Fostering climate resilient technologies for sustainability in eastern region

ICAR- Agricultural Technology Application Research Institute Kolkata

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National Innovations in Climate Resilient Agriculture

Technology Demonstration Component

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NICRA

National Innovations in Climate Resilient Agriculture

ICAR-Agricultural Technology Application Research Institute Kolkata

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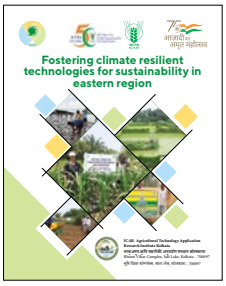

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Preface

The National Innovations in Climate Resilient Agriculture (NICRA) project is a National Network Project of the Indian Council of Agricultural Research (ICAR) that aims to improve the resilience of Indian agriculture to climate change and climatic vulnerability. Its components include competitive research grants to fill critical research gaps, strategic research on adaptation and mitigation, technology demonstrations on farmers' fields to deal with current climate variability, and capacity building of various stakeholders. NICRA's overarching goal is climate variability adaptation, which includes responding appropriately to unforeseen circumstances. In order to maintain productivity increases, the main goals of technological demonstrations in these areas are improvements in natural resource use efficiency and interventions aimed at managing with vulnerability.

Under the National Innovations in Climate Resilient Agriculture (NICRA) initiative, the Technology Demonstration Component (TDC) is functioning in seventeen districts that are vulnerable to climate change: West Bengal (7), Odisha (9) and A & N Islands (1) in Zone V. In farmers' fields in NICRA-adopted communities, location-specific best innovative practices to handle significant climate vulnerabilities, such as drought, flood, heat stress, and other extreme weather occurrences, were exhibited during 2022-23. Improving farms' and the farming community's resistance to climate threats is the main goal of NICRA's technology demonstration programs in order to maintain sustainability over the long run. The focus has been on documenting and enhancing our knowledge of how technologies function in various farming systems and agro-ecologies.

This book contains all the pertinent and necessary details about ICAR–ATARI Kolkata, as well as the accomplishments of a few NICRA–KVKs which have been chosen to address the issues of climate vulnerability in farming practices and livelihood patterns for the community's empowerment during the year 2022-23. A thorough evaluation of the efforts made by a few chosen NICRA-KVKs in climatically vulnerable areas, under the supervision and direction of ICAR-ATARI Kolkata, is presented in this compilation. Concurrent achievements in the areas of technology demonstrations, VCRMC, institutional interventions, seed production, capacity building, extension activities, review workshops, etc. were also documented.

For their advice and assistance in putting together the information contained in this book, I would like to sincerely thank the Secretary, DARE and Director General, ICAR, Deputy Director General (Agricultural Extension), Director, ICAR-CRIDA Hyderabad and Coordinator (NICRA-TDC), and other officials of the Division of Agricultural Extension, ICAR. I thank all of the chosen NICRA implementing KVKs for their cooperation in delivering timely information, as well as the support provided by the Directors of Extension Education of the State Agricultural Universities in this zone. I sincerely appreciate the cooperation and assistance provided by the entire ICAR-ATARI Kolkata staff.

January, 2024

(Pradip Dey)
Director

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कार्यकारी सारांश

आहार में बदलाव और दुनिया भर में बढ़ती आबादी के कारण भोजन की मांग बढ़ रही है। दुनिया के कई हिस्सों में फसल की पैदावार कम हो रही है, समुद्र का स्वास्थ्य गिर रहा है, और मिट्टी, पानी और जैव विविधता जैसे प्राकृतिक संसाधन गंभीर रूप से ख़त्म हो गए हैं। उत्पादन को इन घटनाक्रम के साथ तालमेल बिठाना मुश्किल हो रहा है। 2020 के एक अनुमान के अनुसार, लगभग 690 मिलियन लोग, या दुनिया की 8.9 प्रतिशत आबादी, अल्पपोषित हैं, केवल पाँच वर्षों में लगभग 60 मिलियन की वृद्धि हुई है। यह देखते हुए कि विश्व को अनुमानित 9 अरब लोगों को खिलाने के लिए 2050 तक लगभग 70% अधिक भोजन का उत्पादन करने की आवश्यकता होगी, खाद्य सुरक्षा सुनिश्चित करने की समस्या और भी बदतर हो जाएगी।

समस्या इस बात से और भी बदतर हो गई है कि कृषि जलवायु परिवर्तन के प्रति कितनी संवेदनशील है। बढ़ा हुआ तापमान, बार-बार चरम मौसम की घटनाएं, कृषि-पारिस्थितिकी तंत्र की सीमाओं में बदलाव, आक्रामक कीट और फसलें, और मौसम परिवर्तनशीलता, ये सभी जलवायु परिवर्तन के हानिकारक प्रभावों के उदाहरण हैं जो वर्तमान में महसूस किए जा रहे हैं। जलवायु परिवर्तन के कारण पशु उत्पादकता, प्रमुख अनाज की पोषण गुणवत्ता और खेतों में फसल की पैदावार कम हो रही है। मौजूदा पैदावार को बनाए रखने और मांग को पूरा करने के लिए उत्पादन और भोजन की गुणवत्ता बढ़ाने के लिए अनुकूलन में महत्वपूर्ण निवेश की आवश्यकता होगी।

भारतीय कृषि अनुसंधान परिषद ने फरवरी 2011 में ग्यारहवीं योजना के दौरान एक प्रमुख नेटवर्क परियोजना 'जलवायु लचीला कृषि पर राष्ट्रीय पहल' (एनआईसीआरए) लॉन्च की, और बारहवीं योजना के दौरान इसे 'जलवायु लचीला कृषि में राष्ट्रीय नवाचार' (एनआईसीआरए) के रूप में जाना जाता है। यह देखते हुए कि जलवायु परिवर्तन एक निरंतर चुनौती है, इस महत्वपूर्ण क्षेत्र पर अधिक जोर देने की आवश्यकता है। इसे ध्यान में रखते हुए, एक योजना को मजबूत किया गया है और XII पंचवर्षीय योजना के दौरान की गई पहल पर मज़बूत निर्माण करने का प्रयास किया गया है। इस प्रकार नेशनल इनोवेशन इन क्लाइमेट रेजिलिएंट एग्रीकल्चर (एनआईसीआरए) इन उद्देश्यों के साथ जारी है: 1. बेहतर उत्पादन और जोखिम प्रबंधन प्रौद्योगिकियों के विकास और अनुप्रयोग के माध्यम से जलवायु परिवर्तनशीलता और जलवायु परिवर्तन के लिए फसलों, पशुधन और मत्स्य पालन को कवर करने वाली भारतीय कृषि की लचीलापन को बढ़ाना। , 2. वर्तमान जलवायु जोखिमों के अनुकूल होने के लिए किसानों के खेतों पर स्थान- विशिष्ट प्रौद्योगिकी पैकेजों का प्रदर्शन करना, 3. जलवायु लचीले कृषि अनुसंधान और इसके अनुप्रयोग में वैज्ञानिकों और अन्य हितधारकों की क्षमता निर्माण को बढ़ाना और 4. लचीलापन बढ़ाने वाली प्रौद्योगिकियों और विकल्पों को व्यापक पैमाने पर अपनाने के लिए नीति दिशानिर्देश तैयार करना।

एनआईसीआरए का प्रौद्योगिकी प्रदर्शन घटक (टीडीसी) किसानों के साथ काम करने और वर्तमान जलवायु परिवर्तनशीलता को संबोधित करने के लिए क्षेत्रीय परिस्थितियों में ऐसी प्रौद्योगिकियों को लागू करने का शानदार अवसर प्रदान करता है। इससे इन लचीली प्रौद्योगिकियों को अपनाने की गति बढ़ेगी। देश भर के 121 जलवायु रूप से संवेदनशील जिलों में केवीके के माध्यम से और आईसीएआर के 7 प्रमुख अनुसंधान संस्थानों द्वारा ग्रामीण समूहों में जलवायु लचीलेपन के लिए ऑन-फार्म भागीदारी प्रदर्शन लागू किए जा रहे हैं। विभिन्न कृषि-पारिस्थितिकी और कृषि प्रणालियों में प्रौद्योगिकियों के प्रदर्शन पर समझ को समझने और सुधारने पर जोर दिया गया है। इससे विभिन्न जैव-भौतिक और सामाजिक-आर्थिक संदर्भों में जलवायु लचीलापन का गठन करने वाली चीज़ों की पहचान करने में भी सुविधा होती है। एनआईसीआरए -केवीके ने ग्राम स्तरीय आकस्मिक फसल योजनाएं और उपाय तैयार और कार्यान्वित किए। एनआईसीआरए कार्यक्रम के कार्यान्वयन के दौरान ओडिशा (9), पश्चिम बंगाल (7) और केंद्र शासित प्रदेश ए एंड एन द्वीप समूह (1) के चयनित सत्रह केवीके जिलों की जलवायु संबंधी भेद्यता ने तकनीकी सहायता, मानव संसाधन विकास और समग्र रूप से निश्चित आवश्यकता को आगे बढ़ाया। कृषक समुदाय को सूखा, अनियमित वर्षा, लू, बाढ़, चक्रवाती तूफान जैसी जलवायु संबंधी कमजोरियों से निपटने में सक्षम बनाने के लिए उन्हें सशक्त बनाया है। तदनुसार, केवीके जिलों के कमजोर गांवों में फसल उत्पादन, संसाधन संरक्षण, पशुधन और मछली पालन, जल संचयन आदि शुरू करने के लिए तकनीकी हस्तक्षेपों को क्रियान्वित करने के माध्यम से इसके कार्यान्वयन के लिए कार्य योजना तैयार की गई। आईसीएआर-कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थान, कोलकाता में सत्रह एनआईसीआरए कार्यान्वयन केवीके हैं, जिन्होंने विभिन्न मॉड्यूल में जलवायु लचीले कृषि कार्यक्रम में राष्ट्रीय नवाचारों के प्रौद्योगिकी प्रदर्शन घटकों के तहत विभिन्न गतिविधियां कीं, जिससे 41710 किसानों को लाभ हुआ (एनआरएम- 11849, फसल उत्पादन - 3762, पशुधन और मत्स्य पालन- 2050, संस्थागत हस्तक्षेप- 5050, क्षमता निर्माण- 4903 और विस्तार गतिविधियाँ- 14096)।

प्राकृतिक संसाधन प्रबंधन मॉड्यूल में बाढ़ संभावित क्षेत्रों में बेहतर जल निकासी, यथास्थान नमी संरक्षण, नए जल संचयन और पुनर्चक्रण का निर्माण/नवीनीकरण, संरचनाएं/खेत तालाब/चेक बांध/टैंक छत जल संचयन टैंक, भूमि आकार और वर्षा जल संचयन संरचनाएं शामिल हैं। बाढ़ प्रवण क्षेत्रों में जल निकासी, जहां उपयुक्त हो, संरक्षण जुताई, कृत्रिम भूजल पुनर्भरण और पानी की बचत करने वाली सिंचाई विधियां, हरी खाद, फसल अवशेष प्रबंधन, खेत की मेड़बंदी, ब्रॉड बेड फ़रो, मिट्टी परीक्षण आधारित पोषक तत्व अनुप्रयोग, सूक्ष्म सिंचाई तकनीक, खाद गड्ढे आदि। इस मॉड्यूल ने 3837 हेक्टेयर क्षेत्र को कवर किया जिससे क्षेत्र के 11849 कृषकों को लाभ हुआ।

फसल उत्पादन मॉड्यूल के तहत एनआईसीआरए-केवीके द्वारा विभिन्न क्षेत्र-विशिष्ट हस्तक्षेप किए गए; जैसे कि सूखा, नमक और बाढ़ सहिष्णु/प्रतिरोधी किस्मों का परिचय, टर्मिनल गर्मी के तनाव वाले क्षेत्रों में रबी फसलों की रोपण तिथियों की प्रगति, पानी की बचत करने वाली धान की खेती के तरीके (एसआरआई, एरोबिक, प्रत्यक्ष अंकुर), विलंबित मानसून के लिए सामुदायिक नर्सरी, स्थान विशिष्ट अंतरफसल प्रणाली; उच्च टिकाऊ उपज सूचकांक, नई फसलों की शुरूआत/फसल विविधीकरण, समय पर रोपण के लिए कस्टम हायरिंग सेंटर, कम तापमान सहनशीलता, मानसून के बाद की वर्षा का उपयोग करके दालों को बढ़ावा देना, एकीकृत फसल/कीट/रोग प्रबंधन, आकस्मिक फसल के रूप में सब्जियां उगाना, एकीकृत फसल प्रबंधन , एकीकृत रोग प्रबंधन, आकस्मिक फसल आदि। यह मॉड्यूल 607 हेक्टेयर क्षेत्र को कवर किया जिससे 3762 किसानों को लाभ हुआ।

इसी प्रकार पशुधन और मत्स्य पालन मॉड्यूल के तहत विभिन्न पशुधन केंद्रित हस्तक्षेप किए गए, जिनमें सूखे/बाढ़ के दौरान चारा उत्पादन के लिए सामुदायिक भूमि का उपयोग, बेहतर चारा/चारा भंडारण के तरीके, पशुधन में गर्मी के तनाव को कम करने के लिए बेहतर आश्रय, पानी के दौरान मछली तालाबों/टैंकों का प्रबंधन शामिल है। पानी की कमी और अधिकता, नस्ल उन्नयन, खनिज मिश्रण के माध्यम से संतुलित आहार और चारा प्रबंधन, फ़ीड ब्लॉक और साइलेज बनाना, अजोला आहार, कृमि मुक्ति और टीकाकरण के माध्यम से नस्ल पशु स्वास्थ्य प्रबंधन, मछली तालाब की सफाई और मछली पालन, स्वच्छ दूध और चारा उत्पादन आदि को कवर किया गया जिससे 2050 पशुपालकों को लाभ हुआ।

बीज बैंक, चारा बैंक, कमोडिटी समूह, समय पर संचालन के लिए कस्टम हायरिंग, सामुदायिक नर्सरी निर्माण, सिंचाई, सामूहिक विपणन सहित संस्थागत हस्तक्षेप, ग्रामीण स्तर के मौसम स्टेशन के माध्यम से जलवायु साक्षरता और लगभग सभी एनआईसीआरए गांवों में जागरूकता विकसित की गई। 5050 किसानों के 168.8 हेक्टेयर क्षेत्र को कवर करते हुए कुल 177 इकाइयाँ विकसित की गई हैं। इसमें मिनी स्वचालित मौसम स्टेशन (एडब्ल्यूएस) का प्रावधान है जिसके माध्यम से किसानों को मौसम पूर्वानुमान डेटा प्रदान किया जाता है।

गांवों की जलवायु संबंधी कमजोरियों को कम करने और इस कार्यक्रम के तहत अपनाई जाने वाली रणनीतियों के बारे में ग्रामीणों के साथ गहन चर्चा के बाद ग्राम जलवायु जोखिम प्रबंधन समिति (वीसीआरएमसी) का गठन किया गया था। वीसीआरएमसी उनके नाम पर एक बैंक खाता खोलने के साथ चालू हो गया, जिसे वीसीआरएमसी के अध्यक्ष और संबंधित केवीके प्रमुख द्वारा संयुक्त रूप से संभाला जा रहा है। केवीके के परामर्श से गांव में लागू किए जाने वाले तकनीकी हस्तक्षेपों पर महत्वपूर्ण निर्णय लेने के अलावा, विभिन्न कृषि उपकरणों और उपकरणों की कस्टम हायरिंग की निगरानी वीसीआरएमसी द्वारा की जा रही थी। कस्टम हायरिंग सेंटर में विभिन्न कृषि उपकरणों जैसे पावर टिलर, थ्रेशर, रीपर, वॉटर पंप, जीरो-टिल ड्रिल, रेज्ड बेड प्लांटर, स्प्रेयर, वीडर आदि का प्रावधान है।

वीसीआरएमसी की देखरेख में एनआईसीआरए द्वारा गोद लिए गए गांव में शुरू किए गए कस्टम हायरिंग सेंटर किसानों के बीच बेहद लोकप्रिय हो गए हैं और पर्याप्त राशि भी उत्पन्न हुई है। सभी एनआईसीआरए केवीकेएस के वीसीआरएमसी ने रुपये 881352 की राशि उत्पन्न की। और इनमें से 2022-23 के दौरान रु. 278680 कस्टम हायरिंग सेंटरों के माध्यम से उत्पन्न की।

2022-23 के दौरान 4903 किसानों और कृषक महिलाओं (2717 पुरुषों और 2186 महिलाओं) को लाभान्वित करने वाले विभिन्न विषयगत क्षेत्रों पर क्षमता निर्माण के तहत कुल 271 पाठ्यक्रम आयोजित किए गए। विषयगत क्षेत्रों में फसल प्रबंधन, प्राकृतिक संसाधन प्रबंधन, पोषक तत्व प्रबंधन, एकीकृत फसल प्रबंधन, फसल विविधीकरण, संसाधन संरक्षण प्रौद्योगिकी, कीट और रोग प्रबंधन, पशुधन और मत्स्य प्रबंधन, नर्सरी पालन, रोजगार सृजन, पोषक उद्यान, कृषि मशीनरी की मरम्मत और रखरखाव शामिल हैं। और उपकरण, एकीकृत कृषि प्रणाली, चारा और चारा प्रबंधन, लाख की खेती, महिलाओं के लिए कृषि उपकरणों के साथ कठिन परिश्रम में कमी, मूल्य संवर्धन, मानव पोषण और बच्चे की देखभाल, कृंतक नियंत्रण आदि भी शामिल हैं।

समीक्षाधीन अवधि के दौरान विभिन्न विषयगत क्षेत्रों पर कुल 461 विस्तार गतिविधियों से 14096 अभ्यासशील किसानों (8795 पुरुष और 5301 महिलाएं) को लाभ हुआ। विस्तार गतिविधियाँ विधि प्रदर्शन, कृषि सलाहकार सेवाएँ, जागरूकता, पशु स्वास्थ्य शिविर, किसान चौपाल, किसान गोष्ठी, संसाधन संरक्षण प्रौद्योगिकी, क्षेत्र और किसान दिवस का उत्सव, नैदानिक दौरे, समूह चर्चा, विश्व पृथ्वी दिवस, प्रौद्योगिकी सप्ताह, किसान मेला आदि पर आयोजित की गई। आदि सभी 17 एनआईसीआरए-केवीके ने 5 दिसंबर, 2022 को केवीके में कार्यशाला, सेमिनार, संगोष्ठी और जागरूकता शिविर आयोजित करके विश्व मृदा दिवस मनाया है और एनआईसीआरए गांवों के 1109 किसानों के बीच 1069 मृदा स्वास्थ्य कार्ड वितरित किए हैं।

वर्ष के दौरान एनआईसीआरए केवीके द्वारा विकासात्मक एजेंसियों, जो एनआईसीआरए द्वारा गोद लिए गए गांवों में कार्यरत हैं, के साथ अभिसरण कार्यक्रमों में कई हस्तक्षेप किए गए। इन विकासात्मक कार्यक्रमों के सहायता का उपयोग गाँव में सिद्ध हस्तक्षेपों को बढ़ाने के लिए किया गया था। वर्ष 2022-23 के दौरान एनआईसीआरए लागू करने वाले केवीके द्वारा चल रहे विकास कार्यक्रमों या योजनाओं के साथ बड़ी संख्या में अभिसरण कार्यक्रम चलाए गए। प्रमुख विकास योजनाएं जैसे एससीएसपी, मनरेगा, सुंदरबन विकास बोर्ड, वन विभाग, सिंचाई विभाग, आईसीएआर संस्थान, संबंधित राज्यों के विभिन्न विभाग आदि हैं। वर्ष के दौरान इस कार्यक्रम के माध्यम से 2.89 करोड़ रुपये की राशि उत्पन्न हुई है।

Executive Summary

The demand for food is rising due to changes in diet and an increasing worldwide population. Crop yields are levelling off in many parts of the world, ocean health is declining, and natural resources, such as soils, water, and biodiversity, are severely depleted. Production is finding it difficult to keep up with these developments. Almost 690 million people, or 8.9 percent of the world's population, are undernourished, according to a 2020 estimate, an increase of nearly 60 million in only five years. Given that the globe would need to produce roughly 70% more food by 2050 in order to feed an expected 9 billion people, the problem of ensuring food security will only get worse.

