वार्षिक प्रतिवेदन | Annual Report 2021

भाकृअनुप– कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थान, क्षेत्र –IV, पटना

ICAR-Agriculture Technology Application Research Institute

ZONE - IV, PATNA - 800014 INDIA

भाकृअनुप
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ICAR-ATARI Annual Report 2021

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PREFACE

Participatory technology assessment and refinement ensure greater linkage between scientist and farmers in bottom-up approach. Following the theme ICAR- Agricultural Technology Application Research Institute, Zone IV, Patna actively engaged in such activities through 68 Krishi Vigyan Kendras of Bihar and Jharkhand with specific objectives to plan, monitor and evaluate theprogrammes. Besides, the challenges of doubling the farmers' income, low productivity of cereals, pulses, vegetables and enhancing the capacity building of the farmers, rural youth for mitigating the effect of climate change and a large number of improved agricultural technologies released, need to be validated in the farmers' field are the major important domain to implement. We also trying to widen the service domains creditably in the form of successful implementation of many different programs like Farmer's First Program, Cluster Front Line Demonstrations on Pulses and Oilseeds under National Pulse Production Program, Seed Hub on Pulses, New Extension Methodology in Agriculture, Cereal Systems Initiative for South Asia, Attracting and Retaining Youth in Agriculture, National Innovations in Climate Resilient Agriculture, Swachh Bharat Abhiyan, Tribal Sub Plan, District Agro Meteorological Unit, Jal Shakti Abhiyan, Plantation Program and which are all being successfully being implemented and documented in this report.

The report presents salient achievements in developing

functional linkage with various stakeholders, performance of Directorates of Extension Education of State Agricultural Universities and Krishi Vigyan Kendras of this zone jurisdiction represents in a very systematic manner to enable a clear mandated vision for systematized progressive agriculture and allied activities in this region. Further, all mandated activities such as On-Farm Trials (OFT), Front Line Demonstrations (FLD), Training programme, production of seed and planting materials, soil and water sample analysis, mobile advisory services, revenue and resource generation, publication, organizing special programme to make various stakeholders to understand the reach of our science center in income generating agri related diversifying activities in day-to-day agriculture.

Many flagship programmes like Cluster Front Line Demonstration (CFLD) on Pulses and Oilseeds, National Innovations in Climate Resilient Agriculture (NICRA), Farmer FIRST Programme (FFP), Attracting and Retaining Youth in Agriculture (ARYA), Cereal Systems Initiative in South Asia (CSISA), Gramin Krishi Mausam Sewa (GKMS), of KVKs are the important activities documented well within this report.

I acknowledge and extend my sincere thanks to our colleague Dr. Amrendra Kumar and Dr. Mukesh Kumar Sinha, Principal Scientists of the institute deserve appreciation for their untiring efforts in compilation and editing the annual report and its timely publication. Cooperation and supports extended by Heads & Senior Scientists of KVKs, Staff members, Senior Research Fellows, Young Professionals, Data Entry Operators of ATARI, and KVKs, all host organizations and Indian Council of Agricultural Research, New Delhi most needed contribution for bringing out this report is thankfully acknowledged. Hope our annual report will be immensely useful for the different stakeholders i.e. the policy makers, researchers, developmental functionaries, and the farmers.

July 05th 2022
Patna

(Anjani Kumar)
Director
ICAR-ATARI, Zone-IV

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कार्यकारी सारांश

कृ.वि.के. प्रशिक्षण, ऑन–फार्म परीक्षण और प्रदर्शनों की निगरानी और मूल्यांकन

भा.कृ.अनु.प.–अटारी ने प्रशिक्षण ऑन–फार्म परीक्षण, अग्रिम पंक्ति प्रदर्शन आदि के क्षेत्रों में सभी निर्धारित लक्ष्य हासिल किए। वर्ष 2021 में कृषि विज्ञान केंद्रों ने फसल क्षेत्र पशुधन क्षेत्र और संबद्ध क्षेत्रों से संबंधित विभिन्न तकनीकों का आकलन करने के लिए 2881 स्थानों पर 488 ऑन–फार्म परीक्षण किए। जिन समस्याओं के समाधान पाए गए, उन्हें राज्य की मुख्य धारा में लाने से पहले पुनः छोटे पैमाने पर प्रदर्शन के रूप में फिर से परीक्षण किया गया। क्षेत्र की व्यापक कृषि–पारिस्थितिकी स्थिति के अनुरूप विकसित प्रौद्योगिकी के आवश्यक सुधार/संशोधन के लिए अनुसंधान प्रणाली की प्रतिक्रिया भी प्रदान की जाती है।

अग्रिम पंक्ति प्रदर्शन

कृषि विज्ञान केन्द्रों द्वारा चयनित दलहन, तिलहन, धान्य, बागवानी एवं अन्य फसलों की उत्पादकता बढ़ाने हेतु अग्रिम पंक्ति प्रदर्शन संचालित किए गए तथा बीज प्रति स्थापन करने हेतु नई किस्मों /कृषि क्रियाओं के पैकेज को भी विमोचित किया गया। कृषि विज्ञान केन्द्रों ने खरीफ रबी के दौरान दलहन एवं तिलहन फसलों में इस जोन के 14239 किसानों को शामिल करते हुए इस अंग्रिम पंक्ति प्रदर्शन कार्यक्रम के तहत 2885.67 हे. क्षेत्रफल शामिल किया। उद्यमों के विस्तार हेतु 6891 प्रदर्शन तकनीक को 2461 किसानों /उद्यमियों के बीच लगाये गये। पशुधन क्षेत्र में 5072 पशुओं के लाभार्थ 2351 किसानों को शामिल किया गया। मत्स्यकी में 1090.50 हे. जल क्षेत्र का आच्छादन करते हुए कृषि विज्ञान केंद्रो द्वारा 113 प्रदर्शन किए गए।

समूह अग्रिम पंक्ति प्रदर्शन

दलहन और तिलहन फसलों की उत्पादकता बढ़ाने के लिए, विशेष रूप से धान परती भूमि का उपयोग करने के संदर्भ में, समूह अग्रिम पंक्ति प्रदर्शन (सी एफ एल डी) कार्यक्रम का क्रियान्वयन वर्ष 2021 के दौरान अन्य उपलब्धि में से एक रही। समग्र रूप से, दलहन के अन्तर्गत कुल 2960 हे. तथा 7406 प्रदर्शन क्षेत्रफल आवंटित किया गया था, जिसमें 2294 हे. क्षेत्रफल में सफलतापूर्वक प्रदर्शन कुल 6908 कृषक प्रक्षेत्रों में हुआ। खरीफ दलहनों की उपज में औसत वृद्धि 35.38 से 45.17 प्रतिशत की दर्ज किया गया। रबी दलहन के अंतर्गत कुल 1160 हे. क्षेत्रफल में मसूर, चना, मूँग, मटर को सम्मिलित कर उपज में औसत वृद्धि 35.94 से 38.57 प्रतिशत दर्ज किया गया। दूसरी ओर ग्रीष्म कालीन दलहन, मूँग और उड़द के अन्तर्गत कुल 484 हे. क्षेत्रफल में सफलतापूर्वक प्रदर्शन हुआ जो कुल लक्ष्य 665 हे. क्षेत्रफल से थोड़ा कम है।

तिलहन समूह अग्रिम पंक्ति प्रदर्शन कार्यक्रम खरीफ, रबी और ग्रीष्म के दौरान 5267.9 हे. क्षेत्र में 14432 प्रदर्शनों के माध्यम से सफलतापूर्वक आयोजित किया गया था। खरीफ में, मूंगफली, सोयाबीन, तिल, नाइजर और सूरजमुखी का 3969 स्थानों पर 1266.7 हेक्टेयर में प्रदर्शन किया गया, जिससे उपज में 39.14 से 54.73% की वृद्धि हुई। रबी के दौरान सरसों, अलसी, कुसुम, सूरजमुखी, तिल जैसी फसलों का प्रदर्शन 3699.2 हे. क्षेत्र में किया गया, जिसमें उपज में 32.57 से 50.00% की वृद्धि हुई। ग्रीष्म में कुल मिलाकर 302 हे. क्षेत्र में 801 प्रदर्शन किए

गए।

क्षमता विकास प्रशिक्षण

कृषि और सम्बद्ध क्षेत्रों के सतत विकास के लिए वास्तविक क्षेत्र की स्थिति में इसके अनुप्रयोग के लिए पर्याप्त ज्ञान और कौशल की आवश्यकता होती है। किसानों, कृषि महिलाओं, ग्रामीण युवाओं और विस्तार कार्यकर्ताओं के बीच ज्ञान और कौशल प्रदान करने के लिए क्षमता विकास कार्यक्रम चलाया गया। फसल उत्पादन, बागवानी, मृदा स्वास्थ्य प्रबंधन, कृषि अभियांत्रिकी, पशुधन और मत्स्य पालन, गृह विज्ञान, कृषि विस्तार और कई अन्य पहलुओं पर 7,212 पुरुषों और महिलाओं के लिए कुल 232 प्रशिक्षण कार्यक्रम आयोजित किए गए।

ग्रामीण युवाओं के बीच स्वरोजगार प्रशिक्षण

स्व–रोजगार अवसर प्राप्त करने की दिशा में युवाओं को प्रेरित करने के उद्देश्य से जोन IV के कृषि विज्ञान केन्द्रों के द्वारा प्रशिक्षण कार्यक्रम आयोजित किए। ज्ञान और कौशल विकसित करने के क्रम में, केवीके ने 30,642 ग्रामीण युवाओं और युवतियों के लाभ के लिए 1,171 प्रशिक्षण कार्यक्रम आयोजित किए, जिसमें 20,799 ग्रामीण युवक और 9,843 ग्रामीण युवतियाँ शामिल थीं।

विस्तार कर्मियों और युवाओं के व्यवसायिक प्रशिक्षण

कृषि, पशुपालन, मत्स्य पालन और अन्य सम्बद्ध क्षेत्रों में हाल के विकास के बारे में जागरूक करने के लिए विस्तार कर्मियों के क्षमता निर्माण के लिए व्यवसायिक क्षेत्रों का चयन किया गया था। जोन– IV के केवीके द्वारा 25,445 विस्तार पदाधिकारियों के लिए कुल 669 पाठ्यक्रम संचालित किए गए। केवीके ने युवाओं को स्व–रोजगार के अवसरों के प्रति रोजगार करने के लिए तुलनात्मक रूप से लंबी अवधि के व्यावसायिक प्रशिक्षण कार्यक्रम का भी आयोजन किया। इस प्रक्रिया में, 6,060 ग्रामीण युवाओं और 2,497 ग्रामीण युवतियों के लिए कृषि और सम्बद्ध क्षेत्रों के विभिन्न क्षेत्रों में 235 पाठ्यक्रम संचालित किए गए।

प्रायोजित प्रशिक्षण और जागरूकता कार्यक्रम

केवीके ने 1197 प्रायोजित प्रशिक्षण कार्यक्रम आयोजित किया जिसमें प्रतिभागियों की आवश्यकता के अनुसार विभिन्न संगठनों द्वारा नामांकित 48,219 प्रतिभागियों को शामिल किया गया। उन्नत कृषि और सम्बद्ध प्रौद्योगिकियों के लाभ के बारे में ग्रामीण कृषक समुदाय के बीच बड़े पैमाने पर जागरूकता पैदा करने में, कृषि विज्ञान केन्द्रों ने 37,467 पुरुष और 10,752 महिला किसानों और विस्तार अधिकारियों के प्रतिभागियों तक पहुंचने के लिए विभिन्न विस्तार गतिविधियों का आयोजन किया। उन्नत कृषि और सम्बद्ध प्रौद्योगिकियों के लाभ, और अन्य संबंधित पहलुओं के बारे में किसानों के बीच जागरूकता पैदा की गई, जिसके लिए जोन–IV के केवीके ने 18,21,181 किसानों तक पहुंचने के लिए 5,767 विभिन्न विस्तार गतिविधियों का आयोजन किया,जिसमें 50,605 किसान महिलाएं थीं।

भागीदारी मोड में ग्रामीण बीज उत्पादन कार्यक्रम

फसल की उत्पादकता बढ़ाने के लिए बीज और रोपण सामग्री सबसे महत्वपूर्ण सामग्री हैं। उत्पादकों /किसानों की जरूरतों को पूरा करने के लिए, गांवों में ''ग्राम बीज उत्पादन'' कार्यक्रम के तहत भागीदारी प्रणाली में बीज उत्पादन शुरू

किया गया है। इस वर्ष हमारे कृषि विज्ञान केंद्रों ने धान (7463.15 क्विंटल), गेहूं (3789.17 क्विंटल), मक्का (1.00 क्विंटल), सरसों (161.80 क्विंटल), अलसी (22.88 क्विंटल), नाइजर (2.85 क्विंटल), मूंगफली जैसी प्रमुख फसलों के 13259.23 क्विंटल बीजों का उत्पादन किया। मूंगफली (1.50 क्विंटल), चना (120.59क्विंटल), मसूर (175.36 क्विंटल) सब्जियां (849.37 क्विंटल), आदि।

फल फसलों, सब्जियों आदि की रोपण सामग्री/ पौधों का वितरण

कृषि विज्ञान केन्द्रों ने फल फसलों, सब्जियों, पुष्प फसलों, वन्य फसलों, औषधीय एवं सुगंधीय पादपों की कुल 32.73 लाख रोपण सामग्रियों/पौधों का उत्पादन किया जिससे 37801 किसान लाभान्वित हुए। खेतों में जैव–उत्पाद का प्रयोग पर्यावरण की दृष्टि से अधिक लोकप्रिय हो रहा है और इसलिए कृषि विज्ञान केंद्रों ने 19517 किलोग्राम जैव उत्पाद का उत्पादन किया जिसकी बाजार मूल्य 300620 रूपये है। जैव उत्पाद में केचुआँ खाद, जैव एजेन्ट तथा केंचुआँ किसानों को उपलब्ध कराया गए। गुणवत्तापूर्ण पशुधन प्रजाति और मछली अंगुलिकायें उपलब्ध कराने के लिए, कृषि विज्ञान केन्द्रों ने इस क्षेत्र के किसानों के बीच 38 दुधारू पशुएँ 108 छोटे जुगाली करने वाले, 85 सूअर, 64843 कुक्कुट और 812800 मछली के अंगुलिकायें उपलब्ध कराए।

मिट्टी और पानी के नमूने का विश्लेषण

मिट्टी और पानी के नमूने के विश्लेषण में, केवीके ने पूरे क्षेत्र के 1063 गांवों के 29,361 नमूनों का विश्लेषण किया, जिससे 14,790 किसान लाभान्वित हुए। इस प्रक्रिया न किसानों को मृदा स्वास्थ्य की स्थिति और फसलों में आवश्यकता आधारित रासायनिक उर्वरक के उपयोग के बारे में उच्च उत्पादकता प्राप्त करने और लंबी अवधि के लिए मिट्टी की स्वास्थ्य स्थिति को बनाए रखने में सक्षम बनाया है। अनिवार्य गतिविधियों के अलावा, केवीके ने सार्वजनिक–निजी भागीदारी, विश्व मृदा दिवस, राष्ट्रीय विज्ञान दिवस, विश्व पशु चिकित्सा दिवस और अन्य महत्वपूर्ण दिनों के माध्यम से कृषि समुदाय के बीच जागरूकता पैदा करने के साधन के रूप में विशेष दिन/सप्ताह का भी आयोजन किया।

जलवायु अनुकूल कृषि पर राष्ट्रीय पहल

वांछित उद्देश्यों की पूर्ति सुनिश्चित करने के लिए पिछले एक वर्ष के दौरान भा.कृ.अनु.प.–अटारी, पटना जोन–IV पर अनेक प्रमुख कार्यक्रमों का कार्यान्वयन करना मुख्य जिम्मेदारी थी। जोन–IV में एक राष्ट्रीय नेटवर्क परियोजना, राष्ट्रीय जलवायु अनुकूल कृषि नवोन्मेश (निकरा) एक ऐसा ही कार्यक्रम है जिसका बिहार और झारखंड के 34 गाँवों को समाहित करते हुए इस जोन के 14 कृषि विज्ञान केन्द्रों के जरिये कार्यान्वयन किया जा रहा है। निकरा का प्रौद्योगिकी प्रदर्शन घटक (टीडीसी) वर्तमान जलवायु विचनशीलता से उपयुक्त उपायों के द्वारा निपटने के लिए किसानों के साथ कार्य करने का एक बड़ा अवसर प्रदान करता है। अतः चिंहित जिलों की जलवायु भेद्यता का गहनता से आकलन किया गया है ताकि प्रौद्योगिकीय सहायता, संसाधन विकास और खेतिहर समुदाय के समग्र सशक्तिकरण के आधार पर, विशेष आवश्यकता की पहचान की जा सके और उन्हें सूखा, बाढ़, गरम हवाओं, अनियमित वर्षा, आदि जैसी जलवायु भेद्यताओं से निपटनें में सहायता प्राप्त हो सके।

दालों की गुणवत्तायुक्त बीज सामग्री

जोन–IV में दलहन उत्पादन और पोशाहार को बनाये रखने के लिए दलहनी फसलों का बीज केंद्र एक महत्वपूर्ण घटक है। 10 वर्ष के अन्दर विकसित नयी किस्मों (विमोचित/अधिसूचित) के गुणवत्ता पूर्ण बीजों के उत्पादन को बढ़ावा देने के लिए जोन–IV के अंतर्गत बिहार के 7 कृषि विज्ञान केन्द्रों और झारखंड के 3 कृषि विज्ञान केन्द्रों में चिन्हित दलहनी फसलों का बीज उत्पादन कर रहे हैं।

फार्मर फर्स्ट एक किसान–केंद्रित कार्यक्रम

फार्मर फर्स्ट जो कि एक किसान–केंद्रित कार्यक्रम है को इस जोन के दो भा.कृ.अनु.प. संस्थानों (भा.कृ.अनु.प.–महात्मा गाँधी समेकित कृषि अनुसंधान संस्थान मोतिहारी और भा.कृ.अनु.प.–पूर्वी अनुसंधान परिसर) और दो राज्य कृषि विश्वविद्यालयों (बिहार कृषि विश्व विद्यालय, सबौर एवं बिरसा कृषि विश्वविद्यालय, राँची) के माध्यम से कार्यान्वित किया जा रहा है। इस कार्यक्रम का मूल सिद्धांत यह है कि किसान अनुसंधान से जुड़ी समस्या की पहचान करने प्राथमिकिकरण परीक्षण के संचालन और किसानों के खेतों में उसके प्रबंधन में अहम भूमिका निभाएं। इस परियोजना के जरिए चयनित किसानों /किसान परिवार की आजीविका में समग्र रूप से सुधार लाने के लिए कार्यान्वयन संस्थानों /राज्य कृषि विश्वविद्यालयों द्वारा प्राकृतिक संसाधन प्रबंधन, फसल बागवानी, समेकित कृषि प्रणाली, पशुधन और मत्स्यकी मापांक के तहत विभिन्न कार्यकलापों का कार्यान्वयन किया गया। इस परियोजना से कुल 3819 किसान परिवार वर्ष 2021 के दौरान लाभान्वित हुए।

जन जातीय उपयोजना (टीएसपी)

जन जातीय क्षेत्रों और जन जातीय आबादी में पिछड़ेपन के मुद्दों का समाधान करने हेतु, एक विशिष्ट कार्यक्रम जन जातीय उपयोजना (टीएसपी) इस जोन के 21 जिलों में कार्यान्वित की जा रही है। जन जातीय किसानों को उन्नत कृषि विधियों के लाभ को पहुँचाने के लिए परि संपत्ति सृजन, ऑन–फार्म परीक्षण, प्रशिक्षण कार्यक्रम बीज और रोपण सामग्री आदि जैसी पहल की गई है। प्रतिवेदित अवधि के दौरान इस जोन के अंतर्गत कृषि विज्ञान केन्द्रों के लिए कुल 410 लाख आवंटन किया।

अनुसूचित जाति उपयोजना

अनुसूचित जाति उपयोजना विज्ञान और प्रौद्योगिकी के माध्यम से अनुसूचित जाति की आबादी को सशक्त बनाने की एक योजना है। यह कार्यक्रम अटारी, जोन–IV के 45 कृ.वि.के. के तहत 99.0 लाख के कुल परिव्यय के साथ परिचालित है। इस के तहत जोन–IV के कृ.वि.के. द्वारा दिया गया प्रशिक्षण /प्रदर्शन कार्यक्रम आयोजीत किया गया जिससे 5197 किसान, 2908 महिला किसान, 1182 ग्रामीण युवा और 2905 विस्तारक व्यक्ति लाभान्वित हुए। इसके अलावा मोबाइल के माध्यम से किसानों को 18747 कृषि–सलाह प्रेषित एवं विभिन्न फसलों के 31.25 क्विंटल बीज तथा विभिन्न फसलों की 0.19 लाख रोपण सामग्री का किसानों में वितरण किया गया।

जल शक्ति अभियान

जल शक्ति अभियान के तहत लक्षित क्षेत्र जल संकट वाले जिले और प्रखंड थे जिसमें जल संरक्षण, वर्षा जल संचयन, पारंपरिक जल निकायों के नवीनीकरण आदि जैसे कार्य प्रथमिकता से किए गए। वर्ष 2021 में, प्रशिक्षण और जागरूकता कार्यक्रम आयोजित किया गया, जिससे क्रमशः 24928 और 16787 किसान लाभान्वित हुए। इसके अलावा सब्जियों के बीज के 4164 थैला और फलों और वन पौधों के 47095 पौधे भी प्रतिभागियों के बीच वितरित किए गए।

आर्या परियोजना

कृषि कार्यक्रम में युवाओं को आकर्षित करना और बनाए रखना भा.कृ.अनु.प. ने कृषि के प्रति युवाओं को स्वरोजगार से स्वावलम्बन हेतु आर्या कार्यक्रम शुरू किया गया ताकि ग्रामीण युवाओं को विभिन्न कृषि एवं संबंध क्षेत्रों की ओर आकर्षित कर उन्हें सशक्त किया जा सके जिससे उन्हें स्थायी आय हासिल करने तथा लाभप्रद रोजगार पाने में सहायता दी जा सके। तद्नुसार बिहार के 06 कृ. वि. केन्द्रों ने और झारखंड के 04 कृ. वि. केन्द्रों ने वित्त पोषण सहायता के साथ जोन–IV के तहत इस कार्यक्रम का सफलता पूर्वक कार्यान्वयन किया। उद्यमियों को जिले में चिन्हित युवाओं को वित्तीय एवं तकनीकी सहायता उपलब्ध कराने के लिए चयनित किया गया। कृ. वि. केन्द्रों के प्रयास और भा.कृ.अनु.प.–अटारी पटना के पर्यवेक्षण से कुल 4686 ग्रामीण युवाओं एवं युवतीयों ने भाग लिया तथा 1560 ग्रामीण युवाओं को अपनी उद्यम स्थापित करनें में सहायता मिली। परियोजना की सफलता ने अन्य ग्रामीण युवाओं को अपनी आजीविका के लिए ऑफ–फार्म उद्यम स्थापित करने के लिए भी अभिप्रेरित किया।

कृषि मौसम सेवा

इस क्षेत्र में ग्रामीण कृषि मौसम सेवा (जी के एम एस) भी चालू है और इस क्षेत्र के कृषि विज्ञान केंद्रों द्वारा कुल 26,693 कृषि–सलाहकार बुलेटिन जारी किए गए हैं और कुल मिलाकर 94,751 किसानों को वर्ष 2021 के दौरान कृषि–परामर्श बुलेटिन प्राप्त हुआ है।

दक्षिण एशिया में अनाज प्रणाली पहल परियोजना

सी एस आई एस ए (दक्षिण एशिया में अनाज प्रणाली पहल) परियोजना चरण III, भा.कृ.अनु.प. के सहयोग से 8 कृ.वि.के. में प्राकृतिक संसाधन आधार के संरक्षण, खेती की लागत में कमी, किसानों की आय बढ़ाने और बेहतर आजीविका सुनिश्चित करने पर जोर देने के साथ अनाज आधारित फसल प्रणाली में सुधार के लिए चल रही है। किसान फसल स्थापना विधि, डीएसआर में खरपतवार प्रबंधन और जीरो टिलेज के तहत रबी फसल क्रम में इस परियोजना के तहत मूल्यांकन की जाने वाली कुछ प्रौद्योगिकियां थीं।

मेरा गांव मेरा गौरव (एमजीएमजी)

मेरा गांव मेरा गौरव कार्यक्रम भा.कृ.अनु.प.–अटारी, पटना की देखरेख में इस क्षेत्र के 06 भा.कृ.अनु.प. संस्थानों और 01 राज्य कृषि विश्वविद्यालय के माध्यम से परिचालित है। कुल मिलाकर 168 वैज्ञानिकों और 57 गांवों को मिलाकर 31 समूहों को अपनाया गया। चयनित गाँवों में नियमित रूप से वैज्ञानिक दौरा,

पारस्परिक संवाद, बैठक, प्रशिक्षण प्रदर्शन, मोबाइल आधारित सलाह, जागरूकता सृजन आदि का 2279 कार्य किया गया। जिससे कुल मिलाकर 13,851 किसान लाभांवित हुए।

स्वच्छ भारत अभियान

स्वच्छ पर्यावरण के प्रति उत्तरदायित्व की भावना लाने के लिए इस क्षेत्र के अंतर्गत 68 कृ.वि.के. के कर्मचारियों सहित भा.कृ.अनु.प.–अटारी, पटना के सभी स्टाफ सदस्य कार्यालय परिसर के साथ–साथ आस–पास के स्थानों में स्वच्छता और स्वच्छता बनाए रखने के लिए 'स्वच्छ भारत अभियान' में शामिल थे। आम नागरिकों में जागरूकता। भा.कृ.अनु.प.–अटारी, पटना के तहत सभी 68 कृ.वि.के. ने इस अभियान के दौरान कई गतिविधियों का आयोजन किया जिसमें 143 गणमान्य अतिथि सहित कुल 35420 भागीदारी थी।

पोषक–संवेदनशील कृषि–संसाधन और नवाचार कार्यक्रम

बच्चों/बच्चों के स्वास्थ्य के बारे में महिलाओं में जागरूकता लाने के लिए कृ.वि.के. द्वारा पोषण–संवेदनशील कृषि–संसाधन और नवाचार (एन ए आर आई) कार्यक्रम के तहत पोषण माह मनाया गया, जिसमें 12990 महिलाओं ने भाग लिया तथा पोषक थाली और पोषक–बागवानी कार्यक्रम में रुचि दिखाई।

के.वि.के. ज्ञान पोर्टल

भा.कृ.अनु.प–अटारी, पटना द्वारा निगरानी किए जा रहे के.वि.के. ज्ञान पोर्टल ने दूर दराज के क्षेत्रों से बड़ी संख्या में किसानों को कृषि विज्ञान केन्द्रों के कामकाज के बारे में जानकारी प्राप्त करने में तथा उन्नत कृषि और संबंध विधियों के लिए सूचना प्रदान करने में मदद मिली। कृषि विज्ञान केंद्रों ने किसानों को सूचना उपलब्ध कराने के लिए पोर्टल में विभिन्न सूचनाएं अपलोड की, जैसे कि कृ.वि.के. पर उपलब्ध सुविधा, कृषि विधियों का पैकेज, विभिन्न परियोजनाओं की स्थिति, आगामी घटना क्रमों आदि। इसके अलावा, कृषि की नवीनतम प्रौद्योगिकी, प्रकाशन, परीक्षण अंकडा, प्रेक्षणात्मक अंकडा, सर्वेक्षण सूचना और जियो–पोर्टल के साथ नियमित रूप से अपलोड किया जाता है। यह रिपोजिट्री कृषि और संबंध क्षेत्रों के बारे में सूचना की मेगा डाटा इन्वेंट्री है, जो किसानों, अनुसंधान कर्ताओं और योजनाकारों द्वारा सहज पहुँच के लिए भा.कृ.अनु.प. संस्थानों/ राज्य कृषि विश्वविद्यालयों के पोर्टल पर उपलब्ध है। राष्ट्रीय किसान पोर्टल एक सशक्त माध्यम है जो एस एम एस सेवा के माध्यम से किसानों को सलाहकारी सेवाएँ उपलब्ध कराता है।

राष्ट्रीय किसान पोर्टल

राष्ट्रीय किसान पोर्टल एस एम एस सेवा के माध्यम से किसानों को परामर्शी सेवाएं प्रदान करने का एक सशक्त माध्यम है। असंरचित सहायक सेवा डाटा (यू एस इ स डी), इंटरेक्टिव वॉयस रिस्पोंस सिस्टम (आई वी आर एस) और पूल एस एम एस कुछ ऐसी मूल्य वर्धित सेवायें हैं जो पोर्टल से संबंधित है और किसानों तथा अन्य हितधारकों को संदेश प्राप्त करने तथा इंटरनेट सुविधा के बिना अपने मोबाइल पर वेब आधारित सेवाएं प्राप्त करने में सहायता करती हैं।

सार्वजनिक वित्तीय प्रबंधन प्रणाली

सार्वजनिक वित्तीय प्रबंधन प्रणाली (पी एफ एम एस) को भा.कृ.अनु.प.–अटारी, पटना में कार्यान्वित किया गया है ताकि वित्तीय प्रबंधन, क्रय/प्रापण, भंडार प्रबंधन तथा अन्य संबंधित कार्य कलापों में दक्षता बढ़ाई जा सके। इससे कार्यालय को काफी हद तक कागज रहित कार्य को संचालित करने में सहायता मिली है।

समुदाय के लिए अनिवार्य और समर्थन गतिविधियाँ

भा.कृ.अनु.प.–अटारी, पटना एक ओर अपने अधिदेश के अनुरूप कार्य कर रहा है वहीं दूसरी ओर खेतीहर समुदाय के कल्याण के लिए समस्त अधिदेशित एवं अन्य सेवाओं के कार्यान्वयन के लिए कृषि विज्ञान केन्द्रों तथा विस्तार शिक्षा निदेशालयों को सहायता प्रदान करने में सक्रिय भूमिका निभा रहा है। वैज्ञानिक सलाहकार परिषद (एस.ए.सी.) बैठक में भाग लेने तथा प्रदर्शन खेत में दौरा करने के जरिए ऑन द स्पॉट मूल्यांकन भी किया गया ताकि कृषि विज्ञान केन्द्रों द्वारा कार्यान्वयन किए जा रहे प्रमुख कार्यक्रमों के निष्पादन का आकलन किया जा सके। इसके अतिरिक्त कार्यशाला प्रशिक्षण बैठकें आदि का आयोजन कृ.वि.के. कार्मिकों के लिए भा.कृ.अनु.प.–अटारी, पटना की एक नियमित गतिविधि रही है जिससे कृषि और संबंध विषयों के बारे में उनके ज्ञान का संवर्धन किया जा सके। केंद्र सरकार की किसान–हितैशी योजनाओं का बड़ी संख्या के किसानों के बीच पर्याप्त रूप से प्रचार–प्रसार किया जाता है ताकि संसाधनों के अभाव के कारण गरीब किसान उक्त कार्यक्रमों से स्वयं के विकास के लिए लाभ उठा सकें। अनेक प्रमुख कार्यक्रमों में प्राप्त सफलता को राज्य विस्तार कार्य प्रणाली द्वारा अपने व्यापक बर्हिवेशन के लिए अपनाया जा रहा है। विभिन्न राज्य केंद्रीय और अन्य संगठनों के साथ प्रभावकारी तालमेल और सहयोग किए जाने से कृषि विज्ञान केन्द्रों को लाभकारी प्रयोजन में उपयोग करने के लिए अतिरिक्त संसाधन तथा आय अर्जित करने में भी सहायता मिली है। भा.कृ.अनु.प.–अटारी पटना में विकसित कार्य योजना तथा बड़े समर्पण के साथ उसके कार्यान्वयन ने इस जोन के कृषि विज्ञान केन्द्रों को कृषि में कार्यान्तरण लाने हेतु एक सशक्त माध्यम बना दिया है।

EXECUTIVE SUMMARY

Monitoring and evaluations of training, on-farm trials and demonstrations

ICAR-ATARI achieved all the set target in the areas of training, on-farm trial and frontline demonstration, etc. During the year Krishi Vigyan Kendras conducted 488 on-farm trials in 2881 locations to assess different technologies pertaining to crop sector, livestock sector and allied sectors. The solutions to the problems find out was again tested in the form of small-scale demonstration before applying it to mainstream state extension system in the form of technology capsules. The feedback to research system is also provided for the necessary improvement/modification of the developed technology to suit the wider agro-ecological situation of the zone.

Frontline demonstrations

Frontline demonstrations have been conducted by the KVKs in cereals, pulses, oilseeds, vegetables, fruits and other crops to establish the production potentiality of the newly released varieties/package of practices to enhance the production and productivity of selected crops. The KVKs brought 2885.67 ha under such frontline demonstration programme on pulses, oilseeds, cereals, horticulture and other crops during kharif, rabi and summer, covering 14239 numbers of farmers across zone. Demonstrations on 6891 enterprises were conducted involving 2461 farmers. In livestock, 2351 number of farmers was involved in various demonstration programmes for the benefit of 5072 livestock. In fishery, demonstrations were taken up by 113 numbers of farmers to cover a water area of 1090.50 ha.

Cluster Frontline Demonstration

Implementation of Cluster Frontline Demonstration (CFLD) programme for pulses and oilseed crops to enhance the productivity with particular emphasis on utilizing rice fallow and increasing the cropping intensity . Altogether in pulse crops 2960 ha area covering 7406 demonstration was allotted against achieved was 2294 ha through 6908 demonstrations. In *Kharif* pulses,average increase in yield ranging 35.38 to 45.17 %. In Rabi season the covered area was 1160 ha under lentil, chickpea and field pea with yield increase to a tune of 35.94 to 38.57 %. On the other hands for summer pulses (green gram and black gram) achieved 484 ha over and above target of 665 ha in Bihar and Jharkhand.

Cluster Frontline Demonstration

CFLD oilseed programme were successfully conducted during kharif, rabi and summer in area of 5267.9 ha through 14432 demonstrations. During *Kharif* season in groundnut, soybean, sesame, niger and sunflower were technologies demonstrated in 1266.7 ha on 3969 locations with increase in yield of 39.14 to 54.73 %. During *Rabi* season crops like mustard, linseed, safflower, sunflower, sesame was demonstrated covering an area of 3699.2 ha with increase in yield ranging from 32.57 to 50.00%. In summer, altogether 801 demonstrations in 302 ha area were conducted.

Capacity development training

The sustainable development of agriculture and allied sectors needs adequate knowledge and skill for its application in the actual field condition. Capacity development program to provide knowledge and skills among farmer, farm women, rural youth and extension functionaries were carried out. A sum of 232 training programmes were organized for 7,212 farm men and women on various aspects of crop production, horticulture, soil health management, agricultural engineering, livestock and fishery, home science, agricultural extension and many more.

Self-employment training among rural youth

With an aim to encourage self-employment among rural youths conducted training programmes for inculcating knowledge and skill. The KVKs conducted 1,171 numbers of such training programmes for benefit of 30,642 rural youths involving 20,799 rural boys and 9,843 rural girls.

Vocational training in frontier area to extension personnel and youth

Frontier areas were selected for the capacity building of extension personnel to make them aware of the recent development in agriculture, animal husbandry, fishery and other allied fields. A total of 669 courses were conducted by the KVKs for 25,445 personnel. The KVKs also organized vocational training programme of comparatively longer duration to expose the youths towards self-employment opportunity. In the process, 235 courses in different areas of agriculture and allied sectors were conducted for 6,060 rural boys and 2,497 rural girls.

Sponsored training and awareness programme

The KVKs conducted 1197 sponsored training programme for 48,219 participants nominated by various organizations as per the need of the participants. In creating large-scale awareness among the rural farming community about the benefit of advanced agricultural and allied technologies, KVKs organized various extension activities to reach out 37,467 male and 10,752 female farmers including extension officials' participants.

Awareness was created among farmers about the benefit of advanced agricultural and allied technologies, and other related aspects, and for which the KVKs organized 5,767 different extension activities to reach out to 18,21,181 farmers in which 50,605 were farm women.

Village seed production programme in participatory mode

Seed and planting materials are the most critical input to increase the productivity of the crop. To cater the need of the growers/farmers, seed production has been initiated in the villages under the head of "village seed production" programme in a participatory mode. During the year 2021, KVKs produced 13259.23 q of seeds of major crops like paddy (7463.15 q), wheat (3789.17 q), maize (1.00 q), mustard (161.80 q), linseed (22.88 q), niger (2.85 q), groundnut (1.50 q), chick pea (120.59 q), lentil (175.36 q) vegetables (849.37 q), etc.

Distribution of planting materials/seedlings of fruit crops, vegetables, etc.

KVKs of Zone-IV produced 32.73 lakhs quality planting materials of fruit crops, vegetables, flower, forest plants, medicinal and aromatic plant for 37,801 beneficiaries. Use of bio-product in agricultural field is gaining popularity from environmental point of view and the KVKs produced 19,517 kg worth Rs. 3,00,620 values of bio-fertilizers including vermi-compost, bio-agents and earthworm to make available among the farmers. In order to provide quality livestock strain and fish fingerling, KVKs made available 38 dairy animals, 108 small ruminants, 85 pigs, 64,843 poultry birds and 8,12,800 fish fingerlings among farmers of this zone.

Soil and water sample analysisfor higher productivity

In soil and water sample analysis, the KVKs analyzed 29,361 number of samples from 1063 villages across the zone benefitting 14,790 farmers. The process has enabled the farmers about the soil health status and use of need based chemical fertilizer in crops for obtaining higher productivity and to sustained soil health status for longer period. Apart from the mandated activities, the KVKs also organized special day/week as a means to create awareness among farming community like Technology Week through Public-private partnership, World soil day, National science day, World veterinary day and other important day.

National innovations in climate resilient agriculture

Implementation of a good number of flagship programmes to ensure the fulfillment of the desired objectives was essential activity on ATARI during the year. A National Network Project, National Innovations in Climate Resilient Agriculture (NICRA)

is one such programme in operation in Zone IV through 14 KVKs covering 34 villages in Bihar and Jharkhand. Technology demonstration component (TDC) of NICRA offers a great opportunity to work with the farmers to address current climate variability with matching responses. Thus, climatic vulnerability of the identified districts has been critically assessed to bring forward definite requirement in terms of technological support, resource development and overall empowerment of farming community to enable them to cope up with climatic vulnerabilities like droughts, flood, heat wave, erratic rainfall, etc.

Quality seed material of pulses

Quality seed material of pulses are most important inputs for increasing productivity and production and provide nutritional security in the Zone. In order to promote production of quality seeds of new varieties (released/notified not older than 10 years) 10 'Seed Hubs' at 7 KVKs of Bihar and 3 KVKs of Jharkhand were engaged in producing pulse seeds of improved varieties of identified pulses during the year covering all seasons.

Farmers first programme: A farmer-centric programme

The basic concept of this programme is that farmers play the key role in research problem identification, prioritization, conduct of experiment and its management in farmer's fields through different interventions of NRM, agronomical crops, horticultural crops, IFS, livestock and fisheries modules. This project is implanted by institute (ICAR-MGIFRI, Motihari and ICAR-RCER, Regional Centre) and this project is implemented by 02 State Agricultural Universities (BAU, Sabour and BAU, Ranchi) to bring overall improvement in livelihood of the selected farmers/farm families. A total of 3819 farm families were benefitted from this project during 2021.

