Annual Report

2023

Division of Agricultural Economics
ICAR- Indian Agricultural Research Institute
New Delhi

e-Annual Report 2023

Published: 2025

Supervision and Guidance

Dr.Alka Singh, Head, Division of Agricultural Economics, ICAR-IARI

Compilation Committee and Editorial Team Members

Dr. Asha Devi S S
Dr. Chiranjit Mazumder
Dr. Praveen K V
Dr. Renjini V R

Technical Assistance

Mr. Narinder Mohan Singh
Mr. Pavan Kumar Malik

Acknowledgements

We acknowledge the contributions from the Scientific, Technical, Administrative and Supporting staff of the Division of Agricultural Economics in the compilation of this report.

Correct citation: e-Annual Report 2023, Division of Agricultural Economics, ICAR-Indian Agricultural Research Institute, New Delhi –110012, India

Published (in online mode) by the Head, Division of Agril Economics, New Delhi-110012

Contents

1. कार्यकारी सारांश

कृषि अर्थशास्त्र संभाग, भारतीय कृषि अनुसंधान परिषद- भारतीय कृषि अनुसंधान संस्थान (ICAR-IARI) में सामाजिक विज्ञान स्कूल का एक प्रमुख महत्वपूर्ण हिस्सा है जिसकी स्थापना वर्ष 1960 में की गयी। कृषि अर्थशास्त्र संभाग ने अनुसंधान और स्नातकोत्तर शिक्षा में उत्कृष्टता प्राप्त करने व प्रदान करने के साथ-साथ बुनियादी और व्यावहारिक अनुसंधान दोनों के माध्यम से कृषि नीतियों में अपना महत्वपूर्ण योगदान दिया है। इस संभाग ने वर्ष 1995 से आईसीएआर सेंटर ऑफ एडवांस्ड फैकल्टी ट्रेनिंग (CAFT) उन्नत संकाय प्रशिक्षण केंद्र के रूप में मान्यता प्राप्त कर कृषि अर्थशास्त्र और नीति अनुसंधान क्षमता को मजबूत किया है,जिससे समसामयिक विषयों पर 34 प्रशिक्षण कार्यक्रमों के माध्यम से 657 शोधकर्ताओं को लाभ प्राप्त हुआ है। कृषि अर्थशास्त्र संभाग को मुख्य अनुसंधान के साथ-साथ कृषि में उभरती चुनौतियों का समाधान करने के लिए विकसित किया गया है,जिनमें कृषि व्यवसाय विश्लेषण और संसाधन आवंटन पर प्रारंभिक अध्ययनों से लेकर कृषि प्रौद्योगिकियों, नीतियों, नवाचारों के प्रभाव, मूल्य पूर्वानुमान, बाजार दृष्टिकोण, माध्यमिक कृषि,व्यापार की क्षमता, कृषि उत्पादन प्रणालियाँ, प्राकृतिक संसाधन उपयोग, जलवायु परिवर्तन प्रभाव, शमन और अनुकूलन आदि शामिल हैं। इसके अलावा,वर्ष 2023 के दौरान कृषि अर्थशास्त्र संभाग में किए गए शोध कार्यों का सारांश यहां आगे दिया गया है।

सम्पूर्ण भारत में ई-नाम (e-NAM) के सहयोग व प्रदर्शन द्वारा किसानों ने अपनी फसल का बेहतर मूल्य प्राप्त किया है व ई-नाम की क्षमता को उजागर किया है,हालांकि किसानों में जागरूकता की कमी (23%) व भुगतान निपटाने में देरी और व्यापारी गुटबंदी जैसी चुनौतियाँ बनी हुई हैं और केवल 2% खाद्यान्न का व्यापार मंच के माध्यम से हुआ। खाद्य प्रसंस्करण उद्योग (FPI) में मूल्य संवर्धन के विश्लेषण से पता चलता है कि संगठित क्षेत्रों और उच्च ग्रामीण पूंजी निवेश की ओर बदलाव के साथ-साथ ग्रामीण सकल मूल्य वर्धन(GVA) में हिस्सेदारी 1994-95 में 54.72% से बढ़कर 2015-16 में 57.08% हो गई है। तकनीकी प्रगति के बावजूद, सामग्री की लागत, जो उत्पादन व्यय का 80-90% है,जो कि गंभीर बनी हुई है और जिसके कारण 5% की कमी, उद्योग के उत्पादन को एक तिहाई तक बढ़ा सकती है। किसानों को अपनी उपज को बेचनें के लिए बाजार पसंद पर शोध से पता चलता है कि APMC ,सहकारी समितियों या FPO को बेचने से अक्सर बेहतर मूल्य की प्राप्ति होती है। जबकि गन्ने को छोड़कर अधिकांश फसलों के निपटान की प्रमुख जगह स्थानीय बाज़ार रहे और मूल्य प्राप्ति विभिन्न बाज़ार प्रकारों में भिन्न रही। इसके अलावा कृषि-निर्यात कार्यों में यूरोपीय संघ द्वारा कृषि-निर्यात अस्वीकृतियों के विश्लेषण से पता चलता है कि कीटनाशक अवशेष अस्वीकृतियों के प्राथमिक कारण हैं,जिनमें मसाले और तिल जैसे उत्पाद सबसे अधिक प्रभावित होते हैं।

एक अन्य अध्ययन में ग्रामीण मजदूरी पर मनरेगा (MGNREGA) के सकारात्मक प्रभावों पर प्रकाश डाला गया, जिसमें दोनों लिंगों के लिए वास्तविक कृषि मजदूरी में उल्लेखनीय वृद्धि हुई, जिससे लिंग मजदूरी अंतर कम हुआ। एक अध्ययन में देश में किसान उत्पादक संगठनों (FPO) की सफलता के प्रमुख कारकों के रूप में संचार में पारदर्शिता,सदस्यों की जरूरतों को संबोधित करने और प्रौद्योगिकी-संचालित प्लेटफार्मों का लाभ उठाने के महत्व पर जोर दिया गया। भारत का कृषि व्यवसाय स्टार्ट-अप पारिस्थितिकी तंत्र तेजी से बढ़ रहा है,जो देश को एक वैश्विक खिलाड़ी के रूप में स्थापित कर रहा है, और उनकी सफलता के प्रमुख संकेतक राजस्व वृद्धि, पुनर्खरीद और ग्राहक अधिग्रहण रहे।

एक अध्ययन में कृषि व्यवसाय स्टार्ट-अप के विकास को बढ़ावा देने के लिए उत्पाद बाजार में फिट होने, एक प्रभावी व्यवसाय मॉडल और नवाचार, सलाह और प्री-इन्क्यूबेशन कार्यक्रमों के माध्यम से समर्थन के महत्व पर प्रकाश डाला गया। राष्ट्रीय परिवार स्वास्थ्य सर्वेक्षण (2015-21) के विश्लेषण से पता चलता है कि बाल विकास में कमी के मामले में थोड़ी गिरावट आई है, ग्रामीण क्षेत्रों में इसकी व्यापकता अधिक है, जबकि ग्रामीण क्षेत्रों में खासकर एनीमिया 50% से अधिक महिलाओं को प्रभावित किया है व मां की शिक्षा, बच्चे की उम्र और स्वच्छता जैसे कारक परिवार की स्वास्थ्य विकसिकता को प्रभावित करते हैं, जबकि महिला सशक्तिकरण का पोषण संबंधी बातों पर सकारात्मक प्रभाव पड़ता है।

भारतीय कृषि अनुसंधान संस्थान के चावल और गेहूं की किस्मों के आर्थिक विश्लेषण से पता चलता है कि पीबी-1509 बासमती और एचडी-3086 गेहूं की क़िस्मों ने उपभोक्ताओं और उत्पादकों दोनों को उल्लेखनीय लाभ प्रदान किए। बीज उत्पादन मॉडल जैसे IARI-SPU, FPO-NSC और बीज लाइसेंसिंग फर्मों का मूल्यांकन किया गया है,जिससे पता चला है कि बीज उत्पादन में अधिक लागत आती है लेकिन इससे आय अधिक होती है। हरियाणा में धान की सीधी बुआई डायरेक्ट सीडिंग राइस (DSR) पारंपरिक तरीकों की तुलना में जल उत्पादकता, कम सिंचाई और कम लागत के लिए फायदेमंद साबित हुई है। हालांकि इसे अपनाने की चुनौतियाँ अभी भी बनी हुई हैं। कम कार्बन फुटप्रिंट सहित डीएसआर के पर्यावरणीय लाभों को भी नोट किया गया है। जैवउर्वरक अपनाने पर एक अध्ययन से पता चलता है कि किसानों के बीच इसे अपनाने की अवधि प्रशिक्षण के माध्यम से बढ़ाई जा सकती है,जबकि भारतीय कृषि में नाइट्रोजन बजटिंग ने उर्वरकों पर अत्यधिक निर्भरता को उजागर किया है, जिससे स्थिरता संबंधी चिंताएं पैदा हो रही हैं। इसके अतिरिक्त, किसानों ने कृषि में

विभिन्न प्रकार की प्रबंधन रणनीतियों को अपनाने के बावजूद कृषि में मानव-वन्यजीव संघर्ष(HWC) के परिणामस्वरूप काफी फसल क्षति हुई,जिसमें बेहतर मुआवजे और बीमा योजनाओं की आवश्यकता को महसूस किया गया।

