

ANNUAL REPORT

वार्षिक प्रतिवेदन

2022



ICAR - Agricultural Technology Application Research Institute Kolkata

भाकृअनुप-कृषि तकनीकी अनुप्रयोग संस्थान कोलकाता

Salt Lake, Kolkata- 700 097

सॉल्ट लेक, कोलकाता-700097

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Indian Council of Agricultural Research

भारतीय कृषि अनुसंधान परिषद

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ICAR-Agricultural Technology Application Research Institute Kolkata

Bhumi Vihar Complex, GB Block, Sector-III, Kolkata – 700097

Phone: 033 2335 2355, 2335 3830

Fax: 033 2335 2355

Email: atarikolkata@gmail.com; atari.kolkata@icar.gov.in

Website: www.atarikolkata.org

Correct Citation

ICAR-ATARI Kolkata. 2023. Annual Report 2022, ICAR-Agricultural Technology Application Research Institute Kolkata, Salt Lake, Kolkata 700097.

Published by

Director, ICAR-ATARI Kolkata

Compiled & Edited by

S.K. Mondal, K.S. Das , P.P. Pal, A. Haldar and P. Dey

Technical Assistance

Satyajit Khutia, Sk. Golam Rasul, Susanta Kumar Nayak

Printed at

Semaphore Technologies Pvt. Ltd.

#+91-9038245205

Preface



The record of achievements with respect to assigned duties and responsibilities is reflected in the yearly progress report of any scientific institute. Accordingly, the Annual Report 2022 of ICAR-Agricultural Technology Application Research Institute (ICAR-ATARI) Kolkata deals with the fulfilment of set target of 59 KVKs spread across the Union Territory of Andaman & Nicobar Islands and the states of Odisha and West Bengal run under the administrative control of State Agricultural Universities, Central Universities, Deemed to be Universities, Indian Council of Agricultural Research Institutes, State Department as well as Non-Government Organizations. The report also portrays the effectiveness of technical guidance provided at ATARI level, supervision done and technological backstopping provided by Directorates of Extension Education of SAUs as per its jurisdiction and efficiency of host organization in creating adequate infrastructure, staff recruitment and ensuring congenial atmosphere to enable the KVKs to excel in improving agricultural situation of the farming community of this zone.

Compilation of Annual Report 2022 of ICAR-ATARI Kolkata has encompassed all the related areas of KVK functioning including the detailed account of mandated activities like training, on-farm trial, frontline demonstration, extension activities, soil testing, seed and planting material production, fish fingerlings and livestock production and others. Such elaboration will help in understanding the sphere of KVK activities as well as its reach among the farmers of remote regions of the states.

With the launching of a number of flagship programmes by Department of Agriculture Cooperation & Farmers Welfare and ICAR, New Delhi and various Central Sector Schemes by different ministries, the KVKs under the direct supervision of ICAR-ATARI Kolkata are addressing various farming practices, non-farming enterprises,

climate, entrepreneurship development, Swachh Bharat Mission, Tribal development and many more related areas which have been adequately depicted in this Annual report with precise information and quality photographs to provide the desired clarity. The new initiatives like Natural farming and Agri-Drone projects have also been recorded in this document. Likewise, the contribution of Directorates of Extension Education of SAUs in overseeing the KVK functioning, ensuring technological backstopping, developing human resources and performance of ATICs have been given proper weightage in this compilation.

Information about various events like Mahila Kisan Divas, Garib Kalyan Sammelan, Swachhta Hi Suraksha 2022, Celebration of Vigilance Week etc. organized at ICAR-ATARI Kolkata as well as KVKs has also been incorporated in this documentation with special emphasis on digitization. A glimpse of KVK Portal, KRISHI Portal, National Farmers Portal and regular uploading of data in various portals and other relevant information have been recorded in the Annual Report 2022.

Bringing out this publication incorporating vast array of agricultural development initiatives and newly approved research projects within the stipulated time has become possible only due to help and corporation extended by all concerned. As the Director of ICAR-ATARI Kolkata, I thankfully acknowledge the guidance received from Division of Agricultural Extension, Indian Council of Agricultural Research, New Delhi and help, assistance and cooperation received from all Host Organizations, Deans/ Directors of Extension Education, entire KVK fraternity of this zone and all the staff of ICAR-ATARI Kolkata including the project staff of the institute.



Director

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कार्यकारी सारांश

पिछले एक वर्ष के दौरान आईसीएआर-अटारी, कोलकाता की गतिविधियों के क्षेत्र में अनुसंधान पर अधिक जोर दिया गया, तथ 59 केवीके के माध्यम से विस्तार और अच्छी संख्या में प्रमुख कार्यक्रमों को पूरा किया गया। नीति निर्माण निकाय में परिप्रेक्ष्य में बदलाव के साथ, सभी वैज्ञानिक प्रौद्योगिकी अपनाने, पोषण सुधार, उन्नत कृषि प्रणाली विकसित करने, जलवायु लचीली प्रौद्योगिकी के प्रभाव मूल्यांकन, कृषि उद्यमिता और वैकल्पिक आजीविका के महत्वपूर्ण लक्षणों को उजागर करने के लिए नेटवर्क और अंतर-संस्थागत परियोजनाओं दोनों में शामिल रहे। साथ ही जनजातीय लोगों के लिए विकास, सामाजिक-आर्थिक सशक्तीकरण और स्थायी आजीविका सुरक्षा, किसानों की आय बढ़ाने के लिए चयनित हस्तक्षेप की पहचान, खाद्य उपभोग पैटर्न और पोषण सुरक्षा के बाद आहार विविधता का आकलन, क्षमता विकास और पशुधन उत्पादन में वृद्धि के बीच संबंध, की पहचान प्रौद्योगिकी प्रसार और अन्य के लिए उचित वितरण मार्ग आदि में भी शामिल रहे। चूँकि सभी परियोजनाएँ अभी पूरी नहीं हुई हैं, उन परियोजनाओं में महत्वपूर्ण परिणाम प्राप्त किए जा सकते हैं ताकि इसके बड़े निहितार्थों के लिए नीति दस्तावेज विकसित करने में मदद मिल सके।

राष्ट्रीय हित की उपर्युक्त अनुसंधान परियोजनाओं को पूरा करने के अलावा, आईसीएआर-अटारी, कोलकाता दलहन और तिलहन पर सीएफएलडी (क्लस्टर फ्रंटलाइन प्रदर्शन), ARYA (कृषि में युवाओं को आकर्षित करना और बनाए रखना), एनआईसीआरए (जलवायु लचीली कृषि में राष्ट्रीय नवाचार), एफएफपी (किसान प्रथम कार्यक्रम), फार्म मशीनीकरण, बीज हब, एनईएमए (नेटवर्क विस्तार पद्धति दृष्टिकोण), जीकेएमएस-डीएमएम (ग्रामीण कृषि मौसम सेवा-जिला कृषि-मौसम इकाई), प्राकृतिक खेती, टीएसपी (जनजातीय उप योजना), एएससीआई (कौशल विकास प्रशिक्षण कार्यक्रम), केकेए (कृषि कल्याण अभियान), मधुमक्खी पालन, मॉडल- आईएफएस (एकीकृत कृषि प्रणाली), सीएसआईएसए (दक्षिण एशिया के लिए अनाज प्रणाली पहल), एफपीओ (किसान उत्पादक संगठन), राष्ट्रीय किसान पोर्टल, पीएफएमएस, एनएआरआई, कृषि-वानिकी और मूल्य श्रृंखला प्रबंधन, कृषि पोर्टल, डीएफआई, किसान सारथी, गैर-एएससीआई कौशल विकास कार्यक्रम आदि जैसे विभिन्न प्रमुख कार्यक्रमों की निगरानी/कार्यान्वयन भी कर रहा है। सभी परियोजनाओं के परिणाम ग्रामीण युवाओं और किसानों को खेत पर और खेत से बाहर कृषि को बनाए रखने में सहायक रहे हैं। बाजार बनाने या बाय बैक तंत्र की व्यवस्था करने में केवीके में लागू करने वाली प्रमुख परियोजना के प्रयासों ने विभिन्न हितधारकों को बेहतर कृषि और कृषि विपणन के लिए एक साथ आने के लिए प्रभावित किया है। इसके अलावा, इस विशिष्ट परियोजना ने जलवायु संबंधी संवेदनशीलता के मुद्दे को संबोधित करते हुए जलवायु प्रभावित किसानों को अपने कमजोर किसानों/ पारिस्थितिकी तंत्र में कृषि पद्धतियों के उपयुक्त साधन खोजने में मदद की है। इसी तरह, मॉडल खेती प्रणाली ने घटकों के उचित चयन के माध्यम से छोटी और सीमांत भूमि में किसानों के लिए अतिरिक्त निवेश के बिना अधिक कमाई का रास्ता खोल दिया है जो एक दूसरे के पूरक के रूप में कार्य कर सकते हैं। पोषण सुरक्षा के मोर्चे पर, विशेष महिलाओं/ लड़कियों जैसे गर्भवती, किशोरी और अन्य शारीरिक अवस्था वाली महिलाओं/ लड़कियों सहित कृषक परिवारों की पोषण स्थिति में समग्र

सुधार के लिए जैव-फोर्टिफाइड फसलों और सब्जियों के साथ पोषण उद्यान के विकास की दिशा में ग्रामीण महिलाओं को पर्याप्त रूप से शामिल किया गया था। संक्षेप में, प्रमुख कार्यक्रमों ने न केवल लक्षित हितधारकों को लाभान्वित किया है, बल्कि अन्य संगठनों को भी जनता के बीच अपनी पैठ बनाने के लिए इस महत्वपूर्ण उपलब्धि को अपनाने के लिए प्रेरित किया है।

आईसीएआर-अटारी कोलकाता के अथक प्रयासों से न केवल अनुसंधान के मोर्चे पर उत्कृष्टता प्राप्त हुई है बल्कि केवीके गतिविधियों में भी विविधता प्राप्त की जा सकी है। ऑन-फार्म परीक्षण की पारंपरिक विधि के माध्यम से विशिष्ट कृषि पारिस्थितिकी में उपचारात्मक उपायों को इंगित करने के लिए आवश्यकता आधारित प्रौद्योगिकी मूल्यांकन के साथ-साथ, नए क्षेत्रों को भी विपणन बुद्धिमत्ता, समूह गतिशीलता, विस्तार पद्धतियों आदि जैसे अनुकूली अनुसंधान के दायरे में लाया गया। प्रौद्योगिकी मूल्यांकन करने के लिए केवीके ने विभिन्न प्रकार के प्रदर्शन, आईसीएम, आईडीएम, आईएनएम, आईपीएम, आरसीटी, आईएफएस, एनएम, पीएचटी, मृदा स्वास्थ्य में आवर्ती कृषि समस्याओं का समाधान और प्रजनन प्रबंधन, कृषि कार्यान्वयन और मशीनरी, भोजन और पोषण, जल प्रबंधन, पशुधन और मत्स्य पालन आदि प्रदान करने के लिए 308 प्रौद्योगिकियों का आकलन करने के लिए 361 स्थानों पर 443 ऑन-फार्म परीक्षण किए। मूल्यांकन का परिणाम राज्य विस्तार मशीनरी, एटीएमए और अन्य हितधारकों को इसके एक्सट्रपलेशन के लिए प्रौद्योगिकी कैप्सूल के रूप में उपलब्ध कराया गया था। सीएफएलडी के संबंध में, केवीके 2265.5 हेक्टेयर क्षेत्र को विभिन्न प्रकार के प्रतिस्थापन, जैव उर्वरक के अनुपयोग, बीज उपचार, पंक्ति में बुआई, कीट प्रबंधन और अन्य सहित प्रदर्शन की बेहतर प्रथाओं के तहत ला सकते हैं। सीएफएलडी तिलहन के तहत, मूंगफली, तिल, सूरजमुखी और सरसों की पहचान की गई फसलें थीं, जबकि सीएफएलडी दलहन कार्यक्रम के तहत अरहर, उड़द, मूंग चयनित फसलें थीं। प्रदर्शित प्रौद्योगिकियों में उन्नत किस्में, पंक्ति में बुआई, खरपतवार प्रबंधन, जैव उर्वरकों के साथ बीज उपचार, एकीकृत पोषक तत्व प्रबंधन, एकीकृत कीट प्रबंधन आदि शामिल थे। करीबी पर्यवेक्षण और निगरानी ने समग्र तिलहन उत्पादन में 12 से 44.2 प्रतिशत अधिक उपज प्राप्त करने में मदद की, जबकि प्रदर्शित दलहन फसल में 32 से 60 प्रतिशत के बीच सीमा थी। हालाँकि, इस क्षेत्र के 10 केवीके को आवंटित बीज केंद्र दो या तीन केवीके को छोड़कर वांछित मात्रा में उत्पादन नहीं कर सका। इस कमी के लिए मौसम की आपदा और बुआई के समय गुणवत्तापूर्ण बीज की अनुपलब्धता को जिम्मेदार ठहराया जा सकता है।

अंडमान और निकोबार द्वीप, ओडिशा और पश्चिम बंगाल के सभी 59 केवीके द्वारा किसानों, कृषक महिलाओं, ग्रामीण युवाओं और विस्तार कार्यकर्ताओं के लिए क्षमता विकास को पर्याप्त प्राथमिकता दी गई। ग्राहकों की सुविधा और विषय की आवश्यकता के आधार पर, 2022 के दौरान केवीके द्वारा कैम्पस के अंदर और बाहर दोनों तरह के प्रशिक्षण कार्यक्रम आयोजित किए गए। आयोजित क्षमता निर्माण कार्यक्रम का सारांश बताता है कि केवीके ने 112680 प्रतिभागियों को 4278 पाठ्यक्रमों की पेशकश की। तीनों श्रेणियों में से। चूँकि विषयगत क्षेत्र पूर्व निर्धारित थे, केवीके ने प्रशिक्षण के केवल उन्हीं क्षेत्रों को

चुना जैसे फसल उत्पादन, बागवानी, मृदा स्वास्थ्य और उर्वरता प्रबंधन, पशुधन उत्पादन और प्रबंधन, महिला सशक्तिकरण, कृषि इंजीनियरिंग, पौध संरक्षण, मत्स्य पालन, इनपुट उत्पादन, समूह गतिशीलता और कृषि वानिकी आदि। अनिवार्य क्षमता निर्माण कार्यक्रमों के अलावा केवीके ने विभिन्न श्रेणियों के 14222 प्रतिभागियों के लिए 455 प्रायोजित प्रशिक्षण कार्यक्रम आयोजित किए। इसी प्रकार, 5122 युवाओं को स्वरोजगार अपनाने में मदद करने के लिए 206 लंबी अवधि के व्यावसायिक पाठ्यक्रम भी संचालित किए गए। निरंतर प्रशिक्षण के रूप में केवीके ने बीज उत्पादन, रोपण सामग्री, जैव उत्पाद और पशुधन और मत्स्य पालन के उत्पादन के बाद बड़ी संख्या में विस्तार गतिविधियाँ आयोजित कीं। मिट्टी नमूना विश्लेषण के क्षेत्र में केवीके ने 2331 गांवों के 42125 किसानों को मृदा स्वास्थ्य कार्ड जारी करने के लिए 30258 नमूनों का विश्लेषण किया। इसके अलावा, 5 दिसंबर, 2022 को सभी केवीके द्वारा सांसदों/विधायकों की उपस्थिति में 6925 मृदा स्वास्थ्य कार्ड वितरित करने के लिए विश्व मृदा दिवस मनाया गया।

एनआईसीआरए के तहत गतिविधियाँ एनआरएम, फसल, पशुधन और मत्स्य उत्पादन और संस्थागत हस्तक्षेप के इर्द-गिर्द घूमती थीं। जल पुनर्भरण क्षमता से लेकर जल धारण क्षमता और जलवायु स्मार्ट फसल किस्मों के साथ-साथ प्रबंधन प्रथाओं के सफल हस्तक्षेप तक सभी मोर्चों पर महत्वपूर्ण उपलब्धि दर्ज की है। कस्टम हार्विंग सेंट्रों के लाभ के अलावा, किसान मिनी स्वचालित मौसम स्टेशनों से भी मौसम की जानकारी प्राप्त कर सकते हैं।

फार्मर फर्स्ट कार्यक्रम में कार्यान्वयन संस्थानों ने फसल, बागवानी, पशुधन/मत्स्य पालन, एकीकृत कृषि प्रणाली, प्राकृतिक संसाधन प्रबंधन और उद्यम आधारित मॉड्यूल के 792 प्रदर्शन कार्यक्रम शुरू किए। कार्यक्रमों में कुल मिलाकर 2633 किसान परिवार शामिल थे। अनुसूचित जनजाति घटक के तहत जनजातीय गांव में स्प्रेयर, रिज मेकर, हंसिया, पंप सेट, वीडर और अन्य छोटे कृषि उपकरणों के रूप में संपत्ति के निर्माण पर जोर दिया गया था। जनजातीय गांवों में केवीके ने लगभग 903 क्विंटल बीज का, 7.23 रोपण किए गए सामग्री और 54600 पशुधन उपभेद उत्पादन किया। 2022 के दौरान की गई अन्य गतिविधियाँ में ओएफटी, एफएलडी, प्रशिक्षण आदि थीं।

कृषि में युवाओं को आकर्षित करने और बनाए रखने के लिए, 9 केवीके जिलों में प्रशिक्षित युवाओं द्वारा 468 उद्यमशीलता इकाइयाँ स्थापित की गईं। मधुमक्खी पालन, मुर्गी पालन, मत्स्य पालन, बकरी पालन, नर्सरी, लाख, मशरूम और वर्मीकम्पोस्ट जैसे पहचाने गए उद्यम समूह उद्यमियों के लिए चयनित उद्यमों हेतु रु. 51,000/- से रु. 9,60,1850/- तक की सीमा में औसत वार्षिक आय प्रदान कर सकते हैं। एमजीएमजी कार्यक्रम में, आईसीएआर संस्थान, क्षेत्रीय केंद्रों और इस क्षेत्र के एसएयू ने 31606 किसानों के लाभ के लिए 340 गांवों को कवर करने के लिए 637 क्षेत्रीय गतिविधियाँ शुरू कीं।

आईसीएआर-अटारी कोलकाता ने पिछले एक वर्ष के दौरान राष्ट्रीय मधुमक्खी बोर्ड, भारत सरकार द्वारा प्रायोजित मधुमक्खी पालन जैसे रोजगार सृजन के नए क्षेत्रों को लोकप्रिय बनाने पर भी विचार किया। यह देश भर में 100 केवीके की भागीदारी के साथ राष्ट्रीय मधुमक्खी पालन और शहद मिशन का एक हिस्सा है। परियोजना के प्रशिक्षण और पर्यवेक्षण से समूह उद्यमियों के लिए 0.5-95 लाख और व्यक्तिगत उद्यमियों के लिए 0.1 से 9.7 लाख के बीच औसत वार्षिक आय के लिए शहद उत्पादन पर 20 समूह उद्यमियों और 181 व्यक्तिगत उद्यमिता का विकास हुआ है।

इस क्षेत्र में अनुसंधान और विस्तार गतिविधियों में अंतर्राष्ट्रीय संगठन को आकर्षित करने के लिए, CIMMYT के तहत दक्षिण एशिया के लिए अनाज प्रणाली पहल के साथ सहयोग कार्यक्रम को पिछले साल चावल-दलहन फसल प्रणालियों में लैंडस्केप डायमनोस्टिक सर्वेक्षण (एलडीएस) के साथ ओडिशा और पश्चिम बंगाल के चयनित जिले में पुनर्जीवित किया गया था।

इस पहल को पश्चिम बंगाल के छह कृषि-जलवायु क्षेत्रों में मॉडल आईएफएस को आगे बढ़ाने के लिए नाबाई द्वारा विशेष वित्तीय सहायता प्रदान की गई थी। परियोजना पूरी होने की कगार पर है और निष्कर्ष जल्द ही फंडिंग एजेंसी को सौंप दिए जाएंगे।

पिछले एक वर्ष के दौरान आईसीएआर-अटारी कोलकाता की अन्य प्रमुख उपलब्धियों में डेयरी, जलवायु लचीलापन, किसान सारथी, ड्रोन प्रौद्योगिकी आदि पर क्षमता निर्माण के लिए नियोजित प्रशिक्षण कार्यक्रम शामिल हैं। एफपीओ गठन और प्रचार, एएससीआई और गैर-एएससीआई कौशल विकास कार्यक्रम, एम-किसान पोर्टल का रखरखाव, जिला कृषि-मौसम इकाई के माध्यम से जीकेएमएस, पोषण संवेदनशील कृषि संसाधन और नवाचार, केकेए चरण-III, संस्थान की वेबसाइट का रखरखाव, केवीके पोर्टल का रखरखाव और अन्य पर भी विशेष जोर दिया गया था। इसके अलावा, कार्यालय कामकाज के हर क्षेत्र में ऑफिस ऑटोमेशन/ ई-ऑफिस को पीएफएमएस के साथ पूरी तरह से संचालित किया गया है। मेजबान संस्थानों, विशेष रूप से विस्तार शिक्षा निदेशकों ने चयनित केवीके के माध्यम से अनुसंधान गतिविधियों को चलाने के साथ-साथ निगरानी का भी भरपूर समर्थन किया है। अनुरोध किए जाने पर वे केवीके, एटीआईसी और अन्य आवश्यक क्षेत्रों की गतिविधियों की देखरेख में भी सहायक थे।

वर्तमान संस्थान को विस्तार उन्मुख गतिविधियों से अनुसंधान-विस्तार इकाई में बदलने के लिए पर्याप्त समर्थन, समन्वय और उपयुक्त नेतृत्व की आवश्यकता है। पिछले एक वर्ष के दौरान इस संस्थान की उपलब्धि ऐसी सभी विशेषताओं के निर्बाध एकीकरण के कारण संभव हुई है। यह उम्मीद की जाती है कि सभी ओर से मदद और सहायता के प्रवाह से आईसीएआर-अटारी कोलकाता पूरे आईसीएआर प्रणाली की खुशी के लिए एक नई ऊंचाई पर पहुंच जाएगा।

Executive Summary

The sphere of activities in respect of ICAR-ATARI, Kolkata during last one year encompasses grater thrust in research followed by extension through 59 KVKs and accomplishing a good number of flagship programmes. With the change of perspective at the policy making body, all the scientists remained involved both in network and intra institutional projects to highlight significant traits of technology adoption, nutritional improvement, developing improved farming system, impact assessment of climate resilient technology, agripreneurship and alternate livelihood development, socio-economic empowerment and sustainable livelihood security for the tribal people, identification of selected intervention to enhance farmers' income, assessment of dietary diversity followed by food consumption pattern and nutritional security, relation between capacity development and augmentation of livestock production, identification of appropriate delivery pathways for technology dissemination and others. Through all the project are yet to complete, significant results could be obtained in those projects to help develop policy papers for its larger implications.

In addition to carrying out the above-mentioned research projects of national interest, ICAR-ATARI, Kolkata is also monitoring/ implementing various flagship programmes like CFLD (Cluster Frontline Demonstration) on Pulses, and Oilseeds, ARYA (Attracting and Retaining Youth in Agriculture), NICRA (National Innovations in Climate Resilient Agriculture), FFP (Farmer FIRST Programme), Farm mechanization, Seed Hub, NEMA (Network Extension Methodology Approaches), GKMS-DAMU (Gramin Krishi Mausam Sewa-District Agro-Met Unit), Natural farming, TSP (Tribal Sub Plan), ASCI (Skill Development Training Programme), KKA (Krishi Kalyan Abhiyan), Bee keeping, Model- IFS (Integrated Farming System), CSISA (Cereal System Initiative for South Asia), FPO (Farmer Producer Organisation), National farmers' portal, PFMS, NARI, Agro-forestry and value chain management, Krishi portal, DFI, Kisan Sarathi, Non-ASCI Skill Development programme etc. The outcome of all the projects has been

instrumental towards motivating rural youth and farmers to retain on and off-farm agriculture as they are prime livelihood development option. The efforts of flagship project implementing KVKs in creating markets or arranging buy back mechanism has further influence various stakeholders to come together for a better agriculture and agricultural marketing. Moreover, the issue of climatic vulnerability addressed this specific project has served the climate-hit farmers to find out suitable means of agricultural practices in their vulnerable farmers/ecosystem. Likewise, model farming system has opened up the avenue to earn more without additional investment by the farmers in small and marginal lands through appropriate selection of components that can act as complementary to one another. In the front of nutritional security, the rural women were adequately involved towards development of nutritional garden with bio-fortified crops and vegetables for the overall improvement in the nutritional status of farm families including special women/ girls like pregnant, adolescent and other physiological stages. In short, the flagship programmes have not only benefitted the targeted stakeholders but also inspired other organization to adopt the key achievement for its scaling out among the masses.

The tireless efforts of ICAR-ATARI Kolkata has not only excelled in the research front but also diversity could be obtained in the KVK activities. Along with need based technology assessment to pinpoint the remedial measures in specific agroecology through the conventional method of on-farm trial, newer areas were also brought under the gambit of the adaptive research like marketing intelligence, group dynamics, extension methodologies etc. In the process of carrying out technology assessment the KVKs conducted 443 on-farm trials in 361 location to assess 308 technologies to provide solution for the recurring farming problems in varietal performance, ICM, IDM, INM, IPM, RCT, IFS, NM, PHT, soil health and fertility management, farm implement and machineries, food and nutrition, water management, livestock and fishery. The result of the assessment was made available to the state extension

machinery, ATMA and other stakeholders in the form of technology capsule for its extrapolation. In respect of CFLD, the KVKs could bring 2265.5 ha area under improved practices of demonstration including varietal replacement, application biofertilizer, seed treatment, line sowing, insect pest management and others. Under CFLD oilseeds, crops identified were groundnut, sesame, sunflower and mustard whereas pigeon pea, blackgram, greengram were the selected crops under CFLD pulse programme. The demonstrated technologies were improved varieties, line sowing, weed management, seed treatment with biofertilizers, integrated nutrient management, integrated pest management, etc. The close supervision and monitoring helped in achieving 12 to 44.2 percent more yield in overall oilseed production whereas the range was between 32 to 60 percent in the demonstrated pulse crop. However, the seed hub allocated to 10 KVKs of this zone could not produce the desired quantities barring two or three KVKs. The shortfall may be attributed to weather calamity and non-availability of quality seed at the time of sowing.

Capacity development for the farmers, farm women, rural youth and extension functionaries was given adequate priority by all 59 KVKs of Andaman and Nicobar Island, Odisha and West Bengal. Based on the convenience of the clientele and need of the subject, both on and off campus training programmes were organized by the KVKs during 2022. The summary of the capacity building programme organized indicates that the KVKs offered 4278 number of courses to 112680 number of participants of all three categories. As the thematic areas were predetermine, the KVKs opted for those areas of training only like crop production, horticulture, soil health and fertility management, livestock production and management, women empowerment, agriculture engineering, plant protection, fisheries, input production, group dynamics and agroforestry. Apart from mandated capacity building programmes the KVKs conducted 455 sponsored training programmes for 14222 number of participants of varied categories. Likewise, 206 long duration vocational courses were also conducted for 5122 youths to help them take up self employment. As a continued trained

the KVK's conducted a large number of extension activities followed by production of seeds, planting material, bioproducts and production of livestock and fishery. In the area of soil sample analysis the KVKs analyzed 30258 numbers of samples to issue Soil Health Cards to 42125 numbers of farmers from 2331 villages. Moreover, World Soil Day was observed on December 5, 2022 by all the KVKs in the presence of MPs/ MLAs to distribute 6925 numbers of Soil Health Cards.

The activities under NICRA revolved around NRM, crop, livestock and fishery production and institutional intervention. In all fronts significant achievement could be recorded starting from water recharge capacity to water retention and successful intervention of climate smart crop varieties as well as management practices. Apart from the benefit of Custom Hiring Centers, the farmers could also access weather information from mini automatic weather stations.

InFarmer FIRST programme, the implementing institutes took up 792 demonstration programmes of Crops, Horticulture, Livestock/ Fisheries, Integrated Farming System, Natural Resource Management and Enterprise based modules. Altogether 2633 farm families were involved in the programmes. Under schedule tribe component thrust was given for creation of assets in the tribal village in the form of sprayer, ridge maker, sickles, pump sets, weeder and other small agriculture implements. In the tribal villages the KVKs produced nearly 903q seeds, 7.23 take planting material 54600 livestock strains. Other activities carried out during 2022 were OFT, FLD, training etc.

In attracting and retaining youth in agriculture, 468 no of entrepreneurial units were established by the trained youth in 9 KVK districts. The identified enterprise like apiary, poultry, fishery, goatery, nursery, lac, mushroom and vermicompost could provide average annual income in the range of Rs. 51,000/- to Rs.9,60,1850/- against the selected enterprises for group entrepreneurs. In MGMT programme, ICAR institute, regional centres and SAU of this Zone took up 637 field activities to cover 340 villages for the benefit of 31606 farmers.

ICAR-ATARI Kolkata also contemplated to popularize newer areas of employment generation like bee keeping sponsored National Bee Board, GoI during last one year. It is a part of National Beekeeping and Honey Mission with involvement of 100 KVKs across the country. The training and supervision of the project has led to development of 20 group entrepreneurs and 181 individual entrepreneurship on honey production for an average annual income between 0.5-95 lakh for group entrepreneurs and 0.1 to 9.7 lakh for individual entrepreneur.

In a continued bid to attract international organization in research and extension activities in this zone, collaboration programme with cereal system initiative for South Asia under CIMMYT was revived last year with the additional of Land Scape Diagnostic Survey (LDS) in Rice-Pulse cropping systems in the selected district of Odisha and West Bengal.

This initiative was provided special financial support by NABARD to carry out Model IFS across six agro-climatic regions of West Bengal. The project is on the verge of completion and the findings will be submitted to the funding agency very soon.

Other major accomplishments of ICAR-ATARI Kolkata during last one year include planned training

schedule for capacity building on dairy, climate resilience, kisan sarathi, drone technology etc. Special emphasis was also laid on formation and promotion of FPOs, ASCI and non-ASCI skill development programme, maintaining m-Kisan portal, GKMS through district agro-met unit, nutrition sensitive agriculture resources and innovation, KKA phase-III, maintaining institute website, maintaining KVK portal and others. In addition, office automation/e-office has been fully operated with PFMS in every walks of office functioning. The host institutes, particularly the Directors of Extension Education have amply supported the monitoring as well as carrying out research activities through the selected KVKs. They were also instrumental in overseeing the activities of KVKs, ATIC and other needed areas as and when requested for.

Transformation of present institute from extension oriented activities to research-extension entity needs adequate support, co-ordination and apt leadership. The achievement of this institute during last one year has been possible due to seamless integration of all such attributes. It is expected that with the flow of help and assistance from all corners will take ICAR-ATARI Kolkata into a newer height for the delight of entire ICAR system.

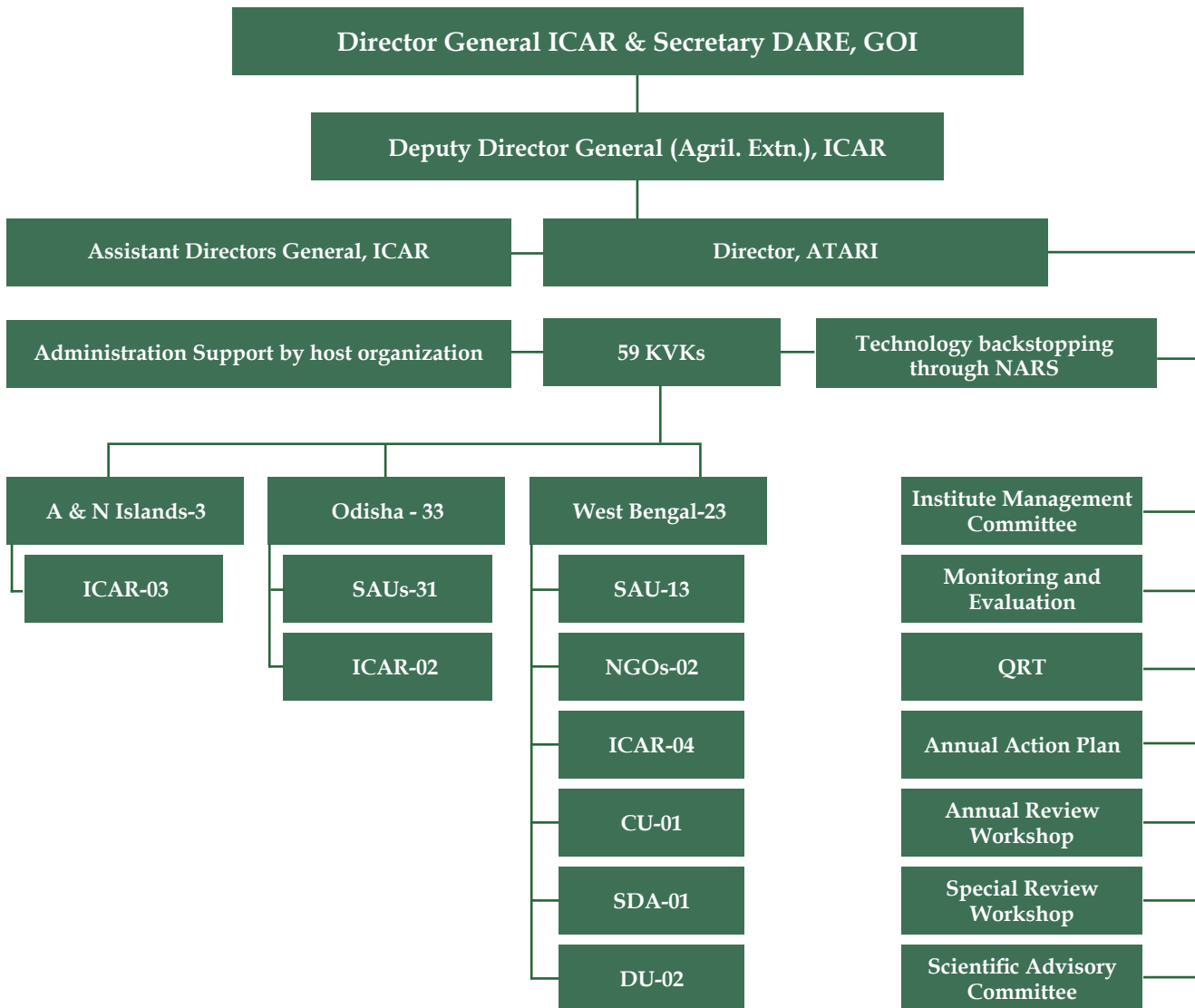
1.0 Introduction

In order to strengthen the KVK system across the country, Indian Council of Agricultural Research has approved 11 Agricultural Technology Application Research Institute to look after and guide the activities of 731 KVKs functioning in almost all the rural districts of the country, in the larger rural districts one additional KVK has also been established by ICAR. ICAR-ATARI, Kolkata has been entrusted with the monitoring of 59 KVKs spread across West Bengal, Andaman & Nicobar Islands and Odisha.

1.1 Profile :

ICAR-ATARI, Kolkata is functioning as an integral part of Division of Agricultural Extension, New Delhi headed by the Deputy Director General (AE). All the SMDs in ICAR including Division of Agricultural Extension come under the office of Secretary (DARE) and Director General (ICAR). The organizational structure of ICAR-ATARI, Kolkata is depicted below through a concise chart.

1.2 Organizational Structure :



1.3 Budget Provision:

Providing need based fund to the KVKs of this zone is of utmost importance in running the KVKs. It is always ensured that KVKs receive fund in time throughout the year for the mandated activities and to meet up other requirements. Accordingly,

assessment of budget requirement, placing demand for fund and releasing fund are carried out by this Institute on a regular basis. The process helped 59 KVKs and 4 Directorates of Extension Education of the SAUs of this zone to receive a sum of Rs 10875.62 lakh during 2022 from ICAR-ATARI, Kolkata. Head-wise details are as follows:

Table : Budget in respect of ICAR-Agricultural Technology Application Research Institute & KVKs under Zone- V during 2022

(Rs. in lakh)

ATARI/KVK	Recurring							Non-Recurring					Revol. Fund	Grand total
	P & A	T.A.	H.R.D	Cont.	TSP Cont.	SCSP Cont.	Total	Equip.& furn	Works	Lib.	Vehicle	Total		
ICAR-ATARI, Kolkata	342.00	18.13	4.44	59.28	0.00	0.00	423.85	4.15	0.00	0.00	0.00	4.15	0.00	428.00
State Agricultural University														
OUAT, Bhubaneswar (31)	3420.95	39.87	13.30	260.00	88.50	444.00	4266.62	182.35	381.24	3.10	81.70	648.39	0.00	4915.01
UBKV, Coochbehar, West Bengal (5)	982.44	7.50	3.50	44.50	0.00	114.00	1151.94	24.05	30.85	0.50	27.00	82.40	0.00	1234.34
BCKV, Nadia, West Bengal (5)	867.28	7.00	4.00	46.50	0.00	107.50	1032.28	16.75	69.07	0.50	18.00	104.32	0.00	1136.60
WBUA&FS, Kolkata (3)	523.74	6.50	3.40	36.50	0.00	73.00	643.14	1.70	24.46	0.30	9.00	35.46	0.00	678.60
ICAR														
ICAR-CIARI, A&N Islands (3)	273.00	4.00	0.90	42.50	6.50	0.00	326.90	7.70	15.81	0.30	9.00	32.81	0.00	359.71
ICAR-CRRI, Cuttack, Orissa (1)	120.00	1.36	0.00	11.44	0.00	21.50	154.30	1.00	57.46	0.10	0.00	58.56	0.00	212.86
ICAR-CIFA, Bhubaneswar, Orissa (1)	180.00	1.60	0.30	7.00	0.00	22.00	210.90	3.30	9.95	0.10	0.70	14.05	0.00	224.95
CRIJAF, West Bengal (2)	259.35	2.50	0.60	14.00	0.00	44.00	320.45	3.25	5.00	0.20	0.00	8.45	0.00	328.90
ICAR-CISH, Lucknow (1)	37.05	1.00	0.30	3.50	0.00	18.00	59.85	2.90	0.00	0.10	0.00	3.00	0.00	62.85
ICAR-NDRI, Karnal (1)	34.87	0.80	0.30	5.00	0.00	19.00	59.97	0.30	3.00	0.10	0.00	3.40	0.00	63.37
Central University, Visva Bharati, West Bengal (1)														
Deemed University, RKMVERI, West Bengal (2)	402.85	3.20	0.60	20.00	0.00	45.00	471.65	4.66	12.67	0.20	0.70	18.23	0.00	489.88
State Govt. Undertaking														
WBCADC, Kolkata (1)	46.40	1.00	0.30	5.50	0.00	17.00	70.20	1.00	10.52	0.10	0.00	11.62	0.00	81.82
NGO														
West Bengal (2)	367.10	2.00	0.60	14.10	0.00	44.00	427.80	9.15	17.61	0.20	0.00	26.96	0.00	454.76
GRAND TOTAL	8000.00	99.26	32.84	576.52	95.00	993.00	9796.62	270.36	647.64	5.90	155.10	1079.00	0.00	10875.62

2.0 Krishi Vigyan Kendras

With the generation of newer agriculture and allied technologies, the farming community needs regular access to such development for the betterment of their economic and social condition. To facilitate the process of making technologies available at the doorstep of the farmers, Indian Council of Agricultural Research established Krishi Vigyan Kendras (KVKs) for the rural districts of the country since 1974. Alongside, capacity development of farmers, rural youths and extension functionaries was also vested on KVK to take technology diffusion process in a holistic manner. To cater to the technology and information needs of the farmers, KVK is working as the link between National Agricultural Research System (NARS) and Transfer of Technology System (TOT) through effective convergence with state and other organs. Apart from the set mandate activities, the KVKs are also involved in a number of flagship programmes of state/central government to achieve the desired objectives.

2.1 Genesis of KVK:

The journey of KVK started in the form of polytechnic for providing vocational training.

Later on objectives of other programmes like Lab to Land, National Demonstration etc. were merged into an institutional shape in the form of KVK. The first KVK was established in 1974 at Puducherry under Tamil Nadu Agricultural University followed by the second KVK in West Midnapore district of West Bengal of this zone. During the same plan period another two KVKs were also established, one at South 24 Pgs of West Bengal (Nimpith) and Khordha, Odisha. During VI Five Year Plan, 7 KVKs were established of which six in Odisha and one in West Bengal followed by 6 KVKs during Annual Plan of 1090-92. The process of establishment of KVKs continued in each Five Year Plan and another 4 KVKs were established during VIII Five Year Plan. In IX Five Year plan, this zone was approved only one KVK but 26 KVKs were established during X Five Year plan. In the next two Five Year plan period, 6 KVK each were established in this zone. However, in XII Five Year plan, 5 additional KVKs were established in 5 large districts of West Bengal namely, Murshidabad, Nadia, North 24 Pgs, South 24 Pgs and Malda.

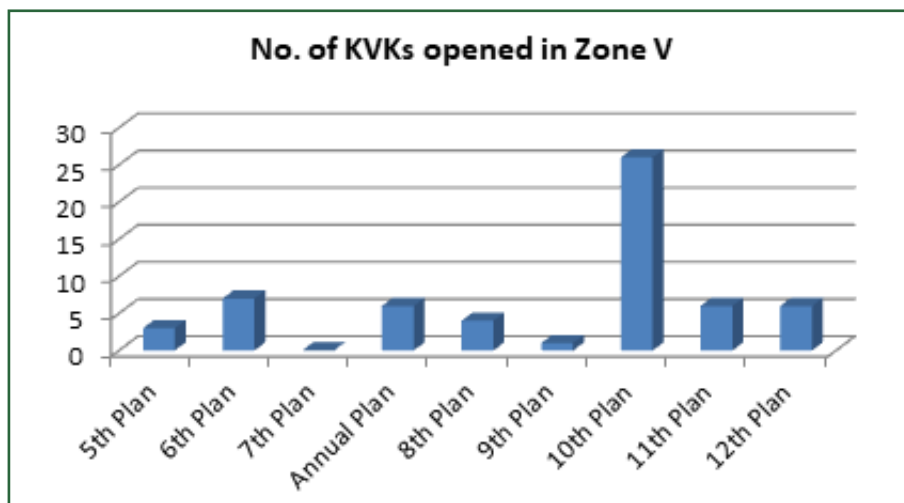


Fig: Plan wise growth of KVKs under Zone V

2.2 Mandate:

The mandate of KVK has been changed many a time as per the need of stakeholders for better application of policy initiatives in agricultural development. The present mandate of KVK is Technology Assessment and Demonstration for its wider Application

and to enhance Capacity Development (TADA-CD). For accomplishment of the existing mandate the following activities are entrusted with the functioning of KVKs.

- Conduct on-farm trials to identify the location specificity of agricultural technologies under various farming systems.

- Organize frontline demonstrations to establish production potential of various crops and enterprises on the farmers' fields.
- Organize need based training for farmers to update their knowledge and skills on modern agricultural technologies and provide training to extension personnel to orient them in the frontier areas of technology development.
- Create awareness about improved agricultural technologies among various clientele groups through appropriate extension programmes.
- Produce quality seeds, planting materials, livestock breeds, animal products, bio-products etc. as per the demand and supply the same to different clienteles.
- Work as knowledge and resource centre of agricultural technologies to support the

initiatives of public, private and voluntary sectors for improving the agricultural economy of the district.

2.3 State-Wise distribution of KVK

With readjustment of states under each ATARI after the creation of three new ATARIs, the KVKs of Odisha, West Bengal and Andaman & Nicobar Islands have been brought under the jurisdiction of ICAR-ATARI, Kolkata (Zone V). Altogether 59 KVKs are in operation in this zone with stipulated mandate and mandated activities.

State/Union Territory-wise distribution of KVKs under ICAR-ATARI, Kolkata indicates that in Odisha 33 KVKs are working in all 30 districts, 23 KVKs are functioning in West Bengal and 3 KVKs are in operation in A&N Islands. The details of state-wise and host organization-wise distribution of KVKs are given below.

Table: State wise status of Krishi Vigyan Kendras

Name of the State	No. of Districts	No. of KVKs under						TOTAL
		SAU	ICAR	DU	CU	NGO	SDA	
A&N Islands	3	-	3	-	-	-	-	3
Odisha	30	31	2	-	-	-	-	33
West Bengal	22	13	4	2	1	2	1	23
Total	55	44	9	2	1	2	1	59

ICAR - Indian Council of Agricultural Research, SAU - State Agricultural University, CU- Central University, NGO - Non-Governmental Organization, SDA- State Department of Agriculture

Table: Host organization wise status of Krishi Vigyan Kendras

Sl. No.	State/UT	Host Institution	Total
1.	A & N Islands (3)	Central Island Agricultural Research Institute (ICAR), Port Blair	3
2.	Odisha (33)	Orissa University of Agriculture & Technology, Bhubaneswar	31
		ICAR-National Rice Research Institute, Cuttack	1
		ICAR-Central Institute of Fresh Water Aquaculture, Bhubaneswar	1

Sl. No.	State/UT	Host Institution	Total
3.	Wes Bengal (23)	Bidhan Chandra Krishi Viswavidyalaya, Nadia	5
		Uttar Banga Krishi Viswavidyalaya, Coochbehar	5
		West Bengal University of Animal & Fishery Sciences, Kolkata	3
		VisvaBharati, Bolpur, Santiniketan (CU)	1
		Central Research Institute of Jute and Allied Fibres (ICAR), Barrackpore	2
		W.B. Comprehensive Area Development Corporation (SDA), Kolkata	1
		Kalyan, Purulia (NGO)	1
		Rama Krishna Ashram, South 24 Parganas (NGO)	1
		Ram Krishna Mission Vivekananda University, Belur Math	2
		ICAR-ERS NDRI Kalyani, Nadia	1
		ICAR-CISH Regional Station, Malda	1
Total			59

2.4 Manpower:

The achievement of KVKs in both mandated and associated activities greatly depends on deployed manpower. All the host organizations having KVK

in this zone are constantly pursued to fill up the vacant posts on priority. In non-ICAR run KVKs, there has been recruitment but the ICAR-run KVKs are still suffering due to skeleton staff strength. The summary of staff position is given below.

Table: State-wise Staff position at KVKs under ICAR-ATARI, Kolkata

Scientific and Technical

Name of the State	Sr. Scientist and Head			Subject Matter Specialist/T-6			Farm Manager/T-4			Program Assistant (computer)/T-4			Program Assistant (lab technician)/ T-4		
	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V
A & N Islands	3	1	2	18	5	13	3	1	2	3	0	3	3	0	3
Odisha	33	24	9	198	136	62	33	24	9	33	32	1	33	20	13
West Bengal	23	20	3	138	98	40	23	17	6	23	18	5	23	16	7
Total	59	45	14	354	239	115	59	42	17	59	50	9	59	36	23

Administrative staff

Name of the State	Assistant			Stenographer grade III			Driver/T-1			Skilled Support Staff			Total		
	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V
A & N Islands	3	0	3	3	1	2	6	4	2	6	2	4	48	14	34
Odisha	33	0	33	33	26	7	66	65	1	66	45	21	528	372	156
West Bengal	23	17	6	23	13	10	46	38	8	46	35	11	368	272	96
Total	59	17	42	59	40	19	118	107	11	118	82	36	944	658	286

S - Sanctioned; F - Filled; V- Vacant.

2.5 Infrastructure facilities:

The KVKs should be showcased as resource, technology and knowledge hub in the districts, so creation of all round infrastructural facility is a *sine qua non*. Apart from keeping administrative building and training hostel in sound shape, KVKs must maintain suitable demonstration units in fully functional mode which not only would increase its visibility and amplify farmers foot fall in the KVK but is instrumental in enhancing farmers perception and confidence upon the KVK and inculcating enthuse

in them to adopt the profitable technologies to the cause of enhancing their livelihood and income.

The matter of providing adequate infrastructure to the KVKs of this zone has been given priority to help KVKs discharge their responsibilities in a better way. Barring a few KVKs, rest are having administrative building, farmers' hostel, staff quarter and demonstration unit. A few KVKs are also having other facilities. The summary of infrastructure facilities available with KVKs is given below.

Table: Status of Infrastructure facilities

Name of the State	Administrative Building (Y/N)	Staff Quarters (Y/N)	Farm-er's Hostel (Y/N)	Demonstration Unit	Soil and Water Testing Laboratory	Rain Water harvesting structure	Integrated Farming System	Minimal processing facility	e-Connectivity (ERNET)	Carp hatchery	Solar Panel	Technology Information Unit	Micro-nutrient Facility	Tractor	Four Wheeler	Two Wheeler
A&N Islands	2	1	1	2	1	1	0	0	3	1	0	0	0	1	3	6
Odisha	33	20	32	116	29	1	15	4	8	11	0	3	3	33	33	31
West Bengal	23	15	22	54	14	26	12	9	5	8	2	6	5	22	23	39
Total	58	36	55	172	44	28	27	13	16	20	2	9	8	56	59	76

2.6 Thrust Area:

- Application of ICT towards agricultural development
- Creation and promotion of FPOs/ FPCs
- Enhancement of water use efficiency through micro-irrigation system
- Varietal substitution of field crops
- Economic improvement of farm women
- Drudger reduction
- Value addition and minimization of post harvest loss crop diversification
- Promotion of IFS
- Improvement of livestock sector with feed and other management practices
- Soil health management
- Popularization of fodder production technology
- Management practices in fishery
- Application of RCT
- Farm mechanization with an emphasis on small tools
- Entrepreneurship development among rural youths
- Development of suitable strategy to combat climatic vulnerability towards crops and livestock production

3.0 About Agricultural Technology Application Research Institute (ATARI) Kolkata

ICAR-Agricultural Technology Application Research Institutes came into existence during July 2015 as upgradation of Zonal Project Directorates. All such eight (8) Zonal Project Directorates were renamed as ATARI with the inclusion of research component in its functioning. With the increase in the number of KVKs across the country, it was felt necessary to create additional ATARIs to bring parity in the monitoring and evaluation process. Accordingly, three additional ATARIs were created and the jurisdiction of all eleven ATARIs was re-adjusted keeping more or less equal number of KVKs under them. In the same process, ICAR-ATARI, Kolkata started monitoring and evaluating the activities of 59 KVKs functioning in A&N Islands, Odisha and West Bengal.

The present network of 731 KVKs spread across the country is centrally governed by Division of Agricultural Extension under Indian Council of Agricultural Research, headed by Deputy Director General. The guidelines of administrative, financial and overall functioning of KVK are provided by Division of Agricultural Extension. The ATARIs send regular report to Division of Agricultural Extension in all areas of KVK functioning.

Apart from looking after KVK activities and providing need-based support, ICAR-ATARI, Kolkata is also implementing a number of flagship programme of DAC&FW, ICAR, IMD, I&B, Ministry of Tribal Affairs, Deptt. of Forestry, Ministry of Petroleum and others through selected KVKs of this zone. A number of private organizations have also been allowed to work with KVKs in the areas of fuel efficiency, water management, farm mechanization etc. Collaboration with CYMMIT through CSISA project has also been established in this zone.

Capacity development for the manpower of KVKs has been taken up by this ATARI on a regular basis either through organizing specialized training programme at this institute or in collaboration with other ICAR institutes for improving the knowledge and skill level of the KVK personnel. The scientific,

administrative and other staff of this institute are also encouraged to undergo specialized programme organized by national/international institutes.

Application of ICT in monitoring of KVK activities has been ensured followed by financial transaction through Public Financial Management System. All the KVKs have been brought under this system for effortless transaction of fund at the shortest possible time.

3.1 Mandate:

The revised mandates of Agricultural Technology Application Research Institute are as follows:-

1. Coordination and monitoring technology application and Frontline Extension Education Programs.
2. Strengthening Agricultural Extension Research and Knowledge Management

The Agricultural Technology Application Research Institute, Kolkata takes up the following functions to achieve the above mandates.

- Formulate, implement, monitor, guide and evaluate the programmes and activities of KVKs.
- Coordinate the work relating to KVKs and ATICs implemented through various agencies such as SAUs, ICAR institutes, voluntary agencies and development departments.
- Coordinate with State/Central Government organizations, financial institutions and other organizations for successful implementation of programmes.
- Partnering with Directorates of Extension Education of SAUs in assured technological backstopping to KVKs and appropriate overseeing of KVK activities.
- Strengthening the Directorates of Extension Education of SAUs with financial support.

- Serve as feedback mechanism from the projects to research and extension systems.
- Implementing projects of ICAR like NICRA, NIFTD and others.
- Maintain close liaison with ICAR headquarter particularly with Division of Agricultural Extension for preparing reports, write ups and other important documents.

3.2 Staff Position of ATARI:

The Agricultural Technology Application Research Institute, Kolkata is having total sanctioned staff strength of 18, out of which 13 were filled up on 01.01.2022.

Table: Staff strength of ATARI, Kolkata

Category	Sanctioned	Filled
Director (RMP)	1	0
Scientific	6	6
Technical	1	1
Administrative	8	5
Skilled Supporting Staff (Gr. II)	2	1
Total	18	13

3.3 Institute Management Committee:

During 2022, the 15th, 16th and 17th Institute Management Committee (IMC) Meetings was conducted on 11th January 2022, 21st September 2022 and 23rd November 2022, respectively at ICAR-

ATARI Kolkata. All the meetings started with formal welcome by Dr. F. H. Rahman, Pr. Scientist-cum-Member Secretary of IMC. Dr. S.K. Roy, Director, ICAR-ATARI Kolkata shared some of the salient achievements of ICAR-ATARI Kolkata during recent times. The IMC members discussed the agenda items in details and approved by following necessary codal formalities. The important agenda items included vehicle replacement, new vehicle procurement, tractor replacement and other farm and infrastructural facilities development etc.