Tribal sub plan (TSP)

In addressing the issues of backwardness in tribal areas and tribal population, a specific programme namely Tribal Sub Plan (TSP) is under operation in 21 districts of this zone. Initiatives like asset creation, conducting on-farm trials, training programmes, seed and planting material production etc. were taken to extend the benefit of improved agricultural practices among the tribal community with an outlay of Rs. 410 lakh.

Scheduled Caste Sub Plan

Scheduled Caste Sub Plan is a scheme to empower schedule caste population through the input of science and technology. This programme is operational under 45 KVKs of ATARI-Zone IV with total outlay of 99.0 lakhs. Under this programme training/

demonstration given by KVKs of Zone IVfrom which 5197 farmers, 2908 women farmers, 1182 rural youth and 2905 extensional personals were benefited. Apart from this 18747 agro-advisory send to farmers through mobile and31.25 q of seed of various crops and 0.19 lakh planting material of different crops were distributed among the farmers.

Jal Shakti Abhiyan

The targeted area under Jal Shakti Abhiyan was water stressed districts and blocks with interventions like water conservation and rainwater harvesting, renovation of traditional water bodies, etc. In 2021, training and awareness programme organized from which 24928 and 16787 farmers benefited, respectively. Apart from this 4164 packets of vegetables seed and 47095 sapling of fruits and forest plants were also distributed among the participants.

Attracting and retaining youth in agriculture program

ICAR has initiated a programme "Attracting and Retaining Youth in Agriculture" (ARYA) is under operation in Zone IV through 06 KVKs of Bihar and 04 KVKs of Jharkhand in order to attract and empower the rural youth for taking up various agriculture and allied sectors enterprises as a source earning for sustainable income round the year and achieving a gainful employment. Based on the opportunity to create commercial venture in the native places, enterprises have been selected to provide financial and technical support to the identified youths in the district. The efforts of KVK and supervision of ICAR-ATARI, Patna has identified 4686 youths of which 1560 rural youths established their enterprises for enhancing annual income in a sustained manner. Seeing the success of project other rural youths were also motivated to take off-farm enterprises for their livelihood.

Agromet advisory bulletin

Gramin Krishi Mausam Seva (GKMS) is also operational in this Zone and altogether 26,693 agro-advisory bulletins have been issued by the KVKs of this zone and approximately 94,751 farmers received the Agro- Advisory Bulletin.

Cereal system initiative in south asia project

CSISA (Cereal System Initiative in South Asia) project phase III in collaboration with ICAR is under operation in 8 KVKs for improving cereal-based cropping system with emphasis on conserving natural resource base, reduction in cost of cultivation, augmenting farmer income and ensuring better livelihood to the farmers. Crop establishment method, weed management in DSR and *Rabi* crop in sequence under Zero Tillage were some of the

technologies evaluated under this project.

Mera Gaon Mera Gaurav program

Mera gaon mera gaurav (MGMG) is operational through 06 ICAR Institutes and 01 SAU of this zone under the supervision of ICAR-ATARI, Patna. Altogether 31 group involving 168 Scientists and 57 villages were adopted. In selected villages and transferring the knowledge to farmers by making regular visit of scientists, interface meeting, training, demonstration, mobile based advisories, recent publication, and mobilizing other line department person. Altogether 2279 activates were conducted for 13,851 farmers.

Swachh bharat abhiyan

To bring a sense of responsibilities towards clean environment all the staff members of ICAR-ATARI, Patna including staffs of 68 KVKs under this Zone was involved in 'Swachh Bharat Abhiyan' to maintain cleanliness and hygiene in office premises as well as nearby places to create awareness among common citizens. All the 68 KVKs under ICAR-ATARI, Patna conducted several activities during this Abhiyan in which 35420 person participated including 143 VIPs.

Nutri-sensitive agri-resources and innovations program

To bring the awareness among the women about the health of babies/children Poshan Maah was celebrated by the KVKs under Nutri-Sensitive Agri-Resources and Innovations (NARI) programme in which 12990 women participated and showed interest in Nutri Thali and Nutri-garden programme.

KVK knowledge portal

KVK knowledge portal monitored by ICAR-ATARI, Patna has helped a large number of farmers from remote areas to know about KVK functioning and solicit information support for improved agriculture and allied practices. Periodically KVKs are uploading various information pertaining to facilities available at the KVK, package of practices of different crops, status of different projects, upcoming events, etc. in the portal for the benefits of the farmers/stakeholder. Alongside, KRISHI Portal is also regularly uploaded with recent technology, publication, experimental data, observational data, survey data and geo-portal. This repository is a meta data inventory of information regarding agriculture and allied sectors which is available at ICAR Institutes/ SAUs for its easy access by the farmers, researchers and planners.

National farmers portal

National Farmers Portal is a powerful tool to provide advisory services to the farmers through SMS service. Unstructured Supplementary Service Data (USSD), Interactive Voice Response System (IVRS) and pull SMS are the value added services associated with this portal which enables farmers and other stakeholders to receive message and get web-based services in their mobile without internet connection.

Public financial management system

Public Financial Management System (PFMS) has been fully implemented in ICAR-ATARI, Patna to enhance the efficiency in financial management, procurement and store management and other related activities. This has helped in running the office without resorting to paper work to a substantial extent.

ICAR-ATARI, Patna mandated and support activities for farming community

ICAR-ATARI, Patna has been intensely involved in carrying out its mandate in one hand and extending support to KVKs and Directorates of Extension Education for taking up all the mandated and other activities for the betterment of farming community on other hand. On the spot evaluation has also been carried out through attending SAC meeting and visit to demonstration field to assess the performance of flagship programmes carried out by KVKs. Organizing workshop, training, meeting etc. has been a regular feature on the part of ICAR-ATARI, Patna for the KVK personnel to sharpen their knowledge about advanced agricultural and allied practices. Farmer-friendly schemes of central Govt. have been given adequate publicity among large number of farmers to take the benefit of such programmes by the resource poor farmers for their own development. The success achieved in a number of flagship programme has been replicated by the state extension mechanism for its large-scale extrapolation. Effective convergence and collaboration with a number of State, Central and other organizations have also helped KVKs to earn additional resources/revenue for its use in productive purpose. The plan of work developed at the level of ICAR-ATARI, Patna and its execution with utmost sincerely have made the KVKs of this zone a powerful tool to transform the agriculture.

Introduction

Introduction

ICAR-Agricultural Technology Application Research Institute was established in August 19, 2015 from the office premises located within the Central Potato Research Station Campus, Sahay Nagar, Patna with the specific objective to plan, monitor and evaluate the programs of Krishi Vigyan Kendra (KVKs) working in Bihar and Jharkhand. Alongside, it is entrusted with the responsibility to monitor and guide the activities of KVKs, which are gradually coming up with great future promises as District Level First Line Agricultural Institutions. The Unit goes on widening its service domains creditably in the form of successful implementation of many different programs like Farmer's First Program, Cluster Front Line Demonstrations on Pulses and Oilseeds under National Pulse Production Program, Seed Hub on Pulses, New Extension Methodology in Agriculture, Cereal Systems Initiative for South Asia, Attracting and Retaining Youth in Agriculture, National Innovations in Climate Resilient Agriculture, Swachh Bharat Abhiyan, Tribal Sub Plan, District Agro Meteorological Unit, Jal Shakti Abhiyan, Plantation Program and which are all being successfully being implemented.

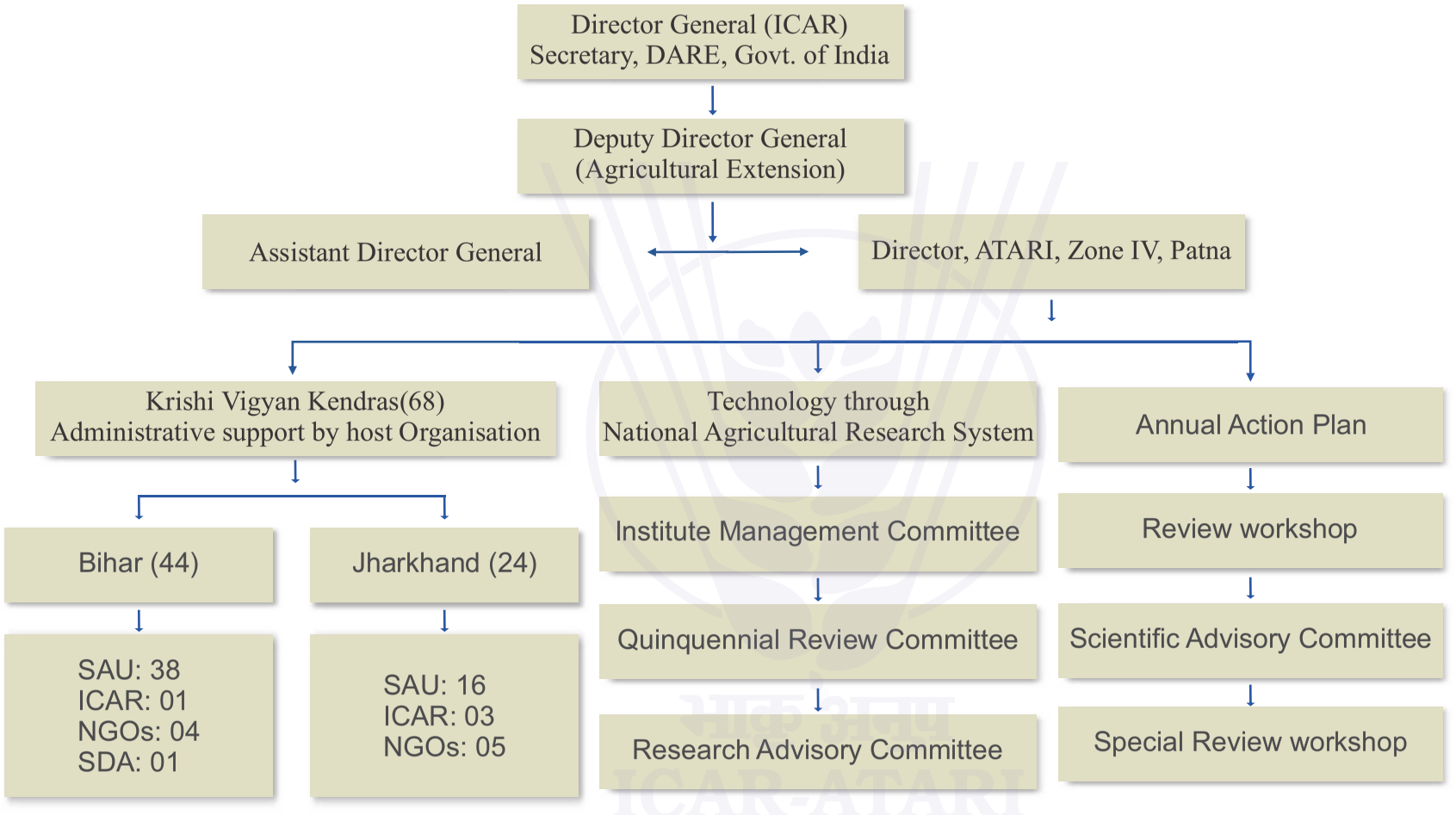
Mandate

- Coordination and Monitoring of Technology Assessment, Demonstration and its Application through KVKs.
- Strengthening Agricultural Extension Research and Knowledge Management Centre.

Salient achievements

Institute monitored the Krishi Vigyan Kendra's activities across Bihar and Jharkhand and achieved all the set target in the areas of training, demonstration as well capacity building, etc. Conducted 823 on-farm trials, cluster front line demonstration on pulses crop (2294 ha) and oilseed crop (5267.90 ha), front line demonstration on field crop (1785.44 ha) and horticultural crop (1099.43 ha). Also organized 5767 courses training programs, where 1.82 lakhs farmers benefited. Further, produced 13259 quintal seed of major field and horticultural crops. Analyzed 20922 number soil sample and

ORGANOGRAM


Director General (ICAR)
Secretary, DARE, Govt. of India
Deputy Director General
(Agricultural Extension)
Assistant Director General
Director, ATARI, Zone IV, Patna
Krishi Vigyan Kendras(68)
Administrative support by host Organisation
Technology through
National Agricultural Research System
Annual Action Plan
Bihar (44)
Jharkhand (24)
Institute Management Committee
Review workshop
SAU: 38
ICAR: 01
NGOs: 04
SDA: 01
SAU: 16
ICAR: 03
NGOs: 05
Quinquennial Review Committee
Scientific Advisory Committee
Research Advisory Committee
Special Review workshop

distributed 5411 soil health cards. To review day to day work and finalize the action plan for the next year 64 Scientific Advisory Committee meeting organized. We also made 384 publications towards transfer of technology. Team ATARI accomplished various meetings, workshop, conference, training programme in online/offline mode towards human resource development and skill enhancing activities.

Infrastructure and the organization

Agricultural Extension Division of Indian Council of Agricultural Research is monitoring the activities of 731 Krishi Vigyan Kendra's spread across the countryand Deputy Director General (Agricultural Extension) looks after the administrative, financial and overall functioning. Agricultural Technology Application Research Institutes (ATARIs) are monitoring the activities of KVKs in their respective zone at state and district level. ICAR-ATARI Patna falls under Zone- IV that controls and monitoring 68 Krishi Vigyan Kendra's (KVKs) of Bihar and Jharkhand state.

Scientific staff at ATARI, Patna

ICAR-ATARI HQ in Patna is having sanctioned scientific staff 4, out of which only two are filled by December 2021.

Table 1: Staff strength of Agricultural Technology Application Research Institute, Patna

Category	Sanctioned	Filled	Vacant
Director (RMP)	01	01	-
Principal Scientist (Agril. Extension)	01	00	01
Scientist (Horticulture)	01	01	-
Scientist (Agril. Extension)	01	0	01

Krishi vigyan kendra

Krishi vigyan kendra is an organization at district level to organize frontline extension activities. It aims at technology assessment and refinement system, dissemination of technology generated by the Universities/Research Institutes, supply of critical inputs and reaching out to the farmers with solutions of their different farming problems. KVKs also provides technological backstopping to different State and Central Government Agencies involved in Agricultural Research, Development and Extension, in addition, to implementing several schemes of Central and State Government at district level. Recently, KVKs have been entrusted with implementation of several National Flagship Programs.

State-wise distribution of KVK:

Eastern states in this zone having 68 KVKs, out of which 44 falls in Bihar and 24 KVK in Jharkhand. Host organization-wise distribution showed 54 KVKs under SAU and CAU; 4 under ICAR; 9 under NGOs; 1 under State Government undertaking, as detailed below in Table 2.

Table 2: State wise status of Krishi Vigyan Kendras

Name of states	No.of districts	No.of KVKs					Total
		SAU	CAU	ICAR	NGO	SDA	
Bihar	38	22	16	01	04	01	44
Jharkhand	24	16	-	03	05	00	24
Total	62	38	16	04	09	01	68

[ICAR – Indian Council of Agricultural Research, SAU – State Agricultural University, CAU- Central Agricultural University, NGO– Non-Governmental Organization, SDA- State Department of Agriculture, DU-Deemed University, NGOs are S.K. Chaudhary Educational Trust, Madhubani, Vanavasi Seva Kendra, Bhabhua, Kaimur, Gram Nirman Mandal, Nawada, Samata Seva Kendra, Sitamarhi, Ram Krishna Mission Ashram, Ranchi, Holy Cross, Hazaribag, Vikas Bharati, Gumla, Santhal Paharia, Deoghar, Garmin Vikas Trust, Godda].

Manpower:

Each KVK has a sanctioned staff strength of 16 which include 01- Senior Scientist and Head; 06- Subject Matter Specialists; 03- Programme Assistants; 02- Administrative Staff, 02- Drivers and 02- Supporting Staff. Accordingly, the total sanctioned staff for 68 KVKs is 1072, out of which 617 (57.55 per cent) are in position. Details staff strength of KVKs are furnished in the Table 3.

Staff position

Table 3: Staff position of KVKs

Staff Position	Bihar	Jharkhand	Sanctioned position
Senior Scientist & Head	37	07	68
Subject Matter Specialist	153	97	408
Program Assistant	79	35	204
Others*	217	45	408
Total	486	184	1088

*Others include Farm Manager, Program Assistant, Assistant, Steno Grade, Driver, Support staff.

Budget provision

Budget provisions based on assessment of the submitted budget requirement, placing demand for fund, receiving funds and subsequent releasing of fund. During the financial year 2021-22 a sum of Rs.11508.40 Lakh was released to this Institute from ICAR HQ. Accordingly, funds were allocated for 68 KVKs and 4 Directorates of extension education (DEE) of the state Agricultural University SAUs of this Zone. During the year 2021-22, a sum of Rs. 11492.15 Lakh has been provided to the KVKs including DEEs in different states as per detail below (Table 4).

Revolving fund

All the KVKs have been provided revolving fund as one-time seed money for making KVK farm self-sufficient in terms of resource generation through seed/sapling production, use of ponds for fish production and establishment of horticulture orchards and other income generation activities for improvement of the farm. Revolving fund reported by 68 KVKs of Zone-IV where revolving fund scheme is operating accumulated a net balance was Rs. 1040.12 lakh as on 1 January, 2022. In the year 2021, a substantial amount of fund i.e. Rs. 507.53 lakh was generated by the KVKs of Zone IV through revolving fund scheme. As per state distribution, Bihar KVKs generated Rs. 404.13 lakhs and Jharkhand of Rs.103.40 lakhs through this scheme in the year 2021. The detail status of revolving fund of KVKs under Zone IV is presented in Table 5.

Table 4: Revised Budget for ATARI Zone IV during 2021-22

Associated Institution	Salary	General Head			Capital Head			Grand Total
		Main	TSP	SCSP	Main	TSP	SCSP	
ATARI, Patna	66.51	43.01	0.00	0.00	11.00	0.00	0.00	120.52
BAU, Sabour	3399.02	248.56	24.91	19.04	50.00	36.00	14.53	3792.07
DRPCAU, Pusa	2114.90	144.32	8.86	15.50	447.13	10.00	7.45	2748.17
BASU, Patna	142.58	4.99	7.64	1.10	0.00	10.50	0.80	167.60
BAU, Ranchi	2067.73	111.47	88.71	9.76	0.00	119.00	8.60	2405.27
NGO, Bihar	724.42	58.18	0.00	6.55	0.00	0.00	10.42	799.57
NGO, Jharkhand	922.40	39.82	35.91	1.10	0.00	37.00	0.80	1037.03
ICAR-RCER, Patna	169.84	16.10	6.92	0.85	46.87	10.00	0.60	251.17
ICAR-NRRI Cuttack	125.77	8.40	0.00	1.10	0.00	0.00	0.80	136.07
ICAR-IINRG, Ranchi	15.23	4.91	7.05	0.00	0.00	7.50	0.00	34.69
Grand Total	**9748.40**	**679.75**	**180.00**	**55.00**	**555.00**	**230.00**	**44.00**	**11492.15**
ATARI RE 2021-22	66.51	59.25	0.00	0.00	11.00	0.00	0.00	136.76
KVKs RE 2021-22	9681.89	636.75	180.00	55.00	544.00	230.00	44.00	11371.64
Total RE 2021-22	**9748.40**	**696.00**	**180.00**	**55.00**	**555.00**	**230.00**	**44.00**	**11508.40**

Table 5: Status of operating revolving scheme by the KVKs in lakhs

State	Accounted Year	Opening Balance	Income during year	Expenditure during year	Closing balance
Bihar	2017 -18	649.19	220.90	227.37	642.73
	2018 -19	642.73	515.65	385.07	773. 31
	2019 -20	773. 31	452.98	410.95	815.34
	2020	899.88	441.89	483.42	778.05
	2021	**1,045.14**	**404.13**	**346.62**	**1,143.12**
Jharkhand	2017 -18	158. 57	80.91	73.76	165.70
	2018 -19	165.70	150.71	110.24	206.17
	2019 -20	206.17	143.59	111.97	237.79
	2020	271.46	129.30	112.11	174.68
	2021	**202.88**	**103.40**	**73.51**	**215.56**
Total	2017 -18	807.76	301.819	301.14	808.43
	2018 -19	808.43	666.36	495.32	979.48
	2019 -20	979.48	596.57	522.92	1053.13
	2020	1053.13	571.19	595.52	952.72
	2021	**952.72**	**507.53**	**420.13**	**1,040.12**

*Opening balance as on 01.01.2021 and closing balance as on 31.12.2021

Infrastructure facilities

In order to enable the KVKs to accomplish its set objectives, KVKs have been provided with number of infrastructure facilities like administrative building, farmers' hostel, staff quarter, demonstration units, soil and water testing laboratories, rain water harvesting structure with micro-irrigation facilities, portable carp hatchery units, IFS model, E-connectivity, technology information units, vehicles etc. In most of the cases, KVKs utilizes these facilities for skill development and knowledge up-gradation of farmers to demonstrate the benefit of proper management practices. The details of infrastructure facilities available with the KVKs are given in Table 6.

Table 6: State-wise details of infrastructure available with KVKs

Infrastructure available	Bihar	Jharkhand	Total
Admin building	35	20	55
Farmers hostel	35	18	53
Demo. units	231	83	314
Staff quarters	158	78	236
Rain water harvesting structure	04	12	16
Soil water testing labs	32	21	53
Minimal processing facilities	10	05	15
Carp hatchery	03	01	04
Integrated farming system units	24	13	37
e-linkages facilities	10	05	15
Technology formation unit	06	03	09
Micro nutrient analysis facilities	05	02	07
Solar panel	19	11	30

Flagship program

Besides performing its regular monitoring activities, also encourage the KVKs of this zone to get them involved in a number of programs depending on the farmers need of the district and technical capability of the KVKs to contribute towards growth of agriculture and allied sectors. Some of the flagship Programs which were undertaken by KVKs are as follows:

- Attracting and Retaining Youth in Agriculture (ARYA)
- New Extension Methodology and Approaches (NEMA)
- KVK Knowledge Network/ KVK Portal/ KRISHI Portal
- Climate Resilient Agriculture-Technology Demonstration (NICRA-TDC)
- Cluster Front Line Demonstration (CFLD) on Pulses and Oilseeds
- District Agro Meteorological Unit (DAMU)
- CSISA-ICAR Collaborative Project Phase-III
- Management Information System including Financial Management System (MIS-FMS) under ICAR-ERP Online reporting by KVKs
- Farmer FIRST Programme
- Tribal Sub Plan (TSP)
- Jal Skakti Abhiyan
- Mera Gaon Mera Gaurav

On-Farm Trials

On-Farm Trials (OFTs)

Improved technologies related to crop production, horticultural production livestock production, fish production, drudgery reduction and value addition etc. have been assessed to provide technological solution to the farming community pertaining to various aspects of agriculture and allied areas and in year 2021, the KVKs conducted 488 on-farm trials at 2881 locations to assess various technologies. State-wise analysis of on-farm trials conducted showed that KVKs of Bihar conducted a total of 299 on-farm trials at 1997 different locations, the corresponding values for Jharkhand were 189 OFTs at 884 locations. In crop sector under various thematic areas, altogether 335 OFTs at 1932 locations were tested (Table 7) among them in integrated nutrient management (INM) through 70 on-farm trials in 399 locations, followed by Integrated Pest Management (IPM) through 53 on-farm trials in 360 locations, Weed Management (WM) through 33 on-farm trials, Integrated Crop Management (23 OFT), Integrated Disease Management (IDM) through 22 OFTs and Farm implement and machineries (17 OFT). Further, in livestock sector, total of 66 on-farm trials at 396 locations were conducted during 2021 covering 13 on-farm trials both in Disease Management and Feed and fodder. In fishery science 04 on-farm trials on 16 locations were conducted. The feedback on the performance of the technologies has also been brought to the notice of research and extension wing for their effective dissemination in the entire zone. Some of the on-farm trials conducted by the KVKs are presented below with table, photographs and relevant information

Table 7: State wise details of On Farm Trial (OFTs) conducted by KVKs under zone IV

Sector wise Thematic Area	Bihar			Jharkhand			Total		
	No. of OFTs	No. of Beneficiaries	No. of Locations	No. of OFTs	No. of Beneficiaries	No. of Locations	No. of OFTs	No. of Beneficiaries	No. of Locations
A) Crop Sector									
Crop production	18	153	136	7	89	15	25	242	151
Cultivation of fruit	10	81	60	1	8	2	11	89	62
Farm implements & machineries (FIM)	13	198	74	4	34	14	17	232	88
Integrated crop management (ICM)	17	142	109	6	60	17	23	202	126
Integrated disease management (IDM)	13	99	81	9	90	45	22	189	126
Integrated nutrientmanagement (INM)	35	315	241	35	344	158	70	659	399
Integrated pest management (IPM)	34	299	263	19	187	97	53	486	360
Management of orchard	5	28	28	1	8	2	6	36	30
Natural resource management	0	0	0	3	40	24	3	40	24
Nursery management	1	10	2	0	0	0	1	10	2
Organic farming	0	0	0	1	10	10	1	10	10
Plant growth regulator	2	25	22	4	36	8	6	61	30
Post-harvestmanagement	3	17	17	0	0	0	3	17	17
Production system	9	74	66	11	101	62	20	175	128
Protected cultivation	2	6	6	1	8	2	3	14	8
Rejuvenation of orchard	2	110	12	0	0	0	2	110	12
Resource conservation technology	4	29	7	5	41	20	9	70	27
Soil fertility management	5	60	29	5	68	17	10	128	46
Varietal evaluation	4	37	14	4	35	18	8	72	32
Water management	3	23	18	6	51	34	9	74	52
Weed management	24	216	159	9	85	43	33	301	202
Sub Total (A)	**204**	**1922**	**1344**	**131**	**1295**	**588**	**335**	**3217**	**1932**
B) Livestock Sector									
Dairy management	11	96	56	2	20	14	13	116	70
Disease management	11	109	73	7	94	37	18	203	110
Feed & fodder management	11	103	96	12	129	58	23	232	154
Fish production	4	24	16	0	0	0	4	24	16
Nutrient management	4	15	25	1	18	2	5	33	27
Poultry management	2	15	9	1	10	10	3	25	19
Sub Total (B)	**43**	**362**	**275**	**23**	**271**	**121**	**66**	**633**	**396**
C) Enterprises	**42**	**626**	**292**	**27**	**350**	**114**	**69**	**976**	**406**
D) Extension	**10**	**699**	**86**	**8**	**248**	**61**	**18**	**947**	**147**
Grand Total (A+B+C+D)	**299**	**3609**	**1997**	**189**	**2164**	**884**	**488**	**5773**	**2881**

Integrated Nutrient Management

Effect of microbial inoculation (*Azospirillum* and PSB) and zinc fortification on growth, yield and economics of Pearl millet. (KVK, Banka)

To assess the effect of microbial inoculation along with micronutrient (Zn) on pearl millet at OFT was conducted with 02 technological option and farmers practices in Banka. Application of RDF (60 kg N and 40 kg P_2O_5 and 40 kg K_2O) + seed dressing with microbes *Azospirillum* and Phosphorus solubilizing bacteria PSB+ basal application of zinc 2 kg/ha produced the highest seed yield (21.8 q/ha) of pearl millet followed by TO_2 (19.60 q/ha) and farmers practice (16.6 q/ha); while corresponding B:C ratio reported 2.25, 1.98 and 1.83 (Table 8).

Table 8: Azospirillum and zinc fortification on growth and crop yield

Technological option / Treatments	Grain Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross Cost (Rs./ha)	Net Return (Rs./ha)	BC Ratio
FP: (60 kg N and 40 kg P_2O_5)	16.60	19500	35690	16190	1.83
TO_1: RDF (60 kg N and 40 kg P_2O_5 and 40 kg K_2O) + seed dressing with microbes *Azospirillum* and PSB+ basal application of zinc 2 kg/ha	21.80	20800	46870	26070	2.25
TO_2: RDF (60 kg N and 40 kg P_2O_5 and 40 kg K_2O) + seed dressing with microbes *Azospirillum* and PSB+ foliar application of $ZnSO_4$ 0.2% at tillering stage	19.60	20800	41280	20480	1.98

Response of Bentonite Sulphur on growth parameters and mustard yield (KVK Parsauni)

An On-farm trial was conducted in Khirwa village of East Champaran to assess the response of bentonite sulphur on crop yield and oil content of mustard crop with 03 technological options viz. TO_1: RDF+ graded dose of sulphur @40 and TO_2: RDF and S @ 60kg/ha were tested against the recommended dose of fertilizer (80:40:40: N: P_2O_5:K_2OKg/ha) as farmers practice. Among the different yield contributing character highest leaf area index (LAI) was found in technological option (TO_2) where RDF along with 60 Kg S/ha was applied. Similarly, siliqua length, grain yield, oil content and benefit cost ratio were higher in TO_2 where 60 Kg/ha S was applied (Table 09)

Table 09: Effect of bentonitesulphur on growth and yield

Technological option	Siliqua length (cm)	Test weight (g)	Yield (q/ha)	Oil content (%)	Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C Ratio
FP: RDF (80:40:40 kg/ha)	3.97	3.22	7.58	31.22	15980	22740	6760	1.42
TO_1: RDF+ Sulphur @40 kg/ha (Bentonite)	4.78	3.98	13.60	38.45	16980	40800	23820	2.40
TO_2: RDF+ Sulphur @ 60 kg/ha (Bentonite)	4.95	4.15	14.5	39.84	17480	43500	26020	2.48

Fig: View of OFT conducted on sulphur nutrition in mustard

Integrated nutrient management in lentil along with liquid bio-fertilizer (KVK: Rohtash)

To see the efficiency of liquid biofertilizer in lentil an OFT was conducted in Rohtash district with 02 technological option and farmers practices. Result revealed that among the different indicators of crop performance, highest yield of 12.36 q/ha was recorded in TO_3 treatment (RDF [20:50:0] (80% of N+ 80 % P) + 1.0 l /ha liquid Rhizobium + 1.0 l/ha liquid PSB). Highest straw yield (35.65 q/ha) and maximum B:C ratio of 2.46 were obtained in TO_3 (Table 10).

Table 10: INM along liquid bio-fertilizer on lentil performance

Technological option	Yield (q/ha)	Straw yield (q/ha)	Gross Cost (Rs.)	Gross Income (Rs)	Net Income (Rs)	BC Ratio
TO_1: Farmers Practice (0:30:0 ::N:P:K) with no uses of liquid bio-fertilizers)	7.28	23.27	28500	41782	13282	1.47
TO_2: RDF [20:50:0] (80% of N) + 1.0 l/ha Liquid Rhizobium	11.08	34.24	28200	63356	35156	2.25
TO_3: RDF [20:50:0] (80% of N+ 80 % P) + 1.0 l /ha Liquid Rhizobium + 1.0 1/ha Liquid PSB)	12.36	35.65	28575	70166	41591	2.46
CD (P=0.05)	0.64	1.92	-	-	-	-

Fig: Field view of OFT on nutrient management in Lentil

Assessment of organic input and bio fertilizers on productivity of paddy and soil fertility status.(KVK Hazaribagh)

To assess the impact of INM on productivity of paddy in Hazaribagh district an OFT was conducted with two technological options. i.e., TO_1 – Farmers Practice + Green Manuring + Biofertilizer and TO_2 - RDF + Green manuring + Biofertilizer were tested with farmer's practice. Result reveled that use of RDF (80:40:20) + Green Manuring + Biofertilizer gave yield 49.50 q/ha, yield increase by 26.60% and highest B.C. Ratio 3.22 in TO_2 followed by 3.01 farmer's practice(FP) (Table 11).

Table 11: Effect of organic input and bio fertilizers on paddy yield and soil fertility

Technological option	Yield	% Increase	Cost of cultivation (Rs.)	Gross Return (Rs.)	Net Return (Rs.)	B:C Ratio
FP	39.10	-	33802	89850	56048	2.66
TO_1	44.60	14.07	35752	107700	71948	3.01
TO_2	49.50	26.60	36186	116550	80364	3.22

Fig: view of OFT conducted by KVK Hazaribagh

Response of INM on the yield of high yielding transplanting rice(KVK: Gumla, Vikas Bharti Bishunpur)

The trial was conducted during kharif season on 08 farmers field at Tingtangar and Bhadauli village of Chainpur Block, Gumla to find out the suitable technological option for enhancing crop yield and income. Data collected during the trial clearly indicated that the maximum yield (40.21 q/ha), income (Rs 41844/ha) and B:C ratio (2.15) was found under technological option 2 i.e., 75% N (90kg) of RD + Full dose of P&K (60:40kg)/ha + 10 q Azolla/ha. The percent yield enhancement observed was 38.65, 18.29 and 7.19 over FP, $T0_1$ and $T0_3$ respectively. Hence TO_2 is being recommended for obtaining maximum yield and income as shown in Table 12.

Table 12: INM response on high yielding transplanted rice yield

Technological option	No. of replication	Data related problem addressed	Yield component	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross income (Rs./ha)	Net Return (Rs/ha)	B:C
		No of effective tiller/m^2	Panicle length (cm)					
FP : FYM@20 -25 q + N (57.25 kg) + P_2O_5 (28.75 kg/ha)	10	177.16	17.73	29.0	31225	56260	25035	1.80
TO $_1$: 75% N (90 kg) of RD +Full dose of P&K (60:40) kg/ha		188.41	19.34	33.99	32983	65941	32958	1.99
TO $_2$ T0 $_1$ + 10 q Azolla/ha		204.50	21.15	40.21	36163	78007	41844	2.15
TO $_3$:RDF (120:60:40 kg) NP K/ha		197.37	20.05	37.51	34030	72769	38739	2.13
CD(P=0.05)				**2.53**				

Fig: Field view of OFT conducted Gumla

Use of balance fertilizer in Main and Ratoon Crop of cabbageKVK: East Singhbhum

To see the residual effect of balanced nutritionof main crop of cabbage on succeeding ratoon crop a OFT was designed and tested at 8 different location in East singhbhum districts. The result reveals that recommended dose of fertilizer (FYM-300q/ha, N:P:K::200:150:100 kg/ha) 50% in main crop and 50% in Ratoon crop on the basis of soil test (TO_3) had higher total cabbage yield of (686 q/ha) as compared to other technological combinations whereas minimum 435 q/ha was observed in farmers practice (where fertilizer was given in main crop as FYM 250q/ha N:P:K: 67.5:125:30 kg/ha and in ratooning N:P:K:: 37.5:28.75:40 kg/ha). The higher B:C ratio of 6.24 was also observed in $T0_3$.

Table 13 : Yield and yield attributing characters

Technological option	No. of trials	Diameter (cm)		No of ratoon crop/ plant	Weight/ plant (gm)		Yield (q/ha)	
		Main crop	Ratoon Crop		Main crop	Ratoon Crop	Main	Ratoon
FP	8	31.2	10.4	2	1350	410	340	95
TO_1		33.4	13.4	2	1725	420	400	170
TO_2		35.3	16.3	2.5	1850	490	445	206
TO_3		37.4	16.8	3.5	1760	560	440	246
CD (p=0.05)		**20.35**	**12.428**		**197.126**	**81.324**	**59.246**	**29.165**

FP- FYM 250q/ha N:P:K::67.5:125:30 kg/ha and in ratooning N:P:K:: 37.5:28.75:40 kg/ha; **TO_1**- RDF (FYM- 300q/ha N:P:K::200:150:100 kg/ha) 50% in main crop and 25% in Ratoon crop;**TO_2** - RDF(FYM- 300q/ha, N:P:K::200:150:100 kg/ha) 50% in main crop and 50% in Ratoon crop; **TO_3**-RDF(FYM- 300q/ha, N:P:K:200:150:100 kg/ha)

Table 14 : Yield, yield attributing characters and economics

Technological option	Total Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	BC ratio
FP	435	98000	435000	337000	4.43
TO_1	570	110000	570000	460000	5.18
TO_2	651	110000	651000	541000	5.92
TO_3	686	110000	686000	576000	6.24
CD @ 5%	**47.785**				

FP- FYM 250q/ha N:P:K::67.5:125:30 kg/ha and in ratooning N:P:K:: 37.5:28.75:40 kg/ha; **TO_1**- RDF (FYM- 300q/ha N:P:K::200:150:100 kg/ha) 50% in main crop and 25% in Ratoon crop;**TO_2** - RDF(FYM- 300q/ha, N:P:K::200:150:100 kg/ha) 50% in main crop and 50% in Ratoon crop; **TO_3**-RDF(FYM- 300q/ha, N:P:K:200:150:100 kg/ha)

Fig: Field view of OFT on main in ratoon cabbage crop

Effects of potassium application on tuber yield in Potato(KVK: Giridih)

An evaluation trial on different doses of potassium on potato cultivar Kufri Red, conducted per treatment, the technology i.e., TO_1: NPK @ 60:45:80 Kg /ha TO_2: NPK @ 150:80:120 Kg /ha and compared with Farmer's Practice NPK @ 60:45:10 Kg /ha. Results indicate that for micro level situation with the

increase in potassium level, tuber yield showed a significantly increasing trend. Other yield contributing characters like plant height; associated with plant growth, tuber number and average tuber weight also exhibited significant influence of increasing level of potash the 34.14% of plants infected with late blight was minimum at maximum level of potash i.e. 120 Kg/ha. It indicated that potassium imparts plant hardiness and induce resistance against late blight disease. Therefore, a level of 120 kg potassium/ ha may be recommended in potato for higher yield in resistance in plant against late blight which is a major threat to the crop in this region.

Table 15: Effects of potassium application on tuber yield in Potato

Technological option	Plant infected with late blight (%)	Plant height (cm	Av. No. of tubers / plant	Av. Tuber weight (gm.)	Tuber yield /ha)	% Increase over check	BC ratio
FP: NPK @ 60:45:10 Kg /ha	51.25	32.42	31.64	36.22	80.45	-	1:0.73
TO $_1$: NPK @ 60:45:80 Kg /ha	42.06	38.53	38.14	41.0	111.02	36.67	1:1.12
TO $_2$: NPK@150:80:100 kg/ha	34.14	42.31	44.74	47.22	119.12	47.34	1:1.26
CD@5%	1.25	1.52	5.835	2.49	6.45	--	--

Fig: Field view of OFT conducted by KVK Giridih

Integrated Pest Management

Ecofriendly management of pod borer, *Helicoverpa armigera*in chickpea (KVK: Jehanabad)

To observe the impact of ecofriendly management of pod borer in chickpea an OFT was designed and tested in the farmer field at 8 locations. Results revealed that the maximum yield of chickpea (15.7 q/ ha) with 2.47 BC ratio and minimum pod infestation 10.60 % were in TO_2 (two sprays of azadirachtin 3000 ppm @ 10 ml/ l water) followed by TO_1 (plots installed with erect bird perches @ 40/ ha + pheromone trap @ 20 q/ha) yield (15.3 q/ ha), BC ratio 2.36 and pod infestation 10.86 % were also observed. Whereas TO_2 plots treated with Chlorpyrifos 20 EC @ 1500 ml/ ha had lowest yield 15.0 q/ ha. For ecofriendly management of pod borer *(H. armigera)* in chickpea the technology erect bird perches @ 40/ ha + Pheromone trap @ 20/ ha and two sprays of azadirachtin 3000 ppm @ 10 ml/ l water at pre flowering and pod formation may be recommended.

Table 16: Ecofriendly Management of pod borer, *H. armigera*in chickpea

Technology option	No. of trials	Pod infestation (%)	Yield(q/ha)	Percent increase	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	BC Ratio
FP:	8	10.82	15.0	-	31,000	73,125	42,125	2.36
TO_1:		10.86	15.3	2.0%	31,000	73,823	42,823	2.36
TO_2:		10.60	15.7	4.67%	31,000	76,538	76,538	2.47

FP: (Chlorpyrifos 20 EC @ 1500 ml/ ha); **TO_1:** Erect bird perches @ 40/ ha + Pheromone trap @ 20/ ha; **TO_2:** Two sprays of azadirachtin 3000 ppm @ 10 ml /ltr water

Fig: Field view of OFT on Chik pea pod borer.