कृषि अर्थशास्त्र संभाग ने वर्ष 2023 में, शैक्षणिक और अनुसंधान प्रगति में उल्लेखनीय उपलब्धियां हासिल की। जिनमें सोलह छात्रों ने(9 पीएच॰डी॰ और 7 एम॰एससी॰) प्रौद्योगिकी और संस्थागत नवाचार, संसाधन उपयोग, जलवायु परिवर्तन, खाद्य प्रणाली विश्लेषण और सामान्य संतुलन मॉडलिंग जैसे क्षेत्रों में सफलतापूर्वक अनुसंधान पूरा किया। कुल 34 पीएच.डी.और 14 एम.एससी. छात्रों का इस वर्ष के दौरान नामांकन किया गया। कई छात्रों को IARI फ़ेलोशिप के अलावा ICAR-JRF/SRF और UGC-JRF सहित फ़ेलोशिप प्राप्त हुई। छात्रों और शिक्षकों ने राष्ट्रीय और अंतर्राष्ट्रीय सम्मेलनों, कार्यशालाओं जैसे विभिन्न शैक्षणिक कार्यक्रमों में सक्रिय रूप से भाग लिया और अपने उल्लेखनीय योगदान के लिए विभिन्न पुरस्कार प्राप्त किये। संभाग के कर्मचारियो ने पूसा कृषि विज्ञान मेला, पूसा समाचार और MGMG कार्यक्रम दौरों में सक्रिय रूप से भाग लेकर विस्तार-प्रसार गतिविधियों में भी अपना उल्लेखनीय योगदान दिया। कृषि अर्थशास्त्र संभाग द्वारा सहकर्मी-समीक्षित नास(NAAS)-रेटेड पत्रिकाओं में 17 शोध लेख भी प्रकाशित किए गये, जिनमें 6 से ऊपर रेटिंग वाले 6 पेपर शामिल हैं। इसके अतिरिक्त, संभाग द्वारा 6 पुस्तक अध्याय,1 प्रशिक्षण मैनुअल और 4 लोकप्रिय लेखों को भी तैयार किया गया हैं।

2. EXECUTIVE SUMMARY

The Division of Agricultural Economics, established in 1960, is a key constituent of the School of Social Sciences at the Indian Council of Agricultural Research-Indian Agricultural Research Institute (ICAR-IARI). With a mandate to excel in research and postgraduate education, the division has made significant contributions to agricultural policy through both basic and applied research. Recognized as an ICAR Centre of Advanced Faculty Training (CAFT) since 1995, the Division has strengthened agricultural economics and policy research capacity, benefiting 657 researchers through 34 training programs on contemporary topics. Its research focus has evolved to address emerging challenges in agriculture, transitioning from early studies on farm business analysis and resource allocation to contemporary areas such as the impact of agricultural technologies, policies and innovations, price forecasting and market outlooks, the potential of secondary agriculture and trade, agricultural production systems and natural resource use, and climate change effects, mitigation, and adaptations. The research works undertaken in the division during 2023 are summarized here.

The performance of e-NAM in India highlighted its potential for better price realization, though challenges like low farmer awareness (23%), delay in settling payments, and trader cartelization persist, with only 2% of food grains traded via the platform. The analysis of value addition in the Food Processing Industry (FPI) showed an increase in rural GVA share from 54.72% in 1994-95 to 57.08% in 2015-16, with a shift towards organized sectors and higher rural capital investment. Despite technological advancements, material costs, constituting 80-90% of production expenses, remain critical, and a 5% reduction could boost industry output by one-third. Research on farmers' market choice for produce disposal showed that selling to APMCs, cooperatives, or FPOs often led to better price realization, while local markets being the major agency of disposal for the majority of crops, except for sugarcane, and price realization varied across market types. Lastly, an analysis of agri-export rejections by the EU revealed that pesticide residues as the primary reason, with products like spices and sesame seeds being most affected.

Another study underscored the positive impacts of MGNREGA on rural wages, with significant increases in real agricultural wages for both genders, reducing the gender wage gap. A study emphasized the importance of transparency in communication, addressing members' needs, and leveraging technology-driven platforms as key factors in the success of Farmer Producer Organizations (FPO) in the country. India's agribusiness start-up ecosystem is rapidly growing, positioning the country as a global player, and key performance indicators for their success were identified as revenue growth, repeat sales, and customer acquisition. A study highlighted the importance of product market fit, an effective business model, and support through innovation, mentoring, and pre-incubation programs to foster the growth of agribusiness start-ups. An analysis of the National Family Health Survey (2015-21) showed a slight decline in child stunting, with rural areas having a higher prevalence, while anaemia affects over 50% of women, especially in rural regions. Factors such as child age, mother's education, and sanitation influence stunting, while women's empowerment positively impacts nutritional status.

Economic analysis of IARI's rice and wheat varieties revealed that PB 1509 basmati and HD 3086 wheat provide substantial benefits to both consumers and producers, with notable surpluses generated. Seed production models like IARI-SPU, FPO-NSC, and seed licensing firms were

evaluated, showing that while seed production incurs higher costs, it yields higher incomes; however, inefficiencies in various models, such as late payments and contract issues, were identified. Direct Seeding Rice (DSR) in Haryana proved beneficial for water productivity, reduced irrigation, and lower costs compared to traditional methods, though adoption challenges remain. The environmental benefits of DSR, including a lower carbon footprint, were also noted. A study on biofertilizer adoption revealed that its adoption duration among farmers could be extended through training, while nitrogen budgeting in Indian agriculture highlighted an over-reliance on fertilizers, leading to sustainability concerns. Additionally, Human-Wildlife Conflicts (HWC) in agriculture resulted in significant crop losses, with farmers adopting various management strategies, indicating the need for better compensation and inclusion in insurance schemes.

In 2023, the division has made notable achievements in academic and research advancements. Sixteen students (9 PhD and 7 M.Sc.) completed research in areas like technology and institutional innovations, resource use management, climate change, food system analysis and general equilibrium modelling. A total of 34 Ph.D. and 14 M.Sc. students were enrolled during the year. Several students received fellowships other than the IARI fellowship, including ICAR-JRF/SRF and UGC JRF. Students and faculty actively participated in various academic events, such as national and international conferences and workshops, and secured different awards for their remarkable contributions. The staff of the division also contributes to extension activities by actively participating in Pusa Krishi Vigyan Mela, Pusa Samachar and MGMG program visits. The division also published 17 research articles in peer-reviewed NAAS-rated journals, including 6 papers rated above 6. Additionally, the division produced 6 book chapters, 8 popular articles, and 1 training manual.

3. OVERVIEW OF DIVISION OF AGRICULTURAL ECONOMICS

3.1 Introduction

The Division of Agricultural Economics, a constituent of the School of Social Sciences of the Indian Council of Agricultural Research-Indian Agricultural Research Institute, was established in 1960. The mandate of the division is to conduct research in frontier areas and serve as a center for academic excellence in post-graduate education. Since its inception, the division has been making contributions to basic and applied research with significant implications for agricultural policy. The division has achieved excellence in post-graduate education and research as an ICAR-UNDP Centre of Excellence through a faculty exchange program for human resources development and strengthening of infrastructure facilities. Since 1995, it has been functioning as an ICAR Centre of Advanced Faculty Training (CAFT) to strengthen the capacity for agricultural economics and policy research in the national agricultural research system. Since then, the division has conducted 34 training programs for early-stage researchers in the National Agricultural Research System. The training has covered a variety of contemporary topics in agricultural economics, with a special focus on empowering the trainees with methodological advances in the field. So far, 657 Researchers have benefited from the CAFT program.

The research contributions of the division have been globally recognized, and many of the alumni hold reputed positions in national and international organizations. The division has maintained good academic liaison with other divisions at IARI and other national and international agricultural research institutions. The division's research focus has been continuously reoriented to address contemporary development challenges. The early research of the division focused on farm business analysis, efficient allocation of resources, supply response, input demand analysis, and marketing efficiency. To address the challenges and opportunities of the Green Revolution, research on capital formation, labour employment, farm mechanization, rural credit needs, yield gap analysis, price policy and subsidy issues, and efficient management of natural resources was undertaken. However, keeping pace with the changes in the agricultural landscape in the country and the world, the research areas are reoriented from time to time.

Current research thrust areas of the division include,

- *Impact of agricultural technologies, policies and innovations:* Impact assessment of agricultural technologies developed by NARS, impact analysis of policies and government flagship programs like e-NAM, crop insurance, agriculture credit policy, market regulations, collective action etc.

- *Price forecasting and market outlooks:* Price forecasting using advanced time series techniques and developing demand-supply projections for selected commodities.

- *The potential of secondary agriculture and trade*: Identifying the secondary agriculture drivers and assessing its potential. Analysis of the changing landscape of agricultural trade and its implications for the agriculture sector.

- *Agricultural production systems and Natural resource use:* Sustainability in the use of natural resources like water, energy and soil in different agricultural production systems and its implications, quantification of services offered by agro-eco systems and designing payment strategies for ecosystem services.

- *Climate change effects, mitigation, and adaptations:* Modelling the impact of climate change on agriculture, assessing the risks, mapping the vulnerabilities and adaptation strategies against climate change.

Facilities in the Division

The division is equipped with facilities, including a smart classroom, postgraduate lab, computer lab, seminar room, committee room, and library, all designed to support research, teaching, and various other activities.