3.4 Ongoing Research Projects of ICAR-ATARI Kolkata during 2022

The newly formed Research Advisory Committee for all the 11 ATARIs approved some research projects to be undertaken by the scientists of ATARIs. Some of the approved projects were in network mode across the whole country involving all the ATARIs, while others were inter-institutional in nature. The details are as follows:-

Table: Details of ongoing research projects at ICAR-ATARI Kolkata

Sl. No.	Title of the project	Lead Centre/ Institute	Name PI and Co-PI/ CCPI from ICAR-ATARI Kolkata
1.	Impact of technological interventions of KVKs on socio-economic empowerment and sustainable livelihood security of tribal farmers	ICAR-ATARI Guwahati	Co-PI: Dr. K.S. Das
2.	Network project on Aspirational Districts programme	ICAR-ATARI Kolkata	PI: Dr. S.K. Roy Co-PI: Dr. K.S. Das
3.	Measuring impact of climate resilient technologies in different agro-climatic zones in India: A study in NICRA project areas	ICAR-ATARI Hyderabad	Co-PI: Dr. F.H. Rahman
4.	Impact of ARYA on promotion of agri-preneurship and alternative livelihoods	ICAR-ATARI Bengaluru	Co-PI: Dr. P.P. Pal

Sl. No.	Title of the project	Lead Centre/ Institute	Name PI and Co-PI/ CCPI from ICAR-ATARI Kolkata
5.	Impact assessment of selected interventions by KVK under Doubling Farmers' Income for enhancing farmers' income	ICAR-ATARI Jodhpur	Co-PI: Dr. A. Haldar
6.	Assessing dietary diversity, consumption pattern and nutritional security in Nutri-SMART Villages- A step towards vocal for local	ICAR-ATARI Jabalpur	Co-PI: Dr. S.K. Mondal
6.	A study on capacity development programs of the KVKs for augmenting livestock production and farmers' income in eastern India	Inter-Institutional Project	PI: Dr. A. Haldar Co-PIs: Dr. P.P. Pal, Dr. S.K. Mondal, Dr. K.S. Das
7.	Assessing appropriate delivery pathways of agriculture and allied technology dissemination in eastern India	Inter-Institutional Project	PI: Dr. P.P. Pal Co-PIs: Dr. S.K. Roy, Dr. A. Haldar, Dr. S.K. Mondal, Dr. F.H. Rahman, Dr. K.S. Das



4.0 Achievements

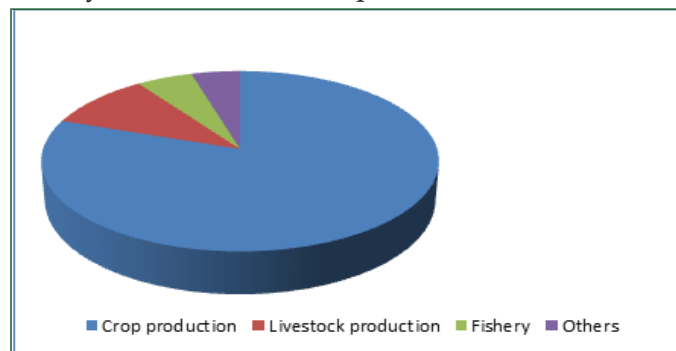
4.1 Technology Assessment:

4.1.1 On-farm Trials:

During the year 2022, all the 59 KVKs under ICAR-ATARI Kolkata, spread over Andaman & Nicobar Islands, Odisha and West Bengal, conducted trials for technology assessment, demonstration and application in agriculture and allied fields. Under this most important mandated activity, i.e., technology assessment, the claimed superiority of location specific agricultural technologies was assessed through conducting on-farm trials by all the KVKs of this Zone, covering various crops, livestock and fishery related technologies extending their practical utility for increasing the income and betterment of livelihood of the farmers and other stakeholders.

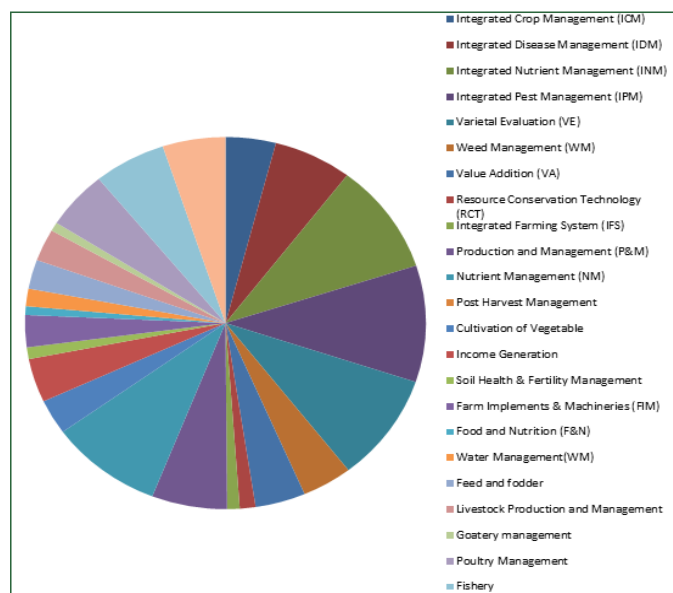
4.1.2 Major Area-wise Trials Conducted:

During 2022, the KVKs carried out on-farm trials with an objective to assess the technologies developed by different R & D institutions in agriculture and allied sectors. Specifically prioritized area of assessing the technologies by KVKs sometimes indicated refinement of the technologies through either KVKs or the research institutions. The assessed technologies included those in the areas of crop production including integrated crop management, crop improvement through varietal trials, insect-pest and disease management, nutrient management; livestock production including feed and fodder management, livestock production and health management; fish production; and others including farm mechanization, drudgery reduction, value addition, women empowerment, income generating agri-enterprises and other areas. The on-farm trials conducted in crop, livestock and fishery sectors have been presented below.



4.1.3 Thematic Area-wise Trials Conducted:

More than 25 various thematic areas were identified for assessment of technologies and presented in following table. Improved technologies related to crop production, livestock production, fish production, drudgery reduction, farm mechanization, women empowerment, post-harvest management and value addition etc. have been assessed to provide technological solution to the farming community pertaining to various aspects of agriculture and allied areas. During the year 2022, the KVKs conducted 443 on-farm trials in 3601 locations to assess a total of 308 technologies. Among various thematic areas, technologies were tested in integrated pest management through 40 on-farm trials involving 649 farmers, followed by integrated nutrient management (38 on-farm trials), varietal evaluation (37 on-farm trials) and others. In livestock sector, the highest number (20) of on-farm trials was conducted in the area of poultry management followed by livestock production and management (14) including goat farming involving a total of 1683 farmers. In fishery, 23 on-farm trials were conducted during this year involving composite fish culture and fish production and management benefitting 375 farmers. The distribution of on-farm trials based on thematic areas has been presented below.



4.1.4 State-wise Trials Conducted:

During 2022, an analysis of on-farm trials conducted

by various states showed that KVKs of Andaman and Nicobar Islands carried out a total of 7 on-farm trials distributed in 49 locations, the corresponding values for the states Odisha were 250 and 1971, and for West Bengal were 186 and 1581, respectively. A total of 30 on-farm trials were conducted by KVKs of Odisha in varietal evaluation, while the KVKs of West Bengal carried out 7 on-farm trials on this thematic area. The other important areas for the KVKs of Odisha were integrated nutrient management (25 on-farm trials), integrated pest management (22 on-farm trials), income generation (15 on-farm trials) and integrated disease management (14 on-farm trials) etc. In West Bengal, nutrient management was the most important thematic area (26 on-farm trials) followed by integrated pest management (18 on-farm trials) and integrated nutrient management (13 on-farm trials) etc. In the area of livestock production, KVKs of Odisha took up 20 on-farm trials followed

by KVKs of West Bengal (24 on-farm trials). The feedback on the performance of the technologies had also been brought to the notice of research and extension wing for their necessary rectification (if any)/ effective dissemination in the entire zone. Some selected on-farm trials conducted by the KVKs are detailed below with table, photographs and relevant information.

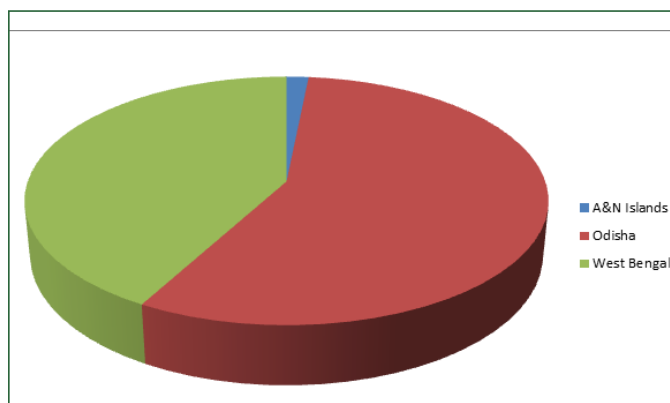


Table: State-wise details of on-farm trials conducted by the KVKs

Thematic Area	A & N Islands		Odisha		West Bengal		Total	
	No. of Locations	No. of OFT	No. of Locations	No. of OFT	No. of Locations	No. of OFT	No. of Locations	No. of OFT
Integrated Crop Management (ICM)			90	12	32	4	122	16
Integrated Disease Management (IDM)			111	14	92	11	203	25
Integrated Nutrient Management (INM)			180	25	110	13	290	38
Integrated Pest Management (IPM)			164	22	116	18	280	40
Varietal Evaluation (VE)			231	30	64	7	295	37
Weed Management (WM)			104	13	28	3	132	16
Value Addition (VA)	7	1	91	14	7	1	105	16
Resource Conservation Technology (RCT)			7	1	26	4	33	5
Integrated Farming System (IFS)			29	4			29	4
Production and Management (P&M)	7	1	96	14	69	9	172	24
Nutrient Management (NM)	14	2	59	8	181	26	254	36

Thematic Area	A & N Islands		Odisha		West Bengal		Total	
	No. of Locations	No. of OFT	No. of Locations	No. of OFT	No. of Locations	No. of OFT	No. of Locations	No. of OFT
Post Harvest Management								
Cultivation of Vegetable			28	4	56	8	84	12
Income Generation			146	15			146	15
Soil Health & Fertility Management			20	2	14	2	34	4
Farm Implements & Machineries (FIM)			87	9	20	2	107	11
Food and Nutrition (F&N)			20	2	8	1	28	3
Water Management(WM)	14	2	27	3	10	1	51	6
Others	7	1	149	20	250	27	406	48
Total	49	7	1639	212	1083	137	2771	356
Fishery			31	6	194	17	225	23
Total	-	-	31	6	194	17	225	23
Feed and fodder			30	5	50	5	80	10
Livestock Production and Management			52	5	52	6	104	11
Goatery management					42	3	42	3
Poultry Management			124	10	96	10	220	20
Total	-	-	206	20	240	24	446	44
Enterprise			95	12	64	8	159	20
Total	-	-	95	12	64	8	159	20
Grand Total	49	7	1971	250	1581	186	3601	443

4.1.5 Details of Selected On-farm Trials:

ANDAMAN & NICOBAR ISLANDS

KVK South Andaman

Thematic area: *Nutrient management*

Assessment of effect of humic acid application on growth and yield of bhendi

Off-season vegetables growing in undulating and sloping topography coupled with very high intensity rainfall is a norm rather than exceptions and this environment speeds up the processes of surface runoff of water, leading to erosion of topsoil

and organic matter rich in nutrients, in addition to the leaching of nutrients from these areas during the rainy season resulting in low soil fertility or poor soil health. Furthermore, the deficiency of the use of organic and inorganic sources of nutrients added to the soil during the rainy season is very low in these islands. To solve this problem, a multi-locational field trial was conducted at 7 different locations of the district considering Farmers' practice: FP (No foliar spray) as control and Technology option-I: TO-I (Humic acid foliar spray @ 1%) and Technology option-II: TO-II (Humic acid foliar spray @ 2%). The results revealed that foliar application of humic acid @2% (TO-II) recorded significantly higher growth

and yield attributes whereas it was at par with application of humic acid @1% (TO-I). Humic acid has enhanced microbial activities which boosted up the processes of photosynthesis, respiration and also improved the uptake of nutrients which were the possible reasons of increasing fruit weight. TO-II recorded 36.1% higher fruit yield as compared to FP whereas higher B:C ratio of 3.41 recorded in TO-II.

Technology assessed

FP: No foliar spray

TO-I: Foliar application of Humic acid @ 1%

TO-II: Foliar application of Humic acid @ 2%

Source of technology: UAS, Bangalore

Table: Effect of humic acid application on growth and yield of bhendi

Technology option	No. of trials	Growth attributes			Yield attributes					Economics	
		Plant height (cm)	DMP (q/ha)	Stem girth (cm)	Fruit/plant	Fruit length (cm)	Fruit girth (cm)	Fruit weight (g)	Fruit yield (t/ha)	Net return (Rs./ha)	B:C ratio
FP	7	90.4	36.1	3.61	12.8	17.4	4.86	15.3	9.7	246.6	2.86
TO-I	7	100.1	50.5	4.73	16.2	23.6	7.42	20.5	12.7	375.5	3.39
TO-II	7	102.3	53.7	4.9	17.3	24.1	7.7	21.1	13.2	402.7	3.41
SEm±		1.8	1.67	0.08	0.36	0.65	0.16	0.61	0.37	-	-
CD (p=0.05)		4.1	3.62	0.45	0.79	2.15	0.46	1.51	1.07	-	-



ODISHA

KVK Sonapur

Thematic area: Integrated Disease Management

Assessment of Integrated Disease Management for sheath blight management in rice

Low yield in rice due to severe sheath blight incidence at peak tillering stage of rice has been identified a major problem of the district. KVK Sonapur undertook a multi-locational field trial at 7 different locations in order to address this issue

and came out with effective integrated measures for sheath blight management in rice. Results indicated that TO-I (Seed treatment with Thiophenate methyl @1.5g/kg seed and alternate spraying of Trifloxystrobin 25%+ Tebuconazole 50%WG @ 200g/ ha and Thifluzamide 24SC @500 ml/ha from the appearance of the disease) increased the yield to the tune of 50.8 q/ha by reducing the infected tillers and also by increasing no. of tillers. This led to a B:C ratio of 1.92. Therefore, it was recommended from the trial that Seed treatment with Thiophenate methyl @1.5g/kg seed and alternate spraying of Trifloxystrobin 25%+ Tebuconazole 50%WG @

200g/ ha and Thifluzamide 24SC @500 ml/ha from the appearance of the disease should be followed by the farmers to combat sheath blight in rice. However, non-availability of Trifloxystrobin 25%+ Tebuconazole 50%WG at near-by market in time has been emerged as farmers' reaction. Therefore, it may be noted that other new generation cost effective fungicides should be tested for their efficacy.

Technology assessed

FP: No seed treatment

TO-I: Seed treatment with Thiophenate methyl @1.5g/kg seed and alternate spraying of Trifloxystrobin 25%+ Tebuconazole 50%WG @ 200g/ ha and Thifluzamide 24SC @500 ml/ha from the appearance of the disease

TO-II: Seed treatment with Carboxyn + Thiram @1.5 g/kg seed and alternate spraying of Propiconazole 13.9 EC + Difenconazole 13.9 EC @500 ml/ha and Azoxystrobin 23% SC@500 ml/ha at 15 days interval

Source of technology: DRR 2017; RRTTS Chiplima 2018

Table: Effect of seed treatment on incidence of sheath blight in rice

Technology option	No. of trials	Yield (q/ha)	No. of infected sheath blight tillers/hill	No. of Tillers/hill	Cost of Cultivation/ha Rs.	Gross Income Rs.	Net Income Rs.	B:C ratio
FP	7	41.5	8.1	17.1	55161	88810	33649	1.61
TO-I	7	50.8	5.5	23.8	53975	103632	49657	1.92
TO-II	7	47.9	6.4	21.3	54590	97716	44874	1.79



KVK Nuapada

Thematic area: Home Science/Women empowerment
Assessment of suitable varieties for value addition of Tomato

Though tomato is a major crop of the district, it has been noticed that higher yield results in distress sale and spoilage due to high perishability. Keeping this in view, KVK Nuapada attempted for value addition of tomato. But the existing variety Laxmi has low TSS content of tomato and it results into problem of value addition. In order to address the issue, a trial was conducted at 13 different locations using

the varieties like Laxmi (FP), Arka Vishesh (TO-I) and Arka Apeksha (TO-II). It has revealed that TO-II was better in terms of TSS content and B:C ratio.

Technology assessed

FP: Value addition using tomato variety Laxmi

TO-I: Preparation of Tomato Puree (Tomato pulp and spices, salt, sugar and vinegar, with or without onion and garlic, containing not less than 25 per cent total solids) from Tomato Var.- A. Vishesh.

TO-II: Preparation of Tomato Puree (Tomato pulp and spices, salt, sugar and vinegar, with or without

onion and garlic, containing not less than 25 percent total solids) from Tomato Var.-A. Apeskha

Community Science College and Research Institute, Madurai

Source of Technology: ICAR-IIHR Bangalore 2019;

Table: Performance of different varieties of tomato for value addition

Technology option	No. of trials	Yield component			Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C ratio
		Amt. of paste/8kg raw tomato	TSS (Degree Brix)	Self life (days)					
FP	13	3.2	2.1	17	315	170	320	150	1.8
TO-I	13	4.1	4.6	34	510	180	410	230	2.2
TO-II	13	4.3	4.7	36	445	180	430	250	2.4



KVK Nayagarh

Thematic area: Fish health management

Assessment of different chemical control measures of Argulus (Lice) in fishes

In carp polyculture, fish mortality due to Argulosis has been identified a major problem. Moreover, slow growth rate of Mrigal (Bottom feeder) affects the average yield in carp polyculture. For solving this problem, KVK Nayagarh took up a multi-locational field trial at 10 different locations of the district. The results of the trial showed that both fish mortality and Argulus population reduced to a considerable

extent with all the technology options as compared to FP. Average body weight was highest in TO-II (730 g) and B:C ratio was also highest in the group (2.40).

Technology assessed

FP: Application of lime 100kg/ha.

TO-I: Cypermethrin 10% EC @ 0.01 ppm in water

TO-II: Deltamethrin 2.8% EC @ 0.02 ppm in water

TO-III: Ivermectin 2% w/w@ 250g/ 1 ton feed

Source of technology: ICAR-CIFA 2018; BENFISH 2018

Table: Effect of various control measures of Argulus (Lice) in fishes in carp polyculture

Technology option	No. of trials	Yield component			Argulus Population / Fish	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C ratio
		Fish Mortality (%)	Plankton (ml/100l)	Avg. Body wt. (gm)						
FP	10	9	5	700	7	20.69	132825	248325	115500	2.15
TO-I	10	0	2	700	0	24.53	169155	294455	125300	2.35

Technology option	No. of trials	Yield component			Argulus Population / Fish	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C ratio
		Fish Mortality (%)	Plankton (ml/100l)	Avg. Body wt. (gm)						
TO-II	10	0	2	730	0	27.00	189000	324000	135000	2.40
TO-III	10	0	5	720	0	24.41	162750	292950	130200	2.25



KVK Kalahandi

Thematic area: Poultry management

Assessment of performance of low-input dual-type chicken breeds in backyard system

Rearing of poultry birds in backyard system has become an important livelihood option for the farmers of the district. But the problem of low body weight gain and low feed conversion efficiency with local birds was diagnosed in backyard poultry farming. With an objective of increasing body weight gain and obtaining high feed conversion efficiency, a trial was conducted at 7 different locations by KVK Kalahandi. It was found that TO-I resulted into significantly ($p < 0.05$) higher body weight gain of 1050 ± 1.72 g at 20 weeks of age as compared to TO-II (970 ± 1.53 g) and FP (675 ± 1.24 g). The highest feed conversion efficiency was found in TO-I with the B:C ratio of 2.02. It was concluded that *Chhabro* breed of

poultry can be reared in backyard for better income generation. However, lack of availability of *Chhabro* breed of poultry at farmers' field has been identified as a constraint, though the farmers' reaction was that there was significant increase in body weight gain in *Chhabro* and *Kaveri* breed of poultry in comparison to local fowl under backyard system

Technology assessed

FP: Rearing of local non-descript poultry birds with no supplemental feeding

TO-I: Rearing of *Chhabro* breed (21 days old) with concentrate feeding @ 70 g/bird/day supported by scavenging feeding

TO-II: Rearing of *Kaveri* breed (21 days old) with concentrate feeding @ 70 g/bird/day supported by scavenging feeding

Source of technology: DPR 2015-16

Table: Performance of different varieties of poultry birds under backyard system

Technology option	No. of trials	Cumulative BW gain at 20 wk (g)	FCR	Incidence of infection (%)	Annual Gross Return (Rs.)/10 birds	Annual Net return (Rs.) /10 birds	B:C ratio
FP	7	675±1.24 ^a	3.25±0.65 ^a	5	4130	1850	1.81
TO-I	7	1050±1.72 ^b	2.7±1.29 ^b	2	6800	3450	2.02
TO-II	7	970±1.53 ^c	2.95±0.89 ^c	2	6300	2985	1.90

a-c: Figures with different superscript in a column differed significantly ($p < 0.05$).

KVK Jharsuguda

Thematic area: Varietal evaluation

Assessment of performance of different sweet corn varieties

Low yield due to existing variety was a problem for sweet corn growers of the district. For getting rid of this problem, KVK Jharsuguda conducted a multi-locational field trial at 7 different locations for identifying suitable sweet corn variety for the district. The results have shown that VL Sweet corn-1 (FSCH-18) variety (TO-II) yields 118.1q/ha with B:C ratio of 2.5. This yield was higher in comparison

to TO-I and FP. It was concluded that the TO-II can be recommended for the district.

Technology assessed

FP: Cultivation of sweet corn variety NS 680

TO-I: Cultivation of sweet corn variety NSCH-12 (Misthi)

TO-II: Cultivation of sweet corn variety VL Sweet corn-1 (FSCH-18)

Source of technology: DMR 2013-14; ICAR-VPKAS 2016; IIMR 2015-16

Table: Performance of various sweet corn varieties

Technology option	No. of trials	Yield component			Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C ratio
		Plant height (cm)	Cob length (cm)	Cob weight (g)					
FP	7	173.5	20.4	204.1	85.9	96000	171852	75852	1.8
TO-I	7	175.6	21.8	212.2	114.7	96000	229462	133462	2.4
TO-II	7	174.1	23.1	214.3	118.1	96000	236252	140252	2.5



KVK Ganjam-I

Thematic area: *Integrated Pest Management*

Assessment of different IPM measures against pod borer complex in pigeon pea

Pigeon pea is an important pulse crop of the district. But low yield of the crop has been major problem, especially due to defoliation and damaged pod. Pigeon pea pod borer complex was emerged as the root cause of the problem. In order to address the problem, a field trial was carried out by KVK Ganjam-I at 7 different locations. It was found that the TO-I was superior that other technological options in controlling the pod borer complex. In TO-I, the damaged pod was reduced to 3.2% and the

highest yield (10.4 q/ha) was recorded with a B:C ratio of 1.83.

Technology assessed

FP: Spraying of Profenofos@1lt./ha

TO-I: Azadiractin 0.15% @ 1.5 lt./ha at 50% followed by Flubendiamide 48SC @ 200ml/ha and Bt@ 1kg/ha. at 15 days interval

TO-II: Pheromone traps @ 10/ha, Azadiractin 0.15% @ 1.5 l/ha at 50% followed by Profenofos @ 1lt./ha. and Emamectin benzoate @ 200ml/ha at 15 days interval

Source of technology: NCIPM 2017-18; OUAT 2018

Table: Performance of various control measures of pod borer complex in pigeon pea

Technology option	No. of trials	Yield component		Yield (q/ha)	Cost of Cultivation(Rs/ha)	Gross return (Rs/ha)	Net Income (Rs/ha)	B:C ratio
		No. of larvae/Plant	Damaged pod (%)					
FP	7	4.4	18.6	7.6	30000	45600	15600	1.52
TO-I	7	0.5	3.2	10.4	34000	62400	28400	1.83
TO-II	7	0.8	5.8	9.2	33000	55200	22200	1.67

KVK Gajapati

Thematic area: *Agricultural marketing*

Assessment of performance of FPOs with varied levels of task and commodity to enhance profitability

Problem of agricultural marketing in not only Gajapati district but also the state is unorganized farmers fetching low price due to distress sale of their farm produce. For solving this problem, KVK Gajapati thought of group marketing by farmers instead of marketing involving middlemen. A total of 40 farmers were brought under this trial dividing them equally in 4 different groups (FP, TO-I, TO-II and TO-III). Except FP, other three technology options dealt with FPOs. It was revealed that a FPO should deal with multi-commodity with multi-task, i.e., Pulses, Crops, Vegetables, Enterprises

like sorting, grading, packaging, value addition, branding, labelling and marketing to gain higher return and profitability.

Technology assessed

FP: Farmers marketing their produce through intermediaries (10 farmers)

TO-I: FPO dealing with a single commodity with a single task i.e., Vegetable-Marketing (10 farmers)

TO-II: FPO dealing with multi-commodity with single task i.e., Pulses, Vegetable, Enterprises-Marketing (10 farmers)

TO-III: FPO dealing with multi-commodity with multi-task i.e., Pulses, Crops Vegetable, Enterprises-sorting, grading, packing, value addition, branding, labelling and marketing (10 farmers)

Source of technology: OUAT 2019

Table: Performance of FPOs with varied levels of task and commodity to enhance profitability

Farmers Opinion on Statement (Yes/No)	Parameters				
	Percentage	FP	TO-I	TO-II	TO-III
A farmer interested to become a member	%	31.20	89.89	93.22	95.44
Contribution to share capital	%	13.44	86.67	88.89	92.11
Better business planning in FPO	%	17.67	87.78	88.89	95.56
Easy to produce the crops	%	18.78	88.89	87.78	92.22
Easy to manage the portfolio	%	22.00	74.56	90.00	91.00
Easy to sell produce	%	18.78	82.11	82.22	93.33
Better marketing of produce (collective)	%	20.11	85.56	84.44	92.22
Farmers participation in FPO	%	19.78	87.56	89.78	94.33



KVK Deogarh

Thematic area: Integrated Pest Management

Assessment of IPM modules for management of fruit sucking moth in sweet orange

Sweet orange is cultivated in Deogarh district as a major fruit crop and it is also remunerative. However, fruit sucking moth causes fruit drop at colour breaking stage in sweet orange. This has been identified as a problem and required KVK's intervention. Therefore, a field trial was undertaken by KVK Deogarh at 7 different locations of the district. Results indicated that TO-I recorded the highest yield of 156 q/ha with the lowest insect pest

incidence of only 8%. The B:C ration in case of TO-I was found to be 2.53.

Technology assessed

FP: Fire in every evening hour in orchard which fails to control the population of the moths

TO-I: Removal of alternate host, installation of light trap, poison bait, foliar application of neem oil (1%) at 10 days interval coinciding with colour breaking stage

TO-II: Hanging of polypropylene sachets with acephate 75% SP 10g @ 2nos./ tree coinciding with colour breaking stage

Source of technology: ICAR-NRCC 2016; ICAR-CCRI 2018

Table: Performance of IPM modules for management of fruit sucking moth in sweet orange

Technology option	No. of trials	Disease/ insect pest incidence (%)	Yield(q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C ratio
FP	7	18	122	165000	366000	201000	2.22
TO-I	7	8	156	185000	468000	283000	2.53
TO-II	7	11	145	190000	435000	245000	2.29

KVK Bolangir

Thematic area: *Livestock feeding management*

Assessment of different feed regimes on milk production in dairy cows

Feeding is an important aspect of animal husbandry. It also has major share of expenditure incurred in dairy cattle production. In Bolangir district, scope of dairying is also encouraging. Farmers keep dairy cows either on subsistence level or giving a very quantity of concentrate mixture in few cases. This results into low milk production. Actually, high grain cost leading to high cost of production and otherwise low milk production due to no grain feeding has been identified as a major problem. In

an attempt to solve this problem, a multi-locational field trial was undertaken by KVK Bolangir at 5 different locations. The results showed that TO-II gave the highest milk yield (5.58 l/ day/cow) with highest (3.09) B:C ratio.

Technology assessed

FP: Grazing, straw feeding, unscientific concentrate feeding (less than required)

TO-I: Grazing + Straw @ 6-8 kg/day + Local available pulse residue (Gandhiri) @ 250g/day + Maize @ 250g/day

TO-II: Grazing + Straw @ 6-8 kg/day + Local available oil cake @ 100g/day

Source of technology: ICAR-IVRI 2014

Technology option	No. of trials	Quality of milk Avg. LR Value	Health status of cow	Milk yield/ day/cow	Cost of Production (Rs./cow/day)	Gross return (Rs./cow/day)	Net return (Rs./cow/day)	B:C ratio
FP	5	29	Good	4.0	47	120	76	2.55
TO-I	5	28	Occasional non-specific loose motion	5.25	59	167	108	2.83
TO-II	5	29	Good	5.58	51	158	107	3.09



KVK Bhadrak

Thematic area: *Fish production management*

Assessment of performance of genetically improved Catla spawn for increasing fish productivity

Pond based farming system is highly prevalent in Bhadrak district. Polyculture of Indian Major Carps (IMCs) is very common in that system. But less initial growth rate of normal Catla spawns in nursery

tanks encourages predation by insects, thus leads to poor survival and final low yield of fry. Moreover, high mortality of Catla spawns in nursery pond is also identified as a problem. To address this issue, KVK Bhadrak undertook a field trial at 6 different locations and found that by stocking genetically improved Catla spawns with phased manuring, the farmers were getting better survivability and specific growth rate. That means, TO-II resulted into

the highest B:C ratio of 2.3 with the highest yield of 24.6 q/ha. The farmers were happy with better specific growth rate and survivability.

Technology assessed

FP: Nursery management with stocking of normal Catla spawns @30 lakhs/ha with single basal manuring

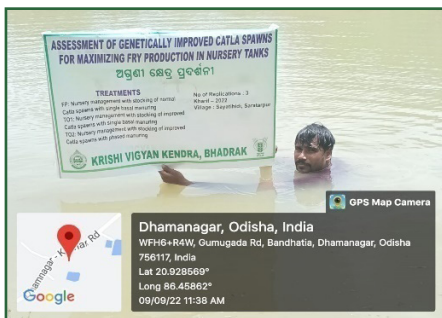
TO-I: Nursery management with stocking of genetically improved Catla spawns @30 lakhs/ha with single basal manuring

TO-II: Nursery management with stocking of genetically improved Catla spawns @30 lakhs/ha with phased manuring

Source of technology: ICAR-CIFA 2015; 2018

Table: Performance of genetically improved Catla spawn for maximising fish productivity

Technology option	No. of trials	Survival rate (%)	Yield(q/ha)	SGR (%)	B:C ratio
FP	6	23	16.5	1.5	1.2
TO-I	6	35	20.4	1.8	1.8
TO-II	6	44	24.6	2.1	2.3



KVK Angul

Thematic area: Poultry production management

Assessment of multi-enzyme mixture and probiotics on growth performance of chickens

Free range system of poultry rearing is very common. But high feed consumption, low FCR and high cost of feeding are making poultry rearing infeasible. In order to solve this problem, a field trial was conducted by KVK Angul at 5 different locations using reduced level of concentrate feeding. Feeding of commercial broiler feed (added with probiotics mixture @ 0.05%) @50% of daily requirement and free range feeding improved gut health and nutrient utilization with positive effect on weight gain performance of chickens reared under this system. Farmers took part in the assessment programme with interest. After the end of assessment they were

satisfied with the final weight gain noticed in case of poultry birds. In this trial, TO-I resulted into the highest body weight (at 12 weeks) of 2.13 kg/bird with B:C ratio of 3.64.

Technology assessed

FP: Free range feeding with no additional supplementation

TO-I: Feeding of commercial broiler feed (added with probiotics mixture @ 0.05%) @50% of daily requirement and free range feeding

TO-II: Feeding of commercial broiler feed (added with multi-enzyme mixture @ 0.05%) @50% of daily requirement and free range feeding

Source of technology: ICAR-CARI 2017-18; ICAR-PDP 2017-18

Table: Effect of multi-enzyme mixture and probiotics on growth performance of chickens

Tech- nology option	No. of trials	Yield component			In- crease over FP (%)	Yield/ unit of 40 birds (Kg)	Cost of cultiva- tion (Rs./unit)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C ratio
		Average Body weight at 3 weeks	Average Body weight at 8 weeks	Average Body weight at 12 weeks						
FP	5	202 gms	1.16 kg	1.43 kg	-	57.2 kg live weight	4080	10,296	6216	2.52
TO-I	5	306 gms	1.54 kg	2.13 kg	48.95%	85.2 kg live weight	4212	15,336	11,124	3.64
TO-II	5	242 gms	1.35 kg	1.75 kg	22.37%	70 kg live weight	4195	12,600	8405	3.0

WEST BENGAL

KVK Birbhum

Thematic area: *Group dynamics*

Assessing performance of different SHGs with different numbers of product focus areas in relation to annual savings

Generally, in West Bengal situation, the majority of SHGs are having up-to 03 (Three) product focus areas. The Govt. encourages formation of SHGs with multiple product focus areas. The selection of appropriate numbers of products focus areas of a Self-Help Group (SHG) is important for efficient group dynamics as well as improved economic performance of the said group. The selection of a suitable number of products focus areas of a SHG is largely influenced by various socio-economic and situational factors which in turn affect the economic performance such as annual savings from the group activities. In order to optimize the no. of product

focus areas, KVK Birbhum carried out a field trial with 40 SHGs of the district. It was found that Self Help Groups (SHGs) should be managed with a minimum of more than three numbers of product focus areas for better economic performances with a diversified product range and relevant diversified markets and reduction of risks of failure of a single product. Farmers actively participated in the day-to-day monitoring and data collection with KVK scientists. Farmers incurred all the cost of maintenance and management of the SHGs concerned.

Technology assessed

FP: Three numbers of product focus areas

TO-I: Two numbers of product focus areas

TO-II: One number of product focus areas

TO-III: More than three numbers of product focus areas

Source of technology: ICAR-IARI

Table: Comparative Performance of different SHGs with different numbers of product focus areas on annual savings

SHG Size (Nos. of Members)	Nos. of Selected SHGs	Average Yearly Savings of SHG from own contribution of members (In Rs.)	Average Yearly Savings of SHG from interest of loan to its member and outsider (In Rs.)	Average Yearly Savings of the SHG from different economic activities of the group (In Rs.)	Average Yearly Revolving Fund received by the SHG from Block Office (In Rs.)	Average Yearly Savings of the SHG from donation (In Rs.)	Average Yearly Savings of the SHG from other sources of income-Income from lottery, harvesting of crops, organizing stall in fairs, social festivals etc. (In Rs.)	Average Yearly Total Savings of the SHG (In Rs.)	Rank
FP	10	2,01,804	1,91,516	2,00,004	81,506	70,507	1,06,000	8,51,337	II
TO-I	10	1,20,000	1,04,506	1,04,000	50,500	50,503	1,13,623	5,43,132	III
TO-II	10	70,994	90,200	67,605	32,000	23,000	80,000	3,63,799	IV
TO-III	10	2,03,964	1,91,560	3,04,001	1,00,000	80,960	1,06,500	9,86,929	I

KVK Dakshin Dinajpur

Thematic area: *Nursery management*

Assessment of the efficacy of polythene tunnel and polythene covers for rice nursery raising during peak winter months in Dakshin Dinajpur district

During raising of *boro* rice seedling, yellowing and severe mortality of *boro* rice is a regular problem due to cold weather condition. In farmers condition seedlings are ready for transplanting only after 45-60 DAS with weak seedlings caused less tillering and poor yield in Dakshin Dinajpur district. To address this issue, KVK Dakshin Dinajpur undertook a multi-locational field trial at 7 different locations of the district. Result showed that significantly highest

yield was obtained from the TO-II. Total number of panicles per meter square area, number of bold grains per panicle, grain and straw yield were increased significantly from FP and TO-I except 1000 grain weight. The B:C ratio of 1.99 was observed in TO-II.

Technology assessed

FP : Wet nursery bed with 10 kg of seed/katha before 45 to 60 days of transplanting with 15 to 20 irrigation

TO-I : Wet nursery bed with polythene tunnel

TO-II : Dry nursery bed covered with polythene cover

Source of technology: AAU, Jorhat

Table: Efficacy of polythene tunnel and polythene covers for rice nursery raising during peak winter months in Dakshin Dinajpur district

Technology options	No. of trials	No. of effective tillers/m ²	No. of bold grains/ panicle	1000 grain weight (g)	Grain yield (t/ha)	Straw yield (t/ha)	B:C ratio
FP	7	335.7	105.3	21.46	4.65	5.12	1.43
TO-I	7	358.2	113.6	22.89	5.19	5.71	1.86
TO-II	7	405.6	119.4	22.97	5.48	6.03	1.99
CD (P=0.05)		16.18	4.37	NS	0.42	0.29	-

KVK Hooghly

Thematic area: *Crop production*

Assessment of performance of honey bee attractants on yield of onion seed in irrigated farming situation of new alluvial soil in Hooghly

district

Low productivity of onion seed due to lack of pollinator at early stage of flowering has been identified as a major problem in rice based (rice-onion-cucumber) production system of Hooghly

district. To increase pollinator, a field trial was carried out by KVK Hooghly at 10 different locations of the district. It has been found that the TO-II (Spray 0.5% Coriander seed oil at 5-10 % flowering and 50 % flowering) showed best performance in respect of number of seed per umbel and yield. Considering the net return and B:C ratio of 4.01.

Technology assessed

FP: Seed production without use of honey bee

attractants

TO-I : Spray 0.5% Fennel seed oil at 5-10% flowering and 50 % flowering

TO-II : Spray 0.5% Coriander seed oil at 5-10% flowering and 50 % flowering

Source of Technology: International Journal of Chemical Studies 2019; 7(4): 2958-2662.



Table: Effect of honey bee attractants on seed yield of onion

Technology option	No. of trials	No. of seed / umbel	Test weight (gm)	Yield (q/ha)	Cost of cultivation (Rs/ha)	Gross Return (Rs/ha)	Net Return (Rs./ ha)	B:C Ratio
FP	10	471.7	3.47	5.6	468750	1680000	1211250	3.58
TO-I	10	578.7	3.35	6.27	495790	1866000	1370210	3.76
TO-II	10	641.2	3.32	6.57	490812	1971000	1480188	4.01
SEm±		3.84	0.05	0.048	-	-	-	-
CD(P=0.05)		11.50	NA	0.14	-	-	-	-

Test weight= 1000 seed weight



KVK Malda-I (Ratua)

Thematic area: *Farm mechanization*

Assessment of production potentiality and profitability of different technologies for rice cultivation

Rice cultivation has been mainstay of farmers' livelihood in Malda district. Due to less use of common farm tools/ implements, the economics of rice production is not very encouraging. Therefore, a field trial was conducted by KVK Malda-I in order to introduce certain common farm implements during rice transplanting. The trial was taken up at 7 different locations of the district. The results revealed that TO-II, i.e., Rice transplanting by Mechanical Rice Transplanter gave highest yield, highest spikelet number and highest effective tiller/ panicle, and is significantly superior to FP and TO-

I, i.e., Un-Puddled Transplanted Rice. Though, it is at par with TO-I, i.e., Un-Puddled Transplanted Rice but significant in respect to yield and spikelet number. TO-II recorded higher gross return, net return and B:C ratio (1.63) than TO-I, i.e., Un-Puddled Transplanted Rice (1.47). So, from the result, it is recommended that TO- II is recommended for the micro level situation for sustainable higher production and more profitability.

Technology assessed

FP: Traditional manual method of transplanting rice

TO-I: Un-Puddled Transplanted Rice

TO-II: Rice transplanting by Mechanical Rice Transplanter

Source of technology: UBKV

Table: Production potentiality and profitability of different technologies for rice cultivation

Technology option	No. of trials	Growth and Yield component				Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C ratio
		Plant Height(cm)	No. of effective tillers/hill	No. of spikelet per panicle	Test wt. (1000 grain wt.) (g)					
FP	7	81.50	5.78	85.86	18.69	32.13	43125.00	52990.00	9865.00	1.23
TO- I	7	80.38	6.05	89.43	19.06	31.80	35625.00	52476.00	18545.00	1.47
TO- II	7	83.43	6.32*	99.57*	18.82	35.81	36650.00	59086.00	22710.00	1.63
SE(m)		1.350	0.096	1.631	0.445	0.342				
C.D.		4.185	0.298	5.080	1.380	1.065				

* Significant ($P < 0.05$)



KVK Murshidabad-II (Sargachhi)

Thematic area: *Integrated nutrient management*

Assessment of different technologies of Integrated Nutrient Management in Chickpea

Low productivity of chickpea due to uncontrolled inorganic nutrient management has been a major problem of the district. Further, such usage also deteriorates soil health. To overcome this problem, a field trial at 8 different locations was taken up by KVK Murshidabad-II. Results of the trial indicated that yield obtained from plots of selected technologies were significantly higher than that obtained in plots of farmers practice of which TO-II recorded highest yield (19.2 q/ha) followed by TO-III (18.75 q/ha). Among the yield attributing characters TO-II showed maximum no of branch/m², no. of pods/plant and it is at par with TO-III. Highest net return and benefit cost ratio was

calculated in case of TO-II followed by TO-III and so TO-II can be recommended to the farmers.

Technology assessed

FP: Application of N:P:K @ 20:30:30 through inorganic fertilizer

TO-I: Seed treatment with *Rhizobium leguminosorum*+ 50 % RDF (25:50:25) through vermin-compost + 50 % RDF through inorganic fertilizer

TO-II: Soil application of microbial consortia (*Rhizobium leguminosorum* + PSB + *F. aurantia*) + 25 % RDF through Vermicompost + 50 % RDF through inorganic fertilizer

TO-III: Soil application of microbial consortia (*Rhizobium leguminosorum* + PSB) + 50 % RDF through Vermicompost + Liquid N P K @ 3g lit⁻¹ twice

Source of technology: Journal of Pharmacognosy & Phytochem. 6(5), 1857-1860; Omon rice (18), 121-128

Table: Performance of different technologies of Integrated nutrient management in chickpea

Technology Option	No. of trials	Growth and Yield Component (Chickpea)			Yield (q/ha)	Cost of cultn (Rs/ha)	Gross Return (Rs/ha)	Net Return (Rs./ha)	B:C ratio
		Plant height (cm)	No of branch / plant	No. of pods/ plant					
FP	8	45.60	6.95	40.56	17.20	36100	82560	46460	2.29
TO-I	8	48.10	7.54	45.97	18.60	38900	89280	50380	2.30
TO-II	8	47.80	8.76	47.64	19.60	37700	94080	56380	2.50
TO-III	8	48.20	8.12	46.40	18.95	38,700	90960	52260	2.35
CD (P=0.05)		2.82	NS	4.16	1.30	-	-	-	-



KVK Nadia-I

Thematic area: *Crop diversification*

Assessment of different cultivation methods with climate resilient cabbage production

Frequent occurrence of erratic and heavy rainfall causing huge loss to vegetable cultivation requires some climate resilient production method especially for cabbage. This will reduce subsequent low availability of harvestable produce. Non-adaptation of climate resilient cultivation methods by the farmers was identified as a problem of the district. Therefore, to address the issue, KVK Nadia-I took up a field trial with different cultivation methods at 7 different locations. From the results, it was found that TO-II (Cultivation of cabbage by plug tray grown seedling with double row planting) performed better than other options. From the trial, it was clear that plug tray grown seedlings with double row planting have resulted higher yield of cabbage i.e. 47.4 t/ha

with 90% seedling survival. Return from TO-II was higher than the other, which was Rs. 4.57/- per rupee invested. Double row planting has helped to harvest about 96% of the planted population of cabbage, whereas it was only 86% and 75% in TO-I and FP respectively. Active participation of farmers was there from sowing process execution. Encouraging response was obtained from the farmer end as they got better price due to high yield.

Technology assessed

Farmers' practice: Cultivation of cabbage by seed bed grown seedling with single row transplanting

TO-I: Cultivation of cabbage by plug tray grown seedling with single row planting.

TO-II: Cultivation of cabbage by plug tray grown seedling with double row planting.

Source of technology: BCKV

Table: Performance of different cultivation methods with climate resilient cabbage production

Technology option	No. of trials	Yield /ha (t/ha)	Seedling survival rate (%)	% of harvestable plant	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C Ratio
FP	7	31.5	65	75	150000	447300	297300	2.98
TO-I	7	40.5	89	86	165000	599400	434400	3.63
TO-II	7	47.4	90	96	165000	754256	589256	4.57
CD (P=0.05)		4.4						



KVK Purba Medinipur

Thematic area: *Varietal evaluation*

Evaluation of water tolerant rice varieties at Purba Medinipur

Most of the rice growing areas are low to mid-low land, thus this situation creates prolonged water-logging condition in most of the rice growing areas of the district. Again, in such condition, conventional varieties are less productive and susceptible to various disease-pests. This OFT was conducted during kharif 2022 to screen out the water tolerance and high yielding rice varieties under water logged and submerged condition. The various morphological characters recorded of rice cultivars were analyzed. Significant variation in different growth parameters were observed amongst different tested cultivars. Based on performance of tested cultivars, it can be concluded that TO-II (variety CR Dhan-409) showed superiority over other cultivars with respect to yield due to its tolerance to water-logged and submerged condition and great yield potential. So the farmer will more be benefited with growing of CR Dhan-409 variety by higher yield and highest net

return also with good B:C ratio. Significant variation observed among most of tested growth and yield parameter of 4 cultivars. Though CR Dhan 409 (TO-II) recorded medium height leads to less lodging, thereby recorded less yield loss. Similarly, CR Dhan 409 recorded maximum value on other growth parameter like no. of effective tiller/hill (14.4), no. of panicle/m² (380), no. of spikelets / panicle (185), panicle length (28 cm) followed by CR Dhan 507. Highest yield of 47.51 q/ha recorded in CR Dhan 409 followed by CR Dhan 507 and Swarna sub1. CR Dhan 409 also recorded highest net return value of Rs. 34218 with B:C ratio of 1.67. CR Dhan 409 (TO-II) recommended for cultivation in water logged or mid-low land situation at Purba Medinipur district for getting higher yield and return.

Technology assessed

FP: Local Variety (Barsha)

TO-I: Swarna Sub1

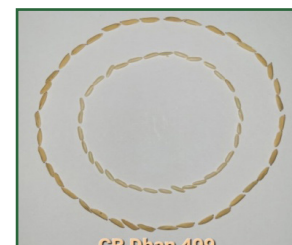
TO-II: CR Dhan 409

TO-III: CR Dhan 507

Source of technology: NRRI, Cuttack

Table: Performance of different water tolerant rice varieties

Tech-nology option	No. of trials	Ger-mi-nation %	Plant height at maturity (cm)	No. of effective tillers/hill	No. of pan-icle/m ²	No. of spike-lets/panicle	Pan-icle length (cm)	1000 seed weight (g)	Seed Yield (q/ha)	Har-vest index (HI)	Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net Return (Rs./ha)	B:C ratio
FP	5	86	180	9.8	240	124	21	18	39.3	41.45	50100	70740	20640	1.41
TO-I	5	98	94	13	292	166	25	19	43.54	42.24	51300	78372	27072	1.53
TO-II	5	98	149.8	14.4	380	185	28	20	47.51	43.27	51300	85518	34218	1.67
TO-III	5	96	170	10.9	285	180	27	20.11	47	42.33	51300	84600	33300	1.65
SEm (±)			0.542	0.436	0.736	0.342	0.257	0.284	0.423	0.21	-	-	-	-
CD (P=0.05)			1.687	1.358	2.293	1.064	0.8	0.884	1.317	0.654	-	-	-	-



KVK South 24 Parganas-II (Narendrapur)

Thematic area: *Nutrient management*

Effect of foliar application of zinc and boron on productivity and profitability of hybrid *rabi* maize

Fertilizer management is one of the important factors affecting maize growth and yield. Foliar nutrient sprays have been found to be an effective way to correct micronutrient deficiencies, which sometimes results in higher yields and crop quality of maize. Zinc and boron deficiencies are largely considered nutritional constraint for crop production in many types of soil, particularly in case of cereals growing in alluvial soil. In West Bengal, 55% of the soils are found to be deficient in Zn. Maize shows the high sensitivity to Zn deficiency for its physiological requirements. Indiscriminate use of high-analysis fertilizers often fail to address the multi-nutrient deficiencies caused by micronutrients. For solving this issue, KVK South 24 Parganas-II conducted a multi-locational field trial at 7 different locations of the district. It was found that TO-III (application of B and Zn along with recommended dose of NPK)

significantly outperformed single application of either B or Zn in terms of yield attributes and economics. Lowest results were recorded in plots receiving farmers' fertilizer practices. Harvest index, estimated from economic and biological yield of maize, was recorded to be lower in case of state recommendation + 0.5% Zn + 0.2% B treatment, which indicates higher dry matter remobilization from different plant parts to maize grain.

Technology assessed

FP: Indiscriminate use of fertilizer (both over and underrated application)

TO-I - State recommendation (SR) of NPK (140: 70: 70 kg N: P₂O₅: K₂O/ha) + foliar spray of 0.2% B at pre-tasseling stage

TO-II - SR + foliar spray of 0.5% Zn at pre-tasseling stage

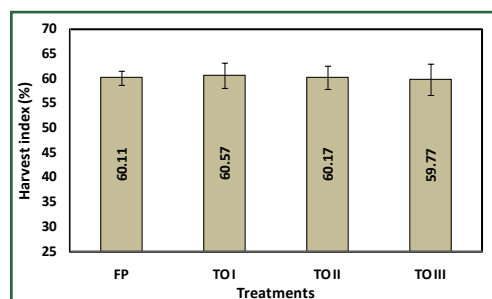
TO-III - SR + foliar spray of 0.5% Zn and 0.2% B at pre-tasseling stage

Source of technology: BCKV

Table: Effect of different technology options on yield attributes, yield and economics of hybrid maize

Technology option	No. of trials	Yield component						Grain yield (t/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C ratio
		Cob length (cm)	Cob girth (cm)	Cob weight (g)	No. of cobs per plant	No. of grain rows per cob	No. of grains per cob					
FO	7	16.3± 0.37b ^a	14.22± 0.29b	215.6± 15.89c	1.43± 0.11c	14.15± 0.61b	335.2± 33.22d	6.11± 0.12c	71123	146640	75517	2.06
TO-I	7	16.2± 0.35b	14.89± 0.24ab	226.33± 12.86c	1.52± 0.10b	14.26± 0.15a	342.5± 36.64c	6.32± 0.21c	72450	151680	79230	2.09
TO-II	7	18.1±0.41ab	15.66± 0.27a	239.24± 34.46b	1.69± 0.08a	14.35± 0.29a	380.2± 33.51b	7.23± 0.31b	73325	173520	100195	2.37
TO-III	7	19.6± 0.36a	16.15± 0.32a	262.12± 32.25a	1.85± 0.08a	14.44± 0.22a	391.5± 35.56a	7.89± 0.12a	74620	189360	114740	2.54

^aData are means ± standard error of samples, Means followed by a different letter are significantly different at p≤0.05 by Duncan's Multiple Range Test.



4.2 Technology Demonstration:

4.2.1 Frontline Demonstrations:

Frontline demonstration (FLD) is the concept of demonstration popularized by Indian Council of Agricultural Research under the Technology Mission. The demonstrations are made on the latest technologies and varieties less than 10 years old with direct supervision of NARS scientist in the farmers' field. This programme is popular among the farmers as there is no other programme of oilseeds, pulses and other crops within the reach of the farmers which update the knowledge and technique of the cultivation. The KVKs of Zone V took up FLD programme not only in oilseeds and pulses but also in the area of cereals, vegetables, cash crop and other crop, so that farmers are updated with latest varieties and technologies under important field crops.

In 2022, the KVKs of Zone-V, conducted Frontline Demonstration programme on oilseeds in

375.54 ha covering 1943 farmers. The area under demonstration in pulse was 219.85 ha which covered 1440 farmers. The coverage in crops like paddy, wheat, maize, brinjal, cauliflower, onion etc. was 1084.24 ha which involved 7014 farmers. As a whole the KVKs of Zone V covered 1679.63 ha under demonstration in 2022 and benefitted 10397 farmers.

In state-wise analysis of Frontline Demonstrations showed Odisha covered 137.44 ha in oilseeds, 41.1 ha in pulses and 355.8 ha in cereals, vegetables and other crops in 2022. Total coverage of demonstration was 534.34 ha in the state which benefitted 2812 farmers. In the state of West Bengal, an area of 238.1 ha in oilseeds 176.75 ha in pulses and 728.26 ha in cereals, vegetable etc. were covered in 2022. Total coverage in West Bengal was 1143.11 ha under demonstration which benefitted 7573 farmers of the zone.

Table: State-wise details of Frontline Demonstration on Oilseeds, Pulses and Other Crops

State	Oilseeds		Pulses		Other crops		Total	
	No. of Farmer	Area (ha)	No. of Farmer	Area (ha)	No. of Farmer	Area (ha)	No. of Farmer	Area (ha)
A & N Islands	0	0	5	2	7	0.18	12	2.18
Odisha	465	137.44	283	41.10	2064	355.80	2812	534.34
West Bengal	1478	238.10	1152	176.75	4943	728.26	7573	1143.11
Total	1943	375.54	1440	219.85	7014	1084.24	10397	1679.63

4.2.2 Oilseeds:

In 2022 total 375.54 ha area was covered under FLD on Oilseeds. Out of the total coverage, Oilseed was demonstrated 137.44 ha in Odisha and 238.10 ha in West Bengal. The farmers covered in West Bengal were 1478 and in Odisha it was 465. The demonstrated yield of groundnut was 26.94 q/ha in West Bengal with an increase in yield of 15.18%. In Odisha, the demonstration yield was 18.45q/ha which is 18.70% higher than traditional variety.

In mustard coverage were 156.8 ha in West Bengal and 12 ha in Odisha. The demonstrated yield was 12.79 q/ha in West Bengal while it was 7.55 q/ha in Odisha. The increase in yield was 28.60% in West Bengal and 24.79% in Odisha. Oilseeds crops like sesame, sunflower also demonstrated by the KVKs of Odisha and West Bengal. The yield improvement in West Bengal, with demonstrations was 28.45% in sesame, 27.73% in sunflower whereas in Odisha 34.77% increase in sesame, 24.64% in Sunflower is observed.

Table: Frontline Demonstration on Oilseeds

Sl. No.	Crop	State	No. of KVKs	No. of Farmer	Area (ha)	Yield (q/ha)		% Increase
						Demo	Check	
1	Ground-nut	Odisha	13	190	52.44	18.45	15.54	18.70
		West Bengal	8	268	44.3	26.94	23.39	15.18
		Total	21	458	96.74	22.69	19.47	16.94
2	Mustard	Odisha	2	38	12	7.55	6.05	24.79
		West Bengal	17	1056	156.8	12.79	9.95	28.60
		Total	19	1094	168.8	10.17	8.00	26.70
3	Sesame	Odisha	4	146	39	5.88	4.37	34.77
		West Bengal	4	132	34.5	10.81	8.42	28.45
		Total	8	278	73.5	8.35	6.39	31.61
4	Sunflower	Odisha	4	91	34	18.29	14.67	24.64
		West Bengal	2	22	2.5	13.55	10.84	27.73
		Total	6	113	36.5	15.92	12.76	26.19
Grand Total			54	1943	375.54			



4.2.3 Pulses:

In pulses, demonstration was conducted in 219.85 ha covering 1440 farmers. The major pulses demonstrated was black gram (89.2 ha) and green gram (56.15 ha). In green gram increase in yield (1.27 q/ha) was 26.69% in Odisha and 29.93% (2.26q/ha)

in West Bengal. Lentil was demonstrated in West Bengal is 52 ha and average demonstrated yield was recorded 12.21 q/ha which was higher by 28.31% of check yield. Pigeonpea, Cowpea and Garden pea are also demonstrated in 5-6 ha under this programme. The yield performance and cover age of frontline demonstration are given below.