Assessment of performance of different chemicals against late blight of potato (KVK: Kodrema)

An OFT on assessment of performance of different chemicals against late blight of potato was conducted in Koderma district with 03 technology option along with 05 locations. The result revealed that soil application and seed treatment with Trichoderma spp. (@ 5.0 Kg/ha) and seed treatment (5.0 g/Kg) respectively for control of late blight of potato has lowest diseases incidence (18%) which was beneficial to farmer over timely spray and TO_1.

Table 17: Evaluation of different chemicals against late blight of potato

Technological Option	Rep.	Disease incidence %	Av. yield (q/ha)	CoC (Rs/ha)	B:C ratio
FP: spray of mancozeb (@ 2.5g/l) of water	05	34	162	72500	2.23
To$_1$: Spray of CoC (@3g/l) of water at 30 DAS and Metalaxyl-Mancozeb (@ 2.5g/l) of water at 10 days interval.		21	178	21	121600
TO$_2$: Trichoderma spp. (5Kg/ha) as soil application and seed treatment (5g/kg)		18	196	18	142100

Fig: Field view of OFT on management late blight of potato

Management of Fall Armyworm, *Spodoptera frugiperda* in maize (KVK: Chatra)

An OFT for management of fall armyworms in maze was planned and conducted by KVK with three technological options. Results revealed that minimum insect infestation 0.7 was recorded in TO_1 (whorl application of sand (after whorl formation and at 5% damage symptoms appearance, spraying of Emamectin benzoate 5SG @0.4g/l of water at 5 days of application of sand, spraying of Thaimethoxam 12.6% + Lambda cyhalothrin 9.5% @0.5ml/l at 15 days of after 1st spray at first appearance of fall army worm and second 15 days) followed by TO_2 (application of soil (after whorl formation and at 5% damage symptoms appearance, spraying of Fipronil 5SC @ 1ml/l of water at 5 days of application of soil, spraying of Spinosad @0.2ml/l at 15 days of after 1st spray) and farmers practice (1.15). Higher grain yield of maize (15.75q/ha) and BC ration 2.90 were obtained in TO_1 followed by TO2 (Table 18)

Fig: Field view of OFT on Fall Armyworm management

Table 18: Management of Fall Armyworm, *Spodoptera frugiperda*in maize

Technology	Technical Parameters		Economic Parameter		
	Infestation level (5 spots/ 10 plant)	Yield (q/ha)	Gross Income (Rs./ha)	Net Income (Rs./ha)	B.C. Ratio.
FP : Application of Carbofuran	1.15	12	14400	8400	2.40
TO_1: Application of sand (after whorl formation & at 5% damage) + spraying of Emamectin benzoate 5SG @0.4g/l of water at 5 days of application of sand + spraying of Thaimethoxam 12.6% + Lambda cyhalothrin 9.5% @0.5ml/l at 15 days of after 1st spray	0.7	15.75	18900	12400	2.90
TO_2: Application of soil (after whorl formation & at 5% damage) + spraying of Fipronil 5SC @ 1ml/l at 5 days of application of soil + spraying of Spinosad @0.2ml/l at 15 days of after 1st spray	0.8	14.25	17100	10600	2.63

Weed Management

Comparative efficacy of proper combination of pre and post-emergence herbicide in Rice crop (KVK: Nawada)

An OFT was conducted during 2021-22 on know the efficacy of proper combination of pre and post-emergence herbicide in paddy crop with 04 technological options consists of farmers practice: (Hand Weeding at 30-35 DAS); TO_1; Oxadarzil @ 18 g ha^{-1}(pre-emergence) fb Bispyribac sodium @ 25 g ha^{-1} (post-emergence) 25 DAS; TO_2: Pyrazosulfuron @ 20 g ha^{-1}(pre-emergence) fb Bispyribac sodium @ 25 g ha^{-1} (post-emergence) 25 DAS; TO_3: Pendimethalin @ 1000 g ha^{-1}(pre-emergence) fb Bispyribac sodium @ 25 g ha^{-1} (post-emergence) 25 DAS. Result showed that TO_2 were effective in reducing weed density 96.11% by other combination of herbicide, and reduced the weed competition for resources and space to the crop along with increased yield (42.77 q/ha) and highest B:C ratio of 3.25:1 followed by TO_1 and TO_3.(Table 19)

Table 19: Comparative efficacy of pre and post-emergence herbicide in paddy.

Technological option	No. of trials	Yield component			Weed Density ($No.m^{-2}$), 40 -50 DAS	Weed control efficiency (%)	Yield (q/h)	Costofcultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs. /ha)	BC Ratio
		Plant Height DAS 120	No. of effective tillers/hill	Test wt. (100 grain wt.)							
FP:	10	101.4	244	37.44	241.44	0	39.71	25000	61153	36153	2.04:1
TO_1:		105.0	237	39.02	11.64	95.17	41.52	20200	63941	43741	3.16:1
TO_2:		104.2	250	39.15	9.37	96.11	42.77	20245	65866	45621	3.25:1
TO_3:		104.8	248	39.20	19.21	92.04	40.25	20230	61985	41755	3.06:1

FP: Hand Weeding at 30-35 DAS); **TO_1:**Oxadarzil at 18 g ha^{-1}(pre-emergence) followed by Bispyribac sodium at 25 g ha^{-1} (post-emergence) 25 DAS; **TO_2:**Pyrazosulfuron at 20 g ha^{-1}(pre-emergence) followed by Bispyribac sodium at 25 g ha^{-1} (post-emergence) 25 DAS; **TO_3:** Pendimethalin at 1000 g ha^{-1}(pre-emergence) fb Bispyribac sodium at 25 g ha^{-1} (post-emergence) 25 DAS

Fig: Field view of OFT conducted on paddy crop weed management

Assessment of productivity on different methods of DSR Cultivation(KVK: Godda)

On farm trial on the entitled assessment of productivity on different methods of DSR cultivation was conducted during the year 2021 with 02 technological options along with farmers' practice at 10 locations. Among the options tested, minimum species wise weed density, total weed density (14.02/m^2) (Table 20) were recorded with DSR + *Sesbania (Sesbania* broadcasted on the same day, *Sesbania* killed by application of 2, 4-D @ 500 g a.i. /ha at 25-30 DAS). TO_2 was significantly superior over DSR (pre sowing irrigation + tillage+ rice seeding) followed by first post sowing irrigation at 15 DAS and farmer practices.

Table 20: Effect of weather parameter and weed density (nos./m^2) on different methods of DSR cultivation

Technology option	No. of trials	Weather data during crop period					Weed density (nos./m^2)			
		Average Rainfall (mm)	Average maximum temperature (°C)	Average manimum temperature (°C)	Average temperature (°C)	RH (%)	Broad Leaf	Grasses	Sedges	Total
FP:	10	823.3	33.3	25.5	29.4	66.3	24.29* (590)	27.23 (741)	18.82 (354)	24.29 (1685)
TO_1:							19.79 (391)	21.83 (476)	15.69 (246)	19.79 (1113)
TO_2							14.02 (196)	14.79 (218)	11.44 (130)	14.02 (545)
SEm±							0.47	0.54	0.36	0.47

FP: DSR in dry soil; TO_1: DSR (Pre sowing irrigation followed by tillage followed rice seeding) followed by first post sowing irrigation at 15 days after sowing; TO_2: DSR + *Sesbania, (Sesbania* broadcasted on the same day DSR is established. *Sesbania* killed by application of 2,4-D @ 500 g a.i. /ha at 25-30 DAS

Table: 21 Effect of growth, grain yield and economics on different methods of DSR cultivation

Technological option	Growth component		Yield component		Grain yield (kg/ha)	Economics			
	Plant height (cm)	No. of tillers/m^2	Panicle length (cm)	No. of grains /panicle		Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	BC ratio
FP:	83.1	271	10.9	53	2703	48300	52443	4143	1.09
TO_1:	87.6	296	13.8	68	3234	49500	62734	13234	1.27
TO_2 :	90.4	339	14.9	71	3407	50900	66098	15198	1.30
SEm±	1.42	4.54	0.19	0.71	36.3				

Fig: Field view of OFT on DSR cultivation

Assessment of different type of cost effective weeding methods in paddy (KVK: Gumla)

Weeds are considered as one of the major problems in paddy cultivation in Jharkhand during kharif season. In order to find out the cost of effective weeding method an on farm trial was conducted on 10 farmers' field in village Ghaghra during Kharif 2021. The data presented in Table (22) indicated that the maximum weed control efficiency (40%) with minimum dry weight (7.80g) were recorded in TO_2 followed by TO_1. Significantly maximum yield (32.10 q/ha) and B:C ratio (1.64) were recorded in TO_2.

Fig: Field view of OFT on cost effective weed controlled method in paddy

Table : 22 Assessment of different type of cost effective weeding methods in Rice

Technological option	No of replication	Population weed parameter		Yield component	Yield (Q/ha)	Cost of cultivation (Rs/ha)	Gross income (Rs/ha)	Net income (Rs/ha)	B:C
		Dry weight of weed/m^2	Weed control efficiency	No of effective tiller/m^2					
FP : Hand weeding	10	13.00	-	6.30	27.21	52787	41853	10934	1.26
TO_1 : Cono weeder (Hand push)		10.00	23.08	8.90	29.42	57074	37303	19771	1.53
TO_2 : Power weeder		7.80	40.00	10.00	32.10	62274	37903	24371	1.64
SEm+_					0.71				

Natural Resource Management

Assessment of irrigation methods on productivity of vegetable Pea. (KVK Chatra)

An OFT on water budgeting has been conducted in Chatra district among 5 farmers with an objective to find out the low water requirement irrigation method in cultivation of vegetable Pea with 03 technological option. The result revealed that maximum pod yield of 17q/ha has been obtained TO_2 (drip irrigation method + sowing of seeds at 30 x 15cm spacing) where about 950 cum/ha water given followed by TO_1 (alternate furrow irrigation + Sowing of seed at 30 x 15cm spacing) and farmers practice. Lowest weed population 125/m^2 and highest BC ratio (5.60) has been obtained in TO_2 and minimum BC ratio (3.88) and maximum weed count (450 /m^2) in FP.

Fig: Field view of OFT on irrigation increasing efficiency

Table 23: Effect of irrigation method on productivity, weed count and economics in vegetable pea

Technology Assesses	No of irrigation	Total quantity of water required cum	No of weeds per sqm	Yield q/ha	Economic Parameter		
					Gross Income (Rs.)	Net Income (Rs.)	B.C. Ratio.
FP: Sowing of seeds at 20 x 10cm spacing + furrow irrigation	4	200	450	14	350000	260000	3.88
TO_1: Sowing of seed at 30 x 15cm spacing + alternate furrow irrigation	4	1450	450	15	375000	295000	4.68
TO_2: Sowing of seed at 30 x 15 cm spacing + drip irrigation.	10	950	125	17	425000	350000	5.60

Water Management

Assessment of moisture conservation in turmeric cultivation through natural mulching materials (KVK: Muzaffarpur-II)

An OFT was conducted to assess of moisture conservation practices in turmeric cultivation through with 03 technological options viz; TO_1**:** Mulching with wheat straw; TO_2: Mulching with maize straw along with FP (without mulching). Results revealed that either mulching with wheat straw, maize straw lower the weed population along with reduction in weeding cost by 66% observed. Use of maize straw mulch materials had increased productivity. The B:C ratio was slightly higher in wheat straw compared to maize straw mulch.

Fig: Field view of OFT on moisture conservation in turmeric using mulch material.

Table 24: Effect of mulching materials on yield, weed population and economics of turmeric

Technological Option	Water requirement (No. of irrigation	No. of replication (plants/m2)	Weed population /m2	Weeding cost (Rs./ha)	Yield (q/ha)	B:C Ratio
F.P.: Conventional method	4	18	800	59,400	380	1.15
TO_1: Mulching with wheat straw	3	18	300	19,800	420	1.82
TO_2 : Mulching with maize straw	3	18	320	19,800	421	1.76

Assessment of different irrigation methods for water management in paddy cultivation (KVK: Munger)

In Munger paddy is cultivated in about 32000 ha of land, out of which only 42% of paddy fields are irrigated with rainwater used in puddling, transplanting and growth tillering stage. In order to reduced water cost, an OFT was conducted during 2021 assessment of irrigation methods for water management in paddy cultivation 09 farmers field during *kharif* season with technological options: Farmer practice, TO_1: Standing water in paddy field throughout crop span and TO_2: Alternate wetting and drying method of irrigation. Results showed that maximum yield (49 q/ha), higher water use efficiency (W.U.E.) 0.49 q/ha-cm, maximum B:C ratio 2.60were obtained in TO_2 followed by TO_1 and FP respectively (Table 25).

Table 25: Effect of irrigation method on yield of paddy & cost economics

Technological option	No. of replications	No. of effective tillers/hill	Yield (q/ha)	Water applied (cm)	% yield increase over control	Water use efficiency (q/ha–cm)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	BC ratio
FP:	09	18	34	96	-	0.35	29300	56200	26900	1.91
TO_1:		24	40	122	17.65	0.33	29300	71500	42200	2.44
TO_2:		32	49	99	44.1	0.49	32400	84200	51800	2.60
SEm±			**0.99**							

FP: (No irrigation, Rainfed); TO_1: (Standing water in paddy field throughout crop span); TO_2: (Alternate wetting and drying method of irrigation)

Fig: Field view of OFT on water management of paddy

Crop Production

Assessment of lentil cultivar for yield and cost benefit ratio (KVK: Lakhisarai)

An OFT was conducted during 2021 on assessment of lentil cultivar for higher yield and cost benefit ratio with 03 technological interventions TO_1: IPL-316, TO_2: PAL-4717/ Pusa Ageti masoor and farmer's practice (Rubi) under late sown condition. Result revealed that out of three varity evaluated under OFT, highest yield (25q/ha) recorded in var. PAL 4717 with BC ratio of 4.42 followed by IPL 316, whereas minimum yield (8q/ha) with minimum BC ratio (1.42) was recorded from farmers practice var. Rubi.

Table 26: Varietal performance of different lentil on yield and economics

Technological option	No. of trials	Yield (q/ha)	Cost of cultivation (Rs./ha)	*Gross return (Rs/ha)	Net return (Rs./ha)	BC ratio
Local var.: Rubi	10	8	39560	56000	16440	1.42
T.O.1: IPL - 316		20	39560	140000	100440	3.54
T.O.2: PAL - 4717		25	39560	175000	135440	4.42

Fig: Field view of OFT on diffrent varieties of Lentil

Assessment of suitable variety of makhana *(Gorgon nut)* in Darbhanga district of Bihar (KVK: Darbhanga)

In Darbhanga district indigenous makhana variety was used by the farmers, which was low productivity. To assess the impact of varietal difference on yield of makhana in Darbhanga, an OFT was conducted on assessment of suitable variety of makhana during 2021with two technological options i.e., TO_1: Swarna Vaidehi; TO_2: Sabour Makhana-1 along with farmer's Practice. Results indicated that the highest yield (20.4 q/ha) and B:C ratio (2.7) were recorded in case of Swarna Vaidehi variety followed by Sabour makhana- 1 and local variety (Table 27)

Table 27: Effect of different variety on yield of makhana

Technological option	No. of trials	Yield component			Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	BC ratio
		No. of Pod/plant	No. of seeds/pod	Test wt (100 grain)					
F.P.: Local variety	07	15.2	68.3	78.21	15.3	65710	129200	63490	1.9
To1: Swarna Vaidehi		21.0	79.5	83.5	20.4	62000	173400	111400	2.7
TO2: Sabour Makhana-1		17.5	75.6	80.24	19.5	64500	149600	85100	2.3

Fig: Field view of evaluation of makhana Varieties

Integrated Disease Management

Efficacy of *Trichoderma viride* against leaf rot disease of betel vine (KVK: Darbhanga)

Leaf rot disease of betel vine causes heavy economical loss to the growers in Darbhanga district due to deterioration of leaf quality mainly during November to February. In order to solve this problem, an on farm trial was conducted on Efficacy of *Trichoderma viride* against leaf rot disease of betel vine with three technological options i.e., TO_1: Application of *Trichoderma Viride* and mustard cake (1:10) TO_2: *Trichoderma viride* mixed with FYM in (1:50) TO_3: Drenching of *Trichoderma viride* four time + four spray *Trichoderma viride@* 5 ml/L. water in the month of December to January (after 10 days interval) along with farmer's practice. The result showed that minimum disease incidence (09.67%) with spotless quality betel leaf and higher BC ratio of 1.64 was recorded in TO_3 followed by TO_2 and TO_1.

Table 28: Effect of different medicines on disease incidence, yield and economics

Technological option	Disease incidence (%)	Yield (Dholi/ha)	Cost of cultivation (Rs.)	Gross return (Rs.)	Net return(Rs.)	BC ratio
F.P:	39.33	14900	255200	324000	68800	1.26
TO_1:	21.00	16800	265000	345900	80900	1.30
TO_2	14.67	17000	271600	379200	107600	1.39
TO_3	09.67	21400	275900	452600	176700	1.64

F.P: Application of carbendazim @ 2gm /L; TO_1: *Trichoderma viride*and mustard cake (1:10)+ polythene sheet covering for 7 days;TO_2 : *Trichoderma viride*e and FYM (1:50)+ gunny bag covering for 7 days interval; TO_3: Drenching of *Trichoderma viride*four time + four spray of *Trichoderma viride@* 5 ml/L water in the month of December to January (after 10 days interval).

Fig: Field view of OFT on leaf rot disease of beetal vine

Orchard Management

Assessment of proper doses of Paclobutrazol in mitigating irregular bearing in mango (KVK, Kishanganj)

Alternate bearing in mango is a serious problems in yield stabilization. Soil application of *Paclobutrazol* has proved its efficacy in regulating bearing and promoting regular crop. Kepping this in view flower promoting factors, there is need to assess the proper dose of *Paclobutrazol* soil application. An OFT was conducted during 2021to assess proper dose of *Paclobutrazol* in mitigating irregular bearing in mango. with 02 technological options viz; TO_1: *Paclobutrazol* @ 1.0g a.i/m^2; TO_2: Paclobutrazol @ 1.5g a.i/m^2 and control:- no use of PGR. Results revealed that lowest 124 days taken to reach the 50% flowing of plant along with the maximum fruits no (502/tree), average fruit weight (247g), average fruit yield (124Kg/plant) and productivity (122.6q/ha) were observed in TO_2 which was statistically significant over TO_1 and farmer practicies. Economic analysis also indicated that the highest net monitory return of

Rs. 293180/ha with B:C ratio of 6.85 were recorded in TO_2. From above findings it can be summarised that the application of *Paclobutrazol* @ 1.5 a.i./meter effective canopy (30-45 g/plant) in soil can be recommended for regulating irregular bearing in mango (Table 29).

Table 29: Effects of different doses of *Paclobutrazol* on yield parameters of mango

Technological option	Days to 50 % flowering from treatments	No of fruit/ plant	Per fruit weight (gm)	Average fruit yield (kg/plant)	Average fruit yield (q/ha.)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs/ha)	BC Ratio (Rs/ha)
FP: No use	140	237	229	53	52.4	38100	146720	108620	3.85
TO_1:Paclobutrazol @ 1.0g a.i/m	132	326	241	79	78.4	46550	219520	172970	4.72
TO_2:Paclobutrazol @ 1.5g a.i/m	124	502	247	124	122.6	50100	343280	293180	6.85
CD @ 5 %	4.7	32.4	27.1	13.6	-	-	-	-	-
CV	**2.2**	**5.6**	**7.0**	**9.8**	**9.9**	-	-	-	-

Fig: Application of Paclobutrazol in mango plant

Assessment of different concentration of urea on crop regulation of guava Cv. Allahabad Safeda (KVK: Nalanda)

Guava is a major fruit crop in Nalanda district, but the severe infestation of fruit fly during the rainy season not only reduces the yield and quality of fruits but also hampers the fruiting during winter season. In order to mitigate the problem an OFT was conducted during 2021 on assessment of effect of different concentration of urea on crop regulation of guava cv. Allahabad Safeda with 02 technological options viz.TO_1: pruning of 50% current season shoots; TO_2: spray of 10% urea solution at pre-blooming stage and Farmer's practice (control). Results indicate that TO_1 improved the quality of fruits by reducing the infestation of fruit fly to the tune of 30.51% and fruit yield (28.06 kg/plant), average fruit weight (96.51g) and TSS (11.6° Brix) and maximum BC ratio recorded in TO_1. (Table 30).

Table 30: Effect of different concentration of urea on yield and economics of guava cv. Allahabad Safeda

Technological option	Yield component							No. of fruits infected with fruit fly /Plants	Cost of cultivation (Rs./Plant)	Gross return (Rs/Plant)	Net return (Rs./Plant)	B:C ratio
	Yield(kg/ Plant)			Av. Fruit weight(g)		TSS (^{0}Brix)						
	Rainy	Winter	Total	Rainy	Winter	Rainy	Winter					
F.P:-(Control)	11.83	8.32	20.15	75.61	83.33	10.3	11.3	59	145.0	170.69	25.69	1.17
TO_1:-Pruning of 50% current season shoot	9.12	18.94	28.06	81.85	96.51	10.6	11.6	41	210	472.53	262.53	2.25
TO_2:-Spray of 10% Urea solution at pre blooming stage.	-	21.42	21.42	-	101.64	-	11.6	-	190	411.88	221.88	2.16

Fig: OFT on crop regulation in guava

Floriculture

Increasing the yield of marigold production through pinching technology (KVK: Vaishali)

To assess the pinching technology on increasing the yield of marigold production an OFT was conducted with two technological options i.e.TO_1: pinching at 30 and 40 days after planting TO_2:pinching at 40 and 60 days after planting and FP:no pinching . Results revealed that pinching at 30 and 40 days after planting, had high flower yield (575 q/ha), increased yield by 53.3% with net return of Rs. 206000 / ha and BC ratio of 2.9. (Table 31)

Table 31: Effect of pinching on marigold flower production

Technological option	Yield of marigold (q/ha)	Percent increase	Cost of cultivation	Gross return (Rs/ha)	Net return (Rs /ha)	B:C Ratio
FP: No pinching	375	-	0.65	180000	115000	1.7
TO_1: Double pinching at 30 & 40 DAT	575	53.3	0.70	276000	206000	2.9
TO_2: Double pinching at 40 & 60 DAT	500	33.3	0.70	240000	170000	2.4

Fig: Field view of OFT on increasing flowering through pinching

Post-Harvest Management

Assessment of multigrain flour for reduction of anemia among rural women (KVK: Vaishali)

To assess the technology of multi grain flour for reduction of anemia among rural women in Vaishali district, an OFT was conducted with three technological options i.e. TO_1: wheat flour + soya flour + besan (1: 0.25 : 0.5) ; TO_2:wheat flour + soya flour + maize flour (1: 0.25 : 0.5) ; TO_3: wheat flour+ maize flour+ besan(1:0.25:05). Pre and post hemoglobin test, Oedema, Koelenchia and body weight were tested amount consumers. Results revealed that wheat flour + soya flour + besan (1: 0.25 : 0.5) was found best in increasing Hemoglobin level by 34.65% ,body weight increased by 4.04% and overall acceptability by 8.86 was observed.(Table 32)

Table 32: Assessment of multigrain atta against anemia

Technological parameter	TO_1		TO_2		TO_3		FP	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Hemoglobin (g/dl)	8.34	11.23 (34.65%)	8.7	10.82 (24.36%)	8.4	10.26 (22.14%)	8.26	8.92 (8%)
Body weight (Kg)	52.32	54.84 (4.04 %)	52.61	54.66 (3.89%)	51.54	52.55 (1.95%)	49.52	50.01 (0.98%)
Organoleptic acceptability*	8.86		8.36		8.52		8.3	

Fig: View of OFT on assessment of multigrain flour

Assessment of preparation methods of carrot jam for more shelf life, enhancement of nutrition & income (KVK: Nawada)

In order to reduce the market glut and fetch higher price an OFT for preparation of carrot jam was conducted in Nawada district. Reasult revealed that carrot Jam was prepared by To2 had higher values for physicochemical, sensory characteristics and shelf life. It was demonstrated that storage has great effect on the quality and stability of carrot jam. On the basis of different analysis and parameters, it was concluded that treatment TO_2, had higher qualities value of physicochemical and sensory parameter in compression to and different technological option (Table 33).

Table 33: Sensory evaluation storage life of carrot jam

Technological option	TSS (%)	PH (%)	Storage time in ambient temp	Storage life refrigerated	Sensory analysis (0-5)				
					Taste	Colour	Flavour	Texture	Overall acceptability
FP:	-	-	-	-	-	-	-	-	-
TO_1:	68.0	03.55	04.60	04.80	04.05	04.26	03.80	Soft	04.21
TO_2:	67.78	03.50	04.50	04.87	04.38	04.06	04.17	Soft	04.43

characteristics of farm women. **FP:** Local people consume fresh carrot as such as vegetables or juice, **TO_1**: Preparation of Carrot Jam Formulation - Ingredients Carrot- 1.0 Kg, Sugar-1.0 Kg, Water-100ml, Citric acid -6.0g, Pectin powder-10g, Sodium Benzoate- 1.0g**, TO_2**: Preparation of Carrot Jam with essence. Formulation - Ingredients Carrot- 1.0 Kg, Sugar-1.0 Kg, Water-200ml, Citric acid -6.0g, Pectin powder-10g, Lemon essence-5ml, Sodium Benzoate- 1.0g

Fig: Carrot jam preparation

Sensory evaluation

Evaluation after freezer

Drudgery Reduction

Assessment of Sugarcane bud chipper/sugarcane single node bud cutter for drudgery reduction (KVK: Gopalganj)

An on farm trial was conducted at 07 location in Gopalganj district to assess sugarcane single node cutter (TO_1) and bud chipper (TO_2) over farmer practice (sugarcane sett cutting by axe) for drudgery reduction on bud chipping capacity, heart rate, and germination percentage. The result revealed that heartbeat was found non-significant at 5% level, on both technological options. Whereas the effect of different chipping

method on heartbeat per minutes was found to be significantly lower in TO_2 . Highest germination (92%) and cost saving 74.47 were recorded in TO_2 followed by To_1. (Table 34).

Table 34: Assessment of bud chipper/s single node bud cutter for drudgery reduction

Technological option	Bud chipping capacity (bud/h)	Heart rate at work (beasts/min)	Cost Saving (%)	Sugarcane germination (%)
FP: (Sugarcane sett cutting)	-	127±2.67 (8.4)	0	63
TO_1: (Sugarcane bud cutter)	451±37.65 (119.9)	110±1.56 (4.9)	65.28	82
TO_2:(Sugarcane bud chipper)	393±17.54 (55.5)	113±1.89 (6.0)	74.47	92

*Value are means ± standard errors with standard deviation shown in brackets

Fig: Sugarcane bud chipping using sugarcane bud chipper

Farm Mechanization

Evaluation of the performance of improved tillage practices in wheat crop (KVK: East Champaran)

To evaluate the performance of improved tillage practices in wheat crop in East Champaran district an OFT was conducted with three technological options i.e. TO_1 :Reduced Tillage (1 harrowing + 1 ploughing) + Line sowing with Zero till cum ferti seed drill; TO_2 :Sowing with zero till cum ferti seed drill (No Till or Zero tillage) and TO_3 :Sowing with Happy Seeder (No Till) and farmer's Practice. Results revealed that sowing with zero till cum ferti seed drill gave more number of effective tillers (06), plant population (94/m^2), yield (48.92 q/ha), and highest BC ratio followed by TO_3, TO_1 and farmers practice respectively (Table 35).

Table 35: Assessment of Tillage Practices

Technological option	No. of Trials	No. of Efective tillers	No. of Plants in Per sq m	Plant Height (cm)	yield (q/ha)	No. of Irrigation	Cost of cultivation (Rs./ha0)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C Ratio
FP:	07	3	82	95.6	34.85	2	34650	64473	29823	1.86
TO_1:		4	87	98.2	44.71	3	32500	82714	50214	2.54
TO_2:		6	94	101.2	48.92	3	29900	90502	60602	3.02
TO_3:		5	88	101.6	46.37	3	30850	85786	54936	2.78

FP :Conventional tillage (2 harrowing + 2 ploughing) + Broadcasting; **TO_1**: Reduced Tillage (1 harrowing + 1 ploughing) + Line sowing with Zero till cum ferti seed drill; **TO_2:** Sowing with zero till cum ferti seed drill (No Till or Zero tillage); **TO_3:** Sowing with Happy Seeder (No Till)

Fig: Sowing of Wheat through Happy Seeder Machine

Sowing of Wheat through Zero till-cum-ferti seed drill Machine

Diseases Management in Livestock

Improving postpartum anestrus in cattle (KVK: Araria)

An OFT was conducted in Araria district of Bihar during 2021 to evaluate the effect of hormone (GnRH) and mineral mixture supplement for minimizing postpartum anestrus in cattle. 30 postpartum anestrus cattle were selected and divided into three equal groups of 10 cattle. Each group comprising 02 technological options and compare with farmer's practice viz. FP**:** Dewormer + Mineral Mixture supplement @ 50gm/day/cow; TO_1: FP + Inorganic phosphorus Inj (15 ml I/M) + Inj.Vitamin AD_3(5ml IM) alternate day for 3 dose + Micro- minerals 1 bolus for 28 days and TO_2 : TO_1+ GnRH inj @ 5ml at the time of A.I. The result revealed that more estrus rate (60%) and conception rate (50%) were recorded inTO_2 followed by FP . Though the estrus rate was similar in both TO_1 and TO_2 but conception rate was higher in TO_2 indicated that inorganic phosphorus with Vitamin AD3 and micro minerals effective for anestrus cattle and inj GnRH at the time of AI improve the conception rate. (Table 36)

Table 36: The estrus and conception rate under different technology options

Technological option	No. of trials	Estrus rate (%)	Conception rate (%)
FP: Dewormer + Mineral Mixture @ 50gm/day/cow.	10	30	10
TO_1:FP+ Inorganic phosphorus Inj. (15ml I/M) + Vitamin AD3Inj alternate day 3 dose +Micro -minerals 1 bolus for 28 days.	10	60	40
TO_2:To_1 +GnRH inj @ 5ml at the time of A.I.	10	60	50

Fig:Diagnosis of Postpartum anestrus in cow

Cow comes in estrous after 5 days completion of TO_2

Effect of feeding medicated UMMB block on reproductive and productive performance of cow (KVK: Banka)

An OFT in Banka district of Bihar was conducted to know the effect of feeding medicated UMMB block on reproductive and productive performance of cow during the year 2021. Forty anestrous cow (more than 6 months postpartum) with similar breed were selected and divided into four equal groups of 10 cow. Each group comprising 03 technological options and compare with farmer's practices viz. FP (Maize, Wheat bran, adlib straw and mineral mixture @50g/day); TO_1 (FP+ Mania leaf 50g single dose), TO_2 (FP+ dry Mania leaf 25g single dose) and TO_3 (FP+ UMMB @ 500g/day (UMMB having Mania leaf powder 5% for 10 days). The result revealed that the animal come in heat (%) was 20, 50, 40 and 80 and percent conception was 50,40, 50 and 62.5 in FP, TO_1, TO_2 and TO_3 groups, respectively (Table37). The medicated UMMB have significantly higher estrus effect (80%) and conception rate (62%) was act as heat inducer with average 40-50 % success rate and followed by feeding 50 gram mania leaf. The net profit over feeding cost was also significantly higher ($p<0.05$) in medicated UMMB.

Table 37:Effect of feeding medicated UMMB block on reproductive performance

Technological option	cow	cow in heat	No. of days to come in heat	No. of animal conceived	% in heat	Conception %
FP:	10	2	38.5	1	20	50
T_1: Mania leaf	10	5	13.5	2	50	40
T_2: Mania leaf powder	10	4	17	2	40	50
T_3: leaf with UMMB	10	8	16	5	80	62.5

Table 38: Effect of feeding medicated UMMB block on productive performance

Technological option	Initial	Final	% increase	Average milk yield (Kg)	Gross profit (Rs)	Net profit (Kg/Day)
FP	3.45	2.80	-18.84	3.01 ±0.07	117 ^{a} ±2.75	50.27 ^{a} ±2.75
T_1: Mania leaf	3.95	2.60	-34.18	3.14± 0.11	122 ^{a} ±4.29	55.46 ^{a} ±4.29
T_2: Mania leaf powder	3.65	2.70	-26.03	2.98± 4.19	116 ^{a} ±4.20	49.03 ^{a} ±4.20
T_3: leaf with UMMB	3.95	4.60	16.46	4.19 ±0.11	163 ^{b} ±4.12	6 6.41 ^{b} ±4.12

Fig: Feeding medicated UMMB

Feeding mania leaf

Mania leaf

Comparative assessment of hormone (GnRH) and mineral mixture supplement for improving postpartum anestrus in cattle (KVK: Gaya)

An On Farm Trial was conducted in Gaya district of Bihar during 2021 to evaluate the effect of hormone (GnRH) and mineral mixture supplement for minimizing postpartum anestrus in cattle. 30 postpartum anestrus cattle were selected and divided into three equal groups of 10 cattle in each group with comprising 02 technological options and compare with farmer's practice viz. FP**:** Dewormer + Mineral Mixture supplement @ 50g/day/cow; TO_1: FP + Inorganic phosphorus Inj (15 ml I/M) + Inj.Vitamin AD_3 (5 ml/IM) alternate day for 3 dose + Micro- minerals 1 bolus for 28 days and TO_2: TO_1+ GnRH inj @ 5ml at the time of A.I. The result revealed that higher estrus rate (%) and conception rate (%) were recorded in TO_2 followed by TO_1 . Estrus rate was similar in both TO_1 and TO_2 but conception rate was higher in TO_2 indicated that Inorganic phosphorus with Vitamin AD3 and micro minerals effective for anestrus cattle and inj GnRH at the time of AI improve the conception rate (Table 39).

Table 39: Assessment of hormone and mineral mixture for postpartum anestrus

Technological option	No. of trials	Estrus rate (%)	Conception rate (%)
FP: Dewormer + Mineral Mixture @ 50gm/day/cow.	7	29	10
TO_1 : FP+ Inorganic phosphorus Inj. (15ml I/M) + Vitamin AD $_3$ Inj alternate day 3 dose + Micro - minerals 1 bolus for 28 days.	7	57	30
TO_2:TO1+GnRH inj @ 5ml at the time of A.I.	7	57	55

Fig: View of OFT on postpartum anestrus in cattle

Evaluation of drugs on control of ecto-parasites in Goat(KVK: Chatra)

Goat is the important enterprises of among landless farmers of Chatra district. However, the goats fails to reach at the optimum growth and body weight rearing in organized farming system resulting deprivation of getting remunerative price of goats. To solve the problems and OFT on evaluation of drugs on control of ecto-parasites in goat was conducted with three technological options. The result showed that treatments TO_2 (Invermectin inj. @1ml/50kg body weight) had increased body weight (13.50 kg) ; reduce mortality (10%) disease infection (5%) and higher BC ratio (3.74) followed by TO_1(Deltamethrin @2ml/liter water solution as whole body spray and in animal houses) and lowest BC ratio in farmers practice (Table 40).

Table 40: Effect of drugs on control of ecto-parasite in goat

Technology Assesses	Technical Parameters				Economic Parameter		
	Initial average body weight of kid. (kg)	Mortality (%)	Kids av. body wt. kids at 06 months (kg)	Disease infection (%)	Gross Income (Rs.)	Net Income (Rs.)	B.C. Ratio.
FP: Hand pick/ combing for ectoparasites and dipping in the water	2.850	40%	9.950 (59.700)	20	23880	11880	1.99
TO_1 : Deltamethrin @2ml/liter water solution as whole body spray and in animal houses.	2.950	20%	12.550 (100.4)	10	40160	27660	3.21
TO_2: Ivermectin injection @1ml/50kg body weight	2.900	10%	13.500 (121.500)	5	48600	35600	3.74

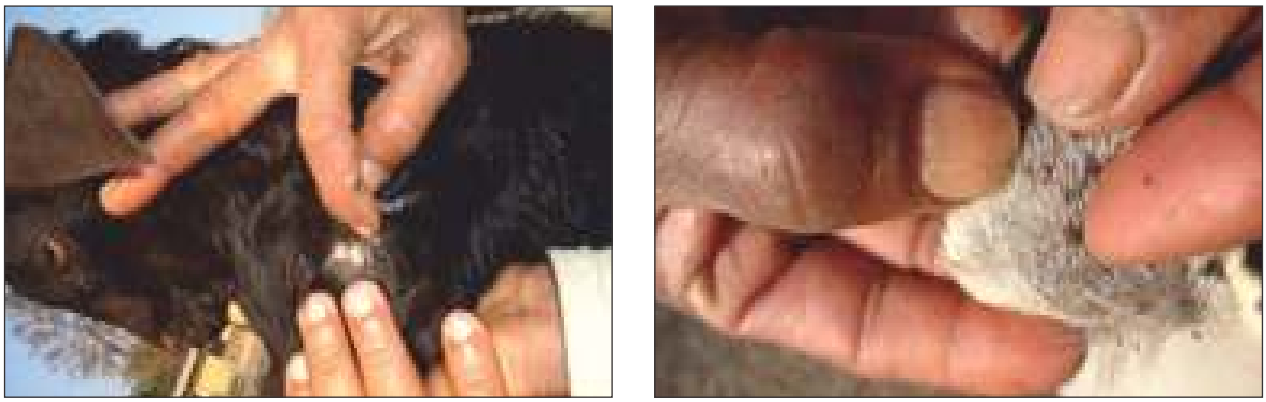


Fig: View of OFT on evaluation of drug on ecto-parasites in goat

Feed Management

Effect of feeding different level of dry distiller's grains on growth performance of goats (KVK: Banka)

An OFT was conducted during 2021 on effect of feeding, different level of dry distiller's grains on growth performance of goats**.** Thirty growing black Bengal kids with similar age and body weight were selected and divided into three groups consisting of 10 goats and technological options were implemented as Farmer's Practices: FP (Straw+ Maize+ grazing); Technological options$_1$ (TO$_1$): (FP+200 g Concentrate having 20% DDG for 60 days) and Technological option$_2$ (TO$_2$): (200 g Concentrate having 35% DDG for 60 days). Result revealed that average daily gain (ADG) was 33.5± 3.0, 47.9 ± 3.2 and 52.3 ± 2.3 g/day in FP, TO$_1$ and TO$_2$ groups, respectively. There was significant ($p<0.05$) increase in total gain, FCR and net profit by 54, 37 and 65%respectively in TO$_2$ as compared to FP in black bengal kids (Table 41).