PG Lab

PG lab is a facility provided in the division so that the M. Sc and Ph. D students can work on their research work in the division under the guidance of the faculty. Currently, it has four computers with internet facilities, each connected to a printer. The software available on the computers includes Microsoft Office (word, PowerPoint, excel & access), STATA and SPSS. The lab also has a separate cabin facility so that the students can work without any disturbance and can use their laptops as well.

Library

The divisional library is a hub of resources, having 5679 books and eight journals and magazines. These include the Indian Journal of Agricultural Economics, Indian Journal of Agricultural Marketing, Agricultural Economics Research Review, Agricultural Statistics at a Glance, Agricultural Situation in India, Fertilizer Statistics, Economic Survey and National Account

Statistics. The library has a collection of the thesis of research work of both M. Sc and Ph. D students from 1964 till date.

Smart classroom:

The smart classroom has a TV panel and digital podium. The faculty can conduct online classes with two-way communication with the students.

Seminar room: The seminar room is equipped with one touchscreen panel, one projector, an effective sound system and online connectivity for video conferencing. The seating capacity is around 55.

Committee room: The committee room has a projector, one computer and internet connectivity. The seating capacity is around 15.

Computer lab: The computer lab has six computers connected with printers and internet connectivity for the students to browse information and work on their research work.

3.1.1 Divisional Projects

The Division manages three institute-funded research projects focusing on themes of *Agricultural Markets and Value Chain, Institutional Innovations and Rural Livelihood, and Technology, Resources and Environment.*

Project 1: Innovations in Agricultural Marketing and Institutional Arrangements for Enhancing Farmers' Income in India

Objectives

- To leverage the potential of agricultural markets under the new institutional environment.
- To identify the drivers of secondary agriculture and assess its potential.
- To analyze and forecast the demand, supply and prices of selected agricultural commodities.
- To understand the changing landscape of agricultural trade and its implications for agriculture sector.

Project 2: Social, Economic and Environmental Impact Assessment of Technology, Policy and Institutional Innovation in Agriculture

Objectives

- To examine the extent of adoption and benefits of improved technologies of IARI/NARS.
- To analyse the impact of knowledge-intensive technologies in mitigating risk and enhancing profitability.
- To study the government policies and institutional innovations for the enhancement of farm income.

Project 3: Exploring Linkages of Agricultural Production Systems and Ecosystem Services for Sustainability

Objectives

- To study interactions between agricultural production system and natural resources in the context of sustainability and farm income.
- To quantify the value of ecosystem services of selected agricultural production systems and formulation of incentive structures.
- To examine the technologies, institutions and policy initiatives on sustainable agriculture production and their implications.

3.2 AGRICULTURAL MARKETS AND VALUE CHAIN

3.2.1 Performance of e-NAM in India

The government of India launched e-NAM mainly to remove inefficiency in the marketing system and ensure fair prices for farmers. We examined the status, extent of coverage, and constraints in e-NAM trading. The e-NAM still needs to go a long way to achieve set targets. As of 4th July 2023, around 14% of the total cultivators have participated in the e-NAM. Around 55% of the principal markets were linked in e-NAM. The trader density was 123/ lakh ha GCA, and about 67% of them received a unified license. The total e-NAM trade value was about 2% of the agriculture gross value added (AgGVA). About 2% of the food grain was traded through the e-NAM portal. The largest traded commodity group in 2021-22 was oilseeds, followed by cereals, fruits, and vegetables. Rajasthan and Haryana are the two states that recorded the highest trade share in terms of value and volume. By applying Wilcoxon signed-rank test, we have compared the e-NAM and AGMARKNET prices for the period 2019-22 to see whether e-NAM results in higher price realization. It was found that e-NAM has been effective in providing higher price realization for farmers, with an increase from 23% in 2019-2021 to 52% in 2019-2022. Findings from primary surveys in Haryana and Rajasthan revealed that only 23 % of farmers were aware of the e-NAM. The stakeholders faced some challenges in using the e-NAM portal, which needs to be addressed to attract more participation. The cartelization of the traders and delays in the settlement of payments were the major problems perceived by the farmers. Traders insisted on manually checking the quality of produce before purchasing. Better assaying facilities and quality standards are required to promote inter-market transactions and better price discovery.

3.2.2 Structure, material costs and role of technology in food processing industries

The regional dynamics of value addition across the sectors were analyzed by using the Annual Survey of Industries data (2019-20). Food processing Industry (FPI), with its strong linkage to agriculture, the rural contribution showed an increasing trend in its share from 54.72 per cent in 1994-95 to 57.08 per cent in 2015-16 in total GVA. In the unorganized sector, GVA reduced to 43.49 per cent in 2015-2016 from 54.69 per cent in 1994-95 in rural areas, whereas it increased to 62.90 per cent in 2015-16 from 57.71 per cent in 1994-95 in the organized sector. Capital investment increased in the rural area from 36.84 per cent to 40.35 per cent during 1994-95 to 2015-16. Although similar dynamics can be observed in the employment pattern, the urban industries indicated proportionately more employment (including skilled and unskilled) than in the rural area. Yet, workers' presence is more in the rural firms, with male and female workers share of 58.78 per cent and 63.02 per cent, respectively. This pattern indicates comparatively more demand for skilled employees in urban areas. Technological advancement expects to deliver products at a competitive price, but the recent technological change was not reflected in terms of prices of processed food in India. Along with technology, the cost of material is equally important, particularly in FPI, since material constitutes nearly 80-90 per cent of the total cost of production.

Reducing material cost by 5 per cent alone will increase the industry output by one-third of the present market value.

3.2.3 Farmers' market choice for farm produce disposal

Access to the market is an important pathway for ensuring profitability for the farmers. In this regard, we studied the farmers' choice of market for selected agricultural commodities in India (gram, wheat, cotton, and millet) using NSSO's 77th round Situation Assessment of Agricultural Households data. The factors determining choice of market was analyzed by the multinomial logit model and impact of the market choice on price realization was analyzed by multinomial treatment effect regression. Analysis found that the local market accounted for the highest share in all the crops except sugarcane. In the case of Gram, farmers selling to APMC realize 3% more sale value in comparison to the farmers selling to local traders. Also, farmers selling to cooperative/govt agencies/FPOs realize 8% more sale value in comparison to the farmers selling to local traders. In the case of cotton, farmers selling to APMC realize a 3 % lesser sale value in comparison to the farmers selling to local traders. Whereas farmers selling to Cooperative/Govt agencies/FPOs realize 5 % more sale value in comparison to the farmers selling to local traders. Also, farmers selling to input dealers realize 6 % more sale value in comparison to the farmers selling to local traders. In the case of wheat, farmers selling to APMC realize 7% more sale value in comparison to the farmers selling to local traders and farmers selling to Cooperative/Govt. Agencies/FPOs realize a 9% higher sale value in comparison to the farmers selling to local traders. In case of bajra and jowar, the farmers selling to APMC markets realized significantly higher prices compared to local traders. Better price realization would incentivize farmers to bring more area under millet cultivation. Ensuring reasonable prices is a key to enhancing both the area and production of millets.

3.2.4 Status and causes of rejection of India's agri export by EU

The study attempted to provide insights into the trend and reasons for rejecting Indian agricultural commodities by the EU and India's non-compliance with EU standards. Out of 300 rejections of Indian agricultural exports to the EU during the study period (2020-2022), around 40 per cent were due to pesticide residues. Basmati rice, shrimp, spices, sesame seeds, and okra were the major agricultural products rejected due to pesticide residues. Spices were the most affected product group, registering 31 per cent of total rejection, followed by sesame seeds and fresh vegetables like okra. The unit rejection rates were found to be high for these three products. The primary pesticide residues detected include *tricyclazole* and *chlorpyriphos* in rice; *nitrofuran* and *furazolidone* in shrimp; *monocrotophos* and *ethylene oxide* in vegetables, and *ethylene oxides* and *chlorpyriphos* in spices and sesame seeds. The EU Maximum residue limit (MRL) for these pesticides was found to be less than 0.02 mg/kg, which Indian exporters did not conform to. Awareness and adoption of GAP at the farm level for judicious use of pesticides, extending traceability system to other commodities, strengthening of testing and certification practices

following global practices, Bilateral initiatives such as knowledge sharing, capacity building, etc. for improved compliances should be adopted for improved compliance and better price realization.

3.3 INSTITUTIONAL INNOVATIONS AND RURAL LIVELIHOOD

3.3.1 Performance of MGNREGS and its effect on wages in India

A performance index was constructed based on seven variables i.e., women participation (%), percentage of demanded household received work (%), Average days of employment in a year,100 days completed households (%), received wage rate, funds utilization (%), work completion rate (%). Based on the index, states were classified, with Mizoram being found to be the best performer and Uttar Pradesh being the least performer. Factors such as cultural acceptance, influence of women's self-help groups, wages, working conditions, social customs, domestic responsibilities, women empowerment levels, and availability of other employment opportunities contribute to the variation in MGNREGS performance across states. Structural break analysis was carried out for the period from 1995-96 to 2007-08 (pre-MGNREGA) and 2008-09 to 2021-2022 (post-MGNREGA). On average, compared to the pre-MGNREGA period, the post-MGNREGA period had an increase in male and female real agricultural wages by Rs.83.18 and Rs.86.15, respectively. After the implementation of MGNREGA, on average, there is an annual increase of real agricultural wages for males and females by Rs.4.16 and Rs 4.94, respectively. There was a significant increase in the real wages of both male and female agricultural workers. The growth rate of wages for female agricultural workers was higher compared to their male counterparts, contributing to a reduction in the gender gap in agricultural wages.