Table: Frontline demonstration on pulses

Sl. No.	Crop	State	No. of KVKs	No. of Farmer	Area (ha)	Yield (q/ha)		% Increase
						Demo	Check	
1	Black Gram	Odisha	2	20	2	12.45	9.73	27.95
		West Bengal	6	508	87.2	10.63	8.04	32.24
		Total	8	528	89.2	11.54	8.88	30.10
2	Green Gram	Odisha	13	141	24.6	6.05	4.78	26.69
		West Bengal	8	274	31.55	9.81	7.55	29.93
		Total	21	415	56.15	7.93	6.16	28.31

Sl. No.	Crop	State	No. of KVKs	No. of Farmer	Area (ha)	Yield (q/ha)		% Increase
						Demo	Check	
3	Lentil	West Bengal	9	342	52	12.21	9.52	28.31
		Total	9	342	52	12.21	9.52	28.31
5	Pigeon pea	Odisha	3	30	5	11.33	8.25	37.29
		Total	3	30	5	11.33	8.25	37.29
6	Cowpea	A&N Islands	1	5	2	5.25	4.02	30.60
		Odisha	3	30	4	96.53	81.37	18.64
		Total	4	35	6	50.89	42.69	24.62
7	Lathyrus	West Bengal	2	28	6	10.04	8.02	25.20
		Total	2	28	6	10.04	8.02	25.20
8	Garden pea	Odisha	4	62	5.5	124.38	95.83	29.79
		Total	4	62	5.5	124.38	95.83	29.79
Grand Total			51	1440	219.85			



4.2.4 Other Crops:

Different field crops important for the respective districts of the KVK were taken up for the purpose of frontline demonstration, rice being the most important crop in the region grown preference for demonstration. The latest varieties and technologies on rice were demonstrated in 446.68 ha covering 2108 farmers. Average yield increase was 17.80% in Odisha and 17.29% in West Bengal. Wheat and maize is not a major crop in these states but to popularize these crops was demonstrated in 25 ha and 37.23 ha in West Bengal and 44.40 ha in Odisha which showed average increase in yield of 23.25% and 33.69% in West Bengal and 14.92% in Odisha.

Among the vegetable crops brinjal, cauliflower, onion, tomato, potato, cabbage, broccoli, chilli, cucumber, point gourd, elephant foot yam, bitter

gourd were demonstrated through frontline demonstration programme. Improvement in yield was demonstrated 17.57 to 24.20% in brinjal, 17.93 to 21.37% in cauliflower, 16.81 to 22.39% in onion, 18.30 to 33.42% in tomato, 23.48 to 26.17% in cabbage, 20.51 to 35.19% in cucumber in the state of West Bengal and Odisha.

Spices like turmeric was demonstrated in both the states of West Bengal and Odisha showing improvement of yield of 18.84 to 25.0% over the existing practices.

Fruit crops like mango and banana were demonstrated during 2022. Yield increment with new technologies was 22.40% in West Bengal. Banana in Odisha showed 23.60% increase in yield and in West Bengal 30.55%.

Table: Demonstration on crops other than oilseeds and pulses

Sl. No.	Crop	State	No. of KVKs	No. of Farmer	Area (ha)	Yield (q/ha)		% Increase
						Demonstration	Check	
1	Rice	Odisha	28	432	110.05	44.24	37.56	17.80
		West Bengal	20	1676	336.63	51.99	44.32	17.29
		Total	48	2108	446.68			
2	Wheat	West Bengal	3	152	25	29.63	24.04	23.25
		Total	3	152	25			
3	Finger Millet	Odisha	10	91	22	14.42	9.96	44.85
		Total	10	91	22			
4	Okra	A & N Islands	2	2	0.10	17.47	13.75	27.02
		Odisha	3	33	1.5	132.07	106.00	26.08
		West Bengal	1	18	0.6	189.80	147.75	28.46
		Total	6	53	2.20			
5	Bitter gourd	Odisha	9	99	7.8	205.47	166.48	23.42
		West Bengal	4	54	4.013	355.65	298.11	40.32
		Total	13	153	11.813			
6	Brinjal	A & N Islands	1	1	0.0235	51.06	41.23	23.84
		Odisha	20	194	20.04	297.29	239.36	24.20
		West Bengal	8	145	12.62	403.95	343.57	17.57
		Total	29	340	32.6835			
7	Broccoli	Odisha	1	10	1	243.00	162.00	50.00
		West Bengal	5	122	5.076	227.68	172.32	32.13
		Total	6	132	6.076			
8	Cabbage	Odisha	5	65	7.1	385.44	305.50	26.17
		West Bengal	3	36	3.339	333.54	270.12	23.48
		Total	8	101	10.439			
9	Capsicum	Odisha	1	13	0.40	175.09	128.94	35.79
		West Bengal	5	65	1.79	154.62	124.38	24.31
		Total	6	78	2.19			
10	Cauliflower	Odisha	5	68	6.90	290.18	239.08	21.37
		West Bengal	10	212	10.08	221.98	188.23	17.93
		Total	15	280	16.98			
11	Chilli	Odisha	13	120	12.2	130.44	104.94	24.30
		West Bengal	1	7	0.25	51.80	44.90	15.37
		Total	14	127	12.45			
12	Cucumber	Odisha	3	30	1.56	136.87	101.24	35.19
		West Bengal	6	146	14.4	298.92	248.03	20.51
		Total	9	176	15.96			
13	Onion	Odisha	5	43	5.52	190.24	156.48	22.39
		West Bengal	6	75	7.4	187.47	160.49	16.81
		Total	11	118	12.92			

Sl. No.	Crop	State	No. of KVKs	No. of Farmer	Area (ha)	Yield (q/ha)		% Increase
						Demonstration	Check	
14	Pointed gourd	Odisha	3	30	2.4	155.53	126.30	24.55
		West Bengal	2	56	11	212.54	193.17	10.03
		Total	5	86	13.4			
15	Summer squash	West Bengal	2	65	2.2	288.50	226.50	27.37
		Total	2	65	2.2			
16	Sweet Corn	Odisha	3	35	7	89.07	74.80	19.07
		West Bengal	2	4	1	289.90	212.60	36.36
		Total	5	39	8			
17	Tomato	A & N Islands	1	2	0.03	41.67	32.00	30.22
		Odisha	16	164	17	402.34	304.41	33.42
		West Bengal	10	221	11.06	425.24	359.45	18.30
		Total	27	387	28.09			
18	Elephant Foot Yam	Odisha	2	7	2.40	235.70	201.50	16.97
		West Bengal	7	148	7.05	432.10	341.91	26.38
		Total	9	155	9.45			
19	Potato	Odisha	3	33	2.40	254	201.35	26.15
		West Bengal	2	76	10.67	339.95	287.35	18.31
		Total	5	109	13.07			
20	Sweet Potato	Odisha	1	10	1	172.70	117.40	47.10
		West Bengal	3	72	4.25	137.43	87.60	56.89
		Total	4	82	5.25			
21	Marigold	Odisha	6	66	6.2	116.47	86.17	35.16
		West Bengal	4	55	3.06	148.78	107.08	38.94
		Total	10	121	9.26			
22	Banana	Odisha	5	48	5.04	411.26	332.73	23.60
		West Bengal	5	74	7.96	362.40	277.60	30.55
		Total	10	122	13.00			
23	Dragon fruit	West Bengal	2	18	1.13	66	55.3	19.35
		Total	2	18	1.13			
24	Guava	West Bengal	2	23	5	270.89	230.46	17.54
		Total	2	23	5			
25	Mango	West Bengal	4	107	20.2	229.06	187.14	22.40
		Total	4	107	20.2			
26	Watermelon	Odisha	2	20	2	402.70	312.30	28.95
		Total	2	20	2			
27	Papaya	Odisha	1	14	0.4	180.00	120.00	50.00
		West Bengal	2	23	0.71	507.00	352.50	43.83
		Total	3	37	1.11			
28	Ginger	Odisha	1	10	1.99	199.30	141.30	41.05
		West Bengal	3	25	1.6	80.83	60.58	33.41
		Total	4	35	3.59			

Sl. No.	Crop	State	No. of KVKs	No. of Farmer	Area (ha)	Yield (q/ha)		% Increase
						Demonstration	Check	
29	Turmeric	Odisha	2	10	0.5	10.00	8.00	25.00
		West Bengal	3	31	1.539	292.47	246.11	18.84
		Total	5	41	2.039			
30	Cotton	Odisha	4	25	20	18.08	13.84	30.62
		Total	4	25	20			
31	Sugarcane	Odisha	3	33	7	95.2	80.33	18.52
		Total	3	33	7			
32	Jute	Odisha	3	35	7	22.93	20.47	12.05
		West Bengal	8	743	171.66	27.49	23.06	19.24
		Total	11	778	178.66			
33	Maize	Odisha	18	190	44.4	54.16	47.13	14.92
		West Bengal	12	234	37.23	155.87	118.14	33.69
		Total	30	424	81.63			
34	Others	A & N Islands	2	2	0.029	178.20	155.61	14.82
		Odisha	14	136	33	187.11	136.31	37.27
		West Bengal	12	260	9.756	209.29	163.35	28.13
		Total	28	398	42.785			
Grand Total			353	7014	1084.24			



4.2.5 Livestock:

Different aspects of livestock management like new breed introduction, livestock feed formulation with locally available materials, deworming, vaccinations, health management measures were demonstrated

by the KVKs of Odisha and West Bengal. In Odisha, demonstrations were made on 958 livestock benefitting 696 farmers. In the state of West Bengal, 640 farmers were involved to demonstrate latest technology of 937 animals/livestock.

Table: Frontline Demonstration on Livestock

Sl. No.	Category	State	No. of KVKs	No. of Farmer	No. of units
1	Poultry	Odisha	18	497	452
		West Bengal	10	231	416
		Total	28	728	868
2	Sheep and goat	Odisha	5	50	195
		West Bengal	5	65	96
		Total	10	115	291

Sl. No.	Category	State	No. of KVKs	No. of Farmer	No. of units
3	Dairy	Odisha	7	68	80
		West Bengal	6	92	102
		Total	13	160	182
4	Duckery	Odisha	3	43	180
		West Bengal	3	60	70
		Total	6	103	250
5	Cow	Odisha	2	23	36
		West Bengal	4	82	92
		Total	6	105	128
6	Feed and Fodder	West Bengal	4	60	65
		Total	4	60	65
7	Others	Odisha	2	15	15
		West Bengal	5	50	96
		Total	7	65	111
Grand Total			74	1336	1895



4.2.6 Fishery:

In fishery, demonstration was conducted on 416

units developed on Common carps, Composite fish, Ornamental fishes etc benefiting 561 farmers in Odisha and West Bengal.

Table: Frontline Demonstration on Fishery

Sl. No.	Category	State	No. of KVKs	No. of Farmer	No. of units
1	Common carps	Odisha	5	66	46
		West Bengal	4	27	27
		Total	9	93	73
2	Composite fish	Odisha	8	145	97
		West Bengal	12	156	159
		Total	20	301	256
3	Ornamental fishes	West Bengal	1	10	10
		Total	1	10	10
4	Others	Odisha	4	104	37
		West Bengal	8	53	40
		Total	12	157	77
Grand Total			42	561	416



4.2.7 Enterprise:

In different enterprise like apiary, vermicomposting, mushroom production, Nutritional Garden, value addition of fruits and

vegetables were demonstrated among farmers and rural youth to exhibit the earning potential of the technologies. These demonstrations benefitted 1404 farmers and rural youths along with 3212 units in this zone.

Table:Frontline Demonstration on Enterprise

Sl. No.	Category	State	No. of KVKs	No. of Farmer	No. of units
1	Oyster mushroom	A & N Islands	1	2	2
		Odisha	13	164	1044
		West Bengal	7	140	260
		Total	21	306	1306
2	Paddy straw mushroom	Odisha	13	164	749
		West Bengal	1	5	5
		Total	14	169	754
3	Vermicompost	A & N Islands	1	2	2
		Odisha	5	52	62
		West Bengal	7	87	97
		Total	13	141	161
4	Apiculture	Odisha	6	59	59
		West Bengal	5	117	131
		Total	11	176	190
5	Nutritional Garden	Odisha	5	60	60
		West Bengal	1	22	72
		Total	6	82	132
6	Value Addition	Odisha	6	60	120
		West Bengal	5	54	55
		Total	11	114	175
7	Sericulture	Odisha	3	40	40
		Total	3	40	40
8	Agroforestry	West Bengal	3	13	5
		Total	3	13	5
9	Others	A & N Islands	2	5	5
		Odisha	10	105	105
		West Bengal	11	253	339
		Total	23	363	449
Grand Total			105	1404	3212



4.2.8 Implements:

Agriculture implements and tools available for farmers are not in use in many villages due to lack of awareness about the machineries. To create

awareness about implements and machineries, 153 demonstrations were organized involving 668 farmers, in the states of West Bengal, Odisha and A & N Islands

Table: Frontline Demonstration on Implements

Sl. No.	Category	State	No. of KVKs	No. of Farmer	No. of units/No
1	Implement	A & N Islands	2	28	8
		Odisha	20	384	60
		West Bengal	11	256	85
		Total	33	668	153



4.2.9 Women Empowerment:

The KVKs of Zone V conducted 796 demonstrations on different aspects of women empowerment

during the year 2022. The various aspects of women empowerment included the strengthening of SHGs, enhanced economic power in the family, eradication of malnutrition in girl children and so on.

Table: Frontline Demonstration on Women Empowerment

Sl. No.	Category	State	No. of KVK	No. of demonstrations
1	Farm Women	A & N Islands	1	4
		Odisha	10	232
		West Bengal	8	216
		Total	19	452

Sl. No.	Category	State	No. of KVK	No. of demonstrations
2	Adolescent Girl	A & N Islands	2	12
		West Bengal	4	72
		Total	6	84
3	Other women	A & N Islands	2	7
		Odisha	3	30
		West Bengal	4	223
		Total	9	260
Grand Total			34	796



4.3 Training:

Continuous updating of knowledge and skill of the farmers are required in the field of agriculture and allied sectors to maintain sustainability in agricultural development. Various organizations come forward with their proposal of training programme to update skills of their farmers/ rural

youths. KVKs took the lead role to train the farmers at district level with their expertise on different fields of agriculture and allied vocations. The farmers approach to the KVKs to get trained in the area of crop production, horticulture, water management, off-season vegetable cultivation, soil health and fertility management, post-harvest technology, plant protection, fishery and value addition etc.

Table: Summary of training programme conducted in Zone V

State	No. of Courses	No. of Participants											
		Farmer & Farm Women			Rural Youth			Extension Functionaries			Grand Total		
		M	F	T	M	F	T	M	F	T	M	F	T
A & N Island	61	984	821	1805	85	220	305	34	0	34	1103	1041	2144
Odisha	2307	25404	21075	46467	3566	2106	5672	2114	1344	3458	31084	24525	55609
West Bengal	1910	27528	12334	40900	4122	1929	6051	7719	1295	9014	39369	15558	54927
TOTAL	4278	53916	34230	89172	7773	4255	12028	9867	2639	12506	71556	41124	112680

4.3.1 Consolidated achievements:

The KVKs of Zone V organized 4278 training courses for the benefit of 112680 farmers and farm women during 2022. Out of total beneficiaries, 71556 was male (63.50%) and 41124 (36.50%) was female.

A good number (34208) of SC farmers were also trained in the programme which constituted 30.36% total trainees. While the number of ST trained was 18819 which was 16.70% of total beneficiaries. The details are given in the table below.

Table: State-wise training programme conducted for farmers and farmwomen in Zone V

State	No. of Courses	No. of Participants											
		Other			SC			ST			Grand Total		
		M	F	T	M	F	T	M	F	T	M	F	T
A & N Island	49	339	501	840	0	0	0	645	320	965	984	821	1805
Odisha	1748	15483	10211	25694	4437	5486	9923	5472	5378	10850	25404	21075	46467
West Bengal	1385	14781	4690	19471	11587	5494	17081	2198	2150	4348	27528	12334	40900
TOTAL	3182	30603	15402	46005	16024	10980	27004	8315	7848	16163	53916	34230	89172

State-wise analysis of training for farmers and farmwomen showed that Union Territory of A&N Islands conducted 49 courses for 1805 participants. In Odisha, 1748 courses were conducted for 46467 beneficiaries while in West Bengal 1385 courses were taken up for training of 40900 beneficiaries.

Skill development through training of rural youth was one of the most important objectives of the KVKs to generate rural employment. Mushroom production, production of organic inputs, seed production, value addition, dairy farming, poultry farming, fish seed production, repair and maintenance of farm machines and bee keeping were the most preferred areas for rural youth training. The KVKs conducted those training programme generally on on-campus mode. Farmers got trained in the latest technologies in those programmes.

In the year 2022, 588 courses were organized for 12028

rural youths through on and off-campus training. Out of the total participants 7773 (64.62%) was male and 4255 (35.38%) was female. Participation of SC in these programmes was 4403 which constituted 36.61% of the total trainees, while participation from ST was 1903 (15.82%).

State-wise analysis of the rural youth trained showed that Odisha trained maximum rural girls 2106 which constitute about 37.13% of total trainees. The percentage of the rural girls was 72.13% in the Union Territory of A&N Islands and 31.88% in the state of West Bengal. A significant number of training programme was organized by the states for rural youths. Union territory of A & N Islands organized 11 courses for 305 beneficiaries. Odisha organized 344 courses for 5672 beneficiaries and West Bengal organized 233 courses for 6051 beneficiaries which makes a total of 588 courses for 12028 beneficiaries.

Table: State-wise training programme conducted for rural youths in Zone V

State	No. of Courses	No. of Participants											
		Other			SC			ST			Grand Total		
		M	F	T	M	F	T	M	F	T	M	F	T
A & N Island	11	85	220	305	0	0	0	0	0	0	85	220	305
Odisha	344	1954	1077	3031	686	534	1220	926	495	1421	3566	2106	5672
West Bengal	233	1679	707	2386	2125	1058	3183	318	164	482	4122	1929	6051
TOTAL	588	3718	2004	5722	2811	1592	4403	1244	659	1903	7773	4255	12028

The extension functionaries in state level were interested in obtaining training from the Krishi Vigyan Kendras. Those extension functionaries were mainly VLWs, *Krishi Prayukti Sahayak* and other block level workers of the state government. State-wise analysis of the programmes showed that West Bengal organized maximum number of training programme of 292 courses involving 9014 extension

functionaries while Odisha organized 215 courses for 3458 extension functionaries and A&N Islands organized 1 course for 34 beneficiaries. Gender analysis of the trainees indicated that nearly 21.10% were female and 78.90% were male participants in 2022. The constitution of SC was 22.40% while ST was 6.02% of the extension functionaries trained in KVKs.

Table: State-wise training programme conducted for extension functionaries in Zone V

State	No. of Courses	No. of Participants											
		Other			SC			ST			Grand Total		
		M	F	T	M	F	T	M	F	T	M	F	T
A & N Island	1	34	0	34	0	0	0	0	0	0	34	0	34
Odisha	215	1621	925	2546	257	210	467	236	209	445	2114	1344	3458
West Bengal	292	5515	857	6372	2025	309	2334	179	129	308	7719	1295	9014
TOTAL	508	7170	1782	8952	2282	519	2801	415	338	753	9867	2639	12506

4.3.1.1 On-and Off- Campus training

The training programmes conducted by the KVKs of Zone V were in both on-campus and off-campus mode. Due to lack of accommodation facilities some of the trainings were organized in off-campus mode.

Out of total training programmes (4278) conducted in all categories, around 61.38% was in off-campus mode and 38.62% in on-campus mode. While 72122 participants received training on off-campus mode (63.43%) and 41584 (36.57%) received training on on-campus mode.

Table: On- and Off-Campus training programme conducted for farmers, farm women rural youth and extension functionaries in Zone V

Farmers and Farm Women

Mode	No. of Courses	No. of Participants											
		Other			SC			ST			Grand Total		
		M	F	T	M	F	T	M	F	T	M	F	T
ON	824	8843	3837	12680	5104	3277	8381	1719	1162	2881	14947	8276	23942
OFF	2358	21760	11565	33325	10920	7703	18623	6596	6686	13282	38969	25954	65230
Total	3182	30603	15402	46005	16024	10980	27004	8315	7848	16163	53916	34230	89172

Rural Youths

Mode	No. of Courses	No. of Participants											
		Other			SC			ST			Grand Total		
		M	F	T	M	F	T	M	F	T	M	F	T
ON	420	2308	1280	3588	1776	1178	2954	974	452	1426	5058	2910	7968
OFF	168	1410	724	2134	1035	414	1449	270	207	477	2715	1345	4060
Total	588	3718	2004	5722	2811	1592	4403	1244	659	1903	7773	4255	12028

Extension Functionaries

Mode	No. of Courses	No. of Participants											
		Other			SC			ST			Grand Total		
		M	F	T	M	F	T	M	F	T	M	F	T
ON	408	5911	1354	7265	1510	362	1872	347	190	537	7768	1906	9674
OFF	100	1259	428	1687	772	157	929	68	148	216	2099	733	2832
Total	508	7170	1782	8952	2282	519	2801	415	338	753	9867	2639	12506

4.3.1.2 Thematic area-wise training programme

Further classification of training programme on thematic area basis showed that under crop production category, training on integrated crop management was conducted for 107 courses involving 3272 participants while in weed management, 86 courses were organized for 2385 beneficiaries. In horticulture, important areas of training included training and pruning in vegetables which 47 trainings were organized for 1355 beneficiaries. In fruits cultivation, 91 trainings were organized for 2593 beneficiaries. Trainings were also organized on ornamental plants cultivation (26), plantation crops (25), tuber crops (22), spices (21), medicinal and aromatic plants (11). In soil health and fertility management, a large number (311) of training programmes were organized involving 8649 beneficiaries to address the issues of efficient fertilizer use and integrated nutrient management. In Livestock Production and Management, 265

courses were organized for 7734 beneficiaries which included dairy management, poultry management, piggery management etc. It showed the importance of those issues for the farmers in the districts. In Home Science, 297 courses were organized for 8002 beneficiaries which included courses like income generation by rural women, value addition of fruits and vegetables. In Agricultural Engineering, 143 courses were organized for 3827 beneficiaries. In plant protection, 448 courses were organized for 12203 beneficiaries in the areas of IPM, IDM and bio-control. Other important areas of training for the farmers were fishery, production of input, capacity building, agro-forestry to create alternative evenness of employment generation. In Fisheries, 223 courses were conducted involving 6865 farmers. In production of input, 103 courses were organized for 2757 farmers. In capacity building, 165 courses involving 4440 farmers and in agro-forestry, 71 courses for 1910 farmers were organized.

Table: Thematic area wise training programme for farmers and farm women

Area of training	No. of Courses	No. of Participants											
		General			SC			ST			Grand Total		
		Male	Fe-male	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop Production													
Weed Management	86	967	377	1344	376	151	527	240	274	514	1583	802	2385
Resource Conservation Technologies	37	346	78	424	258	81	339	97	66	163	701	225	926
Cropping Systems	38	209	138	347	153	74	227	407	246	653	769	458	1227
Crop Diversification	55	732	130	862	499	108	607	70	40	110	1301	278	1579
Integrated Farming	45	193	139	332	241	195	436	64	47	111	498	381	879
Water management	18	223	53	276	154	37	191	26	7	33	403	97	500
Seed production	64	894	249	1143	361	93	454	212	78	290	1467	420	1887
Nursery management	19	138	96	234	116	39	155	54	43	97	308	178	486
Integrated Crop Management	107	1583	373	1956	707	322	1029	154	133	287	2444	828	3272
Fodder production	27	239	124	363	108	103	211	31	97	128	378	324	702
Production of organic inputs	59	692	254	946	296	164	460	75	37	112	1063	455	1518
Others, (cultivation of crops)	54	632	320	952	200	121	321	148	129	277	980	570	1550
Total	609	6848	2331	9179	3469	1488	4957	1578	1197	2775	11895	5016	16911
Horticulture													
a) Vegetable Crops													
Integrated nutrient management	18	97	60	157	112	93	205	50	92	142	259	245	504

Area of training	No. of Courses	No. of Participants											
		General			SC			ST			Grand Total		
		Male	Fe-male	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Water management	5	42	8	50	20	22	42	31	7	38	93	37	130
Enterprise development	8	29	38	67	14	26	40	38	41	79	81	105	186
Skill development	5	48	8	56	28	5	33	33	20	53	109	33	142
Yield increment	20	209	66	275	175	54	229	52	73	125	436	193	629
Production of low volume and high value crops	41	454	126	580	318	76	394	90	85	175	862	287	1149
Off-season vegetables	43	399	151	550	239	226	465	134	94	228	772	471	1243
Nursery raising	40	431	168	599	163	107	270	113	72	185	707	347	1054
Export potential vegetables	15	191	58	249	79	20	99	67	14	81	337	92	429
Grading and standardization	7	72	49	121	32	19	51	9	1	10	113	69	182
Protective cultivation (Green Houses, Shade Net etc.)	28	251	80	331	204	73	277	99	118	217	554	271	825
Others, if any (Cultivation of Vegetable)	49	295	220	515	375	238	613	140	234	374	810	692	1502
Training and Pruning	47	528	210	738	147	207	354	139	124	263	814	541	1355
Total (a)	326	3046	1242	4288	1906	1166	3072	995	975	1970	5947	3383	9330
b) Fruits													
Layout and Management of Orchards	18	244	51	295	171	45	216	30	26	56	445	122	567
Cultivation of Fruit	29	250	129	379	247	111	358	61	75	136	558	315	873
Management of young plants/orchards	4	38	14	52	22	20	42	11	5	16	71	39	110
Rejuvenation of old orchards	3	37	16	53	13	3	16	6	0	6	56	19	75
Export potential fruits	4	34	18	52	37	13	50	0	12	12	71	43	114
Micro irrigation systems of orchards	6	93	25	118	27	12	39	5	6	11	125	43	168
Plant propagation techniques	15	145	88	233	65	37	102	25	23	48	235	148	383
Others, if any(INM)	12	71	85	156	55	38	93	26	28	54	152	151	303
Total (b)	91	912	426	1338	637	279	916	164	175	339	1713	880	2593
c) Ornamental Plants													
Nursery Management	6	104	19	123	51	10	61	3	0	3	158	29	187
Management of potted plants	3	60	8	68	10	2	12	18	7	25	88	17	105
Export potential of ornamental plants	3	21	5	26	15	9	24	18	7	25	54	21	75

Area of training	No. of Courses	No. of Participants											
		General			SC			ST			Grand Total		
		Male	Fe-male	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Propagation techniques of Ornamental Plants	8	93	17	110	21	30	51	25	8	33	139	55	194
Others, if any	6	80	11	91	8	0	8	40	17	57	128	28	156
Total (c)	26	358	60	418	105	51	156	104	39	143	567	150	717
d) Plantation crops													
Production and Management technology	20	273	77	350	145	63	208	33	39	72	451	179	630
Processing and value addition	4	61	36	97	10	2	12	1	0	1	72	38	110
Others, if any	1	23	0	23	2	0	2	0	0	0	25	0	25
Total (d)	25	357	113	470	157	65	222	34	39	73	548	217	765
e) Tuber crops													
Production and Management technology	18	177	49	226	43	57	100	114	116	230	334	222	556
Processing and value addition	0	0	0	0	0	0	0	0	0	0	0	0	0
Others, if any	4	72	13	85	28	6	34	0	0	0	100	19	119
Total (e)	22	249	62	311	71	63	134	114	116	230	434	241	675
f) Spices													
Production and Management technology	19	212	50	262	109	82	191	33	33	66	354	165	519
Processing and value addition	0	0	0	0	0	0	0	0	0	0	0	0	0
Others, if any	2	2	4	6	8	11	19	19	16	35	29	31	60
Total (f)	21	214	54	268	117	93	210	52	49	101	383	196	579
g) Medicinal and Aromatic Plants													
Nursery management	0	0	0	0	0	0	0	0	0	0	0	0	0
Production and management technology	7	119	32	151	33	8	41	3	3	6	155	43	198
Post harvest technology and value addition	2	35	10	45	2	0	2	3	0	3	40	10	50
Others, if any	2	16	37	53	1	0	1	1	0	1	18	37	55
Total (g)	11	170	79	249	36	8	44	7	3	10	213	90	303
Total(a-g)	522	5306	2036	7342	3029	1725	4754	1470	1396	2866	9805	5157	14962
Soil Health and Fertility Management													
Soil fertility management	60	817	450	1267	230	141	371	101	83	184	1148	674	1822
Soil and Water Conservation	12	80	29	109	29	25	54	73	88	161	182	142	324
Integrated Nutrient Management	75	903	238	1141	275	128	403	187	207	394	1365	573	1938

Area of training	No. of Courses	No. of Participants											
		General			SC			ST			Grand Total		
		Male	Fe-male	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Production and use of organic inputs	49	655	183	838	272	101	373	89	20	109	1016	304	1320
Management of Problematic soils	21	281	83	364	80	26	106	65	36	101	426	145	571
Micro nutrient deficiency in crops	23	375	88	463	105	11	116	68	14	82	548	113	661
Nutrient Use Efficiency	18	154	29	183	61	11	72	148	44	192	363	84	447
Soil and Water Testing	25	401	87	488	75	16	91	73	74	147	549	177	726
Others, if any	28	383	94	477	98	43	141	127	95	222	608	232	840
Total	311	4049	1281	5330	1225	502	1727	931	661	1592	6205	2444	8649
Livestock Production and Management													
Dairy Management	42	270	219	489	321	289	610	44	52	96	635	560	1195
Poultry Management	70	330	397	727	325	350	675	130	375	505	785	1122	1907
Piggery Management	9	58	87	145	46	49	95	8	19	27	112	155	267
Rabbit Management	2	8	15	23	3	5	8	2	17	19	13	37	50
Disease Management	50	254	200	454	340	471	811	88	100	188	682	771	1453
Feed management	39	247	233	480	372	298	670	65	128	193	684	659	1343
Production of quality animal products	23	174	128	302	111	179	290	14	11	25	299	318	617
Others, if any Goat farming	30	161	145	306	156	189	345	101	150	251	418	484	902
Total	265	1502	1424	2926	1674	1830	3504	452	852	1304	3628	4106	7734
Home Science/Women empowerment													
Household food security by kitchen gardening and nutrition gardening	66	43	760	803	57	662	719	5	385	390	105	1807	1912
Design and development of low/minimum cost diet	8	7	106	113	2	63	65	2	36	38	11	205	216
Designing and development for high nutrient efficiency diet	6	4	83	87	2	38	40	8	17	25	14	138	152
Minimization of nutrient loss in processing	5	0	109	109	0	24	24	0	2	2	0	135	135
Gender mainstreaming through SHGs	6	0	111	111	20	17	37	0	12	12	20	140	160
Storage loss minimization techniques	5	34	71	105	4	17	21	0	4	4	38	92	130
Enterprise development	13	13	167	180	27	88	115	0	53	53	40	308	348
Value addition	58	17	840	857	10	453	463	7	221	228	34	1514	1548

Area of training	No. of Courses	No. of Participants											
		General			SC			ST			Grand Total		
		Male	Fe-male	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Income generation activities for empowerment of rural Women	24	20	304	324	17	174	191	2	67	69	39	545	584
Location specific drudgery reduction technologies	15	0	169	169	20	114	134	0	87	87	20	370	390
Rural Crafts	2	21	25	46	2	0	2	2	0	2	25	25	50
Capacity building	12	13	110	123	43	75	118	29	48	77	85	233	318
Women and child care	49	64	532	596	25	288	313	29	332	361	118	1152	1270
Others, if any	28	70	326	396	114	182	296	36	61	97	220	569	789
Total	297	306	3713	4019	343	2195	2538	120	1325	1445	769	7233	8002
Agril. Engineering													
Installation and maintenance of micro irrigation systems	30	347	139	486	40	31	71	170	77	247	557	247	804
Use of Plastics in farming practices	19	204	64	268	26	19	45	96	79	175	326	162	488
Production of small tools and implements	11	75	46	121	29	24	53	42	83	125	146	153	299
Repair and maintenance of farm machinery and implements	16	90	44	134	20	12	32	154	66	220	264	122	386
Small scale processing and value addition	14	139	40	179	30	24	54	66	52	118	235	116	351
Post Harvest Technology	23	208	138	346	79	60	139	82	56	138	369	254	623
Others, if any	30	300	332	632	82	38	120	20	104	124	402	474	876
Total	143	1363	803	2166	306	208	514	630	517	1147	2299	1528	3827
Plant Protection													
Integrated Pest Management	198	1897	638	2535	1258	371	1629	630	434	1064	3465	1443	5228
Integrated Disease Management	142	1467	471	1938	780	264	1044	496	239	735	2584	974	3717
Bio-control of pests and diseases	22	268	47	315	157	69	226	38	31	69	360	147	610
Production of bio control agents and bio pesticides	30	351	81	432	218	76	294	42	42	84	548	199	810
Others, if any	56	896	194	1090	265	79	344	296	108	404	1076	381	1838
Total	448	4879	1431	6310	2678	859	3537	1502	854	2356	8033	3144	12203
Fisheries													
Integrated fish farming	30	355	116	471	134	72	206	26	49	75	515	237	752

Area of training	No. of Courses	No. of Participants											
		General			SC			ST			Grand Total		
		Male	Fe-male	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Carp breeding and hatchery management	13	178	28	206	89	2	91	26	7	33	293	37	330
Carp fry and fingerling rearing	16	243	60	303	82	42	124	17	5	22	342	107	449
Composite fish culture & fish disease	60	589	227	816	593	412	1005	99	37	136	1281	676	1957
Fish feed preparation & its application to fish pond, like nursery, rearing & stocking pond	14	105	18	123	250	76	326	14	7	21	369	101	470
Hatchery management and culture of freshwater prawn	6	101	26	127	44	12	56	2	1	3	147	39	186
Breeding and culture of ornamental fishes	8	59	38	97	84	64	148	0	5	5	143	107	250
Portable plastic carp hatchery	6	49	37	86	80	1	81	5	0	5	134	38	172
Pen culture of fish and prawn	3	0	0	0	60	33	93	0	10	10	60	43	103
Shrimp farming	3	15	10	25	65	15	80	10	5	15	90	30	120
Edible oyster farming	2	18	20	38	12	10	22	0	0	0	30	30	60
Pearl culture	4	2	0	2	57	19	76	15	17	32	74	36	110
Fish processing and value addition	29	385	119	504	197	142	339	101	3	104	683	264	947
Others, if any	29	230	215	445	157	101	258	232	24	256	619	340	959
Total	223	2329	914	3243	1904	1001	2905	547	170	717	4780	2085	6865
Production of Input at site													
Seed Production	28	356	37	393	271	104	375	23	12	35	650	153	803
Planting material production	2	15	2	17	24	7	31	3	0	3	42	9	51
Bio-agents production	1	5	0	5	17	6	23	0	0	0	22	6	28
Bio-pesticides production	0	0	0	0	0	0	0	0	0	0	0	0	0
Bio-fertilizer production	4	22	24	46	10	92	102	6	0	6	38	116	154
Vermi-compost production	17	183	43	226	62	177	239	11	30	41	256	250	506
Organic manures production	10	124	46	170	47	6	53	8	2	10	179	54	233
Production of fry and fingerlings	0	0	0	0	0	0	0	0	0	0	0	0	0
Production of Bee-colonies and wax sheets	0	0	0	0	0	0	0	0	0	0	0	0	0

Area of training	No. of Courses	No. of Participants											
		General			SC			ST			Grand Total		
		Male	Fe-male	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Small tools and implements	0	0	0	0	0	0	0	0	0	0	0	0	0
Production of livestock feed and fodder	2	41	7	48	9	1	10	7	0	7	57	8	65
Production of Fish feed	0	0	0	0	0	0	0	0	0	0	0	0	0
Others, if any	39	271	285	556	67	153	220	2	139	141	340	577	917
Total	103	1017	444	1461	507	546	1053	60	183	243	1584	1173	2757
Capacity Building and Group Dynamics													
Leadership development	30	282	119	401	63	70	133	221	84	305	566	273	839
Group dynamics	23	249	95	344	135	42	177	66	25	91	450	162	612
Formation and Management of SHGs	23	76	228	304	31	135	166	58	123	181	165	486	651
Mobilization of social capital	14	202	42	244	63	42	105	10	19	29	275	103	378
Entrepreneurial development of farmers/youths	26	221	58	279	193	64	257	83	36	119	497	158	655
WTO and IPR issues	11	166	12	178	16	7	23	55	24	79	237	43	280
Others, if any	38	445	178	623	118	83	201	141	60	201	704	321	1025
Total	165	1641	732	2373	619	443	1062	634	371	1005	2894	1546	4440
Agro forestry													
Production technologies	29	392	86	478	41	30	71	119	147	266	552	263	815
Nursery management	7	126	1	127	12	10	22	22	24	46	160	35	195
Integrated Farming Systems	35	436	121	557	59	54	113	145	85	230	640	260	900
Total	71	954	208	1162	112	94	206	286	256	542	1352	558	1910
Others (Pl. specify)	25	409	85	494	158	89	247	105	66	171	672	240	912
Grand Total	3182	30603	15402	46005	16024	10980	27004	8315	7848	16163	53916	34230	89172

4.3.2 Rural Youths:

Considering the employment generation of the rural youths in the rural areas, training programmes for rural youths were organized by the KVKs of this Zone during 2022. The KVKs of Zone V conducted 588 courses for 12028 beneficiaries for rural youths in A&N Islands, West Bengal and Odisha. Trainings were organized both in on- and off-campus

mode. In mushroom production, 51 courses were organized for 1023 beneficiaries while in production of organic inputs, 33 courses were organized for 653 youths. Other courses organized were for Protected cultivation of vegetable crops (33), Sericulture (28), Enterprise development and Bee-keeping (25 each), Vermi-culture (22) and others. The details are given in the following table.

Table: Thematic area wise training programme for rural youths

Area of training	No. of Courses	No. of Participants											
		Other			SC			ST			Grand Total		
		M	F	T	M	F	T	M	F	T	M	F	T
Mushroom Production	51	182	211	393	188	265	453	113	64	177	483	540	1023
Bee-keeping	25	200	106	306	133	15	148	92	17	109	425	138	563
Integrated farming	19	131	59	190	78	34	112	40	17	57	249	110	359
Seed production	19	115	69	184	84	101	185	37	11	48	236	181	417
Production of organic inputs	33	217	91	308	204	73	277	61	7	68	482	171	653
Planting material production	15	122	35	157	41	13	54	46	16	62	209	64	273
Vermi-culture	22	99	47	146	47	53	100	50	23	73	196	123	319
Sericulture	28	76	97	173	103	75	178	34	43	77	213	215	428
Protected cultivation of vegetable crops	33	232	106	338	168	52	220	61	15	76	461	173	634
Commercial fruit production	20	136	66	202	71	19	90	41	54	95	248	139	387
Repair and maintenance of farm machinery and implements	19	141	42	183	69	14	83	24	25	49	234	81	315
Nursery Management of Horticulture crops	17	126	82	208	86	42	128	29	18	47	241	142	383
Training and pruning of orchards	17	103	58	161	66	23	89	52	18	70	221	99	320
Value addition	19	75	103	178	24	80	104	45	43	88	144	226	370
Production of quality animal products	12	54	37	91	60	31	91	17	17	34	131	85	216
Dairying	9	49	30	79	51	44	95	33	25	58	133	99	232
Sheep and goat rearing	18	80	81	161	159	73	232	18	14	32	257	168	425
Quail farming	3	4	15	19	23	22	45	0	0	0	27	37	64
Piggery	2	16	11	27	13	4	17	1	0	1	30	15	45
Rabbit farming	7	30	39	69	5	6	11	23	17	40	58	62	120
Poultry production	12	70	23	93	45	100	145	8	0	8	123	123	246
Ornamental fisheries	3	34	0	34	5	5	10	9	2	11	48	7	55
Para vets	6	27	22	49	60	41	101	7	0	7	94	63	157
Para extension workers	0	0	0	0	0	0	0	0	0	0	0	0	0
Composite fish culture	15	133	66	199	54	22	76	21	15	36	208	103	311
Freshwater prawn culture	2	13	4	17	3	3	6	5	7	12	21	14	35
Shrimp farming	0	0	0	0	0	0	0	0	0	0	0	0	0
Pearl culture	2	22	14	36	2	2	4	0	0	0	24	16	40
Cold water fisheries	3	1	19	20	30	12	42	0	6	6	31	37	68

Area of training	No. of Courses	No. of Participants											
		Other			SC			ST			Grand Total		
		M	F	T	M	F	T	M	F	T	M	F	T
Fish harvest and processing technology	9	37	16	53	51	61	112	15	0	15	103	77	180
Fry and fingerling rearing	14	105	67	172	139	44	183	14	6	20	258	117	375
Small scale processing	7	84	6	90	42	0	42	6	0	6	132	6	138
Post Harvest Technology	7	73	23	96	40	28	68	3	1	4	116	52	168
Tailoring and Stitching	8	62	18	80	84	10	94	5	7	12	151	35	186
Rural Crafts	23	181	46	227	169	72	241	95	27	122	445	145	590
Enterprise development	25	212	108	320	97	26	123	98	33	131	407	167	574
Others if any (ICT application in agriculture)	64	476	187	663	317	127	444	141	111	252	934	425	1359
TOTAL	588	3718	2004	5722	2811	1592	4403	1244	659	1903	7773	4255	12028

4.3.3 Extension Functionaries:

Extension functionaries of state department of agriculture and veterinary and extension workers of other government departments approached KVKs for updating of their knowledge and skills. In the area, KVK played an important role in updating knowledge of the state departments. Sometimes, NGO people also approached for training of their staffs. In the year 2022, a total of 508 courses were

organized for 12506 extension functionaries under Zone V. The areas of training were Productivity enhancement in field crops (104), Integrated Pest Management (44), integrated nutrient management (42), protected cultivation (30) and Value addition (25) etc. To extend the benefit to large number of extension workers, apart from line department staffs, teachers, NGO staffs, agricultural workers of the districts, were also included in the training programmes.

Table: Thematic area wise training programme for extension functionaries

Area of training	No. of Courses	No. of Participants											
		General			SC			ST			Grand Total		
		M	F	T	M	F	T	M	F	T	M	F	T
Productivity enhancement in field crops	104	1752	362	2114	368	120	488	41	32	73	2161	514	2675
Integrated Pest Management	44	483	84	567	188	24	212	41	13	54	712	121	833
Integrated Nutrient management	42	590	170	760	153	33	186	50	21	71	793	224	1017
Rejuvenation of old orchards	23	316	51	367	134	10	144	22	8	30	472	69	541
Value addition	25	355	57	412	128	14	142	22	4	26	505	75	580
Protected cultivation technology	30	519	87	606	158	17	175	7	0	7	684	104	788
Formation and Management of SHGs	9	105	42	147	12	11	23	3	4	7	120	57	177

Area of training	No. of Courses	No. of Participants											
		General			SC			ST			Grand Total		
		M	F	T	M	F	T	M	F	T	M	F	T
Group Dynamics and farmers organization	14	192	60	252	55	20	75	3	2	5	250	82	332
Information networking among farmers	10	107	41	148	67	13	80	2	2	4	176	56	232
Capacity building for ICT application	12	172	77	249	24	9	33	0	0	0	196	86	282
Care and maintenance of farm machinery and implements	7	101	29	130	27	10	37	2	3	5	130	42	172
WTO and IPR issues	5	46	41	87	9	8	17	3	1	4	58	50	108
Management in farm animals	19	235	62	297	201	35	236	4	40	44	440	137	577
Livestock feed and fodder production	12	145	43	188	60	24	84	12	19	31	217	86	303
Household food security	16	168	79	247	24	18	42	4	56	60	196	153	349
Women and Child care	12	162	54	216	38	16	54	12	8	20	212	78	290
Low cost and nutrient efficient diet designing	10	89	75	164	11	15	26	12	10	22	112	100	212
Production and use of organic inputs	23	223	53	276	106	30	136	25	60	85	354	143	497
Gender mainstreaming through SHGs	15	242	68	310	79	23	102	8	9	17	329	100	429
Crop intensification	19	206	88	294	76	34	110	9	36	45	291	158	449
Others if any	57	962	159	1121	364	35	399	133	10	143	1459	204	1663
TOTAL	508	7170	1782	8952	2282	519	2801	415	338	753	9867	2639	12506

4.3.4 Sponsored Training Programme:

KVKs of this Zone trained farmers on various aspects of agriculture and allied sectors using their own resources as well as the resources received from the different organizations. A number of government and other non-government organizations were associated to conduct different kinds of trainings for different clienteles. Even different state governments, central government boards, NABARD, ATMA were working in collaboration with the KVKs

to reach the farmers at district level. In those programmes, experts were provided by the KVKs. In the year 2022, the KVKs conducted sponsored 455 training programmes for 14222 beneficiaries with the fund support from different organizations. Out of these 12239, 86.06% were male and 13.94% were female beneficiaries (1983). The composition of SC/ST in those training programmes was 13.52%.

The major courses covered in these programmes were production and value addition (159) for 5110

participants, livestock and fishery (104) for 3520 participants and crop production and management (62) for 2350 participants and others.

State-wise analysis showed that Union Territory of A&N Islands, organized 11 courses for 424

participants, while West Bengal organized 337 courses for 11681 participants and Odisha organized 107 courses for 2117 participants. It indicated that sponsoring organization preferred KVKs for getting their clientele trained for benefit of their organization.

Table: Sponsored training programmes conducted by KVKs of Zone V

State	No. of Courses	No. of Participants											
		Other			SC			ST			Grand Total		
		M	F	T	M	F	T	M	F	T	M	F	T
A & N Island	11	183	241	424	0	0	0	0	0	0	183	241	424
Odisha	107	1130	653	1783	72	133	205	75	125	200	1299	818	2117
West Bengal	337	9712	451	10163	1030	469	1499	15	4	19	10757	924	11681
TOTAL	455	11025	1345	12370	1102	602	1704	90	129	219	12239	1983	14222

Table: Thematic area-wise sponsored training program conducted by KVKs of Zone V

Area of training	No. of courses	No. of Participants											
		Other			SC			ST			Grand Total		
		M	F	T	M	F	T	M	F	T	Male	Female	Total
Crop production and management													
Increasing production and productivity of crops	51	1727	55	1782	45	7	52	10	17	27	1782	79	1861
Commercial production of vegetables	11	442	13	455	35	0	35	0	0	0	476	13	489
Total	62	2169	68	2237	80	7	87	10	17	27	2258	92	2350
Production and value addition													
Fruit Plants	8	255	31	286	27	0	27	0	0	0	282	31	313
Ornamental plants	2	66	4	70	8	0	8	0	0	0	74	4	78
Spices crops	0	0	0	0	0	0	0	0	0	0	0	0	0
Soil health and fertility management	15	493	24	517	30	0	30	10	17	27	533	41	574
Production of Inputs at site	9	258	16	274	57	1	58	0	0	0	315	17	332
Methods of protective cultivation	2	62	4	66	8	0	8	0	0	0	70	4	74
Others (pl. specify)	123	3073	273	3346	337	8	345	27	21	48	3437	302	3739
Total	159	4207	352	4559	467	9	476	37	38	75	4711	399	5110
Post harvest technology and value addition													
Processing and value addition	7	174	1	175	2	47	49	0	0	0	176	48	224
Others (pl. specify)	8	45	0	45	0	0	0	0	0	0	45	0	45
Total	15	219	1	220	2	47	49	0	0	0	221	48	269

Area of training	No. of courses	No. of Participants											
		Other			SC			ST			Grand Total		
		M	F	T	M	F	T	M	F	T	Male	Female	Total
Farm machinery													
Farm machinery, tools and implements	4	99	12	111	11	1	12	41	0	41	151	13	164
Others (pl. specify)	2	85	30	115	10	10	20	4	6	10	99	46	145
Total	6	184	42	226	21	11	32	0	0	0	250	59	309
Livestock and fisheries													
Livestock production and management	45	1150	189	1339	61	109	170	3	0	3	1214	298	1512
Animal Nutrition Management	4	7	26	33	71	36	107	0	0	0	78	62	140
Animal Disease Management	3	8	26	34	63	43	106	0	0	0	71	69	140
Fisheries Nutrition	3	0	0	0	91	9	100	0	0	0	91	9	100
Fisheries Management	21	582	27	609	65	46	111	1	0	1	648	73	721
Others (pl. specify)	28	463	189	652	80	156	236	18	1	19	561	346	907
Total	104	2210	457	2667	431	399	830	22	1	23	2663	857	3520
Home Science													
Household nutritional security	9	300	75	375	20	55	75	3	18	21	323	148	471
Economic empowerment of women	7	30	85	115	3	22	25	17	53	70	50	160	210
Drudgery reduction of women	0	0	0	0	0	0	0	0	0	0	0	0	0
Others (pl. specify)	48	427	119	546	2	0	2	0	0	0	429	119	548
Total	64	757	279	1036	25	77	102	20	71	91	780	328	1108
Agricultural Extension													
Capacity Building and Group Dynamics	0	0	0	0	0	0	0	0	0	0	0	0	0
Others (pl. specify)	45	1279	146	1425	76	52	128	1	2	3	1356	200	1556
Total	45	1279	146	1425	76	52	128	1	2	3	1356	200	1556
GRAND TOTAL	455	11025	1345	12370	1102	602	1704	90	129	219	12239	1983	14222

4.3.5 Vocational Training Programme:

Vocational training programmes are the much-needed training programme at KVK level as these programmes are directed to employment generation and much focus are given on rural based employment generation techniques like repair of maintenance of farm machines, commercial floriculture, commercial fruit production, value addition, tailoring & stitching, dairy farming, composite fish culture, rural craft. After obtaining training in these areas rural youth/farm women can take up self-employment in their

field. Vocational training being a longer duration course farmer enriched by knowledge and skill both and reach in a position to took up self-employment.

In the year 2022, 206 vocational training programmes were conducted by the KVKs of Zone V for benefit of 5122 beneficiaries. Among these West Bengal organized 76 courses for 2400 beneficiaries and Odisha conducted 125 courses for 2540 beneficiaries, while in A & N Islands, 5 courses were organised for 182 participants. Among the courses, mushroom cultivation was most sought by the beneficiaries.

A total of 31 such courses were organized for 875 beneficiaries. While the course on integrated crop management gained favour among the rural youths and 842 rural youths were trained through 36 courses. Other courses that gained popularity were Poultry farming (275 participants), vermicomposting

(220 participants), capacity building and group dynamics (286 participants) and others. In these training programmes, a good number (2375) of SC/ST got trained which constitute 46.37% of the total beneficiaries.

Table: Vocational training conducted by KVKs of Zone V

State	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST			M	F	T
		M	F	T	M	F	T	M	F	T			
A & N Island	5	38	144	182	0	0	0	0	0	0	38	144	182
Odisha	125	984	569	1553	343	299	642	158	187	345	1485	1055	2540
West Bengal	76	586	426	1012	609	621	1230	99	59	158	1294	1106	2400
TOTAL:	206	1608	1139	2747	952	920	1872	257	246	503	2817	2305	5122

Table: Thematic area-wise Vocational training program conducted by KVKs of Zone V

Area of Training	No. of courses	No of Participants									Grand Total		
		Other			SC			ST			M	F	T
		M	F	T	M	F	T	M	F	T			
Crop production and management													
Commercial floriculture	1	9	6	15	0	0	0	0	0	0	9	6	15
Commercial fruit production	2	6	13	19	2	9	11	1	0	1	9	22	31
Commercial vegetable production	13	71	40	111	51	46	97	9	9	18	131	95	226
Total	16	86	59	145	53	55	108	10	9	19	149	123	272
Integrated crop management													
Organic farming	4	19	15	34	10	6	16	0	3	3	29	24	53
Others (pl. specify)	32	436	107	543	120	93	213	18	15	33	574	215	789
Total	36	455	122	577	130	99	229	18	18	36	603	239	842
Post-harvest technology and value addition													
Value addition	6	33	90	123	2	17	19	0	1	1	35	108	143
Others (pl. specify)	3	20	14	34	7	1	8	2	1	3	29	16	45
Total	9	53	104	157	9	18	27	2	2	4	64	124	188
Livestock and fisheries													
Dairy farming	5	41	36	77	35	26	61	4	4	8	80	66	146
Composite fish culture	3	34	10	44	26	17	43	5	1	6	65	28	93
Sheep and goat rearing	5	46	31	77	13	43	56	6	3	9	65	77	142
Piggery	3	13	0	13	74	30	104	2	0	2	89	30	119
Poultry farming	10	48	47	95	92	68	160	11	9	20	151	124	275

Area of Training	No. of courses	No of Participants									Grand Total		
		Other			SC			ST			M	F	T
		M	F	T	M	F	T	M	F	T			
Others (pl. specify)	16	87	59	146	196	171	367	10	7	17	293	237	530
Total	42	269	183	452	436	355	791	38	24	62	743	562	1305
Income generation activities													
Vermicomposting	10	82	48	130	26	21	47	9	34	43	117	103	220
Production of bio-agents, bio-pesticides, bio-fertilizers etc.	6	48	35	83	31	8	39	17	2	19	96	45	141
Repair and maintenance of farm machinery and implements	4	48	31	79	13	9	22	8	5	13	69	45	114
Rural Crafts	8	34	40	74	2	70	72	0	5	5	36	115	151
Seed production	5	51	19	70	26	6	32	17	2	19	94	27	121
Sericulture	2	26	5	31	5	1	6	3	0	3	34	6	40
Mushroom cultivation	31	213	295	508	91	146	237	68	62	130	372	503	875
Nursery, grafting etc.	3	12	12	24	25	12	37	8	6	14	45	30	75
Tailoring, stitching, embroidery, dying etc.	1	0	0	0	0	20	20	0	0	0	0	20	20
Agril. Para-workers, para-vet training	0	0	0	0	0	0	0	0	0	0	0	0	0
Others (pl. specify)	13	96	97	193	47	27	74	21	14	35	164	138	302
Total	83	610	582	1192	266	320	586	151	130	281	1027	1032	2059
Agricultural Extension													
Capacity building and group dynamics	12	66	52	118	42	66	108	22	38	60	130	156	286
Others (pl. specify)	8	69	37	106	16	7	23	16	25	41	101	69	170
Total	20	135	89	224	58	73	131	38	63	101	231	225	456
Grand Total	206	1608	1139	2747	952	920	1872	257	246	503	2817	2305	5122

4.4 Extension Programmes:

Technologies assessed through different programmes of assessment and demonstration are taken to the doorstep of the farmers through the extension activities like field day, exhibition, group meetings, exposure visit, farmers club meeting and through organizing different celebration days in the KVK campus. In creating awareness of the latest technologies in crop production, livestock farming, horticultural production, fishery and other allied technologies, the KVKs of Zone-V organized 52072 numbers of activities involving 1376538 farmers and extension officials in the state of West Bengal, Odisha and A&N Islands. Among these beneficiaries 1331778 were farmers and 44760 were extension officials. Analysis of the

gender-wise participation showed that 27.80% was women beneficiaries, which is almost 1/3 of the male beneficiaries. A number of extension officials (1921) paid visit to the KVKs and interacted with them regarding the latest technologies. Farmers in large number (65251) visited the KVKs and took knowledge about the latest technologies available in the KVK farm and nearby villages. Scientists of the KVK also regularly visited the farmers field. A total of 7024 visit were made by the scientists and during the course of visit 54742 farmers consulted with the scientists. KVKs conducted Kisan Goshties for creating awareness of the different technologies and 299 such KishanGoshties were organized for 8524 beneficiaries.

KVKs also participated in 466 Kisan Melas and

537 numbers of exhibition which benefited 44998 and 38433 beneficiaries, respectively. Different technologies and successful cases were also exhibited through arranging film show for 19084 participants. Farmers seminar, workshop was also organized for creating awareness about different programmes and government schemes. In the year 2022, 127 seminars and 70 workshops were organized to cover 6872 and 4287 farmers, respectively. Advisory services were one of the most popular services sought by the farmers. In the year, 5789 such services were offered by the KVK staff for the interest of 773363 beneficiaries. Camps and clinics were also organized to show the farmers about the latest technologies through 190 soil health camps and 1165 animal health camps, 80 agri-mobile clinics were organized to benefit 3473, 40494 and 2274 beneficiaries, respectively. Farm Science Club, Group Meeting, Self-help group meeting and MahilaMandals meetings were organized to make contact of large numbers of farmers, rural youth to the KVKs, 560 such meetings were organized for benefits of 20436 rural people. Involving farmers and rural people with the KVKs by observation of different programmes like celebration of important days, mahila divas, Swachhta Hi Suraksha, International Women's Day was the objective of the KVK to create awareness regarding the government programmes.