Fig: Feeding of Concentrate feed

Body weight measurement

Table 41: Effect of feeding dry distillers grain included concentrate on productive performance and economics

T.O. / Parameters	Farmer's Practice	TO_1 - Concentrate having 20% DDG	TO_2– Concentrate having 35% DDG
Initial body weight (Kg)	10.5 ±0.4	10.7±0.2	10.8±0.8
Final weight (Kg)	12.5 ^{a} ±0.4	13.6 ^{b}±0.2	14.0 ^{b}±0.7
Total Gain (Kg)	2.01 ^{b}±0.2	2.9 ^{a}±0.2	3.1 ^{a}±0.1
ADG (g)	33.5 ^{a} ±3.0	47.9 ^{b}±3.2	52.3 ^{b} ±2.3
DMI (% B.Wt.)	4.05±0.2	3.80±0.06	3.83±0.17
Cost of feeding (Rs)	234 ^{a} ±0.80	309 ^{b} ±1.04	311 ^{b}±1.52
Gross profit(Rs)	804 ^{a} ±73	1150 ^{b}±76	1255 ^{b} ±55
Net Profit (Rs)	570 ^{a} ±73	841 ^{b}±76	945 ^{b} ±55
FCR (Kg feed/Kg gain)	16.34 ^{b}±1.72	11.26 ^{a}±0.81	10.25 ^{a}±0.53
Cost of feeding (Rs/Kg ADG)	127 ^{b} ±13	112 ^{a} ±8	101 ^{a} ±5
B:C	2.4	2.7	3.0

^{a,b}Values with different superscripts in a row differ ($p<0.05$)

Effect of feeding locally prepared balance concentrate mixture and sprouted grain of productive and reproductive performance of dairy cows (KVK: Birauli, Samastipur-I)

Infertility remains one of key problems for livestock owners especially with the high yielding cross breed cows. In order to reduce the in fertility through nutritional intervention on fertility and milk production status of animals an OFT was conducted with 02 interventions i.e. TO_1 (locally prepared balance concentrate mixture (CM) + mineral mixture (MM) @ 50g/d (3 weeks pre-partum and 3 months post-partum) and TO_2: locally prepared balance concentrate mixture + sprouted grain 250-300g/d (3 weeks pre-partum and 3 months post-partum) as against normal feeding regime adopted by the farmers. Result indicated that increased milk yield (16.80%), reduced the onset of post partum estrous period (31.16 days) with higher conception rate (33%) was found in TO_2 as compared to farmers practice in crossbred dairy cows (Table 42).

Fig: Effect of feed materials on reproductive performance of dairy

Table 42: Effect of feeding locally prepared balance concentrate mixture and sprouted grain on dairy animals.

Technological option	No. of animals (Cows)	Av.MY (lit/d)	Av. milk fat (%)	Increase in milk yield (%)	1st postpartum estrous (days)	Animals comes in heat (No.)	Animal conceived (No.)	Conception rate (%)
FP:	6	9.52	3.72	--	82.66	03	02	33
TO_1:	6	11.12	3.6	16.80	51.5	06	04	66
TO_2:	6	11.01	3.61	15.65	66.2	05	03	50

FP : Feeding imbalance concentrate mixture/only straw feeding; **TO_1**: Locally prepared balance concentrate mixture + mineral mixture @ 50g/d (3 weeks pre-partum and 3 months post-partum); **TO_2**: Locally prepared balance concentrate mixture + sprouted grain 250-300g/d (3 weeks pre-partum and 3 months post-partum).

Fisheries

Grow-out performance of Jayanti Rohu in composite fish culture system(KVK: Turki, Muzaffarpur)

An OFT was conducted on grow-out performance of Jayanti Rohu in composite fish culture system during 2021with 02 technological options viz. (TO_1: composite culture system (3:3:4) of Catla: Rohu: Mrigal with conventional farm-made feed; TO_2: composite culture system (3:3:4) of Catla: Jayanti Rohu: Mrigal) comparing with conventional farm-made feed with FP: composite culture system of IMCs with irregular feeding. Results showed that TO_2 gave maximum yield and survival percentage as compared to TO_1 and farmers practices. But still, farmers prefer to culture in TO_2 due to its high adaptability and lower mortality rate in different climatic conditions and show a great impact in increasing yield upto 15.16% (Table 43).

Fig: View of OFT on performance of Jayanti Rohu in composite fish culture

Table 43: Effect of composite fish culture on economics and yield attributes

Technological option	No. of trials	Length (in cm)	Weight (in g)	Survivability Rate (%)	Yield (q/ha)	Cost of cultivation(Rs. / ha / year)	Gross return (Rs/ha/year)	Net return (Rs./ha/year)	BC Ratio
FP:	07	12.1-34.50	110.10-1000.05	70	58.15	1,63,500	4,15,290	2,51,790	1.54
TO_1:		24.20-53.50	150.85-2000.20	82	69.67	2,06,640	6,44,717	4,38,077	2.12
TO_2:		28.00-47.20	310.07-2100.70	90	80.23	2,21,640	7,77,985	5,56,345	2.51

FP: Composite Culture system of IMCs with irregular feeding; **TO_1:** Composite Culture system (3:3:4) of Catla: Rohu: Mrigal with conventional farm-made feed;**TO_2:** Composite Culture system (3:3:4) of Catla: Jayanti Rohu: Mrigal with conventional farm-made feed

Assessment of different prophylactic and curative techniques for red spot, fin and tail rot and pop eye parasitic diseases in fish fingerling rearing. (KVK: Rohtas)

An OFT was conducted during 2021 on assessment of different prophylactic and curative techniques for red spot, fin and tail rot and pop eye parasitic diseases in fish fingerling rearing with 02 technological options. Among the different technological options tested, the disease incidence percentage was least in TO_2 (05.85 %) followed by TO_1 (10.46 %) and F.P (14.50 %). The maximum BC ratio 2.21 was recorded in TO_2 while it was least in farmers practice (1.88) followed by TO_1 (2.05). Hence, it can be concluded that use of lime @250 kg/ha (quarterly) and Ammonium chloride/ Benzalkonium Chloride (quarterly @1.0/lit./acre/meter) along with water and soil probiotic is beneficial for the polyculture fish farming system (Table 44).

Table 44: Yield and Economics obtained under different preventive disease management tools.

Technological options	No. of replications	Disease/ insectpest incidence (%)	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	BC ratio
FP	7	14.50	155	780500	1472500	692000	1.88
TO_1:		10.46	175.46	810000	1666870	856870	2.05
TO_2:		05.85	185.4	795000	1761300	966300	2.21

F.P.: Preventive measure – Lime application @ 250 kg/ha followed by Therapeutic measure -Tetracycline or Terramycin or Streptomycin application @ 1% of fish feed; **TO_1:** Preventive measure – Application of Lime @ 250 kg/ha + Water sanitizer (CIFEX/ Ammonium chloride/BKC etc. @ 1 litre/Acre) followed by Therapeutic measure – Application of CIFAX/Sokrena WS @ 2 Ltr/Acre/ meter water + Enrafloxacin/ Tetracycline @ 1% of fish feed; **TO_2:** Only Preventive measure – Application of Lime @ 250 kg/ha + Water sanitizer (CIFAX/ Ammonium chloride/BKC @ 1 litre/Acre/meter) + Soil and water probiotic @ 2 kg/acre

Fig: Disease management during fish fingerling rearing

Home Science

Assessment of preparation methods of Potato flakes for more shelf-life and enhancement of income(KVK, ARWAL)

An On farm trial on "Assessment of preparation methods of Potato flakes for more self-life and enhancement of income" was conducted during the year 2021 with 03 technological options and 10 replications. Among the technological options tested, highest shelf- life, overall acceptability and B:C ratio of 2.18 was observed in TO_2. It was also observed that preparation of potato flakes under TO_2 showed better colour, texture (crispness) and taste after frying (Table 44).

Table 45: Effect of different technological options on quality and economics of potato flakes

Technological Options	No of replications	Taste	Texture (crispness)	Colour	Flavour	Overall acceptability	Shelf-life (days)	Gross cost (Rs)	B:C ratio
FP: Local people consume fresh potatoes as such as vegetables.	10	6.9	6.1	6.2	6.8	6.5	20	90	1.61
TO_1: Preparation of potato flakes –Sliced potatoes (3-5 mm) –5 Kg, Salt 50 g, water 7.5L, KMS 6.0 g		7.2	6.8	6.8	7.2	7.0	45	97	2.11
TO_2: Preparation of potato flakes – Sliced potatoes (3-5 mm) – 5 Kg, Salt 50 g, water 7.5L, KMS 6.0 g, Acetic acid 50.0 ml.		7.4	7.2	7.4	7.9	7.47	60	115	2.18

Sensory Evaluation (At 9 Point Hedonic Scale)

Fig: Preparation of Potato flakes

Social Research

Combination of teaching tools on off-season cauliflower cultivation for improving knowledge (KVK: Chatra)

An OFT was conducted to assess the teaching tools for transferring knowledge from source to receiver on the off-season cultivation of cauliflower with three technological options i.e. TO_1 general practices of teaching tools; TO_2: Training + Full package Literature and TO_3:(TO_2+ home study material and weekly mobile advisory) off season cauliflower cultivation(with same content). Results revealed that the highest percentage knowledge score of farmers observed in TO_3 (90-100%) followed by TO_2 (70-90%) and minimum in FP (40- 50%) who acquired knowledge through own source on different management practices (Table 46). Results revealed that 75% farmers had low level of knowledge (acquired knowledge through own source), only 25% farmers gained medium level of knowledge (Table 47). 75% farmers gained high level of knowledge those who acquired knowledge through combination of teaching tools like Training + Full package demonstration on fff season cauliflower cultivation only 25% farmers gained medium level of knowledge. 100% farmers gained high level of knowledge who acquired knowledge through combination of teaching tools i.e., training + full package literature given (Off season cauliflower cultivation) to farmers for home study and weekly mobile advisory (With same content).

Table 46: Average knowledge scores of Off- season cauliflower cultivation farmers with respect to production components

Technological options	Average knowledge score			
	Land Preparation & improved varieties	Nutrient Management	Plant Protection	Grading packaging & marketing
TO_1: General practices	2 (40%)	2.5 (50%)	2 (40%)	2 (40%)
TO_2: Training + full package literature on cauliflower cultivation (with same content)	3.5 (70%)	4.5 (90%)	4.5 (90%)	4.0 (80%)
TO_3: Training + Full package Literature (off -season cauliflower cultivation) for home study and weekly Mobile advisory (with same content)	4.5 (90%)	5 (100%)	5 (100%)	4.5 (90%)

** Maximum score point :05; *Figure in parenthesis indicate percentage

Table 47: Frequency distribution of respondents by their knowledge score about off season cauliflower cultivation

Technological options	Knowledge level			
	Low Level (6.67)	Medium (6.67-13.33)	High level (13.33)	Mean knowledge score
TO_1: General practices	3(75)	-	-	8.25
TO_2: Training + full package literature on cauliflower cultivation (with same content)	1(25)	1(25)	-	14.25
TO_3: Training + Full package literature (off-season cauliflower cultivation) for home study and weekly Mobile advisory (with same content)	-	3(75)	4(100)	15.4
F value	2.963			

Assessment of Ragi/ Maize based enriched food for health and nutrition of adolescents*(*KVK: Dhanbad)

In order to reduce malnutrition in adolescent girls (13-17 years) all women who anemic were about 66.5% in Dhanbad an on-farm trial was designed and conducted by addition of existing dietary pattern i.e. with 02 technological Option. In 13- 17 year age group of adolescent boys and girls once in a day with ten replications involving 30 adolescents. The measurement on height, weight, hemoglobin and Blood glucose level were recorded before and after the technological intervention. Health camp was organized with collaboration of PHC Medical officer team at KVK, Dhanbad campus to fight against malnutrition by value addition of local underutilized cereals maize and ragi. Results revealed that there is marked changes in height, weight & Hemoglobin content in selected adolescents and maximum percent changes were recorded in the TO_2 roasted ragi flour 50g + roasted green gram flour 25g +jaggery 20g + groundnut roasted 10g + with 1/2 cup milk (Table 48). The similar results in organoleptic acceptability by the adolescents were also noted (Table 49).

Table 48: Effect of madua/maize based food on health and nutrition status of selected adolescents.

Technological Option	Height, Weight &Haemoglobin measurements of selected Adolescents								
	Initial			After 3 months			changes		
	Weight (kg)	Height (cm)	Hb (%)	Weight (kg)	Height (cm)	Hb (%)	Weight (kg)	Height (cm)	Hb (%)
FP:	40.01	106.4	8.6	41.5	108.1	09	1.49	1.7	0.4
TO_1:	43.96	126.3	10.6	46.12	128.7	10.04	2.16	2.4	0.56
TO_2:	44.42	133.9	11.73	47.5	137.2	12.5	3.08	3.3	0.77

FP: Inadequate dietary pattern unbalanced intake of nutrients and no / healthy food practices, **TO1:** Roasted malted maize flour 50g + roasted green gram flour 25g +jaggery 20g + groundnut roasted 10g + with 1 cup milk + usual diet (FP) **,TO2:** Roasted ragi flour 50g + roasted green gram flour 25g + jaggery 20g + groundnut roasted 10g + with 1 cup milk + usual diet (FP)

Table 49 : Organoleptic assessment of madua/maize based food foadolescents (5 points acceptability)

Technological Option	Organoleptic assessment on 5 points acceptability			
	Taste	Colour	Odour	Texture
FP: Inadequate dietary pattern unbalanced intake of nutrients and no / healthy food practices	Good (50%)	Average (60%)	Average (60%)	Soft (100%)
TO_1: Roasted malted maize flour 50g + roasted green gram flour 25g +jaggery 20g + groundnut roasted 10g+ with 1 cup milk + usual diet (FP)	Very good (85%)	Good (85%)	Good (85%)	Soft (100%)
TO_2: Roasted ragi flour 50 g + roasted green gram flour 25g +jaggery 20g + groundnut roasted 10g + with 1cup milk + usual diet (FP)	Very good (100%)	Very good (100%)	Very good (100%)	Soft (100%)

Fig: View of OFT on ragi/ maize based enrich food

Frontline Demonstrations

Frontline Demonstrations (FLD)

Bihar and Jharkhand are basically an agrarian state where mainly cereals (paddy/wheat), pulses, oilseeds and sugarcane are cultivated. Adoption of paddy/wheat cropping system has created many problems such as environmental problems, degradation of natural resources, and economic instability. Front Line Demonstration (FLD) is a unique extension approach for dissemination of recent technology and its management practices to provide direct interface/linkages between technology developers and end users of the technology to study the constraints of production, factors contributing for higher production and thereby generate production data and feedback information. FLDs are also conducted in allied fields like Animal Science, Home Science, etc. It is a form of applied research on latest released varieties along with component or full package of practices on identified farmers' fields to exhibit the potentiality of the technology to comparatively large number of farmers with the involvement of research scientists, extension personnel and other agencies. It also provides and opportunity to analyze the performance of the technologies with scientific feedback in totality. Frontline demonstrations were conducted by the KVKs during 2021 and covered total area of 2885.67 ha area to involving 14239 numbers of farmers of this zone (Table 50 and 51).

Table 50: State wise details of Frontline Demonstration of field crops

State	Oilseed		Pulses		Cereals		Total	
	No. of Farmers	Area (ha)	No. of Farmers	Area (ha)	No. of Farmers	Area (ha)	No. of Farmers	Area (ha)
Bihar	204	87.60	767	216.90	7253	752.34	8224	1056.84
Jharkhand	394	108.00	560	152.55	1606	468.05	2560	728.6
Total	**598**	**195.60**	**1327**	**369.45**	**8859.00**	**1220.39**	10784	1785.44

Table 51: State wise details of Frontline Demonstration of horticultural crops

State	Vegetables		Fruits		Other Horticultural Crops		Other Crops		Total	
	No. of Farmers	Area (ha)	No. of Farmers	No. of Farmers	No. of Farmers	Area (ha)	No. of Farmers	Area (ha)	No. of Farmers	Area (ha)
Bihar	1394	147.81	271	535.25	283	25	648	273.12	2596	981.18
Jharkhand	747	79.85	30	20.00	27	3.2	55	16	859	119.05
Total	**2141**	**227.66**	**301**	**555.25**	**310**	**28.2**	**703**	**289.12**	**3455**	**1100.23**

Oilseed crops

In the recent year's government has given more focus on the cultivation of pulses and oilseed crops under national food security mission. The increasing demand of oilseed and pulses had been met through import and burden on exchequer of the country. In order to reduce the economic crisis, the KVKs of Zone-IV took up the programs to enhance the production and productivity of pulses and oilseed crops through planning and executing frontline demonstration program across the zone (Bihar and Jharkhand). In the FLD programme important oilseed crops like mustard, groundnut, niger, linseed, sesame and soybean were taken up covering 195.60 ha area by involving 598 farmers. Among oilseeds more focus was on mustard covering 149.6 ha involving 382 farmers with 36.87 and 38.20% increase in yield over the check with BR ratio of 1.79 and 3.18 for Bihar and Jharkhand state, respectively. However, maximum per cent increase in yield (56.67%) was observed in niger (Table 52).

Pulses crops

In case of Pulses like chickpea, pigeon pea, lentil, green gram etc., FLDs were conducted in 369.45 ha area involving 1327 farmers of which area covered under Bihar was 216.90 ha involving 767 farmers and in Jharkhand 152.55 ha involving 560 farmers. Among pulses chickpea occupied the first rank in area and

farmers involvement with 38.26 and 93.02 percent increase in yield over local check. In Bihar BC ratio of 2.68 was recorded (Table 53). Second position was of pigeon pea with total 87.30 ha area under frontline demonstration involving 340 farmers of which 108 in Bihar with 31.00 ha area.


Cereal crops

Front line demonstrations on cereals crops covering an area of 1220.39 ha involving 8859 farmers were conducted by the KVKs of Bihar and Jharkhand during 2021 (Table 54). Paddy covered an area of 733.38ha by involving 7385 farmers under demonstration by the KVKs of Bihar and Jharkhand resulting in 17.65 and 24.53 % increase in yield in demonstration over local check. FLD in wheat, conducted by KVKs of Bihar and Jharkhand covered 347.01 ha under demonstration involving 978 farmers with 18.33 to 18.68 % increase in yield in the demonstration plot over local check with benefit-cost ratio of 2.26 to 2.04. Maize was demonstrated in 238 farmer's field covering 69.00 ha by the KVKs of Bihar and Jharkhand with 13.90 to 30.69 % increase in yield and BC ratio of 2.38 and 2.16 in Bihar & Jharkhand respectively (Table 54).


Table 52:Details of Frontline Demonstration of Oilseeds

Crop	State	No. of farmers	Area (ha)	Yield (q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
				Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
Mustard	Bihar	194	86.60	12.25	8.95	36.87	24978	58785	33808	2.35	22520	40420	17880	1.79
	Jharkhand	188	63.00	14.62	10.58	38.20	17800	59500	41700	3.34	14300	45500	31200	3.18
	Total	**382**	**149.6**	**13.43**	**9.76**	**37.54**	**21389**	**59143**	**37754**	**2.85**	**18410**	**42960**	**24540**	**2.49**
Groundnut	Bihar	10	1.00	12.60	10.70	17.76	25500	63000	37500	2.47	26800	53500	26700	2.00
	Jharkhand	133	20.00	11.10	6.43	72.59	26213	55309	29096	2.11	21635	36780	15145	1.70
	Total	**143**	**21.00**	**11.85**	**8.57**	**45.17**	**25856**	**59154**	**33298**	**2.29**	**24218**	**45140**	**20923**	**1.85**
Niger	Bihar	58	20.00	4.70	3.00	56.67	12765	27720	14955	2.17	10950	20790	7840	1.90
	Total	**58**	**20.00**	**4.70**	**3.00**	**56.67**	**12765**	**27720**	**14955**	**2.17**	**10950**	**20790**	**7840**	**1.90**
Linseed	Jharkhand	15	5.00	-	-	-	-	-	-	-	-	-	-	-
	Total	**15**	**5.00**	-	-	-	-	-	-	-	-	-	-	-
Grand Total		**598**	**195.60**	-	-	-	-	-	-	-	-	-	-	-

Table 53 :Details of Frontline Demonstration on Pulses

Crop	State	No. of farmers	Area (ha)	Yield (q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
				Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
Chick pea	Bihar	228	59.70	16.83	12.17	38.26	27314	77870	58104	2.85	26391	70604	44213	2.68
	Jharkhand	174	49.25	20.61	10.68	93.02	-	-	-	-	-	-	-	-
	Total	**402**	**108.95**	**37.43**	**22.85**	**131.28**	**27314**	**77870**	**58104**	**2.85**	**26391**	**70604**	**44213**	**2.68**
Pigeon pea	Bihar	108	31.00	13.53	9.58	41.15	20138	84553	64415	4.20	18600	60317	43717	3.24
	Jharkhand	232	56.30	20.35	14.22	43.11	-	-	-	-	-	-	-	-
	Total	**340**	**87.30**	**16.94**	**11.90**	**42.13**	**20138**	**84553**	**64415**	**4.20**	**18600**	**60317**	**43717**	**3.24**
Green gram	Bihar	207	54.20	8.71	7.09	22.79	21093	52078	30789	2.47	18338	37953	19615	2.07
	Jharkhand	65	30.00	15.00	8.00	87.50	13800	45000	32000	3.26	11300	33000	21700	2.92
	Total	**272**	**84.20**	**11.85**	**7.55**	**55.15**	**17447**	**48539**	**31395**	**2.86**	**14819**	**35476**	**20657**	**2.49**
Lentil	Bihar	190	58.00	12.74	9.54	33.54	20810	67448	46038	3.24	19824	52118	32294	2.63
	Total	**190**	**58.00**	**12.74**	**9.54**	**33.54**	**20810**	**67448**	**46038**	**3.24**	**19824**	**52118**	**32294**	**2.63**
Black gram	Bihar	30	10.00	9.81	8.10	21.11	31100	68670	37570	2.21	28800	56700	27900	1.97
	Jharkhand	59	15.00	7.55	5.05	49.50	20450	42275	21825	2.07	19300	45670	26370	2.37
	Total	**89**	**25.00**	**8.68**	**6.58**	**35.31**	**25775**	**55473**	**29698**	**2.14**	**24050**	**51185**	**27135**	**2.17**
Lathyrus	Bihar	4	4.00	15.50	12.00	29.17	25000	69750	44750	2.79	21000	54000	33000	2.57
	Total	**4**	**4.00**	**15.50**	**12.00**	**29.17**	**25000**	**69750**	**44750**	**2.79**	**21000**	**54000**	**33000**	**2.57**
Horse gram	Bihar	30	2.00	-	-	-	-	-	-	-	-	-	-	-
	Total	**30**	**2.00**	-	-	-	-	-	-	-	-	-	-	-
Grand Total		**1327**	**369.45**	-	-	-	-	-	-	-	-	-	-	-

Table 54 :Details of Frontline Demonstration of Cereal Crops

Crop	State	No. of farmers	Area (ha)	Yield (q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
				Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
Paddy	Bihar	6430	456.88	40.71	34.60	17.65	31785	74940	43088	2.36	32005	63474	31410	1.98
	Jharkhand	955	276.50	34.12	27.39	24.53	32699	66539	34820	2.03	31976	54033	23570	1.69
	Total	**7385**	**733.38**	**37.41**	**31.00**	**21.09**	**32242**	**70740**	**38954**	**2.20**	**31990**	**58753**	**27490**	**1.84**
Wheat	Bihar	655	253.46	37.51	31.61	18.68	32362	73294	40452	2.26	32038	62664	30129	1.96
	Jharkhand	323	93.55	34.37	29.04	18.33	33740	68839	35099	2.04	34583	58407	23825	1.69
	Total	**978**	**347.01**	**35.94**	**30.33**	**18.50**	**33051**	**71066**	**37775**	**2.15**	**33310**	**60536**	**26977**	**1.82**
Maize	Bihar	85	24.00	80.89	71.01	13.90	48720	115840	67120	2.38	49183	103370	54187	2.10
	Jharkhand	153	45.00	38.55	29.50	30.69	28780	62185	37005	2.16	27075	47932	26957	1.77
	Total	**238**	**69.00**	**59.72**	**50.26**	**22.29**	**38750**	**89013**	**52063**	**2.27**	**38129**	**75651**	**40572**	**1.94**
Finger Millet	Bihar	35	12.00	8.30	7.40	12.16	12480	31540	19060	2.53	11670	28120	16450	2.41
	Jharkhand	175	53.00	204.53	131.20	55.89	22312	57587	40075	2.58	20968	44130	28262	2.10
	Total	**210**	**65.00**	**106.41**	**69.30**	**34.02**	**17396**	**44563**	**29568**	**2.55**	**16319**	**36125**	**22356**	**2.26**
Oats	Bihar	48	6.00	610.00	460.00	32.61	35000	61000	26000	1.74	30000	46000	16000	1.53
	Total	**48**	**6.00**	**610.00**	**460.00**	**32.61**	**35000**	**61000**	**26000**	**1.74**	**30000.00**	**46000.00**	**16000.00**	**1.53**
Grand Total		**8859**	**1220.39**	-	-	-	-	-	-	-	-	-	-	-

Horticultural crops

Large number of farmers is involved in cultivation of Horticultural crops and Frontline demonstrations in horticulture (vegetables, fruits, flower, etc,) are a focal point in terms of validations of technology by KVKs. In Bihar and Jharkhand FLDs on horticulture crops covered 1100.23 ha involving 3455 farmers field during the year 2021 (Table 55 to 57).

Vegetable crops

During the year 2021 frontline demonstration on 23 vegetable crops was conducted in 227.66 ha involving 2141 farmers of which in Bihar 147.81 ha were covered involving 1394 farmers and Jharkhand covered 79.85 ha increasing 747 farmers. In vegetables crops major focus was on brinjal with area of 38.10 ha covering 282 farmers by the KVKs of Bihar and Jharkhand showing 33.15 and 26.72 % increase in yield in demonstration field over local check, respectively followed by tomato, onion, okra, bottle guard and cauliflower (Table 55).

Fruit crops

Bihar and Jharkhand are the hub of subtropical fruits crops like mango, litchi, guava and banana hence due attention was given to conduct FLD in fruit crops covering 555.25 ha area involving 301 farmers during 2021 (Table 56).

Other crops

In recent year cultivation of other crops like makhana, lac, spices, flower, fiber, fodder etc. has been getting momentum and covered significant area in the Zone IV. Seeing the importance of crop FLDs on marigold was conducted in an area of 2.40 ha involving 21 farmers and recorded 2.80 BC ratio in Bihar and 1.62 in Jharkhand state. In Makhana BAU Sabour released a high yielding variety hence 142.00ha area was covered FLDs involving 175 farmers and recorded 44.92 % increase in yield over farmer's practices. FLD on spices crops, perennial drumstick and nutrition garden were approved and conducted by the KVKs of Bihar and Jharkhand during the year 2021 (Table 57a & b).





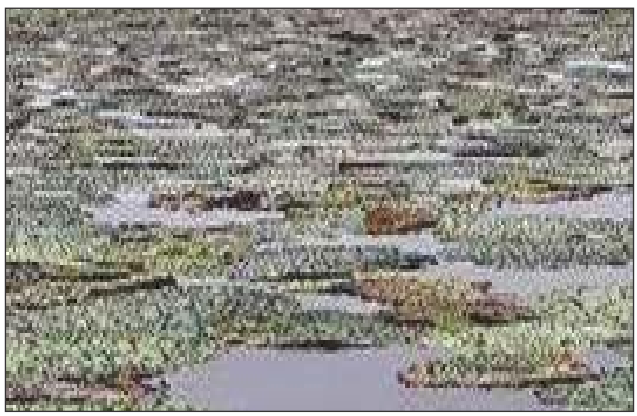



Table 55: Details of Frontline Demonstration on Vegetables Crops

Crop	State	No. of farmers	Area (ha)	Yield (q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
				Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
Brinjal	Bihar	207	18.10	320.27	240.54	33.15	76850	390632	299496	5.08	72684	214063	209208	2.95
	Jharkhand	75	20.00	338.75	267.31	26.72	114762	325075	210313	2.83	118137	282627	164489	2.39
	Total	**282**	**38.10**	**329.51**	**253.92**	**29.94**	**95806**	**357853**	**254905**	**3.96**	**95411**	**248345**	**186849**	**2.67**
Tomato	Bihar	126	7.00	401.28	256.25	59.65	108723	490267	381543	4.51	108058	259767	151708	2.40
	Jharkhand	199	22.50	277.36	199.81	44.63	67024	304197	237173	4.54	62245	214119	151879	3.44
	Total	**325**	**29.50**	**339.32**	**228.03**	**52.14**	**87874**	**397232**	**309358**	**4.52**	**85152**	**236943**	**151794**	**2.92**
Onion	Bihar	108	18.00	257.18	182.68	40.78	90794	342456	251663	3.77	87110	235786	148676	2.71
	Jharkhand	59	7.00	236.67	192.67	22.84	56000	139400	83400	2.49	49833	95567	45733	1.92
	Total	**167**	**25.00**	**246.92**	**187.67**	**31.81**	**73397**	**240928**	**167531**	**3.13**	**68472**	**165676**	**97205**	**2.31**
Okra	Bihar	162	10.12	121.76	100.85	20.74	52688	161328	108640	3.06	50376	125171	74795	2.48
	Jharkhand	89	7.40	148.06	96.42	53.57	66039	236121	135594	3.58	55339	129837	74498	2.35
	Total	**251**	**17.52**	**134.91**	**98.63**	**37.15**	**59364**	**198725**	**122117**	**3.32**	**52857**	**127504**	**74647**	**2.42**
Bottle gourd	Bihar	99	13.40	243.49	213.01	14.31	57874	224510	166636	3.88	56494	177475	120956	3.14
	Jharkhand	27	2.50	175.09	131.43	33.21	47500	135290	87790	2.85	42524	94235	54227	2.22
	Total	**126**	**15.90**	**209.29**	**172.22**	**23.76**	**52687**	**179900**	**127213**	**3.36**	**49509**	**135855**	**87592**	**2.68**
Cauliflower	Bihar	135	11.00	167.85	134.50	24.80	83102	309405	226303	3.72	79122	247238	167981	3.12
	Jharkhand	85	3.50	416.00	262.50	58.48	72638	361250	288613	4.97	67750	232000	164250	3.42
	Total	**220**	**14.50**	**291.93**	**198.50**	**41.64**	**77870**	**335328**	**257458**	**4.35**	**73436**	**239619**	**166116**	**3.27**
Sponge gourd	Bihar	76	10.80	97.75	82.52	18.46	36532	91769	55203	2.51	35047	74734	39688	2.13
	Jharkhand	23	2.40	150.86	112.33	34.30	38044	102288	64244	2.69	35544	71427	35882	2.01
	Total	**99**	**13.20**	**124.30**	**97.42**	**26.38**	**37288**	**97029**	**59724**	**2.60**	**35296**	**73081**	**37785**	**2.07**
Elephant Footyam	Bihar	27	10.24	265.83	164.71	61.40	169732	402187	232454	2.37	127456	250031	122574	1.96
	Total	**27**	**10.24**	**265.83**	**164.71**	**61.40**	**169732**	**402187**	**232454**	**2.37**	**127456**	**250031**	**122574**	**1.96**
Drumstick	Bihar	10	10.00	-	-	-	-	-	-	-	-	-	-	-
	Jharkhand	0	0.00	-	-	-	-	-	-	-	-	-	-	-
	Total	**10**	**10.00**	-	-	-	-	-	-	-	-	-	-	-

Crop	State	No. of farmers	Area (ha)	Yield (q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
				Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
Pointed Gourd	Bihar	20	8.00	95.00	75.00	26.67	90000	190000	100000	2.11	80000	150000	70000	1.88
	Jharkhand	1	0.05	-	-	-	-	-	-	-	-	-	-	-
	Total	**21**	**8.05**	**95.00**	**75.00**	**26.67**	**90000**	**190000**	**100000**	**2.11**	**80000**	**150000**	**70000**	**1.88**
Cucumber	Bihar	81	7.00	88.60	56.56	56.65	64418	164148	99730	2.55	58916	79843	30927	1.36
	Jharkhand	10	1.00	112.00	60.00	86.67	50000	112000	62000	2.24	40000	60000	20000	1.50
	Total	**91**	**8.00**	**100.30**	**58.28**	**71.66**	**57209**	**138074**	**80865**	**2.39**	**49458**	**69922**	**25464**	**1.43**
Broccoli	Bihar	80	3.25	102.00	82.00	24.39	134050	445350	311300	3.32	124075	356060	231985	2.87
	Jharkhand	55	3.00	174.10	145.50	19.66	84050	267785	183735	3.19	84750	218250	133500	2.58
	Total	**135**	**6.25**	**138.05**	**113.75**	**22.02**	**109050**	**356568**	**247518**	**3.25**	**104413**	**287155**	**182743**	**2.72**
Cucurbits	Bihar	20	5.00	340.50	289.70	17.54	45215	136000	90795	3.01	42250	115880	73630	2.74
	Total	**20**	**5.00**	**340.50**	**289.70**	**17.54**	**45215**	**136000**	**90795**	**3.01**	**42250**	**115880**	**73630**	**2.74**
Cowpea	Bihar	48	3.00	107.17	87.83	22.01	58167	175592	117425	3.02	58500	117042	58542	2.00
	Jharkhand	28	1.90	87.10	64.87	34.27	40833	95133	54300	2.33	36542	66778	30236	1.83
	Total	**76**	**4.90**	**97.13**	**76.35**	**28.14**	**49500**	**135363**	**85863**	**2.67**	**47521**	**91910**	**44389**	**1.91**
Lobia	Bihar	60	4.00	110.92	66.98	63.99	114138	284105	169967	2.49	70500	162116	91616	2.30
	Total	**60**	**4.00**	**110.92**	**66.98**	**63.99**	**114138**	**284105**	**169967**	**2.49**	**70500**	**162116**	**91616**	**2.30**
Bitter gourd	Bihar	15	2.00	112.50	75.00	50.00	50500	225000	174500	4.46	50000	150000	100000	3.00
	Jharkhand	25	1.50	145.00	77.50	87.10	98000	290000	192000	2.96	66000	155000	89000	2.35
	Total	**40**	**3.50**	**128.75**	**76.25**	**68.55**	**74250**	**257500**	**183250**	**3.71**	**58000**	**152500**	**94500**	**2.67**

Crop	State	No. of farmers	Area (ha)	Yield (q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
				Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
Veg. Pea	Bihar	52	1.40	30.65	23.60	29.87	23875	64400	40525	2.70	23775	41250	22200	1.74
	Jharkhand	11	2.00	28.00	19.00	47.37	18000	48000	30000	2.67	11000	24000	13000	2.18
	Total	**63**	**3.40**	**29.33**	**21.30**	**38.62**	**20938**	**56200**	**35263**	**2.68**	**17388**	**32625**	**17600**	**1.96**
Beet Root	Jharkhand	10	0.40	220.80		100.00	121200	309120	187920	2.55	-	-	-	-
	Total	**10**	**0.40**	**220.80**		**100.00**	**121200**	**309120**	**187920**	**2.55**	-	-	-	-
Cabbage	Bihar	23	2.00	306.41	230.86	32.73	64738	275767	211029	4.26	80000	150000	70000	3.35
	Jharkhand	20	1.00	-	-	-	-	-	-	-	-	-	-	-
	Total	**43**	**3.00**	**306.41**	**230.86**	**32.73**	**64738**	**275767**	**211029**	**4.26**	**62108**	**207775**	**145668**	**3.35**
Potato	Bihar	8	0.50	310.00	257.00	20.62	83700	295000	211300	3.52	77325	215000	137675	2.78
	Jharkhand	10	2.00	270.00	212.00	27.30	80000	221600	166000	2.77	72000	169000	97600	2.35
	Total	**18**	**2.50**	**290.00**	**234.50**	**23.96**	**81850**	**258300**	**188650**	**3.15**	**74663**	**192000**	**117638**	**2.56**
Capsicum	Bihar	20	1.00	-	-	-	-	-	-	-	-	-	-	-
	Jharkhand	10	0.70	165.10	0.00	100.00	94200	330200	236000	3.51	-	-	-	-
	Total	**30**	**1.70**	**165.10**	**0.00**	**100.00**	**94200**	**330200**	**236000**	**3.51**	-	-	-	-
Ridge Gourd	Bihar	10	1.00	175.00	123.00	42.28	21200	87500	66300	4.13	21000	61500	40500	2.93
	Total	**10**	**1.00**	**175.00**	**123.00**	**42.28**	**21200**	**87500**	**66300**	**4.13**	**21000**	**61500**	**40500**	**2.93**
Pumpkin	Bihar	17	1.00	78.50	50.00	57.00	50500	157000	106500	3.11	50500	100000	49500	1.98
	Total	**17**	**1.00**	**78.50**	**50.00**	**57.00**	**50500**	**157000**	**106500**	**3.11**	**50500**	**100000**	**49500**	**1.98**
Grand Total		**2141**	**227.66**	-	-	-	-	-	-	-	-	-	-	-

Table 56 : Details of Frontline Demonstration of Fruit Crops 2021

Crop	State	No. of farmers	Area (ha)	Yield (q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
				Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
Banana	Bihar	45	402.00	3125 Bunches	2558 Bunches	22.16	89625	373500	283875	4.16	94125	306960	212835	3.26
	Total	**45**	**402.00**	**3125 Bunches**	**2558 Bunches**	**22.16**	**89625**	**373500**	**283875**	**4.16**	**94125**	**306960**	**212835**	**3.26**
Litchi	Bihar	95	95.00	318.00	182.00	74.70	49500	122000	39200	2.46	45000	79000	34000	1.75
	Total	**95**	**95.00**	**318.00**	**182.00**	**74.70**	**49500**	**122000**	**39200**	**2.46**	**45000**	**79000**	**34000**	**1.75**
Papaya	Bihar	10	10.00	36.32	34.28	5.95	31184	108960	77776	3.49	32784	102840	70056	3.14
	Jharkhand	20	10.00	-	-	-	-	-	-	-	-	-	-	-
	Total	**30**	**20.00**	**36.32**	**34.28**	**5.95**	**31184**	**108960**	**77776**	**3.49**	**32784**	**102840**	**70056**	**3.14**
Guava	Bihar	45	18.00	231.35	196.00	18.03	130000	347025	217025	2.67	125000	294000	169000	2.35
	Total	**45**	**18.00**	**231.35**	**196.00**	**18.03**	**130000**	**347025**	**217025**	**2.67**	**125000**	**294000**	**169000**	**2.35**
Mango	Bihar	30	2.50	265.03	190.27	76.07	55867	232533	176000	3.85	58533	176347	117813	2.68
	Total	**30**	**2.50**	**265.03**	**190.27**	**76.07**	**55867**	**232533**	**176000**	**3.85**	**58533**	**176347**	**117813**	**2.68**
Pineapple	Bihar	10	1.00	448.00	380.00	17.89	255000	537600	282600	2.10	250000	456000	206000	1.82
	Total	**10**	**1.00**	**448.00**	**380.00**	**17.89**	**255000**	**537600**	**282600**	**2.10**	**250000**	**456000**	**206000**	**1.82**
Ber	Bihar	10	10.00	0.50	0.00	100.00	5000	10000	5000	1.20	-	-	-	-
	Total	**10**	**10.00**	**0.50**	**0.00**	**100.00**	**5000**	**10000**	**5000**	**1.20**	-	-	-	-
Lime	Bihar	16	4.00	-	-	-	-	-	-	-	-	-	-	-
	Total	**16**	**4.00**	-	-	-	-	-	-	-	-	-	-	-
Strawberry	Bihar	10	2.50	-	-	-	-	-	-	-	-	-	-	-
	Total	**10**	**2.50**	-	-	-	-	-	-	-	-	-	-	-
Grand Total		**301**	**555.25**	-	-	-	-	-	-	-	-	-	-	-