Additionally, there was a significant increase in the wage ratio (female wage rate as a percentage of male wage rate) during the post-MGNREGA period. Possibly, MGNREGA also has a significant effect on wage rates in non-agricultural occupations. These findings highlight the positive impact of MGNREGA on increasing both agricultural and non-agricultural wages, reducing the gender gap in agricultural wages, and providing a crucial safety net for rural households during challenging times.

3.3.2 Performance of Farmer Producer Organizations and agri start-ups in India

Farmers' Producer Organizations (FPOs) have emerged as vital players in this evolving ecosystem, catalyzing enhancing agricultural productivity, improving livelihoods, and promoting sustainable rural development. These organizations, often formed by small and marginal farmers, have gained recognition for their potential to empower rural communities and bridge the gaps in the agricultural value chain. A study was conducted to shed light on the multifaceted nature of FPO performance determinants by synthesizing existing research and presenting empirical evidence from our study. The study undertook a focused group discussion to characterize the performance indicators for FPOs, and convergent interviewing was done with 25 members of selected FPOs to identify performance determinants. Through the course of this study, a notable revelation emerged regarding the pivotal role of transparency in communication as a specific factor that significantly

contributed to the performance of the sampled FPOs. Another pivotal factor underpinning the success of the sampled FPOs is their adeptness in addressing the need-based requirements of their farmer members, prominently manifested through efficient input availability and unfettered market access. The policy recommendations stemming from this study center on fostering transparent communication, addressing members' needs, and capitalizing on technology-driven platforms. By nurturing these elements, policymakers can empower FPOs to play an even more transformative role in India's agriculture landscape, driving economic empowerment and progress among farmer constituents.

Another study assessed the profitability of a mini cold chamber unit (established as a part of a NASF-funded project of division) and the factors influencing the profitability of vegetable farming in the Cuttack district of Odisha. The primary data was collected from 207 respondents, of which 94 farmer members are from the Badamba Farmer Producer Organization (FPO), and 113 farmers are non-participants of FPO in the Badamba block of Cuttack district using a multistage random sampling technique. The study used a gross margins approach and multiple linear regression (MLR) to assess factors influencing profitability. Farmers harvest produce stored at the mini cold chamber and send it to the Gopalpur mandi, which increases bargaining power and income through staggered sales. The net income of FPO members in tomato farming is Rs. 23,675, compared to Rs. 1,444 for non-members of FPO. In bitter gourd cultivation, the net income of member farmers is Rs. 17,873, while non-members earn Rs. 579. Among the FPO non-participants, the significant determinants of profitability included age, education, and land acreage. The determinants of profitability among the FPO participants included education, land acreage, storage and credit access. Policymakers should formulate strategies to encourage more participation in FPO groups that may increase the profitability of farmers.

India, with its agrarian roots and burgeoning start-up ecosystem, is witnessing a remarkable surge in agribusiness start-ups, positioning itself as a global player in the sector. A study was conducted to understand the dynamic landscape of Indian start-ups, focusing specifically on the agribusiness domain along with the characterization and mapping of performance determinants for agribusiness start-ups' success. For this, we conducted a Focused Group discussion to characterize the performance indicators and found revenue growth rate, repeat sales, increase in profit, and customers onboarded as important indicators denoting the success of start-ups. we then selected ten start-ups that fit this criterion. we conducted convergent interviews with them. The determinants were classified into three categories: personal, organizational, and external factors. The most important performance determinants were product market fit and effective business model. There is a need to inculcate innovation and entrepreneurial culture in HEIs to develop better technologies. Incubators shall be focused on providing mentoring support regarding making a good product market fit and building appealing business models. Various pre-incubation programs shall be organized to sensitize the youth to conduct environmental scanning before getting into product development. A bottom-up approach shall be introduced while assessing the needs of the market.

3.3.3 Analysis of the prevalence of child and adult malnutrition

An analysis of National Family Health Survey data in India between 2015-16 and 2019-21 revealed a modest decline in child stunting, with urban areas having a 30% prevalence and rural areas at 37%. Child stunting is more prevalent in rural regions. While most states showed declining trends, some, like Meghalaya, Maharashtra, and West Bengal, recorded higher rates of stunting. Hot spot analysis identified areas of high and low risk, with Eastern, Northern, Western, North-Eastern, and Southern states as hot spots. Determinants of child stunting include factors like child age, mother's education, and sanitation facilities. Anaemia is a significant concern among women aged 15-49 in India, with over 50% prevalence. The issue is more pronounced in rural areas. Anaemia hot spots are present in Eastern, Northern, North-Eastern, and Western states. Determinants of anaemia include age, education, occupation, and region. A survey-based women's empowerment index (SWPER) was developed, with around one-third of Indian women considered highly empowered. Women's empowerment is associated with child stunting and can positively impact the nutritional status of children and women in India, as shown by logistic regression analysis.

3.4 TECHNOLOGY, RESOURCES AND ENVIRONMENT

3.4.1 Economic impact of IARI varieties

The economic impact of IARI rice and wheat varieties was analyzed by employing the economic surplus model. The basmati rice variety PB 1509 is an early maturing and non-shattering basmati rice variety that farmers prefer as it gives a higher yield when planted in time and also fetches good returns. It also enables farmers to take up additional crops, leading to the realization of higher overall income. The variety has led to the generation of consumer and producer surplus for the year TE 2021-22 to the tune of Rs 4264.61 crores and Rs 4467.90 crores, respectively. Thus, the variety has benefited both the consumers and producers, resulting in a greater social goal.

The variety HD 3086 is suitable for timely sown, irrigated conditions of NWPZ and NEPZs region, which accounts for 80 percent of the total wheat area. The variety has shown persistent demand based on the firms taking licenses for the quantum of breeder seed indent. The variety has led to the generation of consumer and producer surplus for the year TE 2021-22 to the tune of Rs 1377.44 crores and Rs 2156.44 crores, respectively. Thus, the variety has benefited both the consumers and producers, resulting in a greater social goal.

3.4.2 Economic evaluation of seed production models of field crops in North India

There are different models of contractual seed production where the farmers enter into agreements with different agencies. Models selected to study are IARI-SPU, FPO-NSC, and Seed Licensed Firm. Data was collected from farmers associated with each model and grain producers. It was evident that while seed production often incurs higher cultivation costs due to factors like quality seed expenses, roguing operations, and manual harvesting, it also yields significantly higher gross and net incomes per acre. Increased land holdings and exposure to seed production-related training significantly heightened the likelihood of farmer engagement in seed production activities. The

highest cost of cultivation is associated with the IARI-SPU model, the lowest is for the FPO model. The total cost of cultivation under the IARI-SPU model is 38.54% more than that of the FPO model. The seed producers linked to the IARI-SPU model exhibited a higher overall technical efficiency (TE) of 79.61 % compared to the other seed producers. Seed producers linked with NSC achieved an overall TE of 75.72 %, followed by FPO farmers (74.86 %), followed by seed producers of seed licensing firms (73.30 %). In terms of marketing efficiency, the IARI-SPU channel was found to be the most efficient. IARI-SPU farmers valued higher price realization, recognition, networking, and technical support but faced challenges related to late payments and contract conditions. Seed licensing firm participants found assurance in contracts but experienced issues with contract compliance and output rejection. FPO-engaged farmers appreciated payment reliability and market access but encountered challenges related to technical guidance, payment delays, and input costs. NSC-affiliated seed growers benefited from higher prices and market assurance but faced late payments and transportation cost hurdles.

Another study was conducted to identify the factors determining yield with a special focus on seed systems based on NSSO data for bajra, ragi and jowar. Multivariate regression analysis revealed that a seed system was found to determine yield after controlling for household-level socio-economic factors. Although farmers majorly use seeds from local traders and own farms, the yield was found to be relatively high in the case of farmers procuring seeds from cooperatives. Besides, land size was found to have an inverse relation with productivity. Access to information positively affects productivity, which implies popularizing superior varieties among farmers helps to achieve higher productivity.

3.4.3 Economic Impact of direct seeded rice in Haryana

To test the effect of the direct seeding technique of rice on productivity, the Regression Adjustment (RA) model was used on the primary data collected from Karnal, Haryana. Direct-seeded rice (DSR) technology offers promise as it efficiently tackles labour and water scarcity issues, with higher water productivity and a lower carbon footprint compared to Puddled transplanted rice (PTR). While DSR adoption varied across districts, with Sirsa leading, the overall DSR area accounted for a small portion of total rice cultivation. Factors influencing adoption included cooperative membership, training, seed drill availability, and extension agent support. Compared to DSR and PTR, DSR requires less labour, less machinery, and fewer specific inputs. More weedicides were needed due to weed growth in non-water-stagnant conditions. DSR showed a significant reduction in the number of irrigations and irrigation water usage, leading to improved water productivity. Despite higher expenses in certain areas, DSR maintained lower overall costs, making it economically feasible and competitive in terms of gross and farm business incomes.

3.4.4 Environmental impact of Direct-Seeded rice in Haryana

In India, where rice production is vital, there's an urgent need to address the challenges of declining groundwater and the diminishing availability of labour in the rice-growing regions. Puddled

transplanted rice (PTR), a traditional cultivation method, heavily relies on groundwater and has adverse environmental consequences, such as methane emissions. Meanwhile, direct-seeded rice (DSR) technology offers promise as it efficiently tackles labour and water scarcity issues, with higher water productivity and a lower carbon footprint. In this context, based on the study conducted in Karnal district, Haryana, the environmental benefits of DSR, including a lower carbon footprint with reduced emissions from inputs, were evaluated. Overall, while DSR offers environmental and economic advantages, there are practical and perceptual challenges that need to be overcome for wider adoption in Indian rice cultivation.

