farmers' resilience and climate change adaptation	CGIAR GENDER Impact Platform, November 11, 18, 22 and 25, December 2 and 6, 2024 (Online)
Purushottam Sharma, Prem Chand, Kingsly I.T., Jaya Jumrani, Balaji S. J.	Training on IFPRI- IMPACT model organized by IFPRI-South Asia Office	ICAR-NIAP, August 1, 2024

Name of the scientist	Name of the event	Venue and duration
Kingsly I.T., Balaji, S.J.	Foresight partnership forum and capacity building training organized by International Food Policy Research Institute (IFPRI) and the Alliance of Bioversity-CIAT (ABC) in collaborating with the Institute for Integrated Development Studies (IIDS)	Dusit Princess, Kathmandu, Nepal, April 16-19, 2024
Kingsly I.T., Balaji, S.J., Kiran Kumara T.M.	International capacity building program on Computable General Equilibrium (CGE) modeling for economy-wide policy analysis in South Asia organized by IFPRI, South Asian Network on Economic Modelling (SANEM) and IARI	ICAR-IARI, April 29-May 3, 2024
Dinesh Chand Meena	From preference to policy: Discrete choice experiments for climate change solutions	JNU, New Delhi, February 3-7, 2025
Balaji, S.J.	Advance-level capacity building training focusing on IFPRI's Computable General Equilibrium (CGE) model for sustainable agri-food system policy analysis	Tribhuvan University, Kathmandu, Nepal, December 7-10, 2024

Presentations in Seminars/Conferences/Workshops/Webinars

Table 7.3. Presentations in Seminars/Conferences/Workshops/Webinars by scientists

Name of the scientist	Name of the topic/event	Venue/Occasion and duration
P.S. Birthal	Panelist *in* the conference on "Animal breeding interventions and feed, fodder and animal nutrition interventions"	National Dairy Development Board (NDDB), Anand, Gujarat, May 21, 2024
	Panelist *in* the Session III of the GFPR (Global Food Policy Report) launch event on "Sustainable food systems and enabling policies"	International Food Policy Research Institute (IFPRI), July 4, 2024
	Technology and policies for groundwater management in South Asia *in* International Conference of Agricultural Economists (ICAE 2024)	New Delhi, August 3, 2024
	Panelist *in* World Bank hosted Special session: SAPLING dialogue on South Asia food and nutrition	New Delhi, September 21, 2024
	Panelist *in* 84th Annual Conference of the Indian Society of Agricultural Economics (ISAE) on "Agriculture trade, climate change and sustainability"	Karaikal, Puducherry, November 12, 2024
	Plenary speaker *in* Global Soil Conference-2024 on "Caring soils beyond food security: Climate change mitigation & ecosystem services"	New Delhi, November 19, 2024
	Distinguished speaker *in* the panel discussion on "CEO's round table on policy and trade" at Grains World 2024 .	New Delhi, December 18, 2024
	Distinguished speaker for an engaging and insightful Budget Discussion Panel	Jaipuria Institute of Management, Indore, New Delhi, February 14, 2025

Name of the scientist	Name of the topic/event	Venue/Occasion and duration
Shiv Kumar	Economic welfare of purported India European Union free trade agreement on Indian agriculture *in* International Conference of Agricultural Economists (ICAE 2024)	New Delhi, August 2-7, 2024
	Keynote speaker *in* National seminar on Vikshit Bharat@2047: Achieving sustainable development goals	Hans Raj Mahila Maha Vidyalaya, Jalandhar, Punjab, February 28, 2025
Raka Saxena	Larger welfare outcomes for rural farm women: Evidence on the drivers *in* International Conference of Agricultural Economists (ICAE 2024)	New Delhi, August 2-7, 2024
	Impact of livelihood diversification based on large household survey in India *in* International Conference of Agricultural Economists (ICAE 2024)	New Delhi, August 2-7, 2024
	Panelist *in* ICAR-IFPRI workplan review meeting organized by International Food Policy Research (IFPRI), South Asia Regional Office, and Indian Council of Agricultural Research (ICAR)	NASC, New Delhi, September 25, 2024
	Lead presentation on "Status and effectiveness of market intelligence in India" *in* National workshop on Market Intelligence and Digital Innovations,	The State Agricultural Prices Board, Government of Kerala Thiruvananthapuram, October 3–4, 2024
N.R. Kumar	Impact of climate change on agriculture in Indo-gangetic plains of India *in* International Conference of Agricultural Economists (ICAE 2024)	NASC, New Delhi, August 2-7, 2024
Khem Chand	Lead speaker *in* workshop on 'Charagah vikas: Viksit Rajasthan ka aadhar' Organized by Shri Karan Narendra Agriculture University, Jobner, Rajasthan and FES India at Rajasthan Agriculture Research Institute (RARI), Durgapura	Rajasthan Agriculture Research Institute (RARI), Durgapura, Jaipur, September 25, 2024
	Panelist,Session on 'Rainfed Livestock Network' in Conference entitled "Commons Convening" organized by FES, UNDP (United Nations Development Programme) and number of NGOs	Dr. Ambedkar International Centre (DAIC), New Delhi, August 29, 2024
	Panelist, National Consultation for "Developing an Integrated Livestock Framework for Forest Fringes in Rainfed Regions", organized by National Rainfed Area Authority (NRAA), in collaboration with the Revitalizing Rainfed Agriculture (RRA) Network, Hyderabad	New Delhi, India, October 8, 2024

Name of the scientist	Name of the topic/event	Venue/Occasion and duration
Rajni Jain	Panelist *in* technical session on "Investments & policy for digital agriculture", National conference on Digital Agriculture: Empowering Indian Farming organised by ICAR, NAAS & ICRISAT (International Crops Research Institute for the Semi-Arid Tropics)	NASC, New Delhi, December 17- 18, 2024
	YOLO models for fruit counting *in* annual conference of the Society of Statistics, Computer and Applications (SSCA) alias international conference on Advances of Interdisciplinary Statistics and Applications in AI & ML (AISAAM-2025)	Department of Statistics, North-Eastern Hill University, Shillong-Meghalaya, February 21-23, 2025
Subhash Chand	Socio Economics factors affecting the micro irrigation adoption in India *in* AERA conference 2024	IGKV, Raipur, December 11-14, 2024
Sant Kumar Kingsly I.T.	Improving technical efficiency: A key to sustainable rice production in India *in* International Conference of Agricultural Economists (ICAE 2024)	NASC, New Delhi, August 2-7, 2024
	Returns from investment in potato research in India *in* National Symposium on "Harnessing Potato Innovations, Diversity for Food and Nutritional Security"	ICAR-CPRI, Regional Research Station (RRS) Modipuram Meerut, January 27-29, 2025
Purushottam Sharma	Food price inflation in India: Determinants and their asymmetric impact *in* International Conference of Agricultural Economists (ICAE 2024)	NASC, New Delhi, August 2-7, 2024
Prem Chand	Sub-national sustainable agricultural development priorities and policies for Viksit Bharat *in* National seminar on "Futuristic Economics: Promoting Sustainable Development and Welfare"	College of Agricultural Engineering & Post Harvest Technology, Central Agricultural University, Ranipool, Sikkim, March 11, 2025
Vikas Kumar	Management of abnormal prices of vegetables in erratic weather situations in India *in* International Conference on Climate Change and Environmental Protection	Sidvi Society for Research and Development, June 4-5, 2024
	Strategic approaches to boost agricultural exports for realizing the atmanirbhar bharat mission *in* international conference	Gujarat Natural Farming Science University, Halol, Gujarat, November 3-5, 2024
	Consumption expenditure and change in business opportunities in rural areas *in* International Conference on Multidisciplinary Approach of Sustainability and Green Innovation	Renaissance University, Indore, December 28-29, 2024