4.4.1 State-wise details of Extension Activities conducted:

State-wise analysis of the extension activities showed that the KVKs of A&N Islands conducted various extension activities for the benefit of 5389 participants. Maximum number of participants (72) benefitted from Advisory Services. MahilaMandals Conveners meetings were provided to 1552 participants and Farmers visit to KVK was done by 380 participants as well as celebration of important days by 167 participants.

West Bengal with 23 KVKs organized various extension activities for benefit of 489561 farmers, farm women, rural youth and extension functionaries. Major extension activities included advisory services (209728), scientist visit to farmers field (13555), animal health camps (38925), farmers visit to KVK (25008) etc.

All the 33 KVKs of Odisha carried out different extension activities involving 881588 participants. The highest participation was in advisory services (564569), the next being scientists' visit to farmers' field (67946). Other important extension activities organized by KVKs of Odisha included farmers' visit to KVK (41784), Lectures delivered as resource persons (28002), Exhibition (29457) etc.

Table: Extension activities organised by KVKs of Zone-V

Nature of Extension Activity	No. of activities	Farmers				Extension Officials			Total		
		Male	Female	Total	SC/ST (%)	Male	Female	Total	Male	Female	Total
Field Day	520	12121	5452	17573	44.95	418	222	640	12539	5674	18213
Kisan Mela	466	29924	15074	44998	26.66	697	279	976	30621	15353	45974
Kisan Ghosthi	299	4020	4504	8524	25.66	358	80	438	4378	4584	8962
Exhibition	537	25225	13208	38433	19.54	1432	322	1754	26657	13530	40187
Film Show	568	12112	6302	18414	29.18	416	254	670	12528	6556	19084
Method Demonstrations	776	9246	4818	14064	25.49	400	165	565	9646	4983	14629
Farmers Seminar	127	5203	1669	6872	16.06	128	59	187	5331	1728	7059
Workshop	70	3086	1201	4287	11.41	169	74	243	3255	1275	4530
Group meetings	3375	11251	4431	15682	19.20	295	158	453	11546	4589	16135
Lectures delivered as resource persons	1305	25858	12202	38060	33.93	1574	663	2237	27432	12865	40297
Advisory Services	5789	574135	199228	773363	20.68	697	309	1006	574832	199537	774369
Scientific visit to farmers field	7024	37484	17258	54742	43.61	21613	5934	27547	59097	23192	82289

Nature of Extension Activity	No. of activities	Farmers				Extension Officials			Total		
		Male	Fe-male	Total	SC/ST (%)	Male	Fe-male	Total	Male	Female	Total
Farmers visit to KVK	16011	44001	21250	65251	26.95	1185	736	1921	45186	21986	67172
Diagnostic visits	2444	15588	7737	23305	33.61	743	255	998	16331	7992	24303
Exposure visits	484	12906	7312	20238	16.88	334	126	460	13240	7438	20698
Ex-trainees Sammelan	762	3140	1505	4645	12.53	86	58	144	3226	1563	4789
Soil health Camp	190	2447	1026	3473	15.33	132	45	177	2579	1071	3650
Animal Health Camp	1165	26803	13691	40494	26.01	445	202	647	27248	13893	41141
Agri mobile clinic	80	1390	884	2274	6.83	100	26	126	1490	910	2400
Soil test campaigns	128	2988	1480	4468	15.34	149	51	200	3137	1531	4668
Farm Science Club Conveners meet	96	2069	819	2888	16.65	159	50	209	2228	869	3097
Self Help Group Conveners meetings	114	2263	2033	4296	11.63	98	80	178	2361	2113	4474
Mahila Mandals Conveners meetings	51	2335	2393	4728	9.07	74	23	97	2409	2416	4825
Celebration of important days (specify)	302	12469	6571	19040	22.33	540	194	734	13009	6765	19774
Sankalp Se Siddhi	73	5218	2870	8088	9.82	357	140	497	5575	3010	8585
Swatchta Hi Sewa	352	5779	3278	9057	26.02	151	77	228	5930	3355	9285
Mahila Kisan Divas	99	2812	2556	5368	16.82	180	184	364	2992	2740	5732
Any Other (Specify)	8865	68293	10860	79153	54.85	765	299	1064	69058	11159	80217
Total	52072	960166	371612	1331778	22.75	33695	11065	44760	993861	382677	1376538

Table: State-wise extension activities organised by KVKs of Zone-V

Nature of Extension Activity	A & N Islands			Odisha			West Bengal			Total		
	M	F	T	M	F	T	M	F	T	M	F	T
Field Day	190	127	317	8077	3385	11462	4272	2162	6434	12539	5674	18213
Kisan Mela	0	0	0	14259	6681	20940	16362	8672	25034	30621	15353	45974
Kisan Ghosthi	99	154	253	1461	946	2407	2818	3484	6302	4378	4584	8962
Exhibition	4	23	27	19584	9873	29457	7069	3634	10703	26657	13530	40187
Film Show	54	63	117	8115	3926	12041	4359	2567	6926	12528	6556	19084
Method Demonstrations	139	155	294	3878	2200	6078	5629	2628	8257	9646	4983	14629
Farmers Seminar	0	0	0	2214	769	2983	3117	959	4076	5331	1728	7059
Workshop	54	6	60	2023	732	2755	1178	537	1715	3255	1275	4530
Group meetings	41	33	74	6028	1569	7597	5477	2987	8464	11546	4589	16135
Lectures delivered as resource persons	302	441	743	18434	9568	28002	8696	2856	11552	27432	12865	40297
Advisory Services	41	31	72	401029	163540	564569	173762	35966	209728	574832	199537	774369
Scientific visit to farmers field	488	300	788	48698	19248	67946	9911	3644	13555	59097	23192	82289
Farmers visit to KVK	255	125	380	26291	15493	41784	18640	6368	25008	45186	21986	67172
Diagnostic visits	68	61	129	13983	6745	20708	2280	1186	3466	16331	7992	24303
Exposure visits	25	27	52	8294	5674	13988	4921	1737	6658	13240	7438	20698
Ex-trainees Sammelan	0	0	0	846	345	1191	2380	1218	3598	3226	1563	4789
Soil health Camp	0	0	0	1523	480	2003	1056	591	1647	2579	1071	3650

Nature of Extension Activity	A & N Islands			Odisha			West Bengal			Total		
	M	F	T	M	F	T	M	F	T	M	F	T
Animal Health Camp	22	22	44	1465	707	2172	25761	13164	38925	27248	13893	41141
Agri mobile clinic	0	0	0	589	284	873	901	626	1527	1490	910	2400
Soil test campaigns	0	0	0	1400	831	2231	1737	700	2437	3137	1531	4668
Farm Science Club Conveners meet	14	2	16	1232	352	1584	982	515	1497	2228	869	3097
Self Help Group Conveners meetings	2	81	83	797	1472	2269	1562	560	2122	2361	2113	4474
Mahila Mandals Conveners meetings	554	998	1552	1038	803	1841	817	615	1432	2409	2416	4825
Celebration of important days (specify)	101	66	167	7376	3172	10548	5532	3527	9059	13009	6765	19774
Sankalp Se Siddhi	0	0	0	5163	2504	7667	412	506	918	5575	3010	8585
Swatchta Hi Sewa	10	12	22	3045	1991	5036	2875	1352	4227	5930	3355	9285
Mahila Kisan Divas	1	97	98	1053	1447	2500	1938	1196	3134	2992	2740	5732
Any Other (Specify)	33	68	101	4837	4119	8956	64188	6972	71160	69058	11159	80217
Total	2497	2892	5389	612732	268856	881588	378632	110929	489561	993861	382677	1376538



4.4.2 Other Extension Activities:

The KVKs of Zone V also gave extensive coverage of their programme through social network and print media. A total of 5839 Extension Literatures were

developed while 694 news coverage in newspaper, 282 TV talks and 202 radio talks were provided to highlight the KVK programmes and on-going projects.

Table: Other extension activities organised by KVKs of Zone-V

Nature of Extension Activity	No. of activities
Newspaper coverage	694
Radio talks	202
TV talks	282
Popular articles	129
Extension Literature	5839
Other, if any	103
TOTAL	7249

5.0 Production of Seed, Planting Materials and Bio-Products

5.1 Seed Production:

Krishi Vigyan Kendras' seed production programme is a unique venture for supply of quality seed to the farmers at district level. There is no designated agency at village level to cater the need of quality seed of the farmers. Therefore, the farmers compelled to use their own seeds. On the other hand, seeds of the recently released varieties are also not available to the farmers. Seed production programme of the KVK enables the farmers to get recently released varieties of different crops, thus helps in spread of such varieties.

State-wise analysis of seed production programme showed that A&N Islands produced 0.9 q seeds which benefited 42 farmers and earned Rs.5600/- in 2022. Odisha produced 3379.445 q seeds, West Bengal produced 7616.025 q seeds in 2022. Total value of seeds was about Rs.40950629/- which benefitted more than 16126 farmers to get seeds of recent varieties.

Table: State-wise total Seed production by KVKs

Sl. No.	State	Village Seed			KVK seed			Total		
		Quantity of seed (q)	Value (Rs)	No. of farmers	Quantity of seed (q)	Value (Rs)	No. of farmers	Quantity of seed (q)	Value (Rs)	No. of farmers
1	A & N Islands	0	0	0	0.9	5600	42	0.9	5600	42
2	Odisha	328.4	1362103	78	3051.045	8991524	2784	3379.445	10353627	2862
3	West Bengal	5605.04	23936578	7417	2010.985	6654824	5805	7616.025	30591402	13222
Total		5933.44	25298681	7495	5062.93	15651948	8631	10996.37	40950629	16126

The total production of seed in rice was 6669.79 q which benefitted 8182 farmers. After rice, 2025.17 q pulse seed production was given importance and 1016.67 q seed of blackgram, 575.92 q lentil, 290.175

q green gram seeds were produced through village and KVK seed production programme. In oilseeds, 429.15 q of sesame, 354.66 q of mustard, and 136.7 q of groundnut seeds were produced.

Table: Crop-wise seed production in Zone-V

Crop	Name of the crop	Village Seed			KVK Seed			Total		
		Quantity of seed (q)	Value (Rs)	No. of farmers	Quantity of seed (q)	Value (Rs)	No. of farmers	Quantity of seed (q)	Value (Rs)	No. of farmers
Cereals	Paddy	2012.59	5540513	2510	4657.2	13337774	5672	6669.79	18878287	8182
	Wheat	100	0	27	4.2	24992	13	104.2	24992	40
	Maize	0	0	0	16.73	58774	215	16.73	58774	215
	Total	2112.59	5540513	2537	4678.13	13421540	5900	6790.72	18962053	8437
Oilseeds	Mustard	309.26	3533640	971	45.4	413124	690	354.66	3946764	1661
	Toria	0	0	0	5.3	0	102	5.3	0	102
	Linseed	0	0	0	0	0	0	0	0	0
	Niger	0	0	0	4.93	10620	71	4.93	10620	71
	Sesame	421.6	3652400	1080	7.55	83850	163	429.15	3736250	1243
	Groundnut	133.1	821700	216	3.6	17600	27	136.7	839300	243
	Soybean	0	0	0	0	0	0	0	0	0
	Rai	0	0	0	0	0	0	0	0	0
	Sun Flower	5.45	441450	160	0	0	0	5.45	441450	160

Crop	Name of the crop	Village Seed			KVK Seed			Total		
		Quantity of seed (q)	Value (Rs)	No. of farmers	Quantity of seed (q)	Value (Rs)	No. of farmers	Quantity of seed (q)	Value (Rs)	No. of farmers
	Toria	0	0	0	0	0	0	0	0	0
	Total	869.41	8449190	2427	66.78	525194	1053	936.19	8974384	3480
Pulses	Redgram	12	107300	79	1.2	13300	30	13.2	120600	109
	Chickpea	100	500000	40	2.61	31320	16	102.61	531320	56
	Lentil	560.06	3823153	741	15.86	151630	211	575.92	3974783	952
	Greengram	251.38	1173525	435	38.795	395284	455	290.175	1568809	890
	Blackgram	994.7	5551500	1193	21.97	191234	196	1016.67	5742734	1389
	Pea	10	93500	25	16.6	96649	115	26.6	190149	140
	Cowpea	0	0	0	0	0	0	0	0	0
	Rajmash	0	0	0	0	0	0	0	0	0
	Total	1928.14	11248978	2513	97.035	879417	1023	2025.175	12128395	3536
Commer- cial crops	Potato	1023.3	45000	8	8.6	22500	73	1031.9	67500	81
	Sugarcane	0	0	0	0	0	0	0	0	0
	Total	1023.3	45000	8	8.6	22500	73	1031.9	67500	81
Vegeta- bles	Okra	0	0	0	33	16000	0	33	16000	0
	Tomato	0	0	0	5.075	10150	0	5.075	10150	0
	Palak	0	0	0	0	0	0	0	0	0
	Radish	0	0	0	0	0	0	0	0	0
	Onion	0	0	0	0.5	6000	30	0.5	6000	30
	chilli	0	0	0	0	0	0	0	0	0
	Brinjal	0	0	0	0.15	1540	0	0.15	1540	0
	Lobia	0	0	0	15.93	21115	0	15.93	21115	0
	Total	0	0	0	54.655	54805	30	54.655	54805	30
Spices	Coriander	0	0	0	0	0	0	0	0	0
	Ginger	0	0	0	7	46000	66	7	46000	66
	Methi	0	0	0	0	0	0	0	0	0
	Turmeric	0	0	0	61.5	149900	165	61.5	149900	165
	Fenugrick	0	0	0	0	0	0	0	0	0
	Total	0	0	0	68.5	195900	231	68.5	195900	231
Fodder crop seeds	Rice Bean	0	0	0	0	0	0	0	0	0
	Barseem	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0
Fiber crops	Jute	0	0	0	26.99	334910	175	26.99	334910	175
	Sunhemp	0	0	0	5.4	24205	106	5.4	24205	106
	Total	0	0	0	32.39	359115	281	32.39	359115	281
Others	Dhaincha	0	0	0	11.35	48747	25	11.35	48747	25
	Broom Stick	0	0	0	0	0	0	0	0	0

Crop	Name of the crop	Village Seed			KVK Seed			Total		
		Quantity of seed (q)	Value (Rs)	No. of farmers	Quantity of seed (q)	Value (Rs)	No. of farmers	Quantity of seed (q)	Value (Rs)	No. of farmers
	Elephant Footyam	0	15000	10	44.69	143130	15	44.69	158130	25
	Sisbania	0	0	0	0.8	1600	0	0.8	1600	0
	Total	0	15000	10	56.84	193477	40	56.84	208477	50
Grand Total		5933.44	25298681	7495	5062.93	15543538	8611	10996.37	40950629	16126

Table: State-wise seed production

Name of the crop	A & N Islands			Odisha			West Bengal			Zone Total		
	Quantity of seed (q)	Value (Rs)	No. of farmers	Quantity of seed (q)	Value (Rs)	No. of farmers	Quantity of seed (q)	Value (Rs)	No. of farmers	Quantity of seed (q)	Value (Rs)	No. of farmers
Cereals												
Paddy	0	0	0	3270.4	9744264	2133	1712.39	4471200	2507	6669.79	18878287	8182
Wheat	0	0	0	0	0	0	100	0	27	104.2	24992	40
Maize	0	0	0	8.3	32849	170	0	0	0	16.73	58774	215
Total	0	0	0	3278.7	9777113	2303	1812.39	4471200	2534	6790.72	18962053	8437
Oilseeds												
Mustard	0	0	0	0	0	0	309.26	3533640	971	354.66	3946764	1661
Toria	0	0	0	5.3	0	102	0	0	0	5.3	0	102
Linseed	0	0	0	0	0	0	0	0	0	0	0	0
Niger	0	0	0	4.93	10620	71	0	0	0	4.93	10620	71
Sesame	0	0	0	2	22000	0	421.6	3652400	1080	429.15	3736250	1243
Groundnut	0	0	0	0	0	0	133.1	821700	216	136.7	839300	243
Soybean	0	0	0	0	0	0	0	0	0	0	0	0
Rai	0	0	0	0	0	0	0	0	0	0	0	0
Sun Flower	0	0	0	0	0	0	5.45	441450	160	5.45	441450	160
Toria	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	12.23	32620	173	869.41	8449190	2427	936.19	8974384	3480
Pulses												
Redgram	0	0	0	0	0	0	12	107300	79	13.2	120600	109
Chickpea	0	0	0	0	0	0	100	500000	40	102.61	531320	56
Lentil	0	0	0	0	0	0	560.06	3823153	741	575.92	3974783	952
Greengram	0.6	4000	27	29.965	242999	60	233.18	974235	385	290.175	1568809	890
Blackgram	0.3	1600	15	9.6	19534	15	994.7	5551500	1193	1016.67	5742734	1389
Pea	0	0	0	25.6	187809	140	0	0	0	26.6	190149	140
Cowpea	0	0	0	0	0	0	0	0	0	0	0	0
Rajmash	0	0	0	0	0	0	0	0	0	0	0	0
Total	0.9	5600	42	65.165	450342	215	1899.94	10956188	2438	2025.175	12128395	3536



Name of the crop	A & N Islands			Odisha			West Bengal			Zone Total		
	Quantity of seed (q)	Value (Rs)	No. of farmers	Quantity of seed (q)	Value (Rs)	No. of farmers	Quantity of seed (q)	Value (Rs)	No. of farmers	Quantity of seed (q)	Value (Rs)	No. of farmers
Commercial crops												
Potato	0	0	0	0	0	0	1023.3	45000	8	1031.9	67500	81
Sugarcane	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1023.3	45000	8	1031.9	67500	81
Vegetables												
Okra	0	0	0	0	0	0	0	0	0	33	16000	0
Tomato	0	0	0	0	0	0	0	0	0	5.075	10150	0
Palak	0	0	0	0	0	0	0	0	0	0	0	0
Radish	0	0	0	0	0	0	0	0	0	0	0	0
Onion	0	0	0	0	0	0	0	0	0	0.5	6000	30
chilli	0	0	0	0	0	0	0	0	0	0	0	0
Brinjal	0	0	0	0	0	0	0	0	0	0.15	1540	0
Lobia	0	0	0	0	0	0	0	0	0	15.93	21115	0
Total	0	0	0	0	0	0	0	0	0	54.655	54805	30
Spices												
Coriander	0	0	0	0	0	0	0	0	0	0	0	0
Ginger	0	0	0	4	16000	30	0	0	0	7	46000	66
Methi	0	0	0	0	0	0	0	0	0	0	0	0
Turmeric	0	0	0	5.6	19600	30	0	0	0	61.5	149900	165
Fenugrick	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	9.6	35600	60	0	0	0	68.5	195900	231
Fodder crop seeds												
Rice Bean	0	0	0	0	0	0	0	0	0	0	0	0
Barseem	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
Fiber crops												
Jute	0	0	0	0	0	0	0	0	0	26.99	334910	175
Sunhemp	0	0	0	5.4	24205	106	0	0	0	5.4	24205	106
Total	0	0	0	5.4	24205	106	0	0	0	32.39	359115	281
Others												
Dhaincha	0	0	0	8.35	33747	5	0	0	0	11.35	48747	25
Broom Stick	0	0	0	0	0	0	0	0	0	0	0	0
Elephant Footyam	0	0	0	0	0	0	0	15000	10	44.69	158130	25
Sisbania	0	0	0	0	0	0	0	0	0	0.8	1600	0
Total	0	0	0	8.35	33747	5	0	15000	10	56.84	208477	50
Grand Total	0.9	5600	42	3379.445	10353627	2862	7616.025	30591402	13222	10996.37	40950629	16126

5.2 Planting Material Production:

A number of fruits and vegetable crops are grown in the states of West Bengal, Odisha and A&N Islands. Very few nurseries are available in these states which supply quality planting materials to the farmers. To address this problem KVKs took up planting material production programme in the district level to provide direct access to the farmers to the planting materials. In the year 2022, KVKs of Zone V produced 50.31 lakh planting materials of graft, gooties, sapling, seedlings and bulbs of fruits

and vegetables and earned Rs.128.67 lakh which benefitted 52065 farmers. Among the different crops mango, banana, guava, lime, papaya, watermelon, brinjal, tomato, cucumber, cauliflower, okra, onion, chilli, bitter gourd, broccoli, capsicum varieties were produced in these programme. State-wise analysis showed that A&N Islands produced 13055 number of planting materials, Odisha produced 3058331 number of planting materials and West Bengal produced 1959554 number of planting materials in the year 2022.

Table: Planting materials production by KVKs

Category	Crop	Number	Value (Rs)	Distrib- uted to No. of Farm ers	Number	Value (Rs)	Distrib- uted to No. of Farm ers	Number	Value (Rs)	Distrib- uted to No. of Farm ers	Number	Value (Rs)	Distrib- uted to No. of Farm ers
		A & N Islands			Odisha			West Bengal			Total		
Vegetable Seedling	Cauliflower	0	0	0	209413	348525.5	3778	189947	270763	1049	399360	619288.5	4827
	Cabbage	0	0	0	164724	316866.5	2618	187210	262809	715	351934	579675.5	3333
	Tomato	1007	5736	92	340475	762818	4466	336057	1981224	1081	677539	2749778	5639
	Brinjal	2848	18864	160	634784	768480	4285	263841	533662	915	901473	1321006	5360
	Chilli	1289	8032	97	233189	385510.5	5179	308109	213565	775	542587	607107.5	6051
	Onion	0	0	0	773102	242958	2365	88961	245939	577	862063	488897	2942
	Others	1389	11112	81	396288	435316	1248	270270	1008825	709	667947	1455253	2038
	Total	6533	43744	430	2751975	3260475	23939	1644395	4516787	5821	4402903	7821006	30190
Fruits	Mango	0	0	0	11466	24615	1633	19346	408965	347	30812	433580	1980
	Guava	85	6750	17	38032	292435	2078	6236	180442	499	44353	479627	2594
	Lime	50	2500	17	13959	69825	2123	23338	170054	774	37347	242379	2914
	Papaya	879	4240	104	37198	680930	2982	25774	725910	254	63851	1411080	3340
	Banana	98	2940	12	74983	118465	1435	11944	108260	169	87025	229665	1616
	Others	5	250	1	19399	325765	2311	27934	100950	927	47338	426965	3239
	Total	1117	16680	151	195037	1512035	12562	114572	1694581	2970	310726	3223296	15683
Ornamental plants	Ornamental plants	370	12400	70	17487	190159	695	16595	161225	481	34452	363784	1246
	Total	370	12400	70	17487	190159	695	16595	161225	481	34452	363784	1246
Medicinal and Aromatic	Medicinal and Aromatic	10	200	5	1299	33530	101	36250	23500	346	37559	57230	452
	Total	10	200	5	1299	33530	101	36250	23500	346	37559	57230	452
Plantation	Plantation	1355	26800	25	11554.6	47500	83	12250	220500	664	25159.6	294800	772
	Total	1355	26800	25	11554.6	47500	83	12250	220500	664	25159.6	294800	772

Category	Crop	Number	Value (Rs)	Distributed to No. of Farmers	Number	Value (Rs)	Distributed to No. of Farmers	Number	Value (Rs)	Distributed to No. of Farmers	Number	Value (Rs)	Distributed to No. of Farmers
		A & N Islands			Odisha			West Bengal			Total		
Spices	Turmeric	125	8400	25	37.3	24200	54	11696.2	96005	175	11858.5	128605	254
	Others	3135	78375	27	8133	45806	68	50	10000	19	11318	134181	114
	Total	3260	86775	52	8170.3	70006	122	11746.2	106005	194	23176.5	262786	368
Tuber	Elephant yams	200	0	50	543.3	29520	30	8121	162650	605	8864.3	192170	685
	Total	200	0	50	543.3	29520	30	8121	162650	605	8864.3	192170	685
Fodder crop saplings	Fodder crop saplings	0	0	0	18920	38730	61	47815	99600	239	66735	138330	300
	Total	0	0	0	18920	38730	61	47815	99600	239	66735	138330	300
Forest Species	Forest Species	0	0	0	4577	45928	67	36019	91332	201	40596	137260	268
	Total	0	0	0	4577	45928	67	36019	91332	201	40596	137260	268
Others, pl.specify	Others	210	0	68	48767.85	205765	1324	31791	170679	709	80768.85	376444	2101
	Total	210	0	68	48767.85	205765	1324	31791	170679	709	80768.85	376444	2101
Grand Total		13055	186599	851	3058331.05	5433647.5	38984	1959554.2	7246859	12230	5030940	12867105.5	52065

5.3 Production of Bio-products:

There is lot of demand of organic fertilizers at village level particularly in vegetable cultivation. To meet up the need of the farmers and to promote organic cultivation for maintaining soil fertility of the soil KVKs encourages the use of bio product and promotes vermicompost and bio-fertilizer in large scale. In the state of Odisha, 38171.5 kg of bio

fertilizers and 4173.25 kg of bio-agent were produced which benefitted 2727 farmers and earned a value of Rs.722385/- in 2022. In West Bengal 57345.6 kg of bio-agent and 91755.44 kg of bio fertilizers were produced which benefitted 1338 farmers and earned Rs.486835/- in 2022. The total production of bio products was 540412.24kg in 2022 under zone V which benefitted 9703 farmers and earned value of Rs.3740267.24/-.

Table: Production of bio-product by KVKs

Name of the product	A & N Islands			Odisha			West Bengal			Total		
	Quantity (Kg.)	Value (Rs.)	Number of farmers	Quantity (Kg.)	Value (Rs.)	Number of farmers	Quantity (Kg.)	Value (Rs.)	Number of farmers	Quantity (Kg.)	Value (Rs.)	Number of farmers
Bio-fertilizers	152	17300	65	38171.5	555235	2263	91755.44	669356	747	130078.94	1241891	3075
Bio-pesticide	255	8925	30	2000	10000	10	82578	167580	839	84833	186505	879
Bio-fungicide	55	0	0	1010.55	18158.25	266	575	42150	10	1640.55	60308.25	276
Bio-agents	316	56880	72	4173.25	167150	464	57345.6	280684.99	591	61834.85	504714.99	1127
Others, please specify.	571	33410	225	22370.5	387636	1735	239083.4	1325802	2386	262024.9	1746848	4346
Total	1349	116515	392	67725.8	1138179.25	4738	471337.44	2485572.99	4573	540412.24	3740267.24	9703

5.4 Livestock and Fishery:

Livestock strains, like chicks, eggs, piglets, fingerlings, spawns etc. are supplied to the farmers by KVKs through their livestock production programmes. In the year 2022 Total production of Poultry was 3456 in the state of A&N Islands. It benefitted 69 farmers and earned Rs.13824/-. In the state of Odisha 3833.5 layer chicks, 17080 broiler chicks, 4647.8 ducks, 765110 fingerlings of major carps, Mixed carp (9500), Spawn (19584.5) were produced which makes total production of 2372495 livestock and fish produced in the state of Odisha in 2022. It benefitted 7457 farmers and earned revenue of Rs.5511324/-. In the state of West Bengal Duck production was 6228, Cow was 28 and in fish production, 4766250.5 no. of Indian Carp was produced followed by 5824000 exotic carp. Total production of livestock and fish was 21083422 in 2022 in the state of West Bengal. It benefitted 5698 farmers and earned Rs.11124015/-. In the entire Zone V, the total production of livestock and fish was 23459373 number in 2022 which benefitted 13224 farmers and earned Rs. 16649163/-.

Table: Production of livestock and fishery by KVKs

Particulars of Live stock	Number	Value (Rs)	No. of Farm ers	Number	Value (Rs)	No. of Farm ers	Number	Value (Rs)	No. of Farm ers	Number	Value (Rs)	No. of Farm ers
	A & N Islands			Odisha			West Bengal			Total		
Dairy animals												
Cows	0	0	0	0	0	0	28	466000	8	28	466000	8
Buffaloes	0	0	0	0	0	0	0	0	0	0	0	0
Calves	0	0	0	0	0	0	28	340000	3	28	340000	3
Others (Pl. specify)	0	0	0	0	0	0	22	43000	0	22	43000	0
Total	0	0	0	0	0	0	78	849000	11	78	849000	11
Small ru-minants												
Sheep	0	0	0	0	0	0	56	89000	3	56	89000	3
Goat	0	0	0	7	20500	4	235	551953	73	242	572453	77
Other, please specify	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	7	20500	4	291	640953	76	298	661453	80
Poultry												
Broilers	0	0	0	17080	472250	428	50315	578290	127	67395	1050540	555
Layers	0	0	0	3833.5	259550	803	77	6462	3	3910.5	266012	806
Duals (broiler and layer)	0	0	0	35096	2282693	1746	2708	535430	1771	37804	2818123	3517
Japanese Quail	0	0	0	9581	96367	1078	3541	218310	652	13122	314677	1730
Turkey	0	0	0	389	26450	16	2733	299865	232	3122	326315	248
Emu	0	0	0	535	35300	44	0	0	0	535	35300	44
Ducks	0	0	0	4647.8	199845	197	6228	533616	638	10875.8	733461	835
Others (Pl. specify)	3456	13824	69	12680	956455	390	85882	3711809	1097	102018	4682088	1556

Particulars of Live stock	Number	Value (Rs)	No. of Farm ers	Number	Value (Rs)	No. of Farm ers	Number	Value (Rs)	No. of Farm ers	Number	Value (Rs)	No. of Farm ers
	A & N Islands			Odisha			West Bengal			Total		
Total	3456	13824	69	83842.3	4328910	4702	151484	5883782	4520	238782.3	10226516	9291
Piggery												
Piglet	0	0	0	0	0	0	68	306000	12	68	306000	12
Hog	0	0	0	0	0	0	0	0	0	0	0	0
Others (Pl. specify)	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	68	306000	12	68	306000	12
Fisheries												
Indian carp	0	0	0	52799	74895	920	4766250.5	620100	279	4819050	694995	1199
Exotic carp	0	0	0	30	15000	78	5824000	194775	62	5824030	209775	140
Mixed carp	0	0	0	9500	39500	29	222000	599600	257	231500	639100	286
Fish fin-gerlings	0	0	0	765110	377869	680	360150	1025400	291	1125260	1403269	971
Spawn	0	0	0	19584.5	171390	263	78300	93960	5	97884.5	265350	268
Others (Pl. specify)	0	0	0	1441622.5	483260	781	9680800	910445	185	11122423	1393705	966
Total	0	0	0	2288646	1161914	2751	20931501	3444280	1079	23220147	4606194	3830
Grand Total	3456	13824	69	2372495	5511324	7457	21083422	11124015	5698	23459373	16649163	13224



6.0 Soil, Water and Plant Sample Analysis

KVK scientists engaged under ATARI Kolkata motivated farmers through conducting various awareness and training programmes for testing soil before cultivation in their land to decrease indiscriminate use of fertilizers, and to control environmental and other health hazards. Besides those, scientists tested a large number of water samples in their KVK laboratories taken by the

farmers for quality analysis. A total of 30258 soil samples (7459 through mini soil testing kit/labs and 22799 through soil testing laboratory) were tested from 2331 villages which benefitted total 42125 farmers in this Zone. A minimum amount was charged from farmers for testing each soil sample. Thus, KVKs of ICAR-ATARI Kolkata earned about Rs. 6.86 lakh during the period.

Table: Soil and water analysis by the KVKs of Zone V

State	Number of soil samples analyzed			No. of Farmers	No. of Villages	Amount realized (in Rs.)
	Through mini soil testing kit/labs	Through soil testing laboratory	Total			
A & N Islands	0	105	105	90	20	0
Odisha	4584	4152	8736	16548	657	8565
West Bengal	2875	18542	21417	25487	1654	677812
Total	7459	22799	30258	42125	2331	686398

7.0 Soil Health Cards Distribution and Observance of World Soil Day

Nodal Scientist: Dr. F. H. Rahman

There are nearly 1000 Soil Testing Laboratories in India, which in the present scenario are not sufficient to cater the soil testing needs of the farming sector. Moreover since the access to these laboratories is beyond the reach of many farmers owing to the distances between the villages and the laboratory location and of course the transportation costs involved, most of the farmers do not get their soils tested. Also the awareness among the farmers to check the health of their soils is a major concern. As a result, farmers seldom get their soils tested, and even if they get it tested, they don't get the reports on time i.e., before sowing/planting of their crops, and thus continue to use fertilizers in an ad hoc manner depending upon their resources and availability of the fertilizers in the market. Such indiscriminate or inadequate use of fertilizers over the years without soil testing is considered as one of the major reasons for the deterioration of soil fertility at a large scale.

There was a long felt need of a quantitative soil test kit and bring the awareness among farmers of the benefits of soil testing and controlled usage of fertilizer and thus save the health of their soil. December 5 is declared as 'World Soil Day' by the International Union of Soil Sciences and to celebrate the importance of soil as a critical component of the natural system and as a vital contributor to human wellbeing, all the KVKs have organized Seminar/symposia/workshop. The World Soil Day campaign aims to connect people with soil and raise awareness on their critical; importance in our lives. One of the several ways of connecting people with soils is to restore and preserve the soil health. All the KVKs of Zone-V distributed the soil health cards among the farmers. A total of 6925 numbers of Soil Health Cards were prepared during the year. SHCs were distributed on World Soil Day, Dec 5, 2022 by the public representatives like MP/MLAs and others in the respective KVKs. State wise distribution of soil health cards are presented in the following table.

Table: Soil Health Card prepared and distributed during the year

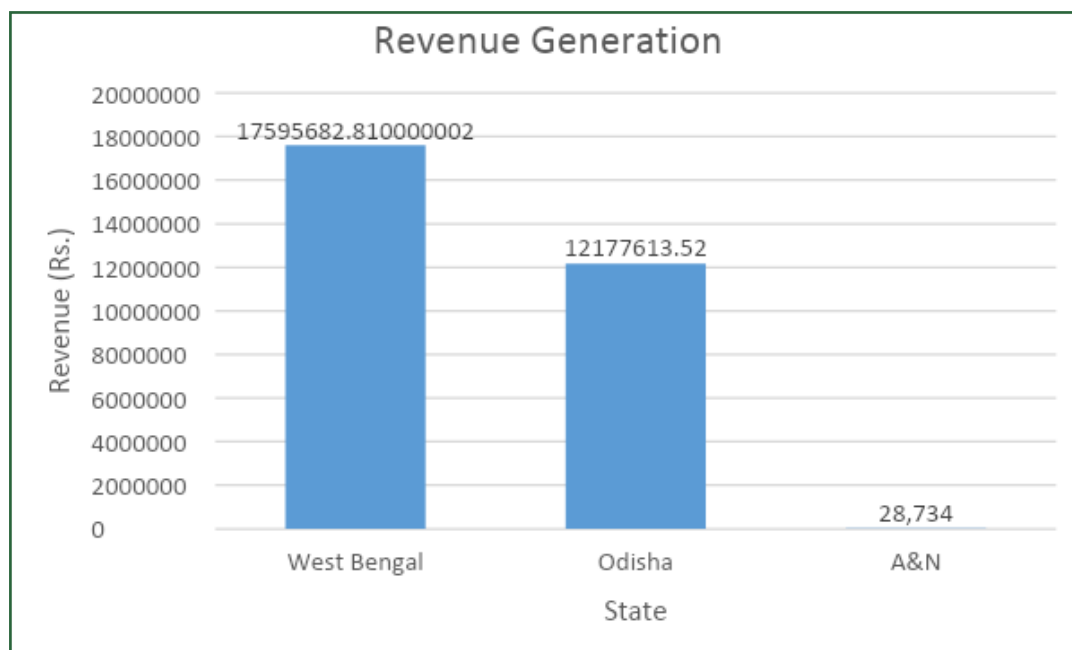
KVK	No of soil samples collected	No. of samples analyzed	SHC issued	No of Farmers benefitted
A & N Islands	87	85	85	85
Odisha	3375	3350	3350	3350
West Bengal	3575	3490	3490	3490
Total	7037	6925	6925	6925



8.0 Revenue Generation

The Krishi Vigyan Kendras have earned through different projects from NABARD, ATMA, IIFCO, state government, RKVY etc. The amount of revenue generation was Rs. 29,802,030 out of which KVK in

Odisha has earned Rs. 12177613.52 and KVKs of West Bengal has earned Rs. 17595682.81 and through different projects.



9.0 Revolving fund status

State	Opening Balance (1 st April)	Income during the year	Expenditure during the year	Net balance in hand as on 1 st April (Kind + Cash)
Odisha	10559632.83	33857433.5	33000469.34	10746196.29
West Bengal	110389436.5	25556682	40315685.33	97553708.12
Total	120949069.33	59414115.5	73316154.67	108299904.41

10.0 Publication by KVKs

In order to highlight the accomplishments of research and other related activities and to make it accessible to other KVKs, SAUs, ICAR institutes, line departments, ATMA, NABARD, other agencies, farmers, and other stake holders, KVK scientists actively prepared and published research papers, technical bulletins, newsletters, popular articles, leaflets/ pamphlets, DVD/CD etc. during the year 2022. The KVK staff of this Zone produced a total of 15985 publications, including 139 research

papers, 108 symposia papers, 67 newsletters, 102 popular articles, 709 books, 44 book chapters, 13230 extension pamphlets/literature, 173 bulletins, 383 technical reports, and 296 electronic publications. The total circulation was more than 2.09 lakh. Fourteen publications were circulated among 82 beneficiaries in Andaman and Nicobar Islands. On the other hand, in West Bengal and Odisha, 10229 and 5742 publications were circulated among 88584 and 120533 beneficiaries, respectively.

Table: Publication by KVKs under ICAR-ATARI, Kolkata

Item	A & N Islands			Odisha			West Bengal			Total		
	Number	No. circulated	No. of KVK	Number	No. circulated	No. of KVK	Number	No. circulated	No. of KVK	Number	No. circulated	No. of KVK
Research paper	2	2	1	57	11155	19	80	100	13	139	11257	33
Seminar/ conference/ Symposia papers	2	0	2	38	1655	9	68	1004	12	108	2659	23
Books	2	10	2	542	16388	10	165	1050	10	709	17448	22
Bulletins	0	0	0	126	10215	9	47	33526	8	173	43741	17
News letter	2	0	1	38	16300	23	27	863	9	67	17163	33
Popular Articles	2	50	2	56	17006	14	44	1804	11	102	18860	27
Book Chapter	2	0	2	7	520	6	35	600	8	44	1120	16
Extension Pamphlets / literature	0	0	0	4597	37051	23	8633	45933	17	13230	82984	40
Technical reports	1	0	1	193	1972	19	189	8	11	383	1980	31
Electronic Publication (CD/ DVD etc)	1	20	1	73	2626	15	222	3195	11	296	5841	27
Others	0	0	0	15	5645	1	719	501	2	734	6146	3
Total	14	82	12	5742	120533	148	10229	88584	112	15985	209199	272

11.0 Scientific Advisory Committee Meetings

The KVKs organised the Scientific Advisory Committee (SAC) Meeting at their respective campuses each year to discuss the physical and financial achievements of that particular year and to finalise the Action Plan for the subsequent year. The committee consisted of the Director, ICAR-ATARI Kolkata or his/her representative, the Head of Host Organisation or his/her representative, representatives from nearby ICAR Institutes/State Agricultural Universities, the district's development departments, media personnel, financial institutions,

progressive farmers and farm women etc. as per guidelines of ICAR. All nominated members were ensured to be present at the meeting. Out of the 59 KVKs of ICAR-ATARI Kolkata, 47 SAC meetings were held in the year 2022. A total of 29 SAC meetings were held by 33 KVKs from the state of Odisha and 15 meetings were held by 23 KVKs from the state of West Bengal. While three KVKs from the Andaman and Nicobar Islands held three meetings during the period under report. About 1445 persons attended the SAC meeting.

Sl. No.	State/UT	No. of SAC meeting	No. of participants
1	A & N Islands	3	87
2	Odisha	29	928
3	West Bengal	15	430
Total		47	1445



12.0 Technology Backstopping by Directorates of Extension Education

The Krishi Vigyan Kendras of this zone conducted round the year activities like on-farm-trial (OFT), front line demonstration (FLD), training programmes, hands-on-training, health camps, special programmes etc. under the guidance/supervision of Directors/Dean, Extension Education of concerned State Agricultural Universities (SAUs) for transferring various agricultural technologies from Research Institutes/ Agricultural Universities to the end users and for catering the needs of the

farmers in the district after getting feedback from them.

All 59 KVKs of ICAR-ATARI Kolkata disseminated latest and most suitable agricultural technologies developed at various institutes/universities under the technological and administrative support of Directors of Extension Education (DEEs). For efficient transfer and use of technologies, 59 KVKs of ICAR-ATARI Kolkata were distributed under

the jurisdiction of 4 DEEs irrespective of any host organization of KVK. The Extension Directorate of Odisha i.e. University of Agriculture and Technology (OUAT), Bhubaneswar was allotted with 33 KVKs; Uttar Banga Krishi Viswavidyalaya (UBKV), Pundibari with 6 KVKs; Bidhan Chandra Krishi Viswavidyalaya (BCKV), Mohanpur with 17 KVKs and West Bengal University of Animal and Fishery Sciences (WBUAFS), Belgachhia with 3 KVKs. During the year 2022, DEEs under ATARI Kolkata were instrumental in supplying seeds, planting materials, package of management practices for agriculture, livestock and fish farming, printed literatures, organizing HRD trainings for KVK personnel and so on.

All the Extension Directorate of ATARI Kolkata organized number of HRD programmes throughout the year 2022 to meet out the demand of KVK personnel, to enrich their skill for efficient transfer

of technologies and to make the newly recruited staff of KVK aware of mandate and functioning of KVKs. During the period under report, a total of 23 HRD programmes involving 262 KVKs for 1814 KVK personnel were conducted on skill training, scientific livestock/fish production, disease/pest management in crops, research-extension interface, digital documentation and research methodology, interaction with QRT members, SLREC meeting, operational modalities of KVKs, scientific animal husbandry and agri-horticultural practices, conducting ARYA/CFLD on pulses and oilseeds, ICT application in agriculture, soil health management, EPF, GeM and many others. The maximum number of programme (10) was conducted by OUAT, Bhubaneswar followed by WBUAFS, Kolkata (8 programmes) and UBKV, Pundibari (5 programmes) and BCKV, Nadia (2 programmes).



In the year 2022, the DEEs/ Dean, Extension Education and their officials visited KVKs for 266 occasions for different programmes including SAC meeting, field days celebration, technology week celebration, training programmes, interaction meetings, workshops/seminars, inaugural meeting of DAESI, *rabi* and *kharif* Campaign, 'World Soil Day'

celebration, 'World Pulse Day' celebration, special programme celebration etc. The Dean, Extension Education of Odisha state visited their KVKs for 132 times, DEE of BCKV for 50 times, UBKV for 35 times and WBUAFS for 49 times. The total numbers of KVKs visited by Dean/Directors, Extension Education during 2022 were noted to be 211.



The overseeing of KVK activities by the DEEs had crucial role in assessing the technological needs of KVKs and in making the KVKs empowered with latest knowledge and skills. During the year 2022, the DEE officials of OUAT visited their OFT fields for 30 occasions and FLD fields for 62 occasions to monitor the performance of newly released variety crops/new strains of poultry, disease and pest incidences, data collection and so on. The officials of BCKV made OFT and FLD field visit for one occasion each to check the performance of crops cultivated for seed production, maintain of experimental fields etc. The Directorate officials of UBKV visited their OFT and FLD fields for 10 times and 20 times, respectively to know the performance of crops in different experimental conditions, to exchange technical know-how with the farmers etc. On the other hand, WBUAFS officials visited 9 times for their OFT fields and 12 times FOR FLD fields to know the disease/pest incidences, to monitor whether experiments were being conducted as per SAC recommendations and so on. A total of 20 visits were done by the officials of all four Directorates for special purposes like monitoring ARYA and NICRA activities, for checking the performance of mini hatcheries for IMC, for checking demonstration plots etc.

During the year 2022, this Zone implemented total 90 technologies through four Extension Directorates. The Directorate of UBKV implemented maximum number (37) of technologies through their 36 KVKs. Some important technologies were- use of temperature controlled waxing chamber for flower preservation, value addition in ginger, introduction of new watermelon varieties, organic fish farming for sustainability, IDM/INM/IPM in crops, developing improved parboiling technology to get quality rice, introduction of suitable variety of strawberry for hilly region, technology to prepare weaning food to address malnutrition, introduction of exotic fruit cultivation, introduction of multi-storied cropping through planting arecanuts, black pepper and turmeric in the same piece of land, introduction of off-season vegetable cultivation. The Directorate of OUAT implemented 26 technologies viz. introduction of drought tolerant/

bio-fortified paddy variety, organic cultivation of aromatic rice, technologies on weed/pest/disease management in crops, disease management in livestock/fishes, feed management in cattle, artificial brooding management in poultry, off-season vegetable production, integrated nutrition management in crops, trellis system for vegetable production and many more involving a total of 534 KVKs. The Directorate of BCKV and WBUAFS implemented 17 and 10 technologies involving 37 and 33 KVKs, respectively. Some of the important technologies of BCKV were- introduction of low cost poly walking tunnel for year round off-season vegetable production, introduction of climate resilient cabbage production, varietal replacement of paddy/black gram/lentil, use of LCC for easy nitrogen estimation, disease/pest management and INM in crops. On the other hand, selective breeding programmes for small animals, preparation of value added products from small animals and poultry, scientific management of *Ghungroop* pigs, area specific IFS model, seasonal fodder cultivation technology for livestock, scientific culture of fishes, ornamental fish rearing, disease and pest management in crops etc. were among those important technologies implemented by WBUAFS.

All the Directorates under ICAR-ATARI Kolkata were actively engaged in publishing various literatures in English, Bengali and Odia language covering all aspects of agriculture, livestock and fishery sector for the benefit of farmers. In the year 2022, a total of 17 technology inventories were published. Out of which, eleven published by BCKV, four by OUAT and one each by WBUAFS and UBKV. Twelve technological inventories (WBUAFS-7, OUAT-3 and BCKV-2) were updated during that period.

The Directorates also supplied seeds to 34 KVKs, planting materials and bio-products to 31 KVKs each, livestock breed to 32 KVKs, livestock products to 28 KVKs, poultry breeds/strains to 34 KVKs, poultry products to 24 KVKs, area specific mineral mixture to 12 KVKs, mushroom to 31 KVKs, fish fry/fingerlings/yearlings to 20 KVKs during the year 2022.

13.0 Agricultural Technology Information Centre (ATIC)

The Agricultural Technology Information Centre (ATIC) serves as a 'single window' system and it usually situated near the entrance of university/institute. The technologies of research institute/state agricultural universities on crop sciences, natural resources management, horticulture, agricultural engineering, livestock sciences, fishery sciences, integrated farming systems, agro-enterprises etc. were transferred to the end users through ATICs. Farmers can access the desired information for solution of agricultural farming related problems. There are five ATICs under ICAR-ATARI Kolkata which were being operated in the Union Territory of Andaman and Nicobar Islands under ICAR-Central Island Agricultural Research Institute (ICAR-CIARI), Port Blair; in Odisha state under

ICAR-Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar and University of Agriculture and Technology (OUAT), Bhubaneswar; and in West Bengal state under Bidhan Chandra Krishi Viswavidyalaya (BCKV), Mohanpur and Uttar Banga Krishi Viswavidyalaya (UBKV), Pundibari.

All the ATICS had the facilities of reception counter, exhibition/technology museum, touch screen kiosk, cafeteria, sales counter(s), farmers' feedback register, hall for farmers' interaction and others. During the year 2022, ATICs were visited by 12322 farmers from different districts of this Zone. Out of which, 5331 farmers visited for technology information followed by technology services (3211 farmers), technology products (1964 farmers) and other purposes (1816 farmers).



It was found that during the year 2022, a substantial number of farmers (12510) received technology information from the ATICs of different centres of this Zone. Out of which, 4445 farmers used kisan call centre to get the information on varieties/hybrids (1383), pest management (752), disease management (510), agro-techniques (724), soil and water conservation (353), post-harvest technology including value addition (323), and animal husbandry including fisheries (400). A total of 32 farmers were benefitted from video showing in the ATICs. Ten farmers met their queries by sending letters to the concerned authorities of the ATICs. The ATICs of this Zone were used for training of large numbers

of farmers/technocrats/students (5127) to fulfil their demands. Maximum farmers were interested in varieties/breeds/strains (1472) followed by agro-techniques (906), pest management (808), animal husbandry and fisheries (629), soil and water conservation (505), disease management (505) and post-harvest technologies and value addition (366). Not only that, field day, interactive meet, 'World Coconut Day', field demonstrations, awareness camp, Exposure visit to students and professional, radio talk, DD talk and others programmes at ATIC were attended by 247, 405, 1214, 308, 517, 10, 17, 63 and 105 persons, respectively.



The farmers and other stake holders were also provided with various types of publications either in the form of books, technical bulletins, CDs etc. for improving their agricultural production skill and knowledge. The literatures were supplied at minimum price or free of cost from the ATICs. During the period of report, 692 copies of books and 2000 copies of technical bulletins were sold which benefitted 7172 farmers. An amount of Rs. 24770/- in the form of revenue was generated from different ATICs during the year 2022.

The ATIC of this Zone was also a potential source of supplying various technological products like seeds, planting materials, table fishes, fish feeds, bio-products, mushroom spawn and others. About 944 q seed, 57990 planting materials, 2105 kg bio-

products, 14120 pieces lemon, 80 pieces green coconuts, 128 kg mango, 11.9 kg turmeric and 2000 kg rhizome (yam) etc. were sold to the farmers from different ATICs. A total of around 16591 farmers got benefit from sale of those technological products and a worth of Rs. 40.35 lakh revenue was generated during the year 2022.

From different ATICs under ATARI Kolkata, 605 soil and water samples were tested and 343 plants were diagnosed for different diseases. It also provided various technological services (71 cases) to other departments of the concerned institutes and other technological services (25 in no.). A total of 2069 farmers were benefitted from various technology services during the period.



14.0 Flagship Programmes

14.1 National Innovations on Climate Resilient Agriculture - Technology Demonstration Component (NICRA-TDC):

Nodal Scientist: Dr. F.H. Rahman

Climate-resilient agriculture (CRA) is an approach that includes sustainably using existing natural resources through crop and livestock production systems to achieve long-term higher productivity and farm incomes under climate variabilities. A key element required for sustainable and transformational development in agriculture is ensuring that

investments are informed by robust evidence about past and future climate risks. Climate resilience is a fundamental concept of climate risk management. In this context, resilience refers to the ability of an agricultural system to anticipate and prepare for, as well as adapt to, absorb and recover from the impacts of changes in climate and extreme weather. Resilience can be enhanced by implementing short and long-term climate mitigation and adaptation strategies, as well as ensuring transparent and inclusive participation of multiple actors and stakeholders in decision-making and management processes. Some hydro-meteorological hazards are slow in their onset, such as changes in temperature and precipitation resulting

in long-term altered temperature, rainfall patterns and agricultural droughts. On the other hand, some occur much more suddenly, such as tropical storms and floods. Both require robust risk preparedness informed by the assessment of climate risk.

National Innovations on Climate Resilient Agriculture - Technology Demonstration Component (NICRA-TDC) is a program implemented (2011) by the Indian Council of Agricultural Research (ICAR) and the Ministry of Agriculture and Farmers' Welfare in India. The NICRA-TDC program aims to address the challenges posed by climate change in agriculture and promote climate-resilient agricultural practices. It focuses on developing and promoting technologies and management practices that can enhance the adaptive capacity of Indian agriculture to climate variability and climate change. Under the NICRA-TDC program, various initiatives are taken to demonstrate and promote climate-resilient agricultural practices in different agro-ecological regions of the country. These initiatives include the development of location-specific climate-resilient technologies, capacity building of farmers and other stakeholders, promoting partnerships between research institutions and farmers, and creating awareness about climate change and its impact on agriculture. The NICRA-TDC program plays a crucial role in ensuring the sustainability and productivity of Indian agriculture in the face of climate change. By promoting climate-resilient practices and technologies, it aims to enhance the adaptive capacity of farmers, improve their livelihoods, and contribute to food security in the country.

Climate vulnerability of Seventeen KVK districts in West Bengal, Odisha, and the Union Territory of the A & N Islands, selected through regional coordination by the ICAR-Agricultural Technology Application Research Institute in Kolkata (ATARIs), forward definite requirement in terms of technological support, human resource development, and overall empowerment of the farming community to help them deal with climate vulnerabilities like droughts, erratic rainfall, heat waves, and floods. In the context of climate variability and to effectively handle these extreme occurrences, it is crucial to improve the adaptive capacity and resilience of farming communities. The NICRA village was chosen based

on how susceptible agriculture was to weather change. Based on secondary meteorological data and the availability of resources, the multidisciplinary KVK team examined the limitations associated with climatic variability. Based on secondary meteorological data, resource availability, farming practices, and agricultural yields during the last few years, the multidisciplinary KVK team examined the restrictions connected to climatic variability. Therefore, the NICRA-KVK interventions carried out in NICRA villages through the intervention like Natural Resource Management, Crop Production, Livestock, Institutional Intervention, Capacity Building and Extension Activities have not only enabled the farmers to cope up climatic vulnerability but also plays a key role in farmers' adaptive capacity along with sustainable agricultural production.

Natural Resource Management

This module provided 812 hectares of land worth of benefits to 7412 different farmers in total. In seventeen NICRA-adopted villages encompassing 365 hectares with 3652 farmers, various demonstrations of in-situ moisture conservation technologies, including summer ploughing, green manuring, zero tillage, organic mulching, etc., have been carried out. The primarily used technologies in zero tillage operations. There has been a considerable impact on the farmers in A&N Island as a result of the introduction of Broad Bed and Furrow intervention to more than 25 ha. In





order to maximize water efficiency and prevent water logging, maize is sown using the ridge and furrow method. The various KVKs showed water collection and recycling for supplemental irrigation in adopted villages with the participation of 250 farmers by renovating ponds, wells and canals, building bunds, using the 5% model, etc. More than 52 ha of land with 312 farmers successfully used zero tillage technique for resource conservation purposes with wheat, lentils, and chickpeas. Sprinkler irrigation, LEWA for rice, RBF for brinjal, and micro-lift irrigation for rice were all shown in NICRA-adopted communities in an 85 ha area across 235 farmer farms. With a storage capacity of 0.98 cu m and a potential for protected irrigation of 461 ha, 52 new rainwater collection structures have been created and 45 others restored. With this strategy, cropping intensity was increased by a maximum of 250%. Through the addition of about 215 q of compost made from solid wastes to the soil, 19 000 q of carbon were sequestered in the years 2022-23. Field bundling, water management and SRI by subsoiler in rice covering 92 hectares in 152 farmer's fields are artificial ground water recharge methods. The maximum rice yield (53.5 q/ha) and B:C ratio (2.25) were achieved through ground water recharge using SRI by subsoilers. In order to address the lack of irrigation water, boost soil carbon, and lessen soil salinity, land shaping with ail cultivation and a rainwater harvesting structure were built over 25.5 ha.