The problem is made worse by how extremely vulnerable agriculture is to climate change. Increased temperatures, more frequent extreme weather events, shifting boundaries of agro-ecosystems, invasive pests and crops, and weather variability are all examples of the detrimental effects of climate change that are currently being felt. Climate change is decreasing animal productivity, key grain nutritional quality, and crop yields on farms. Maintaining existing yields and increasing production and food quality to satisfy demand would need significant investments in adaptation.

The Indian Council of Agricultural Research launched - A Flagship Network Project 'National Initiative on Climate Resilient Agriculture' (NICRA) during XI Plan in February 2011, and during XII Plan it is referred as 'National Innovations in Climate Resilient Agriculture' (NICRA). Considering that the climate change is a continued challenge, the focus on this critical area needs to be continued with greater emphasis. Keeping this view, one scheme has been strengthened and efforts were made to build on the initiative taken during XII five year plan. Thus 'National Innovations in Climate Resilient Agriculture' (NICRA) has been continuing with these objectives: 1. To enhance the resilience of Indian agriculture covering crops, livestock and fisheries to climatic variability and climate change through development and application of improved production and risk management technologies, 2. To demonstrate site specific technology packages on farmers' fields for adapting to current climate risks, 3. To enhance the capacity building of scientists and other stakeholders in climate resilient agricultural research and its application and 4.To draw policy guidelines for wider scale adoption of resilience-enhancing technologies and options.

The overall expected outcome is enhanced resilience of agricultural production to climate variability in vulnerable regions. Initially, 100 KVKs all over India were selected for implementation of the project. In addition to that 21 more KVKs throughout the country have been included for carrying out the project as per approved XII Plan. The research on adaptation and mitigation covers crops, livestock, fisheries and natural resource management.

Technology Demonstration Component (TDC) of NICRA offers great opportunity to work with farmers and apply such technologies under field conditions to address current climate variability. This will enhance the pace of adoption of these resilient technologies. On-farm participatory demonstrations for climate resilience are being implemented in village clusters through KVKs in 121 climatically vulnerable districts across the country and by 7 core research institutes of ICAR. The emphasis has been on capturing and improving the understanding on performance of technologies in different agro-ecologies and farming systems. This also facilitates identification of what constitutes climate resilience in different bio-physical and socio-economic contexts. NICRA KVKs prepared and implemented village level contingency crop plans and measures. Climatic vulnerability of selected seventeen KVK districts of Odisha (9), West Bengal (7) and union Territory of A & N Islands (1) assessed during implementation of NICRA programme brought forward definite requirement in terms of technological support, human resource development and overall empowerment of farming community to enable them to cope up with climate vulnerabilities like droughts, erratic rainfall, heat wave, flood, cyclonic storm. Plan of action, accordingly, was prepared for its implementation through executing technological interventions to initiate crop production, resource conservation, livestock and fish rearing, water harvesting *etc*. in the vulnerable villages of KVK districts. ICAR- Agricultural Technology Application Research Institute Kolkata having seventeen NICRA implementing KVKs which carried out different activities under Technology Demonstration Components of National Innovations in Climate Resilient Agriculture Programme in various modules benefitted 41710 farmers (NRM- 11849, Crop Production-3762, Livestock and Fisheries- 2050, Institutional Interventions- 5050, Capacity Building- 4903 and Extension Activities- 14096).

Natural Resource Management module covered improved drainage in flood prone areas, in-situ moisture conservation, construction/renovation of new water harvesting and recycling, structures/farm ponds/ checks dams/tank roof water harvesting tank, land shaping and rainwater harvesting structures, improved drainage in flood prone areas, conservation tillage where appropriate, artificial ground water recharge and water saving irrigation methods,

green manuring, crop residue management, bunding of field, Broad Bed Furrow, soil test based nutrient application, micro irrigation techniques, compost pits etc. This module covered 3837 ha area which benefitted 11849 practicing farmers in the zone.

Under **Crop Production** module different area specific intervention were taken by the NICRA-KVKs *viz*; introducing drought, salt and flood tolerant/ resistant varieties, advancement of planting dates of rabi crops in areas with terminal heat stress, water saving paddy cultivation methods (SRI, aerobic, direct seedling), community nurseries for delayed monsoon, location specific intercropping systems with high sustainable yield index, introduction of new crops/ crop diversification, custom hiring centres for timely planting, low temperature tolerance, promotion of pulses utilizing post-monsoon rainfall, integrated crop/pest/disease management, growing vegetables as contingency crop, integrated crop management, integrated disease management, contingency crop, covering 607 ha area which benefitted 3762 farmers.

Similarly under **Livestock and Fisheries** module various livestock centric interventions were carried out including Use of community lands for fodder production during drought/ flood, improved fodder/feed storage methods, improved shelters for reducing heat stress in livestock, management of fish ponds/tanks during water scarcity and excess water, breed up-gradation, balanced feed and fodder management through mineral mixture, feed blocks and silage making, azolla feeding, breed animal health management through deworming and vaccination, fish pond cleaning and fish farming, clean milk and fodder production *etc.* were covered which benefitted 2050 livestock owners.

Institutional interventions including seed bank, fodder bank, commodity groups, custom hiring for timely operations, community nursery raising, irrigation, collective marketing climate literacy through a village level weather station and awareness developed in almost all NICRA villages. A total of 177 units have been developed covering of 168.8 ha area of 5050 number of farmers. There is a provision of Mini Automatic Weather Station (AWS) through which farmers are provided weather forecasting data.

Village Climate Risk Management Committee (VCRMC) was constituted after in-depth discussion with the villagers about the mitigation of the climatic vulnerabilities of the villages and the strategies to be adopted under this programme. VCRMC became operational with opening of a bank account in their name being jointly handled by the President of VCRMC and the Head of the KVK concerned. The custom hiring of various farm tools and implements was being supervised by VCRMC apart from taking important decisions on the technological interventions to be implemented at the village in consultation with the KVK. Custom Hiring Centre has the provision of various farm implements like Power tiller, Thresher, Reaper, Water pump, Zero- till Drill, Raised bed planter, Sprayer, Weeder *etc*.

Custom Hiring Centers initiated in the NICRA adopted village under the supervision of VCRMC has become immensely popular among the farmers and substantial amount has also been generated. VCRMC of all NICRA KVKs generated an amount of Rs. 881352 and out of these, Rs. 278680 during 2022-23 through Custom Hiring Centers.

A total 271 courses were conducted under **Capacity Building** on various thematic areas benefitting 4903 farmers and farmwomen (2717 males and 2186 females) during 2022-23. Thematic areas cover on 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 machineries and implements, integrated farming system, fodder and feed management, lac cultivation, drudgery reduction with farm implements for woman, value addition, human nutrition and child care, rodent control *etc*.

A total of 461**Extension Activities** on various thematic areas benefiting 14096 practicing farmers (8795 males and 5301 females) during the reporting period. The extension activities were conducted on method demonstrations, agro advisory services, awareness animal health camp, Kishan Chaupal, Kishan Gosthi, resource conservation technologies, celebration of field and farmers' days, diagnostic visits, group discussion, World Earth Day, technology week, kishan mela *etc*. All the 17 NICRA-KVKs have celebrated World Soil Day through conducting workshop, seminar, symposia, and awareness camp on December 5, 2022 in the respective KVKs and distributed 1069 Soil Health Cards distributed among 1109 farmers of NICRA villages.

A number of interventions were taken up by NICRA KVKs during the year in **Convergence Programmes** with developmental agencies which are operational in the NICRA adopted villages. Support from these developmental programmes was used for scaling up of proven interventions in the village. Huge number of convergence programmes was carried out by the NICRA implementing KVK with ongoing development programmes or schemes during 2022-23. The prominent development schemes are SCSP, MGNREGA, Sunderban Development Board, Forest Department, Irrigation Department, ICAR Institutes, different Departments of the concerned states *etc.* An amount of Rs.2.89 crores has been generated through this programme during the year.

INTRODUCTION

In order to address the difficulties of climate variability and change, as well as farmers' need to adapt to the rapidly rising frequency of drought, flood, and other extreme events through the use of research and technology, National Innovations in Climate Resilient Agriculture (NICRA) was established in 2011. With the present animosity against climate change, the technologies Demonstration Component (TDC) of NICRA provides a fantastic chance to cooperate with farmers and use such technologies under field conditions. The focus has been on documenting and enhancing our knowledge of how technologies function in various farming systems and agro-ecologies. Additionally, this makes it easier to quantify distinct climate resilience components in varied biophysical and socioeconomic contexts.

NICRA-KVKs are crucial in the preparation of various climate resilience metrics and contingency crop planning at the village level. The National Innovations in Climate Resilient Agriculture (NICRA) program's Technology Demonstration Components are implemented in nine KVKs at the ICAR-Agricultural Technology Application Research Institute in Kolkata. These KVKs house diverse activities related to the program's modules. India is becoming increasingly concerned about climate change in order to guarantee food and nutrition security for its expanding population. Although the effects of climate change are felt worldwide, nations like India are particularly vulnerable because of their large agricultural population. Through strategic research and technology demonstration, the initiative aims to increase the resilience of Indian agriculture to climate change and climate vulnerability.

Enhancing farms' and the farming community's resilience to climate threats is the main goal of NICRA's technological demonstrations in order to guarantee sustainability over the long run. As a result, the focus is on climate variability adaptation, which calls for adequate reaction to emergency scenarios. When highly intensive production systems confront the depletion of natural resources, sustainability is the primary objective. Thus, the main goal of technological demonstrations in these areas is not to increase productivity but rather to improve the efficiency of natural resource use and actions aimed at mitigating vulnerability in order to maintain productivity increases. In the context of climatic variability, it is critical to strengthen the adaptive capability and resilience of farming communities in order to effectively manage these catastrophic events.

In climatically sensitive regions of the nation, tested technologies are being showcased as part of NICRA's Technology Demonstration Component (TDC). The goal is to increase stakeholder adoption of these resilient technologies at a faster rate by imparting resilience under varying climates. Through KVKs, on-farm participatory demonstrations were implemented in districts throughout the nation that are sensitive to climate change. The secret to achieving sustainability in agriculture, particularly in light of climate vulnerability, is to increase resilience. The NICRA community was chosen on the basis of how susceptible agriculture is to variations in the weather. The KVK multidisciplinary team examined the limitations imposed by climatic variability by examining secondary weather data, resource conditions, farming practices, and recent agricultural yields.

The objectives of this network project are:

- To enhance the resilience of Indian agriculture covering crops, livestock and fisheries to climatic variability and climate change through development and application of improved production and risk management technologies
- To demonstrate site specific technology packages on farmers' fields for adapting to current climate risks
- To enhance the capacity building of scientists and other stakeholders in climate resilient agricultural research and its application

The research on adaptation and mitigation covers crops, livestock, fisheries and natural resource management. The project is comprised of four components.

- Strategic research on adaptation and mitigation
- Technology demonstration on farmers' fields to cope up with current climate variability
- Sponsored and competitive research grants to fill critical research gaps
- Capacity building of different stakeholders

One of the most crucial parts of the project is the technology demonstration component, which involves using site-specific technology packages to conduct demonstrations on farmers' fields and encourage the adoption of new technologies to address both the present vulnerability to climate change and the growing threat of climate change. The project is expected to produce both short- and long-term results in the form of enhanced crop varieties, livestock breeds, and

management techniques that support the creation of policies that mainstream climate resilient agriculture along the path of developmental planning.

The project was formulated and addressed based on the following steps:

- Analysis of climate constraints of the village based on long term data
- Assessment of natural resources status of the village
- Identification of major production systems
- Studying of existing institutional structures and identifying the gaps
- Focus group discussion with the community to finalize the interventions

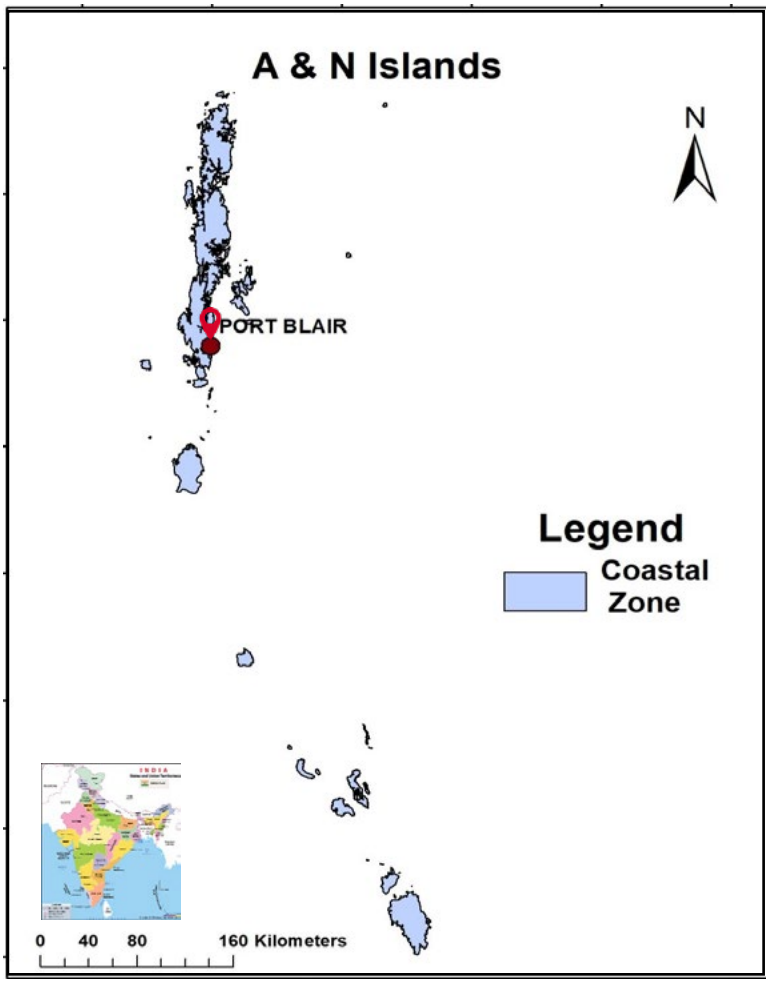
The interventions being implemented are based on four modules, i.e. (1) Natural resources management, (2) Crop production, (3) Livestock and fisheries and (4) Institutional interventions.