Name of the scientist	Name of the topic/event	Venue/Occasion and duration
S.K. Srivastava	NITI working group report on "Crop husbandry, agricultural inputs, demand and supply *in* Knowledge Exchange Workshop	The Energy and Resources Institute (TERI), New Delhi, May 9-10, 2024
	Assessing benefits and feasibility of coupling solar and micro irrigation technologies in India at Symposium on "Technology and Policies for Groundwater Management in South Asia" *in* International Conference of Agricultural Economists (ICAE 2024)	NASC, New Delhi, August 2-7, 2024
	Demand projection for milk production in India by 2047 *in* Symposium during 32nd Annual Conference of AERA	Raipur, Chhattisgarh, December 12, 2024
	Panelist for a workshop on "Strategies for crop residue management in India", organized by International Water Management Institute (IWMI), New Delhi in collaboration with ICAR-NIAP.	New Delhi, December 16, 2024
	Panelist for the discussion on "Union Budget 2025"	Lovely Professional University, Phagwara February 7, 2025
	Harnessing potential of solar-powered micro-irrigation *in* International Conference	Rama University, Kanpur, February 24-25, 2025
Arathy Ashok	Willingness to pay for integrated Extension and Advisory Services (EAS) for crop-livestock mixed farming in India *in* International Conference of Agricultural Economists (ICAE 2024)	NASC, New Delhi, August 2-7, 2024
Pavithra, S.	Impacts of credit on income, consumption and investment of agricultural households in India *in* International Conference of Agricultural Economists (ICAE 2024)	NASC, New Delhi, August 2-7, 2024
	Can access to institutional credit promote adoption of improved technology? A case of biofertilizer use among the Indian paddy farmers *in* 84th Annual Conference of the Indian Society of Agricultural Economics	Karaikal (Puducherry), November 11-13, 2024
Jaya Jumrani	Agricultural production diversity and women's nutritional status: Evidence from rural Bangladesh *in* International Conference of Agricultural Economists (ICAE 2024)	NASC, New Delhi, August 2-7, 2024

Name of the scientist	Name of the topic/event	Venue/Occasion and duration
Dinesh Chand Meena	Soil nutrient management for sustainability of Indian agriculture: Evidence from a meta-analysis *in* International Conference on 'Current Innovations and Technological Advances in Agriculture and Allied Sciences (CITAAS-2024)'	Guru Kashi University, Bathinda, August 30, 2024 (Online)
Balaji S.J.	Impact of climate heterogeneity on agricultural gross domestic product: Food security implications for India *in* International Conference of Agricultural Economists (ICAE 2024)	NASC, New Delhi, August 2-7, 2024
	Market power and product perishability: Impact on farmers' price margins *in* Food and Agriculture Research Discussion Forum (FARDF)	Global Forum for Food and Agriculture (GFFA), May 4, 2024 (online).
Prabhat Kishore	Effectiveness of Subsoil Water Preservation Act 2009 *in* International Conference of Agricultural Economists (ICAE 2024)	NASC, New Delhi, August 2-7, 2024
Kiran Kumara T.M.	Panelist in strategy workshop on "Strategies for crop residue management in India"	NAAS, New Delhi, May 4, 2024
	Lead paper on Economic valuation of agro-ecosystem in India *in* National Conference on Living With Nature: Soil, Water and Society In Ecosystem Conservation (LNSWSEC-2024)	ICAR-IISWC (Indian Institute of Soil and Water Conservation), Dehradun, June 20-22, 2024
	Presentation in workplan review meeting	ICAR-IFPRI, New Delhi, September 25, 2024
	Agricultural greenhouse gas mitigation: From research to implementation *in* International Research Symposium, Berlin, Germany	Berlin, Germany, October 21-23, 2024
	Panelist *in* Brainstorming session on "Unlocking potential of wheat and barley crops for healthy and sustainable food system: A road map"	ICAR-IIWBR (Indian Institute of Wheat and Barley Research), Karnal and SAWBAR, Karnal, March 7-8, 2025
	Keynote lecture on Transforming agrifood systems in the face of climate changes and energy transitions *in* 4th Indian Ecological Society International Conference	Ludhiana, Punjab, November 12-15, 2024
	Strategies for crop residue management in India *in* Workshop on "Strategies for Crop Residue Management in India", organised by ICAR-NIAP and International Water Management Institute (IWMI)	New Delhi, December 16, 2024

Name of the scientist	Name of the topic/event	Venue/Occasion and duration
	Futuristic Economics: Promoting sustainable development and welfare *in* Brainstorming Seminar, Central Agricultural University (CAU), Gangtok, Sikkim and ISAE.	Central Agricultural University (CAU), Gangtok, Sikkim March 11-12, 2025 (Online)

Programs Attended by Scientists

Table 7.4. Seminar/Conference/Webinar/Workshop/Panel Discussion attended

Name of the scientist	Name of the event	Venue and duration
P. S. Birthal	Workshop on "Indian National Agroforestry Policy - A Decadal Experience"	NASC, New Delhi, April 5, 2024
	Brainstorming Session on Agriculture	NITI Aayog, New Delhi, April 23, 2024
	International Capacity Building Training Program on CGE Modelling for Economic Policy Analysis	IARI Campus, New Delhi, April 29, 2024
	Animal Breeding Interventions and Feed, Fodder and Animal Nutrition Interventions	National Dairy Development Board (NDDB), Anand, Gujarat, May 21, 2024
	Foundation Day of the National Academy of Agricultural Sciences	NASC, New Delhi, June 6, 2024
	Brainstorming Session on "Public-Private Partnership in Agriculture: A Way Forward"	TAAS, New Delhi, July 9, 2024
	Workshop on "Regional Integration, Sustainability and Food Security in South Asia"	New Delhi, August 2, 2024
	Workshop on 'Transforming Food Systems in South Asia' International Conference of Agricultural Economists (ICAE 2024)	NASC, New Delhi, August 2, 2024
	Brainstorming Session on 'Water Security: Is Quantum or Management Issue' Organised by NAAS	NASC Complex, New Delhi. August 9, 2024 (Online)
	Global ESG Conclave 2025 organized by Sri Balaji University, Pune (SBUP), World Cooperation Economic Forum and the Confederation of NGOs of Rural India (CNRI)	SBUP Campus, Pune, Maharashtra, January 23–24, 2025
	Roundtable discussion on 'Setting the Agenda for Food Policy in India'	IIM (Indian Institutes of Management), Ahmedabad, Gujrat, January 31, 2025