Crop Production

A variety of area-specific measures were taken under the Crop Production module, including the demonstration of drought, salt, and flood tolerant/resistant varieties, advancing rabi crop planting dates to avoid terminal heat stress, water-saving paddy cultivation techniques like SRI, aerobic, direct seedling, community nurseries for delayed monsoon, location-specific intercropping systems with high sustainable yield index, introduction of new crops/crop diversification, and custodial care. In 95 ha of 812 farmer fields, drought-tolerant rice cultivars like Sahbhagi, Anjali, Naveen, and Abhishek were tested. Gosaba 5, CARI Dhan-5, Usar Dhan-5, Jarava, Geetanjali, SR-26B, and Amalmona are a few salt-tolerant cultivars of rice that were tested in 521 farmer's fields over a 214 ha area. By producing the highest yield of 32.5 q/ha and a higher economic return (BC ratio of 2.23), the Luna suwarna, Javarva, Geetanjali, and Amalmona cultivars demonstrated maximal salt tolerance potential. Rice cultivars that can withstand flooding, such as Swarna sub 1, Sabita, and Dudheswar, were tested on 65 ha of farmer land, producing 36.0 q/ha with a 2.33 economic return. Rice, wheat, lentils, mustard, potatoes, and other crops were sowed 12 days in advance during rabi season to prevent terminal heat stress. These demonstrations, which involved 256 farmers' farms totaling 168 ha land, were conducted in adopted villages. To benefit 215 farmers, a 45.2 ha area was covered for spaced-out community nurseries of rice, brinjal, cauliflower, and tomato. Introducing various crops in drought prone area that require less water, such as okra (var. HYV Gajendra), cauliflower (var. MSN-16), rice (var. Pusa Bold, Pusa 362), tomatoes (var. Param F1), etc., as part of dependent crop planning during kharif's rainfall shortfall. 895 farmers benefited from the planting of rice, brinjal, cauliflower, lentils, and cabbage over an area of 351.3 ha. Ridge and furrow farming is widely practised in Odisha. In a total area of around 250 ha, cabbage, cauliflower, brinjal, tomatoes, chilies, cowpeas, and bottle gourds are grown. The average annual income is very substantial. By using hybrid maize, crops are diversified. In those districts, close to 305 farmers have taken up residence. Various intercropping



systems were demonstrated in regions which are one of the key mechanisms for adapting to settings with variable rainfall is intercropping systems. In practically all adopted communities, intervention on site-specific intercropping was demonstrated. There were 4125 farmers in total who received benefits, totaling 750 ha of land.

Livestock and Fisheries

Various livestock-centric interventions were carried out, including breed improvement, balanced feed and fodder management through mineral mixture, feed blocks and silage production, azolla feeding, better shelters for reducing heat stress in livestock, management of fish ponds/tanks during water scarcity and excess water, management of fish ponds/tanks during water scarcity and excess water. 512 livestock owners who had 3956 animals enrolled in the vaccination campaign benefited from these treatments. In rainfed regions, a sufficient supply of green or dry feed is essential for the survival of animals. Many states suffered delayed commencement and deficiency rainfall conditions. The area planted with millets and pulses, which are crucial to supplying fodder in rainfed areas, has decreased. Farmers' fields were used to show short- and medium-duration fodder cultivars of a variety of crops and fodder species in the kharif and rabi seasons under rainfed and limited irrigation circumstances to support revenue and cash flow from animal husbandry. In farmer fields, improved rice-bean fodder and silage production were displayed. In several adopted communities, community lands covering an area of 236 ha and employing 412 farmers for various fodder production were on display. The main feedstuffs produced by the initiative included berseem, oat, sudanchari, maize, and hybrid napier. Sudan grass demonstrated the greatest benefit return (B: C: 5.59) of all these demonstration legumes. The results of silage production for 265 individuals and 17 hectares of units were quite encouraging. In the communities that were adopted, vaccination clinics for the following diseases were held: BQ vaccine, deworming, PPR for goats, Ranikhet for poultry, and FMD for cattle. After the organisation of the vaccination camps, a mortality rate reduction of up to 90% and an average rise in cattle milk yield of up to 40% have been noted. There was a demonstration of rural backyard poultry (Kuroiler and Nicobari fowl), vanraja, kadaknath, Khaki Campbell duck, T X D breed of pig, mineral mixture, and azolla as cattle feed. Through this intervention, which also had extremely encouraging results, an improved ornamental bird was introduced. Reduced heat



stress and low mortality rate were documented in the improved poultry shed. Improved sheds with standard space gave higher performance to dairy

and poultry animals. Improved shelter was shown to be effective in interventions to lessen heat stress for increased survivorship of backyard poultry and dairy animals.

Institutional Intervention

Institutional interventions have been made, such as the establishment of a seed bank, a fodder bank, commodity groups, custom hiring for timely operations, community nursery rearing, irrigation, communal selling, and the development of awareness in practically all NICRA communities. A total of 121 units totaling 265 ha and 5152 farmers have been produced. Custom Hiring Centre offers a variety of agricultural equipment, including a power tiller, reaper, water pump, zero-till drill, raised bed planter, sprayer, and weeder, among others. Farmers can access weather forecasting information using a Mini Automatic Weather Station (AWS) feature.



Village Climate Risk Management Committee (VCRMC)

After extensive discussion with the villagers regarding the mitigation of the climate vulnerabilities of the villages and the tactics to be followed under this project, the Village Climate Risk Management Committee (VCRMC) was established. The President of VCRMC and the Head of the KVK in question jointly opened a bank account in their names, which marked the beginning of VCRMC's operating phase. The custom hiring centre for farm implements and micro-irrigation systems, the seed and fodder bank, community nurseries, the collection of farmers' share in planting material and inputs, the establishment of a small weather station in the village, the participation of farmers in programmes that build their capacity, and exposure trips to learning locations are all managed by the VCRMC. Institutional interventions, such as the establishment of a seed bank, a fodder bank, commodity groups, specialised hiring for time-sensitive tasks, community nursery rearing, irrigation, collective selling, and the development of awareness among the farmers in the Zone.

Custom Hiring of Farm Implements and Machinery at NICRA Adopted Villages

In addition to making crucial decisions about the technological interventions to be implemented in the village in consultation with the KVK, the VCRMC oversaw the custom hiring of various farm tools and implements, which has now become extremely well-liked among the farmers and generated a sizable amount of revenue. To deal with climate fluctuation, agricultural operations must be timely, especially when sowing and working across cultural boundaries. For resilient practices for preserving in situ soil moisture and draining surplus water in heavy soils to be widely adopted, access to tools for planting in raised beds, broad bed furrows, and ridge-furrow is crucial. It is crucial that these farm tools are accessible to small and marginal farmers in rainfed areas. Similar to this, managing kharif crop residues through zero-till rabi crop farming lowers the issue of residue burning, contributes to the improvement of soil health, and boosts water usage efficiency. The VCRMC members choose the costs for renting the equipment/implements. Additionally, the funds from hiring fees and deposits made into





a bank account formed in the name of VCRMC are used by this committee. 25% of the proceeds are set aside as a sustainability fund and the remaining proceeds are utilised to repair and maintain the tools. Different types of farm machinery are stocked in the CHCs, the most popular being Zero till drill, Happy seeder, BBF planter, drum seeder, multi crop planter, power weeder, mechanical weeder, chaff cutter, conoweeder, duster, sprayer, laveler, FIRB planter, sub-soiler, zero-till frti-seed, disc harrow, bucket laveler, reaper, thresher, cultivator, rotavator, pumpset etc.

Capacity Building

In total, 156 courses were offered under the Capacity Building programme in 2022-23, benefiting 6215 farmers and farmwomen (3521 men and 2694 women). Crop management, natural resource management, nutrient management, integrated crop management, crop diversification, resource conservation technology, pest and disease management, livestock and fishery management, nursery raising, employment generation, nutrient garden, repair and maintenance of farm machinery



and implements, integrated farming system, fodder and feed management, lac cultivation drudgery reduction with farm implements for women, and nutrient garden are among the thematic areas covered.

Extension Activities

8935 practicing farmers (3854 men and 5081 women) benefited from a total of 215 Extension Activities in various subject areas during the reporting period. The extension activities included method demonstrations, agro advisory services, resource





conservation technologies, awareness animal health camps, KishanChaupal, KishanGosthi, diagnostic visits, school student visits, group discussions, World Earth Day, technology week, and kishan mela, among others. In the relevant KVK, December 5, 2022 was observed as World Soil Day, and 620 soil health cards were given out to farmers in NICRA communities.

Convergence by NICRA with Ongoing Development Programmes

One of the most important accomplishments made by all NICRA KVKs since the project's commencement is resource generation through convergence with other current development schemes. Each NICRA KVK implementation team carried out convergence initiatives in conjunction with ongoing development plans. MGNREGA, National Micro and Minor Irrigation Scheme, Pradhan Mantri Gramme Sadak Yojana, Backward Rural Grant Fund, Sunderban Development Board, NFSM, IWMP, IVRI, ICAR-DWR, Forest Department, etc. are different development schemes. NICRA KVKs will be a part of various convergence programmes from 2022-23.

14.2 Cluster Frontline Demonstrations:

14.2.1 Oilseeds:

Nodal Scientist: Dr. P.P. Pal

Cluster frontline demonstration on oilseeds under NFSM is conducted to demonstrate the production potential of newly released technologies on the farmers' fields at different location in a given farming system. It also includes various extension activities for farmer and extension workers to make them aware of the potentiality of the demonstrated technology. The project is being implemented since 2015-16. Initially Bihar, Jharkhand and West Bengal were under this zone. In the year 2017-18 Bihar and Jharkhand shifted under ATARI Patna whereas Odisha joined ATARI Kolkata. Since then, CFLD Oilseeds project is implemented in the KVKs of West Bengal and Odisha under this zone. Usually, the demonstrations are conducted in three seasons, Kharif, Rabi and Summer based on the availability of funds.

In continuation of CFLD Oilseeds programme of the year 2021-22, the reports of Rabi season were

not recorded in the Annual Report of the year 2021. Therefore, the details of the performance of CFLD Oilseeds during Rabi season of the year 2020-21 are reported in Annual Report of 2022. The

demonstrations were conducted on Groundnut, Rapeseed & Mustard and Sunflower in the selected districts through respective KVKs of West Bengal and Odisha.

Table: State and crop wise performance of CFLD Oilseeds during Rabi 2021-22: (CFLD Regular programme)

Sl. No.	State	Crop	Target of FLD Approved		Achievements of CFLD		Yield(q/ha)		Increase%	Difference in yield (q/ha)
			No. of Demo	Area(ha)	No. of Demo	Area(ha)	Demo	Local		
1	West Bengal	Groundnut	125	50	125	50	18.72	13.97	34	4.75
		Rapeseed & Mustard	625	250	625	250	14.6	8.63	69.1	5.97
		Sunflower	25	10	25	10	13.59	10.67	27.36	2.92
2	Odisha	Groundnut	400	160	400	160	18.74	14.19	32.06	4.55
		Rapeseed & Mustard	375	150	375	150	8.87	5.51	60.98	3.36
Total			1550	620	1550	620				

In rabi season total 620 ha area was covered under CFLD Oilseeds in West Bengal and Odisha. Altogether 1000 demonstrations were conducted on rapeseed & mustard covering an area of 250 ha in West Bengal and 150 ha in Odisha. The yield increase percentage of rapeseed & mustard is observed 69.1% in West Bengal and 60.98% in Odisha. In case of groundnut a

total 525 demonstrations were conducted covering an area of 50 ha in West Bengal and 160 ha in Odisha. The yield increase percentage of groundnut is observed 34% and 32.06%, respectively, in West Bengal and Odisha. 25 CFLDs were conducted on sunflower in an area of 10 ha in West Bengal. The yield increase percentage of sunflower is observed 27.36%.



Table: State and crop wise performance of CFLD Oilseeds during Kharif 2022: CFLD Regular programme)

Sl. No.	State	Crop	Target of FLD Approved		Achievements of CFLD		Yield(q/ha)		Increase %	Difference in yield (q/ha)
			Area (ha)	No. of Demo	Area(ha)	No. of Demo	Demo	Local		
1	West Bengal	Groundnut	50	125	50	125	22.86	15.84	44.32	7.02
		Sesame	20	50	20	50	9.43	6.52	44.63	2.91
		Soybean	10	25	10	25	13.28	11.90	11.59	1.38
2	Odisha	Groundnut	90	225	90	225	18.26	13.83	32.03	4.43
		Sesame	60	150	60	150	5.95	4.44	34.00	1.51
		Niger	20	50	20	50	4.74	3.50	35.42	1.24
Total			250	625	250	625				

In Kharif season, a total 625 no of demonstrations were conducted by the KVKs of West Bengal in 80 ha and 170 ha of Odisha. Out of 625 demonstrations, more no of demonstrations were on groundnut (350) followed by Sesame (200), Niger (50) and Soybean (25). The maximum yield increase percentage in West Bengal is observed in sesame i.e., 44.63%. The yield increase percentage of sesame in Odisha is

34%. The yield increase percentage of groundnut in West Bengal and Odisha is 44.32% and 32.03%, respectively. Soybean in West Bengal showed 11.59% increase in yield compared to local check variety. A significant increase in yield (35.42%) is also observed in niger during CLFD Oilseeds Kharif programme of the year 2022.



Table: Cluster Frontline Demonstration on Rabi Oilseeds during 2022-23

Sl. No.	State	Crop	Target of FLD Approved		Achievements of CFLD	
			Area (ha)	No. of Demo	Area (ha)	No. of Demo
1.	West Bengal	Rapeseed & Mustard	350	875	140	350
		Groundnut	60	150	70	175
2.	Odisha	Rapeseed & Mustard	220	550	100	250
		Groundnut	160	400	160	400
		Sunflower	230	575	220	550
Total			1020	2550	690	1725

14.2.2 Pulses:

Nodal Scientist: Dr.S.K. Roy

Cluster Frontline Demonstration was conducted on Pulse crops during summer of 2022 by the KVKs of Zone V. In summer, blackgram and greengram were demonstrated in 100.5 ha. Blackgram was demonstrated in West Bengal in an area of 50 ha by three (03) KVKs viz. Birbhum, Murshidabad and Murshidabad (Addl.). *Pant Urd 31* was demonstrated in 40 ha area and remaining 10 ha by *Pant Urd 01*.

Cluster demonstrations on greengram (summer) was conducted in an area of 100 ha in W. Bengal (by KVKs of Birbhum, Hooghly, Howrah, South 24 Parganas, Uttar Dinajpur) and demonstrated in an area of 0.5 hain A&N Islands. Mainly IPM-205-07 (*Virat*) variety was taken under greengram FLDs, other variety are IPM-205-07 (*Virat*) and *CARI Moong 2*. The results depicts that the average yield blackgram and greengram is 12.78 q and 11.40 q, respectively. The difference of yield in comparison to check plot is maximum in case of blackgram (4 q/ha).

Table: Cluster Frontline Demonstration on Summer Pulses during 2022

Name of crop	State	Target of FLD approved		Achievements of FLD		Yield (qt/ha)		Increase %	Difference in yield (q/ha)
		No. of Demo	Area (ha)	No. of Demo	Area (ha)	Demo	Check		
Blackgram	West Bengal	125	50	125	50	12.78	8.73	46.37	4.05
Greengram	West Bengal	250	100	250	100	11.40	7.84	45.37	3.56
	A & N Islands	50	20	2	0.5	2.15	1.10	95.45	1.05
Total		425	170	377	150.5				



In kharif 2022, the major pulse crops are pigeonpea, blackgram and greengram which were demonstrated by the 18 KVKs Odisha and West Bengal in an area of 800 ha. Pigeon pea varieties namely PRG 176, LRG-52,41, BRG-5, UPAS-120, *Laxmi* by 18 KVKs of Odisha and West Bengal with participating 910 farmers. It recorded an average yield increase of 52.3 percent when compared to local check. Increase in average yield of black gram in West Bengal and Odisha was 42.77 and 29.20per cent, respectively.

In case of green gram demonstrations, the average increase in demonstrated yield was 31.79per cent in West Bengal whereas was 43.48 per cent in Odisha as shown in table. PU 31, a blackgram variety was covered in an area of 230 ha in West Bengal. The technologies like seed treatment, line sowing, integrated pest management and integrated nutrient management contributes to increase yield in all kharif pulses demonstrated.

Table: Cluster Frontline Demonstration on Kharif Pulses during 2022

Name of crop	State	Target of FLD approved		Achievements of FLD		Yield (q/ha)		Increase %	Difference in yield (q/ha)
		No. of Demo	Area (ha)	No. of Demo	Area (ha)	Demo	Check		
Pigeonpea	Odisha	675	270	675	270	11.85	8.28	43.08	3.57
	West Bengal	100	40	100	40	15.92	9.91	60.60	6.01
Blackgram	Odisha	275	110	275	110	5.95	4.60	29.20	1.34
	West Bengal	825	330	825	330	9.76	6.84	42.77	2.92
Greengram	Odisha	50	20	50	20	9.90	6.90	43.48	3.00
	West Bengal	75	30	75	30	9.56	7.25	31.79	2.31
Total		2000	800	2000	800				



The CFLD on Groundnut, Sesame and Sunflower were conducted in summer 2 demonstration was conducted in an

Lentil, chickpea, field pea, horsegram, blackgram and greengram are major rabi pulses crop demonstrated

under clustered frontline demonstration programme in rabi 2022-23, by KVKs of Odisha, West Bengal and A& N Islands to cover an area of 290 ha. Table below shows the state wise area covered by different rabi pulses in Zone V.

Table: Demonstration conducted under CFLD on Rabi Pulses during 2023-23

Name of crop	State	Target of FLD approved		Conducted demonstration	
		No. of Demo	Area (ha)	No. of Demo	Area (ha)
Lentil	West Bengal	200	80	200	80
Chickpea	Odisha	50	20	50	20
	West Bengal	25	10	25	10
Fieldpea	Odisha	25	10	25	10
	West Bengal	50	20	50	20
Horsegram	Odisha	25	10	25	10
Blackgram	Odisha	50	20	50	20
	A& N Islands	25	10	25	10
Greengram	Odisha	225	90	225	90
	A& N Islands	50	20	50	20
Total		725	290	725	290

14.3 Seed Hub Programme for Pulses:

Nodal Scientist: Dr.S.K. Roy

The availability of quality seed locally as a crucial factor in increasing the productivity of pulses, Department of Agriculture and Farmers Welfare, GoI, has taken initiative to ensure quality seed availability locally through creation of Seed-Hubs through a dedicated ICAR project “Creation of seed hubs for increasing indigenous production of pulses in India”. ICAR-IIPR, Kanpur is acting as Nodal Agency for implementation of project in creations of seed hubs and providing the technical support for quality seed production. The project has a provision of one time grant of Rs. 50 lakh in the first year per seed hub for creating infrastructures (seed processing plant and storage facility). In addition to this, Rs. 100 lakh has been allocated to each seed

hub as a revolving fund to meet various expenses for production, procurement and processing of seeds during 2016-18. The profit generated out of seed sale can be utilized by Seed-Hub for development of other facilities and engaging manpower *etc.*, as per requirement for increasing quality seed production of pulses

There are ten (10) seed hubs under ICAR-ATARI, Kolkata, Zone V, three (03) seed hubs in West Bengal (Malda (CISH), Narendrapur and Uttar Dinajpur) and seven (07) seed hubs in Odisha (Baragarh, Bhadrak, Cuttack, Deogarh, Kalahandi, Keonjhar, and Mayurbhanj I). All seed godowns are completed and processing plant are functional. 1871.4 q of seeds were produced in the years 2021-2022, of which 1226.8 q were certified and 644.6 q were foundation and certified seeds of blackgram, greengram, and pigeonpea. 225.5 q of blackgram and pigeon pea seeds were produced in kharif 2021.

Table: Seed Production of Seed Hub during Rabi (2021-22)

Sl. No.	Name of Seed Hub	Crop	Variety	Target 2021-22(q)	Actual Production (q)	Category of seed
1	Uttar Dinajpur	Blackgram	IPU - 2-43	50	20.5	CS
		Greengram	IPM-02-3 & IPM-02-14	100	56.7	FS & CS
		Lentil	KLS-122, IPL 220, L -4717	50	19.2	FS & CS
Total				200	96.4	
2	CISH Malda	Lentil	IPL-220, PusaAgeti Masoor	300	220.5	FS

Sl. No.	Name of Seed Hub	Crop	Variety	Target 2021-22(q)	Actual Production (q)	Category of seed
3	South 24 Pgnos. (Additional) Narendrapur	Lentil	L-4717,IPL-220	200	233	FS & CS
		Khesari (Lathyrus)	BidhanKhesari-I,Ratan, Mahateora	100	102	FS & CS
		Greengram	Virat (IPM-205-7),IPM-2-14	700	715	CS
Total				1000	1050	
4	Bhadrak	Greengram	IPM-02-14	300	96.72	CS
5	Mayurbhanj I	Greengram	IPM-02-14	50	18.2	CS
6	Kalahandi	Pigeonpea	PRG-176	480	90	CS
7	Bargarh	Pigeonpea	PRG-176	100	13.2	FS
		Greengram	IPM-02-14	500	14.68	CS
Total				600	27.88	
8	Deogarh	Pigeonpea	PRG-176	80	3.5	CS
		Greengram	Virat	100	4.2	CS
Total				180	7.7	
9	Keonjhar	Pigeonpea	PRG-176	160	20	CS
		Blackgram	Vallabh Urd 1	150	10	CS
		Greengram	IPM-02-14	50	10	CS
Total				360	40	
10	NRRI Cuttack	Greengram	IPM 02-14	1000	224	CS
Grand total				4470	1871.4	

Table: Seed Production of Seed Hub during Kharif 2022

Sl. No.	Name of Seed Hub	Crop	Variety	Target 2021-22 (q)	Actual Production (q)	Category of seed
1	Uttar Dinajpur	Blackgram	PU-7	2.5	1.7	FS
			PU-8	1.5	0.7	FS
			IPU-10-26	3	1.6	FS
			IPU-13-1	3	1.8	FS
			VBN-9	5	3.2	FS
			IPU-11-2	5	3.7	FS
			IPU - 2-43	100	69.8	CS
Total				120	82.5	
2	Bargarh	Pigeonpea	LRG-52	40	5.0	FS
3	Deogarh	Pigeonpea	LRG-52	80	10.5	CS
4	Keonjhar	Pigeonpea	LRG-52	80	50	CS
5	Kalahandi	Pigeonpea	LRG-52	120	77.5	CS
Total				320	143	
Grand total				440	225.5	



Seed Hub centres at KVK Bhadrak and KVK South 24 Parganas (Addl.), Narendrapur

14.4 Farmer FIRST Programme:

Nodal Scientist: Dr. K.S. Das

A novel initiative of the Indian Council of Agricultural Research (ICAR), the 'Farmer FIRST Programme', was focused on Farmers' Farm, Innovations, Resources, Science and Technology (FIRST) where farmers played a central role in the identification of research problems, prioritisation of those problems, and conduct of experiments as well as their management in field conditions. Small-scale and marginal farmers, especially women, were the main target groups. This programme came into action during the year 2015-16. However, after zone reorganization, Odisha came under the jurisdiction of ATARI Kolkata since 2017-18. Accordingly, Farmer FIRST projects pertaining to ICAR-NRRI, Cuttack; ICAR-CIFA, Bhubaneswar; ICAR-IIWM, Bhubaneswar and OUAT, Bhubaneswar came in operation under ATARI Kolkata.

During the year 2022, a total of 792 demonstrations were conducted under crops, horticulture, livestock/ fisheries, IFS, NRM and enterprise-based modules

with involving total 2366 farm families. On the other hand, 38 programmes on different extension activities were also conducted which involved 1903 farmers. Two zonal review workshops (one online and one off-line) were organised by ICAR-ATARI Kolkata for four FFP institutes to review the physical/financial progress (2021-22 and 2022-23) of the projects and to finalize the action plan (2022-23 and 2023-24). Two field visits were conducted to monitor the progress of various activities being carried out by the project institutes at their new and old adopted villages.

Considering the doubling farmers income, about 200 cases of successful farmers were collected from the concerned institutes in the prescribed proforma of ICAR and all cases were submitted to the ICAR-ATARI, Hyderabad for its publication. During the period of report, one initiative was taken to publish a coffee table book entitled 'Pioneer Farmers: Agri-sustainability through Farmer FIRST approach' from ATARI Kolkata on selected successful farmers of the project since the year 2016-17 to 2020-21. The details of FFP projects and budget allocation during 2022-23 have been given as under.

Sl. No.	Name of the project (Institute/University)	Name of the PI/Nodal Scientist of the project	Fund allocated during 2022-23 (Rs. in lakh)	Fund utilized during 2022-23 (Rs. in lakh)
1.	Increasing productivity and sustaining the rice-based production system through Farmer FIRST approach (ICAR- National Rice Research Institute, Cuttack)	Dr. Biswajit Mondal, Pr. Scientist	20.00	17.85
2.	Promoting Improved Agriculture and Allied Sector Technologies in Khordha District through Farmer FIRST Approach (ICAR- Central Institute Freshwater Aquaculture, Bhubaneswar)	Dr. H. K. De, Pr. Scientist	16.75	16.63

Sl. No.	Name of the project (Institute/University)	Name of the PI/Nodal Scientist of the project	Fund allocated during 2022-23 (Rs. in lakh)	Fund utilized during 2022-23 (Rs. in lakh)
3.	Enhancing water and livelihoods security and improving water productivity in tribal dominated paddy fallow rainfed agro eco system of Odisha (ICAR-Indian Institute of Water Management, Bhubaneswar)	Dr. D. Sethi, Scientist	16.50	12.48
4.	Enhancing Farm Productivity & profitability with 'Farmer FIRST' FOCUS IN Khordha district of Odisha (OUAT, Bhubaneswar)	Dr. B. S. Rath, Professor	16.50	16.00
5.	ICAR-Agricultural Technology Application Research Institute (ATARI) Kolkata	Dr. K. S. Das Pr. Scientist	6.50	5.70
<i>Total</i>			76.25	68.66

Salient achievements of projects

ICAR-CIFA, Bhubaneswar

The Farmer FIRST project of ICAR-CIFA, Bhubaneswar covered five villages i.e. Anthuari, Purohitpur, Barijanga (Block-Balianta), Siddhakutila and Brahmanakhandi (Block- Balipatna) in Khordha district. During the year 2022-23, two field days and six scientist-farmer interfaces were organised involving 50 and 420 farmers, respectively. Different technological interventions under five modules were demonstrated in the adopted villages involving more than 400 beneficiaries. Grow out carp culture was demonstrated in individual and community ponds in an area of 6ha comprising 150 beneficiaries. Good quality fish seed, timely testing of soil and pond water sample, recommended dose of feed and lime application led to increase in the production. An average yield of 3t/ha was recorded in the ponds of adopted villages. Integrated Nutrient Management in paddy was demonstrated in 14.4 ha involving 36 beneficiaries. A new technology on 'IFFCO Nano Urea' was demonstrated in the adopted villages (Dose: 3 to ml/litre of water). An average yield of 55 q/ha was recorded in PAN 804 variety whereas *Gayatri* and *Mali 4* cultivar yielded up-to 50 q/ha in the demonstration plots. Green manuring, micronutrient

supplement and balanced use of RDF enhanced the productivity and profitability of the beneficiaries. Thermo-insensitive variety of cauliflower var. *Fujiyama* was demonstrated in 1.7 ha area involving 35 beneficiaries of 4 villages. An average yield of 18 t/ha was recorded in the demonstration plots. Three fish based integrated farming systems having an area of 3.35 ha were developed and enterprises like horticulture, dairy, poultry and vermicomposting etc. were integrated for profit maximization. The ICAR-NAARM conferred Sri B. C. Nayak, an adopted farmer of ICAR-CIFA, with 'Innovative Farmer Award' under the theme 'Doubling Farmers' Income' on its 47th Foundation Day celebration held at Hyderabad on 01.09.2022. 'One stop aqua shop' was established in Naroda, Balipatna. It would meet the needs of the member farmers (quality fish seed, feed, medicines and other inputs) at one location in order to strengthen Bhargabi Fish Farmers Producers Company Limited. Additionally, that was served as a sales outlet for member's high-quality fish. Chaupal under Aquaculture Field School (AFS) at Sarakana village (Balianta block) was also constructed which worked on the principle of farmer-to-farmer extension. During reporting period, one research article and one brochure on significant achievements of FFP in English were published.



ICAR-NRRI, Cuttack

The Farmer FIRST project covered four old villages (Satyabhamapur, Biswanathpur, Laxminarayanpur, Ganeswarpur) and four new villages (Purusottampur, Ganapur, Gopinathpur and Malihata) in Cuttack district and involved 748 farmers including farm women under different modules and 657 farmers including farm women under capacity building and different extension activities. The institute demonstrated eight most promising rice varieties namely CR Dhan 1009 (Sub-1), CR Dhan 409 (Pradhan dhan), Pooja, CR Dhan 800, Swarna Sub-1, CR Dhan 312, CR Dhan 507 and CR Dhan 508 with complete package of practices during kharif 2022 covering over 57 ha area in eight adopted villages. As critical inputs, 10-15 kg seed mini kits along with need-based pesticides were provided to each of the 270 farmers. The demonstration of raising mat type rice nursery using rice seedling trays (100 nos.) and transplanting through eight-row power tiller operated rice transplanter were done in all adopted villages. Demonstrated and distributed *Trichoderma viridae* as a bio-fungicide for seed and soil treatment, and also distributed green manuring Dhaincha not only to incorporate the nitrogen but also to improve the soil health by improving the physical and chemical properties of the soil. Five quintals Dhaincha seeds were provided to 270 farmers through the project.

Neem based pesticide spraying was demonstrated around 50 acres through drone technology on paddy and horticultural crops. It helped the farmers a lot as there were some distinct advantages like high field capacity and efficiency, less turnaround time and other field operational delays, wastage reduction of pesticide due to high degree of atomization and water saving due to ultra-low volume spraying. Farmers were trained to use android-based trilingual 'Rice Pert' mobile app (English, Hindi and Odia) developed by the institute as a decision support system at all operational levels in rice farming. Vegetables like cucumber (*Rain Special*), bitter gourd (*US 1315*), tomato (*Mithili*), okra (*Shivansh*) and ridge gourd (*NZ 1001*) were demonstrated for 206 farmers/farmwomen. Mulching sheets were distributed for conservation of soil moisture, suppression of weed growth, prevention of soil erosion, control of pest and disease and demonstration was conducted for 8 farmers/farmwomen.



Under livestock-based module, distribution of mineral mixture was done for 100 farmers and demonstration was done to use mineral mixture as a macro-and micro- mineral element for proper metabolic functions of cows, goats, poultry and fishes. About 50000 no. fish fries consisting of *Rohu*, *Catla* and *Mrigal* were also distributed among 37 farmers/farmwomen. Poultry bird *Vanaraja* was distributed among 48 farmers/farmwomen and demonstrations were done on the rearing of those birds under backyard conditions.

Under enterprisebased module, demonstrated the cultivation method of paddy straw mushroom for 34 farmers/farmwomen @ 10-50 beds each. In addition, technical backstopping was also provided to over ten FFP promoted mushroom entrepreneurs. Agro-shade net house was structured for controlling the incidental sun light falling upon the mushroom bed of 10 farmers.



Under capacity building and extension activities, training programme was conducted on '*Deficiency syndromes in animal and birds: Prevention and medication*' for 104 farmers. Exposure visit of farmers was also conducted. Thirty nine farmers received innovative Farmers Award from ICAR-NRRI, Cuttack on the occasion of 77th Foundation Day and '*Dhan Diwas*' celebration. More than hundred farmers from the adopted villages were mobilized to become member-cum-shareholder of '*Nirmalya Farmers Producer Company Ltd.*', Salipur, Cuttack. Not only that, training-cum-demonstrations on paddy seed treatment with *Trichoderma* bio-agent, *kharif* nursery management, commercial paddy straw mushroom farming, scientific backyard poultry farming for livelihood and nutritional security, mushroom cultivation and fish rearing for enhancing farmers' income were also conducted during the period under report.

Sh. U. C. Padhi was felicitated as '*Innovative Farmer*' during Garib Kalyan Sammelan. Sh. S. Swain, Smt. Puspita Samal, Smt. Mamta Biswal and Sh. R. K. Sahoo were felicitated on the occasion of Foundation Day celebration for their involvement in adoption of NRRI rice varieties and technologies during the year 2022. Adopted farm-woman Smt. Menaka Mohanty and Smt. Lilipta Behera were also awarded for her leadership role in agriculture and allied areas on the occasion of '*International Women's Day*' celebration at ICAR-NRRI, Cuttack.

OUAT, Bhubaneswar

During the year 2022-23, under Farmer FIRST Programme, the selected villages of OUAT, Bhubaneswar were Govindapur, Gopalpur, Brahmapura and Brahmapurapatna under Govindapur GP of Begunia Block in Khordha district. For the horizontal expansion, two new villages were selected. The major cropping systems of the area were rice-green gram, rice-fallow, rice-vegetable and vegetable-vegetable. With regards to other vocations, farmers depend on goatery and back yard poultry for supplementary income. Before implementation of the project, the farmers were following broadcasting of low yielding local varieties- *Nalidhusura*, *Chinamali* etc. After FFP interventions, demonstration of line sowing was

popularized and HYVs like *Swarna Sub-1* and *Hasant* were introduced with improved package of practices. The average yield of local variety was about 26 q/ha which gave net return of Rs. 11534/- to the farmers, whereas, *Swarna Sub-1* and *Hasant* (both of 145 days) had the average yield of 45.7 and 48.3 q/ha with the net return of Rs. 22350/- and

Rs. 26250/-, respectively. The variety *Swarna Sub-1* was cultivated by 155 farmers in 50.2 ha area and *Hasant* variety was grown by 95 farmers in 33.2 ha area. The per cent increase of production of *Swarna Sub-1* and *Hasant* over farmers' practice was noted to be 76 and 86%, respectively.



Under horticulture based module, the farmers were demonstrated for cultivation of hybrid pumpkin var. *Vimal*, hybrid cucumber var. *Rajmata*, papaya hybrid *Red Lady 782* and marigold rooted cuttings *BM 2* for pro-tray culture under poly-house. The

seed rate was reduced by 500g/ha. It was found that mostly the off-season cultivation of hybrid pumpkin with improved package of practices enhanced the profitability. The economics of horticultural crop production are given in the table.

Crop variety	No. of farmers	Area (ha/ac)	Yield (q/ha)	Percentage growth over Farmers' Practice	Net return (Rs.)
Pumpkin Tokita hybrid 'Vimal'	70	7.5	325.0	117	193411
Cucumber- Annapurna hybrid 'Rajmata'	20	4.2	207.0	66	186429
Papaya hybrid 'Red Lady 782'	13	2.5	292.0	Newly introduced	207960
Marigold, rooted cuttings <i>BM 2</i>	04	0.25	1.97	Newly introduced	12350



Under livestock-based module, vaccination against HS, BQ and FMD and routine deworming were done. Mineral mixture and vitamins were supplied to the farmers for supplementing with feed. Training programmes were conducted on scientific dairy farming, oestrous synchronization, nutritional management and adopting hygienic measures to check spread of animal diseases. Twenty-five repeat breeding cows were properly treated for pregnancy, timely AI was done for many animals resulting into regular calving. That caused increased milk production from 2 lit/day to 5 lit/day and farmers' income enhanced from Rs. 1500/-

per month to Rs. 3750/- per month. In case of goat, after introducing superior *Ganjam* breed buck, the kid mortality rate came down to 3.95% from 20%. The average birth weight of kids was 2.53kg during 2021-22 which changed to 2.66kg during 2022-23. The weaning weight of kids at 90 days also changed from 5.03 kg (2021-22) to 5.20 kg (2022-23). As a result, the average annual income of farmers from goateries was increased by Rs. 10934/- since inception of the project. The adopted new villages under FFP were provided with two superior bucks. The impact of FFP interventions will be assessed with due course of time. The convergence was done

with the State Govt. Department. The beneficiaries were provided with 21 days old chicks rather than day old chicks which decreased the mortality rate from 46.2 to 9.75%. The chicks were vaccinated and farmers were supplied with vitamins, supplements and feeds for proper growth. The annual profit was increased from Rs. 50400/- to Rs. 89600/- from rearing birds. Not only that, it created employment to the unemployed youth and women of the adopted villages.



Under enterprise based module, 20 farmers were demonstrated for mushroom spawn production (boiling of wheat, drying/filling of bottles, plugging with non-absorbent cotton, autoclaving and inoculations in the bottle) at Parichhal village. Total 250 spawn bottles (200 oyster + 50 paddy straw) were prepared during the period and used for their own purpose. Demonstrations on dal mill operation, fruit juice and beverage preparation were done involving 50 farmers.

The partnership was built with the Department of Horticulture/Agriculture/Animal Husbandry/Mission Shakti of Govt. of Odisha for holistic agricultural development in the district. Different publications were made in reputed journals/magazines/newspapers on different activities of the projects. Field day-cum-farmer scientist interaction was also organized. Sh. H. Pradhan of Gobindapur was felicitated at 50th Golden Jubilee of Odisha Lift Irrigation System, OUAT Farmers' Fair and Krushi Odisha as successful and leading farmer of Khordha district.

ICAR-IIWM, Bhubenswar

In addition to three existing adopted villages- Khuntapingu, Mallarpada and Jamuda of Keonjhar, three new contiguous villages, namely Haridamada, Giringaput and Jamujhari in Khordha district with a sizable tribal population were selected during 2022-

23 within 30 kilometers distance from the institute and adopted for module-based technological interventions. Brief demographics (frequency and percentage of total population and caste composition) of the newly adopted village cluster are as follows.

Village	SC %age	ST %age	Others %	Total
Haridamada	0 (0.0)	345 (51.72)	332 (49.78)	677 (100.0)
Giringaput	35 (2.86)	441 (35.97)	750 (61.17)	1226 (100.0)
Jamujhari	27 (2.36)	305 (26.66)	812 (70.98)	1144 (100.0)

N.B.: Figures in the parentheses indicate percentages

Under crop based module, sweet corn was cultivated in summer season through irrigation. Polythene mulching was demonstrated covering 30 participants from 2 SHGs of Mallarpada and Jamuda village of Keonjhar district. Critical inputs e.g. polythene mulching materials, fertilizers and hybrid sweet corn of *Sugar-75* variety were provided for higher productivity. Paddy seed production was also demonstrated under irrigated

condition in *rabi* season for enhancing productivity and farmers' income. Truthfully leveled paddy seed production of two varieties i.e. *CR Dhan-312* and *Lalat* was conducted in Haridamada village involving 15 farmer participants with a coverage of 6 acres land during *rabi* season of 2022-23. Pre-emergence herbicide and pesticide were provided to the farmers for weed/pest management.

Village	Land (acre)	Seed provided (kg)	Total production (q)	Price/kg (Rs.)	Total income (Rs.)	Total cost of production	Net income (Rs.)	B:C Ratio
Mallarpada	1.5	5	91.50	15.00	137250	47000	90250	2.92
Jamuda	0.8	3	58.30	15.00	87450	36800	50650	2.38



Under horticulture based module, tissue culture banana cultivation under polythene mulching was demonstrated successfully in the fields of 14 participating farmers in adopted villages of Keonjhar. Demonstration of improved variety of nutri-garden kits for nutritional security was carried out in the backyard of 400 farm families in both Keonjhar and Khordha districts. Demonstration of



grafted brinjal cultivation under polythene mulching was conducted in adopted villages of Keonjhar. A total of 1000 grafted brinjal seedlings along with pheromone trap, yellow sticky trap and light trap were provided as critical inputs. The results of the demonstrations of *kharif* vegetables in 3 villages of Keonjhar are given below.

Items vs. crops	Brinjal	Bittergourd	Okra	Tomato	Cabbage
No.offarmers	45	8	15	25	22
Production (q/ha)	206.01	101.81	123.66	235.86	240.83
Average cost ofcultivation (Rs./ha)	51000/-	75000/-	42000/-	45000/-	65000/-
Average net income (Rs./ha)	567030/-	332240/-	205320/-	426720/-	657490/-



Under enterprise based module, paddy straw mushroom farming and vermi-composting were demonstrated in three adopted villages of Keonjhar district. As critical inputs, 400 bottles of mushroom

spawns and 12 vermi-composting beds along with required quantity of earthworms were provided to the 12 SHGs.



Under NRM based module, demonstration of water conservation through polythene mulching was conducted in farmers' fields involving more than 40 adopted farmers and farmwomen in three adopted villages of Keonjhar cluster. Thirty-six soil

samples were collected from farmers' agricultural plots, fallow land and forest plantation lands of Khuntapingu, Mallarpada and Jamuda of Keonjhar and analyzed for their physical and chemical properties. The results are given in the table.

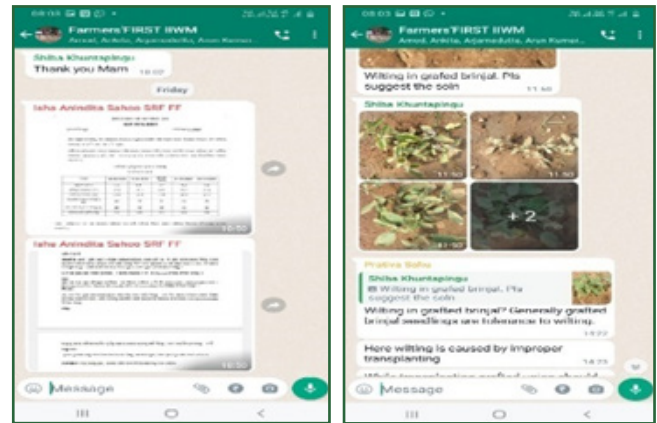
Village	Soil organic carbon (%) Mean (SD)	Sand (%) Mean (SD)	Silt (%) Mean (SD)	Clay (%) Mean (SD)
Khuntapingu	0.56 (0.12)	54 (6.82)	17 (3.28)	29 (7.82)
Jamuda	0.60 (0.10)	54 (9.46)	18 (4.26)	28 (9.26)
Mallarpada	0.57 (0.09)	56 (9.34)	16 (4.02)	27 (9.80)



During the period under report, two training programmes on 'Pre kharif crop selection and agricultural practices' in Jamuda village and 'Importance of nutri-garden for nutritional security' in Haridamada (Behera Sahi) village and one *Swachhata* awareness programme in Haridamada (Tribal Sahi) were organized for 101, 52, and 72 farmers, respectively. Nutri-garden kits with 12 different vegetable seeds for *rabi* season were also distributed among farmers.



The content mobilization was done through dedicated *WhatsApp* group comprising of farmers and scientists from different disciplines. Timely and problem-solving advisory services were provided along with sharing of agricultural knowledge and information. Weekly weather forecast and package of practices of different crops provided by IMD were being shared with the farmers on regular intervals through sending messages. Farmers of the project area were also connected with *Kisan Sampark Sutra* conducted every fortnightly by ICAR-IIWM, Bhubaneswar through zoom platform to provide knowledge on advanced agricultural knowhow to farmers.



14.5 Scheduled Tribe Component (STC) erstwhile Tribal Sub-Plan (TSP):

Nodal Scientists: Dr. K.S. Das and Dr. S.K. Mondal

The Scheduled Tribe Component (STC) erstwhile Tribal Sub-Plan (TSP) was implemented during Fifth Five Year Plan (1974-1979) with the objective to channelize the flow of outlays and benefits from the general sectors in the Central Ministries/ Departments for the development of Schedules Tribes at least in proportion to their population, both in physical and financial terms. The Ministry of Tribal Affairs, GoI identified tribal dominated districts across the country to provide the tribal people a better quality of life. Ten tribal dominated districts i.e. one district (Nicobar) from Andaman & Nicobar Islands and nine (Gajapati, Kandhamal, Mayurvanj-I and II, Malkangiri, Nabarangapur, Raygada, Sundergarh-I and II) from Odisha state were identified from this Zone under STC programme during the year 2022. An amount of Rs. 399.00 lakh fund was allotted to those 10 KVKs (Rs. 8.60 lakh for A & N Islands and Rs. 390.40 lakh for Odisha) to conduct different activities like agricultural farming, horticulture, animal husbandry, dairy development, vocational training, kitchen gardening, fish production, and many others for livelihood development of tribal community.

The physical output and outcome under STC by the KVKs under ICAR-ATARI Kolkata during 2022 have been presented below. The substantial number (3396) of assets in the form of sprayer, ridge maker, sickles, pump set, weeder, store bins, drip irrigation set, poultry feeder/drinker, small

agricultural implements etc. were created and distributed among tribal farmers during the period. The KVKs of tribal districts conducted 88 OFTs and 1781 FLDs for overall agricultural development in the districts. About 11745 farmers were trained and more than 30000 farmers took participation in various extension activities conducted by the KVKs. The KVKs produced 902.65 quintals seed, 7.23 lakh

planting materials and about 54594 livestock strains and fish fingerlings. Not only that, ten KVKs under ATARI Kolkata conducted 430 programmes on 'Awareness camp', 'Swachha Bharat Abhiyaan', 'Special Day Celebration', 'Planting materials distribution', 'Vaccination camp', 'Animal health camp' etc. About 12.63 lakh farmers got mobile agro-advisory services through 10 KVKs.



Table: Physical output and outcome under TSP during 2022

Sl. No.	Achievements of physical output		Achievements of physical outcome	
1.	Asset creation (in number; Sprayer, ridge maker, pump set, weeder etc.)	3396	Number of technologies identified after assessment	37
2.	On-farm trials (in number)	88	Upgraded skills and knowledge of farmers (in number)	20165
3.	Frontline demonstrations (in number)	1781	Oriented extension personnel in frontier areas of agricultural technology (in number)	1024
4.	Farmers training (in lakh)	0.11745	Increased availability of quality seed (in quintal)	1519.8
5.	Extension personnel training (in lakh)	0.01103	Increased availability of quality planting materials (in number)	1081447

Sl. No.	Achievements of physical output		Achievements of physical outcome	
6.	Participants in extension activities (in lakh)	0.30406	Increased availability of live-stock strains and fingerlings (in number)	52057
7.	Seed production (in quintals)	902.65	Testing of soil & water samples for balance fertilizer use (in number)	3898
8.	Planting materials production (in lakh)	7.22709		
9.	Livestock strains and fingerlings production (in lakh)	0.54594		
10.	Soil, water, plant, manures samples testing (in lakh)	0.03943		
11.	Provision of mobile agro-advisory to farmers (in lakh)	12.63249		
12.	No. of other programmes (Swachha Bharat Abhiyaan, agriculture knowledge in rural school, planting material distribution, vaccination camp, animal health camp etc.)	430		



About 20165 farmers upgraded their agricultural knowledge and skills, and 3898 farmers got benefit from testing soil and water samples to use balanced fertilizer in their fields. The availability of quality seed, planting materials, livestock strains and fish

fingerlings etc. in the tribal districts were increased during the period. The district and village-wise beneficiary depicted that 17645 tribal farmers from 275 villages got benefit from this plan during the year 2022.

Table: Location and beneficiary details during 2022

Name of KVK/state	District	Sub-district	No. of villages	Village-wise total amount spent (Rs.)	ST population benefitted (No.)	Description of activity
A & N Islands	1	1	14	318935	1799	Conducted OFTs/FLDs/ trainings, supplied planting materials/inputs/ livestock strains, analyzed soil samples, provided mobile agro-advisory services etc. to the tribal farmers.
Odisha	9	45	261	8425009	15846	
Total	10	46	275	8743944	17645	

Not only that, 44 programmes were organized by the KVKs to promote agri-entrepreneurship which benefitted 168 farmers in this zone. As far as natural farming was concerned, the numbers of demonstrations, trainings and awareness programmes were noted to be 46, 65 and 144, respectively. The respective benefitted farmers were 257, 1166 and 2893 during the period under report.



14.6 Attracting and Retaining Youth in Agriculture (ARYA):

Nodal Scientist: Dr. P.P. Pal

In light of declining rural economies and dissipating rural populations, scholars, policy makers and programme developers have increasingly looked to local business development and entrepreneurship as a means of revitalizing rural communities across the globe. Due to the immense potential of younger residents to make significant contributions to the economic landscape and community, youth entrepreneurship and workforce preparation in particular are being positioned as crucial elements of business development and revitalization. Recent demographic trends indicate increased levels of migration among younger segments of society from many small towns and villages across the country in search of better educational and economic opportunities to sustain their livelihood which make them vulnerable to feel disconnected from their own communities. The consequences of such rural decline can be severe and widespread. Lack of employment opportunities and dissipating populations can mean that local businesses become less sustainable, and smaller populations translate to lower tax bases unable to sustain basic social services (e.g., healthcare, schools). This further aggravates the problem of emigration of rural youths and dissipation of rural communities. To overcome such 'brain-drain' or, 'hollowing out' situation, motivating youth to find job opportunities in their rural communities is of utmost importance. Youth entrepreneurship is widely being recognized as a promising approach across the world to numerous economic difficulties, such as a lack of employment and a declining level of economic viability in rural and/or developing areas. Owing to

their unique attitudinal and motivational features like risk bearing ability, flexibility and higher receptivity to new knowledge and technologies compared to their senior counterparts, youths may be especially primed to become entrepreneurs. Due to remote area rural enterprises often experience a reduced market concentration, limited direct access to entities crucial to business operations (such as suppliers), and in many cases, poor infrastructure. At the same time, rural enterprises pose certain advantages like reasonably steady workforce base, higher levels of employee loyalty and reduced land costs. Hence, in order to achieve a substantial and long-lasting positive impact on future society and the economy, small businesses need to act in an entrepreneurial way.

Realizing the importance of rural youth in agricultural development especially from the point of view of food security of the country and to empower rural youth, the Indian Council of Agricultural Research (ICAR) had initiated a flagship programme on 'Attracting and Retaining Youth in Agriculture (ARYA)' during

2015-16. Under this scheme, special efforts are being taken up to attract the rural youth under the age of 35 years in agriculture to provide income generating opportunities and engage them in agriculture.

In this zone, during 2022 altogether nine KVKs namely, Nimpith, Hooghly, Uttar Dinajpur and Purulia from West Bengal and Nayagarh, Sambalpur, Ganjam-1, Puri, and Cuttack from Odisha are involved in carrying out this programme. The respective districts of West Bengal and Odisha implementing ARYA project through the KVKs are shown in Figure1. The achievements of the project have been assessed against different parameters like increased number of participants, average seasonal/ yearly income, additional manpower creation and support of various organizations towards entrepreneurship development. The total number of training conducted this year increased substantially, and as a result, the number of youths got benefited increased as well. Table1 indicates the positive changes among the youths in respect of the stated parameters.

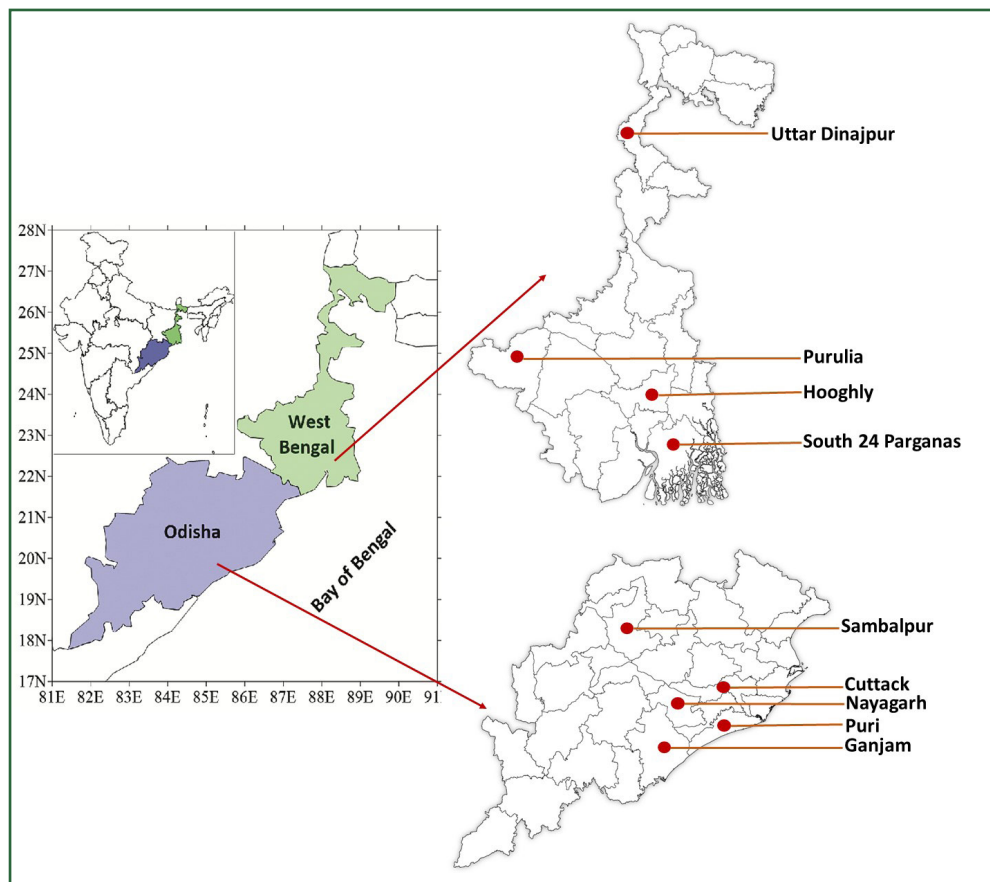


Figure: Districts implementing ARYA project at West Bengal and Odisha through KVKs collaborating with ICAR-ATARI Kolkata

Table: Training and horizontal spread of ARYA activities

Name of the Enterprise	No. of Training in 2022	No. of youth trained in 2022	No. of entrepreneurial unit established in 2022
A. Nimpith KVK			
Fish Hatchery	1	13	5
Horticulture nursery	1	10	5
Mushroom	1	16	4
Poultry	1	10	5
B. Purulia KVK			
Lac cultivation	2	30	15
Vermicompost	2	30	10
Horticulture nursery	2	30	14
Goatery	2	30	20
C. Uttar Dinajpur KVK			
Mushroom	2	40	6
Vermicompost	2	40	8
Fish Hatchery	1	20	6
Horticulture nursery	3	65	2
D. Hooghly KVK			
Horticulture nursery	1	14	6
Poultry	1	12	12
Mushroom	1	16	8
Vermicompost	1	15	5
E. Cuttack KVK			
Mushroom	1	25	6
Poultry	0	0	0
Goatery	0	0	0
Horticulture nursery	1	15	5
F. Nayagarh KVK			
Poultry	2	40	20
Mushroom	2	40	20
Fish Hatchery	2	40	20
Horticulture nursery	2	40	0
G. Sambalpur KVK			
Poultry	2	20	20
Mushroom	2	22	18
Horticulture nursery	2	20	16
H. Ganjam-I KVK			
Fish Hatchery	1	25	11
Poultry	1	30	21
Mushroom	1	30	29
Horticulture nursery	1	25	11
I. Puri KVK			
Mushroom	2	30	30
Poultry	2	30	25
Apiary	2	30	30
Fish Hatchery	2	30	55

The findings of the performance in respect of youth involved and entrepreneurial units developed are presented graphically in Figure. It is observed that irrespective of KVKs, out of eight (08) enterprises, the highest and the lowest numbers of entrepreneurial units were developed in Mushroom (121) and Lac cultivation (15) enterprises, respectively. Irrespective of enterprises, among the nine (09) KVKs, highest

number of units were developed in Puri KVK (140) followed by Nayagarh (80), Ganjam-I (72), Purulia (59), Sambalpur (54), Hooghly (31), Uttar Dinajpur (22), Nimpith (19), and Cuttack (11). It was also observed that irrespective of KVKs, out of eight (08) enterprises, the highest number of youth were involved in mushroom enterprise (190) followed by poultry enterprise (144).