3.4.5 Adoption and dis adoption of biofertilizer among paddy farmers in IGP

The process of technology choice is dynamic and best represented as a sequence of decisions influenced by past choices and the current or expected economic conditions. Simple binary decision models, such as limited dependent variable models, cannot capture this dynamic nature effectively. Instead, duration or hazard analysis is more suitable, as it focuses on understanding when economic decisions occur over time. A duration analysis was conducted among the selected paddy farmers in Haryana and Uttar Pradesh regarding the adoption of biofertilizers. The analysis indicated that among the farmers who adopt biofertilizers, there is a high probability that they will adopt the technology soon. The average duration of adoption of biofertilizers is 3.5 years. The duration of adoption can, however, be enhanced through training and other targeted measures as indicated by the Kaplan-Meier survival estimates and the Weibull and Gompertz regression. The findings from this research shed light on how, over time, farmers may increasingly abandon sustainable agricultural technologies due to evolving economic conditions and the learning-by-doing phenomenon. The insights gleaned from this study have significant implications for policymakers and Extension educators, offering valuable guidance for the development of novel policies and programs or the refinement of existing initiatives aimed at promoting the sustained adoption of agricultural technologies and practices.

3.4.6 Estimation of nitrogen budget in Indian agriculture

The discord between the nitrogen (N) fertilizer use and the actual N requirement in Indian agriculture is of enormous concern. When N is overused, it emerges as a threat to the environment, and crop yields are affected when it is underused. Nutrient budgeting is a valuable tool in assessing the inflows and outflows of nutrients to the agricultural system and formulating future strategies. We constructed a nitrogen budget for Indian agriculture for 1961-2017. The N input to Indian croplands increased from 4.87 million tons (Mt) to 24.08 Mt during this period. Among the different components of N use in 2017, the contribution of fertilizer is the highest (70%), followed by biological N fixation (16%), manure (9%), and atmospheric deposition (4%). The analysis portrayed Indian agriculture's transformation from the N deficit value of -0.61 Mt in 1961 to a surplus-value of 1.21 Mt as of 2017. The crop N use efficiency during the period decreased from 72 per cent to 55 per cent. Since the policies and socio-economic factors are the commonly studied drivers of N fertilizer use, crop production factors have not received due attention. The fertilizer

application rate (FAR) is the most important among the major crop production factors that drive N fertilizer use. Findings suggest that the surplus N in Indian agriculture, hastened by higher FAR, may pose serious sustainability issues if not addressed.

3.4.7 Impact of Human-Wildlife Conflicts (HWC) in Agriculture

HWC is defined as any interaction between wildlife and humans that causes harm, whether it is to humans or wild animals or property. The study is based on primary data collected from 426 farmers in the villages located in the Eco-sensitive Zone (ESZ) of Bannerughatta National Park (BNP), Karnataka. Results showed that elephants and wild boars were major depredators, causing significant crop losses. Indian gaur and deer are new intruders. The amount of crop loss varies from 9.28% in mulberry to 50.13% in the case of paddy and ragi being major crops, and loss is up to 29.50 %. Stone wall fences, solar fences, acoustics, frightening devices, and guarding by farmers were more effective management strategies adopted by farmers. Groundnut, paddy, kodo millet, little millet, and foxtail millet are major crops replaced by mulberry cultivation to avoid HWC. The study finds the need for more scientific mechanisms in compensation fixation for each crop as it takes a minimum of 6 months to 18 months to receive the compensation. Farmers showed willingness to pay an additional 1.30 % of the premium towards PMFBY if HWC-based crop loss is covered under the scheme.

4. CAPACITY BUILDING PROGRAMS

Capacity-building programs are comprehensive initiatives designed to enhance the skills, knowledge, and competencies of individuals, organizations, or systems to improve their performance and effectiveness in achieving specific objectives. These programs aim to empower participants by strengthening their technical expertise, fostering innovative practices, and improving decision-making and problem-solving capabilities. They often include key components such as training sessions, hands-on workshops, skill development activities, access to necessary resources and tools, and continuous monitoring and evaluation to ensure progress and impact. Capacity-building programs delivered through various methods, including online platforms, in-person workshops, and hybrid models, cater to a wide range of audiences including students, researchers, professionals, and rural communities. Their scope can range from technical areas like statistical analysis, econometrics, and machine learning to broader themes such as climate-smart agriculture, sustainable development, and leadership training. These programs play a critical role in addressing skill gaps, promoting knowledge sharing, and enabling participants to adapt to emerging challenges. By equipping individuals and organizations with the tools and insights needed to innovate and collaborate effectively, capacity-building programs contribute significantly to long-term development, improved project implementation, and enhanced productivity across diverse fields.

The Division of Agricultural Economics, ICAR-IARI, successfully organized two notable training programs, and details are as follows;

Table 1: Details of training programs conducted in the division

Trainings	Duration	No. of Participants		
		Male	Female	Total
NAHEP training on Analytical Techniques for Empowering Social Science Research	August 07-18, 2023	21	13	34
NAHEP workshop on "Qualitative Data Analysis using NVIVO"	October 13, 2023	15	15	30


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DIVISION OF AGRICULTURAL ECONOMICS
कृषि प्रसार संभाग
DIVISION OF AGRICULTURAL EXTENSION
NAHEP
National Agricultural Higher Education Project (NAHEP)


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कृषि प्रसार संभाग
DIVISION OF AGRICULTURAL EXTENSION
NAHEP
IRRI

Capacity building programs attended by the scientists

S. No	Name of the Scientist	Name of Training Program Attended
1	Dr. Alka Singh	Study Tour to the University of Manchester and University of Birmingham in the United Kingdom as a part of the Gender Advancement for Transforming Institutions (GATI) program in March 2023.
2	Dr. Harbir Singh	• 9th AgMIP Global Workshop: Modelling the Future of Food (virtual participation) • First Global Symposium on Farmers' Rights
3	Dr. Praveen KV	• Attended a workshop on 'Making better use of evidence for sustainable development - methods of meta-analysis' organized by Campbell South Asia held at the Global Development Network, New Delhi. • Attended a workshop for Harmonizing Methodology for Network Project on Impact Assessment of Agricultural Technologies at ICAR-NIAP
4	Dr. Asha Devi	• Attended Batch-III Pedagogy Development Programme held from 20-24 November, 2023 at NASC, New Delhi. • Attended a workshop on Advances in difference-in-difference estimation conducted by the International Food Policy Research Institute, South Asia office, New Delhi on July 27, 2023, in seminar Hall, NASC, New Delhi.
5	Dr. M. Balasubramanian	• Attended a workshop on Advances in difference-in-difference estimation conducted by the International Food Policy Research Institute, South Asia office, New Delhi on July 27, 2023, in seminar Hall, NASC, New Delhi.

5. THE GRADUATE SCHOOL ACTIVITY

5.1 Courses offered (BSMA syllabus) in the academic session 2023

Ist Semester

S. No.	Course No.	Course Title	Credits
1	AEC-501*	Micro Economic Theory and Applications	3+0
2	AEC-502*	Agricultural Production Economics	1+1
3	AEC-504*	Macro Economics and Policy	2+0
4	AEC-506	Agricultural Development and Policy Analysis	2+0
5	AEC-509*	Research Methodology for Social Sciences	1+1
6	AEC-603**	Advanced Econometrics	2+1
7	AEC-605	Operations Research	2+1
7	AEC-607**	Quantitative Development Policy Analysis	1+1
8	AEC-608	Natural Resource Management	2+1
9	AEC-591/691	Seminar	1+0

IInd Semester

S. No.	Course No.	Course Title	Credits
1	AEC-503*	Agricultural Marketing and Price Analysis	2+1
2	AEC-505*	Econometrics	2+1
3	AEC-507*	Agricultural Finance and Project Management	2+1
4	AEC-508*	Linear Programming	1+1
5	AEC-511*	International Economics	1+1
6	AEC-515***	Development Economics	2+0
7	AEC-601**	Advanced Micro Economic Analysis	1+1
7	AEC-602**	Advanced Macro Economic Analysis	2+0
8	AEC-604**	Advanced Production Economics	2+1
9	AEC-606***	Advanced Agricultural Marketing and Price Analysis	2+1
10	AEC-591/692	Master's & Doctoral Seminar	1+0

5.2 Number of students enrolled during the year 2023

Name of the Degree Programme	No of students
Ph.D.	
I st Year	10
IInd Year	8
IIIrd Year	7
IVth Year onwards	9
MSc.	
I st Year	8
IInd Year	6
Total	**48**