Name of the scientist	Name of the event	Venue and duration
Shiv Kumar	Workshop on-Agri Value Chain Financing sponsored by NABARD	Ministry of Agriculture & Farmers Welfare, Government of India, New Delhi, May 31, 2024
	Zonal Midterm review workshop of FFP	ATARI Jodhpur, July 29, 2024
	Editors Workshop-Enabling research ecosystem	NASC Complex, New Delhi, September 2024
	ICSSR New Delhi sponsored a one-day National seminar on "The Role of Rooftop Solar Adoption for Future Clean Energy Solutions under Vision Vikshi Bharat@2047	Department of Economics, Chaudhary Charan Singh University, Meerut, UP, February 7, 2025
N.R. Kumar	ADBI Conference on "Mechanization of Small-Scale Farms In Asia: Current Status, Impacts, And Future Prospects"	April 23-24, 2024 (Online)
	Workshop on "The Future of Digital Agriculture: Role of Artificial Intelligence"	June 17, 2024 (Online)
	IFPRI- 2024 GFPR Launch Event	ICAR Lecture Hall, 2nd floor, NASC Complex, Pusa, New Delhi, July 4, 2024
	Review meeting organized by International Food Policy Research (IFPRI), South Asia Regional Office, and the Indian Council of Agricultural Research (ICAR)	NAAS Committee Room 2 at the National Agriculture Science Complex (NASC), New Delhi, September 25, 2024
	Brainstorming Session on "Promotion of Agricultural Exports: Prospects and Challenges" organised by the National Academy of Agricultural Sciences (NAAS)	NAAC Complex, New Delhi. October 10, 2024
	Seminar on "Spatial Tools In Agriculture-ARC-GIS and ENVI "	ICAR-NAARM, Hyderabad, December 18, 2024
	Discussion on a working paper of BASA on Farmers' Interests in Agriculture entitled "Have Farmers' Interests in Farming Increased in Eastern India in the Post-Pandemic Period? Under the chairmanship of Dr. S.N. Jha President BASA and DDG (Agril. Engineering)	ICAR, New Delhi, January 15, 2025 (online)
Khem Chand	National Conference on Scaling-Up Food Fortification for Nutritional Security-The Way Forward	Associated Chambers of Commerce and Industry of India (ASSOCHAM), New Delhi, April 25, 2024
	National Conference on "Scaling-up Cold Chain Infrastructure for Developing a Sustainable Food Processing Sector"	ASSOCHAM, New Delhi, July 19, 2024
	Panelist in session on 'Rainfed Livestock Network'	Commons Convening, Conference Hall 1, August 29, 2024
	Consultation on Review of Milestone Setting for SDG National Indicators	Vigyan Bhawan, New Delhi, August 16, 2024

Name of the scientist	Name of the event	Venue and duration
	Program for the launch of CITI-ILO project on 'Fundamental Principle and Rights at Work (FPRW)'	Indian Habitat Centre, New Delhi, August 13, 2024
	World Cotton Day 2024, Theme: Megatrends Shaping Cotton Textile Value Chain , organized by Ministry of Textiles and Cotton Corporation of India	New Delhi, October 7, 2024
	National Consultation for Developing an Integrated Livestock Framework for Forest Fringes in Rainfed Regions, organized by National Rainfed Area Authority (NRAA) & the Revitalizing Rainfed Agriculture (RRA) Network,	New Delhi, October 8, 2024
	3rd Community Conference on Commons organised by Assam Agribusiness and Rural Transformation Project (APART), FES & other organizations	New Delhi, December 4-6, 2024
	Celebration of International Year of Camelids 2024 and Way forward for Strengthening of Camel Milk Value Chain in India	ICAR-NRCC, Bikaner, December 20, 2024
	32nd Annual Conference of Agricultural Economics Research Association (AERA)	IGKV, Raipur, December 11-13, 2024
	Review workshop - Network project on Impact Assessment of Agricultural Technologies	Raipur, Chhattisgarh, December 10, 2024
Anil Kumar	Approval of the departmental terminology of the Department of Animal Husbandry and Dairying	Commission for Scientific and Technical Terminology, Department of Higher Education, Ministry of Education, New Delhi, April 22-26, 2024
	Dairy Sector Roadmap and Quantitative Modelling for MP	Council on Energy, Environment and Water (CEEW), Bhopal, June 15-18, 2024
	Global Food Policy Report 2024: India Launch	NASC, New Delhi, July 4, 2024
	ILRI (International Livestock Research Institute) Consultative Workshop on Foresight Data Validation of Livestock Production in India	New Delhi, December 10, 2024
	32nd Annual Conference of Agricultural Economics Research Association (AERA)	IGKV, Raipur, December 11-13, 2024
Rajni Jain	Brainstorming Session on "How smart is agriculture with AI ?" , organised by The Indian Society of Agricultural Information Technology (INSAIT) & University of Agricultural Sciences (UAS), Dharwad	University of Agricultural Sciences (UAS), Dharwad, July 6, 2024 (Online)

Name of the scientist	Name of the event	Venue and duration
	Webinar on Blockchain Technologies in Agriculture	National Institute of Agricultural Extension Management (MANAGE), Hyderabad, October 22, 2024
	Review workshop - Network project on Impact Assessment of Agricultural Technologies	Raipur, Chhattisgarh, December 10, 2024
	National Conference on Digital Agriculture: Empowering Indian Farming	NASC, New Delhi, December 17-18, 2025
	International Conference on Advances of Interdisciplinary Statistics and Applications in AI & ML	North Eastern Hill University, Shillong, February 21-23, 2025
Subhash Chand	Webinar on 'Connecting flow and ecology"	Koshi Basin, Nepal, September 04, 2024
	Co- Chair, Session on Use of Digital Technological Innovation in AERA conference 2024	Raipur, Chhattisgarh, December 12, 2024
Sant Kumar	Impact of Mustard Technology in Assam	ICAR-DRMR (Directorate of Rapeseed-Mustard Research), Bharatpur, May 29, 2024
	World Environment Day 2024-Our Land Our Future	Hotel Le Meridian, New Delhi, June 5, 2024
	ICAR-IFPRI Work Plan Review Meeting	ICAR-IFPRI Delhi office, NASC complex, New Delhi, September 25, 2024
Prem Chand	Workshop on 'Adaptation options for managing climatic risks in major crops in India' Organised by Atlas of Climate Adaptation in South Asian Agriculture (ACASA)	New Delhi, August 28-29, 2024
	84th Annual Conference of the Indian Society of Agricultural Economics (ISAE)	Karaikal, Puducherry, November 11-13, 2024
	Expert in Panel Discussion on 'Food Systems For Nutrition: Converging Economic, Social And Environmental Sustainability Goals	International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, India, November 12, 2024
	Workshop on "Strategies for Crop Residue Management in India", organised by International Water Management Institute (IWMI), New Delhi and ICAR - National Institute of Agricultural Economics and Policy Research, New Delhi.	New Delhi, December 16, 2024
S.K. Srivastava	Knowledge Exchange Workshop on Low Carbon Modelling For Land Use, Land-Use Change, and Forestry (Lulucf) Sector Under Eu Climate Dialogues (Eucds) Project	The Energy and Resources Institute (TERI) May 9-10, 2024

Name of the scientist	Name of the event	Venue and duration
	Biennial workshop of AICRP on Irrigation Water Management	NDUAT, Ayodhya, July 2-4, 2024
	National Workshop on "Sustaining Tank-Fed Agriculture through Community-led Water Conservation Models"	Water Technology Centre, ICAR-IARI, September 19, 2024
	National Consultation: Food System for Sustainability and Profitability of Millets"	Rani Laxmi Bai Central Agricultural University, Jhansi, October 5-6, 2024
	32nd Annual Conference of Agricultural Economics Research Association (AERA)	Raipur (Chhattisgarh), December 11-13, 2024
	National Brainstorming Workshop on "Groundwater and the Water-Food-Energy nexus: Challenges & Opportunities"	ICAR-Indian Institute of Water Management, Bhubaneswar, March 22, 2025
Vinayak Nikam	FPO Summit by Confederation of Indian Industries (CII)	India Habitat Centre, December 10, 2024
D.C. Meena	Globalization of the Bioeconomy	IFPRI, May 07, 2024
Balaji, S.J.	Workshop on International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) Model	International Food Policy Research Institute (IFPRI), Washington DC, USA, October 21-25, 2024
	IFPRI- 2024 GFPR launch event	ICAR Lecture Hall, 2nd floor, NASC Complex, Pusa, New Delhi, July 4, 2024
	Panelist for the review meeting organized by International Food Policy Research (IFPRI), South Asia Regional Office, and the Indian Council of Agricultural Research (ICAR)	National Agriculture Science Complex (NASC), New Delhi, September 25, 2024
	Webinar on API (Application Programming Interface) SETU: Enabling Seamless Digital Integration"	ICAR-NIAP, New Delhi, November 12, 2024
	Seminar on "Spatial Tools in Agriculture-ARC-GIS and ENVI "	ICAR-NAARM, Hyderabad, December 18, 2024
	Discussion on a working paper of BASA entitled "Have Farmers' Interests in Farming Increased in Eastern India in the Post-Pandemic Period? Under the chairmanship of Dr. S.N. Jha President BASA and DDG (Agril. Engineering)	ICAR, New Delhi, January 15, 2025 (online)
Prabhat Kishore	Discussant in workshop on "The Microeconomics of Irrigation and Household Water Use"	Department of Social Sciences and Humanities, IIIT (Indraprastha Institute of Information Technology) Delhi, August 9, 2024
Ankita Kandpal	Review workshop of ZTMs/ITMUs/ABDs organized by IPTM Unit, ICAR	July 30, 2024, and February 18, 2025 (Online)