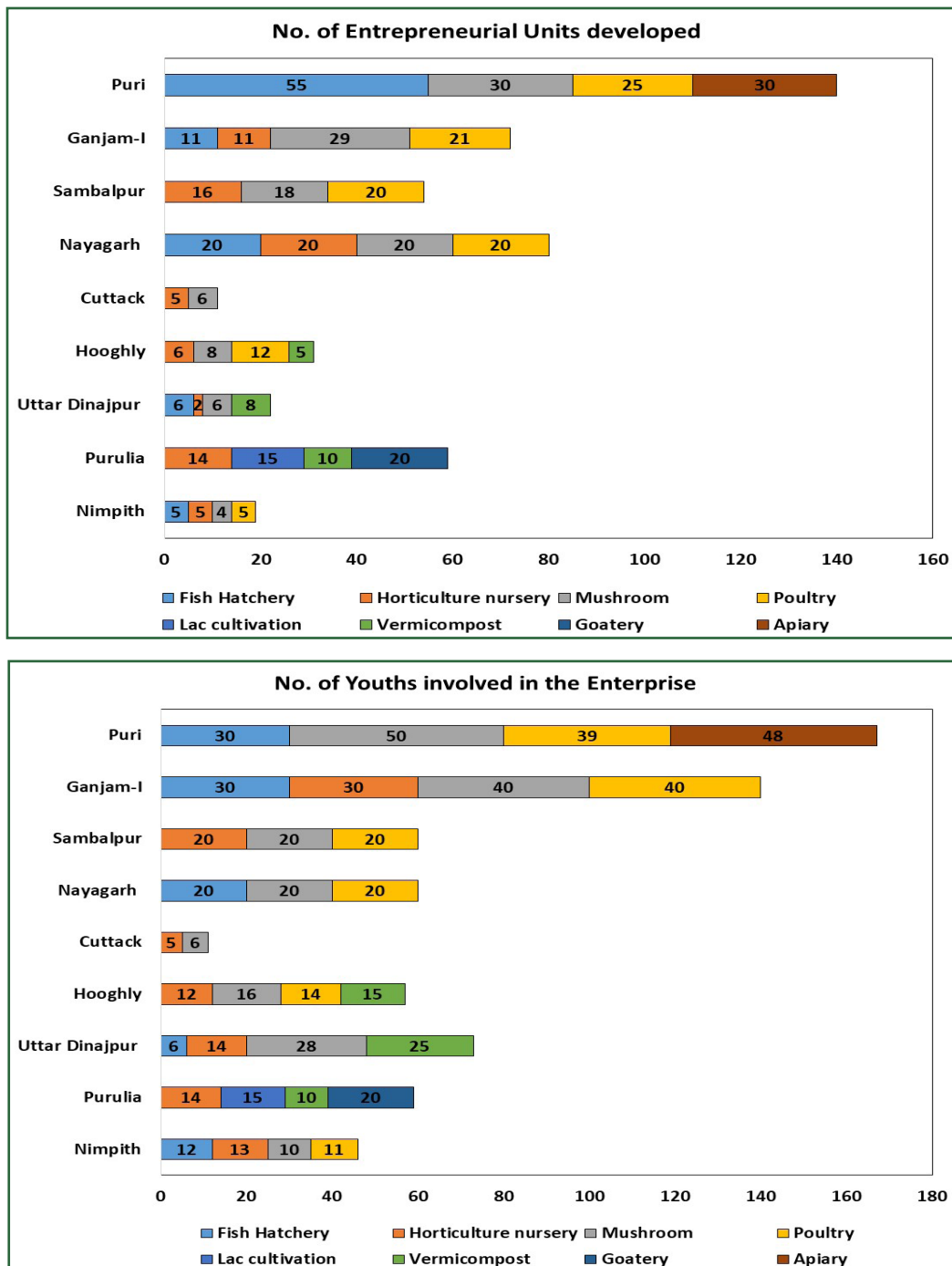


Figure: Number of entrepreneurial units developed and youth involved under the project ARYA

Moreover, the impact of this initiative was clear from the improvement in the livelihood of rural youth - in most of the beneficiaries it was seen that the youth

were able to earn more than their previous earning. The incomes from eight (08) different enterprises before and after adopting ARYA are given in Table.

Table: Impact of implementing ARYA during 2022

Sl. No.	Name of the Enterprise	Annual Income (Rs.)	
		Before adopting ARYA	After adopting ARYA
1	Apiary	18000-22000	51000-98400
2	Backyard poultry	29220-120075	60000-385350
3	Fish hatchery	29166-40200	65750-168000
4	Goatery	672000-674000	808400-809400
5	Horticulture nursery	43000-462000	77000-897600
6	Lac cultivation	699500-1139500	2578700-9601850
7	Mushroom cultivation	12000-432000	72000-1296000
8	Vermicompost production	26400-87000	96000-202000



Horticulture nursery



Mushroom cultivation



Apiary

14.7 Mera Gaon Mera Gaurav Programme:

Nodal Scientist: Dr. P.P. Pal

Several agricultural revolutions have gradually increased our food production. However, to achieve self-sufficiency and better livelihood for Indian farmers, more works are yet to be done. The technologies developed and refined by research institutes, agricultural universities, and private and other organizations are accepted and adopted to various extents by the farming community. The Hon'ble Prime Minister of India launched Mera Gaon Mera Gaurav (MGMG) 2015 to strengthen

the bond between scientific development and their implementing section, especially in agricultural production. It is an innovative program planned to promote the direct interface of scientists with the farmers to hasten the lab-to-land process. This scheme aims to provide farmers with the required information, knowledge, and advisories regularly by adopting villages.

In the zone of Odisha, WB, and Andaman & Nicobar Islands, ICAR-ATARI Kolkata is monitoring this project and implementing it with the help of several other ICAR institutes, regional centers, and SAUs.

(In number)

State	Groups/team	Scientists involved	Villages covered	Field activities	Messages / advisory sent	Farmers benefitted
West Bengal	53	150	161	298	289	13535
Odisha	48	164	164	310	275	16346
Andaman & Nicobar Islands	12	57	15	29	42	1725
Total	113	371	340	637	606	31606



14.8 Celebration of Swachhta Pakhwada 2022 (*Swachhta Hi Suraksha*):

Nodal Scientist: Dr. S.K. Mondal

During 2022, various Swachhta activities were

conducted by ICAR-ATARI Kolkata as well as its constituent KVKs. For various Swachhta Action Plan (SAP) activities a total of Rs. 9.00 lakh was sanctioned and utilized in the Zone. The details have been given below

Table: Celebration of Swachhta Pakhwada from 16 to 31 December, 2022 – ‘Swachhta Hi Suraksha’

Sl. No	Date	Activities	No. of KVKs Involved	No. of Participants (Farmers/ Staffs/ other Participants)	No. of VIPs attended the program
1	16.12.2022	Display of banner at prominent places, taking Swachhata pledge, Stock taking & briefing of the activities to be organized during the Pakhwada, plantation of trees.	59	705	37
2	17.12.2022	Basic maintenance: Stock taking on digitization of office records/ e-office implementation. Cleanliness drive including cleaning of offices, corridors and premises. Review of progress on weeding out old records, disposing of old and obsolete furniture's, junk materials and white washing/painting.	34	251	21
3	18.12.2022	Sanitation and SWM Cleanliness and sanitation drive in the villages adopted under the Mera Gaon Mera Gaurav Programme and/ or other schemes by ICAR Institutes/ KVKs involving village community. Reviewing the progress made under ongoing Swachhtaactivities including implementation of Swachhta Action Plan (SAP) & providing at the spot solutions.	32	306	17
4	19.12.2022	Sanitation and SWM Cleanliness and sanitation drive within campuses and surroundings including residential colonies, common market places. Stock taking of biodegradable and non-biodegradable waste disposal status and providing on the spot solutions.	11	121	9
5	20.12.2022	Stock taking of waste management & other activities including utilization of organic wastes/ generation of wealth from waste, polythene free status, composting of kitchen and home waste materials. Promoting clean & green technologies and organic farming practices in kitchen gardens of residential colonies and at least one nearby village and proving on the spot technology solutions.	12	42	2

Sl. No	Date	Activities	No. of KVKs Involved	No. of Participants (Farmers/ Staffs/ other Participants)	No. of VIPs attended the program
6	21.12.2022	Campaign on cleaning of sewerage & water lines, awareness on recycling of waste water, water harvesting for agriculture/ horticulture application/ kitchen gardens in residential colonies/ 1-2 nearby villages.	8	51	5
7	22.12.2022	Organising Workshops, exhibitions, technology demonstrations on agricultural technologies for conversion of waste to wealth, safe disposal of all kinds of wastes. Debate on Swachhata at the DARE/ICAR establishments, Seminars, awareness camps, rallies, street plays and expert talks	51	814	32
8	23.12.2022	Celebration of <u>Special Day</u> - Kisan Diwas (Farmer's Day) - 23 December inviting farmers. Experience sharing on Swachhata initiatives by farmers and civil society officials. Felicitating farmers/ civil society officials for exemplary initiatives on Swachhata.	22	115	13
9	24.12.2022	Swachhta Awareness at local level (organizing Sanitation Campaigns involving and with the help of the farmers, farm women and village youth in new villages not adopted under any scheme by Institutes/ establishments.	23	295	18
10	25.12.2022	Cleaning of public places, community market places and/or nearby tourist/ selected spots.	9	42	6
11	26.12.2022	Fostering healthy competition: Organising Webinar, VC meetings, competition and rewarding best offices/ residential areas/ campuses on cleanliness. Quiz, assay & drawing competitions for school children, village youth.	9	37	5
12	27.12.2022	Awareness on waste management & other activities including utilization of organic wastes/ generation of wealth from waste, polythene free status. Curb the use of Single Use plastic (SUP) and discourage the use of plastic in the office. Composting of kitchen and home waste materials, promoting clean & green technologies and organic farming practices in new area.	13	154	6

Sl. No	Date	Activities	No. of KVKs Involved	No. of Participants (Farmers/ Staffs/ other Participants)	No. of VIPs attended the program
13	28.12.2022	Campaign on cleaning of sewerage & water lines, awareness on recycling of waste water, water harvesting for agriculture/ horticulture application/ kitchen gardens in residential colonies. Outside campuses/ nearby villages with the involvement of local/ village communities.	12	128	7
14	29.12.2022	Visits of community waste disposal sites/ compost pits, cleaning and creating awareness on treatment & safe disposal of bio-degradable/ non-bio-degradable wastes by involving civil/ farming community.	8	31	5
15	30.12.2022	Involvement of VIP/ VVIPs (Union Ministers, MPs and other dignitaries) in the Swachhta activities, Involvement of print and electronic media may be ensured so that adequate publicity is given to the SwachhtaPakhwada.	-	-	-
16	31.12.2022	Organization of press conference for highlighting the activities of Swachh Bharat Pakhwada by involving all stake holders including farmers/ VIPs/ press and electronic media.	-	-	-



14.9 Scientific Beekeeping Training: National Bee Board (NBB) Sponsored Central Sector Scheme:

Nodal Scientist: Dr. A. Halder

In view of the importance of beekeeping, DAC&FW, GoI has sanctioned Rs. 921.15 lakh/- to the ICAR in the month of January 2021 for organizing 600 trainings (500 physical and 100 online trainings) on scientific beekeeping by 100 KVKs across the country under National Beekeeping & Honey Mission (NBHM) of National Bee Board (NBB). Accordingly, ICAR-ATARI Kolkata received 50%

of the sanctioned budget i.e. Rs. 64,48,050.00 during 2020- 21 financial year and again the rest 50% of the sanctioned budget i.e. Rs. 64,48,050.00 during 2021- 22 financial year from the Council for organizing training on scientific beekeeping by selected 15 KVKs of Andaman and Nicobar Islands (Port Blair), Odisha (Cuttack, Dhenkanal, Gajapati, Kalahandi, Keonjhar, Jharsuguda, Puri, Sundargarh-I) and West Bengal (Cooch Behar, Dekshin Dinajpur), Murshidabad-II-Sargachi, Nadia-I-Gayespur, South 24 Parganas-Nimpith, Birbhum) in this zone. ICAR-ATARI Kolkata released Rs. 4,60,575.00 during 2020- 21 financial year and again Rs. 4,60,575.00 during 2021- 22 financial year to each KVK. Till March 31,

2022 a total of Rs.49,87,589.00 out of Rs. 1,28,96,100 remained unutilized and thus, Rs. 49,87,589.00 was revalidated at fag end of 2022-23. However, only Rs. 9,99,573.00 was utilized during 2022-23 financial year by KVKs. Till date, Rs. 89,08,084.00 (69.08% of fund) was utilized.

Objectives

- To train the farmers, rural youth, women for engagement in beekeeping and production of higher quantity and good quality of honey and other high value beehive products, viz.; bee wax, bee pollen, propolis, royal jelly, comb honey, bee venom, etc. in regards to income generation and livelihood support.
- To maximize, economic, ecological and social benefits by diversification through beekeeping.
- To promote agri- entrepreneurs and agri- startup in beekeeping/ honey production through either individual or group approach (SHGs/ FPCs/ FPOs)

Achievements

- ▶ Till date 15 KVKs conducted 52 only physical trainings each of 7 days involving 1303 participants with a batch of 25 participants in each training of which 5 physical trainings each of 7 days involving 125 participants were organized during 2022. Five KVKs organized online training of 3 Days with a total of 163 participants on scientific beekeeping. However, there was no online training during 2022.
- ▶ The most significant achievements of the training included effective skill development on scientific beekeeping, enthusiasm and interest creation among the rural youth, especially women. Most of the trainees have started either individual or group beekeeping entrepreneurship as a new venture.
- ▶ Bee keeping training helped to develop 20 numbers of group entrepreneurs who maintain 30- 1300 bee boxes with the production of honey ranging from 120 kg to 60,000 kg per year and net income per year ranging between 0.5 and 95.0 lakhs.

- ▶ Development of 181 numbers of individual entrepreneurs who maintain 10- 200 bee boxes with the production of honey ranging from 30 kg to 10,000 kg per year and net income per year ranging between 0.1 and 9.7 lakhs.



Figure: Displaying super honey chamber during 7 days physical training on scientific beekeeping at Cuttack KVK, OUAT, Odisha



Figure: Hands on 7 days physical training on scientific beekeeping at Dakshin Dinajpur KVK, UBKV, West Bengal

A success story

Apiary: An alternative venture for landless farmers on the islands

Mrs Anbumalar is an unemployed woman from the Shoal Bay villages of South Andaman. She has made very little money from mushroom and floriculture activities. She planned to explore her options for making more money with fewer resources. She visited ICAR-KVK in Port Blair to meet specialists about generating self-employment with limited resources. Experts assessed her capability, interests, and resources. She was inspired by the expert's explanation of the apiary's daily operations.



Mrs. Anbumalar participated in a seven-day hands-on scientific beekeeping training program organized by ICAR-KVK, CIARI, Port Blair, with financial support from the National Bee Board, Department of Agriculture and Farmers Welfare, New Delhi. She became very interested in beekeeping after receiving training. The ICAR-KVK in Port Blair inspired her beekeeping endeavours. She observed that both the availability of flower sources for beekeeping and the local population's demand for honey which is increasing daily. Initially, she began with five bee hive boxes that had a lower capacity for honey production. She asserts that the island has a high biodiversity, which enables bees to collect nectar from a wide variety of flower types and create honey of superior quality. She recognized the value of beekeeping in increasing agricultural and horticultural crop productivity in her field. Later,

she expanded her apiary operations, installing over thirty bee hive boxes and extracting more honey than ever before. She has consistently worked for 1 or 2 hours per day, specifically for artificial feeding during the rainy season. She is now gathering more than 75-80 kg of honey in a year and she has started packaging and selling honey in the neighbourhood market.

Even though it is more expensive than honey available at the market, consumers have a strong preference for the honey produced on Anbumalar's farm. This is because the honey produced on her farm has a higher quality. She earns between Rs. 70,000.00 and Rs. 80,000.00 annually from the sale of honey on the local market and participates in several exhibitions in the Andaman and Nicobar Islands. Mrs. Anbumalar's initiatives not only aim to earn money by providing superior quality honey to the local market, but also generate employment opportunities for rural women. As a result of her efforts, there are now more members of self-help groups and more housewives engaging themselves in beekeeping. She wishes to ensure that her honey is available to all tourists who visit these islands.

14.10 CSISA-ICAR Collaboration Project Phase-IV:

Nodal Scientist: Dr. S.K. Roy

Cereal Systems Initiative for South Asia (CSISA) Phase-IV" for the year 2022-23 is running in 6 KVKs of Odisha like Bhadrak, Mayurbhanj-I, Ganjam-I, Puri, Baragarh and Kalahandi.

The broader objectives of the (CSISA) Phase-IV are as follows:

1. Development of dynamic agro-advisory/ messages based on agreement amongst CP partners and the dissemination of shared messages through a single-window system.
2. To deal with the yield and profitability gaps experienced by smallholder farmers, what technologies are ready for scaling? Where may these technologies be targeted for the highest

potential gains? (This helps in prioritization for targeting).

3. Consensus on prospective new technologies that are pertinent to the state but still need to be improved, validated, or supported by evidence.
4. Interventions at the policy level are required to enable the faster scaling.

Experiments and Results:

KVK Bhadrak, Mayurbhanj-I and Ganjam-I carried out an experiment individually on “Evaluate the effect of agronomic and genetic bio fortification approaches in manual puddle transplanted rice”. They are working on a common objective which is “To compare the individual and combined effects of Zn enriched varieties and Zn fertilizer application on productivity, profitability, and grain quality (Zn content) of rice under manual puddle transplanted rice (PTR) in Odisha”. First experiment was treated with Farmer’s variety and Zinc-enrich variety and the application was done with basal dose of ZnSo₄, 0.5 % of Zn Foliar and foliar spray with Nano Zn. The result shows that Supplementation of Zn in any form (either in soil or in foliar application) give good crop response to filled grain which response to Yield. KVK Puri carried out another experiment titled “Evaluate weed management under drill dry direct-seeded rice in Odisha”. The Objective of this experiment was “To evaluate the effect of herbicides & different herbicide combinations in DSR Rice”. Total 7 experiment was done with various application of various herbicides like “mix of Bispyribac and Pyrazosulfuron, mix of Vivaya and Almix, combination of Triafamone + Ethoxysulfuron, mix of Fenoxaprop and Ethoxysulfuron, mix of Pretilachlor and Safener, combination of Triafamone + Ethoxysulfuron and one spot hand weeding 30-35 DAS”. According to the results, Treatment 2 (application of bispyribac + pyrazosulfuron) and Treatment 7 (application of a premix combination of Triafamone + ethoxysulfuron) both have good average grain yields of 40.1 q/ha and 41 q/ha, respectively.



15.0 Training and Capacity Building

Nodal Scientist: Dr. S.K. Mondal

Training Need Assessment (TNA) and preparation of Annual Training Plan (ATP) for all categories of employees of the Institute were initiated in the year 2015-16. In continuation, ICAR-ATARI, Kolkata has performed TNA and prepared ATP for the year 2022. For a continuous Human Resource Development (HRD) in the institute, such plans became instrumental and category-wise trainings have also been planned and implemented. The completed trainings have not been uploaded in ERP system by individual employees. During the year 2022, out of 14 employees of the institute none opted for training through Training Information Management System (TIMS) but one training programme of scientific and administrative staff was performed on Medicinal and Aromatic plants.



15.1 Capacity Building of Farmers through Training Programmes on Profitable Dairy Farming:

Under the capacity building of farmers, a special programme on profitable dairy farming was undertaken by KVKs of West Bengal during the period from April 2022 to December 2022. The programme mainly focused on various aspects like Skill Development Training on Profitable Cattle Farming, Scientific Management of Dairy Farming, Dairy and Poultry based Integrated Farming for sustainable livelihood, Production of Value Added Milk Product, Commercial Dairy Management, Multipurpose Artificial Insemination Technician

in Rural India (MAITRI), Livestock Disease Management and others. A total of 456 rural youth were trained under this programme.



15.2 HRD programme by ATARI Kolkata:

ICAR-ATARI, Kolkata conducted 71 HRD programmes during the year for updating knowledge and skill of the KVK staff. The details are given in the following Table.

Table: Workshop-cum-training programme and meetings organised by ICAR-ATARI, Kolkata

Sl. No.	Name of the programme(s)	No. of scientist(s)/ staff attended
1	Online Zonal Review Workshop of FFP under ICAR-ATARI Kolkata organized by ICAR-ATARI Kolkata	7
2	Online Mid-Term Review Meeting of RAC approved projects organized by ICAR-ATARI Bengaluru	6
3	Online review meeting of officers and staff of ICAR H.Q., Institutes of ICAR, ASRB and DARE addressed by DG, ICAR organized by the Council	8
4	Online meeting on 'Indian Agriculture after 75 years of Independence' organized by ICAR, GIST (Global Indian Scientists and Technocrat Forum)	6
5	Annual Zonal Workshop 2022 for KVKs of ATARI Kolkata at Lataguri, Jalpaiguri, WB organized by ICAR-ATARI Kolkata in collaboration with KVK Jalpaiguri	10
6	XII th Biennial National KVK Conference 2022 at YSPUH, Solan organized by ICAR-ATARI Ludhiana in collaboration with YSPUH, Solan KVK Jalpaiguri	5
7	Online meeting with PIs/CO-PIs/SSHs of KVKs of different network projects	6
8	Review meeting with PIs/CO-PIs of different Institute projects	4
9	Selection Committee Meeting as Chairman/Member for selecting SRF/YP-I/Project Assistants of FFP/ARYA/NEMA/NABARD funded projects at ICAR-ATARI Kolkata	10
10	Online interaction meeting with farmers and Hon'ble PM of India	15
11	Meeting as Chairman/ Committee member for scrutinizing application of various posts of KVKs at ICAR-ATARI Kolkata	5
12	Meeting with SSHs of KVKs under MDP programme and scientists of ICAR-ATARI Kolkata	9
13	Meeting on CFLD on Pulses and Oilseeds-area allotment during 2022-23	4
14	Online review meeting of ARYA	3
15	Scientific Advisory Committee (SAC) meeting of KVKs	6
16	Review meeting on 'Formation and Promotion of FPOs by KVKs and ICAR Institutes'	4
17	Meeting with Dr. P. Kumar, Former Director, ICAR-Zonal Project Directorate, Bengaluru and scientists of ICAR-ATARI Kolkata	7
18	Online meeting on 'Promotion of Kisan drones: Issues, challenges and way forward' organized by DAFW, New Delhi	8
19	Online meeting of DDG (AE), ICAR, New Delhi and scientists of ATARIs regarding interaction of farmers with Hon'ble PM held on 31.05.2022 organized by the Council	8
20	Meeting with WBSCTVESD, Department of Technical Education, Training & Skill Development, Govt. of West Bengal and scientists of ATARI Kolkata organized by ICAR-ATARI Kolkata	5
21	Online programme of 94 th Foundation Day of ICAR held at New Delhi organized by ICAR, New Delhi	22
22	Meeting to review documentation of 75000 DFI cases and finalization of format of presentation	4
23	Fifteenth Institute Management Committee (IMC) Meeting of ICAR-ATARI Kolkata	6

Sl. No.	Name of the programme(s)	No. of scientist(s)/ staff attended
24	e-Meeting of Division to discuss the revision of KVK Manager's Guide (Administrative and Financial Matter) and review of MoU/Agreement signed between the Host Organization and ICAR	3
25	Meeting of Task Force agro-climatic zone of Eastern Himalayas	2
26	Online meeting on 100% budget utilization and other related issues organized by the Council	10
27	Workshop and District Committee meeting of ICAR-ARYA project at KVKs	2
28	Divisional meeting on DFI and Kisan Bhagidari organized by the Council	4
29	Meeting on <i>Kharif</i> planning for CSISA Project	2
30	Meeting for discussion on QRT recommendations organized by the Council	3
31	Meeting with Director, ICAR-ATARI Kolkata on various issues	12
32	Programme of Hon'ble Minister of State for Education, Govt. of India on ' <i>Garib Kalyan Sammelan</i> ' at Bankura	4
33	Online meeting for launching of NABARD funded project on ' <i>Integrated Farming</i> ' at ICAR-ATARI Kolkata	4
34	Online inaugural program of beekeeping training organised by KVK Nadia and Nimpith	1
35	Online meeting on ' <i>KishanSharati</i> ' organized by the Council	2
36	Online meeting on ' <i>Area expansion of sunflower in rice-fallows</i> ' under National Food Security Mission- Oilseeds, Ministry of Ag.& FW, GoI	2
37	Attended and delivered lecture in the inauguration program of training on ' <i>Hygienic meat processing and value addition</i> '	1
38	Other meetings on various issues	10
39	Online meeting on discussion and finalization of DFI success stories organized by Division of Agricultural Extension, ICAR, New Delhi	4
40	Review meeting on budget utilization under various projects of ICAR, New Delhi	10
41	Online meeting with DDG and Director, ATARIs on ' <i>Review of budget utilization of different schemes</i> ' organized by Division of Extension Education, ICAR, New Delhi	7
42	Online programme of 94 th Foundation Day of ICAR held at New Delhi organized by the Council	14
43	Scientific Advisory Committee (SAC) meeting of KVKs through virtual/physical mode	6
44	Online/offline review meeting with PIs/CO-PIs/SSHs of KVKs of different National Network projects	6
45	Online/offline review/PMC meeting with PIs/CO-PIs of Institute/NABARD funded projects	8
46	Selection committee meeting as Chairman/Member for selecting SRF/YP-I/DEO of different projects at ICAR-ATARI Kolkata	10
47	Review workshop of ARYA	30
48	Online meeting for preparing documents on achievements under STC/TSP w.r.t. ICAR-ATARI Kolkata	3

Sl. No.	Name of the programme(s)	No. of scientist(s)/ staff attended
49	Meeting as chairman/committee member for scrutinizing applications for different posts of KVKs held at ATARI Kolkata	6
50	Meeting with newly recruited KVK scientists under MDP programme at ATARI Kolkata	11
51	Online interaction meeting of OIC-Data Management for <i>KRISHI Portal</i> organized by Dr. R. Prasad, Director, ICAR-IASRI, New Delhi and In-Charge, <i>KRISHI Portal</i>	2
52	Meeting on 'Awareness programme for soil testing labs under soil health card scheme' organized by ICAR-ATARI Kolkata in collaboration with National Accreditation Board for Testing and Calibration Laboratories (NABL) at ICAR-ATARI Kolkata	25
53	Online meeting on 'Special campaign 2.0 for disposal of pending matters from 02.10.2022 to 31.10.2022' under the Chairmanship of Hon'ble DG, ICAR and Secretary, DARE organized by ICT, New Delhi	12
54	Online programme on 'Agri-start up conclave and PM Kisan Sammelan' inaugurated by the Hon'ble Prime Minister of India organized by Ministry of Ag. & FW, New Delhi at ICAR-IARI, New Delhi	10
55	Online interaction meeting of Hon'ble DG, ICAR and Secretary, DARE with Scientists of ICAR on 'Revitalizing ICAR activities, aspirations and actions' organized by ICT, New Delhi	10
56	Online meeting of DDGs, ICAR on 'Activities and Aspirations of ICAR' under the Chairmanship of Hon'ble DG, ICAR, New Delhi organized by ICT, New Delhi	6
57	Online meeting with WBSCTVESD organized by ATARI Kolkata	4
58	Meeting of Extension Council as ICAR Nominee for U.B.K.V., Coochbehar	1
59	Online/offline review meeting on NICRA/ DAMU project	5
60	Meeting on tribal village development of Bankura district	2
61	Meeting of Regional Advisory Group of NABARD, Kolkata organized at NABARD, Kolkata	2
62	Online meeting on 'Kisan Sarathi' of Zone V organized by ICAR-ATARI Kolkata	3
63	'Livestock Conference-2022' at Park Hotel, Kolkata organized by Confederation of Indian Industry, Eastern Region, Kolkata	1
64	Meetings of District Level Committee for ARYA project	2
65	Online meeting to present the achievements of National Agricultural Science Funded (NASF) completed project on Black Bengal goats organized by NASF, ICAR, New Delhi	1
66	Meeting with Director, ICAR-ATARI Kolkata, scientists and other staff members of ATARI Kolkata on various issues	12
67	Online review meeting on ASCI SKDT programme organized by the Council	1
68	Workshop as an expert for OFT finalization on animal science for the KVKs of Zone IV organized by ICAR-ATARI Patna	1
69	Online/offline review meeting on implementation of Agri-drone project	6
70	National workshop on natural farming at Kurukshetra, Haryana	3
71	Other meetings on various issues	10

16.0 Ongoing Programmes

16.1 Formation and Promotion of FPOs: National Cooperative Development Corporation (NCDC) funded Central Sector Scheme:

Nodal Scientist: Dr. A. Haldar

The Aim of Formation and Promotion of Farmer Producer Organisation (FPO) is to catalyse transformation of agriculture sector, where small and marginal holdings less than 2 hectares constitute over 80% of farmers' population and distressingly have ownership of a minor share of land. This Scheme aims to achieve inclusive and sustainable transformation through the creation of a holistic and supportive ecosystem for the formation of 10,000 FPO in India by 2023-24, and their nurturing, handholding and capacity building over a five-year period from their inception, to facilitate the development of vibrant and sustainable income-oriented farming that would lead to the overall socio-economic development and wellbeing of agrarian communities. The rationale for setting up farmer producer organisations is based on the premise that collectivisation of farmer producers, particularly smallholder farmers, has a direct effect on increasing farmer incomes, through securing production by increasing productivity and reducing costs of cultivation, adding value to production through reducing transaction costs, up scaling trade and bulk selling of the produce or its further processing into downstream products, enabling access to technology, increased bargaining power and integration with value chains and above all increasing market access and power. Further, it is in their democratic functioning based on Cooperative Principles, that FPO must definitely have an advantage and are seen as the way for taking small and marginal farmers forward, through offering them better and more dignified livelihood options and living.

Objectives

- To facilitate the development of a sustainable income-oriented farming and business platform for the smallholder farmers.

- To assure the farmers' income by enhancing productivity and reducing costs of cultivation, up scaling trade and bulk selling of the produce or its further processing into downstream products, enabling access to technology, integration with value chains, increasing market access and bargaining power.

Achievements

- ▶ The Competent Authority of NCDC and thereafter Agricultural Extension Division of ICAR, New Delhi has sanctioned and released an amount of Rs. 8,00,000.00 to ICAR-ATARI for the formation and promotion of FPOs in Balasore and Nuapada district of Odisha during 2021-22 for the first time. Accordingly, each Rs. 4,00,000.00 has been provided to ICAR-National Rice Research Institute, Cuttack and KVK, Nuapada for the formation of FPOs at Balasore Sadar and Remuna of Balasore district and Komna and Boden of Nuapada district of Odisha, respectively.
- ▶ Both CBBOs have completed baseline survey, identified potential commodities in cluster, organized awareness program and mobilized farmers for inclusion in FPO membership, formed Farmers' Interest Group, made linkages with line Depts., other business organizations, E-business portal, conducted district level stakeholder meeting, facilitated for preparation of business plan and opening bank account, mobilized equity share and conducted review meetings.
- ▶ All four FPOs in Balasore and Nuapada districts of Odisha got the registration number. FPOs have helped the small and marginal farmers in individual as well as community farming through the access to various inputs such as quality seeds, fertilizer, pesticides, organic manure, farm machinery etc. The farmers have started collective marketing of various commodities. FPOs have planned for taking new initiatives like - opening an exclusive outlet for SHG product, farm product and in millet production, value addition, processing, packaging and marketing.

Table: Status of FPOs under ICAR- ATARI, Kolkata during 2022

Name of CBBO	Name of FPO	Block & District	Registration Number & Date of Registration	No. of Shareholders (Male and Female)	No. of Training Organized	Commodity wise Business Achieved (Sale in ton & Net Profit)	Paid up capital (in lakh)	Equity collected (in lakh)
ICAR-NR-RI, Cuttack	PurbaBaleswar 4S4R FPO	Remuna, Balasore	Registration Number: 1418/BLS-DT.24.09.2021 Dated 24.09.21	Total:603 (Male: 353 & Female: 250)	12	Approx.34.9 ton vegetables sold in local market and to Kolkata traders and total sales revenue collected Rs. 4.69 lakh	7.24	7.24
	Upakula-Baleswar 4S4RFPO	Balaso-reSadar, Balasore	Registration Number: 1419/BLS Dated 26.07.22	Total:317 (Male:217 & Female:100)	13	Approx.27.5 ton tomato sold to 5 traders of Jajpurand sales revenue collected Rs 1.30 lakh	1.90	1.90
KVK, Nuapada, OUAT	Sidheswar FPO	Komna, Nuapada	Registration Number: 43/NPD Dated 02.06.22	Total: 401 (Male: 338 & Female: 63)	6	Millets: 2.5 q Oilseeds: 1.5 q MFP: Mahua-12.0 q, Honey and Paper plate-Net profit- Rs. 0.26 lakh	0.43	0.36
	Sibashakti FPO	Boden, Nuapada	Registration Number: 44/NPD Dated 02.06.22	Total: 302 (Male: 224 & Female:78)	5	Millets: 1.5 q Oilseeds: 1.0 q MFP: Mahua- 8.0 q, Honey Net Profit- Rs. 0.145 lakh	0.42	0.28



Figure: Harvesting and marketing of potatoes from the farmer's field by PurbaBaleswar 4S4R FPO, Odisha



Figure: Collection and sending vegetables to the traders by from the farmer's field by UpakulaBaleswar 4S4R FPO, Odisha



Figure: Inputs' distribution by Sidheswar FPO at Komna, Nuapada district, Odisha



Figure: Meeting with the stakeholders of Sibashakti FPO at Boden of Nuapada district, Odisha

16.2 Skill Development Training programme (Other than ASCI):

Nodal Scientist: Dr. S.K. Mondal

The KVKs of this Zone also conducted different skill development training programmes (of less than 200 hours duration) as a part of capacity development of farmers in various job-oriented aspects of agriculture and allied sectors during the period under report. The details of skill development trainings are given in the Table below.

Table: Skill development training programme (less than 200 hrs) conducted in Zone V

State	No. of training conducted	Duration (in hrs.)	No. of participants			Fund utilized for the training (Rs.)
			Total			
			M	F	T	
A & N Islands	1	168	8	70	78	460000
Odisha	12	373	225	163	388	1200200
West Bengal	7	336	76	49	125	294000
Total	20	877	309	282	591	1954200



16.3 National Farmers' Portal (*m-Kisan Portal*):

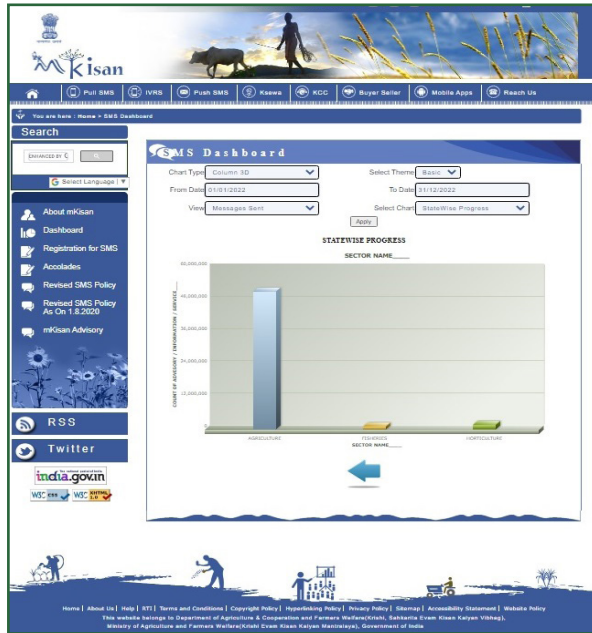
Nodal Scientist: Dr. K.S. Das

In this era of digital revolution, farmers of our country were very much acquainted with the handling of smart phones, touch screen kiosks, mobile apps, internet, agri-clinics, mass media, common service centres, kisan call centres etc. to get latest information on different activities on agricultural farming and allied sectors. Central and State Government Organizations e.g. Krishi Vigyan Kendras, Meteorological Department, State Agriculture Universities, ICAR Institutes, Department of Animal Husbandry, Dairying and Fisheries and others were provided information/services/advisories to the agricultural farmers through SMSs in their different languages

through National Farmers' Portal or *m-Kisan Portal* platform (www.mkisan.gov.in). As per portal, since its inception during July, 2013, about 327 crore messages or more than 1044 crore SMSs on crops, seeds, pesticides, farmers' insurance, farm machineries, storage, fertilizers, market price of agricultural produce, package of practices, various extension activities, weather forecasts, disease incidences and so on were sent to 8.93 crore farm families throughout the length and breadth of the country. All 59 KVKs of ICAR-ATARI Kolkata provided various information to the farmers of their concerned district through SMSs. During the year 2022, KVKs of Andaman and Nicobar Islands, Odisha and West Bengal sent 25, 582 and 199 advisories, respectively which benefitted more than 4.47 crore agricultural farmers.

State wise distribution of SMS advisories and number of beneficiaries during 2022

State/UT	No. of advisory count	No. of beneficiaries
A & N Islands	25	914641
Odisha	582	32424150
West Bengal	199	11334177
Total	806	44672968



16.4 Implementation of Public Financial management System (PFMS):

Nodal Officer: Mr. Somnath Mukharjee

The Public Financial Management System (PFMS) is a web-based online software application developed and implemented by the Controller General of Accounts (CGA), Department of Expenditure, Ministry of Finance, Government of India. PFMS started during 2017 in this institute with the objective of tracking funds released under all schemes/ non-schemes of Government of India, and real time reporting of expenditure at all levels of Programme implementation.

The mandate is to provide information across all plan schemes/ implementation agencies in this zone on fund utilization leading to better monitoring, review and decision support system to enhance public accountability in the implementation of plan schemes. The roll-out fund will also result in improved programme administration and management, reduction of float in the system and greater transparency and accountability in the use of public funds. The proposed system is an important tool for improving governance.

All the funds under Pay & Allowances heads are booked in PFMS under non-scheme (1270) and the fund under the Grant-in-aid "General" and "capital" are booked under scheme (0092). The both fund under two different schemes are regulated through PFMS with Digital Signatures by two authorized signatories of this Institute. During the financial year 2022-23 an amount of Rs.293623000 was released through scheme 0092 and Rs.730715000 was released through scheme 1270.



16.5 Gramin Krishi Mausam Sewa (GKMS) through District AgroMet Unit (DAMU):

Nodal Officer: Dr. F. H. Rahman

In Gramin Krishi Mausam Sewa (GKMS) scheme, the India Meteorological Department (IMD) established District AgroMet Unit (DAMU) in 530 districts, in addition to already operating 130 AgroMet Field Units (AMFUs). DAMUs receive weather forecast from IMD to prepare and disseminate sub-district level agromet advisory bulletins. ICAR through KVKs is working on improvement in weather based advisory and strengthening outreach of advisory bulletin to the farming community. Agrometeorology is an important multidisciplinary subject. Hence, ICAR maintains Agromet observatories as well as Automated Weather Stations (AWS) and record Agromet observations at its Institutions, National Research Centres, Project Directorates, Krishi Vigyan Kendras (KVK) etc. to generate agrometeorological information for use in studies of crops, pests and diseases, soil, agro-forestry, livestock, horticulture, agricultural physics, soil science etc. Such data help ICAR Institutes to study crop-weather relationship, relationship between crop-weather and pest/disease and develop region/location specific agromet predictive models. In Phase-I of GKMS, 16 KVKs (6 in West Bengal and 10 in Odisha) were selected to set up DAMUs which started functioning since 2018. Another 8 KVKs in West Bengal were selected in Phase-II of GKMS out of which only one KVK (Burdwan) started functioning since 2021. These DAMUs are providing weather forecast bulletins to the farmers since inception of the project. A budget of Rs.2.64 crore is sanctioned for this Zone during the year 2022-23. Weather forecast bulletins/special bulletins are generated regularly in English and local languages and communicated to the farmers well in advance. Agromet Advisory Bulletins are prepared twice a week (every Tuesday and Friday) and circulated among all the farmers of the district. Several modes of dissemination of advisories are used like email, messages, whatsapp group, social media, through input dealers, block level extension functionaries, through village-

based clusters etc. The KVKs are enhancing outreach and dissemination of agromet advisories using new and effective means of communication i.e. emails, whatsapp, KVK facebook page and SMS (in m-Kisan portal) are being used to deliver agromet advisory bulletins to registered members of different farmers clubs, FPOs, line departments and ultimately to reach the farmers. With the help of RMC/MCs, DAMUs are also using social media and whatsapp groups consisting of AMFUs (Nodal Officer, Technical Officer), DAMUs (Nodal officer, SMS-Agromet) and concerned officials viz. DAOs etc. for quick dissemination of weather forecast, nowcasts, alerts and warnings, and agromet content to farmers at village level. They are utilizing this channel effectively for sending information on very high impact weather events like thunderstorm and lightening to farmers to reduce the casualties and other losses. During extreme weather conditions over Odisha, West Bengal and neighbourhood, these DAMUs prepare special bulletins of warnings in regional languages and circulate to the farmers well in advance, such as to complete harvesting of crops, strengthen the macha of vegetables and betel vine, to stay at home along with safety of cattle and livestock in this period, fishermen are advised not to move into the sea. This helps the farmers to a great extent in minimizing the loss and crop damage during these extreme weather conditions. KVKs are also taking initiative in popularizing of 'Meghdoot' and 'Damini' mobile apps for outreach of agromet advisories and to help individuals keep updated about thunderstorm/lightening likely to strike in their locations. During fag end of the year, two more KVKs of West Bengal i.e. Kalimpong and Uttar Dinajpur, have been selected to set up DAMUs and instruction conveyed to the Host of KVKs to recruit the man powers (SMS and Agromet Observer) and the KVKs have initiated the process for recruitment.

To acquaint the farmers with the importance of weather based agro advisories, help them understand the effect of climatic/weather aberrations and its impact on agricultural production and strategies to mitigate the situations, DAMUs organize several Farmers Awareness Programme (FAP) and trainings to cover all the

blocks and farmers and farmwomen of the district. Total no. of FAPs conducted during the year by 17 DAMU KVKs was 52 involving 1728 farmers. Total

no. of AAS prepared and circulated to the farmers during the year by DAMUs was 2106 along with 58309 no. of beneficiaries.



16.6 Nutri-sensitive Agricultural Resources and Innovations (NARI):

Nodal Scientist: Dr. S.K. Mondal

The concept on nutri-sensitive agriculture was being nurtured by the Council since the year 2018-19. Initially, ICAR-ATARI Kolkata identified 6 KVKs (4 from Odisha and 2 from West Bengal) for

undertaking the activities related to nutri-garden, biofortified crop etc. under this concept. Later on, a project on Nutri-SMART village has been approved by RAC during 2021-22. Therefore, the conceptual framework was same but the no. of KVKs increased for taking up OFT, FLD, training and extension activities on various aspects of the nutri-sensitive agriculture in this Zone. The details of the activities conducted during 2022 have been tabulated below.

Table: Nutri-sensitive agricultural activities undertaken during 2022 by KVKs of Zone-V

State/ UT	No. of KVKs involved	No. of OFT on specified aspects	No. of FLD on specified aspects	No. of capacity development programme on specified aspects	No. of Extension activities on specified aspects	No. of farmers/ farm women/ girls benefitted		
						M	F	T
A & N Islands	2	2	5	1	3	6	108	114
Odisha	8	3	111	16	20	172	1186	1358
West Bengal	3	11	271	10	8	138	894	1032
Total	13	16	387	27	31	316	2188	2504



16.7 Krishi Kalyan Abhiyan-Phase III (Training Programme):

Nodal Scientist: Dr. K. S. Das

After successful completion of *Krishi Kalyan Abhiyan (KKA)-Phase-I, KKA-Phase-II* and *KKA-Phase-III* (AI of dairy animals) programme in 112 Aspirational District KVKs during the year 2018-19, ICAR planned to conduct capacity building trainings for farmers in

the name of *KKA-Phase III* (Training Programmes) for consecutive three years i.e. 2020-21, 2021-22 and 2022-23. A total of 10 KVKs from Odisha State were selected under Aspirational District programme from this Zone. The *KKA-III* (Training Programme) had started from July, 2020. During first 90 days of 2020-21, 6 training programmes on diversified farming practices for Doubling Farmers' Income involving 180 farmers was targeted. For

rest of the year, the target was of 18 programmes involving 540 farmers. During 2nd year and 3rd year, 24 training programmes involving 720 farmers for each year were targeted. During the year 2022, 10

KVKs conducted 312 trainings which benefitted 7823 farmers including farm women in the Zone. The KVK-wise training achievements are given in the table.

Particulars	Name of KVKs										Total
	Bol-angir	Dhen-anal	Ga-japati	Kalah-andi	Kand-hamal	Kora-put	Mal-kangiri	Naba-rangpur	Nua-pada	Ray-gada	
Total no. of training programmes conducted	3	65	15	24	28	36	2	98	17	24	312
No. of farmers trained											
Male	39	627	365	315	550	538	46	1316	174	493	4463
Female	6	1003	85	285	150	542	14	799	269	207	3360
Total	45	1630	450	600	700	1080	60	2115	443	700	7823



16.8 Institute (ICAR-ATARI Kolkata) website:

Nodal Scientist: Dr. K.S. Das

The ICAR-ATARI Kolkata website was regularly updated with latest information on KVKs, host organizations, personnel of ATARI Kolkata, past/present/upcoming events by KVKs, publications, proceedings of meetings/review workshops, awards, news, on-going programmes and many others. The website can be accessed through logging in www.atarikolkata.org.



16.9 Model Integrated Farming across Six Agro-Climatic Regions of West Bengal: An Externally NABARD Funded Project:

Nodal Scientist: Dr. A. Halder

Farming is facing changing demands. There is a continuous decline in per capita availability of land in the country, practically there is no scope for horizontal expansion of land for agriculture. Expansion is only possible by integrating farming components to ensure reasonable returns to farm families. Integrated farming (IF) has been advocated for harmonious use of inputs through integration of various available resources to make the agriculture productive, profitable and sustainable. In the process of technology transfer by the Krishi Vigyan Kendra (KVK) of West Bengal, a shift from the traditional model of farming to systemic and client-oriented IF has been developed at the farmers' field in six agro-climatic zones of West Bengal, which are (i) northern hill zone, (ii) terai and teesta zone, (iii) old alluvial zone, (iv) new alluvial zone, (v) red and laterite zone and (vi) costal saline zone. Yet, adoption of IF remains

low. Besides, there is neither a complete information on different models of IF, nor data on possible combination of different components with recycle mechanism for the reduction of cost of production within IF, economics of various IFs, infrastructure and support services availability, growth potential of sectoral activities, forward and backward linkages and marketing of produces across six agro-climatic regions of West Bengal. Hence, NABARD Kolkata approved a project entitled, 'Formulation of Area Development Schemes and Development of Area-Specific Software Template for Model Integrated Farming across Six Agro-Climatic Regions of West Bengal' (sanctioned no. No. NB.WBRO/736/FSDD-FSPF/ICAR-ATARI/2021-22 dated 19.08.2021) with a grant of Rs. 9.0 lakhs.

Objectives

(i) To explore technically feasible, economically viable, area-specific existing models of IF across six agro-climatic regions of West Bengal for preparing Area Development Schemes on IF.

(ii) To develop Software Template for Model Integrated Farming (MIF) with unit cost, economics and financing plan across six agro-climatic regions of West Bengal.

Achievements

- ▶ A total of 60 existing IFs in six agro-climatic regions of West Bengal were selected randomly in 15 districts by 16 KVKs situated in different districts of West Bengal. The existing IFs in the district were selected in such a way that 10 IFs were considered from each agro-climatic regions of West Bengal and thus, a total of 60 IFs were considered under the study.
- ▶ An integrate SWOT (Strengths, Weaknesses, Opportunities, and Threats) - AHP (Analytic Hierarchy Process) analysis was completed for prioritizing the practicing farmers' perceptions on the driving forces as well as limiting factors influencing integrated farming (IF) and determining a strategy plan for practicing IF under a smallholder farming set-up in West Bengal.

- ▶ A comprehensive review of the literature and focus group discussion (FGD) among the Subject Matter Specialists (SMSs) of district Krishi Vigyan Kendra (KVK), Scientists of different Institutes and the farmers were made to identify the factors (to be used in the AHP) under four components, namely Strengths (S), Weaknesses (W), Opportunities (O), and Threats (T) of IF in West Bengal.
- ▶ A total of 32 SWOT factors under 4 SWOT components (8 SWOT factors under each 4 SWOT component) affecting the performance of IF in West Bengal was identified.
- ▶ A multi-stage sampling to select 60 practicing IF adopters in West Bengal for data collection on 32 SWOT factors using field observations and face-to-face interviews with a close-ended questionnaire was used. The questionnaire facilitated the responses against all possible pair-wise comparisons among the SWOT factors using a comparison scale.



Figure: Visit of integrated farm for 2nd phase data collection on integrated farm at Haldibari, Coochbehar District, WB

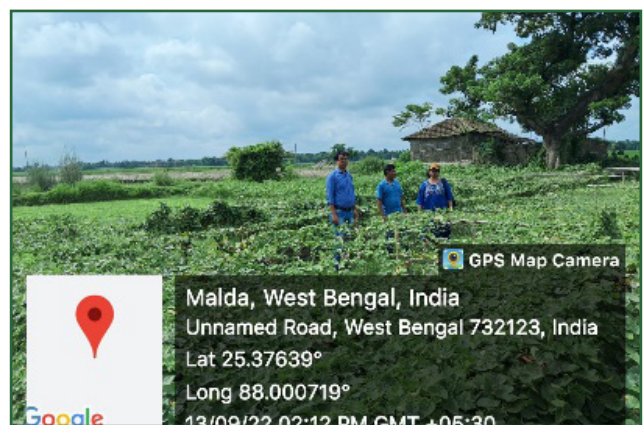
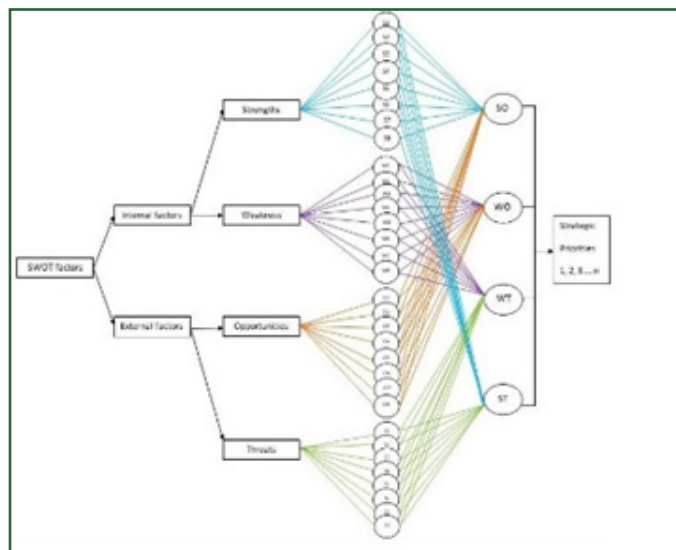


Figure: Visit of integrated farm for 2nd phase data collection on integrated farm at Malda District, WB

- ▶ A pair-wise comparison data of factors in SWOT analysis for AHP was used to understand the quantitative importance of each component and factor of SWOT analysis concerning the selection of driving factors and planning strategies on IF in West Bengal. The SWOT-AHP model is shown in Figure below.



In Figure above, there is the SWOT-AHP model which follows the following steps: (1) Building the SWOT analysis information through internal factors (Strengths and Weaknesses) and external factors (Opportunities and Threats); (2) Conducting a pairwise comparison of the SWOT factors with relative weights within every SWOT component; (3) Performing a pairwise comparison of the four SWOT components; (4) Using AHP analysis to prioritize each factor in the analysis; (4) Prioritizing and strategy formulation.

- ▶ The study successfully combined a qualitative SWOT analysis model and quantitative AHP analysis to rank strategies in formulating IF system development plans. Results of the multi-criteria analysis showed the total priority weight of the opportunity component was the highest, followed by strength component indicating that the farmers perhaps practiced IF to explore opportunities and strengths. Since the highest preference of the farmers was on the external positive factors of “opportunity” component followed by the internal positive

factors of “strength” component, the factors like “sustainable livelihood security”, “promotion of organic farming”, “better risk management”, “incorporation of high-value crops”, “climate resilient farming practices” etc under “opportunity” component and “increased farm production and productivity”, “enhancement in income”, “effective utilization of farm by-products” etc under “strength” component might be the strategical driving factors for accelerating the successful adoption of IF by the farming communities. None of the factors of weakness and threat components could rank within first ten factors. Although less important, the limiting factors (weaknesses and threats) might be helpful to formulate mitigation strategies for mainstreaming IF in the natural resource management plans. The results obtained from SWOT-AHP analysis would help decision-makers and extension program planners to improve extension services delivery for popularizing towards adoption of IF to the smallholder farmers in West Bengal.

- ▶ A second set of questionnaires was used to collect in-depth data which were digitalized for ranking of 60 existing IFs in six agro-climatic regions of West Bengal. Further, the data was analyzed using machine learning tools. To identify important independent variables affecting dependent variables like Total Net Income (Rs.) and Benefit Cost Ratio of all 60 IFs, Multilayer Perceptron Model (MPM) of Artificial Neural Network (ANN) was employed.
- ▶ The independent variables which showed more than 80% importance were taken into further steps for ranking all 60 IFs using TOPSIS, known as Technique for Order of Preference by Similarity to Ideal Solution, a multi-criteria decision analysis method. Then zone wise IFs based on selected independent variables from MPM model were ranked using TOPSIS model.
- ▶ Fishery-based integrated farming of Shri. Haradhan Mondal in North 24 Parganas under New Alluvial Zone of West Bengal ranked first in the present study. The income analysis revealed that from a small farm piece of 1.56 ha area, the annual gross

income of Rs. 9,17,160.00 could be realized from an investment of Rs. 5,32,080.00 with an annual net income of Rs. 3,85,080.00 and resource use efficiency of Rs. 1.72 per rupee invested.



Figure: Fishery-based IFS of Shri. Haradhan Mondal in North 24 Parganas under New Alluvial Zone ranked first among 60 IFSs in West Bengal

► Figure below depicts how Shri. Haradhan Mondal manages to recycle the resources for achieving bio-economic circularity of resources at a fishery-based IFS.