Enhancing resilience is one of the important keys to achieve sustainability in agriculture especially in the background of climate vulnerability and climate change. The vulnerabilities of the respective KVK districts are mentioned here under:

The vulnerabilities of the respective KVK under different districts are mentioned here under:

A & N Islands

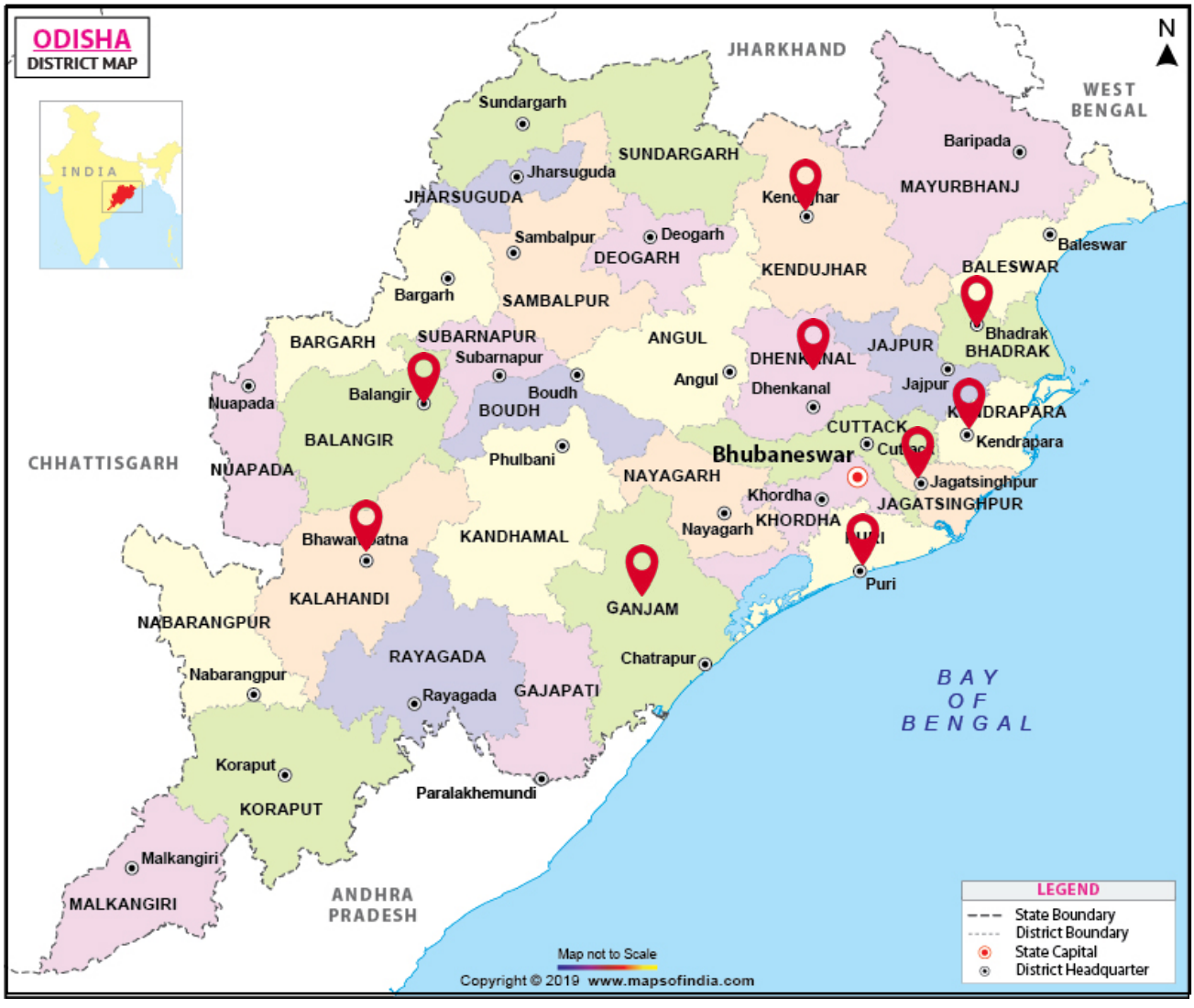
S. N.	NARP Zone	Districts	Climate vulnerability	Name of the village
1	Coastal Zone	Port Blair	Cyclone	Badmaspahad and Port Mount



Project location site

Odisha

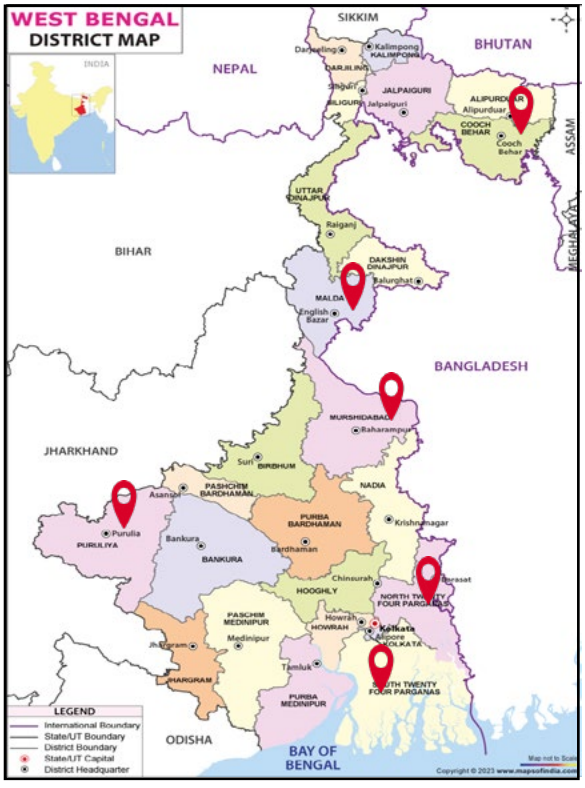
S. N.	NARP Zone	Districts	Climate vulnerability	Name of the Village
1	North-Eastern Ghat	Ganjam 1	Drought	Chopara
2	Western Central Table	Bolangir	Drought	Odiapali
3	Western Undulating zone	Kalahandi	Drought	Pipalpada, Maskaguda, kamardha
4	East & South Eastern Coastal Plain	Kendrapara	Flood / Cyclone	Dasmankul
5	North Central Plateau	Keojhar	Drought / Flood	Denua
6	East & South Eastern Coastal Plain	Puri	Heavy rainfall with irregular distribution, flood	Jatipura
7	East & South Eastern Coastal Plain	Jagatsinghpur	Flood/Cyclone	Achyutadaspur
8	North Eastern Coastal Plain	Bhadrak	Flood, eratic distribution of rain, thunderstorm in summer	Fatepur
9	Mid Central Table Land	Dhenkanal	Erratic, unseasonal rainfall with irregular distribution	Arachua



Project location site

West Bengal

S. N.	NARP Zone	Districts	Climate vulnerability	Name of the Village
1	Terai Zone (WB-2)	Coochbehar	Heavy rainfall	Khagribari
2	Old Alluvial Zone (WB-3)	Malda	Flood	Brozolaltola, Meherchandtola, Jayramtola and Mahendrotola
3	Coastal Saline Zone (WB-6)	South 24 Parganas	Cyclonic storm/heavy rainfall within short period	Bongheri and Kaikhali - 2
4	Coastal Saline	North 24 Parganas	Cyclone and Flood prone with soil salinity during Rabi-Summer	Samsernagar
5	Red Lateritic	Purulia	Intermediate drought, Heat wave	Haramjanga
6	Old Alluvial	Mursidabad II	Drought	Sujapur-Banomalipur
7	Hill	Kalimpong	Cold and foggy	Paiyong Khasmahal



Project location site

The NICRA village was selected based on vulnerability of agriculture to climatic variability. The multidisciplinary team of KVK analyzed the constraints related to climatic variability based on secondary weather data, resource situation, farming systems and agricultural yields in the past few years. Thus the interventions executed in NICRA villages by the NICRA-KVKs have not only enabled the farmers to cope up climatic vulnerability as well as it plays a key role in farmers' adaptive capacity along with sustainable agricultural production. Climatic vulnerability of selected nine KVK districts of Odisha, West Bengal and union Territory of A & N Islands assessed during implementation of NICRA programme brought forward definite requirement in terms of technological support, human resource development and overall empowerment of farming community to enable them to cope up with climate vulnerabilities like droughts, erratic rainfall, heat wave, flood, cyclonic storm. Plan of action, accordingly, was prepared for its implementation through executing technological interventions to initiate crop production, resource conservation, livestock and fish rearing, water harvesting etc. in the vulnerable villages of KVK districts. Demonstration of appropriate practices and technologies with a climate focus is taken up in farmer participatory mode in NICRA villages. The NICRA villages have become hubs of learning on climate resilient agriculture in the other parts of the districts.

INTERVENTIONS WITH MODULES

Module I: Natural Resource Management

In-situ moisture conservation, water harvesting and recycling for supplemental irrigation, improved drainage in flood prone areas, conservation tillage wherever appropriate, artificial ground water recharge and water saving irrigation methods and rainwater harvesting structure development.

Module II: Crop Production

Introducing drought, salt and flood tolerant/ resistant varieties, advancement of planting dates of rabi crops in areas with terminal heat stress, water saving paddy cultivation methods (SRI, aerobic, direct seedling), community nurseries for delayed monsoon, location specific intercropping systems with high sustainable yield index, introduction of new crops/ crop diversification, custom hiring centres for timely planting.

Module III: Livestock and Fisheries

Use of community lands for fodder production during drought/flood, improved fodder/feed storage methods, preventive vaccination, improved livestock demonstration, improved shelters for reducing heat stress in livestock, management of fish ponds/tanks during water scarcity and excess water.

Module IV: Institutional Interventions

Strengthening the existing institutional interventions or initiating new ones relating to seed bank, fodder bank, commodity groups, custom hiring centre, collective marketing group, introduction of weather index based insurance and climate literacy through a village weather station are part of this module.

MODULE I: NATURAL RESOURCE MANAGEMENT

The major emphases of the intervention were on augmenting rainwater availability through its efficient use by adopting site-specific rainwater harvesting strategies. Major interventions under this theme included in-situ moisture conservation; construction/renovation of new water harvesting and recycling structures/farm ponds/checks dams/tank roof water harvesting tank; land shaping and RWH structure; improved drainage in flood prone areas; conservation tillage where appropriate; artificial ground water recharge and water saving irrigation methods; green manuring; 5% model of irrigation; crop residue management; bunding of field; broad bed furrow; soil test based nutrient application; micro irrigation techniques; compost pits; participatory soil health management through identification and correction of major and micro nutrients. The impact of interventions aimed and enhancing rainwater harvesting and utilization capacity was very significant across the clusters. The efforts in this area resulted in the creation of an additional rainwater harvesting capacity of over 17.3 lakh cu m leading to increase cropping intensity by bringing around 1250 ha of area under protective irrigation regime since the inception of the project.

2.1.1 In-situ Moisture Conservation – Resource Conservation Technology:

In-situ rainwater management through ridge and furrow method and broad bed furrow practice conserves rainwater at field level and also drains out excess water into community drainage channels. This water can also be utilized for recharging ground water to provide supplemental irrigation to post-rainy season crops, which is otherwise not possible with flat bed planting. Through these methods, soil moisture is managed by maximizing the use of rainfall through increased infiltration and moisture retention and reducing runoff and soil erosion. The performance of high yielding improved varieties is optimized by *in situ* moisture management. Surface runoff and deep drainage water is exploited as supplemental irrigation to post-rainy season crops like wheat and chickpea. These conservation technologies have been demonstrated in 17 NICRA adopted villages covering 724 farmers in 189.7 ha area. The performance of different technologies by the various KVKs is presented in the following table.

Table: Performances of demonstration of in-situ moisture conservation technologies

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)	Economics of demonstration(Rs/ha)		
				Gross Cost	Net Return	BCR
ZeroTillageinwheat	75	55.0	32.2	28950	48705	2.08
In- situ moisture conservation throughLand leveling for brinjal	45	17.0	320.0	42259	135191	4.20
SummerPloughinginPaddy	63	25.2	45.2	19300	18260	1.94
Greenmanuaring(dhaincha)inPaddy (Vasundhara)	76	21.0	35.5	21400	21200	1.90
BrownmanuaringinPaddy	16	2.5	24.6	16300	13220	1.81
AzollainPaddy	3	1.0	32.3	19500	19220	1.98
Optimization of horticultural production through landembankment development	54	25.3	65.0	52700	60200	2.14
Repair of bund	22	3.5	28.5	17500	12650	1.72
Upgradation of monocropped land to multiple one with integration of fish	23	0.9	165.5	28400	22950	1.80
Ridge and furrow method of brinjal, cow pea (var. Kashikanchan) and radish cultivation	132	20.5	38.3	22575	34000	2.51
Organicmulchinginvegetables(Tomato,Var.-Rakhi, pointed gourd, cucumber, chilli)	70	1.0	256.2	57540	72500	2.26
PlasticmulchingOkra,cucumber	72	0.3	30	3000	4500	2.50
Useplant leaf mulchingin ginger	45	7.5	531.0	397000	943000	3.37
Usepaddystraw,forestleavesinelephantfootyam	18	6.0	300.0	280000	320000	2.14
Poly mulching in Strawberry	5	0.05	14.02	620000	340000	2.21

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)	Economics of demonstration(Rs/ha)		
				Gross Cost	Net Return	BCR
Organic mulching (leaf mould) in vegetables	5	0.25	5	24800	18600	1.75
Total	**724**	**189.7**				

2.1.2 Water harvesting and recycling for supplemental irrigation:

Water harvesting and recycling for supplemental irrigation were demonstrated in 17 NICRA adopted villages by the different KVKs involving 726 numbers of farmers in 356 ha. The performances of different indicators in the demonstrations are presented in following table.

Table: Performances of water harvesting and recycling for supplemental irrigation

Technology demonstrated	No. of farmers	Area (ha)/ Unit	Output (q/ha)	Economics of demonstration (Rs/ha)		
				Gross Cost	Net Return	BCR
RenovationofWellforirrigation	65	35.6	40.0	10000	4000	1.4
Desiltation and renovation of pond	25	47.0	53.84	16923	44615	3.63
Renovationofpondforfishproductionandirrigation	70	45.2	40.0	70000	370000	6.2
Construction of canal	90	41.0	-	-	-	-
Renovation of check dam	32	12.0	168.0	34011	70989	3.09

Technology demonstrated	No. of farmers	Area (ha)/ Unit	Output (q/ha)	Economics of demonstration (Rs/ha)		
				Gross Cost	Net Return	BCR
Bundmakinglevelinginpaddyfield	55	15.0	35.7	30240	18060	1.59
DiggingofsmallpitsinDiaralandforcucubits	16	13.0	-	43291	120708	3.78
Newwaterharvestingstructureinthepaddyfield	31	10.2	33.6	31334	12265	1.39
Newwaterharvestingstructureinthewheatfield	21	11.2	35.7	30240	15759	1.52
Construction of deep open well	25	13.4	1498	250000	345000	2.38
Renovationofoldwaterharvestingstructureinpaddyfield	53	24.0	42.0	106299	67722	1.63
Raisingoflandembankmentinbrinjalfield	24	4.0	200.0	43291	128909	3.98
Groundwaterrecharge	42	9.0	-	-	-	-
Tanksiltapplicationinbittergourdfield	22	5.0	142.0	34421	85279	3.48
Desiltationofdefunctwaterharvestingstructures	3	0.4	-	-	-	-
Renovation of irrigation channel	2	20.0				
Check dam construction	150	50.0				
Total	**726**	**356**				

2.1.3 Conservation tillage:

Sowing of *rabi* crops depends on the harvesting time of the preceding crop in *kharif* and also soil moisture status for undertaking land preparation for sowing. In case of wheat, this involves 2 to 3 or even more tillage operations for obtaining appropriate tilth before planting of wheat. In addition to the costs incurred and energy required, this causes delay in planting of wheat which often results in coincidence of vulnerable stage with high temperature stress during February/ March. This often leads to reduction in grain yield and loss to farmer. Zero till technology offers a viable and practical solution by avoiding repeated tillage for land preparation and sowing, reducing cost of cultivation and also permits planting early by 10-15 days. Advancement in sowing date is an adaptation to avoid terminal heat stress. Zero-tillage refers to direct drilling of wheat in unploughed paddy fields immediately after rice harvest using zero till drill or happy seeder. Conservation tillage in wheat, rice, lentil, pea and chickpea demonstrated in ten NICRA adopted villages in an area of 51 ha in 181numbers of farmers.

Table: Performance of ZTD in various crops

Technology demonstrated	No. of farmers	Area (ha)	Output (q/ha)	Economics of demonstration (Rs./ha)		
				Gross Cost	Net Return	BCR
Promotion of improved variety of maize + Zero tillage technology	55	7	55.0	35000	39870	2.14
Promotion of improved variety of wheat + Zero tillage technology	65	15	42.5	25550	23350	1.91
Surface seeding and mulching in lentil, sweet corn	27	9.5	18.5	21150	36000	2.70
Surface seeding and mulching in mustard	15	9.5	15.2	16450	17500	2.06
Sowing of rice with power tiller	19	10	18.1	21500	22040	2.03
Total	**181**	**51**				




2.1.4 Artificial ground water recharge:

Artificial ground water recharge done by field bunding, water management and through SRI by sub-soiler in paddy in NICRA adopted villages covering 118.6 ha area in 172 farmers fields. Ground water recharge through SRI by sub-soiler recorded highest rice yield (53.0 q/ha) and benefit: cost ratio (2.24).

Table: Performance of artificial ground water recharge technologies demonstrated

Technology demonstrated	No. of farmers	Area (ha)	Output (q/ha)	Economics of demonstration (Rs./ha)		
				Gross Cost	Net Return	BCR
Water management through bunding of rice fields	110	65	47.0	24700	20800	1.92
Ground water recharge through SRI by sub-soiler	41	25.3	53.0	39550	45500	2.24
Field bunding	21	28.3				
Total	**172**	**118.6**				

2.1.5 Water saving irrigation methods:

Water saving irrigation methods like sprinkler irrigation, LEWA in rice, RBF in brinjal, micro-lift irrigation in paddy demonstrated in NICRA adopted villages covering an area of 70.96 ha in 252 farmers' fields.