Name of the scientist	Name of the event	Venue and duration
S.V. Bangararaju Tatipudi	Workshop on "Assessing the Impacts of International Agricultural Research: New Methods, Rigorous Evidence, Better Decisions"	NASC, Complex, New Delhi. August 2, 2024
	Workshop on "Inclusive Access to Seed Catalyzing Sectoral Synergies And Tracking Change"	ICRISAT, Hyderabad, August 29-30, 2024
N. R. Kumar, Rajni Jain Prem Chand Arathy Ashok	Editor's Workshop- Enabling a Research Ecosystem	Hosted by Elsevier, ICAR, Delhi, September 24, 2024 (Online)
N. R. Kumar, Anil Kumar Rajni Jain Arathy Ashok	Seminar on Geospatial and Advanced Analytical Tools in Agriculture	ICAR-NIAP, New Delhi, December 18, 2024
Shiv Kumar Rajni Jain	Seminar on IP Prospects in Social Science Research	ICAR-NIAP, New Delhi, April 29, 2024 (online)
Raka Saxena and Purushottam Sharma	National Workshop on Market Intelligence and Digital Innovations	State Agricultural Prices Board, Kerala, October 3-4, 2024
P. S. Birthal, Khem Chand and Rajni Jain	96th ICAR Foundation and Technology Day	ICAR, New Delhi, July 15-16, 2024
Dr. P.S. Birthal Dr. Prem Chand, Dr. S.K. Srivastava and Dr. Kiran Kumara T.M.	Workshop on "Strategies for Crop Residue Management in India"	IWMI and ICAR-NIAP, December 16, 2024
Dr. P.S. Birthal, Dr. Raka Saxena, Dr. Shiv Kumar, Dr. Khem Chand, Dr. Prem Chand, Dr. S.K. Srivastava and Dr. Prabhat Kishore	Conference on Harnessing the Potential of Solar-Powered Micro Irrigation for Accelerating Sustainable Agriculture	The Lalit, Barakhamba road, New Delhi, January 22, 2025

Meetings Attended by the Scientists

P. S. Birthal

- XXVII Meeting of ICAR Regional Committee (Zone II) comprising the States of West Bengal, Odisha, Telangana, Andhra Pradesh, and the Union Territory of Andaman & Nicobar Islands at ICAR-NRRI (National Rice Research Institute), Cuttack, August 23, 2024

- 27th meeting of the Regional Committee No. IV for the states of U.P., Bihar & Jharkhand organized by ICAR-IIVR (Indian Institute of Vegetable Research), Varanasi and ICAR-IISR, Lucknow, November 14, 2024
- ICAR Regional Committee No.1, comprising the states of Himachal Pradesh, Uttarakhand, Jammu & Kashmir, Union Territory, and Ladakh Union Territory at NASC, New Delhi, November 22, 2024
- Meeting (Hybrid Mode) on 'Viksit Bharat' with respect to various commodities like Rice, Wheat, Maize, Oilseed, Pulses, Meat, Fruit Crops, Vegetable Crops, Mushroom, Potato & Tuber Crops, Flowers/Orchids and Medicinal Crops, Spices etc., Board Room of IGH, NASC, Delhi, May 01, 2024
- 11th half-yearly meeting of the Nagar Official Language Implementation Committee (North Delhi), New Delhi on January 19, 2024, under the chairmanship of Hon'ble Chairman, Protection of Plant Varieties and Farmers' Rights Authority, Ministry of Agriculture & Farmers Welfare, Government of India, and Chairman, NARAKAS (North Delhi)
- Research Advisory Committee (RAC) meeting of the ICAR-IIWBR, Karnal, ICAR-IIWBR, Karnal, November 18, 2024
- The First meeting of the working group No. 2D: Agriculture Sector under the Chairpersonship of Prof. Ramesh Chand, Hon'ble Member, NITI Aayog, June 05, 2024.
- Second Meeting of the "Working Group 2D - Agriculture Sector" under the Chairpersonship of Prof. Ramesh Chand, Honorable Member, NITI Aayog, December 18, 2024
- IVth QRT Meeting of ICAR-CIRC, Meerut, ICAR-CIRC, Meerut, January 09, 2025

Shiv Kumar

- Second meeting of the Reconstituted Board, State Agricultural Prices Board (SAPB), Thiruvananthapuram, Kerala, December 12, 2024
- 36th Basmati Export Development Foundation (BEDF) board meeting of Agricultural and Processed Food Products Export Development Authority (APEDA), (Ministry of Commerce and Industry, Govt. of India) NCUI Building, New Delhi, January 7, 2025
- Co-Resource person, provided input needed for collaboration with the African Academy of Sciences with the National Academy of Agricultural Sciences, Delhi, to explore potential areas of collaboration, particularly in the field of Agriculture, April 19, 2024

Nalini Ranjan Kumar

- First meeting on 'Viksit Bharat', Board Room of IGH, NASC, Pusa, New Delhi, convened by DDG (CS), April 16, 2024
- BASA EC meeting organised by RPCAU Pusa, June 29, 2024 (online)
- Interaction meeting with Secretary, Animal Husbandry & Dairying, ICAR-NIAP, New Delhi, August 29, 2024

Khem Chand

- II Technical Committee Meeting on 21st Livestock Census, NASC Complex, New Delhi, May 15, 2024
- Technical Committee for Revision of Integrated Sample Survey (ISS) Schedule of DAHD, New Delhi, January 21, 2025
- Annual Meeting of Technical Committee of Direction for Improvement of Livestock Statistics, Pune, Maharashtra, January 29-30, 2025

Rajni Jain

- 20th virtual meeting of the national working group 20 (NWG-20) corresponding to

ITU-T Study Group 20, Department of Telecommunications, Telecommunication Engineering Centre, Div of IoT, India, April 3, 2024

- A meeting of the RFP ICAR-Data Centre committee as an External Expert, ICAR-IASRI, May 29-31, 2024
- Departmental Promotion Committee of Scientist as Subject Expert ICAR-NCIPM, June 25, 2024
- External Member, RFP ICAR-Data Centre committee, ICAR-IASRI, New Delhi, January 01, 08, 14, 27 & 30, 2025
- ISO certification meeting with consultants and auditors, ICAR – NIAP, New Delhi, January 31, 2025

Subhash Chand

- IMC meeting of ICAR-IISWCRTI, Dehradun, December 3, 2024

Sant Kumar

- ICAR-IFPRI Work Plan Review Meeting, ICAR-IFPRI Delhi office, NASC complex, New Delhi, September 25, 2024
- Research Advisory Committee Meeting of ICAR-National Centre of Integrated Pest Management (NCIPM), ICAR-NCIPM, New Delhi, October 15-16, 2024

Prem Chand

- Zonal Programme Management Committee (ZPMC) meeting as Expert Member under the Farmer FIRST Programme (FFP) of ICAR-ATARI, Zone-I, Ludhiana, August 13-14, 2024

Vikas Kumar

- Scientific Advisory meeting of KVK- Bhind, Madhya Pradesh, KVK, Bhind, November 6, 2024

Kiran Kumara T.M.