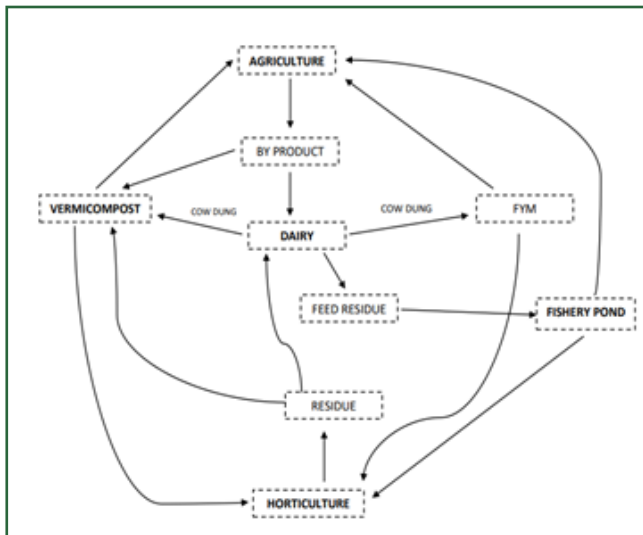


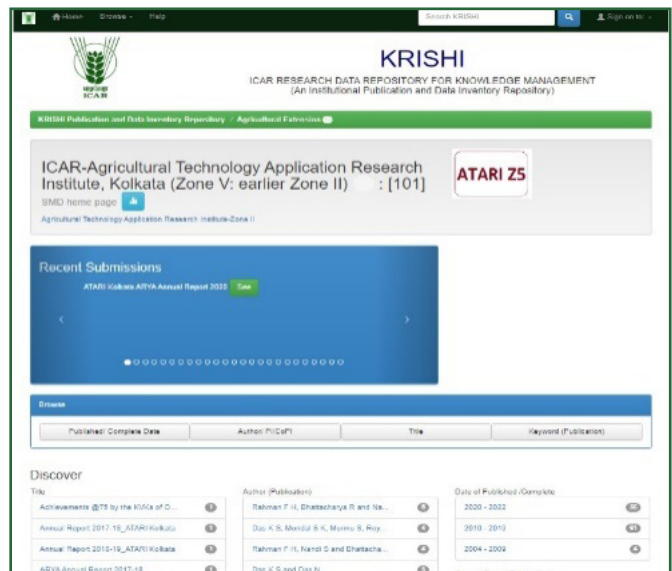
Figure: Flow diagram of bio-economic circularity of resources at a fishery-based IFS of Shri Haradhan Mondal in North 24 Parganas under New Alluvial Zone of WB

16.10 KRISHI Portal

Nodal Scientist: Dr. K. S. Das

The *KRISHI* (Knowledge based Resources Information Systems Hub for Innovations in

Agriculture) Portal, one kind of data inventory repository, was developed by ICAR to bring its knowledge resources to all stakeholderse.g. farmers, researchers and planners at one place. This portal has a centralized data repository system of ICAR consisting of technology, data generated through experiments/ surveys/ observational studies, geo-spatial data, publications, learning resources etc. The portal can be accessed at <http://krishi.icar.gov.in>. During the year 2022, documents including books, technical bulletins, annual reports, newsletters etc. published by this institute were uploaded in *KRISHI*Portal for wide circulation among the readers.



16.11 Krishi Vigyan Kendra Knowledge Network or KVK Portal:

Nodal Scientist: Dr. K. S. Das

The Krishi Vigyan Kendra (KVK), better known as 'Single Stop Shop' in the district, served as knowledge and resource centre of agricultural technologies. It linked farmers with NARS with extension system. The Government of India launched 'KVK Portal or KVK Knowledge Network' in the year 2016-17 to upload various agriculture related activities at district level which were conducted by the KVKs across the country. The portal can be accessed through logging in- <http://kok.icar.gov.in>. It can be monitored with ease from Ministry Level to Farmers' doorstep depending upon its necessity. The portal has been enriched with various kinds of features e.g. facilities available with the KVKs, KVK profile, package of practices for production of crops/horticulture/livestock/fisheries, past/ongoing/upcoming events, monthly report, news items, national programmes and many others. All 59 KVKs (3 from Andaman & Nicobar Islands, 33 from Odisha and 23 from West Bengal) were registered with ATARI Kolkata and the information is being uploaded in their respective portal on regular basis. During the period under report, KVKs uploaded 10050 events during the year 2022. Five KVKs updated ten different facilities available with them. Not only that, 8 KVKs added new package of practices on crops, livestock, fisheries and horticulture. As per KVK profile was concerned, employee detail was updated by maximum (16) KVKs followed by soil health card (2 KVKs) and fish and finance resource (1 KVK each).

S. No.	Zone Name	Total No. of KVK	No. of Events added by KVK	No. of Facilities added by KVK				No. of KVKs that Report on Package of Practices			No. of KVKs that Report on Health Card			No. of KVKs that Report on Fisheries		
				Crop	Livestock	Fisheries	Restoration	Employee	Prize	Finance	Soil Health Card	Appliance	Crop	Resource		
1	ICAR-ATARI Zone-V Kolkata	59	10050 (2022)	5 (02)	16 (16)	2 (04)	2 (20)	1 (05)	3 (07)	16 (06)	06	1 (03)	2 (03)	06	06	1 (07)

Note: In the table, values which are shown within the brackets indicate the cumulative values.

16.12 Promotion of Agro Forestry and Value Chain Management: An Externally NABARD Funded Project:

Nodal Scientist: Dr. A. Haldar

Agroforestry is the concept of modern cropping system for effective utilization of available space, both horizontally and vertically to enhance productivity and risk coverage against unstable weather conditions. While mono cropping neither provides gainful employment opportunities nor generates sufficient income to meet the family expenses, agroforestry systems have significant potential in employment generation, household nutritional security from vegetables and fruits and economic development with a hope of insurance or pension resource of a farm family out of the forest plants besides the scope of processing and value addition. Agroforestry is an excellent sustainable model to improve natural ecosystem with biodiversity conservation of the area through inclusion of diversified crops in different tiers leading to augmentation of atmospheric carbon sequestration and mitigation of climate change effects as well.

NABARD Kolkata funded a project entitled, 'Agroforestry and Value Chain Management for Doubling Farmers' Income in New Alluvial Region of West Bengal' (sanctioned no. NB.WBRO/2807/FSDD-FSPF/ICAR-ATARI/2020-21 dated 29.03.2021) with a grant of Rs. 19.40 lakhs. The project was implemented through the KVK network in floodplain coastal Purba Medinipur district of West Bengal at six villages in Panskura block of Purba Medinipur district targeting the involvement of 300 farm families (50 families each from one village) during a period of 3 years from 2021- 22 to 2023- 24.

Objectives

1. To utilize the available farm resources properly.
2. To maximize per unit production of food, fodder and fuel.

3. To check soil erosion, conserve soil moisture and increase the soil fertility.
4. To generate employment opportunities for rural people.
5. To manage land efficiently so that the system can contribute in doubling farmers' income.

Achievements

- ▶ The project was launched for implementation of its activities at Purba Medinipur on 27.07. 2021. After the discussion with the line departments, DDM, NABARD, Purba Medinipur and the local body (Gram Panchayat) of the villages, the project activities were implemented in six villages, namely Dabuapukur, Rupchak, Sundarnagar, Saraswata, Atberia and Harijhama in Panskura block of Purba Medinipur district of West Bengal.

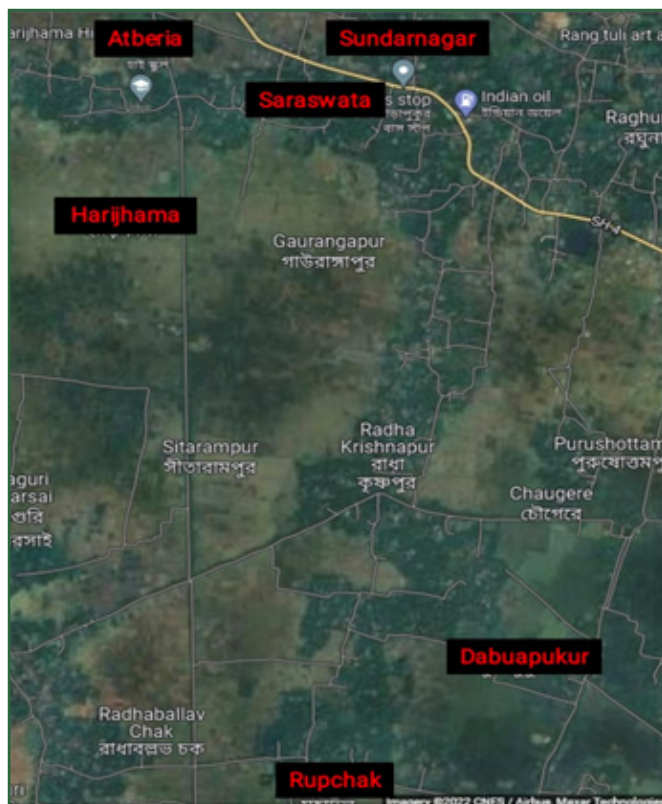


Figure: Satellite pictorial view of six villages of Panskura block of Purba Medinipur, WB

- ▶ The majority of the farmers in the Purba Medinipur district including six selected villages were small landholders with various available resources. As there was a huge scope of homestead agroforestry regardless of ecological and socioeconomic diversities, an

attempt was made to motivate the smallholder farmers for developing homestead agroforestry in the vacant and/ or unutilized land adjacent to the farmer's dwellings for providing multiple products through the production of a wide variety of fruits, vegetables, spices, and different tree products to the households and making homestead agroforestry system productive, profitable and sustainable.

- ▶ Development of 287 agro-forestry units of two models under the project was done. **Model 1:** Fruit plants (Mango+Guava+Ber etc) - Forest plants (Lambu+Kadamba+Sonajhuri etc) - Vegetables (Cucurbits/tuber crops/ Leafy vegetables) and **Model 2:** Fruit plants (Sapota+Jackfruit+Aonal etc) - Forest plants (Subabul+ Nim+ Gamhar+Jam etc) - Spices (Ginger+Turmeric).
- ▶ Various trainings on growing and management of vegetables, transplanting, care and management of fruit plants, nursery management of forest and fruits plants, propagation technique of fruits crops were organized at the villages.
- ▶ The project utilized the backyard barren land for developing three-tier system agroforestry model (Fruit plants + Forest plants + Vegetables/ Spices) with the active participation of 287 farm families covering a total of 5.74 ha area.
- ▶ Participation of about 31.35% farm women in the project
- ▶ An earning of Rs. 3350.00 to Rs. 4500.00 by the farm families from one katha interspace land was recorded by cultivating seasonal vegetables and/ or spices in newly developed agroforest for the first time in the adopted villages.
- ▶ Generation of 110 man-days in a year from a single agroforestry unit.
- ▶ Till date, various Fruit Plants (5385 numbers) like Mango, Guava, Ber, Sapota, Jackfruit and Amla, Forest Plants (3450 numbers) like Lambu, Sonajhuri, Kadam, Subabul, Neem and Gamar, 44 kg Vegetable Seeds (Spinash, Red Amaranthus, Cucurbits) and 32,000 Vegetable Seedlings (Chilli, Brinjal, Tomato, Cauliflower), 13.5 q Ginger and Turmeric, 15 q Elephant Footyam and 100 cuttings of Dragon fruits were given to 287 farmers. Besides, vermicompost,

fertilizer, organic pesticides, pheromone trap with lure etc were given to the beneficiaries.

- Ecological and environmental benefits like richness of biodiversity in the area; increased fruit set of nearby crops due to improvement of pollinators as informed by the farmers.



Figure: Model 1- Homestead agroforestry with fruit plants + forest plants + vegetables



Figure: Model 2- Homestead agroforestry with fruit plants + forest plants + spices



Figure: Agroforestry field visit by Dr. Avijit Halder, Principal Scientist of ATARI Kolkata and PI of the project along with Co-PIs of KVK, Purba Medinipur on 23rd June 2022



Figure: Intercrop produces harvested from agroforestry unit

16.13 Doubling Farmers' Income in Eastern India under ATARI Zone V:

Nodal Scientist: Dr. A. Haldar

Indian economy is predominantly dependent on Agriculture and other allied activities with more than 60% population dependent on agriculture as their principal means of livelihood. During the period of last 50 years from 1965 to 2015, since the adoption of green revolution, India's food production multiplied 3.7 times while the population multiplied by 2.55 times. The net result has been a 45% increase in per person food production, which has made India not only food self-sufficient, but also an exporting country. So far, the strategy for development of agriculture sector in India has focused primarily on raising agricultural output and improving food security. During last five decades, agricultural research has focused on the development of higher productivity of crop varieties and animal breeds, better farm implements and machinery, increased fertilizer uses and other production technologies which enabled the farmers to grow more food, but at the same time it over exploited the resources and resulted in decreasing farm productivity and profitability. While the country achieved commendable position in food production, farming itself turned non-profitable overtime due to rising costs and uneconomical holdings. Farmers' income remains low in relation to income of those working in the non-farm sector. Low level of absolute income as well as deteriorating disparity between income of a farmer and non-agricultural worker constitute an important reason for the emergence of agrarian distress and farmers' unrest in the country. In this background, the goal set to double farmers' income by 2022 is central to promote farmer's welfare, reduce agrarian crisis and bring parity between income of farmers and those working in non-agricultural professions. Hence, the paradigm has been changed from food security to income security for the farmers. The Government of India (GoI) announcement of doubling farmers' income by 2022 and its implementation must have a direct impact on almost half of the population to realize a sense of income security to farmers in a time bound manner to reduce agrarian distress and promote farmers'

welfare. The subject has attracted a lot of attention, generating thoughts and debates on policy, strategy and implementation to achieve the goal. However, the government's intension seems to be to double the income of the farmers from farming in real terms. In this context, many efforts have been undertaken at various levels to make strategic plans and prepare road map for doubling the farmers' income at the district level. Accordingly, 59 KVKs of Andaman and Nicobar Islands, Odisha and West Bengal under ICAR-ATARI, Kolkata, Zone V have undertaken various activities like FLD, OFT and training along with many technological interventions in the villages under this zone. A farmer's field baseline survey was conducted by 59 KVKs on total 6181 farmers in Odisha (3460 farmers), West Bengal (2664 farmers), Andaman & Nicobar Islands (57 farmers) to figure out how the farmer's income has been doubled or more between 2016-17 to 2020-21.

Odisha:

Agriculture is the backbone of the rural economy in Odisha where the small and marginal farm holdings are dominating. Of the total 48.7 lakh land holdings in Odisha, 93% are in the small and marginal category with less than 2 ha of land accounting for around 75% of the total land. The number of small and marginal farmers has increased by 5.6% between 2010-11 and 2015-16. Large farmers, on the other hand, are a mere 0.1% with around 2% of the total land. In Odisha, agriculture is characterized by low productivity on account of different factors. These factors include problematic soil like acidic, saline and water logged, lack of assured irrigation, low seed replacement rate, low level of fertilizer consumption and low level of farm mechanization etc. Huge gaps in yield potential and the technology transfer provide a good opportunity to increase productivity and production substantially.

With the growing demand for high value agricultural commodities like milk, meat, fruits and vegetables, there is pressure for change in the cereal centric policies of the state. The increasing value of livestock and horticultural output as compared to food grains testifies to the process of diversification in Odisha's agriculture and need for supportive action to foster the development of agricultural value chain. The

major crops of the state are cereals and pulses like paddy, black gram, green gram, maize, horticultural crops like citrus, guava, papaya, pineapple, watermelon and vegetables like brinjal, tomato, chili.

In spite of having immense potentiality in horticultural sector, Odisha suffers not only from the lack of organized marketing but also from a shortage of cold storage facilities for perishable fruits and vegetables. In dairy sector also the state suffers from low animal productivity, poor marketing and low level of milk processing. Hence, it was a formidable challenge for the 33 KVKs of the state to increase the income of the farmers up to the desired level i.e. 200% compared to their earning in the year 2016-17.

The KVKs of Odisha (33 number) put forth its efforts in advocating improved agriculture, animal husbandry and fishery practices among the farmers of the state to enable them to double their income between 2016-17 to 2020-21. In the process, they have introduced newer varieties of crops and vegetables, improved cultivation practices, appropriate irrigation practices, harvesting and processing and other associated practices. The sector-specific interventions by KVKs of Odisha included the broad areas like field crops, horticultural crops, livestock and fisheries, farm and non-farm enterprises etc.

In Odisha, 3460 farmers were surveyed by 33 KVKs. Out of that, data of 20% of the surveyed farmers, i.e. 692 farmers' data was analysed. The detailed analysis pertaining to various avenues that contributed on enhancement in income is presented in Table 1. It was found that, 43% of them were marginal farmers (<2.5 acre), 36% small farmers (2.5-5 acre) and 12% large farmers (> 5 acre). The information indicates that the average net income of a farmer increased from Rs. 1,18,078.00 to Rs. 2,88,144.00 (144.03%) in 2016-17 to 2020-21.

A further analysis indicates that an average income from the crops has increased from Rs. 33,462.00 of 2016-17 to Rs. 64,521.00 of 2020-21 (92%). This increase was recorded due to introduction of new crops. About 20% farmers cultivated at least one more crop other than paddy during this period.

Income from livestock sector has been increased from Rs. 58,885.00 in 2016-17 to Rs. 1,49,528.00 in

2020-21(153%). Among the livestock, 30% of the farmers have taken up poultry rearing, dairy or fish farming for the first time in the period of 2016-17 to 2020-21. Some brackish water fish cultivation has been found to be very profitable. The contribution of KVKs towards this income enhancement was observed in the respect of introducing appropriate rearing practices, feed management, disease management, and other related areas. Vaccination and health awareness camp conducted by the KVKs also helped in improving the health and production

of livestock that contributed higher income on the part of the farmers. Similarly, fishery sector also recorded higher income due to proper pond management, stocking density, quality fish seed and marketing.

The paradigm shift in farmers' income was more evident in the other enterprises like bee keeping, mushroom and vermicompost production. The income from these sectors was increased from Rs. 25,730.00 of 2016-17 to Rs. 74,095.00 of 2020-21(187%).

Table: Economics of farmers' income in Odisha during 2016-17 and 2021-22

Crops and Enterprises	Net income (Rs/household at current prices)		% increase in income	% share in total income		% share in additional income
	2016-17	2020-21		2016-17	2020-21	
Field crops	13385.00	23808.00	77.9	11.3	8.3	6.1
Horticulture	20077.00	40713.00	102.8	17.0	14.1	12.1
Livestock	23554.00	50811.00	115.7	19.9	17.6	16.0
Fisheries	35331.00	98717.00	179.4	29.9	34.3	37.3
Farm and non-farm enterprises	25730.00	74095.00	188.0	21.8	25.7	28.4
Overall	118078.00	288144.00	144.03	100.0	100.0	100.0

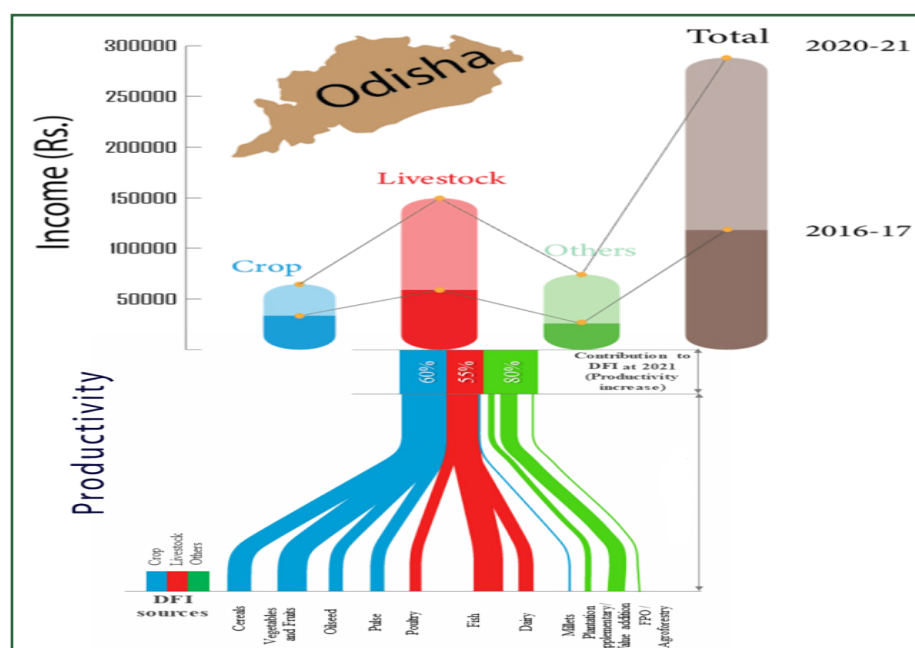


Fig.: Sector wise increase in income from 2016-17 to 2020-21

The overall analysis indicates that marginal farmers were more dependent on cereal crops and small farmers were more prone to cultivate horticultural crops. Whereas, large farmers have diversified their farming pattern to fisheries and livestock. Marginal farmers showed change in income from Rs. 81,081.00 to Rs. 1,95,493.00 with an increase of 141%. They cultivated paddy, ragi, greengram, mustard and fodder crops with a small portion having vermicompost pit, mushroom beds etc. Small farmers showed change in income from Rs. 66,867.00 to Rs. 2,20,560.00 with an increase of 229%. They cultivated paddy, sunflower, maize, cabbage, brinjal, tomato, chilli, cauliflower, sunhemp etc. Supplementary enterprises like bee keeping, vermicompost, value addition etc also contributed towards enhancement of farm income. Large farmers had shown the highest increase in income from Rs. 1,70,017.00 to Rs. 4,94,492.00 (190%). Non-crop sectors like fisheries, poultry, dairy, bee keeping etc. might have contributed to a great extent towards such enhancement of income.

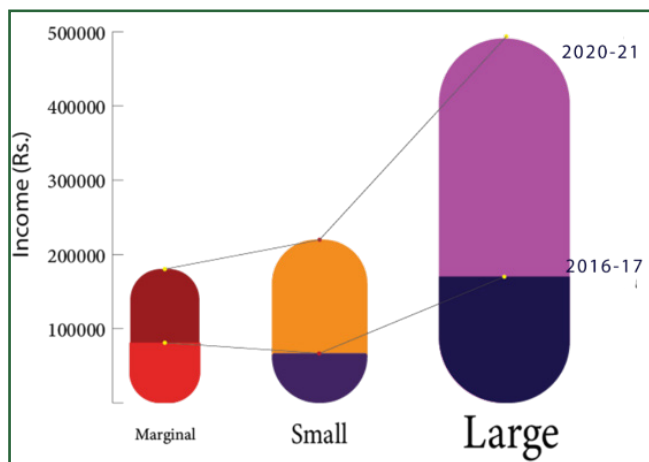


Fig.: Farmer category wise increase in income from 2016-17 to 2020-21

Success Story

Shri. Duryodhan Nayak is a 28 years old farmer of Village- Kuanrda, P.O.- Bonth of District- Bhadrakin the State Odisha. As per record of 2016-17, Shri. Duryodhan Nayak was cultivating rice in 1.0 acre of land and vegetable production in 0.15 acre of land and he had the annual net income of Rs. 56,500.00. He faced problems of pest incidence in rice. Shri. Duryodhan Nayak came to know about various training programs of KVK, Bhadrak and took hands

on training on mushroom cultivation and broiler poultry farming from KVK, Bhadrakand thereafter he started mushroom cultivation with 3000 beds and broiler poultry farming with 1000 birds and thus recorded annual net income of Rs.1,71,000.00 in 2020-21.



Mushroom cultivation



Broiler poultry farming

West Bengal:

West Bengal (21° 25' 24" and 27° 13' 15" north latitudes and 85° 48' 20" and 89° 53' 04" east longitudes) is predominantly an agrarian State, comprising of only 2.7% of India's geographical area. West Bengal is located in Eastern India stretching from the Himalayas in the north to the Bay of Bengal in the south. It has an area of 88,752 sq km. West Bengal supports nearly 8% of its food production in the country. There are 71.23 lakh farm families of whom 96% are small and marginal farmers. The average size of land holding is only 0.77 ha. Total cultivable area of the state is about 56 lakh ha which 63% of its geographical area. The major crops of the state are paddy, potato, pulses, oilseeds, fishery, livestock and horticultural crops. Other enterprises are also

found in good numbers which are supporting the family income to a great extent. As the state enjoys natural resources to a great extent followed by adoption of improved crop cultivation practices, achieving the objective of doubling farmers' income is perhaps the most promising aspect.

Almost two third population of the state directly or indirectly depends on agriculture and agri-allied activities. The central pillar of economic growth remains agriculture. Though the state has a surplus production of rice, vegetables and potato, a huge gap exists between the requirement and production of pulses, oilseeds and maize. Deterioration soil health due to imbalance in use of chemical fertilizers, paucity of suitable improved variety of seeds, inadequate farm mechanization, unorganized marketing structure etc. are some of the major challenges to agricultural growth of this state.

The KVKs of West Bengal (23 KVKs) operating in this state have collected data from 2664 farmers to understand the average income of the farmers from both farm and non-farm sectors i.e. contribution of various enterprises during 2016-17 to 2020-21. This was followed by identification of gaps in various sectors in terms of technology, input support, skill support, marketing, group formation like FPOs etc. The continuous efforts of the KVKs during last five years to double the income of the farmers are reflected through enhancement of productivity of crops and commodities and rise in income between 2016-17 to 2020-21. In the process, they have introduced newer varieties of crops and vegetables, improved cultivation practices, appropriate irrigation practices, harvesting and processing and other associated practices. The sector-specific interventions by KVKs of Odisha included the broad areas like field crops, horticultural crops, livestock and fisheries, farm and non-farm enterprises etc.

In West Bengal, 2664 farmers were surveyed by 23 KVKs. Out of that, data of 22% of the surveyed farmers, i.e. 586 farmers' data was analysed. The detailed analysis pertaining to various avenues that contributed on enhancement in income is presented in Table 2. It was found that the population

consisted of 56% marginal farmers (<2.5 acre), 25% small farmers (2.5-5 acre) and 19% of large farmers (> 5 acre). The enhancement and productivity are presented graphically. On the whole the net income of a farmer increased from Rs. 1,26,033.00 to Rs. 3,24,052.00 (157.10%) during this period.

It is observed that average income per farmer from the crops has increased from Rs. 35,436.00 to Rs. 85,708.00 in five years (142%) by cultivating improved variety of paddy, vegetables like cauliflower, brinjal, tomato, chilli, gourds, potato, cabbage, oilseeds like mustard, sesame, ground nut etc.; pulses like lentil, blackgram, chick pea, green gram etc. and fruits like mango, guava, litchi, banana, sapota, jackfruit etc. The vegetable crops produced higher income compared to cereals and other crops. However, potato, jute and tea are predominately cultivated as the cash crops which ensure enhanced as well as steady income from agricultural sector. In addition, nearly 23% farmers opted for vegetable cultivation alongside crop cultivation/enterprises.

Income from livestock sector was also increased from Rs. 60,134.00 to Rs. 1,56,044.00 (159.50%). The contribution of KVKs in assuring scientific livestock rearing practices, following vaccination schedule by the farmers, conducting large scale awareness camp, introduction of AI, nutritious feed preparation etc. was well documented in achieving such success. Poultry and fisheries are another two dominating sectors that contributed towards doubling of farmer's income in association with overall livestock rearing. Processing and value addition of fishes, particularly of marine fishes is another lucrative livelihood for the fish farmers in enhancing their income.

Apart from that, it was also found that adopting subsidiary enterprises like bee keeping, vermiculture production, mushroom production, lac cultivation, vegetable seedling rearing, planting material production, embroidery did help in enhancing income of the farm families. The income from these sectors was increased from Rs. 30,463.00 to Rs. 82,300.00 (170%) with an additional involvement of nearly 80% farmers/farm women seeking employment in these enterprises.

Table: Economics of farmers’ income in West Bengal during 2016-17 and 2020-21

Crops and Enterprises	Net income (Rs/household at current prices)		% increase in income	% share in total income		% share in additional income
	2016-17	2020-21		2016-17	2020-21	
Field crops	14170.00	28880.00	103.8	11.2	8.9	7.4
Horticulture	21266.00	56828.00	167.2	16.9	17.5	18.0
Livestock	20053.00	50418.00	151.4	15.9	15.6	15.3
Fisheries	40081.00	105626.00	163.5	31.8	32.6	33.1
Farm and non-farm enterprises	30463.00	82300.00	170.2	24.2	25.4	26.2
Overall	126033.00	324052.00	157.1	100.0	100.0	100.0

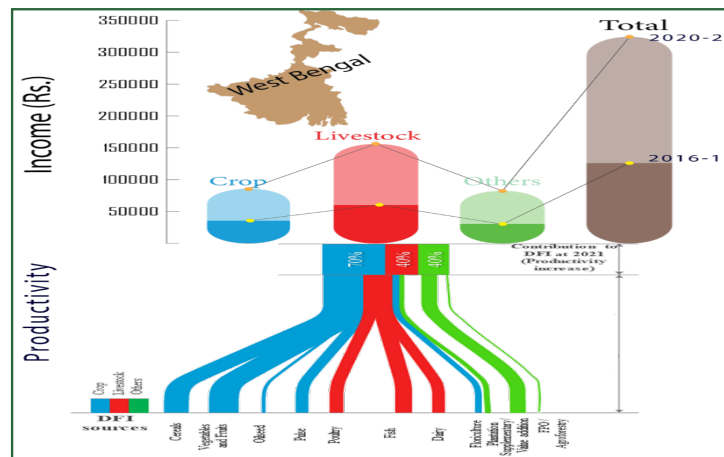


Fig.: Sector wise increase in income from 2016-17 to 2020-21

The trend in change of income to achieve the objective of doubling farmers’ income indicates that the marginal farmers enhanced their income from Rs. 32,769.00 to Rs. 66,987.00 (104%). In respect of small farmers, the increase in income was from Rs. 16,794.00 to Rs. 44,173.00 (163%). Large farmers, however, could increase their income through

cultivation of crops and vegetables, scientific livestock rearing, crop diversification towards high value crops and vegetables and creation of large number of enterprises in the rural areas have contributed greatly towards the success to double the income of the farmers of West Bengal.

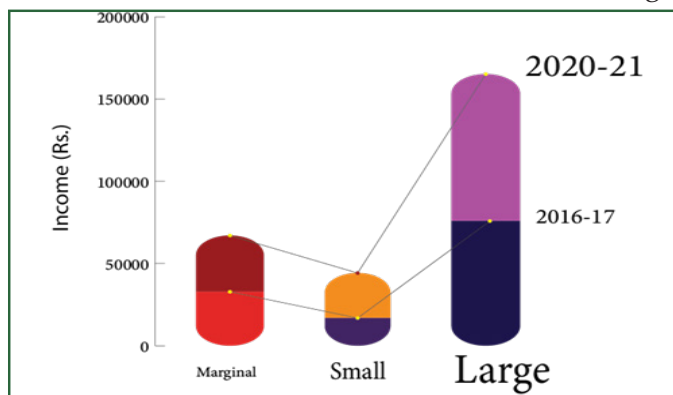


Fig.: Farmer category wise increase in income from 2016-17 to 2020-21

agriculture and allied means from Rs. 75,800.00 to Rs. 1,65,196.00 (117%). It can be inferred that commercial

Success Story

Mosarab Ali Molla, aged 41, having a land of 2.66 acre at Village- Kantul, P.O.- Puinan, Block- Polba-Dadpur of District- Hooghly in the State West Bengal was engaged in kharif paddy production along with potato and mustard cultivation. He had the annual net income of Rs. 82,161.00 in 2016-17. Once he attended training at KVK, Hooghly and came to know the improved variety of paddy, potato, mustard etc., good management practices and the scope of capsicum cultivation, he started cultivation of improved variety of paddy, potato, mustard etc and introduced the production of capsicum at his farm and initiated vegetable nursery after taking training under ARYA project and thus, Mosarab Ali

Molla achieved to earn annual net income of Rs. 1,85,290.00 in 2020-21.



Mustard field of Mosarab Ali Molla



Vegetable nursery of Mosarab Ali Molla

Andaman & Nicobar Islands:

During the settlement period at Andaman & Nicobar Islands, the land distribution system was 2 ha each of paddy and hilly land and 0.4 ha of homestead land to each settler. However, with the time, this holding has been fragmented. Island agriculture is rainfed, carried out on small holdings putting limitations on large scale investments. Agriculture farm families in the Islands is approximately 12,000 wherein small and marginal farmers have 59.65% of the land holdings and own only 25 % of the total area, while 45.34 % of the land holdings owned by medium and big farmers have 75% of the area. The average size of the agriculture land holding in the Islands is only 1.85 ha which is declining rapidly. The livelihood opportunities in the Islands are limited to tourism and agricultural sectors. With tourism being Port Blair centric, agriculture and allied sectors are

only options for livelihood for people located in far flung areas/Islands. With the limited land availability, only vertical expansion is possible to facilitate increase in yield per unit area to meet the food demand of the increasing population. Though the total rainfall received in the Islands is considered to be normal but variations cause water shortage particularly during dry season.

Andaman & Nicobar Islands are one of the 7 Union Territories of India situated in Indian Ocean and spread overall area of 8249 KM. Altogether, it has 572 Islands of which 38 (26 and 12 in Andaman and Nicobar group of Islands) are inhabited. Farming provides support to farmers; while the subsidiary activities of animal husbandry and marine fishing do form important livelihood activities of the Islanders. Farmers of this Union Territory generally grow cereal, vegetables, pulses, fruits, tuber, fish, meat, livestock and plantation crops for earning livelihood from farming related activities.

In achieving the ambitious programme of doubling farmers' income in this territory, 3 KVKs of this union territory of India identified the gaps during the baseline survey before initiation of DFI activities in their respective areas. In addition to enhancement in productivity of horticultural crops, spices and plantation crops, livestock and fishery, 3 KVKs also strategized to enhance farmers' income through adoption of other enterprises providing intensive skill development activities. In the process, they have introduced newer varieties of crops and vegetables, improved cultivation practices, appropriate irrigation practices, harvesting and processing and other associated practices. The sector-specific interventions by KVKs of Odisha included the broad areas like field crops, horticultural crops, livestock and fisheries, farm and non-farm enterprises etc.

In the course of implementing DFI during 2016-17 to 2020-21, 3 KVKs of this Islands could document 57 success stories where 57 practicing farmers actually doubled their income within this period. The detailed analysis pertaining to various avenues that contributed this enhancement in income is presented below. The major crops cultivated in the Islands were paddy, pulses like

chickpea, green gram, vegetables like turnip, okra, cucumber, chilli, bitter gourd etc. Farmers also cultivated fruits like mango, pineapple, guava, jackfruit. The efforts of 3 KVKs in introducing improved varieties, scientific package of practices, diversification of high value crops/vegetables and appropriate skill resulted into enhancement of average income per farmer from crops from Rs. 12,344.00 to Rs. 32,553.00 (164%).

In livestock poultry, sheep, goat and fishery sector

also, the average income per farmer was increased from Rs. 27,667.00 to Rs. 69,043.00 (150%) during 2016-17 to 2020-21 due to interventions of KVKs in scientific livestock rearing, vaccination schedule, maintenance of appropriate stocking density, improved pond eco system and other related endeavors. Average income of the farmers was also doubled from other sectors like areca nut, coconut plantation, food processing that increased from Rs. 15,789.00 to Rs. 40,556.00 (157 %) during 2016-17 to 2020-21.

Table: Economics of farmers' income in Andaman & Nicobar Islands during 2016-17 and 2020-21

Crops and Enterprises	Net income (Rs/ household at current prices)		% increase in income	% share in total income		% share in additional income
	2016-17	2020-21		2016-17	2020-21	
Field crops	4937.00	12532.00	153.8	40.0	38.5	37.6
Horticulture	7407.00	20021.00	170.3	60.0	61.5	62.4
Livestock	16668.00	34336.00	106.0	135.0	105.5	87.4
Fisheries	10999.00	34707.00	215.5	89.1	106.6	117.3
Farm and non-farm enterprises	15789.00	40556.00	156.9	127.9	124.6	122.6
Overall	12344.00	32553.00	163.7	100.0	100.0	100.0

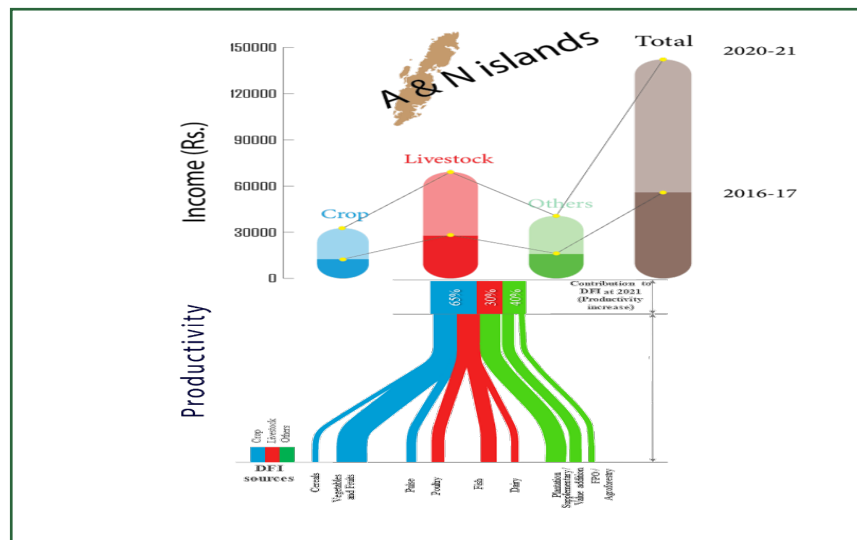


Fig.: Sector wise increase in income from 2016-17 to 2020-21

The overall assessment of enhancement of farmer's income indicates that the marginal farmers (<2.5 acre) increased income from Rs. 73,505.00 to Rs. 2,00,150.00 (172%) by cultivating cereals of high yielding variety followed by vegetables like okra,

potato, chili, cow pea etc. The small farmers (2.5-5 acre) recorded an increase in income from Rs. 1,69,337.00 to Rs. 5,45,899.00 (222%) by cultivating spices and plantation crops in particular like areca nut and banana followed by cereal like paddy etc.

Processed food like copra also contributed towards income enhancement. The large farmers (> 5 acre) increased their income from Rs. 1,99,820.00 to Rs. 7,44,507.00 (272%). Though they were mostly coconut cultivars, fish farming, poultry and piggery were also carried out by the large-scale farmers to ensure doubling of income within the given period.

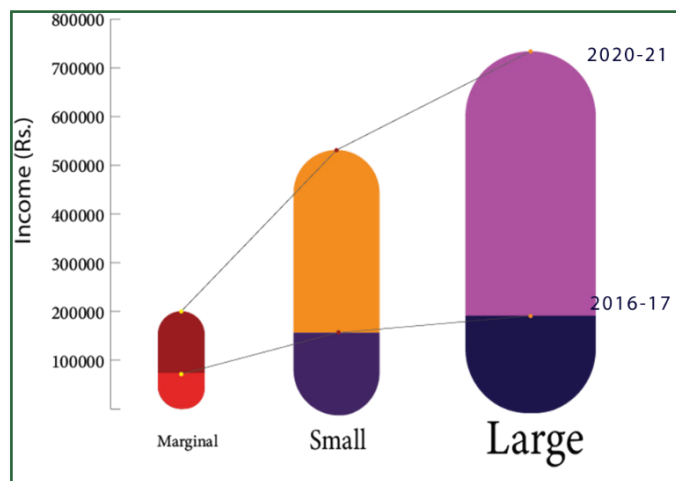


Fig.: Farmer category wise increase in income from 2016-17 to 2020-21

Success Story

Shri. D.N. Madhu, aged 63 years old, is a farmer of Port Blair in Andaman & Nicobar Islands. He lives at Village- Creekabad under Chouldhari Panchayat in Port Blair. He owns 4.3 acres of land. Shri. D.N. Madhu has coconut plants in 0.37 acre of land and a pond in an area of 0.45 acre where he used to rear Indian Major Crabs (IMC) along with a few numbers of poultry birds and ducks and also cultivated bhendi. However, he had no idea about integrated farming system (IFS). He faced problems like irrigation, quality planting seeds/seedlings, ducklings, poor knowledge on farming etc. Once Shri. D.N. Madhu visited KVK, Port Blair, he came to know about IFS and then he gradually adopted pond-based IFS along with scientific fish farming, intensive poultry farming and diversification in vegetable cultivation with brinjal. Earlier, Shri. D.N. Madhu had annual net income of Rs. 1,75,410.00 in 2016-17 and after adoption of IFS, his annual net income has gone just doubled to Rs 3,52,890.00 in 2020-21.



Pond-based IFS



Pond-based IFS

16.14 Research Advisory Committee (RAC) approved Institute Project

Principal Investigator: Dr. A. Haldar

Co-Investigators: Dr. S. K. Mondal, Dr. K. S. Das, Dr. P. P. Pal, Dr. R. Goswami, Dr. T. K. Dutta and Dr. S. Roy

The project entitled, 'A Study on Capacity Development Programs of the KVKs for Augmenting Livestock Production and Farmers' Income in Eastern India' aims at strengthening the capacity of the livestock farmers across agro-climatic regions in Eastern India. Capacity development is the key for agricultural extension activity and a major mandate of Krishi Vigyan Kendra. In India, the farm households access lesser information on livestock technology as compared to accessing information on modern technology for crop farming. No database is available on Capacity Development Programs (CDPs) in livestock sector in KVK network system. The questions of what and how capacity development programs are appropriate

to a given socio-economic milieu under certain agro-climatic region. Hence, the present project is designed to explore the relevance of various CDPs of the KVKs in terms of livestock production and farmers' income and make available reliable database for decision-making process for particular agro-climatic region in Eastern India.

Objectives

1. To delineate a typology of CDPs in livestock production system across agro-climatic regions in Eastern India based on the intended stakeholders' perceptions and program outcomes
2. To assess the relative relevance of existing CDPs of the KVK system
3. To map the pathways of ongoing CDPs for achieving higher farm production and farmers' income
4. To study the likelihood of achieving higher production and income under different combinations of capacity development initiatives

Achievements

- ◀ Data was collected on 940 CDPs with the help of 19 KVKs in Eastern India.
- ◀ 50.0% data of CDPs have been collected from West Bengal (Figure). Each 27.0% of CDPs have been organized on dairy animals and poultry birds followed by small ruminants (24.0%) (Figure).

Species wise distribution of CDPs

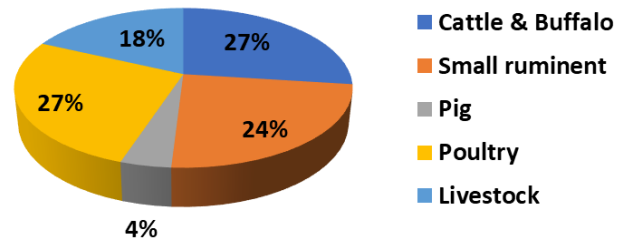


Figure: Species-wise distribution of CDPs

- ◀ As shown in Figure below, maximum numbers (43.0%) of CDPs have been organized on general management followed by feeding and nutrition (23.0%) and health and disease management (20.0%). Increased income (32.6%) was the most significant success due to the effect of CDPs. Other significant successes were improved knowledge (30.3%) followed by increased production (15.5%) (Figure 4).

Theme wise Distribution of CDPs

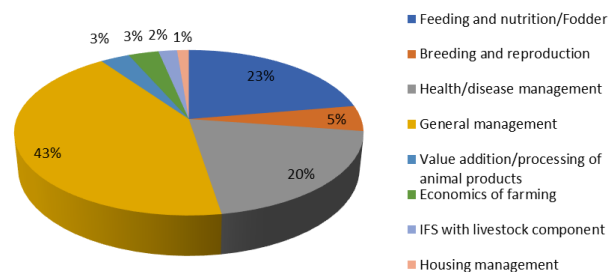


Figure: Theme-wise distribution of CDPs

State-wise distribution of CDPs

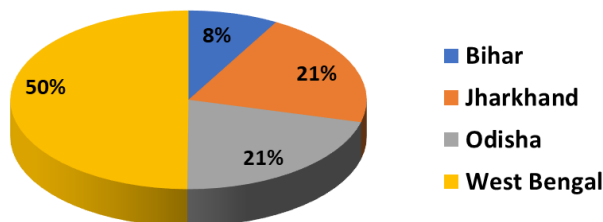


Figure: State-wise distribution of CDPs

Most Significant Success of CDPs

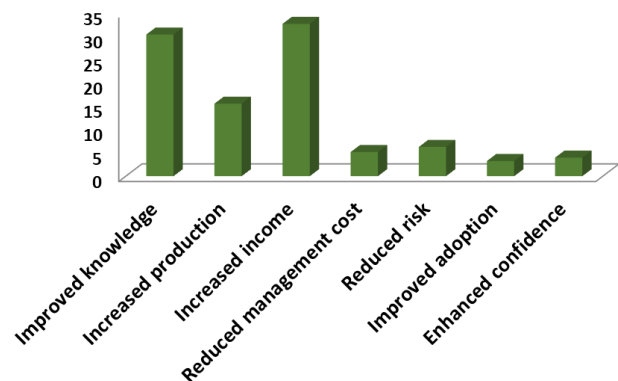


Figure: Indicators of success of CDPs

- ◀ A small pilot study was completed to identify the pathways of training's impact on trainees' incomes as perceived by the farmers, field-level staff and experts. Considering all the stakeholders' opinions and concerns about how the system of impact creation should be drawn, how it works and how one component affects another, we used Fuzzy Logic Cognitive Mapping (FCM) to develop a dynamic system modeling.
- ◀ We have documented different cognitive maps of farmers' and Pani Bondhus' and experts earlier. The cognitive map of farmers' and Pani Bondhus' was simpler, but more pragmatic and 'field-oriented'. 'Good health' showed the highest indegree centrality. The training demonstrated the highest outdegree centrality. Farmers and Pani Bondhus' focused 'deworming' as an important factor, since it affected health, disease etc., and they could take care of this at the farm level. The experts' cognitive map was more complicated, with a greater number of ties, as they might have considered a lot more connections among factors/elements due to their academic knowledge coupled with working with the farmers. The cognitive map of the experts showed that 'body weight' was the highest indegree centrality, while 'breed selection' was another critical factor which controlled many other factors such as 'health', 'weight' etc. The maps indicated various pathways through which training exerts impacted on farmer's income.
- ◀ These earlier cognitive maps were further subjected to scenario analysis, where we could put different realistic scenarios (possible at the village level) to see how training's effect could be optimized by the KVKs and local stakeholders of animal husbandry by suitably following the semi-quantitative model developed in our study.
- ◀ We ran a scenario analysis for five different hypothetical scenarios based on our experience and expert consultation. These were-
 - a) Scenario-1: Effective training with ensured knowledge gain
 - b) Scenario-2: Assured veterinary service
 - c) Scenario-3: Access to improved breed and stopping inbreeding (by providing appropriate male)
 - d) Scenario-4: Introduction grazing land and/or fodder cultivation
 - e) Scenario-5: Access to institutional credit and market

Scenario	Significant improvement in
Scenario-1	Triggers the majority of elements, especially - Healthcare, Feed management, and Vaccination, thus reducing Disease and Mortality and Improved income
Scenario-2	Improved Vaccination and Healthcare, leading to reduced Disease and Mortality
Scenario-3	Reducing Disease and Cost, and improving Body weight and Marketability
Scenario-4	Improved feed management and reduced Cost, thus higher profit
Scenario-5	Improved Housing and Feed management, improved Income

◀ We recorded prediction percentage: Scenario-1: 70%; Scenario-2: 77.78%; Scenario-3: 75%; Scenario-4: 83.33%; Scenario-5: 100% as shown in Figure 5.

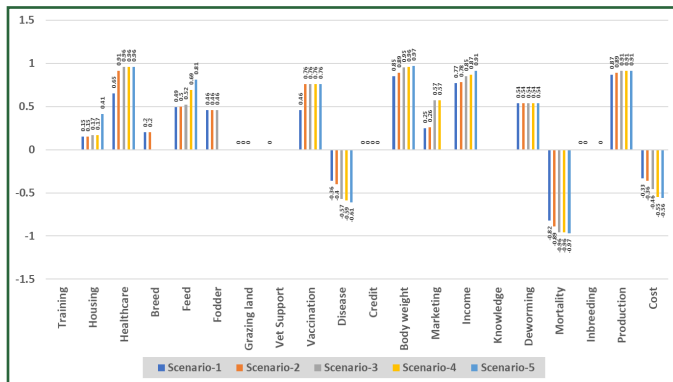


Figure: Prediction percentage in different scenario

◀ Finally, we have drawn a shared cognitive map of all stakeholders as shown in Figure below.

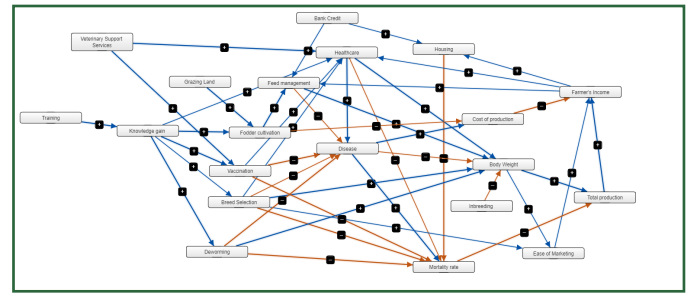


Figure: A final shared cognitive map of all stakeholders

◀ The final shared cognitive map of all stakeholders showed that ‘animal body weight’ was the highest indegree centrality, while ‘breed selection’ demonstrated the highest outdegree centrality followed by ‘knowledge gain’ as highest outdegree centrality indicating these various factors/ pathways through which training impacted on farmer’s income.

Table: Centralities of system elements in the final shared cognitive map

Component	Indegree	Outdegree	Centrality	Type
Training	0	0.5	0.5	Driver
Housing for animals	0.45	0.5	0.95	Ordinary
Healthcare of animals	2.05	1.45	3.5	Ordinary
Breed selection	0.2	2.47	2.67	Ordinary
Feed availability	1.15	0.83	1.98	Ordinary
Fodder cultivation	1.2	0.7	1.9	Ordinary
Availability of Grazing land	0	0.7	0.7	Driver
Veterinary support services	0	1.2	1.2	Driver
Vaccination	1	1.3	2.3	Ordinary
Occurrence of Disease	2.1	1.65	3.75	Ordinary
Access to institutional credit	0	0.5	0.5	Driver
Animal body weight	3.25	1	4.25	Ordinary
Ease of marketing	0.65	0.46	1.11	Ordinary
Farmers' income	1.855	1.05	2.9	Ordinary
Knowledge gain	0.5	2.05	2.55	Ordinary
Deworming	0.6	1.6	2.2	Ordinary
Mortality rate	2.95	0.8	3.75	Ordinary
Inbreeding	0	0.3	0.3	Driver
Total production	1.6	0.8	2.4	Ordinary
Cost of production	0.89	0.6	1.5	Ordinary

Total Components – 20; Total connections – 43; Density: 0.1131578947; Connections per Component – 2.15; Drivers – 5, Receivers – 0; Ordinary components – 15

16.15 Kisan Sarathi:

Nodal Scientist: Dr. A. Haldar

‘Kisan Sarathi’ is an Information Communication and Technology (ICT) based interface platform for supporting agriculture at a local niche with a national perspective. This digital platform was launched jointly by Shri. Narendra Singh Tomar, Minister for



Agriculture and Farmers Welfare with Shri. Ashwini Vaishnav, Minister for Electronics and Information Technology, through video conference on 16th July 2021 on 93rd Foundation Day celebration of Indian Council of Agriculture Research (ICAR) to facilitate farmers to get ‘right information at right time’ in their desired language. With the ‘Kisan Sarathi’ digital platform, the farmers can interact and avail

personalised advisories on agriculture and allied areas directly from the respective scientists of Krishi Vigyan Kendra (KVKs). ‘Kisan Sarathi’ initiative is highly valuable not only in addressing the location specific information needs of the farmers but also in Agricultural Extension, Education and Research activities of ICAR. Using this digital platform, the farmers can get information about crop, livestock, fisheries etc and their productions, among other things that will help them in improving the quantity and quality of their produces. With the help of the Kisan Sarathi platform, the farmers will be able to get information about good crop practices, good livestock management practices and many other basic things. Moreover, the farmers can also learn new farming techniques and/ or technologies using the ‘Kisan Sarathi’ platform,

Under ‘Kisan Sarathi’ platform, a total of 6,34,925 farmers of this zone have already been registered from different districts of Andaman & Nicobar islands, Odisha and West Bengal (Table 1). As shown in Figure 1, 59 KVKs with 252 experts of KVKs under ICAR-ATARI Kolkata have been registered during 2022. A total of 4356 calls/ queries have been made so far. This initiative of Kisan Sarathi definitely empowers farmers with technological interventions to reach farmers in remote areas.

Table 1: The Status of Registered Farmers in different States under Zone V

Sl. No.	State	Registered Farmers	Max. (KVK)	Min. (KVK)
1	A & N Islands	1,716	821 (Port Blair)	121 (N & M Anadaman)
2	Odisha	2,46,902	17,456 (Ganjam-I)	371 (Bolangir)
3	West Bengal	3,86,307	61,690 (Uttar Dinajpur)	1,449 (Kalimpong)
Total		6,34,925		

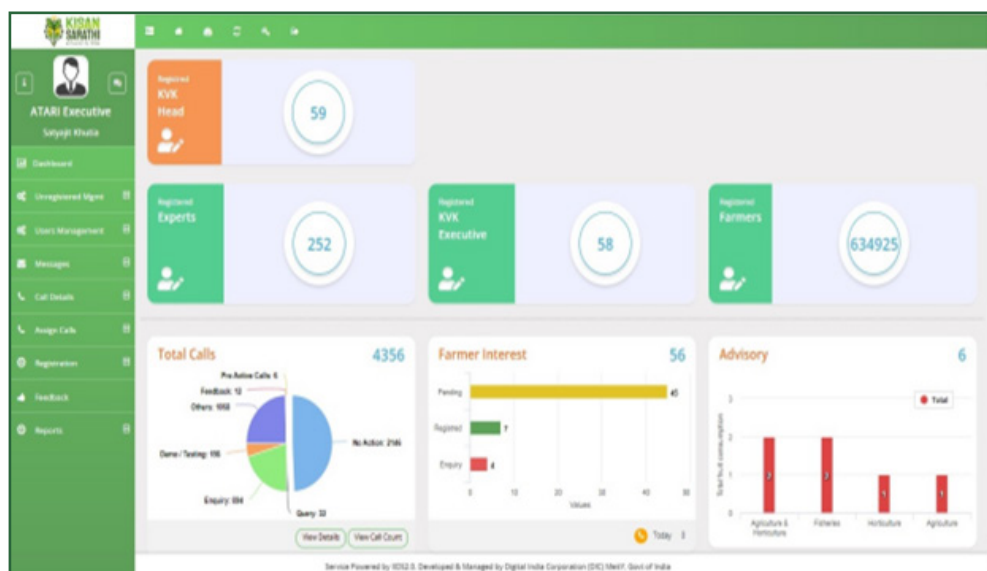


Figure: Status of Registered Farmers, Experts, Calls Received, Farmer Interest etc.

17.0 Other Programmes

17.1 BSF Personnel Training:

The KVK scientists of ATARI Kolkata educated BSF personnel available in their respective districts on various technologies relating to agriculture and allied sectors e.g. horticultural production, grafting techniques, honey production, hi-tech agriculture, livestock rearing, fish rearing and many others. Very good liaison between army personnel and local civilians were established by the KVKs. During 2022, three KVKs from West Bengal state trained 117 BSF personnel.