5.3 List of degree recipient students and chairpersons of their advisory committee

S. No.	Name of the student & Roll No.	M.Sc./ Ph.D.	Title of the thesis	Chairperson	Institute
1.	Shubho Paul (21568)	M.Sc	Performance analysis of e-NAM and its impact on price realization in Rajasthan and Haryana	Dr. Venkatesh P.	ICAR-IARI, New Delhi
2.	Ankit (2159)	M.Sc	Impact of blending of edible vegetable oils on rapeseed and mustard crop in Bharatpur district of Rajasthan-An economic investigation	Dr. P. Anbukkani	ICAR-IARI, New Delhi
3.	Pavan Kumar Kumawat (21570)	M.Sc	A study of determinants of performance of agribusiness start-ups in India	Dr.Akriti Sharma	ICAR-IARI, New Delhi
4.	Sneha S B (21571)	M.Sc	Changing rural employment pattern and its implications on farm economy	Dr. Shivendra Kumar Srivastava	ICAR-IARI, New Delhi
5.	Hitaishree M (21572)	M.Sc	Competitiveness, concentration and capacity utilization of oilseeds processing industry	Dr. Kingsly Immanuelraj	ICAR-IARI, New Delhi
6.	Swati Singh (21573)	M.Sc	Study of determinants of performance of farmer producer organization in India	Dr.Akriti Sharma	ICAR-IARI, New Delhi
7.	Sudhan Bhusal (21731)	M.Sc	Estimating the economic and environmental benefits of direct seeded rice in Karnal district of Haryana	Dr.Alka Singh	ICAR-IARI, New Delhi

8.	Jaiprakash Bisen (10562)	Ph. D	A multi market, multi- regional analysis of important cereals in India: A partial equilibrium approach	Dr. Shiv Kumar	ICAR-IARI, New Delhi
9.	Ragavendra K.J. (10734)	Ph.D	A multi-stakeholder analysis of e-marketing of agricultural commodities	Dr. Shiv Kumar	ICAR-IARI, New Delhi
10.	Sharath S Yeligar (10938)	Ph.D	Impact of India and European Union FTA on Indian agriculture	Dr. Shiv Kumar	ICAR-IARI, New Delhi
11.	B. J. Giridhar (11163)	Ph.D	Conjunctive use of farm pond and ground water and its implications on farm economy in semi- arid region of Karnataka	Dr.Dharam Raj Singh	ICAR-IARI, New Delhi
12.	Naveen Kumar Naik (11165)	Ph.D	Economic assessment of human-wildlife conflicts in agriculture	Dr.Venkatesh P.	ICAR-IARI, New Delhi
13.	Nandini Saha (11380)	Ph.D	Economic evaluation of seed production of field crops in north India: Institutions, technology and markets	Dr. Pramod Kumar	ICAR-IARI, New Delhi
14.	Athare Prakash Goraksha (11384)	Ph.D	Climate change vulnerability and risk management in agriculture of Maharashtra	Dr. Dharam Raj Singh	ICAR-IARI, New Delhi
15.	Osman Nabay (11924)	Ph.D	An economic analysis of food systems and food security in Sierra Leone	Dr. P.Venkatesh	ICAR-IARI, New Delhi
16	Priyanka Upreti (10731)	Ph.D	Institutions and technologies for enhancing efficiency and equity of groundwater irrigation in India	Dr. Dharam Raj Singh	ICAR-IARI, New Delhi

5.4 Students Achievements

Name and roll no. of student	M.Sc./ M.Tech./ Ph.D.	Name of the award	Year	Agency
Adrita Dam 12434	Ph.D.	***Best Poster presentation award November, 2023*** International Conference on Sustainable Natural Resource Management under Global Climate Change; NASC Complex, New Delhi.	2023	Soil Conservation Society of India, New Delhi
Geetha M.L 11381	Ph.D.	Best Paper Presentation Award	2023	Agricultural Economics Research Association
A. Jamaludheen	Ph. D	Received Dr. Anamitra Saha Prize during the 83rd Annual Conference of The Indian Society of Agricultural Economics	2023	Indian Society of Agricultural Economics

5.5. Fellowships (other than IARI) received by the students

Name of the Fellowship	Name of students		Funding Source
	M.Sc./ M.Tech.	Ph.D.	
ICAR-JRF	Harshit Gupta Athulya S. Sagar Umesh Kolkar Anukriti Raj Vishwanath Neha Sannyasi		ICAR
ICAR-SRF	NA	Aryakrishnan J.U. Seema Arya Cheela Soumya Raj Ratan Panday S. Harshitha Nayak Indrajit Mondal	ICAR

		Hemanth DB	
UGC-JRF	NA	Padigapati Venkata Naga Sindhuja Arya Krishnan J.U. Neelakantappa P. Srinath TN Jagdeesh MS Ajmal S. Adrita Dam Sunil Naik Ragini P. Jambagi Snigdha Patowary	UGC
NFOBC	NA	Geetha ML	UGC
National Fellowship for Scheduled Caste	NA	Trilok Belli BM	UGC
Foreign Fellowship	NA	Osman Nabay	ICAR

6. OFFICIAL LANGUAGE (RAJ BHASHA) IMPLEMENTATION

(क) जारी कागजात की कुल संख्या : 107

(ख) द्विभाषी रूप में जारी कागजात की संख्या : 107

हिंदी में प्राप्त पत्र (राजभाषा नियम 5) जिनके उत्तर अनिवार्यत: हिन्दी में दिए जाने हैं:

(क) हिंदी में प्राप्त कुल पत्रों की संख्या : 214

(ख) इनमें से कितनों के उत्तर हिंदी में दिए गए : 103

(ग) इनमें से कितनों के उत्तर दिए जाने अपेक्षित नहीं थे : 111

अंग्रेजी में प्राप्त पत्रों के उत्तर हिंदी में दिए जाने की स्थिति (केवल 'क' एवं 'ख' क्षेत्र में स्थित कार्यालयों के लिए):

	अंग्रेजी में प्राप्त पत्रों की संख्या	इनमें से कितनों के उत्तर हिंदी में दिए गए	इनमें से कितनों के उत्तर अंग्रेजी में दिए गए	इनमें से कितनों के उत्तर दिए जाने अपेक्षित नहीं थे
	1	2	3	4
'क' क्षेत्र के लिए	123	39	कोई नहीं	84

भेजे गए मूल पत्रों का ब्यौरा:

	हिंदी/द्विभाषी	केवल अंग्रेजी में	भेजे गए पत्रों की कुल संख्या	हिंदी/द्विभाषी में भेजे गए पत्रों का प्रतिशत
	1	2	3	4
'क' क्षेत्र के लिए	61	कोई नहीं	61	100 प्रतिशत

तिमाही के दौरान फाइलों/दस्तावेजों पर हिंदी में लिखी गई टिप्पणियों का ब्यौरा:

(क) हिंदी में लिखी गई टिप्पणियों के पृष्ठों की संख्या : 61

(ख) कुल टिप्पणियों के पृष्ठों की संख्या : 61

(ग) हिंदी में प्रकाशित प्रसार साहित्य (पैम्फलेट आदि) : 5

संभागीय राजभाषा कार्यान्वयन समिति की आयोजित बैठक दिनांक 27.02.2023 को अपराहन 3:30 बजे

संभागीय राजभाषा कार्यान्वयन समिति की आयोजित बैठक दिनांक 29.05.2023 को अपराहन 3:30 बजे

संभागीय राजभाषा कार्यान्वयन समिति की आयोजित बैठक दिनांक 20.09.2023 को अपराहन 3:30 बजे

संभागीय राजभाषा कार्यान्वयन समिति की आयोजित बैठक दिनांक 30.11.2023 को अपराहन 3:30 बजे

राजभाषा समिति द्वारा आयोजित बैठकें

दिनांक 29.03.2023 को ऑनलाइन आयोजित

दिनांक 30.06.2023 को ऑनलाइन आयोजित

दिनांक 27.09.2023 को ऑनलाइन आयोजित

दिनांक 28.12.2023 को ऑनलाइन आयोजित

कृषि अर्थशास्त्र संभाग में हिंदी दिवस का आयोजन

प्रतिवर्ष की भांति इस वर्ष भी कृषि अर्थशास्त्र संभाग में हिंदी दिवस का आयोजन किया गया। संभाग में हिंदी के प्रचार-प्रसार एवं हिंदी में अधिक से अधिक सरकारी कार्य करने के लिए सुलेख, श्रुतलेख एवं प्रश्नोत्तरी, अपना परिचय, काव्य-पाठ आदि प्रतियोगिताओं का आयोजन दिनांक 13 सितम्बर, 2023 को किया गया। इससे संभाग के वैज्ञानिक, तकनीकी अधिकारी, छात्र एवं अनुबंध पर अनुसंधान कार्य करने वाले (वाईपी-1, एसआरएफ़) ने भाग लिया और विभिन्न पुरस्कार प्राप्त किए। संभाग में पुरस्कार वितरण 13 सितम्बर, 2023 को किया गया, जिसमें मुख्य अतिथि डॉ. अतुल कुमार (बीज विज्ञान एवं प्रौद्योगिकी विभाग), संभागाध्यक्ष डॉ. अलका सिंह एवं राजभाषा नोडल अधिकारी श्री पवन कुमार मलिक के द्वारा सभी प्रतियोगिताओं में प्रथम, द्वितीय, तृतीय एवं सांत्वना विजेताओं को स्मृति चिन्ह एवं प्रमाण-पत्र प्रदान कर सम्मानित किया गया। मुख्य अतिथि एवं संभागाध्यक्ष ने हिंदी राजभाषा को बढ़ावा देने के लिए इस प्रकार के आयोजन की प्रशंसा की और भविष्य में कुछ और प्रतियोगिताओं को कराने के लिए प्रेरित किया। हिंदी में सर्वाधिक कार्य करने के लिए भी श्री नन्दन कुमार, सहायक प्रशासनिक अधिकारी को निदेशक महोदय द्वारा पुरस्कृत किए जाने पर अध्यक्ष महोदया ने उनको बधाई दी एवं संभाग को हिंदी में कार्य करने के लिए प्रोत्साहित किया।