- ICAR-IFPRI Workplan Review Meeting organized by IFPRI-South Asia, New Delhi, September 25, 2024

S.V. Bangararaju

- HT Cotton Expert Committee Meeting, hosted by MOEF & CC (Ministry of Environment, Forest & Climate Change), participated as a member of the Expert Committee, constituted in accordance with the recommendations of the 149th meeting of the Genetic Engineering Appraisal Committee (GEAC) for analysis of proposal for environmental release of Bollgard II Roundup Ready Flex (BGII RRF) cotton, July 24, 2024.

Participation in Mass Media

N.R. Kumar

- सच का साथ programme – a live panel discussion on the Recommendation of the Parliamentary Standing Committee on Agriculture, PM-Kisan Samman Nidhi, DD Kisan, December 31, 2024
- As an expert in the radio program "कृषि शिक्षा में युवाओं को रोजगार के अवसर", Radio, Akashvani New Delhi, December 4, 2024
- Krishi Budget, DD Kisan under the Hello Kisan program, February 3, 2025

Khem Chand

- कृषि विशेषः किसानों की आय बढ़ायेंगे अर्थशास्त्री, DD Kisan, August 15, 2024
- ऊँट-यह प्रजाति धीरे धीरे लुप्त हो रही है, Grandhi, Bajju, Bikaner, May 8, 2024 (Youtube) https://youtu.be/DIHG-pKdLaw?si=6G7XYziuTfHEE_Tc
- विकसित भारत का बजट-2024 (pre-budget session), DD Kisan, July 23, 2024
- विकसित भारत का बजट-2024 (post-budget session), DD Kisan, July 23, 2024
- Hello Kisan: Agricultural Budget, DD Kisan, Feb 1 & 3, 2025
- सच का साथ programme on PM Dhan Dhanya Yojna, DD Kisan, Feb 13, 2025

Rajni Jain

- Panelist, TV Talk -26 October 2024 Topic: Digital Agriculture Mission, Vichar Vimarsh, DD Kisan, October 26, 2024

- Panelist, Digital Kisan ID, Vichar Vimarsh, DD Kisan, March 15, 2025

Prem Chand

- ''बातचीत – ग्रामीण क्षेत्रों के विकास में सूक्ष्म, लघु और मध्यम उद्योगों की भूमिका'' All India Radio (AIR) FM Gold, New Delhi, June 25, 2024
- किसान की बात "किसान क्रेडिट कार्ड योजना– किसानों के लिए लाभकारी", All India Radio, July 20, 2024
- कृषि जगत–II आम बजट 2024–25 में कृषि, किसान एवं पशुपालन", All India Radio, July 24, 2024
- Radio talk, "देश खाद्य सुरक्षाः किसान, कृषि वैज्ञानिक हमारी सरकार की योजनाएँ", All India Radio, New Delhi, October 16, 2024
- Radio talk, "कृषि के विकास में लाल बहादुर शास्त्री जी का योगदान", All India Radio, New Delhi, December 23, 2024
- Radio talk, "अंतरिम बज़ट 2025–2026 में कृषि एवं किसान", All India Radio, New Delhi, February 2, 2025

Vikas Kumar

- Radio talk on ''भारत सरकार की किसानों के हित के लिए कृषि योजनाएँ'', खेत खलियान और गौधूलि कार्यक्रम, रेडियो ज्ञानस्थली 89.6 FM, July 1, 2024

8 Management Committee Meetings

Quinquennial Review Team (QRT)

QRT of ICAR-NIAP conducted multiple meetings to review the Institute's progress from 2018 to 2023 and enhance accountability and transparency mechanisms. The team was led by Dr. Mruthyunjaya, Former Director, NIAP, New Delhi. The composition of the QRT is given in Table 8.1. The first meeting of the current QRT was held on June 27–28, 2024, where the team interacted with the DDG (Education) and Assistant Director General (ADG) (EQA&R). Presentations were made on the Institute's overall achievements over the past five years, the action taken on IV QRT recommendations, and detailed research accomplishments across various thematic areas. Members provided their feedback during discussion sessions. The team interacted with the Institute's technical and administrative staff to identify potential constraints. Following QRT's suggestions, an online feedback survey was conducted among ICAR-NIAP stakeholders. The second meeting of the QRT took place on October 24–25, 2024, at the Institute, gathering stakeholder feedback on ICAR-NIAP's future research, capacity-building initiatives, and policy advocacy. The team also interacted with the chairpersons of various Institute committees.

Table 8.1 Composition of Quinquennial Review Team

Dr. Mruthyunjaya, Former National Director, NIAP, New Delhi	Chairman
Prof. J.V. Meenakshi Indraprastha Institute of Information Technology, New Delhi	Member
Dr. A. Ganesh Kumar Professor, IGIDR (Indira Gandhi Institute of Development Research), Mumbai	Member
Dr. M. H. Wani Former Registrar, SKUAST-K, Shalimar	Member
Dr. C.S.C. Shekhar Professor, Institute of Economic Growth, Delhi	Member
Mr. Deepak Pareek, Founder Managing Director, HnyB Tech-Incubation Pvt. Ltd.	Member
Dr. P. S. Birthal Director, ICAR-NIAP, New Delhi	Member
Dr. Khem Chand Principal Scientist (Ag. Economics), ICAR-NIAP, New Delhi	Member Secretary

V QRT Members of ICAR-NIAP

QRT meeting with the scientists

Research Advisory Committee (RAC)

The first meeting of the 11th Research Advisory Committee of ICAR-NIAP took place on October 18, 2024. The meeting was chaired by Dr P.K. Joshi, Former Director of the International Food Policy Research Institute (South Asia). Dr P. S. Birthal, Director, welcomed the RAC and presented an overview of the institute's activities and achievements. All the scientists presented their research work. RAC members reviewed the progress of the ongoing research programmes under all the themes and provided valuable suggestions and recommendations for improving future research agendas. The composition of the RAC as of March 31, 2025, is given in Table 8.2.

Table 8.2. Composition of Research Advisory Committee

Dr. P.K. Joshi Former Director, International Food Policy Research Institute (South Asia), New Delhi	Chairman
Dr. Samrendra Mohanty Director (Asia), International Potato Centre (CIP), New Delhi	Member
Prof. Surendra Kumar Senior Professor, Department of Economics, Delhi School of Economics, University of Delhi, New Delhi	Member
Prof. Reetika Khera Department of Humanities and Social Sciences, Indian Institute of Technology, Hauz Khas, New Delhi	Member
Dr. Rajinder S. Sidhu Former Registrar, Punjab Agricultural University, Ludhiana, Punjab	Member
Prof. Abhiroop Mukhopadhaya Professor, Indian Statistical Institute, New Delhi	Member

Dr. P. S. Birthal Director, ICAR-NIAP, New Delhi	Member
Assistant Director General (EQR) Education Division, Indian Council of Agricultural Research, Krishi Anusandhan Bhawan-II, New Delhi-110 012	Member
Dr. Birpal Singh RZ-35, Hans Park, West Sagarpur, New Delhi – 110 046	Member
Dr. Tarun Kumar Gupta RZ-17, Maruti Gali, Surakhpur Road, Gopal Nagar, Najafgarh New Delhi – 110 043	Member
Dr. Raka Saxena Head, Division of Technology and Sustainable Agriculture, ICAR-NIAP, New Delhi	Member Secretary

11th Research Advisory Committee Meeting of ICAR-NIAP

Institute Management Committee (IMC)

The institute conducted the 32nd IMC on September 9, 2024, under the chairmanship of Dr. P.S. Birthal, Director, ICAR-NIAP, New Delhi. The meeting was attended by the officials from ICAR, the Department of Agriculture, and the State Agricultural Universities. The composition of the IMC as of March 31, 2025, is given in Table 8.3.