Table 57 (a):Details of Frontline Demonstration of Other Horticultural Crops

Crop Category	Crop	State	No. of farmers	Area (ha)	Yield (q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
					Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
Spices	Turmeric	Bihar	106	10.40	188.05	153.71	22.34	95452	308091	212638	4.76	93642	248760	155118	3.29
		Total	**106**	**10.40**	**188.05**	**153.71**	**22.34**	**95452**	**308091**	**212638**	**4.76**	**93642**	**248760**	**155118**	**3.29**
	Chilli	Bihar	73	6.60	62.88	56.90	10.51	57873	185500	127628	3.15	57313	153700	96388	2.64
		Jharkhand	15	2.00	405.00	311.00	30.23	83342	405000	321658	4.86	83000	311000	228000	3.74
		Total	**88**	**8.60**	**233.94**	**183.95**	**20.37**	**70607**	**295250**	**224643**	**4.00**	**70156**	**232350**	**162194**	**3.19**
	Ajowain	Bihar	19	1.40	9.60	7.10	35.21	22085	76800	54715	3.47	-	-	-	-
		Total	**19**	**1.40**	**9.60**	**7.10**	**35.21**	**22085**	**76800**	**54715**	**3.47**	-	-	-	-
	Fenugreek	Bihar	19	1.40	19.40	14.90	30.20	27470	116400	88930	4.23	-	-	-	-
		Total	**19**	**1.40**	**19.40**	**14.90**	**30.20**	**27470**	**116400**	**88930**	**4.23**	-	-	-	-
	Nigella	Bihar	19	1.40	19.80	14.00	41.43	25380	138600	113220	5.46	-	-	-	-
		Total	**19**	**1.40**	**19.80**	**14.00**	**41.43**	**25380**	**138600**	**113220**	**5.46**	-	-	-	-
	Coriander	Bihar	19	1.40	18.00	13.80	30.43	25090	180000	154910	7.17	-	-	-	-
		Total	**19**	**1.40**	**18.00**	**13.80**	**30.43**	**25090**	**180000**	**154910**	**7.17**	-	-	-	-
	Fennel	Bihar	19	1.40	11.80	7.90	49.37	23745	53100	29355	2.23	-	-	-	-
		Total	**19**	**1.40**	**11.80**	**7.90**	**49.37**	**23745**	**53100**	**29355**	**2.23**	-	-	-	-
	Total of Spices		**289**	**26.00**	-	-	-	-	-	-	-	-	-	-	-
Flowers	Marigold	Bihar	9	1.00	89.00	71.50	24.48	67375	275900	208525	4.09	52250	150150	97900	2.80
		Jharkhand	12	1.40	187.00	90.00	107.78	65000	280000	215000	4.30	65000	105600	40600	1.62
		Total	**21**	**2.40**	**138.00**	**80.75**	**66.13**	**66188**	**277950**	**211763**	**4.20**	**58625**	**127875**	**69250**	**2.21**
	Total of Flowers		**21**	**2.40**	-	-	-	-	-	-	-	-	-	-	-
Grand Total			**310**	**28.40**	-	-	-	-	-	-	-	-	-	-	-

Table 57 (b):Details of Frontline Demonstration of Others

Crop Category	Crop	State	No. of farmers	Area (ha)	Yield (q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
					Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
Other Enterprises	Makhana	Bihar	175	142.00	24.74	17.07	44.92	91000	311355	220355	3.14	83333	215614	132271	1.99
		Total	**175**	**142.00**	**24.74**	**17.07**	**44.92**	**91000**	**311355**	**220355**	**3.14**	**83333**	**215614**	**132271**	**1.99**
	Nutritional garden	Bihar	32	3.00	153.18	85.00	80.21	1500	4595	3095	3.06	1000	2500	1500	2.50
		Total	**32**	**3.00**	**153.18**	**85.00**	**80.21**	**1500**	**4595**	**3095**	**3.06**	**1000**	**2500**	**1500**	**2.50**
	Lac	Bihar	32	0.32	34.89	18.22	91.49	-	-	-	-	-	-	-	-
		Total	**32**	**0.32**	**34.89**	**18.22**	**91.49**	-	-	-	-	-	-	-	-
Total of Other Crops			**239**	**145.32**	-	-	-	-	-	-	-	-	-	-	-
Fiber Crops	Jute	Bihar	60	24.00	23.84	20.13	19.18	38547	108820	70273	2.86	38173	92707	54533	2.45
		Total	**60**	**24.00**	**23.84**	**20.13**	**19.18**	**38547**	**108820**	**70273**	**2.86**	**38173**	**92707**	**54533**	**2.45**
Total of Fiber Crops			**60**	**24.00**	-	-	-	-	-	-	-	-	-	-	-
Fodder Crops	Green Fodder	Bihar	53	5.80	182.95	165.93	10.26	14212	32745	18533	1.56	14544	26898	12354	1.34
		Jharkhand	45	15.00	256.67	208.67	23.00	29000	77000	48000	2.69	25667	62600	36667	2.77
		Total	**98**	**20.80**	**219.81**	**187.30**	**16.63**	**21606**	**54873**	**33267**	**2.13**	**20106**	**44749**	**24510**	**2.05**
	Sorghum	Bihar	94	9.40	630.83	413.05	52.73	23605	97403	73798	4.15	19653	65012	45359	3.20
		Total	**94**	**9.40**	**630.83**	**413.05**	**52.73**	**23605**	**97403**	**73798**	**4.15**	**19653**	**65012**	**45359**	**3.20**
	Berseem	Bihar	84	5.00	665.00	587.50	13.19	34300	91900	57600	2.97	32290	80500	48210	2.75
		Jharkhand	10	1.00	-	-	-	-	-	-	-	-	-	-	-
		Total	**94**	**6.00**	**665.00**	**587.50**	**13.19**	**34300**	**91900**	**57600**	**2.97**	**32290**	**80500**	**48210**	**2.75**
	Napier	Bihar	28	1.60	-	-	-	-	-	-	-	-	-	-	-
		Total	**28**	**1.60**	-	-	-	-	-	-	-	-	-	-	-
Total of Fodder Crops			**314**	**37.80**	-	-	-	-	-	-	-	-	-	-	-
Measures Control	Fruit fly trap	Bihar	25	25.00	17.60	16.00	10.00	125000	416000	291000	3.33	132000	390000	258000	2.95
		Total	**25**	**25.00**	**17.60**	**16.00**	**10.00**	**125000**	**416000**	**291000**	**3.33**	**132000**	**390000**	**258000**	**2.95**
	Pheromone trap	Bihar	25	25.00	22.00	20.00	10.00	110000	360000	250000	3.27	128000	288000	160000	2.25
		Total	**25**	**25.00**	**22.00**	**20.00**	**10.00**	**110000**	**360000**	**250000**	**3.27**	**128000**	**288000**	**160000**	**2.25**
Total of Control Measures			**50**	**50.00**	-	-	-	-	-	-	-	-	-	-	-
Bio-Fertilizer	Waste decomposer	Bihar	40	32	-	-	-	-	-	-	-	-	-	-	-
		Total	40	32	-	-	-	-	-	-	-	-	-	-	-
	Total of Bio-Fertilizer		**40**	**32**	-	-	-	-	-	-	-	-	-	-	-
Grand Total			**703**	**289.12**	-	-	-	-	-	-	-	-	-	-	-

Livestock and Fishery

Frontline demonstrations were also conducted in livestock and fisheries related aspects for assessment of breed, feed & fodder management, vaccination of animals, deworming, pond management, stocking density, fish, fingerling production and other areas by the KVKs of ICAR-ATARI Zone IV. In livestock, 2351 farmers were involved in such demonstration for the 5072 numbers of livestock of which 1651 number of farmers were involved in Bihar and 700 in Jharkhand. In fisheries total 113 demonstrations were conducted by the KVKs covering water area of 1090.50 ha in both the state with farmers and water bodies brought under demonstration (Table 58).

Table 58: State wise details of Frontline Demonstration on Livestock and Fisheries

Category	State	No. of Farmers	Area (ha)/No.
Livestock	Bihar	1651	2001.00
	Jharkhand	700	3071.00
	Total	**2351**	**5072.00**
Fishery	Bihar	95	1072.50
	Jharkhand	18	18.00
	Total	**113**	**1090.50**

Fig: View of FLD on fisheries and animal sector

Other Enterprises

Apart from conducting demonstration on field crops, horticultural crops, livestock and fisheries, the KVKs also conducted demonstrations on various agro-enterprises in the farmers' fields to exhibit relative advantage of improved technologies over conventional practices and/or to introduce newer income generating enterprises. In this process, altogether 2461 farmers involved covering 6891.00 ha/ no. of area/number of vermi-compost, bee keeping, value addition, mushroom production, backyard poultry rearing, homestead vegetable cultivation, feed production, azolla cultivation and many more enterprises were taken up by KVKs (Table 59). The Bihar KVKs demonstrated 1909.00 enterprises involving 1644 farmers and Jharkhand KVKs demonstrated 4982.00 enterprises covering 817 farmers during 2021. (Table 59).

Table 59:State wise details of Frontline Demonstration on Enterprise

Category	State	No. of Farmers	Area (ha)/Nos.
Enterprise	Bihar	1644	1909.00
	Jharkhand	817	4982.00
	Total	**2461**	**6891.00**

Fig: View of FLD on enterprises

Farm Implements

The use of farm machinery, tools and implements reduces the labour requirement, reduces seed rate, enhances water use efficiency and also helps in drudgery reduction. Various farm machinery, tools and implements were demonstrated in this zone for the benefit of 11767 farmers. The performance of improved tools and implements were demonstrated in 4671.35 ha area during 2021 of which KVKs of Jharkhand covered 2920.00 ha area involving 7884 farmers and in KVKs of Bihar demonstrated to 3883 farmers to covering 1751.35 ha (Table 60).

Table 60: State wise details of FLD on Farm Implement and machinery

Category	State	No. of Farmers	Area (ha)/No
Implement	Bihar	3883	1751.35
	Jharkhand	7884	2920.00
Total		**11767**	**4671.35**

Fig: View of FLD conducted on farm implement

Women Empowerment

Advance agro-techniques were demonstrated targeting the farm women to empower them in decision making process and in income generation activities such as tailoring, value addition, embroidery and other activities in which total 3517 farm women were involved of which 858 from Bihar 2659 farm women from Jharkhand state (Table 61).

Table 61: State wise Frontline Demonstration on Women Empowerment

Category	State	No. of Women/Children
Women Empowerment	Bihar	858
	Jharkhand	2659
	Total	**3517**

Fig: View of FLD on women empowerment

F1 Hybrid seeds

In Bihar and Jharkhand majority of farmers are small and marginal with small and fragmented plots. In order to bring more areas under the use of hybrid varieties for getting higher return, frontline demonstrations were conducted on adopting F1 hybrid varieties of different crops by farmers. KVKs of Bihar and Jharkhand demonstrating in 385.80 ha area involving 1509 farmers (Table 62).

Table 62: State wise details of Frontline Demonstration on F1 Hybrid varieties

Category	State	No. of farmers	Area (ha)/No.
Hybrid	Bihar	650	138.50
	Jharkhand	859	247.30
Total		**1509**	**385.80**

Cluster Frontline Demonstration (CFLD)

With a view of bringing more areas under pulses/oilseeds cultivation through cluster frontline demonstrations enhancing production, productivity and area of pulses and oilseed crops. An ambitious program of DAC & FW GoI has been implemented since 2015-16 through the KVKs of Bihar and Jharkhand. A series of workshop was conducted by ICAR-ATARI, Patna to enable the KVKs to cover as much area as possible under pulse and oilseed crops cultivations with advanced technologies/varieties.

Pulses Crops

Under CFLD on Pulses altogether 6908 demonstrations covering 2294 ha were conducted against the target of 7406 demonstrations and 2960 ha area. Overall yield increase in pulses was 36.38 % with very high yield difference of 3.34 and 4.06 q/ha in Bihar and Jharkhand respectively (Table 63).

Kharif Pulses

Pulses are the cheapest, easily digestable and concentrated source of protein in diet of Indian people. In order to meet the increasing demand of pulses CFLD on pigeon pea, black gram, green gram and horse gram were conducted during *Kharif* 2021 covering 650 ha against the target of 810 ha. As per the target maximum (1250) number of demonstrations covering 500 ha area was allotted in pigeon pea followed by green gram 325 demonstration covering 130.00 ha area (Table 64). Performance analysis of individual pulse crop indicated that in pigeon pea, there was 34.14 to 56.34 *per cent* increase in average yield under demonstration in Bihar and Jharkhand average difference of approximately 3.62 and 4.93 q/ha, respectively. In case of black gram, the average increase in yield Jharkhand was recorded 42.91% with a yield difference of 3.05 q/ha over check. In case of green gram increase in yield was tune of 35.33 % over check with yield difference of 2.52 q/ha. In respect of yield enhancement in horse gram, average increase was 32.39 and 47.77 % in Bihar and Jharkhand with yield difference of 2.30 to 2.38 q/h respectively.

Table 63: State wise Cluster Frontline Demonstration on Pulse

State	Target of CFLD Approved		Achievement of CFLD		Average yield (q/ha)		Yield Increase (%)	Difference of yield between demo and local (q/ha)
	No. of Demonstration	Area (ha)	No. of Demonstration	Area (ha)	Demo	Local		
Bihar	4855	1940	5139	1724	12.91	9.57	34.86	3.34
Jharkhand	2551	1020	1769	570	13.99	9.93	40.90	4.06
Grand Total	**7406**	**2960**	**6908**	**2294**	**13.19**	**9.67**	36.38	3.52

Table 64: Cluster Frontline Demonstration on *Kharif* Pulses

Crops	State	Target of CFLD Approved		Achievement of CFLD		Average yield (q/ha)		Yield Increase (%)	Difference of yield between demo and local (q/ha)
		No. of Demonstration	Area (ha)	No. of Demonstration	Area (ha)	Demo	Local		
Pigeon pea	Bihar	825	330	1054	310	14.21	10.59	34.14	3.62
	Jharkhand	425	170	394	120	13.68	8.75	56.34	4.93
	Total	**1250**	**500**	**1448**	**430**	**14.08**	**10.10**	39.42	3.98
Black gram	Bihar	0	0	0	0	0.00	0.00	0.00	0.00
	Jharkhand	200	80	170	60	10.16	7.11	42.91	3.05
	Total	**200**	**80**	**170**	**60**	**10.16**	**7.11**	42.91	3.05
Green gram	Bihar	25	10	25	10	9.37	6.90	35.80	2.47
	Jharkhand	300	120	250	70	9.64	7.12	35.33	2.52
	Total	**325**	**130**	**275**	**80**	**9.60**	**7.09**	35.38	2.51
Horse gram	Bihar	25	10	36	10	9.40	7.10	32.39	2.30
	Jharkhand	225	90	242	70	7.37	4.99	47.77	2.38
	Total	**250**	**100**	**278**	**80**	**7.62**	**5.25**	45.17	2.37
Grand Total		**2025**	**810**	**2171**	**650**				

Rabi Pulses

In Rabi season under CFLD on pulses 3360 demonstrations were conducted in 1160 ha against the target of 3718 demonstrations in 1485 ha under lentil, chickpea and field pea during 2021 by KVKs of Bihar and Jharkhand. The performance of demonstration in lentil resulted in an increase in yield of 36.87 % in Bihar and 58.63 % in Jharkhand with yield difference of 3.65 and 3.95 q/ha respectively (Table 65). In chick pea, the KVKs of Bihar and Jharkhand reported an average increase in yield to the extent of 70.05 % in Jharkhand and 33.07 % in Bihar. In case of field pea yield increase of 36.89 and 27.57 per cent were recorded in Bihar and Jharkhand with yield difference of 4.51 and 3.35 q/ha respectively.

Fig: View of CFLD on pulses

Table 65: Cluster Frontline Demonstration on Rabi Pulses

Crops	State	Target of CFLD Approved		Achievement of CFLD		Average yield (q/ha)		Yield Increase (%)	Difference of yield between demo and local (q/ha)
		No. of Demonstration	Area (ha)	No. of Demonstration	Area (ha)	Demo	Local		
Lentil	Bihar	1475	590	1575	576	13.57	9.91	36.87	3.65
	Jharkhand	425	170	167	60	10.69	6.74	58.63	3.95
	Total	**1900**	**760**	**1742**	**636**	**13.22**	**9.54**	38.57	3.68
Chick pea	Bihar	780	310	876	270	14.97	11.25	33.07	3.72
	Jharkhand	525	210	346	120	35.37	20.80	70.05	14.57
	Total	**1305**	**520**	**1222**	**390**	**19.34**	**14.02**	37.93	5.32
Field pea	Bihar	325	130	313	104	16.74	12.23	36.89	4.51
	Jharkhand	188	75	83	30	15.50	12.15	27.57	3.35
	Total	**513**	**205**	**396**	**134**	**16.61**	**12.22**	35.94	4.39
Grand Total		**3718**	**1485**	**3360**	**1160**				

Summer Pulses

KVKs of Bihar and Jharkhand under CFLD program on summer pulses were conducted in 1377 demonstrations against the target of 1663 demonstrations covering an area of 484 ha against the target of 665 ha on green gram and black gram. In green gram, 414 ha area was covered by KVKs of Bihar whereas, in Jharkhand 30.0 ha area. However, in black gram, 30.0 ha and 10.0 ha in Bihar and Jharkhand covered, respectively. Performance indicator showed that yield increase was tune of 33.71 and 33.16 % in green gram and 43.50 and 53.33% in black gram under this zone in Bihar and Jharkhand respectively (Table 66).

Table 66: Cluster Frontline Demonstration on Summer Pulse

Crops	State	Target of CFLD Approved		Achievement of CFLD		Average yield (q/ha)		Yield Increase (%)	Difference of yield between demo and local (q/ha)
		No. of Demonstration	Area (ha)	No. of Demonstration	Area (ha)	Demo	Local		
Green gram	Bihar	1200	480	1185	414	9.27	6.93	33.71	2.34
	Jharkhand	163	65	92	30	8.57	6.43	33.16	2.13
	Total	**1363**	**545**	**1277**	**444**	**9.21**	**6.89**	33.67	2.32
Black gram	Bihar	200	80	75	30	13.33	9.29	43.50	4.04
	Jharkhand	100	40	25	10	11.50	7.50	53.33	4.00
	Total	**300**	**120**	**100**	**40**	**12.87**	**8.84**	45.59	4.03
Grand Total		**1663**	**665**	**1377**	**484**	-	-	-	-

Oil seeds crops

With the target of increasing oilseed production and productivity in India as well as decreasing the import bill of oilseed cluster frontline demonstration programme was launched. CFLD on oilseeds altogether covered 5267.90 ha through 14432 demonstrations by KVKs of Bihar and Jharkhand against the target of 5500.00 ha and 13750 demonstrations in farmer's field (Table 67 a).

Kharif oilseed

In *Kharif* season CFLD on oilseed crop like sesame, niger, groundnut, soybean and sunflower altogether 3969 demonstrations were conducted covering 1266.70 ha against the target of 3525 demonstrations in 1410 ha. Among different oilseed crop maximum number of demonstration (1422) was under taken in groundnut with area coverage of 311.7 ha of which 922 demonstrations with 228.2 ha area under KVKs of Jharkhand. Second important crop was sesame, in which 947 demonstration was conducted in 340 ha

area in Bihar and Jharkhand KVKs resulting in 47.61 *per cent* more yield over local check in Jharkhand whereas, in Bihar 36.76 %. Another important oilseed crop, niger in which 887 demonstrations were conducted covering an area of 340 ha. Demonstration programme in soybean and sunflower were also conducted covering 170 and 90 ha respectively both the states (Table 67(b)).

Table 67 (a): State wise Cluster Frontline Demonstration on Oilseed

State	Target of CFLD Approved		Achievement of CFLD		Average yield (q/ha)		Yield Increase (%)	Difference of yield between demo and local (q/ha)
	No. of Demonstration	Area (ha)	No. of Demonstration	Area (ha)	Demo	Local		
Bihar	8525	3410	9780	3660.5	11.90	8.67	37.25	3.23
Jharkhand	5225	2090	4652	1607.4	9.39	6.16	52.37	3.23
Grand Total	**13750**	**5500**	**14432**	**5267.9**	**10.62**	**7.37**	43.99	3.24

Table 67 (b): Cluster Frontline Demonstration on *Kharif* Oilseed

Crops	State	Target of CFLD Approved		Achievement of CFLD		Average yield (q/ha)		Yield Increase (%)	Difference of yield between demo and local (q/ha)
		No. of Demonstration	Area (ha)	No. of Demonstration	Area (ha)	Demo	Local		
Sesame	Bihar	275	110	350	120	6.23	4.55	36.76	1.67
	Jharkhand	700	280	597	220	5.30	3.59	47.61	1.71
	Total	**975**	**390**	**947**	**340**	**5.55**	**3.85**	44.23	1.70
Niger	Bihar	50	20	50	20	5.20	3.27	63.30	2.07
	Jharkhand	875	350	837	335	5.85	3.74	56.33	2.11
	Total	**925**	**370**	**887**	**355**	**5.72**	**3.72**	53.63	2.00
Ground nut	Bihar	250	100	500	83.5	13.06	9.53	37.03	3.53
	Jharkhand	575	230	922	228.2	13.60	9.34	45.54	4.26
	Total	**825**	**330**	**1422**	**311.7**	**13.52**	**9.37**	44.30	4.15
Soybean	Bihar	400	160	349	130	13.83	8.32	66.33	5.52
	Jharkhand	125	50	108	40	13.47	9.18	46.84	4.30
	Total	**525**	**210**	**457**	**170**	**13.63**	**8.81**	54.73	4.82
Sunflower	Bihar	125	50	77	30	12.73	9.68	31.52	3.05
	Jharkhand	150	60	179	60	11.12	7.78	42.93	3.34
	Total	**275**	**110**	**256**	**90**	**11.58**	**8.32**	39.14	3.26
Grand Total		**3525**	**1410**	**3969**	**1266.7**	-	-	-	-

Fig: Field view of kharif oilseed demostration

Rabi Oilseeds

In Rabi season under oilseed crop cluster front line demonstrations were conducted by the KVKs of Bihar and Jharkhand for an area of 3699.20 ha against target of 3670.00 ha in CFLD on oilseed. In rapeseed & mustard, the KVKs of Bihar conducted 6453 demonstration covering area of 2579 ha with 37.83*per cent* increase in demonstration yield over local check, while in Jharkhand it was 72.62 *per cent*. In linseed, the demonstrations in clustered mode covered 479.0 ha area and recording 32.57 and 78.55 *per cent* higher yield over the local check in Bihar and Jharkhand state, respectively. The KVKs of Bihar recorded the yield increase to tune of 35.28 per cent in sesame, whereas in sunflower yield increase was 44.68 % (Table 68).

Table 68: Cluster Frontline Demonstration on Rabi Oilseed

Crops	State	Target of CFLD Approved		Achievement of CFLD		Average yield (q/ha)		Yield Increase (%)	Difference of yield between demo and local (q/ha)
		No. of Demon-stration	Area (ha)	No. of Demon-stration	Area (ha)	Demo	Local		
Mustard	Bihar	5525	2210	6453	2579	13.00	9.43	37.83	3.57
	Jharkhand	1625	650	1478	531.2	12.76	7.39	72.62	5.37
	Total	**7150**	**2860**	**7931**	**3110.2**	**12.95**	**9.00**	43.99	3.96
Sunflower	Bihar	175	70	187	60	17.00	11.75	44.68	5.25
	Jharkhand	125	50	52	20	-	-	-	-
	Total	**300**	**120**	**239**	**80**	**17.00**	**11.75**	44.68	5.25
Sesame	Bihar	50	20	75	30	6.02	4.45	35.28	1.57
	Jharkhand	50	20	-	-	-	-	-	-
	Total	**100**	**40**	**75**	**30**	**6.02**	**4.45**	35.28	1.57
Safflower	Jharkhand	50	20	-	-	-	-	-	-
	Total	**50**	**20**	**-**	**-**	**-**	**-**	**-**	**-**
Linseed	Bihar	850	340	992	326	9.08	6.85	32.57	2.23
	Jhark hand	725	290	425	153	7.96	4.46	78.55	3.50
	Total	**1575**	**630**	**1417**	**479**	**8.60**	**5.73**	50.00	2.87
Grand Total		**9175**	**3670**	**9662**	**3699.2**	**-**	**-**	**-**	**-**

Fig: Field view of rabi oilseed demostration

Summer oilseeds

Cluster frontline demonstrations were also conducted during summer 2021 on oilseed crop (sunflower, sesame and groundnut) in an area of 302 ha against the targeted area of 420 ha covering 801 demonstrations against the target of 1050 demonstration. Sunflower and sesame were successful in Bihar and failed in Jharkhand. Yield increase to a tune of 40.32 and 10.17 % were recorded in sunflower and sesame in Bihar with yield difference of 4.79 and 0.53 q/ha respectively (Table 69). In groundnut overall % yield of 37.37 was recorded.

Table 69: Cluster Frontline Demonstration on Summer Oilseed

Crops	State	Target of CFLD Approved		Achievement of CFLD		Average yield (q/ha)		Yield Increase (%)	Difference of yield between demo and local (q/ha)
		No. of Demon-stration	Area (ha)	No. of Demon-stration	Area (ha)	Demo	Local		
Sunflower	Bihar	300	120	204	80	16.66	11.87	40.32	4.79
	Jharkhand	75	30						0.00
	Total	**375**	**150**	**204**	**80**	**16.66**	**11.87**	40.32	4.79
Sesame	Bihar	350	140	334	122	5.74	5.21	10.17	0.53
	Jharkhand	125	50						0.00
	Total	**475**	**190**	**334**	**122**	**5.74**	**5.21**	10.17	0.53
Groundnut	Bihar	175	70	209	80	15.47	11.38	35.95	4.09
	Jharkhand	25	10	54	20	14.36	10.10	42.18	4.26
	Total	**200**	**80**	**263**	**100**	**15.19**	**11.06**	37.37	4.13
Grand Total		**1050**	**420**	**801**	**302**				

Fig: Field view of summer oilseed demostration

Training Achievements

Training Achievements

Adequate knowledge and technological skills are pre-requisite in developing agriculture through adoption / application of improved agricultural technologies practices. Large number of farmers and farm-women came forward to register their names for acquiring improved updated knowledge and recent technological skills in different areas of cereal crop, vegetable, fruit production, cultivation of ornamental plants, management of plantation crop, livestock production and management, home science and women empowerment, agricultural engineering, plant protection, fisheries development, production of inputs at site, capacity building and group dynamics, agro-forestry and other areas. Rural youths, on the other hand also enrolled their name to obtain hands on skill training in more specific areas which has potentiality for enterprise development in the respective districts. In respect to extension functionaries, the assessment of training need is made by the concerned departments/organizations for the knowledge up-gradation. KVKs help them to refresh and upgrade their knowledge mainly in the areas of frontier technology developed by research institution and universities for their application in farmers' field. For imparting training to farmers, rural youths and extension functionaries, the KVKs conduct trainings on-campus and off-campus condition as per the requirement of training course curriculum. As the farmers need field application of newly generated technologies/practices, concentrated emphasis was given by the KVKs on providing a greater number of on-campus training programs. A total of 5767 numbers of training programs was organized by the KVKs, covering 182181farmers. Participation of farm women in these training programs was 50605, whereas number of farm men was 131576. (Table 70).

Table 70 :Training Programme for farmers &farm women (Bihar & Jharkhand)

Thematic Area	No. of Courses	Farmer & Farm Women participants (no.)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Bihar	4258	83355	16752	16892	11182	2831	1837	103078	29771	132849
Jharkhand	1509	10628	6756	3666	3529	14204	10549	28498	20834	49332
G. Total	**5767**	**93983**	**23508**	**20558**	**14711**	**17035**	**12386**	**131576**	**50605**	**182181**

Category-wise/thematic training programs

Detailed analysis of category-wise training programs organized by the KVKs of Zone-IV indicated that out of total 5767 programmes, 1327 courses were conducted in crop production related areas. Among horticulture crop training programme organized on many aspects' vegetable crops (636), fruit crops (228), ornamental plants (34), plantation crop (20), tuber crops (23), spices (16) and medicinal and aromatic plants (23). Other major categories of training programme were soil health and fertility management (562), livestock production and management (543), home science and women empowerment (634), agricultural engineering (552), plant protection (672),production of inputs at site (89), capacity building and group dynamics (232), agro-forestry (5) and in others programmes (45) (Table 71).

Table 71: Category wise training programs organized

Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Crop production	1327	26434	3650	5577	2363	4541	2559	36552	8572	45124
Horticultural crop	980	15309	3677	3806	2385	2772	2088	21887	8150	30037
a. Vegetable	636	9942	2544	2538	1719	1880	1351	14360	5614	19974
b. Fruit	228	3855	686	838	394	495	411	5188	1491	6679
c. Ornamental	34	418	81	124	27	217	130	759	238	997
d. Plantation	20	243	130	97	55	32	28	372	213	585
e. Tuber	23	242	110	68	110	45	106	355	326	681
f. Spices	16	317	23	57	26	5	0	379	49	428
g. Medicinal and Aromatic	23	292	103	84	54	98	62	474	219	693
Soil health and fertility management	562	10237	1892	1670	828	2330	1358	14237	4078	18315
Livestock production and management	543	7435	1854	1988	1659	2472	1554	11895	5067	16962
Home science/women empowerment	634	3553	5977	972	4043	599	2079	5124	12099	17223
Agricultural engineering	552	10751	1525	2345	965	693	606	13789	3096	16885
Plant protection	672	12454	2898	2592	1390	1986	1194	17032	5482	22514

Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Fisheries	126	2199	143	470	49	213	101	2882	293	3175
Production input	89	995	515	287	176	508	329	1790	1020	2810
Capacity building programme	232	3397	1140	686	720	829	440	4912	2300	7212
Agro-forestry system	5	123	21	5	22	0	0	128	43	171
Other activities	45	1096	216	160	111	92	78	1348	405	1753
Grand Total	**5767**	**93983**	**23508**	**20558**	**14711**	**17035**	**12386**	**131576**	**50605**	**182181**

Crop production

A further classification of thematic area-wise training programmes organized by the KVKs revealed that in crop production thematic area total 1327 number of courses were conducted by the 68 KVKs for 45124 farmers of which 8572 were farm women. Among various sub-thematic areas, maximum number of courses (330) were offered in integrated crop management in which total 11398 farmers participated of which 2102 were farm women followed by weed management 174 courses in which 5748 farmers participated among them 1173 were farm women. Other sub-thematic areas like seed production (153), resource conservation technologies (147), cropping system (94) and water management (66) and integrated farming (61) courses were offered (Table 72).

Table 72: Training programme on crop production thematic area

Thematic Area	No. of Courses	No. of Participants(Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Crop diversification	38	621	151	167	67	291	192	1079	410	1489
Cropping systems	94	1495	308	390	122	530	197	2415	627	3042
Integrated crop management	330	6826	719	1401	755	1069	628	9296	2102	11398
Integrated farming	61	1721	205	309	93	592	216	2622	514	3136
Nursery management	37	650	113	227	91	100	71	977	275	1252
Production of organic inputs	59	1198	217	232	69	149	43	1579	329	1908
Resource conservation Technologies	147	3342	304	529	134	273	128	4144	566	4710
Seed production	153	2581	317	570	272	384	179	3535	768	4303
Water management	66	1167	283	301	185	160	82	1628	550	2178
Weed management	174	3325	548	876	350	374	275	4575	1173	5748
Other (cultivation of crops)	151	3064	428	496	225	619	548	4179	1201	5380
Total	**1327**	**26434**	**3650**	**5577**	**2363**	**4541**	**2559**	**36552**	**8572**	**45124**

Horticultural crop

Horticulture is considered as the 2nd most important thematic areas where as a whole, 980 numbers of training courses were organized for 30,037 farmers of which 8150 were farm women (27.13%). Among seven sub-thematic areas, highest number of courses was offered in cultivation of vegetable crops (636) with 19974 total farmers' participants followed by cultivation of fruit (228) with 6679 participations.

Among vegetable crops more focus was on cultivation of vegetable crops (176) in which 5834 farmers participated followed by nursery raising techniques (97) with 2708 participations. In fruit crops the maximum priority was on layout and management of orchards (54) courses in which 1394 farmers participated followed by cultivation of fruit (50) programmes with 1561 participants and Management of young plants/orchards (31) courses covering 1007 farmers. Among plantation crop emphasis was given on production and management technology in which 12 courses were conducted with 339 participations (Table 73).

Table 73: Training programme for horticultural crop thematic area

Horticulture Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Vegetable Crops										
Enterprise development	23	471	135	90	82	37	21	598	238	836
Export potential vegetables	11	193	52	60	36	33	6	286	94	380
Grading and standardization	11	253	13	51	4	5	7	309	24	333
Integrated nutrient management	81	1424	236	367	153	137	136	1928	525	2453
Nursery raising techniques	97	1266	343	301	219	271	308	1838	870	2708
Off-season vegetables	48	456	189	256	107	262	212	974	508	1482
Cultivation of vegetable crops	176	2523	953	590	630	685	453	3798	2036	5834
Production of low volume and high value crops	42	592	132	203	132	173	61	968	325	1293
Protective cultivation	45	682	180	220	142	100	71	1002	393	1395
Skill development	17	328	27	52	16	11	13	391	56	447
Training and pruning	10	146	25	62	44	32	16	240	85	325
Water management	22	332	123	78	55	55	19	465	197	662
Yield increment	27	549	53	124	45	17	0	690	98	788
Sub total (a)	**636**	**9942**	**2544**	**2538**	**1719**	**1880**	**1351**	**14360**	**5614**	**19974**
Fruit Crops										
Cultivation of fruit	50	957	82	132	48	173	169	1262	299	1561
Export potential fruits	17	249	54	104	45	6	28	359	127	486
Layout and management of orchards	54	789	172	184	71	109	69	1082	312	1394
Management of young plants/ orchards	31	566	96	129	80	69	67	764	243	1007

Horticulture Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Micro irrigation systems of orchards	11	127	46	23	25	33	27	183	98	281
Plant propagation techniques	26	302	55	60	55	89	46	451	156	607
Rejuvenation of old orchards	14	259	65	109	34	4	3	372	102	474
Training and Pruning	13	332	96	46	17	8	2	386	115	501
Others	12	274	20	51	19	4	0	329	39	368
Sub total (b)	**228**	**3855**	**686**	**838**	**394**	**495**	**411**	**5188**	**1491**	**6679**
Ornamental Plants										
Export potential of ornamental plants	4	54	6	35	6	26	40	115	52	167
Management of potted plants	9	52	13	16	6	121	36	189	55	244
Nursery management	9	98	15	39	8	49	34	186	57	243
Propagation techniques of Ornamental Plants	7	107	18	16	2	16	20	139	40	179
Others	5	107	29	18	5	5	0	130	34	164
Sub total (c)	**34**	**418**	**81**	**124**	**27**	**217**	**130**	**759**	**238**	**997**
Plantation crops										
Processing and value addition	5	59	8	22	3	25	28	106	39	145
Production and Management technology	12	143	122	45	22	7	0	195	144	339
Others	3	41	0	30	30	0	0	71	30	101
Sub total (d)	**20**	**243**	**130**	**97**	**55**	**32**	**28**	**372**	**213**	**585**
Tuber crops										
Processing and value addition	3	43	5	8	1	0	21	51	27	78
Production and Management technology	18	172	105	60	109	29	71	261	285	546
Others	2	27	0	0	0	16	14	43	14	57
Sub total (e)	**23**	**242**	**110**	**68**	**110**	**45**	**106**	**355**	**326**	**681**
Spices										
Processing and value addition	2	34	13	7	5	0	0	41	18	59
Production and Management technology	11	218	10	44	21	1	0	263	31	294
Others	3	65	0	6	0	4	0	75	0	75
Sub total (f)	**16**	**317**	**23**	**57**	**26**	**5**	**0**	**379**	**49**	**428**
Medicinal and Aromatic Plants										
Nursery management	5	89	20	27	11	8	15	124	46	170
Post-harvest technology and value addition	6	64	36	23	32	1	1	88	69	157

Horticulture Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Production and management technology	8	112	30	29	9	39	17	180	56	236
Nursery management	5	89	20	27	11	8	15	124	46	170
Others	2	0	11	0	0	39	26	39	37	76
Sub total (g)	**23**	**292**	**103**	**84**	**54**	**98**	**62**	**474**	**219**	**693**
Total (a to g)	**980**	**15309**	**3677**	**3806**	**2385**	**2772**	**2088**	**21887**	**8150**	**30037**

Soil health and fertility management

Soil health and fertility management is another important thematic area where 562 training coursed were offered for 18315 farmers in which integrated nutrient management (183), soil fertility management (85), production and use of organic inputs (78) and soil and water testing (77) courses covered with 5469, 2697, 2415 and 2518 participations of farmers, respectively. Other areas like micronutrient deficiency in crops, nutrient use efficiency and soil and water conservation were also covered (Table 74).

Table 74: Training programme on soil health and fertility management

Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Integrated nutrient management	183	3256	540	460	225	604	384	4320	1149	5469
Management of problematic soils	17	311	28	113	8	39	41	463	77	540
Micro nutrient deficiency in crops	43	761	152	111	103	156	118	1028	373	1401
Nutrient use efficiency	30	591	64	95	25	115	42	801	131	932
Production and use of organic input	78	1437	157	214	75	325	207	1976	439	2415
Soil and water conservation	30	595	318	163	117	206	149	964	584	1548
Soil and water testing	77	1286	301	214	147	366	204	1866	652	2518
Soil fertility management	85	1437	275	251	123	427	184	2115	582	2697
Others	19	563	57	49	5	92	29	704	91	795
Total	**562**	**10237**	**1892**	**1670**	**828**	**2330**	**1358**	**14237**	**4078**	**18315**

Livestock production and management

Livestock production and management was considered as an important frontier area for training both in respect of number of courses offered and participation of farmers took place. In this thematic area, 543 courses were conducted for 16962 farmers of which 5067 were farm women covering 29.87 % of the

participants. Among different courses; goatery (113), disease management (109), dairy management (99), poultry management (85) and feed management (73) training were conducted by the KVKs for 3853, 3126, 2872, 2466 and 2211 numbers of farmers' participations, respectively (Table 75).

Table 75: Training programme on livestock production and management

Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Dairy management	99	1606	268	421	290	169	118	2196	676	2872
Disease management	109	1485	367	334	232	438	270	2257	869	3126
Feed management	73	1000	280	281	227	312	111	1593	618	2211
Goatery	113	1792	405	445	399	526	286	2763	1090	3853
Piggery management	22	81	44	53	39	220	191	354	274	628
Poultry management	85	787	309	324	415	338	293	1449	1017	2466
Production of quality animal products	24	215	83	64	30	305	246	584	359	943
Fish management	5	168	9	24	2	79	18	271	29	300
Others	13	301	89	42	25	85	21	428	135	563
Total	543	7435	1854	1988	1659	2472	1554	11895	5067	16962

Home science/women empowerment

In terms of courses offered and participation, home science/women empowerment was considered as fifth important areas, where 634 courses were conducted for 17223 farmers of which 12099 were women covering 70.25 per cent of the participants. Among topics household food security by kitchen gardening and nutrition gardening (129) and value addition (127) were considered important sector with 2630 and 2433 farm women participations respectively (Table 76).

Table 76: Training programme for home science/women empowerment

Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Capacity building	11	61	52	22	87	12	63	95	202	297
Design and development of low/minimum cost diet	47	135	494	56	352	45	139	236	985	1221
Designing and development for high nutrient effciency diet	25	85	240	22	201	28	182	135	623	758
Enterprise development	53	593	329	138	161	26	156	757	646	1403

Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Gender mainstreaming through SHGs	11	53	154	24	83	12	23	89	260	349
Household food security by kitchen gard ening and nutrition gardening	129	780	1280	156	1019	95	331	1031	2630	3661
Income generation activities for empowerment of rural Women	44	116	605	21	392	61	235	198	1232	1430
Location specific drudgery reduction technologies	11	33	51	33	112	14	36	80	199	279
Minimization of nutrient loss in processing	26	124	158	17	111	18	132	159	401	560
Rural Crafts	10	16	104	12	61	5	36	33	201	234
Storage loss minimization techniques	36	321	252	75	168	24	97	420	175	937
Value addition	127	501	1218	206	799	116	417	823	2434	3257
Women and child care	42	69	432	20	319	66	181	155	932	1087
Others	62	666	608	170	178	77	51	913	837	1750
Total	**634**	**3553**	**5977**	**972**	**4043**	**599**	**2079**	**5124**	**12099**	**17223**

Agricultural engineering

Agriculture engineering is another emerging area in which 552 training programmes conducted and altogether 16885 farmers participated in which 18.33% were farm women. Among thematic areas, repair and maintenance of farm machinery and implements (199), installation and maintenance of micro irrigation systems (93) and post-harvest technology (46) were considered as the most important sub-thematic both in terms of courses conducted and farmers participated to the extent of 5670, 3040 and 1334 respectively (Table 77).