Table: Performance of different water saving irrigation methods

Technology demonstrated	No. of farmers	Area (ha)	Output (q/ha)	Economics of demonstration (Rs./ha)		
				Gross Cost	Net Return	BCR
Sprinkler irrigation in Brinjal (*MuktaKeshi*)	22	10.0	450	148500	565500	4.81
Sprinkler irrigation in Greengram (PDM-84-139)	18	8.5	25	7500	23600	4.15
Sprinkler irrigation in green gram (Var. *HUM-16*)	18	8.5	20	16200	25450	2.57
Irrigation system (micro lift Irrigation system) for rice	25	6.1	32	27500	22000	1.80
Application of biofertilizer in rice (var. *MTU 7029*)	42	9.2	54	38000	50000	2.32
RBF in Brinjal and cucumber (var. *Malini*)	13	2.5	11	51150	31550	1.62
Sprinkler irrigation in Chilli(Tejaswini)	35	2.4	239	175000	800500	5.57
Sprinkler irrigation in chickpea (var. *PG-186*)	22	7.5	16	13000	18550	2.43
Sprinkler irrigation in green gram	16	12	13	20150	15850	1.79
Sprinkler irrigation in Pumpkin	12	0.75	179	55000	104600	2.90
Sprinkler irrigation in Cucumber	18	2.5	150	53000	160000	4.02
Sprinkler irrigation in Okra	5	0.3	186	54000	105500	2.95
Sprinkler irrigation in Poi (Basella)	6	0.71	263	45900	159000	4.46
Vermi-compostfrombiodegradablewastes in Dolley Chilli	5	0.80	20.58	65000	245337	4.46
Sprinklerirrigationin vegetable crops	10	0.80	64.5	26280	40560	2.54
Total	**252**	**70.96**				

2.1.6 Other Demonstrations:

Demonstrations like in-situ vermicomposting in orchards, soil test based nutrient application, planting forest trees, plant for biodiversity, forestation, bio pesticides in tomato, were carried out in 194 farmers' fields with an area of 50.5 ha of land. Out of these demonstrations on in-situ vermicomposting in orchards showed highest economic return.

Table: Performance of other demonstrations

Technology demonstrated	No. of farmers	Area (ha)	Output (q/ha)	Economics of demonstration (Rs./ha)		
				Gross Cost	Net Return	BCR
In-situ vermicomposting in orchards	12	9.2	14.8	35010	170500	5.87
Soil test based nutrient application in Cucumber	45	12.2	156	56000	166600	3.98
Soil test based nutrient application	68	15	12.5	30000	26120	1.87
Bio pesticides in Vegetables	35	10.2	149	48000	120000	3.50
Use of IPM in Chilli leaf curl management	15	2.4	113	175820	396180	3.25
Use of IDM in Bittergourd bacterial wilt management	12	1.5	130	225585	509615	3.26
Shed net house for mushroom cultivation	7	-	2.4 kg per bed	40/- per bed	160/-per bed	5.00
Total	**194**	**50.5**				




2.1.7 Rainwater harvesting structures developed:

Rainwater harvesting (*ex-situ*) and efficient use to enhance resilience of farms, farm ponds brought about a perceptible change in crop production during *Kharif and rabi s*eason. Though the rainfall was less during the months of June and early part of July, the intense storms with rains which generated run-off and was stored in farm ponds created in farmers' field. The harvested water was used for critical irrigations to wheat, vegetables, fodder etc. Farmers realized an additional yield and income from these crops. There were total 97 number of rainwater harvesting structures have been developed which could store 0.98 million cu m of water which could provide irrigation to 461 ha of land. This intervention increased the cropping intensity to the maximum extent up to 265%. Storage capacity and increase in cropping intensity through the rain water harvesting structures are given in the following table.

Table: KVK wise rainwater harvesting structures developed during 2022-23

New (Nos.)	Renovated (Nos.)	Total	Storage capacity (cu m)	Protective irrigation potential (ha)	Cropping Intensity (%) increase
52	45	97	0.98 million	461 ha	140-265




MODULE II: CROP PRODUCTION

Monsoon contingency action plans were prepared and implemented in NICRA KVKs which experienced delayed onset/ deficit rainfall conditions during 2022-23. Contingency crop plans for late planting (after mid-July) involving appropriate crop, soil moisture, nutrient management measures, crop diversification *etc.* were taken up in NICRA villages. The impact of resilient practices and technologies is highlighted through different intervention mentioned below.

2.2.1 Introducing drought resistant varieties:

During the current year timely onset of monsoon but aberrant rainfall was experienced in several districts of Odisha and a number of short duration and drought tolerant varieties were demonstrated to make effective use of the remaining growing season. Iintroductions of drought resistant varieties of rice, brinjal, tomato, black gram, arhar *etc* were demonstrated in NICRA adopted villages involving 698 number of farmers in 148.6 ha area. Performance of the different drought resistant varieties of various crops is presented in the following table.

Table: Performance of different drought tolerant varieties

Technology demonstrated	No. of farmers	Area (ha)	Yield(q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Rice (Sahabaghi Dhan)	26	3.12	48.75	34.125	30.0	59,610.00	28,140.00	1.47
Rice (Swarna shreeya)	20	11	45.8	31.0	47.74	20000	43500	2.17
Rice (Swarna Sub1)	100	14	38	30	26.66	29300	32190	2.09
Rice (Jogesh)	30	18.8	30	18	66.67	19100	16000	1.84
Rice (GB-I)	32	4.68	51.75	39.75	23.18	55,410.00	37,740.00	1.68
Rice (Anjali IET-16430)	20	3.0	46.90	-	-	46750	40350	1.86
Rice(MTU-1153)	20	3.0	52.60	47.90	-	48100	49160	2.02
Sugarcane (Birendra)	35	8	827	600	37.83	62500	125000	3.00
Jute (JRO 7835)	110	18	26.25	22.5	16.66	45000	73125	2.62
Finger millet (Indravathi)	02	0.39	14.025	8.4	40.10	27975.00	70,200.00	3.5
Red gram (bund planting)	17	1.4	15	12	25.00	27750	45500	2.64
Brinjal (VNR- 218, VNR-212)	30	6	594	422	40.76	75000	190000	3.53
Tomato (*Utkal Kumari, Laxmi*)	21	2.2	160	110	45.45	53000	165000	4.11
Black gram (*PU 31*)	28	5.3	14	10	40.00	21500	39660	2.84
Cotton (*Shalimar*)	35	18.3	25	15	66.67	38000	82000	3.16
Arhar (*PRG 176*)	17	9	13	9	44.44	15500	39850	3.57
Chilli (VNR-315)	33	5	50.2	41.0	22.4	78800	190200	2.41
Green gram (IPM 2-14)	60	8.7	6.4	4.3	48.83	22200	58000	2.61
Maize (CO-4)	32	5.2	92.5	70.5	31.20	83000	202300	2.43
Sunflower (Swathi)	30	3.5	84.5	68.9	22.64	42000	92600	2.20
Total	**698**	**148.6**						




2.2.2 Introducing salt tolerant rice varieties:

Salt tolerant varieties of rice like *CARI Dhan,Usar Dhan-5*, *Jarava*, *Luna suwarna, CSR-36* were introduced in 19.8 ha area in 96 farmers' fields. Variety CARI Dhan-5 and Jarava proved maximum salt tolerant potential by giving highest yield of 50.0 and 45.5 q/ha respectively and more economic return in Luna Suwarna (BC ratio of 2.12)

Table: Performance of different salt tolerant rice varieties

Technology demonstrated (Salt tolerant varieties)	No. of farmers	Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Rice: Luna Suwarna (CR LC2096-71-2)	16	3.06	39.40	34.22	15.07	35348	39489	2.12
CARI Dhan-5	18	4.2	50.0	36.7	36.8	29750	23700	1.81
SR-26B	22	3.2	43.0	34.0	26.5	27500	29000	2.14
Usar Dhan-3	17	3.1	35.5	30.2	15.9	33650	16800	1.52
Rice *Jarava*	12	3.7	45.5	25.0	80.0	41250	26000	1.72
Rice *CSR-36*	11	2.5	44.0	33.6	31.0	29650	28200	2.04
Total	**96**	**19.8**						






2.2.3 Introducing flood tolerant varieties:

Flood tolerant varieties of paddy like Varshadhan, *Swarna sub 1,*Pratiksha and CR 500 were introduced through demonstration in 22.63 ha area in 120 farmers' fields.

Table: Performance of different flood tolerant varieties

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Submergence tolerant Rice Variety: Varshadhan (CRLC 899)	10	1.35	42.53	33.17	28.21	35597	45210	2.27
Flood tolerant /Submergence-tolerant varieties: Rice Swarna Sub-1	40	6	44.25	37.5	18	33750	44130	2.31
Promotion of submergence tolerance rice Pratiksha	53	10.5	43.5	30.0	44.3	21250	34600	2.72
Rice CR500	7	3.4	42.5	30.1	40.8	27500	19000	1.69
Submergence tolerant Rice Variety: CR1009 sub1	10	1.38	38.64	34.61	11.64	35250	30438	1.86
Total	**120**	**22.63**						






2.2.4 Advancement of planting dates of *rabi* crops in areas with terminal heat:

To avoid terminal heat stress in crops like rice, wheat, lentil, mustard, potato, *etc.* were sown in 12 days advance (avg.) during rabi season. These demonstrations were carried out in seven NICRA adopted villages involving 318 number of farmers' fields with an area of 43.54 ha land.

Table: Performance of advancement of planting dates in different crops

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Mustard: Earlymaturing (102-107) and aphid resistance(NRCHB-101)	31	4.0	22.40	17.80	25.84	37600	69920	2.86
Rice (GB-1)	18	2.4	46.50	37.50	24	33150	46830	2.41
Lentil- Paira cropping var. PL-8	30	6	10.80	8.10	33.33	18450	29070	2.57
Mustard (Agrani)	70	10	12.50	8.80	42.04	23000	52000	3.26
Blackgram (IPU 02-43)	105	12	16.50	11.50	43.47	24500	67900	3.77
Mustard (45S46)	16	3.25	15.30	8.40	54.90	42030.00	65070	2.54
Watermelon(Jigina)	03	0.39	151.87	106.12	30.12	83813.00	98437	2.17
Green Gram,*var. PDM139*	45	5.5	13.40	6.90	94.0	20500	40700	2.98
Total	**318**	**43.54**						










2.2.5 Water saving rice cultivation methods:

Water saving paddy cultivation through SRI, short duration varieties, direct seeded rice *etc.* have been demonstrated in 84.90 ha area of 379 number of farmers' fields. These interventions were carried out in seven NICRA adopted villages.

Table: Performances of water saving technologies for rice cultivation

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)		% in-crease	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Conservation furrow in Chilli cultivation	5	0.4	176.25	161.25	9.31	114000	309000	3.71
Sowing of Wheat with ZTD machine	15	2	30.75	27	13.89	31125	52890	1.69

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)		% in-crease	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Sowing of Maize with ZTD machine	45	6	63.00	53.25	18.3	41850	98910	2.36
Crop diversification through promotion of Lentil (PL-8)	30	6	10.80	8.1	33.33	18450	29070	2.57
Mulching (Poly) invegetables (Cucumber and other cucurbitaceous crop)	18	2.4	292.50	262.5	11.43	73950	160050	3.16
Organic (Rice straw)mulchinginvegetables (Pointed Gourd)	20	3.4	117.00	106.5	9.86	93675	192975	3.06
DSR(Sahabhagi)	40	6	36.00	30.5	18.03	22500	33300	2.48
Sowing of Maize with ZTD machine (DHM-107)	45	5	72.00	62.5	15.20	50000	49500	1.99
Water saving through SRI (GB-1)	04	1.52	62.62	39.75	57.54	60,315.00	52,293.00	1.86
Demonstration of Kharif groundnut using 4-row multi crop planter (TG-37A)	25	1.95	16.87	8.625	51.11	43,620.00	40,755.00	1.94
Line sowing by paddy drum seeder	38	15.5	38.00	29	31.3	14580	35720	3.44
Direct seeded brown manured rice	40	10.2	45.50	35	30.5	32900	36100	2.12
DSR (var. *Anjali*)	44	20.5	40.50	30	33.3	22858	33800	2.38
Abiotic stress management through Biostimulants in Brinjal	5	2.0	102.5	85.3	20.2	126700	334550	3.64
Abiotic stress management through Biostimulants in Tomato	5	2	119	100	19.0	187500	407500	3.17
Total	**379**	**84.90**						










2.2.6 Community nurseries for delayed monsoon:

Seedlings of 25-30 days age are transplanted in July so as to complete flowering of photosensitive varieties before October and harvesting by mid-November to facilitate taking up of timely sowing of *rabi* crops. Such a practice ensures optimum performance of both kharif and rabi crops. It appeared that failure of rain in July is responsible as transplanting of paddy is delayed with resultant adverse effect on productivity and a cascading negative impact on rabi crops. Delay in transplanting of paddy affects productivity as over aged seedlings suffer from low tillering ability various crops of different crop duration and varieties has been promoted. Besides paddy other crops like of cauliflower, brinjal, and tomato are followed for staggered nursery development. These intervention were demonstrated in 16.5 ha area of 92 numbers of farmers. These interventions were carried out in five NICRA adopted villages.

Table: Performance of Community nurseries

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Community nursery of tomato	17	2.5	325	248	31.05	131250	142875	2.08
Community nursery of brinjal	11	5.0	560	420	33.33	75000	205000	3.7
Community nursery of onion	20	5.5	230	185	24.32	145000	12000	1.8
Community nursery of Chilli (Tejaswini)	19	3.5	112	75	49.33	177500	362500	3.04
Nursery management and production of Cabbage, Dalley Chilly and Tomato under low cost poly house	25	0.01	--	---	Crop in field	--	--	--
Total	**92**	**16.5**						




2.2.7 Location specific intercropping systems with high sustainable yield index:

Various intercropping systems were demonstrated in regions which are prone to drought. Intercropping systems are considered as one of the important adaptation mechanism for variable rainfall situations. Intervention on location specific intercropping was demonstrated in six NICRA adopted villages. The demonstrations were carried out in 16.24 ha area of 140 number of farmers' fields.

Performance of different location specific intercropping systems

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Black gram (PU-31)+ papaya	10	05	B. gram: 10.60 Papaya: 187.5	B.gram: 12	-	102500	148500	2.45
Cabbage(var. Green Express)+coriander (suravi)	10	0.67	367	305	20.32	91200	92300	2.02
Cauliflower (Dawn)+ Spinach	10	0.67	372	318	16.98	78900	107100	2.36
Pea + cole crops (Cabbage and cauliflower)	10	0.40	1.2	0.59	17.20	16280	41560	2.55
			20.24	18.07				
			18.21	15.17				
Maize + Mung	20	2	97	85	14.11	55500	105060	2.89
Brinjal + Cowpea	15	2	150	120	25	50600	91750	2.81
Cauliflower + Ridge gourd	8	1.5	750	560	27.5	163800	224800	2.37
Brinjal + Coriander	7	1.0	650	502	21.5	145700	272600	2.87
Cucurbits / Gourd + solanaceous vegetables	22	1.5	Gourd : 63 Vegetables: 272	-	-	217500	64500	3.02
Maize+Ladies finger	18	0.5	Maize: 87.0	Maize: 75.0		63750	138750	2.21
Chilli + Tomato	10	1.0	320	260	24.8	241200	113700	1.89
Total	**140**	**16.24**						






2.2.8 Introduction of new crops/ crop diversification:

Crop diversification through introducing new crops in prevailing cropping pattern was demonstrated in the different NICRA adopted villages. These demonstration were carried out in 143.3 ha area of 1006 number of farmers' fields.

Table: Performance of different crop diversification in NICRA villages

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Mustard (YSH0401, Pusa Bold)	28	4.4	11.4	9.3	22.58	25425	50730	1.99
Lentil (PL-8)	30	6	10.8	8.1	33.33	18450	29070	2.57
Jute, Stem rot resistant variety (JRO-204)	40	6.4	23.24	20.25	14.82	50850	52613	2.04
Elephant foot yam Gajendra (Kovur)	35	5	305	241	26.55	70000	205000	3.92
Turmeric (Suranjana)	30	3	230	165	39.39	130000	233000	2.79
Milky Mushroom cultivation	15	02	0.78	-	-	3350	8350	3.49
Physical and mechanical approaches to insect pest management in Cabbage	25	1.3	293	-	-	173925	137325	1.79
Hybrid Maize var. Kaveri	35	6.7	129q/ha (green cob)	71 q/ha (greencob)	81.69	46000	72000	2.57
Sweet corn variety- Sugar-75	25	2.6	120q/ha (green cob)	93(q/ha) Green cob	29.03	68000	162000	3.38
Onion (var. *N-53*)	40	7	299	190	57.37	68300	300050	5.39
Chilli (var. *Surajmukhi*)	53	8.3	92	58	58.62	66000	173000	3.62
Gram (var. *Pusa 362*)	63	15.2	17	10	70.00	26650	48400	2.82
Tomato (var. *Param F1*)	54	8.5	200	153	30.72	75600	150200	2.99
Cabbage (var. *OM-3*)	60	9.4	360	260	38.46	75000	215500	3.87
Radish (var. *Suhra -32*)	45	5.4	159	97	63.92	71100	86000	2.21
Brinjal (var. *F1-Hybride Long*)	46	7	218	165	32.12	78500	156100	2.99
Cauliflower (var. *MSN-16*)	55	6.5	229	129	77.52	78800	184000	3.34
French Bean(var. *FE-51 ANUPMA*)	45	3.5	68.8	42.4	62.26	80900	112000	2.38
Turmeric(var. *Rajendrasoniya*)	40	7	260	170	52.94	90000	300000	4.33
Ginger (var. *Nadiya*)	35	3.6	206	158	30.38	110000	550000	6.00
Lentil(Short duration var. *PL 406*)	39	6.2	13.1	7	87.14	18000	30000	2.67
Linseed(Short duration var. *T 397*)	25	6.5	7.5	5	50.00	11000	18750	2.70
Nutritional garden- veg. seed Seem (*dolicus lablab)*	78	4.8	20	13	53.85	9000	17000	2.89
Tomato under mulching	65	7	81	40	102.50	10000	29400	3.94
Total	**1006**	**143.3**						





2.2.9 Other Demonstrations:

There are some other demonstrations in various aspects mentioned in the following table which was carried out in different NICRA adopted villages involving 913 numbers of farmers. Among all the demonstration cultivating contingency crops like brinjal, cauliflower and short duration tomato and banana bunch cover, integrated fish farming were remunerative.