Table 8.3. Composition of the Institute Management Committee

Dr. P.S. Birthal Director, ICAR-NIAP, New Delhi	Chairman
Director (Animal Husbandry) Animal Husbandry Development Department, GNCTD (Government of National Capital Territory of Delhi) of Delhi, Zorawar Singh Marg, Near Pul Mithai, Tis Hazari, Delhi- 110 054	Member
Director of Agriculture Department of Agriculture, Punjab Kheti Bhawan, Institutional Site No 204, Phase-6, Mohali, Punjab	Member
Vice Chancellor Maharana Pratap University of Horticulture, Anjanthali, Karnal, Haryana – 125 004	Member

Dr. Birpal Singh RZ-35, Hans Park, West Sagarpur, New Delhi- 110 046	Member (non-official)
Dr. Tarun Kumar Gupta RZ-17, Maruti Gali, Surakhpur Road, Gopal Nagar, Najafgarh, New Delhi- 110043	Member (non-official)
Dr. Prawin Arya Head (A), Forecasting & Agricultural Systems Modelling, ICAR-IASRI, Pusa, New Delhi -110 012	Member
Dr. Alka Singh Head, Division of Agricultural Economics, ICAR-IARI, Pusa, New Delhi- 110 012	Member
Dr. Ranjit Kumar Principal Scientist, Agribusiness Management Division, ICAR-NAARM, Rajendranagar, Hyderabad 500 030, Telangana	Member
Dr. A.K. Dixit Principal Scientist, Dairy Economic, Statistics and Management Division, ICAR-National Dairy Research Institute, Karnal-132 001, Haryana	Member
ADG, Education Quality Assurance and Reforms (EQAR) ICAR, Krishi Anusandhan Bhawan-II, Pusa, New Delhi-110 012	Member
Sh. Mahesh Kumar Senior Finance & Accounts Officer, ICAR, Pusa, New Delhi-110012	Member
Administrative Officer ICAR-NIAP, New Delhi- 110 012	Member Secretary

Institute Research Council (IRC)

The Institute conducted its annual Institute Research Council (IRC) meeting on August 28, 2024, presided over by the Director of ICAR-NIAP. Dr. Devesh Roy, a Senior Research Fellow from the International Food Policy Research Institute in New Delhi, was the external expert. The Director, as the Chairman of the meeting, initiated the proceedings by outlining the meeting's agenda and introducing the research themes to the expert. Subsequently, all scientists presented their research progress since January 2024 and outlined their proposed research activities for the upcoming year. The external expert expressed approval of the completed research and commended the research accomplishments. He offered constructive feedback for future improvements.

Annual Institute Research Council (IRC) meeting

9 Other Institute Activities

Annual Day

ICAR-NIAP celebrated its 33rd Foundation Day on May 2, 2024. On this occasion, Prof. J. V. Meenakshi, Professor, Indraprastha Institute of Information Technology, Delhi, delivered the 17th Prof. Dayanatha Jha memorial lecture on "Evaluating Impact at Scale". On this occasion, Prof. Ramesh Chand, Member of NITI Aayog, Dr. R.C. Agrawal, DDG (Agricultural Education), and Dr. Ajit Singh Yadav, ADG (EQA&R) were also invited as guests. The program was attended by participants in both online and offline modes.

17th Prof.Dayanatha Jha Memorial Lecture

Annual day cultural evening

Har Ghar Tiranga

ICAR-NIAP celebrated the 78th Independence Day in the institute by organizing a Har Ghar Tiranga program on August 14, 2024. All staff of the institute participated in the event with great enthusiasm and respect.

Vigilance Awareness Week

The institute celebrated Vigilance Awareness Week in October 2024. As part of this, the Integrity Pledge was administered to the staff on October 28, 2024, at the Institute. The vigilance officer, Dr. Prem Chand, acquainted the staff with various aspects of vigilance in office matters.

Swachhata Pakhwada

ICAR-NIAP has organized different awareness programmes as a part of Swachhata Pakhwada during December 16-31, 2024. Pakhwada started with the Swachhata Pledge on December 16, 2024. Swachhata Pledge was administered to all the NIAP staff.

किसानों को दी सरकारी कृषि योजनाओं की जानकारी

स्वच्छता पखवाड़े के तहत मनाया किसान दिवस

—कैलाश पाराशर/कंट्री विजन/चौमूं

गोविन्दगढ़ पंचायत समिति के ग्राम नृसिंहपुरा में सोमवार को राष्ट्रीय कृषि आर्थिकी एवं नीति अनुसंधान संस्थान (निआप) के तत्वावधान में स्वच्छता पखवाड़ा के तहत किसान दिवस में मनाया गया। कार्यक्रम में संस्थान के निदेशक डॉ.प्रताप सिंह ने किसानों के लिए भारत सरकार द्वारा चलाई जा रही विभिन्न योजनाएं जैसे उच्च उपज वाली फसल की किस्में, मृदा स्वास्थ्य कार्ड, प्रति ड्रॉप अधिक क्रॉप, एफपीओ पंजीकृत योजना, ई-नाम पोर्टल, सोलर ऊर्जा योजना आदि के बारे में विस्तार से जानकारी दी। वहीं नोडल अधिकारी ख्याली राम चौधरी ने स्वच्छता के साथ–साथ किसानों को नमो ड्रोन योजना, प्रधानमंत्री फसल बीमा सहित अन्य योजनाओं का लाभ उठाने का आह्वान किया। इस मौके पर वक्ताओं ने भारत रत्न एवं किसान नेता चौधरी चरण सिंह की जयंती पर उनके जीवन पर प्रकाश डाला एवं किसानों के लिए किए गए संघर्ष व कार्यों की जानकारी दी। इस दौरान कार्यक्रम में मौजूद कृषि अधिकारियों व किसानों ने चौधरी चरण सिंह के चित्र पर पुष्प अर्पित कर श्रद्धांजलि दी। कार्यक्रम में आसपास के किसानों ने हिस्सा लेकर विभिन्न योजनाओं के बारे में जानकारी प्राप्त की।

कृषि योजनाओं की दी जानकारी

कालाडेरा@ पत्रिका. राष्ट्रीय कृषि आर्थिकी एवं नीति अनुसंधान संस्थान (निआप) की ओर से स्वच्छता पखवाड़ा के तहत किसान दिवस में मनाया। गांव नृसिंहपुरा में आयोजित कार्यक्रम में आसपास के किसानों ने हिस्सा लेकर विभिन्न योजनाओं के बारे में जानकारी प्राप्त की। संस्थान के निदेशक डॉ.प्रताप सिंह ने किसानों के लिए भारत सरकार द्वारा चलाई जा रही विभिन्न योजनाएं जैसे उच्च उपज वाली फसल की किस्में, मृदा स्वास्थ्य कार्ड, प्रति ड्रॉप अधिक क्रॉप, एफपीओ पंजीकृत योजना, ई-नाम पोर्टल, सोलर ऊर्जा योजना आदि के बारे में जानकारी दी। नोडल अधिकारी ख्याली राम चौधरी ने भी विचार व्यक्त किए। इस दौरान कार्यक्रम में मौजूद कृषि अधिकारियों व किसानों ने चौधरी चरण सिंह के चित्र पर पुष्प अर्पित कर श्रद्धांजलि दी।(निसं.)

ICAR Zonal Sports Tournament

The Institute participated in ICAR- Zonal sports at Bhopal during March 3-7, 2025. A total of 12 contingents participated in various events- Cricket, badminton, volleyball (shooting and smashing), and athletics. The cricket team of the institute could reach the semi-final match.