Table 77: Training programme on agricultural engineering

Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Farm mechanization	31	678	91	99	27	7	10	784	128	912
Installation and maintenance of micro irrigation systems	93	2013	287	304	110	195	131	2512	528	3040
Post harvest technology	46	765	98	152	129	109	81	1026	308	1334
Production of small tools and implements	34	667	83	114	62	67	31	848	176	1024
Repair and maintenance of farm machinery and implements	199	3518	500	938	294	151	269	4607	1063	5670
Small scale processing and value addition	26	454	145	121	70	16	7	591	222	813
Mechanization in agriculture	13	523	36	64	19	0	0	587	55	642
Use of plastics in farming practices	31	543	119	177	71	116	66	836	256	1092
Others	79	1590	166	376	183	32	11	1998	360	2358
Total	552	10751	1525	2345	965	693	606	13789	3096	16885

Plant protection

Plant protection is other important thematic area both in terms of training programmes conducted and participation of farmers. The KVKs of Bihar and Jharkhand together organized 672 numbers of courses for the benefit of 22514 farmers of which 5482 participants were farm-women. Among them integrated pest management in which 346 courses were conducted with 11583 participations followed by integrated disease management (163) courses with 5477 participants and bio-control of pests and diseases with 55 courses involving 2185 participants were thrust areas (Table78).

Table 78: Training programme on plant protection aspects

Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Bio-control of pests and diseases	55	926	464	293	144	204	154	1423	762	2185

Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Integrated disease management	163	2801	803	606	411	540	316	3947	1530	5477
Integrated pest management	346	7214	1254	1367	641	642	465	9223	2360	11583
Production of bio control agents and bio pesticides	44	392	57	120	50	322	179	834	286	1120
Others	64	1121	320	206	144	278	80	1605	544	2149
Total	**672**	**12454**	**2898**	**2592**	**1390**	**1986**	**1194**	**17032**	**5482**	**22514**

Fisheries

In fishery science 126 numbers of courses were conducted by the KVKs with involvement of 3175 farmers and farm women. Among different aspects integrated fish farming, composite fish culture & fish disease and fish feed production & application to fish pond were more focused by covering 36, 35 and 17 courses during the year 2021 with involvement of 943, 838 and 447 farmer participations respectively (Table 79).

Table 79: Training programme on fisheries

Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Fisheries										
Carp breeding and hatchery management	7	120	0	22	0	7	2	149	2	151
Carp fry and fingerling rearing	5	60	5	22	2	29	16	111	23	134
Composite fish culture & fish disease	35	624	23	102	12	46	31	772	66	838
Fish feed preparation & its application to fish pond, like nursery, rearing & stocking pond	17	306	33	46	12	38	12	390	57	447
Fish processing and value addition	4	68	13	25	3	0	0	93	16	109
Hatchery management and culture of freshwater prawn	5	93	1	24	2	5	0	122	3	125

Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Fisheries										
Integrated fish farming	36	648	48	128	14	65	40	841	102	943
Pearl culture	3	50	1	12	0	1	0	63	1	64
Pen culture of fish and prawn	2	39	5	4	2	0	0	43	7	50
Portable plastic carp hatchery	6	106	5	47	0	10	0	163	5	168
Others	6	85	9	38	2	12	0	135	11	146
Total	**126**	**2199**	**143**	**470**	**49**	**213**	**101**	**2882**	**293**	**3175**

Production of inputs

Production of inputs at site was another thematic area where 89 courses offered and 2810 trainees received training on vermi-compost production, organic manure production, seed production, bio-fertilizer production etc (Table 80).

Table 80: Training programme on production of inputs

Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Fisheries										
Carp breeding and hatchery management	7	120	0	22	0	7	2	149	2	151
Carp fry and fingerling rearing	5	60	5	22	2	29	16	111	23	134
Composite fish culture & fish disease	35	624	23	102	12	46	31	772	66	838
Fish feed preparation & its application to fish pond, like nursery, rearing & stocking pond	17	306	33	46	12	38	12	390	57	447
Fish processing and value addition	4	68	13	25	3	0	0	93	16	109
Hatchery management and culture of freshwater prawn	5	93	1	24	2	5	0	122	3	125
Integrated fish farming	36	648	48	128	14	65	40	841	102	943
Pearl culture	3	50	1	12	0	1	0	63	1	64
Pen culture of fish and prawn	2	39	5	4	2	0	0	43	7	50
Portable plastic carp	6	106	5	47	0	10	0	163	5	168
Others	6	85	9	38	2	12	0	135	11	146
Total	**89**	**995**	**515**	**287**	**176**	**508**	**329**	**1790**	**1020**	**2810**

Capacity building programme

KVKs of Bihar and Jharkhand conducted 232 numbers of courses for 7212 farmers and farm-women in capacity building and group dynamics. Major areas covered in this thematic area included courses on formation and management of SHGs (53), entrepreneurial development of farmers/youths (53), group dynamics (33), leadership development (24) and mobilization of social capital (20) with participation of 1751, 1681, 985, 669 and 603 farmers, respectively (Table 81).

Table 81: Training programme on capacity building programme

Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Entrepreneurial development of farmers/youths	53	636	183	133	164	416	149	1185	496	1681
Formation and management of SHGs	53	903	363	92	195	102	96	1097	654	1751
Group dynamics	33	517	185	90	89	58	46	665	320	985
Integrated farming systems	16	296	24	90	15	66	30	452	69	521
Leadership development	24	305	88	94	83	51	48	450	219	669
Mobilization of social capital	20	211	165	62	119	31	15	304	299	603
Nursery management	4	34	12	22	5	22	12	78	29	107
WTO and IPR issues	5	83	4	13	2	17	0	113	6	119
Others	21	339	112	86	45	66	44	491	201	692
Total	**232**	**3397**	**1140**	**686**	**720**	**829**	**440**	**4912**	**2300**	**7212**

Agro-forestry system

The KVKs also organized 5 courses on agro-forestry covering integrated farming system (2) and production technologies (3) with involvement of 128 and 43 farmers and farm women, respectively etc (Table82).

Table 82: Training programme for agro-forestry system

Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Integrated farming systems	2	44	6	0	0	0	0	44	6	50
Production technologies	3	79	15	5	22	0	0	84	37	121
Total	**5**	**123**	**21**	**5**	**22**	**0**	**0**	**128**	**43**	**171**

Other activities

The KVKs also organsised training programme for some other agriculture related activities like bee keeping, integrated crop management etc. with involvement of 1753 farmers in which 405 were farm womens (Table 83).

Table 83: Training programme on other activities

Thematic Area	No. of Courses	No. of Participants (Farmer & Farm Women)								
		Other		SC		ST		Total		
		M	F	M	F	M	F	M	F	T
Bee keeping	2	32	1	2	0	2	0	36	1	37
Entrepreneurship development	2	3	10	0	0	30	62	33	72	105
Integrated crop management	3	84	12	4	0	20	0	108	12	120
Organic farming	4	54	0	39	16	19	6	112	22	134
GKMS	34	923	193	115	95	21	10	1059	298	1357
Total	**45**	**1096**	**216**	**160**	**111**	**92**	**78**	**1348**	**405**	**1753**

Rural youth

With the objective of provide skill-oriented training to rural youth for self-employment generation, KVKs of Zone-IV conducted various enterprise-oriented training programmes in a planned manner for a large number of rural youths during 2021. In the course of imparting knowledge and technical skill, KVKs conducted 1171 numbers of training programmes for the benefit of 30,642 rural youths covering 20,799 rural boys and 9,843 rural girls. Among the participants 17.72 % were schedule caste and 17.40 % Schedule Tribe. In terms of courses preferred, mushroom production was mostly preferred by the 4988 trainees. The second highest number of trainees (2691) was recorded for nursery management of horticulture crops followed by integrated farming (2396) and bee-keeping (2362) numbers of trainees.

In case of animal sector, sheep and goat farming was taken by 1766 people in 60 courses. Under dairy sector 43 courses was selected by 1171 participants; in value addition 53 courses by 1427 trainees, poultry production in 1135 trainees participated in 49 courses, seed production by 1768 youth and vermi-culture in 40 courses by 1159 trainees . Overall trend showed that rural youths including girls have relied on the skill training from KVKs for self-employment generation and getting additional income through agro-based enterprises (Table 84 and 85).

Table 84: Training Programme for Rural Youth (State wise at a Glance)

State	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Bihar	791	12008	3720	15728	2526	1695	4221	402	244	646	14936	5659	20595
Jharkhand	380	2616	1534	4150	594	615	1209	2653	2035	4688	5863	4184	10047
Total	**1171**	**14624**	**5254**	**19878**	**3120**	**2310**	**5430**	**3055**	**2279**	**5334**	**20799**	**9843**	**30642**

Table 85: Training Programme for Rural Youth (Thematic Area wise)

Thematic Area	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Beekeeping	109	1313	394	1707	243	151	394	215	46	261	1771	591	2362
Commercial fruit production	14	239	71	310	56	7	63	37	34	71	332	112	444
Composite fish culture	16	265	13	278	67	10	77	17	4	21	349	27	376
Dairying	43	727	135	862	109	44	153	102	54	156	938	233	1171
Enterprise development	53	756	313	1069	75	158	233	226	113	339	1057	584	1641
Fish harvest and processing technology	3	44	20	64	15	2	17	8	10	18	67	32	99
Freshwater prawn culture	5	81	21	102	18	5	23	8	2	10	107	28	135
Fry and fingerling rearing	5	89	11	100	26	3	29	8	1	9	123	15	138
Integrated farming	92	1367	290	1657	216	77	293	274	172	446	1857	539	2396
Mushroom production	204	1960	1204	3164	472	516	988	314	522	836	2746	2242	4988
Nursery management of Horticulture crops	98	1120	496	1616	316	165	481	306	288	594	1742	949	2691
Ornamental fisheries	3	27	20	47	6	0	6	10	0	10	43	20	63
Para extension workers	2	28	4	32	16	3	19	0	0	0	44	7	51
Para vets	5	115	34	149	15	9	24	47	13	60	177	56	233
Pearl culture	2	82	6	88	0	0	0	0	0	0	82	6	88
Piggery	11	54	15	69	38	23	61	148	48	196	240	86	326
Plant propagation technique	31	459	64	523	107	82	189	44	13	57	610	159	769
Planting material production	33	278	184	462	78	107	185	50	118	168	406	409	815
Post-harvest technology	28	325	88	413	73	71	144	91	83	174	489	242	731
Poultry production	49	564	93	657	125	53	178	180	120	300	869	266	1135
Production of organic inputs	8	92	33	125	8	8	16	27	4	31	127	45	172
Production of quality animal products	5	17	39	56	1	3	4	33	17	50	51	59	110
Protected cultivation of vegetable crops	4	84	13	97	9	5	14	2	1	3	95	19	114

Thematic Area	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Quail farming	4	84	13	97	9	5	14	2	1	3	95	19	114
Repair and maintenance of farm machinery and implements	56	1013	123	1136	176	48	224	152	12	164	1341	183	1524
Rural crafts	13	86	125	211	16	71	87	12	39	51	114	235	349
Seed production	66	1119	142	1261	209	66	275	168	64	232	1496	272	1768
Sericulture	2	40	0	40	6	0	6	0	0	0	46	0	46
Sheep and goat rearing	60	965	275	1240	212	70	282	165	79	244	1342	424	1766
Small scale processing	11	12	134	146	4	44	48	54	61	115	70	239	309
Tailoring and stitching	15	8	77	85	5	99	104	30	32	62	43	208	251
Training and pruning of orchards	11	153	21	174	49	10	59	22	5	27	224	36	260
Value addition	53	322	465	787	118	258	376	62	202	264	502	925	1427
Vermiculture	40	613	137	750	144	39	183	158	68	226	915	244	1159
Others	21	207	194	401	92	103	195	85	54	139	384	351	735
Grand Total	**1171**	**14624**	**5254**	**19878**	**3120**	**2310**	**5430**	**3055**	**2279**	**5334**	**20799**	**9843**	**30642**

Extension Functionaries

State Government Departments Extension functionaries play vital role in disseminating the recent technologies among the larger agriculture farming communities. From time-to-time knowledge up-gradation of extension functionaries are required about recent technologies along with advancement in the agricultural sciences including animal sector. In this context, KVKs play an important role in updating technological knowledge and skill in the frontier areas of the agriculture and allied sectors. A total of 669 training programme were conducted in various thematic areas for 25445 extension functionaries comprising 6532 females and 18913 males. Among different thematic area of training programmes, productivity enhancement in field crops is preferred one with 108 courses followed by integrated nutrient management (87), integrated pest management (73), protected cultivation technology (47), care and maintenance of farm machinery and implements (38) and value addition (36) were in the

priority list. In productivity enhancement in field crops 108 courses were conducted in which 4764 extension functionaries participated at the same time 87 courses were organized for 3642 extension functionaries in the field of integrated nutrient management. At the same time 47 courses in protected cultivation technology for 1698 persons and 33 courses in household securities for 1043 extensionist, respectively. Rejuvenation of old senile orchards, formation and management of SHGs, management of farm animals were other important thematic areas of training to the extension functionaries and complete details can be seen in Table 86 and Table 87. In order to extend the benefit to large number of extension worker, the trainees include line department officials, teachers, NGO staff and other agricultural related workers of Bihar and Jharkhand.

Table 86: Training programme for Extension Functionaries (statewise at a glance)

State	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Bihar	491	13303	2980	16283	2388	904	3292	109	26	135	15800	3910	19710
Jharkhand	178	1814	1073	2887	327	342	669	972	1207	2179	3113	2622	5735
Total	**669**	**15117**	**4053**	**19170**	**2715**	**1246**	**3961**	**1081**	**1233**	**2314**	**18913**	**6532**	**25445**

Table 87: Training programme for extension functionaries (Thematic Area wise)

Thematic Area	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Capacity building for ICT application	11	165	100	265	25	23	48	31	32	63	221	155	376
Care and maintenance of farm machinery and implements	38	1458	146	1604	222	32	254	6	0	6	1686	178	1864
Crop intensification	7	442	31	473	98	26	124	10	2	12	550	59	609
Formation and management of SHGs	10	183	54	237	49	32	81	21	16	37	253	102	355
Gender mainstreaming through SHGs	9	49	75	124	19	34	53	1	20	21	69	129	198
Group dynamics and farmers org.	18	445	130	575	41	37	78	29	18	47	515	185	700

Thematic Area	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Household food security	33	232	530	762	107	125	232	16	33	49	355	688	1043
Information networking among farmers	10	131	19	150	12	3	15	1	0	1	144	22	166
Integrated nutrient management	87	2388	410	2798	449	92	541	121	182	303	2958	684	3642
Integrated pest management	73	1880	268	2148	281	104	385	147	77	224	2308	449	2757
Livestock feed and fodder production	28	798	94	892	123	34	157	80	40	120	1001	168	1169
Low cost and nutrient effcient diet designing	24	37	390	427	10	132	142	5	403	408	52	925	977
Management in farm animals	7	192	20	212	36	11	47	38	2	40	266	33	299
Production and use of organic inputs	43	914	225	1139	127	42	169	51	59	110	1092	326	1418
Productivity enhancement in field crops	108	3120	435	3555	643	145	788	276	145	421	4039	725	4764
Protected cultivation technology	47	1108	191	1299	199	68	267	89	43	132	1396	302	1698
Rejuvenation of old orchards	27	505	135	640	83	29	112	65	25	90	653	189	842
Value addition	36	500	246	746	82	105	187	27	48	75	609	399	1008
Women and child care	24	49	369	418	18	104	122	16	54	70	83	527	610
WTO and IPR issues	1	0	20	20	0	9	9	0	10	10	0	39	39
Others	28	521	165	686	91	59	150	51	24	75	663	248	911
Grand Total	**669**	**15117**	**4053**	**19170**	**2715**	**1246**	**3961**	**1081**	**1233**	**2314**	**18913**	**6532**	**25445**

Sponsored training programme

The KVKs of ATARI Zone-IV is not only helping the farming community in receiving need-based support and information back-up but also attracting different organizations engaged in agricultural development activities to come in close contact with KVKs to improve the linkages between different agencies. Visit and interaction with KVKs and farming community convinced these organizations to solicit help and guidance from KVKs for better implementation of their plan of action. At the same time, the organizations felt it appropriate to utilize the expertise of KVKs in upbringing the knowledge and skill of their target beneficiary through HRD programmes of KVKs Zone-IV towards agricultural development in general and capacity building of farmers in particulars. A number of Govt. and other organizations have approached KVKs to get their clienteles training on various aspects of agricultural development, livestock rearing, fishery, post-harvest technology and value addition, farm machinery, women empowerment/ home science, capacity building etc. The KVKs, on the other hands, have tried to fulfill the expectations of those organizations apart from working on the mandated activities. During the year 2021 KVKs conducted 1197 courses for 48219 participants of which 10752 were female (Table 88).

Table 88: State wise sponsored training programme (at a glance)

State	No. of Courses	General			SC			ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Bihar	1003	29113	5355	34468	4844	2612	7456	406	144	550	34363	8111	42474
Jharkhand	194	1172	1173	2345	453	512	965	1479	956	2435	3104	2641	5745
Total	**1197**	**30285**	**6528**	**36813**	**5297**	**3124**	**8421**	**1885**	**1100**	**2985**	**37467**	**10752**	**48219**

The major areas of training covered by the KVKs were crop production and management (321) involving 19649 participants followed by home science involving 155 courses with 1775 participants, production and use of organic inputs (148) accommodating 6504 persons. In case of animal sector on livestock and production management 146 programmes covered involving 4773 persons, horticultural crops production (166) covering 3759 agricultural extension (100), farm machinery (42) and post-harvest technology & value addition (33) courses were conducted (Table 89). The trend of participation indicated that the sponsoring organizations preferred to get their clienteles trained in those areas where the participants might start their own venture for self-employment.

Table 89: Sponsored training conducted (thematic areawise)

Area of Training	No. of Courses	General			SC			ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Agricultural extension	100	2777	569	3346	430	291	721	78	53	131	3285	913	4198
Crop production & management	321	13480	2061	15541	2395	1336	3731	272	105	377	16147	3502	19649
Entrepreneurship development	136	1717	1090	2807	345	347	692	209	104	313	2271	1541	3812
Farm machinary	42	1812	248	2060	305	140	445	14	0	14	2131	388	2519
Home science	155	708	560	1268	161	221	382	53	72	125	922	853	1775
Horticultural crops production	116	2233	447	2680	394	208	602	239	238	477	2866	893	3759
Livestock production & management	146	2361	647	3008	445	247	692	710	363	1073	3516	1257	4773
Postharvest technology & value addition	33	723	209	932	111	111	222	73	3	76	907	323	1230
Production and use of organic inputs	148	4474	697	5171	711	223	934	237	162	399	5422	1082	6504
Total	**1197**	**30285**	**6528**	**36813**	**5297**	**3124**	**8421**	**1885**	**1100**	**2985**	**37467**	**10752**	**48219**

KVK East Champaran

KVK Ramgarh

Vocational training programme

KVKs of the Zone IV organized 235 vocational training programmes for 8,557 participants to address problem of unemployment among the rural youths during 2021 (Table 90). Category wise analysis of vocational training showed that rural youths and girls preferred maximum training in mushroom production. Based on the potential of agro-based enterprise in the district as well as interest of farmers, the KVKs identified frontier areas like mushroom production, goat farming, entrepreneurship development, vegetable cultivation, integrated farming system, income generation, dairy management, farm mechanization, commercial fruit production, value addition to enable the youths to develop their own enterprise/ consultancy as a source of their livelihood. In most of the cases, financial/ credit institutions were associated to help the youths for seed money which helped them overcome their anxiety in the case of enterprise development.

Table 90: **State wise Vocational Training Programme**

Sl. No.	State	No. of Training	Grand Total		
			Male	Female	Total
1	Bihar	188	4795	1850	6645
2	Jharkhand	47	1265	647	1912
Total		**235**	**6060**	**2497**	**8557**

Vocational training courses being of longer duration programme helped to upgrade the skill and knowledge of the rural youths and farmers. It was conducted in different areas of importance and most liked programme was mushroom production (44) courses covering 1704 participants. Secondly the goat farming (26) courses involving total 1032 rural persons of which 876 boys and 156 girls (Table 91). Thirdly in dairy management (19) for 634 participants covering 528 boys and 106 girls and fourth bee keeping (18) for 633 farmers of which 470 boys and 163 girls and fifth Poultry farming (12) for 424 trainees among them 309 boys and 115 girls. The KVK training programmes which helped to build up trained manpower for self- employment in different areas of rural farming and agro-based enterprises. About 366 participants were trained in commercial Fruit Production in 9 courses. Similarly, 341 rural youths had chosen farm mechanization as their desired vocational courses and were trained through 10

courses. Seed production, value addition, vermi-composting, organic farming, protected cultivation and tailoring and stitching were also the other areas where trainees showed their interest (Table 91).

Table 91: Vocational Training Programme

Sl. No.	Area of training	No. of Training	Grand Total		
			Male	Female	Total
1	Beekeeper	18	470	163	633
2	Commercial fruit Production	9	184	182	366
3	Dairy management	19	528	106	634
4	Entrepreneurship development	8	200	57	257
5	Farm mechanization	10	327	14	341
6	Fish production	3	90	36	126
7	Goat farming	26	876	156	1032
8	Income generation	8	139	129	268
9	Integrated farming system	3	201	94	295
10	Integrated nutrient management	6	268	45	313
11	Mushroom production	44	1089	615	1704
12	Organic farming	2	41	16	57
13	Poultry farming	12	309	115	424
14	Production of organic input	8	204	55	259
15	Protected cultivation	7	219	96	315
16	Seed production	13	274	61	335
17	Soil & water testing	4	152	31	183
18	Tailoring and stitching	5	27	122	149
19	Value addition	11	101	250	351
20	Vegetable cultivation	9	166	93	259
21	Vermicompost production	10	195	61	256
Grand Total		**235**	**6060**	**2497**	**8557**

Extension programmes

In creating awareness among farmers about the benefit of advanced agricultural and allied technologies, scientific livestock rearing, fish fingerling production, soil testing, group farming and other related aspects, the KVKs of Zone-IV organized 1,47,441 different extension activities to reach out 17,22,207 farmers and extension officials. Among the beneficiaries 16,89,611farmers and 32,596 extension officials participated in the extension activities. Gender-wise classification indicates that 453316 farm women took part in various extension activities against 1268891 numbers of farm men. In respect of extension officials, there are 7473 were women extension officials and 25123 were male extension officials (Table 92).

Table 92: State wise Extension Activities

Name of State	No. of activities	Farmer			Extension offcials			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Bihar	121417	650993	141857	792850	20839	5240	26079	671832	147097	818929
Jharkhand	26024	592775	303986	896761	4284	2233	6517	597059	306219	903278
Total	**147441**	**1243768**	**445843**	**1689611**	**25123**	**7473**	**32596**	**1268891**	**453316**	**1722207**

In respect of programme organized, advisory service was the most important extension activities conducted by KVKs where 71,727 number of advisory services were provided for 758299 number of farmers and farm women and 3612 for extension officials total 761911. A total of 5476 diagnostic visits were performed by the scientists to farmer's field covering 23174 famers and extension officials. On the other hand, altogether 102165 farmers and other officials visited to the KVKs of which 22941 were women. Another important category of extension activities by KVKs was scientific visit to farmer's field and total 8053 visit was made in which 50147 beneficiaries farmers benefitted. Organization of workshop was another window to update the farmer's knowledge and as such 208 workshops were organized by the KVKs for 16524 beneficiaries. Organization of exhibition is another way to show case the technology developed and total 89 exhibition and 447 exposure visits such were organized by the KVKs and benefitted 13133 and 26293 farmers including extension officials during the year (Table 93).

Method demonstration is also very effective tools of KVKs where 14578 farmers and 493 extension officials were benefited by organizing 414 numbers of programme. In spite of COVID-19 pandemic KVKs had conducted as many as 88 numbers of Farmer Seminars where 7441 beneficiaries participated. Other important extension activities carried out by the KVKs includes conducting kisan gosthi, field day, film show, group meeting, soil test campaign, self-help group conveners meeting, mahila mandal convener's meetings and farm science club conveners' meet, celebration of important days and others

Table 93: Extension activities organized under Zone IV jurisdiction

Name of Extension Activity	No. of activities	Farmer			Extension officials			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Advisory services		463435	294864	758299	2796	816	3612	466231	295680	761911
Agri-mobile clinic	8066	1510	292	1802	16	3	19	1526	295	1821
Animal health camp	113	4362	1105	5467	138	74	212	4500	1179	5679
Clinical service	154	212	29	241			0	212	29	241
COVID-19 awareness programme	7	589	260	849	5	0	5	594	260	854
Diagnostic visits	5476	18927	3582	22509	543	122	665	19470	3704	23174
Exhibition	89	8787	3539	12326	602	205	807	9389	3744	13133
Exposure visits	447	19777	5531	25308	783	202	985	20560	5733	26293

Name of Extension Activity	No. of activities	Farmer			Extension officials			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Ex-trainees sammelan	31	870	267	1137	42	27	69	912	294	1206
Farm science club conveners meet	32	1781	431	2212	79	36	115	1860	467	2327
Farmers seminar	88	5178	2047	7225	160	56	216	5338	2103	7441
Farmers visit to KVK	45880	80792	22505	103297	1432	436	1868	82224	22941	105165
Field day	670	21892	5751	27643	765	153	918	22657	5904	28561
Film show	497	14869	5967	20836	584	318	902	15453	6285	21738
FLD training	24	295	180	475			0	295	180	475
Group meetings	332	5470	2016	7486	3401	626	4027	8871	2642	11513
Jal shakti abhiyan	70	2101	1194	3295	71	13	84	2172	1207	3379
Kharif workshop	7	327	296	623	5	1	6	332	297	629
Kisan chaupal	9	255	79	334	11	6	17	266	85	351
Kisan ghosthi	792	46803	17861	64664	2099	571	2670	48902	18432	67334
Krishi chaupal	10	540	313	853			0	540	313	853
Lectures delivered as resource persons	1302	36953	12608	49561	1562	477	2039	38515	13085	51600
Kisan mela	100	60686	18422	79108	1933	648	2581	62619	19070	81689
Mahila mandals conveners meetings	23	270	831	1101	65	56	121	335	887	1222
Method demonstrations	414	10765	3813	14578	403	90	493	11168	3903	15071
mKisan portal	10	241889	0	241889			0	241889	0	241889
Parthenium awareness week	7	143	57	200	6	0	6	149	57	206
Live telecast	23	2723	1385	4108	80	14	94	2803	1399	4202
PM-Kisan samman nidhi yojana	12	2304	439	2743	54	56	110	2358	495	2853
Poshan mah	12	591	720	1311	25	24	49	616	744	1360
Rabi workshop	28	2866	608	3474	94	23	117	2960	631	3591
RAWE programme	2	45	1	46	0	0	0	45	1	46
Sankalp se siddhi	20	783	601	1384	154	32	186	937	633	1570
Scientist visit to farmers field	8053	38652	9920	48572	1223	352	1575	39875	10272	50147
Self help group conveners meetings	92	1821	1973	3794	116	69	185	1937	2042	3979
Soil health camp	77	3197	1370	4567	291	90	381	3488	1460	4948
Soil test campaigns	123	4686	1004	5690	189	64	253	4875	1068	5943
Special programme	261	10124	5958	16082	501	188	689	10625	6146	16771
Swatchta hi sewa	954	18905	7515	26420	719	274	993	19624	7789	27413

Name of Extension Activity	No. of activities	Farmer			Extension officials			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Technology week	1	162	255	417			0	162	255	417
Video conferencing	28	225	102	327	96	12	108	321	114	435
Workshop	208	9988	3504	13492	2521	511	3032	12509	4015	16524
Other	1170	97218	6648	103866	1559	828	2387	98777	7476	106253
Grand Total	**147441**	**1243768**	**445843**	**1689611**	**25123**	**7473**	**32596**	**1268891**	**453316**	**1722207**

Fig: View of extension activities organized during 2021

Other extension activities

The KVKs also exercised other means of communication like publishing through newspaper, radio/ TV talks, writing popular article, preparing extension literature and acting as resource persons for ATMA or state agriculture department as well as organizing awareness camps etc. The KVKs of Zone-IV conducted 19222 number of such extension activities. The KVKs prepared and distributed 13473 extension literature depicting cultivation techniques of crops, vegetables, fish rearing, livestock rearing etc. in local vernacular. Among all the states, KVKs of Bihar developed and distributed (10840) of extension literature followed by Jharkhand (2633). KVK personnel delivered TV talk 342 of which 193 times in Jharkhand, 149 times in Bihar during year 2021. Activities of KVKs of Zone IV also were published through newspaper by 4455 times (Table 94).

Table 94:Others extension activities organized

Nature of extension activity	No. of activities		
	Bihar	Jharkhand	Total
Extension literature	10840	2633	13473
Newspaper coverage	3430	1025	4455
Popular articles	337	99	436
Radio talks	134	114	248
TV talks	149	193	342
Other	198	70	268
Total	**15088**	**4134**	**19222**

Production of seed, planting materials and bio-products

Production of seed, planting materials and bio-products

Seed produced by KVKs (Farm and Village Seed Production)

Seed is one of the most critical inputs on which the production and productivity of any crops depends. It is very essential that seed of any annual crops should be replaced by farmers at regular interval to maintain and the productivity of the crop and to increase the production. As farm size in KVKs is limited so seed production cannot be done in large quantities at KVK farm. To maximize the seed production and to meet the demands of farmers for quality seed it has been initiated in the villages as "Village seed production" programme. During 2021, KVKs produced 13259.23 q of seeds of major field viz; cereal, pulse, oilseed and horticultural crops like vegetable, flower, spices, etc of which Bihar KVKs produced 11071.55 q and Jharkhand 2187.68 q.

Cereals crops

During the year 2021 the KVKs of ATARI Zone IV produced cereals (11261.62 q), pulses (420.97q), oilseeds (194.37q), vegetables (849.37q), commercial crops (366.70q), spices (153.50q), flowering (1.20 q) green manures (11.50 q), etc. of quality seeds in the system to make it available to the farmers of the zone (Table 95).

Table 95: Crop wise Seed Production

Crop Type	Name of Crop	Bihar	Jharkhand	Total
		Quantity of Seed (q)	Quantity of Seed (q)	Quantity of Seed (q)
Cereals	Paddy	5744.03	1719.12	7463.15
	Wheat	3697.64	91.53	3789.17
	Ragi	2.50	5.80	8.30
	Maize	0.00	1.00	1.00
	Total	**9444.17**	**1817.45**	**11261.62**
Pulses	Lentil	175.36	0.00	175.36
	Chickpea	117.59	3.00	120.59
	Pigeon pea	43.77	12.90	56.67
	Green gram	43.97	3.00	46.97
	Pea	12.75	8.41	21.16
	Black gram	0.22	0.00	0.22
	Total	**393.66**	**27.31**	**420.97**
Oilseeds	Mustard	130.31	31.49	161.80
	Linseed	16.00	6.88	22.88
	Sesame	5.34	0.00	5.34
	Niger	0.45	2.40	2.85
	Groundnut	0.00	1.50	1.50
	Total	**152.10**	**42.27**	**194.37**
Vegetables	Potato	682.68	70.00	752.68
	Bitter gourd	0.00	38.00	38.00
	Brinjal	0.00	23.08	23.08
	Cowpea	0.00	14.08	14.08
	Mushroom Spawn	12.90	0.00	12.90
	Tomato	0.00	5.50	5.50
	Veg Pea	2.25	0.00	2.25
	Ridge gourd	0.00	0.36	0.36
	Sponge Gourd	0.00	0.32	0.32
	Okra	0.20	0.00	0.20
	Total	**698.03**	**151.34**	**849.37**
Commercial Crops	Sugarcane	185.00	0.00	185.00
	Elephant Foot yam	56.00	95.00	151.00
	Aonla	0.00	27.64	27.64
	Barley	2.59	0.47	3.06
	Total	**243.59**	**123.11**	**366.70**
Spices	Turmeric	126.00	25.00	151.00
	Coriander	2.50	0.00	2.50
	Total	**128.50**	**25.00**	**153.50**
Flowering Crops	Sesbania	0.00	1.20	1.20
Green Manure	Dhaincha	11.50	0.00	11.50
Total		**11071.55**	**2187.68**	**13259.23**

Horticultural planting materials

Saplings and other quality planting materials like grafts, gooties, bulbs, etc. are another very important for areas increasing horticulture production by providing theme to the farmers. During 2021, altogether 32.72 lakh numbers of planting materials were propagated by the KVKs of which 20.33 lakh were from Bihar and 12.38 lakhs from Jharkhand and generated total Rs. 103.42 lakh as revenue from the sale quality planting materials to 37801 numbers of beneficiaries in Zone-IV(Table 96).

Table 96: State wise production of horticultural planting materials by KVKs

Crops	Bihar			Jharkhand			Total		
	Plants (No.)	Value (Rs.)	Farmers (No.)	Plants (No.)	Value (Rs.)	Farmers (No.)	Plants (No.)	Value (Rs.)	Farmers (No.)
Fruits	199222	6617125	8999	111892	1293940	5527	311114	7911065	14526
Vegetable	1749881	1386468	12179	961621	450508	5837	2711502	1836976	18016
Tuber	3000	0.00	6	11160	109400	610	14160	109400	616
Medicinal plants	2184	930	54	90742	154142	377	92926	155072	431
Ornamental plants	27972	23240	268	23700	78897	1661	51672	102137	1929
Spices	12856	8920	122	22327	11675	78	35183	20595	200
Plantation	0	0	0	836	900	418	836	900	418
Fodder crop saplings	26500	48300	253	16610	33513	1046	43110	81813	1299
Forest species	12060	123700	346	60	480	20	12120	124180	366
Total	**2033675**	**8208683**	**22227**	**1238948**	**2133455**	**15574**	**3272623**	**10342138**	**37801**

Fruit crops

Quality planting of important fruit crops like mango, litchi, guava, lemon etc were high demand every year. During the year altogether 2.55 lakh of quality materials were propagated of which maximum 106521 nos. of mango plants in which KVKs of Bihar produced 79006 plants. In case of papaya total 44507 plants of different varieties were produced during the year of which 27759 were from KVKs of Jharkhand. In case of guava total 39628 plants were propagated of which 23653 were from KVKs of Bihar. In case of litchi altogether 8559 plants were propagated from which 8083 from Bihar (Table 97).

Table 97: Production of planting materials in fruits crops

Fruit crops	Bihar			Jharkhand			Total		
	Plants (No.)	Value (Rs.)	Farmers (No.)	Plants (No.)	Value (Rs.)	Farmers (No.)	Plants (No.)	Value (Rs.)	Farmers (No.)
Mango	79006	4678020	6178	27515	249270	647	106521	4927290	6825
Papaya	16748	191110	493	27759	212505	931	44507	403615	1424
Guava	23653	847190	1549	15975	451735	2572	39628	1298925	4121
Cape Gooseberry	0	0	0	25000	25000	180	25000	25000	180
Lime	8440	247650	243	2540	92300	621	10980	339950	864
Banana	55	65	10	10027	200810	123	10082	200875	133
Litchi	8083	409030	180	476	36320	200	8559	445350	380
Jack Fruit	2270	12950	97	200	4000	50	2470	16950	147
Dragon fruit	2000	121000	0	0	0	0	2000	121000	0
Others	1995	9800	8	0	0	0	1995	9800	8
Ber	0	0	0	1500	7500	0	1500	7500	0
Aonla	502	20460	72	0	0	0	502	20460	72
Coconut	500	20000	106	0	0	0	500	20000	106
Bael	260	2080	19	0	0	0	260	2080	19
Strawberry	0	0	0	200	1000	0	200	1000	0
Custard apple	0	0	0	200	1000	0	200	1000	0
Karonda	0	0	0	200	3000	60	200	3000	60
Pomegranate	90	4250	26	50	5000	45	140	290	71
Butter fruit	0	0	0	50	2500	48	50	2500	48
Watermelon	20	120	6	0	0.00	0	20	120	6
Total	**143622**	**6563725**	**8987**	**111692**	**1291940**	**5477**	**255314**	**7855665**	**14464**

Vegetable crops

Quality planting of important vegetable crops as per season were also propagated of which tomato ranked first with total 673604 seedlings during the year followed by Onion, cauliflower, brinjal with their values 591090,494750 and 403391 respectively. In case of tomato total 673604 seedlings 513501 from Bihar and 160103 seedlings were from Jharkhand KVKs (Table 98).

Table 98: Production of Planting Materials in Vegetable Crops

Vegetable Crops	Bihar			Jharkhand			Total		
	Plants (No.)	Value (Rs.)	Farmers (No.)	Plants (No.)	Value (Rs.)	Farmers (No.)	Plants (No.)	Value (Rs.)	Farmers (No.)
Tomato	513501	332049	2385	160103	113043	1005	673604	445092	3390
Onion	256090	28718	178	335000	12500	0	591090	41218	178
Cauliflower	385698	432679	2028	109052	66819	1111	494750	499498	3139
Brinjal	257386	125171	1996	146005	82380	905	403391	207551	2901
Chilli	184309	58712	1873	57542	35884	792	241851	94596	2665
Cabbage	53979	37001	1196	81239	67796	748	135218	104797	1944
Broccoli	25582	35364	537	36490	25295	262	62072	60659	799
Bottlegourd	7308	13985	220	8000	0	34	15308	13985	254
Drumstick	12127	186220	969	2325	19360	15	14452	205580	984
Cucurbits	12500	27278	135	750	7500	89	13250	34778	224
Knolkhol	0	0	0	12452	13604	419	12452	13604	419
Capsicum	11165	34320	155	1000	2000	28	12165	36320	183
Sponge gourd	5154	770	40	3500	0	18	8654	770	58
Cucumber	8374	21900	117	0	0	0	8374	21900	117
Others	10025	38675	81	2163	4326	391	12188	43001	472

Vegetable Crops	Bihar			Jharkhand			Total		
	Plants (No.)	Value (Rs.)	Farmers (No.)	Plants (No.)	Value (Rs.)	Farmers (No.)	Plants (No.)	Value (Rs.)	Farmers (No.)
Ridgegoud	253	1265	60	6000	0	20	6253	1265	80
Bittergourd	5244	6270	144	0	0	0	5244	6270	144
Pumpkin	636	3591	55	0	0	0	636	3591	55
Summer squash	500	2500	10	0	0	0	500	2500	10
Beans	50	0	0	0	0	0	50	0	0
Total	1749881	1386468	12179	961621	450508	5837	2711502	1836976	18016

Spices, medicinal & aromatic and other crops

KVKs of Bihar and Jharkhand also propagated planting materials of medicinal and aromatic plants (92,926), tuber crops (14,160), ornamental plants (51,672), spices (35183) and plantation crops (1396) during the year 2021 shows interest of farmers in cultivation of these crops which have local demand and bio-aesthetic values (Table 99). In medicinal and aromatic high demand were of palmarosa, lemon grass, rauvolfia, etc. tuber crop viz; elephant yam foot and cassava had high demand in the Jharkhand whereas; forest species like mahogany, teak and other plants had more demand in Bihar states.