Table: Performance of other demonstration

Technology demonstrated	No. of farmers	Area (ha)	Yield(q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Short duration Greengram cultivation (var. IPM 205-7)	10	2.37	10.29	7.52	36.83	34217	37827	2.11
Yellow Mosaic Virus (YMV) tolerant blackgram variety PU-31	10	0.68	7.86	6.52	20.55	28210	1895	1.67
Chilli var. Arka Tejasvi	7	0.13	131	122	7.37	155128	238300	2.54
low BOAA content Lathyrus var. Prateek	10	1.41	8.07	6.07	32.94	23445	25011	2.07
Use CRIJAF Sona an dNINFET Sathi Powder to accelerate the retting process and removed efect in jute fibre	88	10.00	Yield: 30.75 Days:14 Defect (%):6	Yield: 30.75 Days: 26 Defect (%): 14	-	Demo 74250 Local 72000	90750 83775	2.22 2.16
Above + Dipping of extracted jute fibre in 1% vizol polyquat solution to improve jute colour and lusture	12	1.50	Yield:30.75 Days:14 Defect (%): 6 Grade: TDN-2	Yield: 30.75 Days: 14 Defect (%): 6 Grade : TDN-4	-	Demo 76750 Local- 72000	100550 83775	2.31 2.16

Technology demonstrated	No. of farmers	Area (ha)	Yield(q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Production of seedling in in protray and establishment of nutrition garden with suitable crops (Tomato/bottlegourd / pumpkin / cabbage / cauliflower/ broccoli / spinach/beet/carrot)	11	0.22	Yield:195.00	-	-	36000	81000	3.25
Bio-fortified cauliflower cultivation (var. Valentine Carotina)	10	0.67	305	-	-	96500	208500	3.16
Broccoli cultivation (var. Green Magic)	10	0.67	151	-	-	88700	168000	2.89
Mushroom Production (Oyster)	5	5 unit	1.7	1.3	30.76	5000	20,500	4.1
Cultivation of improved variety of turmeric	10	0.25	5.6	3.7	51.35	16,000	44,500	3.78
Lentil, IPL 220	115	15	16.5	11.5	43.47	23800	47500	2.99
Brinjal, Pusa Purple Long	45	5	190	152	25	65000	125000	2.92
Multi-tier Horticulture (vegetables base)	90	6	155	96.5	60.62	45000	91600	3.03
Black Gram (IPU 11-02)	20	2.6	8.85	4.1	46.32	32108.00	29842.00	1.92
Red Gram (ICPL 87119)	04	1.2	7.125	2.625	36.84	33653.00	37,597.00	2.12
Green Gram /(Pusa 1431)	11	1.65	8.25	3.375	40.91	35108.00	30,892.00	1.88
Short duration Greengram cultivation (Var. IPM 205-7)	10	2.6	10.47	7.09	47.67	34904	27916.00	1.80
System of Assured Rice Production (SARP) in kharif	10	1.33	37.90	31.81	19.14	33866	30564.00	1.90
Cultivation of disease resistant Tomato var. Arka Rakshak	15	1	267	209	27.75	85000	353500	5.16
Cultivation of short duration green gram var. IPM 02-3	10	3.7	7.1	4.9	44.90	15510	22490	2.45
Income generation activities (Marigold cultivation by women SHGs)	10	-	125 q/ha flower yield	85 q/ha		78000	301000	4.86
Vermicomposting	7	7 unit	5q/pit	4q/pit		1500	3500	3.33
Oyster mushroom cultivation by WSHGs	15	-	2.2 kg	1.8 kg/bed		40/- per bed	140/-per bed	4.50
Contingency crop Brinjal (var. *PUSA Uttam*)	22	3.6	350	300	16.67	58000	290000	6.00
Integrated crop management of mustard (*NC-1*)	38	5.9	25	15	66.67	40000	47630	2.19
Promotion of stem rot resistant Jute (var. *JBO-2003H*)	36	4	27	18	50.00	35500	46670	2.31
Integrated crop management of lentil (*Maitri*)	40	5.5	16	12	33.33	31500	44500	2.41
Integrated disease management in vegetables	25	5.5	245	203	20.69	96000	43250	1.45
Demonstration short duration vegetables as contingent crop Tomato (var. *PUSA Gaurav*)	26	4	360	270	33.33	59500	205000	4.45
Contingency crop Cauliflower (var *PUSA Sharad*)	30	2.7	260	210	23.81	61000	262500	5.30

Technology demonstrated	No. of farmers	Area (ha)	Yield(q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Contingency crop Radish (var. *PUSA Chetki*)	37	2	136	90	51.11	52500	65900	2.26
Soil reclamation : Levelling / bunding and flooring for leaching of salt	37	10	36	30	20.00	37500	49000	2.31
Integrated fish farming	26	3.4	2	1.5	33.33	49000	132000	3.69
Integrated farming system	31	3.9						
late blight disease of potato	20	2.5	300	255	17.65	135000	190000	2.41
Total	**913**	**110.98 ha and 12 unit**						























SCIENTIFIC METHOD



FIELD DAY

FIELD DAY

MODULE III: LIVESTOCK & FISHERIES

In this module, interventions include introduction of stress tolerant animal and poultry breeds, nutrient supplementation through area specific mineral mixtures, balanced ration using locally available feed material, fodder production in community lands especially during drought/flood situations, silage making for storage of green fodder and feeding during the dry season, improved shelters for reducing heat stress in livestock, captive rearing of fish seed in nursery ponds prior to stocking in main tanks in the village, breed selection and stocking ratios for fish production in farm ponds and monitoring of water quality in aquaculture and integrated farming system models in diverse agro ecosystems.

2.3.1 Use of community lands for fodder production during droughts / floods:

Community lands of an area of 6.25 ha involving 163 number of farmers utilized for different fodder production were demonstrated in six different NICRA adopted villages. Sudan chari, hybrid napier were the major fodder produced in the programme. Of all these demonstrations, quality Maize fodder (Ganga 5) showed maximum benefit-cost ratio of 2.17.

Table: Performance of different fodder demonstration in community lands

Technology demonstrated	No. of farmers	Unit/ Area (ha)	Output (q/ha)		% increase	Economics of demonstration (Rs/ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Sudan Grass	14	5 units	2785 lt. milk/yr	2540 lt. milk/yr	9.65	42250	44950	1.06
Hybrid Napier	149	6.25 ha	165	150	10.0	8000	11500	1.44
Maize, Ganga 5	70	5	80	66	21.21	60200	70800	2.17
Total	**163**	**5 units & 6.25 ha**						

2.3.2 Improved fodder/feed storage methods:

Adequate supply of fodder, either green or dry, is crucial to the livelihoods of livestock in rainfed areas. In 2022-23 delayed onset and deficit rainfall conditions were experienced in several states. There was reduction in area under millets and pulses, which are important to meet the fodder requirements in the rainfed areas. Short and medium duration fodder cultivars of several crops and fodder species both in *kharif* and *rabi* seasons were demonstrated in farmers' fields under rainfed and limited irrigation conditions to support income and cash flow from animal husbandry. Azolla cultivation for feed supplement of domestic animal showed very promising results.

Table: Performance of improved fodder

Technology demonstrated	No. of farmers	Unit/ Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Production of Napier grass for feed supplement of domestic animal	14	8 units & 2.7 ha						
Azolla cultivation for feed supplement of domestic animal	39	39 units	3 kg/unit/ month			225/unit	875/unit	3.89
Hydroponic fodder production	6	6 units	1500	950	57.9	17000	49500	2.91
Jowar (Var. MP Chari)	05	0.5	2.5	1.8	28	14000.00	10,500.00	1.75
Azolla in poultry	10	10 units	4.1	2.7	51.8	120	400	3.33
Rice bean	25	1.12 ha	255	220	15.9	9575	18135	1.89
Maize	12	0.75 ha	280	240	16.6	8040	11990	1.49
Hybrid napier Co4	7	0.7 ha	190	140	35.7	25450	68500	2.69
Bajra, Co 8	85	3	250	190	31.57	45000	85000	2.88
Total	**113**	**63 units & 5.27 ha**						

2.3.3 Preventive vaccination:

Various vaccination camps were organized against FMD of cattle; PPR against goat, Ranikhet of poultry, BQ vaccine, deworming *etc.* in different NICRA adopted villages. Mortality rate reduce up to the extent of 90% and average increase in cattle milk yield up to 40% have been recorded after the vaccination camps organized.

Table: Performance of various vaccination camps organized

Technology demonstrated	No. of farmers	Unit/ No./ Area (ha)	Measurable indicators of output* (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Vaccination camp against FMD Cattle & PPR against goat	460	532	940 lt. milk/yr	840 lt. milk/yr	11.9	13500	15000	1.11
Vaccination for PPR in goat and Ranikhet in Poultry.	222	398	Body wt. (90 days) 6.6 kg	5.4 kg	22.2	780	1260	1.61
Vaccination against FMD in Zebu Cattle (Milch cow)	25	25 (1 Unit = 1 no. of milch cow)	Milk (lit/ animal/day)_ 2.2	1.8	18.18%	12500.00	9550.00	1.76
Deworming	355	319	945 lt. milk/yr	840 lt. milk/yr	12.5	10500	13700	1.30
Mineral mixture	96	155	990	840	17.9	14400	16200	1.12
Vaccination camp against other diseases	190	79						
Total	**1323**	**1483**						

2.3.4 Management of ponds / tanks for fish and duck rearing:

Composite and cat fish rearing in the existing pond or in renovated pond were demonstrated in 113 farmers' fields of NICRA adopted villages. Khaki Campbell duck was also introduced through this intervention.

Table: Performance of composite and cat fish in the renovated ponds

Technology demonstrated	No. of farmers	Unit/ No./Area (ha)	Measurable indicators of output* (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Cultivation of cat fish in cemented tank	14	14 units						
Composite fish culture by stocking of yearlings of Catla, Rohu and Mrigal	45	5.2	36.3	24.8	46.4	180000	240000	1.33
Stress tolerant fish (Asian Catfish) integrated with IMC for effective utilization of available water IMC (Catla:Rohu:Mriguel@ 3:4:3) = 1300 no./bigha for 4 months + Asian catfish : 1000 no./bigha for 8 months	7	0.75	38.4	30	28	241000	500375	2.08
Installation of Periphyton net by covering 40% of water surface area to facilitate natural feed production in pond and to reduce cost of artificial feed in *Tilapia* culture	3	3 units (0.35 ha)	240	210	14.3	950000	1750000	1.84
Eco Hatchery for Carp Breeding (Reservoir – 1 Breeding pool – 1 Hatching pool – 1 Spawn collection chamber – 1)	1	1 unit	Production of 5.2 million spawn of IMC (Catla, Rohu, Mriguel, Bata and *Puntiusjavonicus*) & Work opportunity for 3 rural youths			17500	45000	2.57
Total	**70**	**18 units & 6.3 ha**						

2.3.5 Livestock demonstration:

Demonstration of rural backyard poultry (*kuroiler, Nicobari fowl*), khaki Campbell duck, Ghungroo breed of pig, mineral mixture and azolla as cattle feed were carried out in 298 number of farmers' fields. Kadaknath bird was introduced through this intervention which showed very promising results (B:C::3.64).

Table: Performance of livestock demonstration in NICRA adopted villages

Technology demonstrated	No. of farmers	Unit/ No. / Area (ha)	Measurable indicators of output* (q/ha)		% in-crease	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Promotion of Ghungroo Piglets	10	10 units & 20 nos.	-	-	-	8000	12000	1.50
Promotion of poultry breed Rhode Island Red (RIR)	22	22 units & 304 nos.	-	-	-	-	-	-
Empowerment of SHG through Egg Incubator	30	1 unit & 1 no.	-	-	-	-	-	
Promotion of goatery breeds for strengthening of marginal farm women	15	15 units & 15 nos.	-	-	-	-	-	-
Duck Rearing-Khaki Campbell	75	230 nos.	2.5	1.75	42.86	550	1725	3.14
Rearing of poultry breed Vanaraj	83	135 nos.	3.5	2.5	40.00	220	650	2.95
Demonstration of stress tolerant breed Kadaknath	40	285 nos.	3	2	50.00	210	765	3.64
Colour bird poultry	23	260 nos.	2.0 kg	2.0 kg		180	300	1.67
Total	**298**	**48 units & 1250 nos.**						

2.3.6 Improved shelters for reducing heat stress in livestock:

Improved Poultry shed recorded low mortality rate and in shady area reduced heat stress. Standard spacing in improved shed resulted better performance in poultry and dairy animals. Interventions to reduce heat stress for higher survivability of backyard poultry and dairy animals were demonstrated of improved shelter.

Table: Performance of improved shelters for poultry and dairy animals

Technology demonstrated	No. of farmers	Unit/ No. / Area (ha)	Measurable indicators of output (q/ha)		% increase	Economics of demonstration (Rs./ha)			
			Demo	Local		Gross Cost	Gross Return	Net Return	BCR
Cement flooring, Straw thatched roof, with mosquito repellent net for better hygienic for cattle	23	48	920	810	13.6	20500	39100	18600	1.91
Low cost shed with raised bamboo platform	13	7	27	17	58.8	2150	6700	4550	3.12
Shelter 1 Low-Cost Goatery Shed	35	35	-	-		2500	4000	1500	1.60
Improved cowshed	7	7	4	3	33.3	26500	53000	26500	2.00
Low cost goat shed	5	5	Bw. gain- 57 g/day	Bw. gain- 46 g/day	-	3500/- per goat per 1 year	9000/- per goat per 1 year	5500	2.57
Total	**83**	**102**							

Module IV: INSTITUTIONAL INTERVENTION

Strengthening the existing institutional interventions or initiating new ones relating to seed bank, fodder bank, commodity groups, custom hiring centre, collective marketing group, and introduction of weather index-based insurance and climate literacy through a village weather station and awareness developed of 5050 number of farmers in the zone.

Seed Bank: Village level seed production of short duration, drought and flood tolerant varieties was taken up by farmers and seed societies in several NICRA villages with the technical support of KVKs in rice, soybean, foxtail millet, green gram, pigeon pea, finger millet, chickpea, wheat, rapeseed and mustard. To tackle contingency situations, increased availability of tolerant varieties was accorded priority especially in the case of paddy, soybean and foxtail millet during 2022-23. It has become a regular practice to source seed of drought tolerant and short duration cultivars from few NICRA villages as interested farmers and seed societies have taken up this as a livelihood activity.

Fodder bank: Fodder bank was established in the village under NICRA project, green fodder shortage and dry fodder shortage is acute. The green fodder shortage was reduced from 86% to 36% within four years of NICRA project. In several NICRA villages in other districts seed of improved cultivars of fodder sorghum, maize, pearl millet, berseem, lucerne and oats was produced for use in regular and contingency situations.

Collective marketing: Collective marketing is where a number of growers work together to sell their combined crops. This may require additional storage, processing or packaging of the crop, with the costs shared by the collective.

Commodity group: An Agricultural Commodity can be defined as grain, livestock, poultry, fruit or any other items produced from agricultural activities. The general price level of an agricultural commodity, whether at a major terminal, port, or commodity futures exchange, is influenced by a variety of market forces that can alter the current or expected balance between supply and demand.

Climate literacy through village level weather station: The Village Climate Risk Management Committee (VCRMC), after the PRA to assess the climate related problems in the village and baseline survey. Then they followed recommendation by KVK and other institute scientist through village level weather station.

Interventions	No. of KVKs	Details of activity			No. of farmers	Unit/ No. /Area (ha)
		Name of crops / Commodity groups / Implements	Quantity(q) / Number / Rent / Charges	Technology used in seed / fodder bank & function of groups		
Seed bank	13	Rice - Sahabhagi dhan, Swarna Shreya	60 q	Rouging, drying	135	75 ha
		Blackgram	70 q	Seed Production	516	4
		Rice var - Swarna Sub – 1	10.2 q	Metal seed bins, layers of dried neem leaves and dry chili kept with seeds to prevent insect infestation	83	10
		Rice var – Sahabhagidhan	48 qt/20/300 per month	Paddy var-Sahabhagidhan	36	23
		Black gram	71.4 q	Proper care and storage of black gram. Seed treatment with bavistine. Preservation of germination quality. Registration of seed bank	190	95.5 q
		Swarna Sub 1 Rice	18 q	-	42	6
Fodder bank	7	Hybrid Napier	53		119	1.3
		Maize	37 q	Proper care and storage of maize seeds. Seed treatment with bavistine. Preservation of germination quality. Registration of fodder bank	28	39.5 q

Interventions	No. of KVKs	Details of activity			No. of farmers	Unit/ No. /Area (ha)
		Name of crops / Commodity groups / Implements	Quantity(q) / Number / Rent / Charges	Technology used in seed / fodder bank & function of groups		
Custom hiring centre	17	Rice, Maize, Vegetables, Jute	Rs. 95000		85	4.8
		Power tiller, sprayer, reaper, diesel pump set, weeder, Thresher cum winnower, MB Plough, seed cum fertilizer drill			135	63 ha
		Power tiller	Rs.250/hr	Ploughing	22	21 ha
		Paddy reaper	Rs.250/hr	Reaping paddy	6	4.8 ha
		Power sprayer	Rs. 20/-hr	Spraying pesticides	46	3.5 ha
		Power Tiller	6 no.* (Rs. 250/hr)	Managed by VCRMC	92	14.7
		Pump set	8 no. (Rs. 80/day)		29	6.8
		Battery operated Sprayer	6 no. (Rs. 50/hr)		44	10.4
		Paddy thresher	7 no. (Rs. 100/ day)		37	11
		Tractor drawn labeller, Tractor drawn MB plough, Tractor drawn rotavator, Self-propelled riding type reaper, Diesel pump set, Knapsack Sprayer	14100		110	53
		Power sprayer, power tiller, Thresher, motor Pump			55	2
Climate literacy through a village level weather station	14	Weather station- Rain gauge, Stevenson screen, wind vein		Daily data recorded by VCRMC	3220	30
Others (if any)	1	Elephant foot yam	1		20	1.5 ha
Total					**5050**	**168.8 ha, 135 q & 177 nos.**






2.4.1 Village Climate Risk Management Committee (VCRMC)

Village Climate Risk Management Committee (VCRMC) was constituted after in-depth discussion with the villagers about the mitigation of the climatic vulnerabilities of the villages and the strategies to be adopted under NICRA. The members of the committee were selected by the villagers under the facilitation of KVKs where NICRA was being implemented. VCRMC became operational with opening of a bank account in their name being jointly handled by the President of VCRMC and the Programme Coordinator of the KVK concerned. The custom hiring of various farm tools and implements was being supervised by VCRMC apart from taking important decisions on the technological interventions to be implemented at the village in consultation with the KVK.