7. PUBLICATIONS

Research papers

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- R.R. Kumar, Girish K Jha*, R. Jaiswal, K. Choudhary (2023). A hybrid approach for forecasting mustard price having long-memory property. Current Science, 124 (5): 632-635.
- Pankaj Das, Girish K Jha and Achal Lama (2023) Empirical Mode Decomposition based Hybrid Machine learning models for Agricultural commodity Price Forecasting. *Statistics and Applications,* 21(1): 99-112.
- S. Niranjan, D. R. Singh, N. R. Kumar, G. K. Jha, P. Venkatesh, M. S. Nain and B Krishnakumare (2023) Do Information Networks Enhance Adoption of Sustainable Agricultural Practices? Evidence from Northern Dry Zone of Karnataka, India.*Indian Journal of Extension Education*,59(1):86-91.
- Jambagi, R., Singh, D. R., Singh, A., Venkatesh, P., Nain, M. S., & Panghal, P. (2023). Are happy seeder and pusa decomposer potential options for sustainable ways of paddy straw management. *Indian Journal of Extension Education*, *59*(3), 132-137.
- Omprakash Naik N, P. Venkatesh, D R Singh, Alka Singh, G K Jha, V Sangeetha, D K Sharma and Balasubramanian M. (2023) "Analysis of Urbanisation's Impact on Land Use and Land Cover in Pune, Maharashtra Using Census and Remote Sensing Data", *Journal of Community Mobilization and Sustainable Development* 2023, *(accepted)*
- Pavithra S, Alka Singh, Harbir Singh, RR Burman, GK Jha and NR Kumar (2023). Drivers and patterns of indebtedness among agricultural households in India: Insights from a large-scale survey, Journal of Community Mobilization and Sustainable Development, communicated & accepted.
- Praveen K.V. and Alka Singh. (2023). The landscape of world research on fertilisers: a bibliometric profile. Current Science, 124(10): 1140-1150.
- Praveen K. V, N. Sivalingam, Girish K Jha*, Alka Singh, H. Pathak (2023). Nitrogen budget of Indian agriculture; trends, determinants and challenges. Environment, Development and Sustainability: 1-18. https://doi.org/10.1007/s10668-023-03142-y
- Rajna, S., Praveen, K. V., & Nebapure, S. M. (2023). The Global Trend in Pesticide Research: A Bibliometric Analysis. Pesticide Research Journal, 35(2), 120-129.
- Upreti, P., Singh, D. R., Kumar, N. R., Venkatesh, P., Nain, M. S., Jha, G. K., & Kumar, S. (2023). Feasibility Analysis of Solar-Powered Tubewells in Arid and Sub-humid Regions of Rajasthan. *Indian Journal of Extension Education*, *59*(3), 126-131.
- Utkarsh Tiwari, Alka Singh, Pramod Kumar, P.Venkatesh, Rashmi Singh, Amrender Kumar, Jaiprakash Bisen and H. V. Harish Kumar (2023) Status and Changes in

Composition of Agricultural Household's Income in India. *Indian Journal of Extension Education*,59(1):13-18.

- Asha Devi S S, B S Chandel, Ravinder Malhothra, A K Dixit, Denny Franco (2023) "What determines the profitability of dairy processing firms in India? A study based on size and experience of the firms.". Indian J Dairy Sci 76(3): 289-296
- Haritha K, Akriti Sharma, P Venkatesh, Asha Devi, P Anbukkani and Abhinandan Kumar (2023) Rise of Agritech: A landscape of technology-driven agricultural sector in India, Agricultural Economics Research Review 36 (2): 145-154
- M.L. Nithyashree, K.S. Aditya, R. Raju, P. Venkatesh and P. Anbukkani (2023) An Economic Insight into Pesticide Usage in Indian Agriculture and its Policy Implications, Indian J Economics and Development, 2023, 19(3):666-671
- Nandini Saha, Pramod Kumar, Alka Singh, Harbir Singh, RR Burman, GK Jha and NR Kumar (2023). Impact of contractual seed production on farmers' profitability, yield and efficiency, Indian Journal of Agricultural Sciences. (Accepted)
- Nandini Saha, Pramod Kumar, Harbir Singh, Alka Singh, RR Burman, GK Jha and NR Kumar (2023). Determinants, perceived benefits and constraints associated with contractual seed production of field crops in North India, Journal of Community Mobilization and Sustainable Development. (Accepted)
- Renjini V R, Girish K Jha and Babita Kathayat (2023) Pushing for self-sufficiency in edible oils in India in the aftermath of recent global events National Academy Science Letters-India,1-4. https://doi.org/10.1007/s40009-023-01294-z (NAAS rating 7.1)

Popular articles

- Renjini V R, Girish K Jha (2023) India in world oilseeds market: status and imperatives, IVPA Souvenir 2023,1-6.
- **हरबीर सिंह**, नरेंद्र मोहन सिंह एवं नित्याश्री एम.एल.(2023). कृषि मूल्य श्रंखला में समसामयिक सूचनाओं का महत्व, *पूसा सुरभि*, 21: 16-18, अप्रैल -सितम्बर, 2023.
- राम भरोस मीना, पवन कुमार मलिक, **हरबीर सिंह**, अलका सिंह एवं प्रवीण के. वी. (2023). किसान उत्पादक संगठन (एफपीओ) कृषि से आय बढाने का एक अनुठा प्रयास, ***पूसा सुरभि***, 21: 64-68, अप्रैल -सितम्बर, 2023.
- नरेंद्र मोहन सिंह**,** एम.बालासुब्रमनियन**,** एवं अलका सिंह (2023). श्री अन्न योजना : किसानों के आर्थिक सशक्तिकरण व स्वास्थ्य सुरक्षा के दृष्टिकोण से अधिक महत्वपूर्ण, प्रसार दूत **,** अंक जनवरी- दिसम्बर 2023, कृषि अर्थशास्त्र संभाग**,** भा.कृ.अ.प. भारतीय कृषि अनुसंधान संस्थान**,** नई दिल्ली-110012
- नरेन्द्र मोहन सिंह**,** अलका सिंह**,** एम.बाला.सुब्रामनियन और माम चंद सिंह (2023). नर्सरी पॉलीहाउस में गेंदा पौध उत्पादन, फल-फूल**,** अंक सितम्बर- अक्तुबर, 2023, कृषि अर्थशास्त्र संभाग**,** भा.कृ.अ.प.- भारतीय कृषि अनुसंधान संस्थान**,** नई दिल्ली- 110012.
- नरेंद्र मोहन सिंह, पी. वेंकटेश , हरबीर सिंह, अलका सिंह, आशा देवी , नरेंद्र सिंह तोमर सागर सूद एवं पी. सुप्रिया (2023). मंडुवा : पोषण सुरक्षा एवं मधुमेह नियंत्रण की संजीवनी, पूसा सुरभि, श्री अन्न (मिलेट्स) विशेषांक, अंक 20, अक्टूबर 2022 - मार्च 2023.

- रवि सैनी, राम भरोस मीना, हरबीर सिंह, पवन कुमार मलिक (2023). भारत की पोषण सुरक्षा प्राप्त करने में मोटे अनाजो की भूमिका: वर्तमान परिदृश्य और भविष्य की संभावनाएं, पूसा सुरभि, श्री अन्न (मिलेट्स) विशेषांक, अंक 20, अक्टूबर 2022 - मार्च 2023.
- नरेन्द्र मोहन सिंह, पी.वेंकटेश, हरबीर सिंह, अलका सिंह, प्रमोद कुमार, आशा देवी, एम. बालासुब्रमनियन, कुन्दन कुमर (2023) *"किसानों की समृद्धि के लिए ई-राष्ट्रीय कृषि बाजार योजना (ई-नाम)"*. विवरण पुस्तिका. कृषि अर्थशास्त्र संभाग, भा.कृ.अनु.प.- भारतीय कृषि अनुसन्धान संस्थान, पूसा, नईदिल्ली-110012. (1 से 6 पृष्ठ)".

Book Chapters:

- Nithyashree, M. L., & Saxena Rakha. (2023). The food processing industry in the post-Independence era: performance and the way forward. Das, Anup., et al. (Eds.), *75 years of Indian Agriculture*, Springer.
- Chiranjit Mazumder (2023) Introduction to Regression Analysis (pp. 112-120) for the book "Emerging Opportunities in Financials and Cooperative Management in Indian Agriculture" by Parmar Publications. (ISBN: 981-81-896021-7-3).
- Utkasrh Tiwari., Jagadeesh, M and Chiranjit Mazumder (2023). Extraction of NSSO data and its analysis in Stata: a case of non-farm income of Agricultural Households (pp.133-140) for the Training Compendium for NAHEP Training program on Analytical Techniques for Empowering Social Science Research during 7-18th August. 2023.
- Renjini V R (2023) Analyzing trade patterns of agricultural commodities-Application of the SMART Model (pp. 86-90) in Training manual on NAHEP sponsored training program on Analytical Techniques for Empowering Social Science Research, Division of Agricultural Economics, ICAR-Indian Agricultural Research Institute, New Delhi
- Alka Singh, Praveen K.V., Renini V.R. & Chiranjit Mazumder (2023). Analytical Techniques for Empowering Social Science Research. Training Manual of NAHEP Sponsored training program. TB-ICN: 306/2023.
- P. Anbukkani and Haritha K. (2023) Structural Break Analysis and its Application, Training Manual of NAHEP Sponsored training program. TB-ICN: 306/2023.