Table 99: Production of planting materials in other horticultural crops

Other horticultural crops	Planting Materials	Bihar			Jharkhand			Total		
		Plants (No.)	Value (Rs.)	Farmers (No.)	Plants (No.)	Value (Rs.)	Farmers (No.)	Plants (No.)	Value (Rs.)	Farmers (No.)
Tuber	Elephant foot yam	3000	0	6	5400	23000	0	8400	23000	6
	Cassava	0	0	0	5760	86400	610	5760	86400	610
	Total	**3000**	**0**	**6**	**11160**	**109400**	**610**	**14160**	**109400**	**616**
Spices	Chilli	5000	0	100	14102	2820	0	19102	2820	100
	Turmeric	7800	7800	0	8155	8155	3	15955	15955	3
	Kadhipatta	0	0	0	70	700	75	70	700	75
	Ajwain	56	1120	22	0	0	0	56	1120	22
	Total	**12856**	**8920**	**122**	**22327**	**11675**	**78**	**35183**	**20595**	**200**
Medicinal and Aromatic	Medicinal plants	1150	250	20	1542	1542	177	2692	1792	197
	Lemon grass	0	0	0	41000	48000	0	41000	48000	0
	Palmarosa	0	0	0	28000	44000	0	28000	44000	0
	Khas	0	0	0	1200	600	0	1200	600	0
	Aloe vera	30	600	7	8000	40000	0	8030	40600	7

Other horticultural crops	Planting Materials	Bihar			Jharkhand			Total		
		Plants (No.)	Value (Rs.)	Farmers (No.)	Plants (No.)	Value (Rs.)	Farmers (No.)	Plants (No.)	Value (Rs.)	Farmers (No.)
Medicinal and Aromatic	Citronella	0	0	0	10000	20000	0	10000	20000	0
	Mint	4	80	2	0	0	0	4	80	2
	Neem	1000	0	25	1000	0	200	2000	0	225
	Total	**2184**	**930**	**54**	**90742**	**154142**	**377**	**92926**	**155072**	**431**
Ornamental Plants	Marigold	7250	4800	58	2000	0	0	9250	4800	58
	Crotons	2580	1600	6	1229	4000	354	3809	5600	360
	Ornamental plants	2400	0	0	526	8780	16	2926	8780	16
	Tuberose	2000	2000	22	0	0	0	2000	2000	22
	Guldawdi	1200	1000	59	0	0	0	1200	1000	59
	Bryophyllum	30	600	8	0	0	0	30	600	8
	Gurhal	12	240	5	0	0	0	12	240	5
	Other Flowers	12500	13000	110	19945	66117	1291	32445	79117	1401
	Total	**27972**	**23240**	**268**	**23700**	**78897**	**1661**	**51672**	**102137**	**1929**
Forest Species	Gamhar	0	0.00	0	500	0.00	100	500	0.00	100
	Sagwan	0	0.00	0	300	0.00	300	300	0.00	300
	Unknown Plants	5500	17500	0	0	0	0	5500	17500	0
	Mahogni	5500	85000	279	0	0	0	5500	85000	279
	Teak	500	10000	52	60	480	20	560	10480	72
	Sagwan	560	11200	15	0	0	0	560	11200	15
	Others	0	0	0	36	900	18	36	900	18
	Total	**12060**	**123700**	**346**	**896**	**1380**	**438**	**12956**	**125080**	**784**
Fodder (Sapling)	Napier	26500	25500	53	13610	9513	430	40110	35013	483
	Subabul	0	0.00	0	3000	24000	616	3000	24000	616
	Azolla	1140kg	22800	200	0	0	0	0	22800	200
	Total	**26500**	**48300**	**253**	**16610**	**33513**	**1046**	**43110**	**81813**	**1299**
Total		**2033675**	**8208683**	**22227**	**1238948**	**2133455**	**15574**	**3272623**	**10342138**	**37801**


Bio-products

There is huge demand for bio-products and bio-pesticides by the farmers. To motivate farmers about use and to produce these products, the KVKs of Zone-IV also facilitated supply of bio-fertilizers, bio-pesticides and bio-agent like earthworms, azolla. Most demanded commodity is bio-fertilizers and huge quantity of 19517 Kg/l was produced by the KVKs along with the production of 8159.00 Kg/l bio-pesticides and 5537.80 Kg/l bio-agent (Table 100).

Table 100: State wise bio-product productions

Name of Bio-Product	Bihar			Jharkhand			Total		
	Quantity(Kg or L)	Value (Rs.)	No. of Farmers	Quantity(Kg or L)	Value (Rs.)	No. of Farmers	Quantity(Kg or L)	Value (Rs.)	No. of Farmers
Bio-agents	2602.00	30600	2	2935.80	120530	82	5537.80	151130	84
Bio-fertilizers	5072.00	186420	47	14445.00	114200	120	19517.00	300620	167
Bio-pesticide	159.00	50000	0	8000.00	112500	0	8159.00	162500	0
Others	33548.28	281441	452	69165.18	678835	89	102713.46	960276	541
Total	**41381.28**	**548461**	**501**	**94545.98**	**1026065**	**291**	**135927.3**	**1574526**	**792**


Livestock production

Livestock production is an inherited property of small and marginal farmers of this zone to support their survival and farm income. In order to meet their basic needs improved breeds of livestock strain, poultry birds, ducks, piglets, fingerlings spawn etc. were provided to the farmers. During the year 2021 KVKs made available 38 dairy animals, 64843 poultry birds, 85 Piggery and 812800 fisheries fingerlings to different farmers under this zone (Table 101).

Table 101: State wise livestock production

Particulars of Livestock	Bihar			Jharkhand			Total		
	Numbers	Weight (in Kgs)	Value (Rs.)	Numbers	Weight (in Kgs)	Value (Rs.)	Numbers	Weight (in Kgs)	Value (Rs.)
Dairy animals	22	0	380500	16	0.0	224000	38	0.0	604500
Dairy Products	0	6371.5	216015	0	0.0	0	0	6371.5	216015
Fisheries	732800	64.5	173540	80000	42.0	30400	812800	106.5	203940
Poultry	10372	37.6	896910	54471	0.0	417850	64843	37.6	1314760
Small ruminants	53	0	161672	55	0.0	265600	108	0.0	427272
Piggery	11	0	59085	74	0.0	292900	85	0.0	351985
Total	**743258**	**6473.6**	**1887722**	**134616**	**42.0**	**1230750**	**877874**	**6515.6**	**3118472**

Flagship Programme

Diploma in Agricultural Extension Service for Input Dealers (DASAI) Programme

Three KVKs of Bihar (Buxar, Munger, Sheohar) and two KVKs of Jharkhand (East Sighbhum and Dhanbad) conducted Diploma in Agricultural Extension Service for Input Dealers (DASAI) Programme sponsored by ATMA of the concerned districts to educate Agri-Input Dealers. The purpose of this programme was to facilitate Agri-Input Dealers for serving the farmers in better way and they will act as para-extension professionals in the districts. Altogether 10 training courses in which total 336 participants received training (Table 102).

Table 102: Details of DASAI

State	No. of Training	No. of input dealer participated and got degree
Bihar	7	219
Jharkhand	3	117
Total	**10**	**336**

National Innovations in Climate Resilient Agriculture -Technology Demonstration Component (NICRA-TDC)

Adoption of climate resilient practices and technologies by farmers are now a necessity of hours. Technology Demonstration Component (TDC) of NICRA offers a great opportunity to work with farmers to address current climate variability with matching responses. Important objective of the programme is getting existing technologies into the hands of small and marginal farmers and developing situation specific technologies to meet the demands of a changing climate. To enhance the resilience of Indian agriculture against climatic variability and climate change, NICRA project is functioning in 14 KVK districts of Bihar and Jharkhand covering 34 villages (Table 103).

Table 103: List of NICRA KVKs

State	Name of KVK	No. of village	Area (ha)
Bihar	Buxar	3	375
	Supaul	5	3000
	Bhagalpur	2	41
	Dharbhanga	3	33.1
	Lakhisarai	3	600
	Nalanda	1	260
	Saharsa	1	240
	Sitamarhi	1	158
	Siwan	3	20
	West Champaran	1	136.47
	Kishanganj	1	390
Jharkhand	**Godda**	5	1531
	Gumla	3	548
	Garhwa	2	530
Total		**34**	**7862.57**

Extension activities

Under extension activities total 42 programmes were conducted involving 1193 male and 614 female farmers (Table 104) received training on in different thematic areas of NICRA-TDC. The major extension activies involved were Exposure visit, Field day, Krishak gosthi, RAWE student exposure visit to NICRA village, Plant health clinic, Pesticide application through Drone, PM Modi Natural Farming programme etc.

Table 104: Details of extension activities under NICRA programme

State	Number of Activities	Number of Beneficiaries	
		Male	Female
Bihar	21	631	159
Jharkhand	21	562	455
Total	42	1193	614

Capacity building programmes

Knowledge upgradation through capacity building is an important module of NICRA programme and during 2021 a total of 62 activities conducted involving 1813 farmers of which 1439 male and 374 women were benefited (Table 105). Among thematic areas maximum emphasis was given on In-situ crop residue management for sustainable soil health management, scientific cultivation of vegetable, goat farming, use and benefits of mineral mixture in dairy animals, mushroom production technique.

Table 105: Details of capacity building programme under NICRA programme

State	Number of Activities	Number of Beneficiaries		
		Male	Female	Total
Bihar	39	1015	214	1229
Jharkhand	23	424	160	584
Total	62	1439	374	1813

Agriculture technology information centre (ATIC)

To deliver updated technologies available at the research institute/ state agricultural universities related to agriculture, animal husbandry and fishery sciences to the end users i.e. farmers, Agricultural Technology Information Centre (ATIC) serves as a "*single window*" system which usually present at the entrance of any institute. It enables farmers to access the desired information for solution to their problems. Under this Zone, the ATICs are being operated in Bihar state under Bihar Agricultural University (BAU), Sabour and DRPCAU, Pusa and in Jharkhand state under Birsa Agricultural University (BAU), Ranchi. The facilities available in ATIC are reception centre, exhibition/ technology museum, touch screen kiosk, sales counter, farmers' feedback register, video conferencing facility, library, cafeteria, community radio station etc. During 2021, due to unprecedented COVID-19 situation the number of farmers visiting ATICs were less but even then 5564 farmers visited ATIC for information, seeds and other services. As per technology information was concerned, 8350 farmers used kissan call centre to get the information on improved hybrids varieties, pest management, disease management, agro-techniques, soil and water conservation, post-harvest technology and value addition, and animal husbandry including fisheries. The ATIC of this Zone was also a potential source of supplying various technological products like seeds, planting materials, livestock, poultry birds, eggs, fish fingerlings, bio-

products, bio-fertilizers, farm-produces, vermi-compost etc and about 12015 q of seed, 1.95 lakh nos. of planting materials, a numbers of poultry birds and livestock as well as quintals of vermi-composting, and lakhs fish fingerlings were provided to farmers by ATIC, RPCAU, Pusa.

Cereal Systems Initiative in South Asia (Phase-III)

Indian Council of Agricultural Research (ICAR) in collaboration with Cereal Systems Initiative in South Asia (CSISA) of CIMMYT has implemented a project for the transfer of developed technologies at the farmer's field. The overarching goal of CSISA in Phase III (2017 – 2021) remained to support the widespread adoption of SI technologies to spur inclusive agricultural growth, both within the time-horizon of investment and beyond. CSISA's theory of change in Phase III was structured around four inter-linked primary outcomes and was coordinated by a fifth that ensures that potential synergies across the project was realized and lessons learnt during implementation was reflected in periodic strategy adjustments. Eight KVKs of Bihar under ICAR-ATARI Patna implement the collaborative project in FY 2021-22 with a sanctioned budget of Rs.8. Out of total sanctioned amount, total Rs. 6.55 lakh was released for 8 KVK's for implementation of this project.

Attracting and Retaining Youth in Agriculture (ARYA)

To attract the Rural Youth towards agriculture and allied sector as income generating enterprise ICAR has initiated a programme "Attracting and Retaining Youth in Agriculture" through 10 identified KVKs in ATARI, Zone IV. This programme is aimed at taking up capital intensive activities like Food processing, Value addition and marketing. Under Zone-IV 6 KVKs of Bihar (Aurangabad, Bhagalpur, Bhojpur, Vaishali, East Champaran, and West Champaran) and 4 KVKs of Jharkhnad (Chatra, East Singhbhum, Gumla, and Ranchi) are implementing this programme. ARYA project has opened a new avenue of opportunities and income generating activities for the rural youths in their native places. Rural youths have been trained on running the Goatary, Backyard poultry, Nursery raising, Fish farming, Poultry, Bee keeping, Mushroom production unit, Pig farming, Quail farming, Banana fiber extraction, Duck farming, Seed production and Lac cultivation, etc. enterprises as a major source of income for their livelihood. This programme was helpful in reducing the labour migration problem prevalent in this Zone. ARYA project has brought profound change in the living status of the family and encouraging

Table 106: Details of achievement of ARYA

State	Name of Enterprises	Training conducted (Nos.)	Nos. of youth trained	Rural youths established entrepreneurial units	Sustainable unit	Average size of each entrepreneurial units	Per unit cost of production	Sale value of the produce	Economic gains	Employment generated	No. of KVK involved
Bihar	Goat farming	5	132	101	63	26	117000	368750	251750	730	2
	Poultry farming	18	552	403	273	700	643800	1011000	367200	555	3
	Mushroom Cultivation	22	611	187	161	1180	268000	560380	536200	915	5
	Nursery Management	14	377	79	39	45100	318000	630125	572000	474	3
	Bee keeping	8	222	53	34	163	42000	440	207500	523	3
	Fish Farming	6	190	69	54	4000	175000	490000	315000	134	1
	Banana fiber	12	275	10	10	1000	72000	280	30000	365	1
	Quail farming	7	175	2	2	1	78000	400	160000	280	1
Sub Total (A)		**92**	**2534**	**904**	**636**	**52170**	**1713800**	**3061375**	**2439650**	**3976**	**19**
Jharkhand	Seed prod. unit	3	148	20	4	1	24000	30	96000	120	1
	Mushroom unit	3	173	30	9	40	1100	135	5400	195	1
	Pig farming	9	270	56	21	39	335500	1001000	794500	605	2
	Poly house (LC)	8	210	24	20	10000	21000	516000	306000	260	1
	Backyard poultry	6	185	17	14	40	150000	450000	30000	300	1
	Goat farming	21	542	188	77	46	51750	193700	231450	370	2
	Lac cultivation	13	311	172	113	35	58500	180275	182500	123	2
	Bee keeping	8	148	137	65	22	37000	71750	113600	232	2
	Duck farming	5	165	12	8	25	170000	370000	200000	250	1
Sub Total (B)		**76**	**2152**	**656**	**331**	**10248**	**848850**	**2782890**	**1959450**	**2455**	**13**
Grand Total (A+B)		**168**	**4686**	**1560**	**967**	**62418**	**2562650**	**5844265**	**4399100**	**6431**	**32**

Technological Backstopping by Directorates of Extension Education

The process of technology transfers from research Institutes/Agricultural Universities to the farmers' field and its feedback from the end users to the researchers play an important role for conducting different activities by the KVKs either in the form of On-farm-trial (OFT) or front line demonstration (FLD) or through organizing various training programs/health camps etc. Under the technological and administrative support of Directors of Extension Education (DEEs), all 68 KVKs disseminated need based agricultural technologies developed by various ICAR Institutes/ Universities of the Zone IV. Under the jurisdiction of Directorate of Extension Education Bihar Agricultural University, Sabour, has

21 KVKs; 16 KVKs under Dr. Rajendra Prasad Central Agricultural University, Pusa, 16 KVKs under Birsa Agricultural University (BAU), Ranchi and one KVK under Bihar Animal Sciences University (BASU), Patna. The Directorate of Extension Education provides technological backstopping to all the KVKs of this Zone. In the year 2021-22 all the four Directorates of SAUs and 04 ICAR institutes had provided updated technological information and inputs to KVKs in the form of breeder and foundation seeds, planting materials, livestock & poultry breeds, mineral mixtures for animals, fish spawns/fingerlings apiary units, mushroom spawn etc. which have ultimately helped the farmers of their areas to benefit from it. Besides, this technological literature has also been provided to KVKs for information and distribution.

With the objective to improve and upgrade the knowledge and skill of KVK scientists/SMS and technical, staff the Directorate of Extension Education of this zone have conducted many HRD programs both off-line and on-line covering a various domain like accounts management, GFR rules, orchard management, soil health management, improving communication and extension skills, quality seed production, demonstrations, livestock management during disaster, conducting health/ vaccination camp for animals, skill development in laboratory work, advance agriculture and allied technologies, mechanization in agriculture, scientific fish production, disease/ pest management and many others.

Monitoring the activities of KVKs is most important function of the Directorate which includes Extension Education council meeting which was held in all Directorates. To oversee the activities and monitor the work carried by the KVKs DEE, ADEE, DDE have visited different KVKs on more than 150 different occasions and functions including celebration of important meetings, conduction of field days, monitoring of OFTs/ FLDs, seed production programs, training programs etc. These activities also help the Directorate to assess the technological needs of KVKs and in empowering the KVKs with advance knowledge and skill.

The DEEs of Bihar and Jharkhand state visited their KVKs for proper application of proposed work plan under different projects. The DEE officials follow up the performance of various cereal, pulses and oilseed crops, establishment of new orchards, farm mechanization, establishment of apiary technology they also inspected the field to assess the performance of different herbicide for controlling weeds in onion, drum seeder, improved poultry and duck breeds, different fungicides used in fruits and vine rot of pointed gourd, nutrient management for groundnut production and other technologies.

Mera Gaon Mera Gaurav Programme (MGMG)

An innovative initiative "Mera Gaon Mera Gaurav" has been planned to promote the direct interface of scientists with the farmers to bridge the gap between lab and land. The objective of this scheme is to provide farmers with required information, knowledge and advisories on regular basis by adopting villages. In Zone IV, six ICAR Institutes and one SAU were implementing MGMG programme covering 57 villages and 13851 farmers. Altogether 2279 activities were conducted and 1219 messages sent to the farmers time to time (Table 107). The major activities performed include visit to village by scientific teams, Interface meeting/ *Goshthies* with farmers, providing training, conducting demonstrations, mobile based advisories, literature support as per the agro-ecological conditions of the village, awareness and educating farmers through newspapers, community radio, etc.

Table 107: Details of works under MGMG Programme

S No. / State	Total No of Groups/team formed	No. of Scientists Involved	No. of villages covered	No. of field activities conducted	No. of messages/ advisory sent	Farmers benefited (No.)
Bihar	20	121	20	1685	2067	8741
Jharkhand	11	47	37	594	1090	5110
Total	**31**	**168**	**57**	**2279**	**3157**	**13851**

Table 108: Activities undertaken by ICAR Institutes under MGMG

S. No.	Name of activity	No. of activities conducted	No. of farmers benefitted
1	Awareness created	13 1	2909
2	Demonstrations conducted	261	987
3	Interface meeting/ *Goshthies*	54	1468
4	Literature support provided	448	2257
5	Training organized	43	1405
6	Visit to village by teams	12 3	1857
7	Mobile based advisories	121 9	3157
	Total	**2279**	**13851**

Table 109: Other activities organized by ICAR Institutes/ SAUs under MGMG

S. No.	Activity	Particulars	Beneficaries
1	Linkages developed with other agencies	No of Agency (No)	34
		Beneficiaries (No)	517
2	Facilitation for farmers		
	i) Technology (No)	Numbers	126.7
		Area (ha)	122
		Beneficiaries (No)	381
	ii) Seeds (q)	Area (ha)	51.5
		quantity (q)	84.13
		Beneficiaries (No)	747
	iii) Other (seedlings, biofertilizer, Poultry bird, etc.)	Numbers	24200
		Area (ha)	17.1
		Beneficiaries (No)	278

Rural Agricultural Work Experience (RAWE)

Students of various Agricultural Universities pursuing agricultural degree and ARS trainee probationers were assigned to undergo Rural Agricultural Work Experience (RAWE) Field exprience training (FET) at various KVKs of this zone. The sole purpose of such programme was to get acquainted with the overall agricultural scenario in rural India. Such trainee's/ trainee officers were also associated with the scientists and administrative staff of ATARI Patna in order to make a note of the activities of this institute. Due to COVID-19 situation the ICAR decided that the RAWE students will pursue their RAWE programme in their nearby KVKs (Table 110).

Table 110: Details of RAWE programme conducted

State	KVKs Involved	No. of student/ARS trained	No. of days stayed
Bihar	34	577	120
Jharkhand	7	354	28
Total	**41**	**931**	**148**

Gramin Krishi Mausam Sewa (GKMS)

Agromet Advisory Service rendered by India Meteorological Department (IMD), Ministry of Earth Sciences, GoI is a set-up to contribute weather information-based crop /livestock management strategies and operations dedicated to enhancing crop production and food security. At present IMD in collaboration with ICAR is venturing into implementation of block level agro met advisory service through KVKs under Gramin Krishi Mausam Sewa (GKMS).

This programme is run with the border objectives of

1. To prepare agromet advisory bulletins for farmers and stakeholders regarding weather sensitive agricultural operations to mitigate weather-based risk on crop cultivation
2. To impart training to the farmers about climate change and its mitigating options.

During 2021, a total of 20 centres comprising 14 centres under Bihar and 06 Jharkhand have prepared and disseminated block level Agromet Advisory Service to the farmers of the respective districts. Altogether 26693 advisories bulletin had been issued covering 257 blocks of Bihar and Jharkhand by which 94751 farmers has been benefitted. During the year total 427 farmers awareness programme (FAP) were

organized to benefit the famers about the usefulness of the Gramin Krishi Mausam Sewa and released 60 publications (Table 111).

Table 111: Agromet advisories services

S. No.	Name of the State	No. of KVKs	No. of Block agromet advisories	No. of advisory bulletin	No. of FAP organized	No. of farmers feedback	No. of farmers received agromet advisory bulletin	No. of publication
1	Bihar	14	198	20585	315	4575	71510	42
2.	Jharkhand	6	59	6108	112	749	23241	18
	Total	**20**	**257**	**26693**	**427**	**5324**	**94751**	**60**

Interaction/Live Telecast Programme of Hon'ble Prime Minister/ Agriculture Minister, Govt of India

Hon'ble Prime Minister GoI and Agriculture and farmer's welfare Minister many times interacted with the farmers of the country on different occasions and these programmes were live telecasted so that maximum farmers could benefit from this. Total 25 progrmmes were direct telecasted by all 68 KVKs of this zone in which 27095 persons participated (Table 112).

Table 112: Interaction/Live telecast programme by Cabinet Minister, Govt of India/Bihar

S. No.	Date of Event	Name of Event/ Programme	No. of KVK	Total Participant
1	29-01-2021	Hon'ble AM, GoB interaction with KVK Scientists	1	6
2	10.02.2021	National horticultural fair	2	95
3	14.05.2021	Kisan samman nidhi	6	1477
4	01.06.2021	World milk day	1	39
5	18.06.2021	Climate resilient varieties (Bio-fortified)	2	118
6	16.07.2021	ICAR foundationday	5	254
7	17.07.2021	Poshanvatika mahaabhiyan and vriksharopan	1	162
8	17.08.2021	Nutrition month program	1	195
9	26.08.2021	Farmers nutritional security and management	17	1564
10	27.08.2021	Food and nutrition program for farmers	1	67

S. No.	Date of Event	Name of Event/ Programme	No. of KVK	Total Participant
11	31.08.2021	Azadi ka amrit mahotsav	1	27
12	17.09.2021	Poshan maha abhiyan & megha plantation day	15	2408
13	26.09.2021	FPO/*Krishko evam niryatma ke liye kshamta parvardhan evam vyapar sammelan*	2	78
14	28.09.2021	Climate resilient varieties technology and practice	35	6369
15	16.10.2021	World food day cum awareness programe	2	123
16	28.10.2021	Krashak vaiganik samagan meet	4	994
17	23.11.2021	Inaugural session	68	730
18	25.11.2021	Awareness of new farm act	1	382
19	26.11.2021	National campaign on the theme "Agriculture and environment: The citizen face	3	234
20	30.11.2021	Natural farming	1	27
21	16.12.2021	Natural farming	36	10863
22	18.12.2021	Natural farming	1	344
23	23.12.2021	Azadi ka amrit mahotsav	1	27
24	25-12-2021	Kisan samman nidhi	1	306
25	28.12.2021	Jalwayu unnmukt kheti	1	206
		Total		**27095**

Doubling farmers' income

The Doubling farmers' income (DFI) Central Committee recognizes agriculture as a value led enterprise and suggests empowering farmers with "improved market linkages" and enabling "self-sustainable models" as the basis for continued income growth for farmers. Science and Technology (S&T) and Innovation in Farm Management are critical inputs for economic development and poverty alleviation in the country. The Committee identifies and focuses on seven major sources of growth operating within and outside the agriculture sector. These are (i) Improvement in crop productivity, (ii) Improvement in livestock productivity, (iii) Resource use efficiency or saving in cost of production, (iv) Increase in cropping intensity, (v) Diversification towards high value crops, (vi) Improvement in real prices received

by farmers and (vii) Shift from farm to non-farm occupations. In view of achieving the target of doubling the farmers' income by March 2022, initiatives for Doubling Farmers' Income in Bihar and Jharkhand have been undertaken by State Coordination Committee (SCC) where the Director of ICAR- ATARI, Patna has been involved actively in formulation of strategy documents for both the states. During the year 2021 KVKs of Bihar and Jharkhand conducted various programme in which 7044 farmers participated and took the benefits.

Farmers FIRST programme (FFP)

Farmer FIRST is an adaptive research project. The term "Farmer FIRST" signifies the farmers' Farm, Innovations, Resources, Science and Technology (FIRST). The basic concept is that the farmer of a village will be in a centric role for research problem identification, prioritization, conduct of experiments and its management in farmers' field conditions. It emphasizes resource management, climate resilient agriculture and production management including storage, marketing, supply chains, value chains, innovation systems and mobilization of information systems for focusing on shifting from production to profit. Thus, the initiative was taken by ICAR to move beyond the production and productivity; to privilege the small holder agriculture; and complex, diverse and risk prone realities of majority of the farmers. Agricultural Extension Division of ICAR, New Delhi approved proposals for funding under Farmer FIRST Programme to ICAR Institutes/ Agricultural Universities of the zone (Table 113). Budget ary allocation of 99.30 lakh has been made for FY-2021-22 to ICAR-ATARI, Patna.

Table 113: The name of the Institute, their project title, budget allotted

Name of the Institute	Title of project	Fund sanctioned during 2021-22(Rs. in lakh)
Bihar Agricultural University, Sabour, Bhagalpur, Bihar	Cross Sectional Livelihood Improvement and Income Enhancement through Agro Enterprise Diversification	17.65
Birsa Agricultural University, Ranchi	Technology integration for doubling farm income through participatory research and extension approaches in Ranchi district of Jharkhand	33.50
MGIFRI, Motihari (East-Champaran, Bihar)	Improved livelihood through good practices in agricultural production system	19.40
ICAR-RCER, RC, Ranchi	Enhancing food, nutritional and livelihood security of marginal and small farmers in Jharkhand through need based agricultural technologies	17.25
ICAR-ATARI, Patna	Coordinating and monitoring FFP in Zone IV	11.50
Total		**99.30**

FFP programme has six different module in NRM, crop, horticulture, livestock & poultry, IFS model and extension activities (Table 114). In horticulture maximum 20 demonstrations were conducted involving 628 farm families and NRM module six demonstrations were conducted involving 179 farm families.

Table 114: Achievements of Farmer FIRST Programme (FFP)

STATE	NRM Module		Crop Module		Horticulture Module		Livestock & Poultry			IFS Model		Extension Activities	
	Demo	No Farm Families	Demo	No Farm Families	Demo	No Farm Families	Demo	No Farm Families	No of Animals	Demo	No Farm Families	No. of progers	Farm
Bihar	2	47	5	98	13	127	3	41	278	0	0	44	1348
Jharkhand	4	132	4	89	7	501	3	130	991	1	6	15	1300
Total	**6**	**179**	**9**	**187**	**20**	**628**	**6**	**171**	**1269**	**1**	**6**	**59**	**2648**

Tribal Sub Plan

The Tribal Sub Plan (TSP) project was launched for tribal development intended to address the issues of backwardness in tribal areas and tribal population in an integrated way with the aim to minimize the gap between the livelihood of tribal people and others. Total 21 KVKs are under Tribal Sub Plan and for FY 2021-22 a sum of Rs. 410.00 lakh was earmarked. To improve the livelihood and skill up-gradation of tribal people, KVKs of Zone IV conducted various Agricultural and allied sector activities including agricultural farming, horticulture, animal husbandry, fish production, vocational training etc. throughout the year providing direct benefit to the individual or families belonging to schedule tribes. During the period, KVKs under TSP produced 1329.76 quintal seeds of different crops and planting materials distributed in the tribal areas. About 6563 farmers soil/ water/ plant/ manure samples were tested from their respective district KVKs. More than 1572054 number of farmers were benefitted by getting farm related SMS and advisories (Table 115).

Table 115: Activities under TSP

Name of Activities	Bihar	Jharkhand	Grand Total
No. of farmers trainings/demos	165	366	531
No. of Farmers	3952	9654	13606
No. of Women Farmer Trainings/Demos	106	161	267
No. of Women Farmers	1707	4404	6111
No. of Rural Youths Trainings/Demos	17	181	198
No. of Youths	461	4314	4775
No. of EP Trainings/Demos	13	66	79
No. of Ext. Person	665	1969	2634
No. of OFTs	18	82	100
No. of farmers involved in OFTs	381	841	1222
No. of FLDs	26	682	708
No. of farmers involved in FLDs	570	2844	3414
No. of Mobile agro -advisory	393	1578	1971
No. of benefited farmers in Mobile agro-advisory	18256	1553798	1572054
Participants in extension activities (No.)	11061	458501	469562
Production of seed (q)		1329.76	1329.76
Production of Planting material (in lakh)	0.14	1.26	1.40
Production of Livestock strains (in lakh)		1.40	1.40
Production of fingerlings (in lakh)		0.25	0.25
Testing of Soil, water, plant, manures samples (No.)	790	5773	6563

Seed Hub

India is the largest producer, consumer and importer of pulses but in recent years, the area under pulses was decreasing steadily resulting in increased import bill and rising prices of pulses. It is a Centrally Sponsored Scheme of NFSM (National food security mission) with project entitled (Creation of Seed Hub for increasing indigenous production of pulses in India) started in June 15, 2016. Hence, Ministry of Agriculture and Farmers Welfare has developed a plan to establish 150 'Seed Hubs' each targeting to produce 100 tons of pulses seeds during the next three years and provide quality seeds to our farmers. Pulses are the important commodities for nutritional securities and the efforts of the KVKs will be helpful to meet demand of pulses as well as to reduce imports. In order to promote production of quality seeds of

new varieties (released / notified) not older than 10 years, 10 Seed Hubs at 07 KVKs (Buxar, Bhojpur, East Champaran, Lakhisarai, Munger, Saran, Vaishali) of Bihar and 3 KVKs (Bokaro, Dumka, East Singhbhum) of Jharkhand under Zone IV have been established.

Production of 10642 quintal pulses seed was expected from the Seed Hubs of Zone IV during 2021 but crop failure due to COVID pandemic, heavy rainfall, etc. only 4444.48 quintal pulses seed could be produced during this year in Seed hub project.

Table 116: Performance of Seed Hub in Zone-IV

Crop	Varieties	Seed target(q)	Area (ha)	Seed Production Crop wise(q)	Category (F/S,C/S,T/L)
Pigeon pea	IPA-203, Rajeev Lochan	1125	70	608	B/S, F/S, C/S
Lentil	IPL-316, HUL-57	4315	290	2155.48	B/S, F/S, C/S
Green gram	IPM-2-3, IPM-214, HUM-16, Sikha	1360	76	693.26	B/S, F/S, C/S
Chick Pea	RVG-202, PUSA 3043, GNG-1581, JG 12	3525	242.15	1917.65	B/S, F/S, C/S
Black Gram	IPU- 1102, WBU-109, IPU-2-43	217	25.5	351	0
Horse gram	VLG-19	100	-	-	-
Total		10642	703.65	5725.39	

Table 117: Seed Production and Revolving Fund Status of Zone-IV

KVK	Seed Production (q)	Revolving fund status (lakh)
Bhojpur	1199.2	111.83
Bokaro	291	82.19
Buxar	266	83.00
Dumka	1340	54.69
East champaran	98.8	5.75
East Singhbhum	623	2.76
Lakhisarai	554.16	40.54
Munger	419.13	8.38
Saran	825	88.15
Vaishali	109.1	9.33

Scheduled Caste - Sub Plan (SCSP)

Govt of India started Scheduled Caste Sub Plan on the principle of social equity demand, special attention and careful intervention to facilitate scheduled caste community in their developmental aspirations' programmes focused on enabling the community need to be developed into both empathy and sensitivity backed up by the supply of adequate resources. Scheduled Castes Sub Plan is a scheme to empower SC population through the input of science and technology. The main objectives of this plan are 1. to promote research, development and adaptation of technology for improving the quality of life of the economically weaker sections of scheduled castes in urban/rural areas 2. to encourage scientists & technologists to apply their knowledge and expertise to solve the problems of economically weaker scheduled caste communities, especially in rural areas and 3. to replicate successful technology models relevant to SC population. ICAR also started programme on Scheduled Caste - Sub Planwith the main objective to promote Scheduled caste economic development through family-oriented schemes by providing resources to the Scheduled caste family living below the poverty line. This programme is operational unde 45 KVKs of ATARI-Zone IV with total outlay of 99.0 lakhs. Under this programme 176 of training/ demonstrations programme for farmers; 137 number of training / demonstrations for women farmers and 31 training programmes for rural youth and 09 trainings for extensional personals were organized by KVKs of Zone IV in which 5197, 2908, 1182and 2905 persons participated respectively. On farm trial and frontline demonstration were also conducted by some KVKs to provide direct interface between researcher and farmers by involving 247 and 2313 farmers, respectively. Apart from this 18747 agro-advisory send to farmers through mobile. Through this programme 31.25 q of seed of various crops and 0.19 lakh planting material of different crops were provided among the farmers (Table 118).

Table 118: Details of activities conducted under schedule caste sub plan

State	Farmer Training		Women Farmer Training		Rural Youths		Extension Personnel		Number of farmers involved			Participants in extension activities (No.)	Production of seed (q)	Production of Planting material (Number in lakh)	Production of fingerlings (Number in lakh)	Testing of Soil, water, plant, manures samples (Number)
	No. of Trainings/ Demos	No. of Farmers	No. of Trainings/ Demos	No. of Women Farmers	No. of Trainings/ Demos	No. of Youths	No. of Trainings/ Demos	No. of Ext. Person	On-farm trials	Frontline demos	Mobile agro-advisory to farmers					
Bihar	125	3336	120	1615	21	888	8	177	95	2093	6648	4924	31.25	0.17	0.50	112
Jharkand	51	1861	17	1293	10	294	1	28	152	220	12099	1193	0.00	0.02	0.00	392
Total	**176**	**5197**	**137**	**2908**	**31**	**1182**	**9**	**205**	**247**	**2313**	**18747**	**6117**	**31.25**	**0.19**	**0.50**	**504**

Jal Shakti Abhiyan

For providing impetus to Jal Sanchay, the Jal Shakti Abhiyan was launched on mission mode water conservation security campaign in which the focus was on water stressed districts and blocks with interventions like water conservation and rainwater harvesting, renovation of traditional water bodies, reuse of water and recharging of structures, watershed development and afforestation. In 2021 as per covid guideline 727 training programme and 428 awareness programme organized on different thematic area related to water conservation in which 24928 and 16787 farmers benefitted, respectively. Apart from this 4164 packets of vegetables seed and 47095 sapling of fruits and forest plants were also distributed among the participants (Table 119).

Table 119: Details of activities under Jal Shakti Abhiyan

State	Training programme (water use)		No. of seed packet	No. of Sapling	Awareness Programme	
	Number	Participant			Number	Participant
Bihar	452	16807	2513	30118	273	12356
Jharkhand	275	8121	1651	16977	155	4431
Total	**727**	**24928**	**4164**	**47095**	**428**	**16787**

Special programmes

Swachh bharat abhiyan

As a part of mass movement of cleanliness, initiated by the Government of India, all the staff members of ICAR-ATARI, Patna including KVKs under this Zone picked up the broom to clean the dirt, garbage, debris, litters, other obnoxious/ unwanted materials from the office surroundings, roads, dwelling places etc. The KVKs of this Zone observed the cleanliness drive through sensitizing farmers/ villagers adopting the slogan "*Neither litter, nor let others litter*". A number of awareness programmes, sensitizing workshops and campaigns were carried out within KVKs and even in the remote villages for all categories of citizens. A sense of responsibility was evolved among the people to keep the environment clean which also included field sanitation and plantation drive. Scientists of KVKs made effort to train the people for making compost from different kinds of waste materials and also taught them in maintaining hygiene and sanitation in and around the houses. All the 68 KVKs under ICAR-ATARI, Patna conducted many activities during this Abhiyan in which 35420 person participated among them 143 VIPs (Table 120).

Table 120: Celebration of Swachhata Pakhwada

Date	No. of KVKs	No. of farmers participated	No. of VIPs Attended	Total No. of Participants
16.12.2021	59	12639	35	12674
17.12.2021	50	1793	6	1799
18.12.2021	54	1569	3	1572
19.12.2021	51	1028	0	1028
20.12.2021	57	1683	2	1685
21.12.2021	55	1531	4	1535
22.12.2021	48	1556	6	1562
23.12.2021	68	2589	30	2619
24.12.2021	49	1511	13	1524
25.12.2021	45	1697	12	1709
26.12.2021	43	820	0	820
27.12.2021	53	1544	12	1556
28.12.2021	48	1223	9	1232

Date	No. of KVKs	No. of farmers participated	No. of VIPs Attended	Total No. of Participants
29.12.2021	59	1427	2	1429
30.12.2021	51	1212	4	1216
31.12.2021	57	1455	5	1460
Grand Total		**35277**	**143**	**35420**

Swachhta hi sewa programme

To celebrate the Birth anniversary of Mahatma Gandhi Swachhta Hi Sewa programme was launched by Govt. of India. A number of programmes were undertaken including plastic waste management and towards the effective ban of single use plastic (SUP) with focus on Swachh Bharat Diwas by massive community mobilization and shramdaan for plastic waste collection organized by all the KVKs under Zone IV of ATARI, Patna. Massive awareness activities were undertaken across the rural areas in 434 villages during 2021 in which 19850 farmers and 70 VIPs participated (Table 121).

Table 121: Sawachhta Hi Sewa Hai

State	No. of KVK	No. of village	No. of farmers participated	No. of VIP
Bihar	32	264	11151	36
Jharkhand	18	170	8699	34
Total	50	434	19850	70

International Women's Day 8th March 2021

Every Year 8th March is globally observed as the International women's day for celebrating the social, economic, cultural, and political achievements of women. The purpose of celebrating this day is to promote peace with women's as well as to honor all women and their achievements and rights. This day is also used as an occasion to reflect and amplify on various issues that come in the way of women's emancipation and hinder realization of gender equality. A total 5073 farm women participated in the celebrations organized by all 55 KVKs of this zone (Table 122).