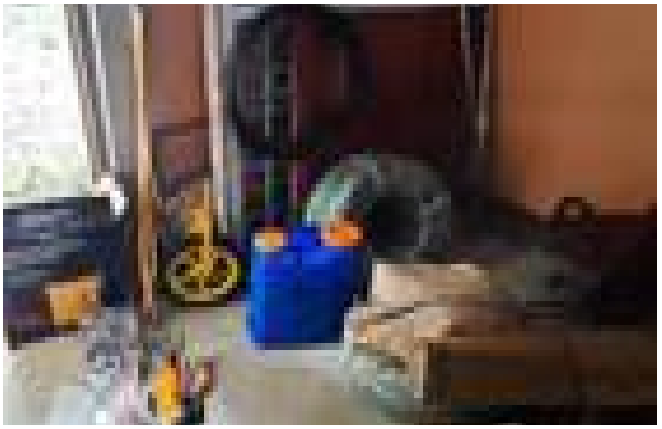
2.4.2 Custom Hiring of Farm Implements and Machinery:

Timeliness of agricultural operations is crucial to cope with climate variability, especially in case of sowing and intercultural operations. Access to implements for planting in ridge-furrow, broad bed furrow and raised beds is essential for widespread adoption of resilient practices for *in situ* soil moisture conservation and drainage of excess water in heavy soils. In rain-fed areas, availability of such farm implements to small and marginal farmers is important. Similarly, in irrigated areas, residue management of *kharif* crops through zero till cultivation of *rabi* crops reduces the problem of burning of residues and adds to the improvement of soil health and increases water use efficiency. Custom Hiring Centres (CHCs) for farm implements were established in NICRA villages. A committee of farmers manages the custom hiring centre. The rates for hiring the machines/implements are decided by the VCRMC. This committee also uses the revenue generated from hiring charges and deposits in a bank account opened in the name of VCRMC. The revenue is used for repair and maintenance of the implements and 25% share is earmarked as a sustainability fund. 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 and chaff cutter. Each CHC was provided an initial sum of Rs. 4.25 lakhs for its establishment under NICRA project. Revenue generated through custom hiring and under VCRMC in different KVKs is presented in the following table.

Table: Revenue generated through Custom Hiring Centres and VCRMC in KVKs 2022-23

Name of KVK	Revenue Generated (Rs.)	
	From Custom Hiring Centres	Total under VCRMC
Port Blair	7139	51361
Bhadrak	8700	8700
Bolangir	9000	27750
Dhenkanal	5400	5400
Ganjam-I	8600	8600
Jagatsinghpur	15651	15651
Kalahandi	13500	13500
Kendrapara	23500	86500
Keonjhar	4500	4500
Puri	6200	6200
Coochbehar	45900	108000
Kalimpong	3040	3040
Malda	5500	64500

Name of KVK	Revenue Generated (Rs.)	
	From Custom Hiring Centres	Total under VCRMC
Murshidabad (Addl.)	7600	33400
North 24 Pgs.	25000	65000
Purulia	20550	20550
South 24 Pgs.	68900	358700
Total	**278680**	**881352**



CAPACITY BUILDING

A total of 271 courses were conducted by all NICRA implementing KVKs under Capacity Building Programme on various thematic areas benefitting 4903 farmers and farm women (2717 male and 2186 female) during 2022-23. Thematic areas covered on SRI, scientific crop management, crop diversification, land shaping, green manuring, natural resource management, resource conservation technology, animal feed management, nursery raising, pest and disease management, weed control, vermicompost, value addition, livestock management, oilseed and pulse demonstration, farm implements, drudgery reduction *etc*. The HRD programme conducted on the basis of priority area of farmers or farm women.

Thematic area	Topic of the training	No. of Courses	No. of beneficiaries		
			Male	Female	Total
Livestock and Fishery Management	Empowerment of farm women through Poultry and duckery farming	14	0	350	350
	Sustainable income generation of rural youth through pig farming	2	0	29	29
	Application of Floating feed in Pisciculture	5	43	18	61
	Training on importance of hydroponic and azolla cultivation and animal feed	11	85	40	125
	Training on Scarcity feed management	2	20	26	46
	Training on deworming& vaccination schedule of livestock	3	22	14	36
	Nursery pond management	2	22	14	36
	Composite fish culture	1	10	8	18
	Integrated Fish Farming with livestock and horticultural Crops	2	45	21	66
	Back yard poultry rearing of Kadaknath	2	30	28	58
	Care and management of dairy animal during heat stress	4	37	24	61
	Rearing of feed management of backyard poultry	2	0	18	18
Integrated Pest and disease Management	Management of Pest & diseases in Rice	4	30	7	37
	Management of Pest & diseases in Pulses	7	44	25	69
	IPM practices of kharif vegetables	1	13	8	21
	IPM practices of rabi vegetables	2	25	20	45
	IPM practices of summer vegetables	2	21	7	28
	IPM &INM System of Assured Rice Production (SARP)	1	32	0	32
	Disease and pest management in Paddy	4	41	15	56
	Disease management in stress tolerant crops	3	26	34	60
	Practice of bio-pesticides for management of sucking pest in cotton	3	22	17	39
Natural Resource Management	Zero tillage technology of maize	2	31	27	58
	Transplanting paddy through transplanter machine	2	30	19	49
	Waste Management for Sustainable Environment	4	35	29	64
	Water Harvesting and Management	5	42	17	59
	Contingency planning for kharif 2019	2	18	15	33
	Conservation of water & its judicious use for sustainable development	3	23	29	52
	Post Cyclone (Bulbul) Contingency Planning for Rabi season	2	35	20	55
	In-situ moisture conservation in vegetable	1	9	5	14
	Trenching and bunding method in mango plantation	6	45	27	72
	Use of farm machinery for conservation of soil moisture	2	24	14	38
	On-farm water conservation in rice	3	27	17	44

Thematic area	Topic of the training	No. of Courses	No. of beneficiaries		
			Male	Female	Total
Crop Management	Cultivation of rabi crops (Paddy, Potato, Vegetables, Lentil, Mustard)	14	255	167	422
	Bio-intensive pest management practices for Rabi crops	7	45	45	90
	Importance and conservation of pollinators for better crop production in climate change perspective	4	48	4	52
	Hybrid vegetable cultivation	5	67	16	83
	Crop diversification from paddy to non-paddy crop groundnut	3	29	25	54
	Training on Use of green manuring for better fertility status and crop yield	1	15	12	27
	Training on high density planting system in cotton	2	28	32	60
	Management in black gram in rice fallow cropping system	2	22	19	41
	Scientific cultivation of Swarna Sub 1	3	25	13	38
	Management of maize based intercropping system	1	10	5	15
Fodder and feed management	Azolla cultivation for feed supplement of domestic animal	7	60	29	89
Resource conservation Technology	Vermicomposting, use of Bio-Fertilizer in diff. crop	3	31	18	49
	Resource conservation technology and implementation	3	26	28	54
	Cultivation of pulse crop as paira cropping	3	59	7	66
Integrated Farming System	Importance, scope and implementation of IFS	5	38	30	68
Farm implements and machineries	Effective use of farm machinery though Petroleum conservation	2	30	0	30
Organic farming	Training on Organic Farming.	1	12	5	17
Vermi composting	Training on Vermi-composting	6	82	63	145
Soil sample collection Technique	Training on Soil sample collection technique	4	36	26	62
Income generation activity	Scientific method of Mushroom cultivation	5	25	33	58
	Employment generation of SHGs through Egg Incubator	2	10	13	23
	Training on Marigold cultivation	2	24	28	52
Mushroom cultivation	Training on mushroom production	5	43	37	80
	Low-cost technology for mushroom cultivation for rural youth	4	38	29	67
	Low-cost technology for mushroom cultivation for women	3	0	40	40
Off- season Vegetable Cultivation	Training on Off- season Vegetable Cultivation	4	22	15	37
Multi-tier horticulture	Selection of vegetables to be grown in multitier	2	36	21	57
Value addition	Value addition for fruits and vegetable crops	2	14	6	20
Nutrient Management	Nutritional garden	2	20	24	44
	System of assured Rice production -IPM & INM	6	65	85	150
	Application of chemical fertilizer based on STBF	1	10	9	19
	INM in Groundnut	1	12	17	29
Nursery raising	Nursery raising, Grafting techniques of veg. & fruits	2	25	16	41
	Seedling production of different horticultural crops throughout the year.	2	14	13	27
	Nursery raising under low cost polytunnel	2	27	11	38
Soil health management	Importance of soil health management and soil sampling	5	70	0	70
Seed production	Seed production technology of pulses	2	10	17	27
	Seed production of turmeric ginger elephant foot yam	1	12	6	18

Thematic area	Topic of the training	No. of Courses	No. of beneficiaries		
			Male	Female	Total
Improved package of practices	Improved package of practices of pulse cultivation	1	14	25	39
	Package of practices for wheat and maize	4	54	39	93
	Improved Package of practices for winter vegetables crops	5	60	30	90
	Improved Package of practices for summer vegetables crops	3	22	20	42
Post-harvest technologies	Post-harvest technologies for vegetables	2	23	17	40
Traps	Use of different attractants/ traps for vegetables	1	15	6	21
	Use of traps for mango and litchi	1	19	0	19
Care & management	Care & management of lactating mother	4	43	31	74
Water borne diseases	Care & management against water borne diseases particularly after flood	5	75	35	110
Awareness programme	Awareness programme on Swachh Bharat Abhiyan	7	110	77	187
Total		**271**	**2717**	**2186**	**4903**








SCIENTIFIC METHOD


ESTABLISHMENT OF
OMMUNITY NURSERY
UNDER NI TDC
HIFAZAT
HIFAZAT

EXTENSION ACTIVITIES

NICRA implementing KVKs conducted a total of 461 extension activities on various thematic areas benefitting 14096 practicing farmers and farm women (8795 males and 5301 females) during 2022-23. The extension activities were conducted on method demonstrations, agro advisory services, awareness camp, animal health camp, *krishak chaupal*, *kishan gosthi*, resource conservation technologies, celebration field and farmers' days, diagnostic visits, group discussion, technology week, kisan mela *etc*.

Name of the activity	Number of Programmes	No. of beneficiaries		
		Male	Female	Total
Method demonstrations	36	575	309	884
Group meetings	23	510	288	798
Field day	19	444	320	764
Exposure visits	27	560	230	790
Awareness Campaigns	29	613	490	1103
ICT based extension services	14	470	256	726
Diagnostic visit	25	505	289	794
Field Visit	54	614	385	999
World Environment Day Celebration	14	450	290	740
Live Webcasting	19	349	303	652
Strengthening SHGs	10	0	400	400
Strengthening kisan clubs	8	91	75	166
Other Training Courses	49	910	320	1230
KMAS Services	7	151	70	221
Popular extension literature	28	430	311	741
Animal Health Camp	55	1040	293	1333
NICRA Workshop at ATARI Kolkata	1	67	22	89
Scientist visit to field	34	356	250	606
Kisan Mela	9	660	400	1060
Total	**461**	**8795**	**5301**	**14096**







of
BRAND NAME BANANA
YEAR: 2022-23

SOIL HEALTH CARDS DISTRIBUTION AND OBSERVANCE OF WORLD SOIL DAY

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 NICRA-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 17 NICRA-KVKs of Zone-V distributed the soil health cards among the farmers in NICRA adopted villages. A total of 1069 numbers of Soil Health Cards were distributed among 1109 farmers on that particular day and cards were distributed by the public representatives like MP/MLAs and others in the respective KVKs. KVK wise distribution of soil health cards are presented in the following table.

Table: Soil Health Card prepared and distributed during 2022-23

KVK	No. of soil samples collected	No. of samples analysed	SHC issued	No. of farmers benefitted
Port Blair	15	15	25	25
Bhadrak	17	17	47	53
Bolangir	30	30	55	55
Dhenkanal	14	14	23	25
Ganjam-I	28	28	55	55
Jagatsinghpur	39	39	120	132
Kalahandi	25	25	30	30
Kendrapara	15	15	25	25
Keonjhar	7	7	22	25
Puri	37	37	45	45
Coochbehar	165	165	205	205
Kalimpong	40	40	75	75
Malda	43	43	45	50
Murshidabad (Addl.)	44	44	90	100
N. 24 Pgs	34	34	70	70
Purulia	25	25	35	37
S. 24 Pgs	45	45	102	102
Total	**623**	**623**	**1069**	**1109**


HEALTH CARD DISTRIBUTION &

CONVERGENCE PROGRAME

A number of interventions were taken up by NICRA KVKs during the year in convergence with developmental programs which are operational at the NICRA adopted villages. Support from these developmental programmes was used for scaling up of proven interventions in the village. In case of NRM, support was mobilized for various water harvesting structures, recharge structures, micro irrigation systems, polythene lining of farm ponds, land shaping and ail cultivation, distribution of green manuring seed to large number of farmers, tree planting including horticulture, *etc*. In crop production, convergence with line departments was used for increasing the spread of HYV of food crops, promotion of cultivation practices such as SRI, Direct seeded Rice, demonstration programme etc. In case of animal husbandry, interventions such as animal vaccination camps, and health camps, timely availability of medicines, large scale production and availability of improved fodder crop seed, planting material and mineral mixture demonstration were taken up in convergence. Capacity building of the farmers in NICRA villages was also taken up in convergence in the form of trainings and exposure visits as part of the ongoing programs. Efforts were made to enhance the coverage of the interventions in the village with the support of the line departments through convergence. Huge number of convergence programmes was carried out by each of the NICRA implementing KVK with ongoing development programmes or schemes during 2022-23. The prominent development schemes are MGNREGA, NTPC, NABARD, Sunderban Development Board, Forest Department, Irrigation Department, different Departments of the concerned states. RKVY *etc*.

KVK	Development Scheme /Programme	Nature of work	Amount (Rs.)
Murshidabad (Sargachhi)	Rural development by garole sheeprearing, training and processing of garole sheep products through stakeholders participatory management model	Distribution of garole sheep and inputs, finance for repairing of low cost house, awareness & training, refresher training	863215
	Pradhan Mantri Krishi Sinchayi Yojona	Installationofsprinklerirrigationsystem	210000
	National Food Security Mission Oilseed	Promotion of early maturity and rust resistance Hybrid Mustard (Kesri Gold)	24500
Total			**1097715**
Dhenkanal	State Forest Deptt.	Vermi composting	322000
	State Deptt. of Agr & FE (Comprehensive programme on Rice Fallow management	Greengram after rice under Rice Fallow management	450000
	Hort. Dept., Govt. of Odisha	Cashew plantation	360000
Total			**1132000**
Bolangir	Panchayati Raj Department , Govt. of Odisha	Rejuvenation of Canal	9600000
		Bora band and Gabion	
		Water harvesting structure	
		Land Development, Field Bunding with 5% Model	
		Fodder Development	
		Bio-Gas Plant	
		Livestock Shelter	
		Dug Well	
		Repair and Maintenance of Check dam with Embankment Strengthening	750000
	Agriculture dept., Govt. of Odisha	Demonstration of Greengram var. Virat	350000
	Odisha livelihood mission, Department , Govt. of Odisha	Agarbati preparation for women empowerment	50000
Total			**10750000**

KVK	Development Scheme /Programme	Nature of work	Amount (Rs.)
Jagatsinghpur	Department of Agriculture, Odisha	Submergence tolerant Rice Variety	30000
		Dhaincha	25500
		Greengram after Rice under Rice-Fallow management	270000
	AICRP on Palm, OUAT, Bhubaneswar	Coconut Plantation	60000
Total			**385500**
South 24 Parganas	SCSP	Distribution of Leaf Colour Chart Beneficiary: 50 at Kaikhali-2	8500
		Distribution of Seven days old RIR and Kadaknath chicks and Pre starter feed Beneficiary: 42 at Kaikhali-2	124800
		Rabi vegetable seeds Beneficiary: 30 at Kaikhali-2	10000
	RKVY	Land Shaping Beneficiary: 2 at Bongheri	189600
	ARYA	Mushroom Production Unit Beneficiary: 2 at Kaikhali-2	30000
	ADA office, Kultali block, Govt. of WB	Distribution of micronutrients and Pesticides Beneficiary: 130 at Kaikhali-2 and Bongheri	65000
	Irrigation and Waterways Department	Strengthening of river embankment along Matla River at Kaikhali for to check erosion and breaching	1000000
	BLDO Office, Kultali block, Government of West Bengal & Mobile Veterinary Clinic, Kultali, Govt. of WB	Animal Health cum Vaccination Camp Beneficiary: 135 at Kaikhali-2 and Bongheri	50000
Total			**1477900**
North 24 Parganas	Promotion Of Climate Resilient Integrated Farming System Model in The Coastal Blocks Of North 24 Parganas District, WestBengal	Demonstration	13424907
Total			**13424907**
Cooch Behar	Seedling hub and rice transplanter machine, convergence with Dept. of Agriculture, Govt. of West Bengal	Rice seedling preparation and transplanting with transplanter machine	700000
Total			**700000**
Grand Total			**28968022**