17.2 Rural Agricultural Work Experience (RAWE) Programme:

To acquaint with the agricultural farming situations under rural conditions, the KVKs of this zone also organized various programmes for ARS trainee probationers at their district level. They were also associated with ICAR-ATARI Kolkata to interact with the scientists and administrative staffs, and to know the activities of the institute. Twenty two KVKs, 12 from Odisha and 10 from West Bengal, trained a total of 531 ARS trainee during 2022. Out of which, 202 trainees were from Odisha and 329 from West Bengal state and altogether they spent for 1298 days at different districts under ATARI Kolkata.

Sl. No	State	No of student trained	No of days stayed
1	Odisha	202	341
2	West Bengal	329	957
Total		531	1298



17.3 KVK in Rural School:

Being an agrarian country, in India proper agricultural knowledge, skills, attitude and dedication of farmers play very important role for successful and sustainable farming. However, in the present scenario, farmers are well aware of latest technologies in the fields of agriculture, but, the current generation of children and youths are not willing agriculture as their dignified profession. In this light, it is very essential to educate the children at young stage about the importance and benefits of agricultural farming. The scientists from 18 KVKs under ICAR-ATARI Kolkata tried to motivate such young buds to inculcate the basic knowledge of agriculture through delivering lectures, presentations, showing audio visuals, distributing leaflets/pamphlets, group discussion, organizing quizzes etc. Four schools from A & N Islands, 15 schools from Odisha and 19 schools from West Bengal were approached for the purpose. During the year 2022, a total of 49 programmes were conducted in different districts of this zone.

State/UT	No. of School	No. of Visits	No. of KVKs
A & N Islands	4	4	2
Odisha	15	20	8
West Bengal	19	25	8
Total	38	49	18



17.4 Celebration of National Girl Child Day 2022:

The 'National Girl Child Day 2022' was celebrated at the KVKs of this Zone on 24.01.2022. On the occasion, various programmes viz. awareness on nutritional security, women empowerment, right to education, health issues, 'Beti Bachao Beti Padao' and so on including art/debate/rangoli/dancing/singing competition were organized. The importance of observation of the special day was narrated by many distinguished speakers. The Government projects related to the girl child were also highlighted during the programme. A total of 35 KVKs undertook the programme with attendance of 30 VIPs, 1564 students and 540 other than students.

17.5 Celebration of International Women's Day 2022:

The 'International Women's Day 2022' was celebrated by KVKs on 08.03.2022 at their respective KVK campuses and some of the adopted villages of the

KVKs under ICAR-ATARI Kolkata. The purpose of the day was to recognize the role of women in agriculture, their challenges and achievements and the theme of International Women’s Day was ‘Empowering women farmers with skill and knowledge’. On the eve of the day, various programmes were

organized on women empowerment, nutrition and income generation. All the KVKs of this Zone were conducting the programmes describing the role of women in agriculture. The detail report of celebration is given in the table.

Name of State	No. of KVKs organized the programme	Seminars organized		Training programme organized		Gosthis organized		Exhibitions organized		Total	
		No. of activities	No. of participants	No. of activities	No. of participants	No. of activities	No. of participants	No. of activities	No. of participants	No. of activities	No. of participants
A & N Islands	2	1	62					1	62	2	124
Odisha	24	8	389	24	882	7	210	6	298	45	1779
West Bengal	14	7	460	22	792	8	464	4	206	41	1922
Total	40	16	911	46	1674	15	674	11	566	88	3825



17.6 Organization of Garib Kalyan Sammelan:

On the occasion of completing of 8 years of the government led by the present Prime Minister (PM) of India, ‘Garib Kalyan Sammelan’ was organized on 31.05.2022 across the country at State Capitals, District Headquarters, and Krishi Vigyan Kendras. The PM addressed the gathering at different places from Shimla, Himachal Pradesh. The elected public



representatives across the country directly interacted with the public to get feedback about the various welfare programmes being run by the Government. The 11th installment of financial benefits under the ‘Pradhan Mantri Kisan Samman Nidhi Fund’ was released. The PM also interacted with the beneficiaries of (PM-KISAN) across the country. About 48043 participants from various sectors attended the programme at 59 KVKs and different ICAR Institutes under ICAR-ATARI Kolkata.

17.7 Celebration of Republic Day 2022:

The ‘Republic Day 2022’ was celebrated at ICAR-ATARI Kolkata on 26th January, 2022. All staff members of ATARI Kolkata assembled in front of the institute to commemorate the spirit of independent and individual India. The Director, Dr. S. K. Roy highlighted the importance of the day and urged everybody to work at their best to develop our nation.



17.8 Celebration of International Yoga Day 2022:

On the occasion of celebrating the 75th years of Independence under ‘Azadi Ka Amrit Mahotsav’, a series of events on ‘Awareness Programmes on Balance Use of Fertilizers’, ‘Region Specific Agro-Forestry’, ‘International Yoga Day Celebration’ were conducted on 21.06.2022 at 59 KVKs including ICAR-ATARI Kolkata. In those programmes, 4507 farmers and other stakeholders participated who were motivated to inculcate habits of yoga, awareness on balance use of fertilizers and importance of region specific agro-forestry.

Name of State/ UT	No. of KVKs organized the event	No. of farmers and other stakeholders participated
A & N Islands	03	235
Odisha	33	2343
West Bengal	23	1929
Total	59	4507

‘International Yoga Day 2022’ was celebrated by practising different yoga Asanas (Taadasan, ArdhaChakrasana, Vrikshasan, Uthanasan etc.) by farmers, staff of KVKs and neighbouring school children. Pranayams e.g., Kapalbhati, Anulom Vilom,

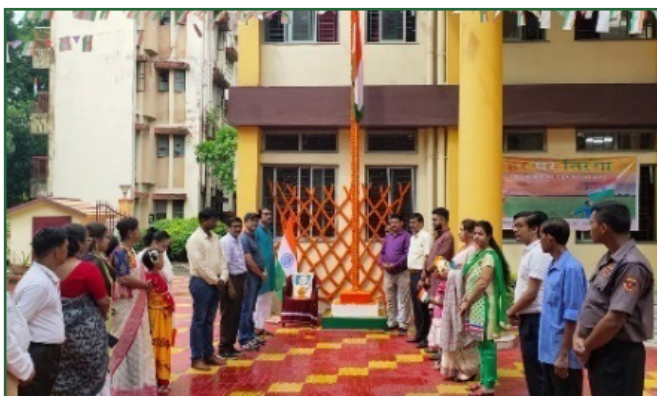
Bhramari and many others were also performed by the participants. The programme was attended by all staff of ICAR-ATARI Kolkata, SSH of KVKs, SMSs, other office staffs, line department officials, students, farmers and rural youth across the zone. Looking into the importance of balance use of fertilizers, KVKs organized awareness programme on balanced use of fertilizers for the farmers and farm women. Awareness was created to stop excessive use of fertilizers/chemicals. The use of site specific fertilizer application was demonstrated on the occasion. During the events of the day, KVKs made the participants aware of importance of adding organic matter to the soil in the form of manure / vermicompost / green manure which in turn will sustain the productivity of the soil. To reduce the risk of climatic vulnerability in cultivation of field crops, awareness on region specific agro-forestry, tree plantation like bamboo, karanja and neem was imparted by expert to farmers. The expert highlighted the benefit of agro-forestry like wind protection to the crop, prevention of soil erosion, increase of organic content as well as biodiversity of the region. Different models on area specific agro-forestry and their technologies and benefits were discussed among farmers and farm women. Several KVKs distributed saplings of eucalyptus, bamboo, palms etc.





17.9 Celebration of Independence Day 2022:

The 'Independence Day 2022' was celebrated at this institute on 15th August, 2022. All staff members of ATARI Kolkata assembled in front of the institute to celebrate the day with utmost fervour, zest and a spirit of patriotism for marking the innumerable sacrifices of the freedom fighters of our country. The Director, Dr. S. K. Roy pointed out the role of freedom fighters and discussed the importance of the day. Dr. Roy requested everybody to work for the development of the organization and ultimately, for the Nation.



17.10 Celebration of Mahila Kisan Diwas:

Considering International Day of Rural Women (IDRW) as an UN observance, Government of India (GoI) declared 15th October as 'Mahila Kisan Diwas' for recognizing the critical role and contribution of rural women, for enhancing agricultural and rural development, for improving food security and eradicating rural poverty. The different activities of this programme are Nutritional Security through kitchen gardening, discussion on Swachhata activities, Natural farming and Millet cultivation, role of women in agriculture and its empowering aspects. During the year 2022, total 23 no of VIPs attend this programme with 153 different villages.

State/UT	Number of KVKs organised programme	No. of villages Involved	No. of VIPs	No. of Participants
A & N Islands	2	4	0	37
Odisha	31	78	10	1627
West Bengal	16	71	13	1316
Total	49	153	23	2980





17.11 Observance of Vigilance Awareness Week 2022:

The 'Vigilance Awareness Week 2022' was observed from 31st October to 6th November, 2022 at ICAR-ATARI Kolkata including KVKs of this Zone. The main theme was focussed on 'Corruption free India for a developed Nation'. About 576 staff and 1818 farmers under ATARI Kolkata have undertaken integrity pledge on 31st October at 11 AM for upholding the highest standards of ethical conduct, honesty and integrity. A number of various programs like panel discussion, lecture, workshop, awareness seminars,

debate, quiz competition, drawing competition, poster competition etc. were conducted involving employees, farmers, school boy and girls throughout the week for sensitizing the people to generate awareness in the public at large about the ill effects of corruption and fight against corruption and enhance transparency and accountability in their functioning. Besides, banner and poster on vigilance awareness week were displayed. Social networking sites like Facebook, Twitter, YouTube, WhatsApp and a voice message in local language, were also used to sensitize the people on vigilance awareness.



18.0 New Initiatives

18.1 Natural Farming:

Nodal Scientist: Dr. F.H. Rahman

In order to deal with excessive fertilizer, use and its impact, A network project entitled, "Outscaling of Natural Farming Through KVKs" of Indian Council of Agricultural Research (ICAR) has been launched, aiming to adapt the farming method, which was basically done by natural phenomena in Indian agriculture, to preserve and sustain soil health through strategic research and technology

demonstration. Natural Farming is a chemical-free traditional farming method considered as agroecology based diversified farming system which integrates crops, trees and livestock with functional biodiversity. Main objective of this project is to restore soil health and fertility, promote local breeds for livestock integration and improve economics of farmers by reducing input cost of agricultural production. During the year 2022-23, a total of 34 KVKs from this Zone comprising of one KVK from A & N Islands i.e. Port Blair, 16 KVKs from

West Bengal i.e. Bankura, Coochbehar, Dakshin Dinajpur, Hooghly, Howrah, Jhargram, Darjelling, Malda, Murshidabad, Murshidabad (Addl.), North 24 Parganas, North 24 Parganas (Addl.), Purulia, South 24 Parganas, South 24 Parganas (Addl.) and Uttar Dinajpur, and 17 KVKs from Odisha i.e. Angul, Balasore, Baragarh, Bhadrak, Dhenkanal, Jagatsinghpur, Kalahandi, Kandhamal, Kendarpara, Keonjhar, Koraput, Mayurbhanj-II, Nayagarh, Puri, Sambalpur, Sundargarh-II and Cuttack were involved under this project. Total sanctioned budget during 2022-23 FY is 382.35 lakhs. Out of the sanctioned fund, ATARI Kolkata received 95.53 lakhs (1st installment). Total 90.10 lakhs already released to KVK.

on February 15-16, 2023 held at WBUAFS, Kolkata to review the physical and financial progress of the project. This workshop was attended by all the Natural farming implementing KVK of this Zone.

KVKs organized awareness programme, training and demonstration to Outscaling Natural Farming among the Farmers. Awareness programme conducted by the KVKs through different means i.e., Exhibition, Tableau van, camps, Kishan Mela as well as distribution of literature, posters and extension materials to make the Farmers aware about the importance of Natural Farming. A total of 555 awareness programmes during the year was conducted by 34 KVKs with 111233 number of farmers' participation.



The action plan workshop of this project was organized on 09.11.2022 on online mode by ICAR-ATARI Kolkata. A workshop on Capacity Building Programme of Natural Farming was organized by ICAR-ATARI Kolkata on 29th November, 2022 at Sasya Shyamala KVK, RKMVERI, Narendrapur to discuss the action plan of this Project. After that, one review workshop was also conducted by this office

Residential Training programme was organized by KVKs to train the farmers on preparation of different inputs and field-oriented approaches along with application. Every KVK trained 40 number of farmers in this year. A total of 34 training programmes were conducted by the KVKs with 1360 farmers benefitted.



Every KVK selected 8 number of Farmers for conducting demonstration in Farmer's field based on some criteria i.e., those who are already conducting Natural farming, those who showed interest during the awareness programme, Farmers who have Desi cow etc. Demonstration was conducted different crops i.e., Tomato, Okra, Mustard, Cauliflower, Cabbage, Potato, Onion, Brinjal, Green gram, Okra, Boro Paddy, Wheat, Garden Pea, Maize, Spinach, Green gram, Chilli, Cowpea, Coriander, Sugarcane etc. In majority of cases Farmers are satisfied with Natural Farming because the cost of cultivation is less and also farmer get more yield compare to conventional method. Total 272 demonstration was conducted in Farmer's field during this year.



18.2 Agri-Drone:

Nodal Scientist: Dr. F.H. Rahman

Agri drones are a cutting-edge technology that can be effectively used to spray pesticides, thereby reducing chemical usage and costs, evaluating the health of crops, and real-time monitoring of weed, disease, and insect infestations over a wide area to enable their timely management practices. During the year 2022, DA & FW launched a Central Sector Scheme entitled "Sub Mission on Agricultural Mechanization for implementation of its component No. 1 under Drone Technology Demonstration". Total budget involved under this project is 4.58 cr during 2022-23. The KVKs have been sanctioned one drone each and the institute/SAU have sanctioned two drone each. Target Area for Kisan Drone Demonstration of each KVK is 250 Ha and for each institute/SAU is 500 Ha.



Table: List of Agri Drone Project Implementing Centres (PICs) under ICAR-ATARI Kolkata

Project Implementing Centres (PICs) (17)

Name of the KVK	Name of Institute/SAU
South 24 Parganas	ICAR-CIFRI Barrackpore
South 24 Parganas (Addl.)	ICAR-CRIJAF Barrackpore
Murshidabad (Addl.)	ICAR-IIWM Bhubaneswar
Birbhum	ICAR-CIFA Bhubaneswar
Coochbehar	ICAR-NRRI Cuttack
Deogarh	ICAR-CIWA Bhubaneswar
Mayurbhanj-I	ICAR-CIARI Port Blair
Nayagarh	OUAT Bhubaneswar
	BCKV Mohanpur

Details of Agri Drone project

No. of Kisan Drones Sanctioned/purchased	Target Area for Kisan Drone Demonstration (Ha)	No. of Kisan Drone Demonstration organized	Area Covered under the Kisan Drone Demonstration (Ha)	Number of farmers participated
26	6500	110	306.5	4835

Different types of cultural operation carried out by using Agri Drone technology like Agrochemical application, Nutrient application and Pesticide application. The Kishan Drone Demonstration

revealed a number of its many benefits i.e., it reduces labour cost, time and water with efficient spray system.



19.0 Selected Success Stories

19.1 KVK South Andaman:

Integrated farming system in tsunami affected areas of Andaman and Nicobar Islands

Shri M. M. Joydhar is a small farmer with 5 family members having 2.5 ha of land. Till December 2004 the land was used for cultivation of paddy during

rainy season and a part of the land for cultivation of vegetables during the dry period using the little water available in his pond. The same land was inundated by the sea water in the earth quake followed by Tsunami in 2004 and therefore became unsuitable for cultivation. During April 2014, the KVK team interacted with Shri M. M.

Joydhar and assessed the available resources in his holdings with interactions. Pre-adoption resource map and bench mark information was collected and a lay out plan was prepared in 1.5 ha of land in integrated approach considering the topography of the land. Pond cleaning with mahua oil cake and pond preparation by addition of manure (cow dung) was conducted. The ducks were introduced to enrich the fertility and aeration of the pond for better growth of the fish. Alongwith coconut trees, saplings of fruit trees like, banana, guava, custard apple, sapota, lemon and pine apple are provided for planting on the pond embankment. He practiced mixed farming system in his field by making BBF and ridge and furrow methods and grows aerial vegetables by making machan (Nylon fishing wire) on the furrows.

The farmer used to get annual income of Rs.165000 from fish culture of Indian major carps, bhendi, cucurbitaceous plants, and coconut etc. With KVK interventions like ridges and furrows, integration and crop rotation with leguminous and leafy vegetables along with intensive poultry farming etc., he is getting annual income of Rs 464435/-. After getting the benefit he has constructed a small house near by the farms. More than six numbers of off campus training program and field days were conducted in his field to show the effectiveness of the technology in the field condition. His success has attracted media attention on his systematic well maintained farming system was covered by DDK (two times) and AIR (two times), Port Blair.

Being an award-winning farmer, he is quite an inspiration for others and a role model in the neighbouring villages. Because of his hard work and successful farming system he became popular one village to village and district to district and other Tsunami affected farmers following his concept of integrated farming system in the brackish water inundated areas. The integration of available resources and the technical guidance by KVK helped the farmer to overcome the impact of Tsunami and now he is one of the role model for other farmers.



19.2 KVK Boudh:

Agri-Horti-Pisciculture has become a boon for marginal farmer

Mr. Manoj Pradhan is a farmer who enjoys agriculture and who chose to be a farmer even though he has talents in other fields such as Comp. Sc. & Engineering. Farming is very close to his heart. He was a job holder of a MNC outside of the country before COVID pandemic situation. With this intention, He started meeting people to understand different agriculture practices and improve his knowledge and he has adopted Integrated farming system-Agriculture crops including Horticulture crops and pisciculture. Along with these, he took up other allied enterprises, such as vermi-compost. He recycles farm waste into healthy manure through the vermi-compost unit and gets over 50% nutrients by recycling the bio-mass available within the farm

itself. He has tried to reduce excess of expenditure by using organic bio inputs and adopted water saving techniques-drip, etc. He is practicing intercrop method for getting extra income and vermi-compost unit. The zero budget preparations like Jeevamrutha, Beejamrutha Ghana, make the farm soil healthy and fertile.

He earns net annual income approx. Rs. 28 lakh from 50 acre of his land (Rs. 5 lakh from Paddy in 40 acre, Rs. 10 Lakh from fishery in 8 acre & Rs. 3 Lakh from Horticultural crops & Others in 1.5-acre area) per annum. Now he is a successful young entrepreneur and became a role model to other farmers in the village as well as other villages. He has motivated many farmers of Boudh and Harbhanga block and mobilized them for development of integrated farming system. He gave employment lots of unemployed rural youth of his locality in his farm. The input cost in subsequent years in traditional farming was more or less constant while it decreased by 25-35% in subsequent years in IFS models and thus especially IFS model proves to be profitable in the present scenario of decreased landholding. IFS provides for low-cost farming systems suitable for Indian conditions based on the productive utilization of farm wastes and fuller utilization of available resources and manpower. Intercropping, vermi-composting practices also aid in increasing the fertility of the soil and also reduce the dependency on chemical fertilizer and also aids in getting better yield.

He has motivated many farmers of 3 blocks of the district and mobilized them for development of integrated farming system, especially who have pond. He gave employment lots of unemployed rural youth of his locality in his farm. Within a short time, he transformed into a successful farmer and became a great example for the farming community & how adopting IFS model could be the way forward for higher income and sustainability. He has proved that wonders can be done in agriculture if investments are made in the right direction and farmers are equipped with the latest knowledge.



19.3 KVK Ganjam-II:

Booming Farmers Income through Crop Diversification

Tarini Reddy, a 45-year-old enthusiastic innovative small farmer from Kutharsingh village having 4 acres of cropland. The farmer got an annual profit of Rs. 82,671 from 3-acres land by traditionally cultivating of rice, beetle vine, vegetable, etc. and remain 1 ac becomes fallow since long. Earlier Sh. Tarini cultivated rice, beetle vine and vegetables but it was not remunerative to manage his family day to day needs. The major constraints were lack of scientific knowledge, low yield of rice, beetle vine and vegetables with various diseases and pest outbreaks.



Realizing the needs of Sh. Tarini, KVK planned a systematic and scientific approach to improve income and livelihood through a diversified need-based approach. He attended numerous training programmes on integrated crop management practices including new crop varieties, fruit, vegetables, beetle vine and rice production technologies. He was advised for seed treatment, STBF application, line transplanting, application of weedicides and timely control of diseases and pests. That helped him change the cultivation practices. He has adopted the ICM practices with new high-yielding varieties to minimize the production cost. As a result, production has increased many folds due to the KVK association and technical interventions.

Before the initiative, he got a meagre profit of Rs. 82,671. After interventions, Tarini got a profit of Rs. 3,65,526 from 4 acres of land where the average benefit-cost ratio is 2.8. Now Tarini feels more secured due to the multifarious interventions that minimize the risk. Over 3 years, the socio-economic condition and way of living are considerably improved due to DFI interventions. Now the technology spread to 5 adjacent villages of the block and the interventions have changed the mindset of villagers.

19.4 KVK Kandhamal:

Journey of a landless women towards self-dependency

Mrs. Bhaktimala Nayak, W/O: Samson Nayak of district Kandhamal was a progressive lady with a zeal to do something substantial to benefit her family and society. As her husband has a marginal land holding, it became very difficult to earn their livelihood from the existing resources. They were living a very harsh life with lots of grief and hunger. In one of her visits to KVK changed her perception towards integrated farming and the sustainable income opportunities from such systems. Mrs. Nayak approached Krishi Vigyan Kendra, Kandhamal and attend the trainings on Oyster mushroom cultivation and Backyard poultry rearing with high yielding colour breeds during September 2019. Then she started mushroom cultivation within her house as per the guidance and support from the scientists and procured the required number of spawn bottles from KVK.

Inspired by the initial success with encouraging support from her husband, she constructed a low cost mushroom production unit attached to her house and started producing mushroom regularly. Also she made a small night shelter for 50 birds and started poultry rearing. To begin with, KVK from its poultry brooding unit arranged 40 number of 28 day-old Vanaraja and Aseel poultry chicks for her.

She participated in the 5 days' skill development training programme conducted on "Mushroom cultivation and Backyard poultry rearing for doubling income" and its management practices at KVK Kandhamal. Mrs. Nayak could able to put around 1600 bags of Oyster mushroom during October to March and produce a total of 28.8 qtls of mushroom during 2019-20. The produce could earn her a total net profit of Rs. 2,24,000/- within 6 months. She sales all the produce from home in retail mode, she also goes for drying the mushroom in case of excess production and less sale. During summer months owing to the reduction in yield of Oyster mushroom, she puts more effort on Backyard poultry rearing by which she could earn an additional income of Rs. 72,000/- from 200 numbers of poultry birds. In total, Mrs. Nayak earns around Rs. 2,96,000/- per annum without having any land resources from these two enterprises.

The training helped her learning appropriate and scientific method of backyard poultry rearing, mushroom cultivation followed by using its byproducts for vermicompost production. She regularly visits KVK and updates herself with new knowledge regularly interacting with scientists which guided her to achieve success. Based on her experience, she started offering hand-on training to farm women groups and youths helping in disseminating the technologies. Inspired by her success, many farm women from the nearby areas started approaching KVK during COVID-19 lockdown period for starting these small income generating enterprises at their backyards for sustenance and development of livelihood. Due to her initial effort, many mushroom growers have come up in G. Udayagiri block and for which there was no scarcity of mushroom during the winter season of this year. The initiative taken by her has proved that landless farmer can also have

satisfactory income and provide employment opportunity to other house wives by taking certain skill full training of mushroom cultivation and backyard poultry rearing.



19.5 KVK Khordha:

Organic Nutri-garden fetched household nutritional security

Smt. Nandini Das, a farmwoman aged about 45 years completed her education in 9th Class. She has nuclear family consists of 05 members. She used inorganic fertilizer and pesticides for growing of vegetables in her Nutri-garden which leads to environmental pollution as well as poses health hazards. She acquired skill training on Organic Nutri-garden,

Vermi-compost Production, Preparation and Application of organic plant growth regulators and bio-pesticides in vegetable crops cultivation in Nutri Garden from Krishi Vigyan Kendra Khordha, ICAR-CIFA, Bhubaneswar under SCSP Programme. Under Front Line Demonstration, KVK Khordha provided necessary critical inputs such as vegetable seeds and seedlings for Nutri-garden for both Kharif and Rabi season. Vermi beds (Size 12×4×2ft and 6×4×2ft) and Earthworm Spp. (*Eisenia foetida*) were supplied for vermi-compost production to the farmwoman. Besides, she has participated in the awareness programmes on health benefits of fruits and vegetables and balance diet requirement for the rural women and children conducted by KVK Khordha. She has grown vegetables in her Nutri-garden in organic method. From her Nutri-garden during the Kharif season the per day per capita nutritional availability were 86.6 g Amaranthus, 33.33g Okra, 37.77g Brinjal, 20g Snake Gourd, 6.66 g Chilli, 5.78g Bitter Gourd, 8 g Cucumber, 126.67g Pumpkin and 47.77g Colocasia. Similarly, during Rabi Season the per day per capita nutritional availability were 66.66g Amaranthus, 66.66g Spinach, 26.66g Okra, 43.33g Brinjal, 37.77g Tomato, 60g Radish, 26.66g Beans and 88.88g Cauliflower. With the technological support, guidance and advisory services from KVK Khordha, she has harvested 548.40 kg of vegetables in Kharif season and 415 kg of vegetables in Rabi season from her Nutri-garden.

Nutri-garden provides continuous supply of fresh vegetables for the family round the year. Besides, household consumption the farmwomen sold excess vegetables in the local market and earned money. She saved Rs.600/- per month of family expenditure through Nutri-garden. This amount has been utilized for purchase of other vegetables, pulses for the family members and also meets the miscellaneous family expenditure.

The farmwomen happily distributed some of the vegetables produced from her Nutri-garden among her friends and neighbours. It is a great way to engage the whole family in physical activity by utilizing their leisure time and reduce the stress. Plants grown in Nutri-garden provide a peaceful mood and positive thinking ability due to its aesthetic beauty. Common villagers are also motivated by

seeing round the year organic vegetable cultivation and have come forward to start the same in their own household area.

Organic Nutri-garden reduces the use of pesticides and agro-chemical need for growing of vegetables. It improves the soil health and protects the environment from pollution. It reduces the human health hazards. Nutri-garden directly contributes to household food security by increasing the availability, accessibility and utilisation of vegetables and perennial fruits. In the same village another 50 households adopted organic Nutri-garden in their backyard. The unused land is also utilized on a productive way followed by engagement of farmwomen in Nutri-garden. It is a low-cost sustainable approach for mitigating malnutrition especially in rural households.



19.6 KVK Sambalpur:

Improved vegetable cultivation method proved profitable

Jagadish Mirdhagrows different vegetable crops like- okra, cow pea, pointed gourd, cluster bean, brinjal, chilli, pumpkin, ridge gourd and other leafy vegetables using the improved technologies in 5.5 acres of land. He also developed a vegetable nursery in a land of 0.5 acre.

In 7 acres of land, he grows okra-1 acre, pointed gourd-1 acre, cluster bean-1 acre, brinjal- 1 acre, chilli-1 acre and pimpkin-1 acre and ridge gourd-0.5 acre and vegetable seedling nursery- 0.5 acre. He is earning Rs 4,98,500/- annually through vegetable cultivation and vegetable seedlings.



The trainings provided by KVK helped him to acquire knowledge and skill on scientific vegetable cultivation. He learned about the good varieties and hybrids of vegetable crops suitable to his farm field. He learned the technologies related to Integrated Nutrient Management, Integrated Weed Management, Soil and water management, Integrated Pest and Disease Management, and Off-season vegetable cultivation. The improved vegetable cultivation practice followed by Mr.

Mirdha enhancing proper utilization of resource and management of nutrient, pests and diseases in an integrated approach and maintaining sustainability.

Mr. Jagdish Mirdhadisseminates knowledge and technologies in various village level and panchayat level training programmes by participating as a local resource person. He has risen as an inspiration for the educated unemployed youths of his locality. He has given employment to four numbers of rural youth in his farm for production, maintenance as well as marketing.

19.7 KVK Bankura:

Harighata Black: A promising poultry bird for women empowerment in Bankura

Sulata Mondal, an 47 year old poultry farmer in Bankura District cannot be a happier women, having opened a bank account for the first time in her lifetime using money earned from production of indigenous (Haringhata Black) chickens. She is one of the beneficiaries of the 'NityanandapurMaa Sarada KrishakAdhikaryGosthi' aided by WBCADC KVK, Bankura with an objective of transforming the rural poultry subsector into a viable commercial enterprise.

From the first 100 batch of Haringhata Black she hatched 450 chicken in her first attempt and raised those 450 to maturity. From those 450 birds in the 2nd cycle she earned by selling 350 birds for worth Rs. 105000.00 and egg of Rs. 61,200.00 after deducting inputs and transportation cost. After cultivation she used part of the money to renovate her house, expand the chicken shed and pay for her children education. Her story has inspired several women in Bankura district to join commercial production of Haringhata Black chickens especially after she was elected as master trainer by KVK Bankura to mobilize other women in the area to start commercial production.

Her story has inspired several women in Bankura district to join commercial production of Haringhata Black Chicken especially after she was elected as master trainer by KVK Bqankura to mobilize other women in the area to start commercial production.



19.8 KVK Birbhum:

The taste of success with homemade incubator and poultry rearing

Amit Ghosh was an electrician. He is having only 1 acre of land and cultivating mainly paddy, mustard, potato to maintain his own means of livelihood. The income from his activities was not satisfactory. He visited Rathindra Krishi Vigyan Kendra frequently to know other possible avenues of earning from Animal Husbandry and related sectors. Rathindra Krishi Vigyan Kendra identified his technical skill and motivated him to develop homemade Incubator and begin poultry rearing in both backyard and deep litter system. KVK proved to be a real helping hand as they came up with the installation of his home-made Incubator that helped in fast hatching of eggs and increasing the production of Women Self Help Groups. KVK, Birbhum also helped him

to create linkages with different Women Self Help Groups and Agricultural Technology Management Agency (ATMA) for installation of his homemade Incubator. Nowadays he is earning Rs. 22000/ from his poultry keeping and related venture.

Sri Ghosh was given a 3-day intensive skill development training programmes on scientific poultry farming and management practices and low-cost feed formulation of poultry by Rathindra KVK, Birbhum. He also attended various awareness programmes and exposure visits to public as well as private sector poultry farms for gaining firsthand experiences. Free of cost Vaccine along with veterinary medicines.g. antibiotic, anti-coccidial drugs, vitamins and mineral supplements supplied by KVK was also part of the initial inputs. He was also supported by technical know-how to develop a homemade Incubator. The marketing of his homemade incubator was also extended by RKVK by linking with, different SHGs, Agricultural Technology Management Agency (ATMA) and other poultry farmers.

The training helped him to learn scientific management of various aspects of poultry rearing. Technical support to develop homemade incubator by Krishi Vigyan Kendra made the venture a profitable one. Use of home-made incubator boosted up the fast production of chicks in rural area. Continuous production and supply of rural backyard poultry chicks e.g., Vanraja, RIR, Aseel. Kadaknath etc. is possible by using this low-cost incubator. It is well known that backyard poultry production has immense importance to overcome the never-ending problems of poverty, hunger, and malnutrition in rural India.

Amit participates in various training programme as a resource person. After installation of his low-cost homemade incubator, he trained and assisted the SHG members in successful hatching of eggs. His success attracted rural youths and farm women to start poultry rearing and hatching their own chicks. This success of Sri Ghosh as a rural entrepreneur can be used as a Model for formulating the Strategies to increase the income and overcome the problem of malnutrition and poverty of the farmers of the Birbhum District, West Bengal.



19.9 KVK Murshidabad-I:

Seed production of threatened catfishes in captive condition

Mr. Sanwar Hoassain Mahaldar, a rural youth from Murshidabad, West Bengal, is practicing fish farming on 0.39 acre area. Previously he was engaged with the producing mainly of mono-sex tilapia in his farm and getting annual income of Rs. 14000.0. He faced different problems like more feed cost and non-availability of good quality fish seed etc. He tried to breed catfishes like singhi, magur and koi several times and wanted to establish a catfish hatchery but he failed to breed these catfishes by his own. Then he came to our KVK for suggestion and as per our guidance he participated in a skill-based

training programme conducted under STRY (Skill Training for Rural Youth) on Entrepreneurship development through seed production of pabda and koi in 2021 by Murshidabad KVK conducted under the coordination of Directorate of Research, Extension and Farms, West Bengal University of Animal and Fishery Sciences, Kolkata. This training programme helped Mr. Mahaldar in acquiring knowledge and skill required for setup a catfish hatchery and production of good quality fish seed till date. In this year (2022), 5 nos. of jar hatchery established for better hatching of catfishes.



With KVK interventions like, giving need-based training on seed production of catfishes through induced breeding technique, by which he produces his own seed required for that system. And also

advised to apply organic juice for reducing feed cost and produce huge amount of zooplankton which serve as primary live food during larval rearing.

The farmer used to get annual income of Rs. 14000.0 from mono-sex tilapia culture in cemented tank before attained the training. Now, he is able to generate an income of Rs. 14500.0/- per month. Now he smoothly runs his hatchery with low investment in backyard. He is confident enough to develop and take his hatchery production in next level in the coming year. He is serving as a master trainer and source of motivation for other fish farmers.

19.10 KVK Nadia-I:

Integration in combating vulnerability: Journey of a successful banana grower

Asim Biswas, a 45 year old farmer used to cultivate banana in his land with traditional knowledge and experience. But, he was continuously suffering from yield loss and crop damage particularly due to panama wilt infestation during the last couple of years before Nadia KVK intervened. Wilted, drooping banana plants were the regular features of his 1 acre field and thus it was becoming quiet depressing and frustrating for Mr. Biswas to cope up with the situation.

Incidentally he had a contact with Nadia KVK through a training programme in Bhyna under Hanskhali block during January, 2020. Nadia KVK got involved with him and introduced some successful ventures to mitigate his problem. He was guided with overall management system with introduction of sucker treatment, preparation of compost with banana pseudo-stem through NOVCOM composting method (a new composting method where compost can be made available only within 21-25 days) and its use with *Trichoderma viridae*, use of balanced and proper fertilizer dose and other essential management practices.

He was astonished to notice the growth and development of his banana garden after few months following the management protocol and continuous guidance of Nadia KVK. His wilted, drooping, pale garden became healthy and robust with increase in yield to a tune of 40-45%. Not only that his cost

of cultivation particularly on account of synthetic fertilizer was also reduced by 40% and simultaneous introduction of self-prepared compost @3 ton per acre rejuvenated the overall soil health of his land.

During the drastic economic and socially stressed vulnerable situation of covid pandemic, Mr. Biswas's destiny was directed towards a reverse direction. Income from his 1 acre of banana garden was reached a land mark of Rs. 1,00,000 and he gained

a profit even upto Rs. 50,000 per acre. His banana garden is now an example of successful grower following integrated management system. He is also guiding other people regarding the easy technique of compost preparation with banana pseudo-stem and management of panama wilt. Many farmers in his locality adopted the technology and successful propagation of 'Waste to Wealth' slogan is now being easily evidenced in that area.



20.0 Publications

Research articles

Vol 57, No.3.

- Attapuram N M, Mondal S K and Das K S. 2022. Sexual Behavioural Activities of Purebred Landrace Boars under Different Mating Regimens. *Asian Journal of Research and Review in Agriculture* **4**(1): 13-16.
- Basak P, Sarkar D, Mandal B, Mal S, Adhikary S, Kundu R, Dutta J, Deb S and Rahman F H. 2022. Determination of critical concentrations of boron in soils and plants of cauliflower (*Brassica oleraceavar. botrytis l.*) using a polynomial equation. *Soil Science and Plant Analysis* (Submitted).
- Debbarma N, Haldar A, Bera S, Debnath T, Paul A, Chakraborty S and Dhama K. 2022. Effect of different management systems on the performance of Black Bengal goat for sustainable and profitable farming. *Journal of Veterinary Medicine and Animal Sciences* **5**(1): 1112.
- Jena M and Pal P P. 2022. Empowering rural women of Odisha, India through self-help group intervention- An assessment. *International Journal of Bioresource and Stress Management* (Accepted).
- Mondal S K, Pal D T, Das K S and Roy S K. 2020. Nutrient composition of preserved fodder grasses of Nagaland used for feeding of mithun (*Bos frontalis*). *Indian Agriculturist*, **64**(1&2): 35-39 [Published in the year 2022].
- Nanda B K, Ramakrishna Y, Kumaravardan R J, Bhattacharya R and Rahman F H. 2022. Adaptation potential of dyke vegetable cultivation to overcome the impact of climate change on Island Agriculture. *Indian Agriculturist*, **64**(1 & 2): 63-66.
- Bommayasamy N, Singh L B, Nanda B K and Rahman F H. 2021. Effect of split application of nitrogen on productivity, profitability and nitrogen use efficiency of drought tolerant rice. *Indian Journal of Extension Education*, Vol 57, No.3.
- Haldar A, Kumar D, Behera M, Ghosh S, Joshi S K, Das U, Kumar A and Roy S K. 2022. Climate resilient technologies for augmenting livestock production and enhancing farmer's income under smallholder farming system. *Indian Journal of Animal Health*, **61**(2): 41- 54.
- Haldar A, Pal P, Ghosh S and Pan S. 2022. Body weight prediction using recursive partitioning and regression trees (RPART) model in Indian Black Bengal goat breed: A machine learning approach. *Indian Journal of Animal Research* [DOI: 10.18805/IJAR.B-4894].
- Jena M and Pal P P. 2022. Empowering Rural Women of Odisha, India through Self-help Group Intervention-An Assessment. *International Journal of Bioresource and Stress Management* (Accepted).
- Laishram M, Mandal S N, Haldar A, Das S, Bera S, Samanta R. 2022. Biometric identification of Black Bengal goat: Unique iris pattern matching system vs. deep learning approach. *Animal Bioscience*, Nov. 14 [DOI: 10.5713/ab.22.0157. PMID: 36397702].
- Mahato S, Mandal S and Rahman F H. 2022. Study on Economic benefit by following agromet advisory services received from district agromet unit in the lateritic belt of Birbhum. *International Journal of Agricultural Science*, pp: 102-107. (<http://iaras.org/iaras/journals/ijas.7>).
- Malakar H, Timsina G, Dutta J, Borgohain A, Deka D, Babu A, Paul R K, Yeasin M, Rahman F H, Panja S and Karak T. 2022. Sick or rich: Assessing the selected soil properties and fertility status across the tea growing region of Dooars, West Bengal, India. *Frontiers in Plant Science*, **13**: 1-22 (DOI: 10.3389/fpls.2022.1017145).
- Mondal S K, Das K S, Roy S K and Rajkhowa C. 2022. Carcass characteristics and proximate composition of Mithun (*Bos frontalis*)



carcass. *Journal of Veterinary and Animal Sciences*, 53(2): 292-296 [DOI: <https://doi.org/10.51966/jvas.2022.53.2.292-296>].

Mondal S K, Saikia P and Das K S. 2022. Incidence of splay leg in purebred and crossbred Landrace piglets. Accepted for publication in *Journal of Livestock Science*.

Pathak P K, Roy U, Bhattacharya R and Rahman F H. Assessment of efficacy of pheromone trap to control fruit and shoot borer (*Leucinodes orbonalis* Guenee) in brinjal at Murshidabad district of West Bengal. *Indian Agriculturist* (Accepted).

Pathak P K, Roy U, Ghosh D K, Bhattacharya R and Rahman F H. 2022. Performance of different turmeric cultivars under old mango orchard at Murshidabad district of West Bengal. *Environment and Ecology*, 40 (4C): 2661-2663.

Book edited

Pal P P, Das S and Ghosh S. 2022. Achievements @75 by the KVKs of Odisha, West Bengal and Andaman & Nicobar Islands [e-book]. Published by the Director, ICAR-Agricultural Technology Application Research Institute, Kolkata, India, pp: 1-180.

Technical bulletins

Das K S, Mondal S K, Roy S K, Pal P P, Haldar A and Rahman F H. 2022. ATARI Kolkata News. Published by the Director, ICAR-ATARI Kolkata, Vol 5, No. 2, pp:1-12.

Ghorai D, Rahman F H, Sahu N C, Sen H S and Mandal B. 2022. Fertilizers and Environment News. Published by the Society of Fertilizers and Environment, Vol. 8, No.1, pp: 1-16.

Ghorai D, Sarkar S, Garai S, Jana C, Ziauddin G, Saikia P, Singh M S, Rahman M A, Behera M S, Rahman F H and Kar G. 2022. Successful farmers- Tales of KVK Burdwan. Published by the Director, ICAR-CRIJAF Barrackpore, Bulletin No. CRIJAF/KVK/2021, pp:1-32.

Ghorai D, Sarkar S, Rahman M A, Behera M S, Rahman

F H and Kar G. 2022. Compendium on Advanced farming technology for Doubling Farmers Income. Published by the Director, ICAR-CRIJAF Barrackpore, Vol 1, pp:1-40.

Pal P P, Dutta S and Das S. 2020. Attracting and Retaining Youth in Agriculture-An approach towards youth empowerment. Published by the Director, ICAR-ATARI Kolkata, pp:1-144 (Published in the year 2022).

Rahman F H, Bhattacharya R and Nandi S. 2022. NICRA Newsletter: Towards climate smart agriculture. Published by the Director, ICAR-ATARI Kolkata, Vol. 8, No. 1, pp:1-8.

Rahman F H, Nandi S and Bhattacharya R. 2022. GKMS Newsletter. Published by the Director, ICAR-ATARI Kolkata, Vol. 3, No. 1, pp:1-16.

Das K S, Mondal S K, Roy S K, Pal P P, Haldar A and Rahman F H. 2022. ATARI Kolkata News. Published by the Director, ICAR-ATARI Kolkata, 6(1): 1- 12.

Ghorai D, Sarkar S, Rahman M A S, M. S. Behera M S, Rahman F H and Kar G. 2022. Compendium on Advanced farming technology for doubling farmers income. Vol 1. Published by the Director, ICAR-CRIJAF Barrackpore, pp:1-45.

Roy S K, Mondal S K, Pal P P, Das K S, Rahman F H and Haldar A. 2022. ICAR-ATARI Kolkata Annual Report 2021. Published by the Director, ATARI Kolkata, pp: 1-172.

Begam A, Dutta S, Das K S and Pramanik M. 2022. Agriculture operations using drone technology. *Just Agriculture*, November 2022, pp: 17-19.

Begam A, Dutta S, Das K S and Mondal S K. 2022. Climate smart agronomical practices for increasing agricultural production. *Indian Farming*, 72(4):26-29.

Invited lectures

Rahman F H. 2022. Climate resilient agricultural practices for sustainable livelihood in Eastern India. Lecture delivered in 6th International

Conference on 'Current issues in agricultural, biological and applied sciences for sustainable development (CIABASSD-2022)' at Kalimpong Science Centre, Deolo, Kalimpong held on 11-13th June, 2022.

Abstracts presented in national/international seminars, conferences etc.

Bhattacharya R, Nanda B K, Ramakrishna Y, Kumaravardan R J, Ghosh S, Murmu S and Rahman F H. 2022. Adaptation potential of dyke vegetable cultivation to overcome the impact of climate change on island agriculture. Paper presented in 9th Annual Convention and A Webinar on 'Managing Agro-chemicals for Crop and Environmental Health' of Society for Fertilizers & Environment held on February 25 & 26, 2022.

Das S, Rahman F H, Roy R, Bhowmik P, Majumder D, Rudra B and Sarkar V. 2022. Effect of arka mango special application on inflorescence development, fruit setting and fruit quality of mango in Malda District, West Bengal. Paper presented in 9th Annual Convention and a Webinar on 'Managing Agro-chemicals for Crop and Environmental Health' of Society for Fertilizers & Environment held on February 25 & 26, 2022.

Garain P K, Mondal C K, Rahman F Hand Jana S. 2022. Climate resilient farming models for different farming system typologies in Sundarbans. Paper presented in 9th Annual Convention and a Webinar on 'Managing Agro-chemicals for Crop and Environmental Health' of Society for Fertilizers & Environment held on February 25 & 26, 2022.

Jena D, Sethy S, Rahman F H, Sarangi D R, Sahoo T R, Mohanta R K. 2022. Piloting district agromet unit for enhancing the economic benefit of farmers by minimizing the input cost and providing block level weather forecast based agromet advisory: A case study of Cuttack district of Odisha. Paper presented in 9th Annual Convention and a Webinar on 'Managing Agro-chemicals for

Crop and Environmental Health' of Society for Fertilizers & Environment held on February 25 & 26, 2022.

Majhi P, Rout K K, Phonglosa A, Das D M, Mohanty A and Rahman F H. 2022. Relative effect of different long term manurial practices on concentration of ammonium (NH₄⁺) in ponding water and determination of minimum holding period to reduce N loss in irrigated rabi rice. Paper presented in 9th Annual Convention and a Webinar on 'Managing Agro-chemicals for Crop and Environmental Health' of Society for Fertilizers & Environment held on February 25 & 26, 2022.

Mishra P, A. Phonglosa A, Rahman F H, Mahapatra N, Sahoo P K and Mishra S N. 2022. Quality vegetable planting material production under heavy rainfall Kedrapara district of Odisha. Paper presented in 9th Annual Convention and a Webinar on 'Managing Agro-chemicals for Crop and Environmental Health' of Society for Fertilizers & Environment held on February 25 & 26, 2022.

Roy S, Maitra N J, Goswami A, Nandi S K and Rahman F H. 2022. Studies on scientific rearing of small ruminants for rural development in Sundarbans. Paper presented in 9th Annual Convention and a Webinar on 'Managing Agro-chemicals for Crop and Environmental Health' of Society for Fertilizers & Environment held on February 25 & 26, 2022.

Roy S, Maitra N J, Rahman F H. 2022. Music-A nonchemical method of milk production enhancement in dairy cattle. Paper presented in 9th Annual Convention and a Webinar on 'Managing Agro-chemicals for Crop and Environmental Health' of Society for Fertilizers & Environment held on February 25 & 26, 2022.

Sahoo T R, Sahoo H K, Rahman F H, Behera M R, Mohapatra R K and S. N. Mishra S N. 2022. Performance of flood tolerant rice variety CR-1009 sub 1 in flood prone area of coastal



- Odisha. Paper presented in 9th Annual Convention and a Webinar on 'Managing Agro-chemicals for Crop and Environmental Health' of Society for Fertilizers & Environment held on February 25 & 26, 2022.
- Sarkar S, Sultana S, Rahman F H and Roy B. 2022. Assessment of different chemistries against mango hopper in Terai region of West Bengal. Paper presented in 9th Annual Convention and a Webinar on 'Managing Agro-chemicals for Crop and Environmental Health' of Society for Fertilizers & Environment held on February 25 & 26, 2022.
- Dey Gupta M, Mondal S K, Das K S and Roy S K. Effect of modifications of existing goat houses on kid mortality of Bankura district of West Bengal. Abstract accepted in National Conference on 'Futuristic approach to viable animal production vis-à-vis climate and calamity challenges' organized by Indian Society of Animal Production Management and Department of Livestock Production and Management, College of Veterinary Science and Animal Husbandry, OUAT, Bhubaneswar to be held on 18th to 20th January, 2023.
- George Z, Mondal S K and Das K S. Evaluation of supplementation of minerals and vitamins for enhancing growth of Teressa goats. Abstract accepted in National Conference on 'Futuristic approach to viable animal production vis-à-vis climate and calamity challenges' organized by Indian Society of Animal Production Management and Department of Livestock Production and Management, College of Veterinary Science and Animal Husbandry, OUAT, Bhubaneswar to be held on 18th to 20th January, 2023.
- Malik H N, Bhattacharya R and Rahman F H. 2022. Comparative study of different moisture stress tolerant rice varieties in western undulating zone of Odisha. Paper presented in the International Conference on 'Re-imaging on rainfed agro-ecosystem: challenges and opportunities' held on 22nd to 24th December, 2022 at ICAR-CRIDA, Hyderabad.
- Rahman F H, Bhattacharya R, Malik H N, and Roy S K. 2022. Micronutrient management on pigeon pea [*Cajanus cajan* (L.) Cv. PRG 176] in Kalahandi district of Odisha. Paper presented in the International Conference on 'Re-imaging on rainfed agro-ecosystem: challenges and opportunities' held on 22nd to 24th December, 2022 at ICAR-CRIDA, Hyderabad.
- Book chapters/ contribution made in compendium*
- Dash L, Sahoo S K, Rahman F H, Mohanty S, Nanda P K, Kundu D P, Mishra S N and Dash S K. 2022. Kendrapada Sheep: An Insight into Productivity and Genetic Potential of this Prolific Breed. Book Chapter published by Springer Nature Singapore Pvt. Ltd., pp:1-14.
- Ghosh S, Bhattacharya M and Rahman F H. 2022. Socioeconomic study of prospective of probiotics, prebiotics, and symbiotics for sustainable development of aquaculture in Indian Sundarbans. In: Prebiotics, Probiotics and Nutraceuticals. Published by Springer Nature Singapore Pvt. Ltd. (https://doi.org/10.1007/978-981-16-8990-1_13).
- Haldar A, Mandal S N, Deb S, Roy R and Laishram M. 2022. Application of information and electronic technology for best practice management in livestock production system. In: Kumar A, Kumar P, Singh S S, Trisasongko B H and Rani M. (Eds). Agriculture, Livestock Production and Aquaculture. Published by Springer, Cham. (<https://doi.org/10.1007/978-3-030-93262-6-11>).
- Haldar A, Samanta I and Patra A. 2022. Knowledge intensive livestock resource management in a changing environment. In: Kumar P, Pandey A K, Singh S K, Singh S S and Singh V K (Eds.). Sustainable agriculture systems and technologies. Published by John Wiley and Sons Ltd., pp: 117- 168 (https://doi.org/10.1007/978-1-119-68888-8_11).

doi.org/10.1002/9781119808565.ch7).

Mondal S K, Das K S and Singh S S. 2022. Smallholder pig value chains development and livelihood security. Book chapter In: Kumar A, Kumar P, Singh S S, Trisasongko B H and Rani M. 2022. Agriculture, Livestock Production and Aquaculture: Advances for Smallholder Farming Systems Volume 1. Published by Springer Nature, pp: 183-204 [DOI : 10.1007/978-3-030-93258-9].

Majumder D, Saha S, Mukherjee B, Das S, Rahman F H and Hossain A. 2022. Application of biochar for improving the crops yield and quality of crops under changing climatic

scenarios. In: Deadline is approaching for Biochar amendments to improve agricultural systems: from crop production to climate change and plant stressors mitigation. Published by Springer, Switzerland. 2022. (Accepted)

Rahman F H and Bhattacharya R. 2022. Climate resilient agriculture for sustainable production of agriculture and allied sectors in Eastern India. In: Advanced extension & communication strategies for sustainable livelihood through Animal Husbandry and allied farming system. Published by NIPA Genx Electronic Resources & Solutions Pvt. Ltd., New Delhi, pp: 288-303.

21.0 Awards and Recognitions



Dr. F. H. Rahman, Pr. Scientist of this Institute has been conferred with 'Fellow of Himalayan Scientific Society for Fundamental and Agricultural Research 2022' during 6th International Conference on 'Current Issues in Agricultural, Biological & Applied Sciences for Sustainable Development' (CIABASSD-2022) at Kalimpong Science Centre, Deolo, Kalimpong held on 11 to 13th June, 2022.

Dr. S. K. Mondal, Pr. Scientist of this Institute has been awarded with 'Appreciation Certificate' for reviewing articles of Net Journal of Agricultural Sciences Journal.

Dr. K. S. Das, Pr. Scientist of this institute, has been awarded with

one of the Editorial Board Members of *Asian Journal of Dairy and Food Research* (Formerly: *Journal of Dairying, Foods and Home Sciences*) published by Agricultural Research Communication Centre, Karnal, Haryana for his outstanding contribution to the journal during the year 2022.

22.0 Distinguished Visitors

Date	Name of the person	Purpose of visit
14.06.2022	Dr. P. Kumar, Former Director, ICAR-Zonal Project Directorate, Bengaluru.	Interacted with the scientists of ATARI Kolkata on different issues
27.06.2022	Dr. A. Bandyoadhyay, Former National Coordinator of National Agricultural Science Fund (NASF), previously named as National Fund for Basic, Strategic and Frontier Application Research in Agriculture (NFBSFRA), ICAR, New Delhi	Review meeting of NABARD funded project of IFS
20.12.2022	Dr. R. K. Samanta, Former Vice Chancellor, BCKV, Mohanpur, West Bengal and Former Chairman, QRT, ICAR-ATARI Kolkata	Review workshop-cum-training programme on ARYA organized

23.0 Personnel (As on 31.12.2022)

Staff position of ICAR-ATARI Kolkata as on 31.12.2022 has been presented in the table below:

Sl. No.	Name	Designation
1	Dr. S.K. Roy	Director (Acting)
2	Dr. P.P. Pal	Principal Scientist
3	Dr. A. Haldar	Principal Scientist
4	Dr. S.K. Mondal	Principal Scientist
5	Dr. F.H. Rahman	Principal Scientist
6	Dr. K.S. Das	Principal Scientist
7	Shri Rama Chandra Pradhan	Asstt. Administrative Officer
8	Shri S. Mukherjee	Asstt. Finance & Accounts Officer
9	Shri A.D. Banik	Assistant
10	Shri D. Debnath	Driver (T-2)
11	Shri S. Saha	UDC
12	Smt. A. Roy	SSS
13	Ms. J. Basak	SRF, CFLD-Pulse
14	Ms. R. Bhattacharya	SRF, NICRA
15	Shri S. Ghosh	SRF, NEMA
16	Ms. B. Ghosh	SRF, CFLD-Oilseed
17	Ms. S. Das	SRF, ARYA
18	Ms. A. Begam	SRF, FFP
19	Shri S. Khutia	DEO, CFLD-Pulse - NFSM
20	Shri S. Nandi	Project Assistant, GKMS
21	Er. S. Paul	YP-I, NEMA
22	Shri A. Dewanji	YP-II, MIS-FMS
23	Mrs. U. Das	PA, NABARD
24	Mr. Purbendu Samanta	YP-I, Natural Farming
25	Mr. Salim Sahaji	YP-I, Natural Farming

Joining/Relieving/Promotion/Demise

Joining

Ms. S. Das has joined this Institute as SRF, ARYA on 21.02.2022 (forenoon).

Mrs. U. Das has joined this Institute as Project Assistant, NABARD Funded Project on 01.04.2022 (forenoon).

Ms. A. Begam has joined this Institute as SRF, FFP on 25.05.2022 (forenoon).

Mr. Purbendu Samanta and Mr. Salim Sahaji joined this institute as YP-I under Natural Farming Project on 30.09.2022 and 07.11.2022, respectively.

Superannuation

Mrs. Sulekha Pal, Principal Private Secretary to the Director, ICAR-ATARI Kolkata has been superannuated from her service on 31.08.2022.

Relieving

Sh. S. Murmu, SRF, FFP has been relieved from this Institute on 31.03.2022 (afternoon).



हर कदम, हर डगर

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Salt Lake, Kolkata- 700 097

सॉल्ट लेक, कोलकाता-700097