8. HONORS/ AWARDS

S. No	Scientist	Honours & Awards
1	Dr. Alka Singh	• Awarded as ISAE Fellow by Indian Society of Agricultural Economics for the Year 2023. • Chairperson of the session 'Reassessing Agri-Food Systems for Sustaining Nutritional Food Security Evidence, Imperatives, and Way Forward' during the 83rd Annual Conference of Indian Society of Agricultural Economics held in Bhubaneswar, December 16-18, 2023. • Invited as Panelist at the session 'Intersecting Identities of Gender, Youth, and Class: What Matters Most for Research Development in Rice-Based Food Systems?' at the International Rice Congress, October 16-19, 2023, Manila, Philippines. • Invited as Panelist in CGIAR Gender Impact Platform and ICAR-organized International Conference titled 'From Research to Impact: Towards Just and Resilient Agri-Food Systems' held October 9-12, 2023, NASC Complex, New Delhi. • Attended a Study Tour related to the Gender Advancement for Transforming Institutions (GATI) program in the UK for a period March 27-31, 2023
2	Dr. Harbir Singh	Participated as Panelist on the TV Talk on 'FPO Marketing and e-NAM' on DD Kisan Channel, September 23, 2023.
3	Dr. P. Anbukkani	• Best presentation award in the 6th CWSS International Conference on 'Agricultural Innovations for Sustainable Development Goals with Special Focus on Natural Farming' (AISDGONF-2023), Karnataka. • Co-Convenor of the 83rd Annual Conference of the Society held in Odisha University of Agriculture and Technology, Bhubaneswar, December 18-20, 2023.
4	Dr. Praveen K.V.	• Session Co-Chair in the session 'Water' during the 9th International Nitrogen Conference (N2024) held at Guru Gobind Singh Indraprastha University, New Delhi, October 5-8, 2023. • Award for outstanding research work by Mosaic company foundation during 2023.
5	Dr. Akriti Sharma	• Jury Member for NIFTEM Technology Innovation and Business Incubation Foundation (NTIBIF)'s NSIP-3, organized July 12, 2023. • Jury Member for 'Millet Ideation Hackathon' in International Conference on Millets for Achieving

		Nutritional and Economic Security (ICMANES 2023) held September 21-23, 2023, at NIFTEM, Kundli, India. • Panelist at 'Enabling Investments in Regenerative Agriculture' organized by AIC-SANGAM on April 14, 2023.
6	Dr. Nithyashree M. L.	Best Poster Award during an international event on Transforming Rice Research in 2023.
7	Dr. Renjini V.R.	Rapporteur at the international conference 'From Research to Impact: Towards Just and Resilient Agri-Food Systems' held from October 9 to 12, 2023, New Delhi.
8	Dr Asha Devi S S	Rapporteur at the international conference 'From Research to Impact: Towards Just and Resilient Agri-Food Systems' held from October 9 to 12, 2023, New Delhi.

9. BUDGET

9.1. Head-wise budget received and expenditure (Rs in Lakhs)

Head	Allotted	Expenditure
Repair	2.50	2.42
HRD	0.50	0.55
Others	19.00	18.45
Miscellaneous	0.50	0.55
Total	**22.50**	**21.97**

9.2 External Grants 2023-24

Project title	PI	Funding agency	Project Period		Budget (Rs. In Lakhs)
			Start Date	End Date	
Production Systems, Agri-business, and Institutions – Component 1-Impact Evaluation of Agricultural Technologies	Dr. Praveen K.V.	ICAR-NIAP	Apr-23	Mar-24	7.29
Production Systems, Agri-business and Institutions – Component 3: Agricultural Market Intelligence and Commodity Outlook	Dr. Asha Devi S.S.	ICAR-NIAP	Apr-23	Mar-24	7.69
Production Systems, Agri-business, and Institutions – Component 4: Farmers Income, Governance Impacts, and Agricultural Trade	Dr. Nithyashree M.L.	ICAR-NIAP	Apr-23	Mar-24	7.69
Unpacking Gender and social dynamics of seed systems and harnessing equality for women's resilience.	Dr. Alka Singh	IRRI	Jun-22	Mar-25	24.9
Gender Advancement in Transforming Agriculture (GATI)	Dr. Alka Singh	Ministry of Science and Technology	Aug-21	Mar - 23	10.00
ChAracterizing, RevIving, Supporting, Monitoring and MAnaging Sustainable Food Systems to address malnutrition in Indigenous tribal communities of India	Dr. M. Balasubramanian	DBT Wellcome Alliance	Apr-23	Mar-28	25.00

also known as CARISMMA sustainable food system study					
UK Research and Innovation Global Challenges Research Fund (UKRI GCRF) South Asian Nitrogen Hub	Dr. Girish K. Jha	UKRI	Jan-21	Feb-24	30.00
Improving access to and affordability of sustainably produced healthy foods through evidence and actions across the food system	Dr. Asha Devi	IRRI	Jun-22	Mar-23	1.6

10. CADRE STRENGTH

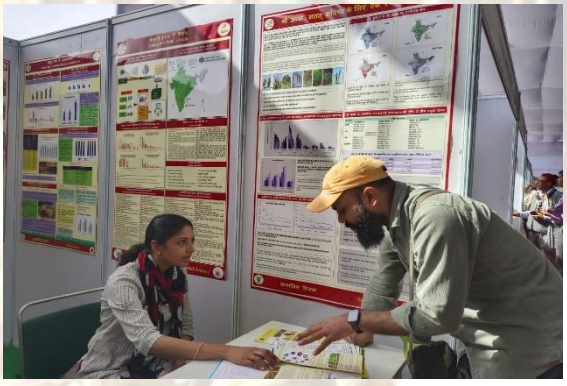
Staff Category	Sanctioned	Existing
Scientific staff	19	13 (1 Study leave)
Technical Staff	9	7 (1 Study leave)
Administrative	5	4
Supporting staff	3	3

11. MISCELLANY

Krishi Vigyan Mela 2023

The staff of Division of Agricultural Economics were actively participated during Pusa Krishi Vigyan Mela on the theme "Nutritional, Food and Environmental Security through Millets" organized from 2-4 March 2023. Also organized a technical session on Agri-Exports.

Technical Session on Agri-exports during Krishi Vigyan Mela 2023



TV and Radio Talks

TV Show and Radio Talks on Budget 2023 & Agriculture and PMFBY

Pusa Samachar

The scientists of the division contributed in developing videos for Pusa Samachar.

ICAR SPORTS MEET

The scientists also participated in sports meet organized by ICAR.

Divisional Committees

Divisional Budget & Research Committee

Dr. Harbir Singh - Principal Scientist & Head (Chairperson)
Dr. Alka Singh - Professor (Member)
Dr. Girish Kumar Jha - Principal Scientist (Member)
Dr. Pramod Kumar - Principal Scientist (Member)
Dr. P. Venkatesh - Senior Scientist (Member)
Dr. P. Anbukkarasi - Senior Scientist (Member)
Dr. Praveen K.V. - Scientist (Member Secretary)

Divisional Stores Purchase Committee

Dr. Girish Kumar Jha - Principal Scientist (Chairperson)
Dr. M. Balasubramanian - Scientist (Member)
Dr. Chiranjit Mazumder - Scientist (Member)
Mr. Narender Mohan Singh - ACTO (Member)
Mr. Narendra Singh Tomar - ACTO (Member & Stores Officer)
Mr. Nandan Kumar - AAO/DDO (Member Secretary)

Reporting of Divisional Research and Publication Committee

Dr. Alka Singh - Professor (Chairperson)
Dr. Nithyashree M.L. - Scientist (Member)
Dr. Renjini V.R. - Scientist (Member)

Dr. Praveen K.V. - Scientist (Member)
Dr. Asha Devi S.S. - Scientist (Member)
Mrs. P. Supriya - Sr. Technical Assistant (Member Secretary)

Hindi Rajbhasha Upsamiti

Dr. Harbir Singh - Principal Scientist & Head (Chairperson)
Dr. Girish Kumar Jha - Principal Scientist (Member)
Dr. Utkarsh Tiwari - Scientist (Member)
Mr. Narendra Singh Tomar - ACTO (Member)
Mr. Narender Mohan Singh - ACTO (Member)
Mr. Pavan Kumar Malik - TO (Nodal Officer)
Mr. Nandan Kumar - AAO/DDO (Member - Check Point)
Mr. R.B. Meena - Sr. Technical Assistant (Member Secretary)

Common Facilities and Staff Welfare Committee

Dr. Harbir Singh - Principal Scientist & Head (Chairperson)
Dr. P. Anbukkarasi - Senior Scientist (Member)
Dr. Asha Devi S.S. - Scientist (Member)
Mr. Nandan Kumar - AAO/DDO (Member)
Mr. Narendra Mohan Singh - ACTO (Member)
Mr. Harpal Singh Verma - PS to Professor & Head (Member)
Mrs. P. Supriya - Sr. Technical Assistant (Member)
Mr. Kundan Kumar - Technical Assistant (Member)
Mr. Sagar Sood - Technician (Member)
Mr. Joginder Singh - LDC (Member)
Mr. Kamal Rajora - Technical Officer (Member Secretary)

Division of Agricultural Economics

ICAR-Indian Agricultural Research Institute

Pusa Campus, New Delhi

Telephone Number- 011-25842951

Email: head_eco@iari.res.in