Dignitaries visited NICRA Villages during 2022-23

Name of the KVK	Name of the Dignitaries	Date of Visit
Purulia	Dr. Sumanta Kundu, CRIDA, Hyderabad	07.09.2022
	Dr. Ashis Banerjee, DDA Admin., Purulia	10.11.2022
	Dr. S. Khanra, DDH., Purulia	15.12.2022
	Dr. K. Mahato, B.L.D.O., Purulia II	07.02.2023
	Swami Vaskaranandaji Maharaj	03.03.2023
South 24 Parganas	Dr. V. Geethalakshmi, Vice- Chancellor, TNAU, Tamil Nadu	03.06.2022
	Dr. Pratap Bhattacharya, Scientist, NRRI, Odisha	08.06.2022
	Dr. Dibyanshu Shekhar, SSH, KVK, Darbhnga, Bihar	10.07.2022
	Dr. Rampal, SSH, KVK, Bhegusarai, Bihar	
	Dr. M.L.Meena. SSH, KVK, Turki, Bihar	
	Dr. Shantosh Kumar Gupta, SSH, KVK, Saraiya, Bihar	
	Dr. A. P Singh, SSH, KVK, Parsauni, Bihar	
	Dr. Amitava Bandypadhyay, Ex-consultant, NAIP	03.09.2022
	Dr. Abhijit Halder, ATARI, Kolkata	
	Dr. S. Mondal, Engineering collage, Kalyani	
	Mr. Saurav Paria, ADA, Kultali, South 24 Parganas	27.09.2022
	Dr. V. K Singh, Director, CRIDA, Hyderabad	30.12.2022
	Dr. R. P Mishra, Principal Scientist, IIFSR, Modipuram	
	Dr. Ameresh Kumar, Dean, DRPCAU, Bihar	02.02.2023
	Dr. Mukesh Kumar Singh, Scientist, IPFT, Gurgaon	17.02.2023
	Mr. Ajin S Anil, Scientist, IPFT, Gurgaon	
	Dr. Jitendra Kumar, Director, IPFT, Gurgaon	
North 24 Parganas KVK	Dr.SumantaKundu,Scientist,ICAR_CRIDA,Hyderabad	02.09.2022
	Dr.S.K.Roy,Director,ICAR-ATARI,Kolkata	16.09.2022 - 17.02.2022
	Dr.F.H.Rahman,NodalOfficer,NICRA,ICAR-ATARI,Kolkata	
	Dr.B.Roy,SeniorScientistandHead,CoochbeharKVK	
	Dr.K.Goswami,SeniorScientistandHead,Nadia KVK	
	Dr.N.C.Sahoo,SeniorScientistandHead,South24Parganas	
	Dr.N.J.Maitra,DeputyDirectorandResearch,WBUAFS	26.03.2022
	Mr.ManirulIslam,ADA,Sandeshkhali-II	
Dhaanyagang Krishi Vigyan Kendra (Murshidabad Additional)	Dr.F.H.Rahaman,PrincipalScientist,ICAR-ATARI,Zone-V	28.07.2022
	Mr.MohanlalKumar,DeputyDirectorofAgriculture,Murshidabad	
	Dr.SreetanuMaity,DeputyDirectorofARD,Murshidabad	
	Mr.KaushalKumarSingh,DDM,NABARD,Murshidabad	
	Dr.Debesh Ch.Das,PD-ATMA,Coochbehar	
	Mr.DipankarMajumder,ChiefExecutiveEngineer,MinorIrrigation,Murshidabad	
	Mr.SanjayKr.Mishra,DFO(N)Fisheries,Murshidabad	
	Dr.N.J.Moitra,DeputyDREF,WBUAFS	
	Dr.K.K.Goswami,Sr.Sc.&Head,NadiaKVK	
	Dr.SumantaKundu(ICAR-CRIDA)	06.09.2022
Cooch Behar	Prof. Sankar Laha, Former Vice Chancellor, UBKV	06.09.2022
	DDA Admn. Cooch Behar, Govt. of West Bengal	13.12.2022
	Sohini Talukdar, ADA, Cooch Behar-II	10.01.2023

Name of the KVK	Name of the Dignitaries	Date of Visit
Malda	Dr. Sumanta Kundu, Zonal monitoring committee member, In-charge of Zone V NICRA KVKs and Scientist of ICAR-CRIDA, Hyderabad.	05.09.2022
Puri	Chief, AICRP on Maize, OUAT	22.09.2022
	Principal Scientist, IIMR	
	Sri Ramesh Chandra Roy, CDAO, Puri	16.11.2022
	Senior Line department officials of 15 districts (Block Agriculture officer, AAO), Forest officials of Puri	
	Sri Jyoti Sankar Mahapatra, Chief Development Officer, Puri	22.11.2022
Jagatsinghpur	Prof. Prasannajit Mishra (Dean , Directorate of Extension Education, OUAT, Bhubaneswar)	30.11.2022
	Dr. Shiba Prasad Sangramsingh (Joint Director, Directorate of Extension Education, OUAT, Bhubaneswar)	
Dhenkanal	Dr. F.H Rahman (principal scientist Cum Nodal Officer, NICRA-TDC Project)	07.04.2022
	Dr. Amit Phonglsa (DDE,DEE,OUAT,BBSR)	
	Sj. Ansuman Pattanaik (CDAO, Dhenkanal)	
	Dr. Prakash Chandra Gogineni (DFO, Dhenkanal)	
	Smt.Geetrashree Parhi (DDH, Dhenkanal)	
	Dr. Gyanendra Kumar Rout(DDM,NABARD, Dhenkanal)	
	Dr. Sunil Samal (Senior Scientist(Horticulture),RRTTS, Dhenkanal)	
	Sj. U.K. Parida (ADSC, Dhenkanal) Sj. P.K Bhuyan,(Dist. Fishery Officer, Dhenkanal)	
	Chandramani Behera(Range officer ,sadangi, Dhenkanal)	
Bhadrak	Debasish Tripathy (AAO, Dhamnagar)	17.09.22
	Sudarsana Panda (Field officer, IFFCO, Bhadrak)	








Glimpses of NICRA-TDC Project launching at different climate vulnerable district of Odisha


OUAT, Bhubaneswar on 04.04.2022


Jatipur Village, Puri on 05.04.2022


Achyutdaspur village, Jagatsinghpur on 06.04.2022

Arachua village, Dhenkanal on 07.04.2022

Field Visit for Monitoring NICRA Activities

Ms. Ria Bhattacharya, SRF, NICRA-TDC, Mr. Shubhodeep Nandi, PA, DAMU and Mr. Purbendu Samanta, Young Professional I, Natural Farming, ICAR-ATAR Kolkata visited NICRA Project sites viz. Bongheri and Kaikhali village of South 24 Parganas (Nimpith), Khagribari village of Coochbehar and Meherchandtola village of Malda KVKs during October 13-14, 2022 and December 1-9, 2022 respevtively to collect data of ongoing activities carried out by the KVKs and also to interact with the farmers and VCRMC members. Various demonstrations like Ail cultivation, ridge and furrow cultivation ;rain water harvesting structures; azolla cultivation pits; check dams; flood tolerant rice varieties (Luna Suwarna), poly mulching, mushroom cultivation, hydroponic fodder cultivation, low cost poultry and goatery house, bee keeping, vermicompost pits, custom hiring centres etc were visited. There was in-depth discussions with the farmers and VCRMC members at respective sites of both the KVKs.

Success Stories

Floating Rice Seedbed – A Climate Resilient technical initiative against shortfall of rain in North 24 Parganas

Considering the fact of less rain fall during the rice seed bed preparation on time, North 24 Parganas Krishi Vigyan Kendra has introduced floating seed bed nursery for rice which is installed in fresh water canal and rainwater harvesting

structure at NICRA village. The making of floating seedbeds follows a simple formula. The Structure of the floating seedbed is made up of bamboo for side wall. Thermocol and rice straw bunch are used under the bamboo structure for floating purposes. Transparent perforated (10%) polythene is used for seed bed substratum. For bed preparation, vermicomposting and soil has been used with a ratio of 3:1.5 and maintained the seed bed 6-inch height. The economic and resilient minimum model size of the structure is Length 9 ft x width 6 ft which will be produced seedling for 0.325 ha area rice cultivation. The rice seed is required 500 gm and sprinkled rice seeds on the floating patches of 'croplands'. For management purpose only N:P:K (20:20:20) has been sprayed (200gm in 10 lit water) and Urea 100 gm after 8 days. In this floating seedbed the seedling has grown in 12 days duration.

The recent shortfall of rainfall is a major concern for West Bengal as well as for the NICRA village of North 24 Parganas KVK. It is reported by IMD that 51 % rainfall is deficit during the month of July-August causing delayed seedbed preparation of rice as well as rice cultivation in this deltaic land is consummately resilient. Delayed cultivation would lead to a series of disruptions in terms of yields and food security. Especially,

its rural people have hardly bowed down to the onslaughts of climate aberration. As part of their resilience, they have faced disasters heroically and resumed their lives anew by piecing together whatever fallout they were left with. In the NICRA village, Samsernagar of Hingalganj Block, 90% area under low land, saline prone, flood prone and single cropped. Rice is grown only in *kharif* season. Considering the fact of less rain fall during the rice seed bed preparation on time, Krishi Vigyan Kendra has introduced floating seed bed nursery for rice which is installed in fresh water canal and rainwater harvesting structure at NICRA village. The seedlings grown from the seeds are then shifted to the main rice fields for transplantation. The timely and full use of floating seedbeds in shortfall of rain is one of these instances. As farmers in many parts of the village are now eagerly interested to turn into the floating seedbed technique during shortfall of rain as well small-scale floods, it appeared before them as the only remedy. While preparing makeshift floating seedbeds, the intrepid farmers are confident that their artificially grown rice seedlings will bail them out this time too. This is how a large number of rice growers are able to escape the dreaded crop loss about to strike them.

Impact of Floating Rice Seedbed technology over conventional seed bed:

Year	Intervention	Seed Germination (%)	Emergence of 2nd leaf (Day)	Root Length (cm)	Organic matter (g/kg)	Cost of Seedling Production (Rs/ha)	Net Return (Rs/ha)
2022-23	Conventional rice seed bed	93	09	3.2	11.2	14900.00	4350.00
	Floating Rice Seedbed technology	98	07	5.7	12.9	10550.00	

This technology has been upscaled widely through the State Agriculture Department through RKVY project 2023-24 implemented total 120 demonstration in the six coastal blocks in North 24 Parganas district.

Popularizing CRIJAF Sona plus, NINFET Sathi powder and Vizol Polyquat to overcome jute retting problem in rainfall scarcity and to improve fibre quality in Murshidabad

Jute is the most important agricultural cash crop in Murshidabad district, West Bengal covering 1, 01,800 ha area. Farmers of the district are facing problem in scarcity of surface water due to nearly 60 % deficit in rainfall than normal rainfall. This coupled with faulty retting procedure severely deteriorate jute fibre quality. In this backdrop, Dhaanyaganga KVK introduced following technologies through training and demonstration in NICRA adopted village and other villages as well:-

1. Jute retting with CRIJAF Sona and NINFET Sathi powder which helps in better retting of jute and hastens retting process; thus reducing retting time and defects in jute fibre.
2. Dipping the extracted fibre immediately after extraction from jute stick in 0.1% vizol polyquat solution for 1-2 minutes improves the colour of jute fibre.
3. A combination of above two technologies improves jute fibre quality from Grade TD-4 / 5 to Grade TD-2/3 which increases sale price of jute fibre in the tune of Rs. 700.00 per quintal and as a result of which gross and net income of farmers increased by Rs. 21,000.00 and Rs. 16,500.00; respectively.

Demonstration of Kisan Drone in NICRA Village for foliar application of nutrient in Sundarbans

Sri Shankar Naskar is a young and energetic educated rural youth who has witnessed the vagary of climate change in and around his village since his childhood. He has witnessed crop losses due to cyclones, floods and dry spells that are very common in Sundarbans. Many of his friends have left farming and moved to the sub-urban in search of petty jobs. But he has adopted several climate resilient technologies like rain water harvesting through Land Shaping, stress tolerant varieties and diversified farming with fishery and livestock farming. However, to Sri Naskar, the main challenge in the event of any climatic vagary has been the timely application of any remedial measures, especially during land preparation, plant protection measures and harvesting.

Sri Naskar utilizes the farm machineries from the custom hiring centre. He ploughs his land timely with the help of assured irrigation in his land shapping plot. He uses the mechanical paddy thresher to quickly transport hos produce from the field to his godown.

This year Sri Naskar adopted another innovative approach by spraying his greengram field with the help of Kisan Drone and motivated all the villagers to adopt the same.

It is a new experience for Sri Naskar and the other villagers. All the villagers doubted on the effectiveness of the drone in spraying the fields uniformly. But after the practical demonstration on the greengram field of Sri Naskar, everyone became ready to spray on their plots also.

Greengram is the second most important crop in the District after paddy. It is cultivated as Rabi-Summer pulse crop after harvesting paddy rice. However, least care is taken in this crop regarding pest management as most of the farmers and labourers migrate to cities after harvesting the preceding crop.

So it is difficult to find labours to spray the crop in case of pest infestation. In this situation the use of Kisan Drone for foliar application of Neem Oil (Azadirachtin) has twin advantage of saving time and labour in addition to increasing crop productivity. 400 ml Azadirachtin (10000ppm) was sprayed with 10 L water over one acre area in 8 min. To cover the same area with manual spraying would have required 5-6hr for an agricultural labour. In one day it was possible to spray 30 acre of greengram plots with the help of one Kisan Drone.

In climate resilient farming, "Time" is the most important factor, be it in decision making or in any farm operation. Hence, the application of Kisan Drone can play an important role in reducing the time required for any farm operation like spraying of an important agro-chemical.

Practical utility of the innovation/ adoption of technology:

- Timely spraying of agro-chemicals while covering large area
- Cost effective and saves time and labour
- Uniform application of agro-chemical on both surfaces of leaves and throughout the field
- Safeguard to the farmer/ labourer

Many farmers from the village came to visit Sri Naskar's plot during the spraying with Drone. As per their demand, the Kisan Drone was used in another 40 farmers plot in and around the village. Sri Naskar led them to show the transformation of his farming and his life due to adoption of several climate resilient agricultural practices. More than 200 ha cropland in the district has been sprayed with nano-urea and neem oil with the help of Kisan Drone in collaboration with the ICAR-ATARI Kolkata.

Doubling of income by poly-mulching and innovative trellis design in bittergourd cultivation in South 24 Parganas

Sri Sanat Naskar is a well-educated (graduate) and enthusiastic rural youth, who is always busy in experimentation and improvisation of agricultural technologies in his farm. As a resource conservationist, he has already been recognized by the ICAR-CRIDA Hyderabad for adopting rainwater harvesting and micro-irrigation. Now he is experimenting with poly-mulching in his bittergourd plot through an innovative trellis design. He started growing bittergourd (var. US-6207) in his 0.053 ha Land Shaping plot in the 4th week of April 2022. By that time he had very less amount of water for optimum irrigation. The poly-mulching helped him to reduce the water requirement by 30%. As there was no weed infestation, he could save the entire labour cost towards manual weeding. Less weed infestation increased fertilizer use efficiency. According to Sri Naskar he applied 20% less fertilizers in his plot. At the same time infestation of thrips was less in his plot. The silver-coloured poly-mulch surface helped to reflect the sunshine which in turn reduced the thrips population in his plot. The innovative trellis design (triangular/ zigzag roof) helped to increase the canopy area by 2.5 times over normal trellis (flat roof). Thus, the overall production increased by 36% and net income increased by 114%.

Activities undertaken	➢ Land Shaping and ail cultivation ➢ Use of sprinkler irrigation for water saving irrigation ➢ Use of poly mulching ➢ Use of farm machineries from village Custom Hiring Centre for timely land preparation ➢ Use of improved varieties (Paddy - Swarna Sub 1 and hybrid vegetables) ➢ On-farm mass production of microbial bio-pesticides for minimizing chemical pesticide usage ➢ Periodic soil testing and soil test based fertilizer application
Input received from NICRA	➢ Skill up gradation Training (Per drop more crop, maximization of land use, IFS, efficient use of water) Mulching papers for vegetable mulching, Sprinkler irrigation, seedling of disease resistant chilli variety: Arka Gagan
Profit/Economic Gain	➢ After intervention the annual income is Rs. 223661/- from the same area. The increase of income is now 286% over the income earned before NICRA intervention.
New initiative	➢ Rooftop rainwater harvesting, Poly mulching, Drip irrigation System
Social Impact	➢ Many farmers from within and outside of the state comes to visit Bongheri village to see the impact of the NICRA project. ➢ Sanat leads them to show the transformation of his farming and his life due to adoption of the climate resilient agricultural practices. ➢ He is also very much interested in biological control of pest and diseases and he practices so.
Up scaling (Other impact)	✓ Horizontal spread of poly mulching for higher production in Bittergourd during moisture stressed saline situation in other nearby villages of Kultali block &Mathurapur II Block. ✓ Good practice of periodic soil testing and soil test based fertilizer application are being promoted in the nearby blocks ✓ Use of improved varieties are being promoted through self initiative after visible success

Recognition	➢ Best Innovative Farmer Award 2018 from ICAR-CRIDA, Hyderabad. ➢ Invited as representative successful farmer from West Bengal for live online experience sharing (via video conferencing) with Hon'ble Agriculture Minister, GoI in the Nutritional Day, on 17 September 2022. ➢ Success story documented and broadcasted through DD-Kisan national channel in December 2022 ➢ Invited as successful farmer in Kisan Sammelan on 17 October 2022 by IARI New Delhi

Different initiatives to combat the climatic vulnerability in the hilly region of Kalimpong

Boniface Rai, 28-year-enthusiastic rural youth old farmer from Kalimpong, West Bengal, holds a Master's degree in Vegetable Science. He manages a total landholding of 4 acres, with 3.5 acres under irrigation and 0.5 acres rainfed. Boniface has diversified his farming portfolio, cultivating various crops such as maize, mustard, cabbage, cauliflower, beans, broccoli, brinjal, mandarin, tomato, and cucumber. His farming experience demonstrates a range of productivities, with crops like cabbage yielding 2300-2500 kg per acre and tomatoes producing 1800-2000 kg per acre. Boniface also engages in livestock farming, with 5 cows, 4 pigs (including 10 piglets), and 62 goats. Additionally, he employs innovative farming technologies to enhance his productivity, including intercropping, a vermicompost unit, and providing mineral mixture supplementation and deworming medicine to his livestock. Furthermore, he utilizes farm machinery such as a 63cc 2hp power tiller, knapsack sprayer, and foot sprayer. Boniface's commitment to adopting modern techniques underscores his dedication to sustainable and efficient agricultural practices in the region. Some of his approaches were: (i) Implementation of intercropping system during rabi and kharif season for efficient utilization of land and maximum returns. For example cole crops+ pea and maize + french beans; (ii) Natural resources management practices for conservation and maintaining soil fertility and soil health through mulching and vermicompost application; (iii) Supplementation of mineral mixture and deworming practices for improving livestock growth and productivity.