Table 122: International Women's Day:

State	No. of KVKs	No. of participant
Bihar	38	3425
Jharkhand	17	1648
Total	**55**	**5073**

International Womens Day 2021 Celebrated at Bagraisai, Rajnagar Block

Celebration of Rashtriya Mahila Kishan Diwas

Women farmers play important multi dimensional role in agriculture and allied sectors participating in 48% of agriculture related employment in India and around 7.5 crore women are actively involved in livestock management and in this light 15th October every year is celebrated as "Rashtriya Mahila Kisan Divas" in the country by ICAR and KVKs. This year also, all ICAR Institutes, Agricultural Universities and Krishi Vigyan Kendras organized Rashtriya Mahila Kisan Diwas by organizing programmes like gosthis, debates, essay and drawing competition, exhibition, etc. on the theme like role of women in agriculture, women empowerment, nutrition and income generation, etc. and also honored the selected women of the area/district for their contributions in the fields of agriculture and allied sectors. Total 2435 women farmers participated in the programme (Table123).

Table 123: Mahila Kisan Diwas Report (held on 15.10.2021)

State	No. of KVKs	No. of participant
Bihar	32	1631
Jharkhand	16	804
Total	**48**	**2435**

Plantation Programme

Special drive was conducted for plantation at all KVKs of Bihar and Jharkhand on 2nd October 2021. On this occasion planting materials of orchard and Agro forestry and medicinal plants were distributed to farmers and farm women to create awareness importance of plant in our ecosystem for sustainable development. A total 7748 persons participated including 211 dignitaries during the programme and 71489 plants were distributed among the farmers for plantation (Table 124).

Table 124: Details of planting material provided during Plantation programme by KVKs

State	Name of fruit/ Vegetables	KVK	Distribution of plants/ saplings	Farmer	Dignitaries	Total
Bihar	Fruits, Vegetables, flowers, medicinal and aromatic plants	44	45883	5139	144	5283
Jharkhand		24	25606	2398	67	2465
Total		**68**	**71489**	**7537**	**211**	**7748**

Agricultural Knowledge in Rural School

Agriculture has always been a basic priority for the society and thus to know the role of agriculture in a society, KVK personnel extended their hand to the rural school with an objective to bring the youth in agriculture. KVKs made an effort to motivate such young buds to inculcate the basic knowledge of agriculture through delivering lectures, showing audio visuals, distributing leaflets and pamphlets, group discussion, presentations, organizing quizzes, etc. To achieve this goal they visited 63 schools and performed 76 visits (Table 125).

Table 125: Details of visit in Agriculture Knowledge in Rural School

State	No. of School visited	Total No. of Visits
Bihar	35	44
Jharkhand	28	32
Total	63	76

National Farmers Day/Kisan Diwas

In India since 2019 every year 23rd December is celebrated as National Farmers Day/Kisan Diwas to mark the birth anniversary of Chaudhary Charan Singh. He served as the sixth prime minister from 28 July 1979 until 14 January 1980 and passed away in 1987. During his tenure as the Prime Minister of India, introduced policies to improve the lives and conditions of farmers in the country. He also played a leading role in the agricultural sector of the country by introducing bills for farmers' reforms. It is believed that 'Zamindari Abolition Bill-1952' was passed due to Chaudhary Charan Singh's hard work. To pay him tribute, the government in 2001 decided to celebrate his birth anniversary as National Farmer's Day. On this day, the KVKs of ICAR-ATARI, Zone IV organized many activities, workshops, seminars on agriculture in which large number of farmers participated and honored the progressive farmers under the jurisdiction.

International Yoga Day

To mark the importance and significance of yoga in one's life, June 21 is observed as International Day of Yoga every year (United Nations declared it in 2015). The theme of 5thInternational Yoga Day 2021 was “Yoga for Wellness". Yoga, which has been practiced for thousands of years, is a holistic solution for physical as well as mental wellness. On this day, several events like yoga, meditation, debates, meetings along with a variety of cultural performances were organized by the KVKs of Bihar and Jharkhand and 1883 and 599, respectively persons participated (Table 126).

Table 126: International Yoga Day Celebration at KVKs

State	No. of participants
Bihar	1883
Jharkhand	599
Total	**2482**

Pre- Rabi Sammelan

Pre-Rabi Sammelan 2021 were organized by the KVKs of ICAR-ATARI, Patna under the banner of the Indian Council of Agricultural Research (ICAR), Ministry of Agriculture and Farmers' Welfare to create awareness amongst the farmers and other stake holders about the latest agricultural technologies. On the occasion, technologies show casing, group meetings, video film on technologies, exhibitions, demonstrations, seminars, lectures, etc. were arranged by the KVK personnel to enrich the farmers and other line department personnel about agricultural knowledge for developing and adopting various strategies for ensuing higher crop production. During the period under report, 5 KVKs of ATARI, Zone IV organized 5 *Pre-Rabi Campaign* programme in which 1359 numbers of participants were present including public representative MP/MLA/ MLC and others (Table 127).

Table 127: Details of Pre-Rabi Sammelan

State	No. of KVKs Involved	No of Programme organized	Total Participants
Bihar	3	3	954
Jharkhand	2	2	405
Total	**5**	**5**	**1359**

World Food Day

The ICAR-ATARI Zone IV, Patna and the KVKs of Bihar and Jharkhand celebrated the World Food Day on 16th October, 2021. World Food Day is a day of action dedicated to tackling global hunger. This day has special relevance to people from around the world come together to declare their commitment to eradicate worldwide hunger from our lifetime. World Food Day is celebrated every year with different themes to focus on areas that require action and offer a common objective. This year the World Food Day 2021 theme was "Safe food today for a healthy tomorrow".

Programmes/ Special Day Celebrated at ATARI, Patna

Hindi Pakhwara: (14th - 29th September, 2021)

ICAR-ATARI, Zone-IV celebrated the Hindi Pakhwara from 14th to 29th September, 2021 and conducted various events for promoting use of Hindi (Rajbhasha) in official work. The main events held were essay competition, Hindi poem recitation, speeches and typing test in which staffs of the Institute took participation. Some of events were conducted virtually.

Gandhi Jayanti (2nd October, 2021)

The ICAR-ATARI, Zone-IV, Patna observed the 152nd anniversary of Father of Nation Mahatma Gandhi on 2nd October 2021 in order to follow his principle of non-violence and remember his contribution in making India independence.

Vigilance Awareness Week: (26th Oct. to 1st Nov.)

ICAR-ATARI, Patna observed vigilance awareness week from 26th October to 1st November, 2021 with the Theme "Independent India @ 75: Self Reliance with Integrity". Director had given the pledge to all staff on this occasion to make corruption free India. A series of events, debates, queries, essay and speech were organized during the vigilance week 2021

Constitution Day: (26th November, 2021)

On 26th Nov 2021 the Institute celebrated the 72st Year of Indian constitution adoption by constituent Assembly and all the staff took pledge to save our constitution and observed as Samvidhan Diwas. Director, ICAR-ATARI, Patna, Zone-IV briefed all staff members about the Preamble of our constitution and gave Oath to all staffs.

Table 128: Celebration of Important Days in KVKs

Celebration of Important Days	Bihar			Jharkhand			Total		
	No. of KVK Organized	No. of Activities	Participants	No. of KVK Organized	No. of Activities	Participants	No. of KVK Organized	No. of Activities	Participants
Republic day (26th Jan.)	38	40	1842	16	18	681	54	58	2523
International Women's Day (8th Mar.)	38	44	3425	17	23	1648	55	67	5073
Ambedkar Jayanti (14th Apr.)	20	9	222	8	8	289	28	17	511
World Environment Day (5th Jun.)	8	9	210	3	3	42	11	12	252
International Yoga Day (21st Jun.)	29	27	468	11	11	215	40	38	683

Celebration of Important Days	Bihar			Jharkhand			Total		
	No. of KVK Organized	No. of Activities	Participants	No. of KVK Organized	No. of Activities	Participants	No. of KVK Organized	No. of Activities	Participants
Independence Day (15th Aug.)	37	39	1883	14	14	599	51	53	2482
Parthenium Awareness Week (16th to 22nd Aug.)	34	99	3164	16	63	2214	50	162	5378
Hindi Diwas (14th Sep.)	22	13	312	6	17	619	28	30	931
Gandhi Jayanti (2nd Oct.)	28	31	1200	9	10	384	37	41	1584
Mahila Kisan Diwas (15th Oct.)	28	28	1952	16	19	917	44	47	2869
World Food Day (16th Oct.)	32	33	1631	16	16	804	48	49	2435
Vigilance Awareness Week (26th Oct. to 1st Nov.)	31	59	1722	11	40	1449	42	99	3171
National Unity Day (31st Oct.)	25	19	615	10	10	261	35	29	876
World Science Day (10th Nov.)	22	14	455	5	5	210	27	19	665
National Education Day (11th Nov.)	19	8	443	6	12	187	25	20	630
National Constitution Day (26th Nov.)	29	33	1178	10	12	376	39	45	1554
World Soil Day (5th Dec.)	36	36	3760	16	16	995	52	52	4755
Kisan Diwas (23rd Dec.)	30	31	2036	13	14	681	43	45	2717

New Initiative Undertaken

Poshan Maah (1-30 September 2021) & NARI (Nutri Sensitive Agri-Resources & Innovations)

ICAR has initiated NARI (Nutri Sensitive Agri-Resources & Innovations) program through KVKs across the country which aimed to sensitize farm women and others on various aspects of nutrition to address malnutrition by bringing change in the food systems through different interventions.

The Government of India is celebrating POSHAN MAAH in September 2021 and ICAR has also taken a decision to celebrate it at each KVK keeping in view the objectives of the NARI program.

1. Creation of Awareness on Nutri Sensitive Agriculture among farming community through capacity development and different level of interfaces.
2. Promotion of Bio-fortified crop varieties for Nutritional Security among farm women and Children.
3. Promotion of Nutri Garden, Nutri-Thaali, and Nutri Villages.
4. Development of Entrepreneurship among youth by producing nutritional products.
5. Promoting Nutri Sensitive innovative practices and Value chain development.

The KVKs of Bihar and Jharkhand states organized special training programme and several other activities to create awareness. A total 12990 persons including girls (5229) and VIPs (224) participated in the programme. KVKs distributed 71,489 planting material and 7,962 packet of vegetable seeds among the farmers (Table 129).

Table 129: Details of Poshan Maah & NARI organized during 2021

State	Number of KVKs	Attended Programme (No.)								Number of plants planted distributed	Number of packets of vegetable seed distributed
		MPs	MLA	Union Minister	Ministers from State	Other VIPs	Girls	Farmers	Total		
Bihar	44	3	7	0	0	144	3505	5139	8798	45883	5416
Jharkhand	24	1	2	0	0	67	1724	2398	4192	25606	2546
Total	**68**	**4**	**9**	**0**	**0**	**211**	**5229**	**7537**	**12990**	**71489**	**7962**

Krishi Vigyan Kendra (KVK) Knowledge Network/ KVK Portal

System (NARS), Krishi Vigyan Kendra (KVK) of this zone is working on application of location specific technology modules in agriculture, livestock, fishery and allied sectors through technology assessment, refinement and demonstrations. KVK also serves as Knowledge and Resource Centre of Agricultural Technology which supports public, private and voluntary sector for improving the agricultural economy of any given district and is linking the NARS with extension system and farmers. KVKs are also producing quality technological products like seed, planting material, bio-agents, livestock, fish fingerlings etc. and make them available to farmers. However, there is mostly only one KVK for serving the whole district. Sometimes, the farmers may not get access to KVK services. To bridge the communication gap between the farmers and KVK, ICAR has developed one portal named as KVK knowledge network/ KVK Portal (www.kvk. icar.gov.in) for the farmers and other stakeholders where various information about KVK and various activities of KVK have been uploaded by the KVK Scientists for quick dissemination of technologies in the district and in the country as a whole. During the period under report, 68 KVKs (44 KVKs of Bihar and 24 KVKs of Jharkhand) of ICAR-ATARI, Patna have uploaded various information e.g. KVK profile report, facility available at the KVK, past and upcoming events, package of practices, status of Cluster Front Line Demonstration (CFLD) on Pulses and Oilseeds etc. in the portal. This portal is being continuously updated by the KVK as per direction. The KVKs have also uploaded Monthly Progress Report to the Portal.

KRISHI Portal

KRISHI (Knowledge based Resources Information Systems Hub for Innovations in Agriculture) Portal has been developed during 2016- 17 as ICAR Research Data Repository for knowledge management. Data Inventory Repository aims at creating Meta Data Inventory through information related to data availability at Institute level. The portal consists of six repositories viz. technology, publication, experimental data, observational data, survey data and geo-portal. As per guidelines of the Council, various kinds of publications pertaining to this institute were uploaded in this portal. The portal can be accessed at http://krishi.icar.gov.in.

Management Information System including Financial Management System (MIS-FMS) under ICAR-ERP

ICAR-ERP developed under NAIP project "Implementation of Management Information System (MIS) including Financial Management System (FMS) in ICAR" was initiated in the year 2015-16. Since September 2017, the system is regularly being updated for proper system management in respect of personnel and finance of the ICAR-ATARI Patna. There are five modules of MIS-FMS, viz., financial management, supply chain management (SCM), human resource management (HRM), Payroll module and Project management. All the modules of the MIS-FMS are being regularly implemented by ICAR-ATARI, Patna.

Implementation of Public Finance Management System (PFMS)

Public Finance Management System (PFMS) is an electronic fund tracking mechanism which compiles, collates and provides real time information on resource availability, flows and actual utilization. It provides unified platform to scheme managers for tracking releases and monitoring their last mile utilization. Considering the diversity and multiplicity of channels through which money is spent/ transferred, the PFMS is designed to serve the pertinent need of establishing a common electronic platform for complete tracking of fund flow from the Central Government to large number of programmes implementing agencies, both under Central Government and the State Governments till it reaches the final intended beneficiaries. The PFMS Scheme has been rolled-out by the Controller General of Accounts (CGA) at the behest of Finance Ministry, Department of Expenditure as a cherished Public Finance Management (PFM) reform in the country since 2009. PFMS is poised to develop as one of the biggest Financial Management Systems of the world, which is critical for bringing about a transformational accountability and transparency in the Government Financial Management Systems

and promoting overall Good Governance. The latest enhancement in the functionalities of PFMS has been commenced in late 2014 for the implementation of various Schemes through Direct Benefit Transfer (DBT) mechanism in this regard. ICAR-ATARI, Patna has implemented PFMS from the financial year 2019-20 and is continuing bringing transparency in the system and helping in easy transfer and tracking of funds.

On-line reporting by KVKs

The data collection and report compilation of the Zone IV is a basic component for monitoring the activities of ICAR-ATARI Patna. The World Wide Web (WWW) is increasingly used worldwide recognized search engine as a tool and platform for data collection and easier compilation. It also provides internet related services and products to a wide range of users at greater utility and lesser cost. There are many web -based applications of Google like Google docs, Google forms, Google drive, Google slides, Google sheets etc., which have immense potential for increasing productivity of academicians, researchers, professionals, policy makers, etc. The non-tampered analysis of the data with full authenticity is also possible within few seconds without any manual tabulation and coding. Further, online method of reporting is much faster than the traditional method of data collection. ICAR-ATARI Patna has started online method of data collection system using Google forms and sheets on various aspects like results framework document, monthly physical and financial progress report, mandated activities of KVK, soil analysis, special programs, etc. Specific guidelines for filling up the forms and sheets have been provided to all KVKs of the Zone for easy understanding and proper timely reporting.

E-Office

E-Office initiated in the year 2009 was developed by NIC with the aim to improve the functioning of government through more efficient, effective and transparent inter-Government transactions and processes. The e-office product aims to support governance by ushering in more effective and transparent inter and intra-government processes. The vision of e-office is to achieve a simplified, responsive, effective and transparent working of all government offices. The Open architecture on which e-Office has been built, makes it a reusable framework and a standard reusable product amenable to replication across the governments, at the central, state and district levels. The product brings together the independent functions and systems under a single framework.

Soil and Water Sample Analysis

Soil testing and soil-based fertilizer application are very important for increasing the productivity and doubling the farmer's income. KVK scientists of Zone IV through different awareness and training programs tried to motivate the farmers to test soil before crop cultivation so that soil test-based fertilizer recommendation may be promoted to reduce indiscriminate use of fertilizers and to manage environmental and other health hazards. The KVKs have also tested a large number of soil and water samples supplied by the farmers for quality analysis at KVK laboratories. In the year 2021, soil (20922), water (171) and food (210) sample were analyzed from which 15020 farmers of this Zone benefitted. A minimum amount was charged from farmers for testing soil and food samples and total revenues of

Rs.14,90,305 was generated (Table 130). The KVKs of this Zone celebrated "*World Soil Day*" on 5th December, 2021. On this occasion, various programmes like seminar, lectures, hands on training on soil sampling methodology, awareness programme were conducted. The distribution of soil health cards to the farmers by local MPs/ MLAs/ other public representatives was one of the major highlights of soil day celebration by the KVKs and total 5487 farmers participated in this program where 4355 soil health card were also distributed to the farmers (Table 131).

Table 130: Soil, Water and Plant analysis at KVK

State	Name of Sample	No. of KVK	No. of Sample Analyzed		No. of Farmers	No. of Villages	Amount realized (Rs.)
			Kit/labs	Laboratory			
Bihar	Soil	28	8268	10161	7314	900	1410305
	Water	05		170	135	42	
	Food	01		1	20	1	25000
	Plant	01		210	210	15	
Jharkhand	Soil	15	7884	2877	7340	120	55000
	Water	01		01	01	01	

Table 131: State wise World Soil Day celebration at KVKs on 5th December 2021

Sl.	State	No. of KVKs distributed	No. of VIP attended	No. of Soil Health Card distributed to farmers	Farmers benefitted
1	Bihar	43	52	4355	5487
2	Jharkhand	23	28	1056	8733
Total		**66**	**80**	**5411**	**14220**

Scientific Advisory Committee (SAC) Meeting

Every year Scientific Advisory Committee (SAC) meeting is organized by the KVKs to review the day to day work in details and to discuss about local problems for finalize the Action Plan for the next year with the suggestions from line department members, progressive farmers, NGOs and other agencies. As per the guidelines of ICAR, the committee comprises of representatives from ICAR-ATARI Patna, Host

Organization, other nearby ICAR Institutes, State Agricultural Universities, developmental departments of the district, media personnel, financial institutions, progressive farmers and farm women and others. During the year 2021, total 64 SAC meetings conducted covering 42 KVK of Bihar and 22 KVKs of Jharkhand state (Table 132). These meetings were attended by 2353 participants with presence of all nominated members.

Table 132: Details of Scientific Advisory Committee Meeting organized

State	No. of SAC Meeting	No. of Participants
Bihar	42	1548
Jharkhand	22	805
Total	**64**	**2353**

National Farmers' Portal

All Central and State Government organizations in agriculture & allied sectors i.e., State Agriculture Universities, KVKs, Agromet Forecasts Units of India Meteorological Department, ICAR Institutes, Organization in Animal Husbandry, Dairy & Fisheries etc. provide information/ services/ advisories to the farmers by SMS in English/ Hindi/ Local languages on weather conditions, agricultural and allied sectors practices through mKisan Portal. As part of agricultural extension (extending research from lab to the field), under the National e-Governance Plan-Agriculture (NeGP-A), various modes of delivery of services have been envisaged. These include internet, touch screen kiosks, agri-clinics, private kiosks, mass media, Common Service Centres, Kisan Call Centres and integrated platforms in the departmental offices coupled with physical outreach of extension personnel equipped with pico-projectors and hand-held devices. 19 KVKs of Zone-IV sent 156 advisories benefitting 4505571 farmers (Table 133). The supplied information includes crops, seeds, pesticides, farmers' insurance, farm machineries, storage, fertilizers, market price of agricultural produce, package of practices, disease outbreak and its prevention, various extension activitiesetc. There are also provisions of downloading different schemes, farm friendly handbook and like many other things. The portal can be accessed at www.mkisan.gov.in.

Table133: State wise Advisories Sent through mKisan Portal by KVKs

Sl. No.	State	No. of KVKs	No. of Advisories Sent	No. of Beneficiaries
1	Bihar	11	85	1376314
2	Jharkhand	8	71	3129257
Total		**19**	**156**	**4505571**

Human Resource Development Programme

Various meetings, workshop, Conference, training was conducted in online/offline mode towards human resource development and skill enhancing activities are as follow (Table134):

Table 134: Workshop/Meetings /Conference/training Conducted by ATARI Patna

Sl. No.	Review/Workshop	Date	Mode/Venue	No. of Participants
1	NICRA Review cum Action Plan Finalization Workshop	13/02/2021	Hybrid, KVK, Jehanabad	25
2	NICRA Concluding and action plan finalization Workshop	22/06 2021	Virtual, ICAR-ATARI, Patna	43
3	Annual Zonal Workshop of KVKs of Bihar and Jharkhand	14/07/2021 to 15/07/2021	Virtual, ICAR-ATARI, Patna	115
4	PosanVatikaMaha Abhiyan and tree plantation 17 Sept. 2021 and review of worktime	15/09/2021	Virtual	
5	Zoom Meeting Related to fill up and submission of DFI Network project questionnaire	08/10/2021	Virtual	68
6	Review meeting of pulses seed Hub and EBSP	14/10/2021	Virtual	67
7	One day training programme for SMS Home Science	09/11/2021	Virtual	26
8	Capacity Development Programme on Competencies of Extension Professional (SME-AE) In post Pandemic Era	17/11/2021 to 18/11/2021	ICAR-RCER, Patna	23
9	Inauguration of Administrative Building, ATARI, Patna	23/11/2021	Hybrid,ICAR-ATARI, Patna	257
10	Review meeting: Bihar KVKs	03/12/2021	Virtual	47
11	Review meeting agenda - DFI	09/12/2021	Virtual	71
12	Gender and nutrition Network Project meeting	18/12/2021	Virtual	10
13	TSP Network Project Meeting	17/12/2021	Virtual	20

Outsourcing of fund by Krishi Vigyan Kendras

The KVK scientists of this zone are actively involved in receiving funds from a large number of external sources and agencies through sanctioning projects in their favor. The projects include organizing additional training programme, research projects, building infrastructural facilities etc. which help in strengthening of KVKs. The KVKs of Bihar and Jharkhand under ICAR-ATARI Zone IV, Patna managed to get funds in 2021 from different other sources such as Govt. of Bihar, State department of Agriculture, Central Government, ITC, BISA, ATMA, MNREGA, NABARD, DHO, NHB, GoI, PCRA, IINRG, District Administration etc. Total fund of ₹ 1993.77 lakh was generated by the KVKs of ICAR-ATARI, Patna (Table 135 & 136).

Table 135: Details of funds from other agencies in KVK

State	KVKs	Amount (in lakh)	Sources of Fund
Bihar	42	1497.41	State Ag. Dept, Bihar Govt. MNREGA, IFFCO,
Jharkhand	20	496.36	District Administration, Coal India Limited, IINRG, PCRA, NABARD, ATMA, NHB, DHO, ATMA etc.
Total	**62**	**1993.77**	

Table 136: Details of funds received (KVKs wise)

State	KVK (a)	Amount(in lakh)	KVK (b)	Amount(in lakh)
Bihar	Arwal	55.43	Siwan	10.30
	Aurangabad	77.93	Vaishali	1.05
	Banka	69.52	West Champaran	29.21
	Begusarai	26.78	West Champaran-II	3.69
	Bhagalpur	78.12	Supaul	39.54
	Gaya	1.43	Saharsa	50.73
	Bhojpur	69.39	Sheikhpura	44.13
	Buxar	75.00	Nalanda	7.63
	East Champaran II	1.50	Purnea	6.65
	East Champaran I	35.10	Sitamarhi	23.78
	Jehanabad	44.77	Kaimur	68.03
	Katihar	95.97	Jamui	49.84
	Kishanganj	47.32	Araria	36.02
	Madhepura	60.49	Munger	12.16
	Darbhanga	12.57	Patna	86.30
	Gopalganj	14.09	Rohtas	67.23
	Madhubani II	14.96	Samastipur	28.71
	Saraiya	9.53	Siwan	10.30
	Turki	14.95	Nawada	24.00
	Saran	0.75	Lakhisarai	16.13
	Sheohar	9.46	Khagaria	66.92
	Total (a)	**815.06**	**Total (b)**	**682.35**
	Grand Total		**1497.41**	

State	KVK	Amount(in lakh)
Jharkhand	Dhanbad	8.00
	Garhwa	4.84
	Giridih	14.05
	Godda	25.80
	Hazaribag	24.25
	Jamtara	1.84
	Pakur	14.25
	Ramgarh	55.59
	Ranchi	89.30
	Sahibganj	28.24
	Simdega	126.95
	East Singhbhum	2.63
	Latehar	1.80
	Palamu	29.50
	West Singhbhum	5.63
	Dumka	1.08
	Saraikela	1.60
	Lohardaga	35.97
	Koderma	20.00
	Chatra	5.07
	Total	**496.36**

Research Publications

To highlight the research and transfer of technology through print media in local language the KVKs scientists are encouraged to actively involve themselves in publishing research papers, books, book chapters, technical bulletins, newsletters, popular articles, leaflets/pamphlets, DVD/CD etc. to make it available to researchers and extension worker of other KVKs, SAUs, ICAR institutes, line departments, ATMA, NABARD, other agencies, farmers and other stake holders. A total of 386 publications comprising of 45 research papers, 20 abstracts,11 book and 22 book chapter were published by the KVK personnel of this Zone (Table 137).

Table 137: Team Research Publications under Zone IV jurisdiction

Publications Head	Number
Research Paper	45
Abstract	20
Books	11
Radio/ TV talk	122
Popular Articles	81
Book Chapter	22
Extension Pamphlets/Literature	55
Electronic Publication (CD/DVD etc.)	29
Total	**384**


औषधीय गुणों का खजाना कसूरी मेथी

Peered Reviewed Research Publication

Bhushan, S. and Shanker, R. 2021. Assessment of management modules against Yellow Stem Borer in paddy, *Journal of Agri Search* **8**(2):117-119.

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Office Personnel

Sl. No	Name	Designation
1.	Dr. Anjani Kumar	Director
2.	Dr. Amrendra Kumar	Pr. Scientist.
Project Staff		
1.	Rabindra Kumar	SRF (NICRA)
2.	Sudeepa Kumari Jha	SRF (CFLD Oilseed)
3.	Pushpa Kumari	SRF (ARYA)
4.	Sumit Kumar Singh	SRF (NEMA)
5.	Preeti Kumari	Young Professional II (FFP)
6.	Sujeet Kumar	Young Professional I (CSISA)
7.	Kumar Nishant	Young Professional I (DAMU)
8.	Sanjeev Kumar	Young Professional I (ARYA)
9.	Anshu Kumari	DEO (CFLD Pulses)
10.	Manoj Kumar	DEO (CFLD Oilseed)

AWARDS
Award and Recognition of Scientist/Institution

Name of Institution/Scientists	Name of Award	Organization
KVK, East Champaran	Pandit Deen Dayal Upadhyay Rashtriya Krishi Vigyan Protshahan Puraskar (National)	ICAR, New Delhi
KVK, Muzaffarpur II	ISEE Fellow Award 2021	ISEE, IARI, New Delhi
Dr. Neeraj, SMS (Horticulture), KVK Begusarai	Best Presentation Award	NABARD & IRRI
Dr. Muneshwar Prasad, Sr. Scientist & Head, KVK Banka	Distinguis hed Scientist Award	Society for Scientific Development in Agriculture and Technology, 4th International conference on DISHA 2021
Mr. Amit Kr. Singh, SMS (Agronomy), KVK Kaimur	Outstanding Extension Worker Award	Society of Agriculture Innovation & Development, Ranchi
Mr. Amit Kr. Singh, SMS (Agronomy), KVK Kaimur	Young Scientist Award	Green Agri Professional Society, Dhanbad
Dr. K. K. Singh, SMS (Soil Science), KVK Muzaffarpur	Best KVK Scientist	Kausambi Foundation India, Agra
Dr. Savita Kumari, SMS (Home Science), KVK Muzaffarpur	Excellence in Extension Award	ICFAI -2021
Dr. Savita Kumari, SMS (Home Science), KVK Muzaffarpur	Outstanding Home Scientist Award	DISHA -202 1
Dr. B. D. Singh, SMS (Extension), KVK Patna	Scientist of the year	Astha Foundation, Meerut
Dr. Kumari Sharda, Sr. Scientist & Head, KVK Patna	Best Extension Personel Award	Astha Foundation, Meerut
Mr. Rabindra Kumar Jalaj, SMS (Fishery Science), KVK Rohtas	Best scientist Award (Fisheries Science)	BAMETI, Patna
Dr. Ratan Kumar, SMS (Horticulture), KVK Rohtas	Best Extension Scientist Award	BAU, Sabour Kisan Mela21
Mr. Rabindra Kumar Jalaj, SMS (Fishery Science), KVK Rohtas	Excellence in Extension Award	ICFAI, 2021

Name of Institution/Scientists	Name of Award	Organization
Mr. Rabindra Kumar Jalaj, SMS (Fishery Science), KVK Rohtas	Young Scientist Award	DISHA, 2021
Dr. Ratan Kumar, SMS (Horticulture), KVK Rohtas	Distinguished Scientist Award	DISHA, 2021
Dr. Ratan Kumar, SMS (Horticulture), KVK Rohtas	Excellen ce in Extension Award	ICFAI, 2021
Dr. Ramakant Singh, SMS (Soil Science), KVK Rohtas	Excellence in Research Award	ICFAI, 2021
Dr. Ramakant Singh, SMS (Soil Science), KVK Rohtas	Scientist of the Year	DISHA, 2021
Dr. Kumari Sunita, SMS (Home Science), KVK West Champaran	Women Scientist Award	Biology, Agriculture, SciTech and Agriculture, Congress Association, India
Dr. Kumari Sunita, SMS (Home Science), KVK West Champaran	Excellency in Extension	Food Agriculture and Innovation (ICFAI)
KVK, Bokaro	3rd prize awarded for stall presentation in the Agrotek Kisan Mela- 2021 at BAU, Ranchi	BAU, Ranchi
KVK, Godda	Appreciation certificate	BAU, Ranchi
KVK, Katihar	Best Stall award	KVK, Purnea
KVK, Khagaria	1st Prize in Stall Pradarshani	BAU, Sabour
	Best Stall Award in Kisan Mela, 2021	BAU, Sabour
	Best Stall Award for Apni Thali Apni Kayari	BAU, Sabour
KVK, Kishanganj	Best Stall Exhibition	BAU, Sabour
KVK, Koderma	Hon. Fellowship Award For outstanding performance and lasting contribution Dr. Chanchila Kumari	International Seminar On Agricultural Sustainability for Doubling Income in Changing Climate Scenario and Market Challenges During Covid -19 10-11 April 2021

Name of Institution/Scientists	Name of Award	Organization
KVK, Muzaffarpur II	Best Exhibition Award	RPCAU, Pusa
	Best Exhibition Award	KVK, Parsauni
KVK, Nalanda	2nd winner in Potato Workshop	NCOH, Noorsarai
KVK, Nawada	Appreciation Letter	BAU Sabour
KVK, Purnea	Second prize in stall	MBAC Agwanpur Sahrasa
KVK, Purnea	Consolation prize in stall	BAU Sabour
KVK, Rohtas	Leadership Role in Curbing Parali Burning	Agriculture Today Group, New Delhi
KVK, Samastipur	Best KVK Award-2021	RPCAU, Pusa
KVK, Siwan	Best KVK Award	Dr RPCAU, Pusa

Award and Recognitions obtained by the farmers

Name of the Farmer	Nam e of the Award	District	Conferring Organization
Md. Musharraff Khalil	IARI -Innovative Farmer Award 2020	Vaishali	ICAR, New Delhi
Sri Jitendra Singh	IARI -Fellow Farmer Award 2020	Vaishali	ICAR, New Delhi
Smt. Manorama Singh	Jagjivan Ram Abhinav Kisan Puraskar -2020	Vaishali	ICAR, New Delhi
Smt. Bandana Kumari	Pt. Deen Dayal Upadhyay Antyodaya Krishi Puruskar-2020	Banka	ICAR
Sri Dilip Kumar Singh	Nawachar Krishak	Rohtas	ICAR Kisan Mela 2020
Sri Sonu Nigam	Best organic fruit grower	Muzaffarpur	IARI
Smt. Binita Kumari	IARI - Innovative Farmer Award	Banka	IARI, New Delhi
Sri Nirbhay Kumar	District level Farmer Award	Arwal	BAU Sabour, Bhagalpur
Sri Manish Kumar	Best Young Enterpreneureship	Aurangabad	Pragatisheel Krishak vikash sewa sanshthan Haidrabad

Name of the Farmer	Nam e of the Award	District	Conferring Organization
Smt. Bandana Kumari	Dr. V Kuriean Innovative Dairy Farmer Award CRIDA-Best Innovative Farmer Award	Banka	Pashudhan Praharee CRIDA Hyderabad
Smt. Savita Devi	Dr V Kuriean Innovative Dairy Farmer Award	Banka	Pashudhan Praharee
Sri Rupesh Kr Choudhary	Innovative Farmer Award	Banka	BISA
Sri Nuneshwar Marandi	Progressive Farmer Award	Banka	BAU, Sabour
Smt Vidya Rani Sing	Best Farmer of District	Bhojpur	BAU Sabour, Bhagalpur
Sri Praveen Kumar Singh	Best Farmer of State	Bhojpur	BAU Sabour, Bhagalpur
Sri Ramjeewan Pandit	Abhinav Kisan pur askar	Buxar	Hon'ble Vice Chancellor
Sri Dhirendra Kumar	Innovative Farmer Award	Darbhanga	DRPCAU, Pusa
Sri Ajay Deo	Abhinav Kisan puraskaar	East Champaran	DRPCAU, Pusa
Sri Ravibhushan Singh	Best Cow Gir	East Champaran	Pasu Aroyagya Mela KVK, Piprakothi
Sri Ramesh Yadav	Best Bull	East Champaran	Pasu Aroyagya Mela, KVK,Piprakothi
Sri Upendra Prasad	First prize in Turnip Production	East Champaran	Kisan Mela 2021, DRPCAU, Pusa, Samastipur
Sri Prajyot Kumar	Prsasati Patra	East Champaran	Anumandal Padhakiari, Areraj, East Champaran
Sri Surendra Singh	Fish Farming	East Champaran	Anumandal Padhakiari, Areraj, East Champaran
Sri Umesh Yadav	Kisan Abhinav Puraskar	Gopalganj	DrRPCAU, Pusa
Sri Prince Kumar Patel	BAU,Kisan Samman in Kisan Mela	Katihar	BAU, Sabour
Sri Ranjay Paswan	Best Stall Award of Goatry	Khagaria	BAU, Sabour
Sri Arjun Verma	Best Farmer Award Under CRA	Khagaria	BAU, Sabour
Sri Jyoti Prasad	Progressive Farmer Award	Kishanganj	BAU, Sabour

Name of the Farmer	Name of the Award	District	Conferring Organization
Sri Saryug Yadav	Innovative & Best farmer award	Lakhisarai	BAU, Sabour
Md. Zubair Ahmad	Kisan Abhinav Purskar	Madhubani	DrRPCAU pusa
Sri Indranand Pandey	Utkrishath farmer award	Madhubani	Govt of Bihar
Sri Maheshwar Thakur	Abhinav Kisan award	Madhubani	DRPCAU, Pusa
Sri Varun Kumar Singh	Innovative Farmers award State level Jal jeevan hariyali award	Munger	Bihar Govt.Patna
Sri Rakesh Kumar	District level Best Farmers award 2021	Munger	BAU,Sabour
Smt. Rekha Devi	Innovative farmer Purskar	Muzaffarpur	DRPCAU, Pusa
Sri Udai Kumar	Best cauliflower grower	Muzaffarpur	RPCAU, Pusa
Sri Ram Babu Singh	Best turmeric grower	Muzaffarpur	RPCAU
Sri Anil Sahani	Best organic	Muzaffarpur	RPCAU
Sri Raju Ranjan	Best potato grower	Muzaffarpur	-
Sri Janrdan Singh	Innovative framer	Nawada	BAU Sbaour
Sri Satendra Kumar	Best Farmer Award	Patna	BAU, Sabour
Sri Dilip Kumar Singh	Dhanuka Innovative Agriculture Award	Rohtas	Dhanuka Agritech Ltd.
	Horticultural Exhibition	Rohtas	BAU Kisan Mela
Sri Nakul Singh	Horticultural Exhibition	Rohtas	BAU Kisan Mela
Sri Deen Dayal Singh	ATMA, Rohtas	Rohtas	ATMA, Rohtas
Smt. Shashi Devi	Progressive farmers Award	Saharsa	BAU, Sabour
Sri Chandan Kumar	Abhinav Kisan Puruskar	Samastipur	RPCAU, Pusa, Samastipur
Sri Chandan Prasad	Abhi nav Kisan Puraskar	Saran	DRPCAU, Pusa
Sri Binod Kumar	Innovative farmers of district	Sheikhpura	BAU, Sabour
Smt. Rani Devi	Abhinav Puraskar	Sheohar	Vice - Chancellor of R PCAU, Pusa
Sri Ksushal Kishore Yadav	Kisan Abinav Puraskar	Sitamarhi	DRRPCAU, Pusa

Name of the Farmer	Nam e of the Award	District	Conferring Organization
Sri Mukesh Kumar	Innovative Farmer's Award	Siwan	Dr.RPCAU, Pusa
Sri Ram Ayodhya Prasad	Kisan Shree		ATMA
Sri Tarakan t Prasad	Kisan Shree	Siwan	ATMA
Sri Laxman Prasad	Kisan Shree	Siwan	ATMA
Sri Abhay Mehta	District Kisan Award	Supaul	BAU Sabour and MBAC Agwanpur
Sri Ram bir Kr. Choudhary	1st prize in nursery at university level Kisan Mela 2021	Vaishali	DRPCAU, Pusa
Sri Rajdev Rai	Innovative Kisan Puruskar 2020	Vaishali	DRPCAU, Pusa
Sri Anand Kumar Singh	Abhinav Kisan Puraskar	West Champaran	RPCAU, Pusa, Samastipur,
Sri Shankar Soren	Progressive Farmer's Award	Bokaro	BAU, Ranchi
Sri Amrit Lal Singh	Progressive Farmer	Godda	BAU, Ranchi
Sri Nitish Anand	Progressive Fa rmer	Godda	BAU, Ranchi
Sri Kalika Prasad Mahto	Progressive Farmer	Godda	BAU, Ranchi
Sri Prince Kumar	Champion Farmer	Godda	Mahindra Foundation
Sri Nitish Anand	Champion Farmer	Godda	Mahindra Foundation
Sri Ramasankar Yadav	NRRI, Best Farmers (Vegetable Production) Awards	Koderma	Director NRRI, Cuttack
	Vegetable Grower	Koderma	ATMA, Koderma
Smt Mamta Kumari	NRRI, Best Farm women (Mushroo) awards	Koderma	Director NRRI, Cuttack ICAR
Sri Raju Yadav	NRRI, Farmer (Dairy Awards)	Koderma	Director NRRI, Cuttack ICAR
Smt Kavita Devi	NRRI Rice Grower Awards	Koderma	Director NRRI, Cuttack ICAR
Sri Raj Kumar Yadav	Vegetable Grower & fruit Grower	Koderma	ATMA, Koderma
Sri Manohar Prasad	Utkrishth Kisan Samman	Latehar	International Conference

Notes

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