ICAR Zonal Sports Tournament 2024

Rural Household Exposure Visit

About 100 farmers from Panipat, Haryana, and Bulandshahr, Uttar Pradesh, were brought to Kisan Mela as part of the exposure visit. They were exposed to various technological innovations in the agricultural field. Farmers were very happy and expressed their wish for regular exposure of farmers in such programmes and field visits. The Director, ICAR-NIAP, encouraged the farmers to participate in such activities and explained the benefits of diversification in agriculture.

Farmers visit to ICAR-NIAP and Pusa Krishi Vigyan Mela

Official Language Implementation

हिंदी पखवाड़ा का आयोजन

संस्थान में हिन्दी के प्रसार एवं अधिकाधिक कार्य कुशलता बढ़ाने के लिए, निदेशक निआप एवं अध्यक्ष राजभाषा डॉ प्रताप सिंह बिरथल के निर्देशन में सितंबर 14-28, 2024 तक हिन्दी पखवाड़ा का आयोजन किया गया। हिंदी पखवाड़े का उद्घाटन, राष्ट्रीय स्तर पर, सितम्बर 14, 2024 को गृह एवं सहकारिता मंत्री माननीय श्री अमित शाह जी द्वारा दो दिवसीय राजभाषा सम्मलेन से भारत मंडपम्, दिल्ली से किया गया। इस सम्मलेन में भारत सरकार के माननीय मंत्रीगण, प्रसिद्ध साहित्यकार एवं विद्वानों ने अपने व्याख्यान दिए। संस्थान स्तर पर हिंदी पखवाड़े के अंतर्गत, संस्थान में विभिन्न प्रतियोगिता कार्यक्रमों का आयोजन किया गया। इस दौरान हिंदी कार्यशाला का आयोजन सितम्बर 23 को किया गया । पुरुस्कार वितरण समारोह में मुख्य अतिथि श्री शिव कुमार सिंह, प्रसिद्ध कवि, रहे जिन्होंने संस्थान में, कविता पाठ प्रतियोगिता में निर्णायक की भूमिका भी निभाई एवं अपनी सुंदर रचनाओं से संस्थान के स्टाफ का ज्ञान वर्धन भी किया। समापन समारोह में निदेशक-निआप डॉ प्रताप सिंह बिरथल द्वारा संस्थान में हिंदी के प्रगामी प्रयोग के लिए किये जा रहे प्रयासों पर प्रकाश डाला और निआप स्टाफ को प्रात्साहित किया। साथ ही विभिन्न प्रतियोगिताओ के विजेताओं को पुरुस्कार वितरित किये।

माननीय गृह मंत्री द्वारा दो दिवसीय राजभाषा सम्मलेन का उद्घाटन, भारत मंडपम, सितम्बर 14-15, 2024

राजभाषा समिति की तिमाही बैठक: संस्थान में राजभाषा की प्रगति एवं प्रोत्साहन के लिए प्रत्येक तिमाही में राजभाषा समिति की बैठक का आयोजन किया गया, जिनमे राजभाषा विभाग की समीक्षा रिपोर्ट पर चर्चा एवं राजभाषा के सभी क्षेत्रो में पत्राचार एवं संस्थान में और अधिक प्रयोग को बढ़ाने के प्रयासों पर समीक्षा हुई।

संस्थान की राजभाषा कार्यान्वयन समिति की तिमाही बैठक, सितम्बर 9, 2024

वर्ष 2024 - 25 में आयोजित राजभाषा कार्यशालाए

पहली तिमाही कार्यशाला: राजभाषा कार्यशाला "किसानो की अधिक आय एवं जोखिम को कम करने के लिए केंद्र सरकार की योजनाये" विषय पर तेजवापुर, बाराबंकी में दिनांक जून 23, 2024 को आयोजित की गयी। इसमें 50 से अधिक किसानो ने भाग लिया। इस कार्यशाला में किसानो को प्रधान मंत्री फसल बीमा योजना, मृदा स्वास्थ्य कार्ड, एक जिला एक उत्पाद योजना के तहत किसानो के लिए प्रोत्साहन योजनाओ के बारे में जानकारी दी गयी।

दूसरी तिमाही कार्यशाला: कार्यशाला का आयोजन सितम्बर 23, 2024 को किया गया जिसमे "स्वास्थ्य सेवाएँ सभी के लिए मुफ्त होनी चाहिए" विषय पर चर्चा की गयी। कार्यशाला का उद्घाटन विभागाध्यक्ष डॉ शिव कुमार जी द्वारा किया गया एवं समन्वयन डॉ रजनी जैन एवं डॉ विकास कुमार द्वारा किया गया।

तीसरी तिमाही कार्यशाला: इस तिमाही में दो कार्यशालाओं का आयोजन किया गया। प्रथम, ग्राम उतरावली, बुलंदशहर में 'उच्च पशुधन उत्पादन के लिए विभिन्न डेयरी सेवाओं का योगदान' विषय पर डॉ आरती अशोक एवं डॉ विकास कुमार द्वारा नवम्बर 13, 2024 को आयोजित की गयी। दूसरी कार्यशाला दिसम्बर 18, 2024 को 'जीआईएस और रिमोट सेंसिंग उपकरण' विषय पर डॉ रजनी जैन, प्रधान वैज्ञानिक (भा.कृ.अनु.प.- निआप) के समन्वय से हाइब्रिड मोड में आयोजित की गयी जिसमे कुल 80 प्रतिभागियों ने भाग लिया। इस कार्यशाला में विषय विशेषज्ञों द्वारा रिमोट सेंसिंग की कार्य प्रणाली एवं सॉफ्टवेयर आदि के बारे में हिंदी और अंग्रेजी दोनों में सुगमता से जानकारी दी गयी।

चौथी तिमाही कार्यशाला: इस तिमाही में दो कार्यशालाओं का आयोजन किया गया। प्रथम, कार्यशाला निदेशक श्री प्रताप सिंह बिरथल की अध्यक्षता में "ई-एचआरएमएस के माध्यम से मानव संसाधन प्रबंधन में दक्षता एवं पारदर्शिता" विषय पर जनवरी 17, 2025 को आयोजित की गयी। इस कार्यशाला में प्रमुख वक्ता श्री इंदरजीत सचदेवा (स.प्र.अधिकारी) ने e-HRMS की आवश्यकता एवं लाभ के बारे में बताया श्री यतिन कोहली (सहायक) ने अवकाश एवं मेडिकल सेवाओं के सम्बन्ध में उचित तरह से फॉर्म भरने के बारे में बताया एवं श्री दुर्गा दयाल यादव (सहायक) ने अन्य फॉर्म्स- इंडेंट आदि को भरने और ट्रैक करने के बारे में जानकारी दी। दूसरी कार्यशाला पानी संस्थान के सहयोग से माल, लखनऊ में मार्च 3, 2025 को आयोजित की गयी जिसका विषय था "ग्रामीण विकास के लिए भू-परीक्षक की कार्यप्रणाली, लाभ और प्रभाव" इस कार्यशाला में डॉ रजनी जैन ने "कृषि में डिजिटल इनोवेशन के बढ़ते महत्त्व" पर जानकारी दी, श्री सदानंद ने भू-परीक्षक यंत्र से भूमि सुधार एवं विकास कुमार ने "डिजिटल इनोवेशन के लिए सरकार द्वारा प्रोत्साहन" विषय पर जानकारी दी।

हिंदी कार्यशाला, सितम्बर 23, 2024

हिंदी कार्यशाला, लखनऊ, मार्च 3, 2025

अखिल भारतीय हिंदी प्रशिक्षण कार्यक्रम में सहभागिता : भाकृअनुप – एनबीपीजीआर, नई दिल्ली में फरवरी 6-8, 2025 को 'प्रशासन में राजभाषा समन्वयन' विषय पर तीन दिवसीय अखिल भारतीय हिंदी प्रशिक्षण कार्यक्रम का आयोजन किया गया। इस प्रशिक्षण कार्यक्रम में भा.कृ.अनुप के सभी संस्थानों से प्रतिनिधियों ने भाग लिया। प्रशिक्षण में कुल 13 सत्रों का आयोजन किया गया जो कि अत्यंत जानकारीपरक, समसामयिक और बहुपयोगी थे। भा.कृ.अनुप-निआप से वरिष्ठ वैज्ञानिक एवं राजभाषा अधिकारी डॉ विकास कुमार ने प्रशिक्षण कार्यक्रम में हिस्सा लिया।

भा.कृ.अनुप के उपमहानिदेशक डॉ डी के यादव द्वारा प्रशिक्षण कार्यकम का उद्घाटन एवं व्याख्यान

पूर्व राज्यसभा सांसद एवं हिंदी लेखक प्रो राकेश सिन्हा द्वारा व्याख्यान

10 Personnel and Budget

Personnel

Scientific

S. No.	Name	Designation
1.	Dr. Pratap Singh Birthal	Director
2.	Dr. Shiv Kumar	Head, Division of Agricultural Market and Trade
3.	Dr. Raka Saxena*	Head, Division of Technology and Sustainable Agriculture
4.	Dr. Nalini Ranjan Kumar	Principal Scientist (Ag. Economics)
5.	Dr. Khem Chand	Principal Scientist (Ag. Economics)
6.	Dr. I. Sekar	Principal Scientist (Ag. Economics)
7.	Dr. Rajni Jain	Principal Scientist (Computer Application in Agriculture)
8.	Dr. Subhash Chand	Principal Scientist (Ag. Economics)
9.	Dr. Naveen Prakash Singh	Principal Scientist (Ag. Economics)
10.	Dr. Sant Kumar	Principal Scientist (Ag. Economics)
11.	Dr. Anil Kumar	Principal Scientist (LPM)
12.	Dr. Purushottam Sharma	Principal Scientist (Ag. Economics)
13.	Dr. Prem Chand**	Senior Scientist (Ag. Economics)
14.	Dr. Vikas Kumar	Senior Scientist (Ag. Economics)
15.	Dr. Shivendra Kumar Srivastava	Senior Scientist (Ag. Economics)
16.	Dr. Kingsly Immanuelraj T.	Senior Scientist (Ag. Economics)
17.	Dr. Dinesh Chand Meena	Senior Scientist (Ag. Economics)
18.	Dr. Vinayak Ramesh Nikam	Senior Scientist (Ag. Extension)
19.	Dr. Jaya Jumrani	Senior Scientist (Ag. Economics)
20.	Dr. Arathy Ashok	Scientist (Ag. Extension)
21.	Dr. Pavithra Srinivasamurthy	Scientist (Ag. Economics)
22.	Mr. Subash S.P.	Scientist (Ag. Economics)
23.	Dr. S.J. Balaji	Scientist (Ag. Economics)
24.	Mr. S.V. Bangararaju	Scientist (Ag. Economics)
25.	Dr. Prabhat Kishore	Scientist (Ag. Economics)
26.	Dr. Ankita Kandpal	Scientist (Ag. Economics)
27.	Dr. Kiran Kumara T.M.	Scientist (Ag. Economics)
28.	Mr. Dilip Kumar	Scientist (Computer Application and IT)

*On deputation as Senior Adviser to NITI Aayog, Government of India, New Delhi, since March 4, 2025

**On deputation as Member (Official) to Commission on Agricultural Costs and Prices (CACP), Ministry of Agriculture and Farmers Welfare, Government of India, New Delhi, since March 4, 2025

Technical

S. No.	Name	Designation
1.	Mr. Khyali Ram Chaudhary	Chief Technical Officer
2.	Mr. Satender Singh	Technical Officer

Administrative

S. No.	Name	Designation
1.	Mrs. Roselima Lakra	Senior Administrative Officer
2.	Mr. Shanker Ramrakhiani	Principal Private Secretary
3.	Mr. Ajay Kumar Yadav	Finance & Accounts Officer
4.	Mr. Inderjeet Sachdeva	Assistant Administrative Officer
5.	Mr. Yatin Kohli	Assistant
6.	Mr. Harish Vats	Assistant
7.	Mr. Ajay Tanwar	Assistant
8.	Mr. Durga Dayal Yadav	Assistant
9.	Mr. Deepak Tanwar	Personal Assistant
10.	Mr. Mahesh Kumar	Lower Division Clerk
11.	Mrs. Kanika Arora	Lower Division Clerk

Skilled Supporting Staff

S. No.	Name	Designation
1.	Mr. Mahesh Pal	Skilled Supporting Staff

Transfers

S. No.	Name and Designation
1.	Mohammad Irfan, Assistant Finance and Accounts Officer, was transferred from ICAR-NIAP, New Delhi, to ICAR Headquarters, on 26.04.2024
2.	Mr. Bijendra Singh Tewthia, Principal Private Secretary (PPS), was transferred from ICAR-NIAP, New Delhi, to ICAR-NCIPM, New Delhi, on 08.07.2024
3.	Mr. Mangal Singh Chauhan, Chief Technical Officer, was transferred from ICAR-NIAP, New Delhi, to ICAR-IISWC, Dehradun on 25.09.2024
4.	Mrs. Sonia Chauhan, Chief Technical Officer, was transferred from ICAR-NIAP, New Delhi, to ICAR-IISWC, Dehradun on 25.09.2024
5.	Mr. Navdeep Kumar Sharma, Administrative Officer, was transferred on promotion to the post of Senior Administrative Officer at ICAR-IIAB (Indian Institute of Agricultural Biotechnology), Ranchi on 06.02.2025

Promotions & New Joinings

S. No.	Name and Designation
1.	Mrs. Roselima Lakra, joined the post of Senior Administrative Officer at ICAR-NIAP, New Delhi, on 13.03.2025 after being promoted from the post of Administrative Officer, ICAR-IARI, New Delhi
2.	Mr. Shanker Ramrakhiani, Private Secretary, was transferred from ICAR-NCIPM, New Delhi, to ICAR-NIAP, New Delhi on 08.07.2024
3.	Mr. Durga Dayal Yadav joined the post of Assistant (DR) on 17.10.2024 at ICAR-NIAP, New Delhi

Study Leave

S. No.	Name and Designation	Study Leave Period
1.	Mr. Subash S.P., Scientist	20.07.2021 to 30.06.2025
2.	Mr. Dilip Kumar, Scientist	01.07.2024 to 30.06.2027

Budget

Table 10.1. ICAR-NIAP Expenditure, 2024-25 (Rs. Lakhs)

Head	Expenditure
Grants for Creation of Capital Assets (Capital)	
Works	0.00
Equipment	54.39
Information Technology	43.19
Library Books and Journals	27.64
Vehicles & Vessels	9.98
Furniture & Fixtures	21.77
Others	0.00
Total Capital Expenditure (A)	**156.97**
Grant in Aid-Salaries (Revenue)	**1116.37**
Pension and other Retirements Benefits	**11.49**
Total Establishment Expenses (B)	**1127.86**
Grant in Aid-General	
Travelling Allowance	11.14
Research and Operational Expenses	142.48
Administrative Expenses	310.77
Others	2.61
Total Expenditure Grant in Aid-General (C)	**467.00**
Grand Total (A+B+C)	**1751.83**
SCSP Grant in Aid Capital	6.33
SCSP Grant in Aid General	20.00
Total Expenditure SCSP (D)	**26.33**
Total Expenditure including SCSP (A+B+C+D)	**1778.16**
Revenue Receipt	35.48
Budget of Externally Funded Projects (Expenditure)	168.24

भाकृअनुप – राष्ट्रीय कृषि आर्थिकी एवं नीति अनुसंधान संस्थान
ICAR - National Institute of Agricultural Economics and Policy Research
(Indian Council of Agricultural Research)
New Delhi 110 012