The intercropping with cole crops and pea resulted higher yield (12.42 t/ha) as compare to sole cropping system. This led to an efficient utilization of land and also generated maximum economic returns. The conversion of organic waste (manures) to vermicompost enhanced the crop productivity as compare to farmyard manure. The efficiency of vermicompost led to conservation of benefit soil microorganism and maintains

soil texture and fertility. Supplementation of mineral mixture and deworming practices led to good health of livestocks. The mineral mixture was given to livestocks according to the doses recommended by assigned subject matter specialist.

The intervention had excellent impact as farmer could fetch maximum returns from small area of land. Intercropping with legume crops improve the health and production of base crop resulting in higher remuneration and ultimately giving high benefit cost ratio. The same innovation was adopted by 10 other farmers in the NICRA village and they were able to attain better profit than mono-cropping practiced earlier.

Mushroom cultivation for income generation of rural women at Singimari, Coochbehar

Coochbehar District experiences high rainfall (average 3000 mm) so, most of the time weather here remains humid which is congenial for growing mushroom. In order to tap potentiality of this Climatic Vulnerability Coochbehar KVK encouraged farmers and farm women for cultivation of Mushroom.

Smt. Krishna Sarkar, aged 26 years and holding master degree in arts is one of the Mushroom trainees of Coochbehar KVK. After getting training, she started one small unit at chat Singimari, with 800 cylinders in her own plot of land in the year 2022-23. She was very much interested in cultivation of milky mushroom with the support from NICRA Project of Coochbehar KVK. She started scientific way of milky mushroom cultivation after getting proper training and support from Coochbehar KVK under NICRA Project. The harvested milky mushroom supplied to various parts of Bhutan and Assam. Her unit is a model for farmers, farmwomen and members of Self Help Groups who have interest for producing milky mushroom and generate employment.

Smt. Sarkar is a house wife and working on her own farm, but, now she is a successful milky mushroom grower and through her skill and knowledge she has attained a better position which is really appreciable. Presently, she is earning Rs. 24,000 to 27,000 per month with a net profit of Rs. 10,000 to 12,000. She has set her name as successful woman mushroom grower in her area and also popularized various types of mushroom (oyster and milky) in her village as well as various parts of Coochbehar.

Mushroom cultivation does not have any adverse impact on environment. As per suggestions of KVK, Mrs. Sarkar is using chemicals of standard grade and using them judiciously. She is also converting mushroom spent into compost for its further use in agricultural field and quality crop production. She is selling fresh product in local market as well as in Assam and Bhutan. The benefit of mushroom cultivation motivated her for large scale cultivation.

Performance of plastic mulching in bitter gourd production in trellis system during kharif season in NICRA adopted village of Coochbehar

One of the most popular cucurbitaceous vegetables growing in the Cooch Behar district of West Bengal is the Bitter gourd. In North Bengal, Bitter gourd seeds are typically sown during last week of March to the third week of April. Heavy rains during the crops growing season, particularly in May and June, has an impact on the yield. This prolonged period of severe rain decreased the yield of this crop by causing soil erosion, fertilizer and nutrient leaching, disease pest infestation, and weed infestation. As a result, growers occasionally may not recoup their production costs.

In order to solve this issue, plastic mulching technology was demonstrated to observe the impact effect of plastic mulching on growth and yield of Bitter gourd during kharif season. This crop is now a highly essential vegetable due to the continual rise in diabetes cases among human being. The farmers of NICRA village adopted the technology and Cooch Behar KVK supported them with seeds and mulching materials. For this technology the farmers prepared seedling in another raised bed. In the main field, the raised hip was prepared at a distance of 1 meter. After mixing manures and fertilizers with soil hips were covered with the transparent plastic (30 micron thickness with one side black and another side silver colour). After that, thirty days old seedlings of bitter gourd (var. Mahyco MBTH 101) were transplanted in the raised hip. About 2 seedlings were transplanted in each hip. The plastic mulched crop of bitter gourd was not only advanced by 15 days over the control (non-mulched crop) but 55.0 percent yield increase was also recorded in the plastic mulched crop. The total fruit yield of 133.0 q/ha was obtained from the plastic mulched crop as compared to the control (non-mulched) crop which produced only 86.0 q/ha fruit yield in bitter gourd. The cost-benefit ratio of bitter gourd production under plastic mulched crop was worked out as 1:2.74 with a net profit of Rs. 134075/- per ha, whereas the cost-benefit ratio under non-mulched crop was 1:1.46 along with a net profit of only Rs. 39500/- per hectare.

Therefore, this technology is highly suitable and economical for growing the crop of bitter gourd for taking high yield and high profit of the produce. Hand weeding was done only without mulch once at 25 days after planting. All the plots were uniformly irrigated as and when required based on crop growth. Recommended plant protection measures were adopted as and when needed. The bitter gourd fruits were harvested in 4-5 pickings. Harvesting started 45 days after planting. The vine length, number of leaves per plant, number of fruits per plant, fruit length, fruit weight and fruit yields were better than non mulched field.

The application of black polyethylene mulch in the cultivation of Bitter gourd served to reduce nutrient losses, control weed incidence, and enhance soil hydrothermal cycles. Additionally, polyethylene mulches effectively buffer soil pH and exchangeable Mg and Ca as compared to unprotected soil. The use of black polyethylene mulch in vegetable production has been reported to control the weed incidence, reduces nutrient losses and improves the hydrothermal regimes of soil. Polyethylene mulches also buffer soil pH and exchangeable Mg and Ca more efficiently than the uncovered soil.

Backyard Pig Farming as a livelihood support enterprise under climate change at Coochbehar

Sri Benjamin Oran, aged 36 years a farmer of NICRA project adopted village Singimari of Coochbehar district of West Bengal is presently realizing a net income of Rs. 1,32,000/- per annum from his piggery unit. Success from his piggery unit attracts other farmers of the nearby villages. He is also keeping few local poultry birds as well as Vanaraja mainly for domestic consumption and planted oats, hybrid napier, hydroponic fodder etc. for feeding of his pigs. He has got only half bigha of land in his backyard farming system, where he constructed a thatched shed with semi-concrete flooring and compartments with a capacity of 5 sows and 20 piglets at a time.

Although he was interested in piggery, he was reluctant to do so as he had no technical knowledge on it. Once he started visiting Coochbehar Krishi Vigyan Kendra, UBKV, West Bengal and discussed about opening of piggery, the Senior Scientist & Head along with concerned Scientist inspired him a lot and helped in building confidence to start the unit and assured all possible technical guidance.

Under NICRA project KVK provides six Ghungroo piglets (1 male and 5 female) to him and he started the unit in 2020. Within 11 - 12 months each sow delivered 8 - 12 nos. of piglets in the first batch. The piglets were reared up to 70 - 80 days of age and sold at Rs. 3,500 - 4,000/- each. He

expressed a great satisfaction while he sold the piglets as there is huge demand of improved piglets. So far he has sold 80 nos. of piglets in this year.

He also disposed the 5 nos. old pigs for pork and keeping the remaining piglets for parental stock. The old pigs were also sold at Rs. 15,000-16,000/- each depending upon the body weight. He further expressed his commitment to keep his pig as long as it could give births so as to show that rearing pigs can substantially augment incomes of a family.

He spends around Rs. 2,000 - 2,500/- per month on purchasing some of the feed ingredients like broken rice, rice bran etc. and medicines, vaccines etc. He also used left-over rice, kitchen waste etc. for feeding of pigs. Recently, he cultivated oats, hybrid napier, hydroponic fodder etc. for feeding of pigs. He engaged himself and his wife to look after the pigs.

Sri Benjamin Oran has become a successful model especially in pig breeding. Many farmers from the District of Cooch Behar visit his farm for piglets.

Land based 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 under the NICRA project 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, 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.

Awards/Recognition

Awarded **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, during June 11-13, 2022.

Name of the KVK	Name of award	Awardee	Award given by	Year
South 24 Parganas	Best Scientist Award	Dr. P. K. Garain (SMS - Plant Protection)	Society of Krishi Vigyan	2022
	Best Oral Presentation Award	Dr. P. K. Garain (SMS - Plant Protection)	Society for fertilizers & Environment	2022
	Best Oral Presentation Award	Dr. P. K. Garain (SMS - Plant Protection)	Indian Society of Dryland Agriculture	2022
	Best Innovative Farmer Award – Zone 5	Sri. Shankar Naskar (Farmer)	ICAR-CRIDA Hyderabad	2023
	IARI Innovative Farmer Award	Sri. Shankar Naskar (Farmer)	ICAR-IARI New Delhi	2023
	2nd prize in "Khet Khamare Bazimat" (Agricultural Quiz)	Sri. Shankar Naskar (Farmer) Sri. Sanat Naskar (Farmer)	DD Bangla	2022
Kendrapara	Best Farmer Award	Sri Pabitra Ku. Nayak (Farmer)	ICAR-CRIDA Hyderabad	2022

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3. Mal, Sudipa., Sarkar, Dibyendu., Mandal, Biswapati., Basak, Piu., Kundu, Ritesh., Ghosh, Deblina., Dutta, Joy., Deb, Shovik.. **and** Rahman, Feroze H. (2023). Determination of Critical Concentrations of Boron in Soils and Leaves of Tomato (Lycopersicon esculentum L.) using Polynomial Equation. Journal of Soil Science and Plant Nutrition https://doi.org/10.1007/s42729-023-01323-2

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6. Paramanik, Bappa., Das, Ganesh., Saha, Debraj and Mandal, Animesh (2022). Analysis the Producer's Share in Consumer's Rupees and Price Spread of Selected Vegetable and Spice Crops in West Bengal. Agro Economist - An International Journal, 9(2):157-160, ISSN : 2350-0786

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2. Debjyoti Majumder, Salil Saha, Bishal Mukherjee, Suddhasuchi Das, F. H. Rahman, Akbar Hossain (2023). Biochar Application for Improving the Yield and Quality of Crops Under Climate Change. Springer Nature Singapore Pte Ltd. 2022. pp. 1-14

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1. D. Ghorai, S. Sarkar, Sk. M. A. Rahman, M. S. Behera, F. H. Rahman, and Gouranga Kar (2022): Compendium on Advanced Farming Technology for Doubling Farmers Income. Vol-I. Published by ICAR-CRIJAF Barrackpore. pp-1-45

2. Ganesh Das, Subrata Poddar, Bikash Roy and Prabhat Kumar Pal (2022). Agricultural e-commerce: A Case Study on Agricultural Start-ups in West Bengal. Advances in Agricultural Marketing & Value Chain Management ISBN: 978-93-94023-15-4 E-ISBN: 978-93-94023-16-1

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1. Roy, S. K., Mondal, S. K., Pal, P. P., Das, K. S. Rahman, F. H. and Haldar, A. (Eds.). 2022. Annual Report. 2021, ICAR-Agricultural Technology Application Research Institute Kolkata, Pub. by ICAR-ATARI Kolkata. pp 1-152

2. F. H. Rahman, R. Bhattacharya and S. Nandi (2022). NICRA Newsletter: Towards Climate Smart Agriculture, Pub. by ICAR-ATARI Kolkata, Vol. 8 No. 2 pp 1 – 12.

3. F. H. Rahman, S. Nandi and R. Bhattacharya (2022). GKMS Newsletter: District Agromet Unit News, Pub. by ICAR-ATARI Kolkata, Vol. 3 No. 1 pp 1 – 12

4. F. H. Rahman, S. Nandi and R. Bhattacharya (2022). GKMS Newsletter: District Agromet Unit News, Pub. by ICAR-ATARI Kolkata, Vol. 8 No. 2 pp 1 – 8

5. S. K. Mondal, F. H. Rahman, R. Bhattacharya and S. Nandi (2023). NICRA Newsletter: Towards Climate Smart Agriculture, Pub. by ICAR-ATARI Kolkata, Vol. 9 No. 1 pp 1 – 12.

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2. P. K. Garain (2022). Performance of climate resilient farming models for different farming system typologies in Sundarbans. 3rd National Conference on Natural, Farming, Organic Farming and Chemical, Farming in Indian Agriculture Present Scenario and Way Forward. *Book of Abstracts.* Society of Krishi Vigyan, 17-19 October 2022, page no. 4 (ISBN - 978-93-5780-226-0)

3. P. K. Garain, C. K. Mondal, A. Saha and F. H. Rahman (2022). Performance of Land Shaping as a Climate Smart Model for the Sundarban. First International Conference in 'Reimagining Rainfed Agro-ecosystems: Challenges and Opportunities'. *Extended Summaries.* Indian Society of Dryland Agriculture, Hyderabad. 22-24 December 2022, page no. 100 (ISBN: 978-93-80883-67-0)

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Newspaper and Media coverage of NICRA adopted villages


আনন্দবাজার পত্রিকা

শস্য চাষের প্রধান শত্রু আগাছা


পতিত জমিতে

ধান চাষ বহু লাভ চাষ

স্বাস্থ্য প্রশিক্ষণ শিবির

পুণ্ডিবাড়ি, ২৩ জুন : কোচবিহার কৃষিবিজ্ঞান কেন্দ্রের উদ্যোগে ও ভূমি শক্তি ফার্মার্স প্রোডিউসার কোম্পানি লিমিটেডের ব্যবস্থাপনায় বৃহস্পতিবার কোচবিহার-২ ব্লকের পাতলাখাওয়া গ্রাম পঞ্চায়েতের ছাট সিঙ্গিমারি গ্রামে গবাদিপশুর স্বাস্থ্যরক্ষার উপর একদিনের প্রশিক্ষণ শিবির হল। কোচবিহার কৃষিবিজ্ঞান কেন্দ্রের প্রাণীবিজ্ঞানী ডঃ রাহুল দেব মুখোপাধ্যায় এবং পশু চিকিৎসক অরুণাভ সাহা প্রশিক্ষণ দেন। এদিন দুশোর বেশি গোরু ও আড়াইশো ছাগলকে ভ্যাকসিন দেওয়া হয়েছে।

প্রশিক্ষণ শিবির

পুণ্ডিবাড়ি, ১৩ জুলাই : কোচবিহার কৃষিবিজ্ঞান কেন্দ্রের উদ্যোগে গোরু ও ছাগলের কৃত্রিম প্রজননের বিষয়ে তিনদিনের প্রশিক্ষণ শিবির শেষ হল বুধবার। পুণ্ডিবাড়িতে অবস্থিত কোচবিহার কৃষিবিজ্ঞান কেন্দ্রে আয়োজিত এই শিবিরে উত্তরবঙ্গ কৃষি বিশ্ববিদ্যালয়ের অধ্যাপক ও প্রাণীসম্পদ দপ্তরের আধিকারিকরা উপস্থিত ছিলেন। ডঃ রাহুল দেব মুখোপাধ্যায় বলছেন, 'এই প্রশিক্ষণের মাধ্যমে যেমন উন্নত জাতের ছাগল ও গোরুর উৎপাদন বাড়বে, তেমনি প্রাণীপালকদের উপার্জনও বাড়বে।' জেলার বিভিন্ন জায়গা থেকে ৩০ জন কৃষি সম্প্রসারণ কর্মী শিবিরে অংশ নিয়েছিলেন।


ও বৃষ্টি নেই, মাথায় হাত কৃষকদের

চড়া রোদে খেতেই ঝলসে যাচ্ছে ফসল


কৃষিকর্ম

বিকল্প আয়ের দিশা

বড়িচাষে

World Soil Day observed by KVKs in A&N Islands

Conducts campaigns with the theme 'Soils: where food begins' to raise awareness of importance of maintaining healthy ecosystems

সুন্দরবনের কৃষকদের কি পরামর্শ দিলেন কৃষি বিজ্ঞানীরা।।

कृषि विज्ञान केंद्र जातिपुर, पुरी जिले में "शकिगोपाल और मध्य"।

मानिकचकের ঘরায় ক্ষতিগ্রস্ত পাট চাষীদের বিকল্প কলাই এর বীজ বিতরণ। #hindnews #manikchak #malda

KRISHI DARSHAN - SUBJECT : NICRA PROJECT.

ଆଜି ୬ ଜିଲ୍ଲାରେ ଜାତୀୟ ନବସନ୍ଧେଷୀ କୃଷିବାୟୁ ନମନୀୟ କୃଷି ପ୍ରକଳ୍ପ

ଭୁବନେଶ୍ୱର, ୩୦(ଖବର)

ଢେଙ୍କାନାଳ ଜିଲ୍ଲା ରେ "ଚିତ୍ରା" ପ୍ରକଳ୍ପର ଶୁଭ ଉଦ୍‌ଘାଟନ

ଢେଙ୍କାନାଳ କୃଷି ବିଜ୍ଞାନ କେନ୍ଦ୍ର ଦ୍ୱାରା ଗଦିଆ ଭୂତ ଆରମ୍ଭୁଆ ଗ୍ରାମରେ ଚିତ୍ରା ପ୍ରକଳ୍ପ ର ଶୁଭାରମ୍ଭ


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Dibyajyoti Parida
I served as SRF in NICRA project in various KVK under OUAT since last 9 year .It was a great pleasure to work in the project. After working 9 year in NICRA project , Now feeling very sad I am not a part Of this project .
Manoranjan Mohapatra
Best wishes
View more comments
2 of 4


ପତିତ ଜମିରେ
ଧାନ ଚାଷ ସହ ମାଛ ଚାଷ


দুরন্ত বার্তা


বৃহস্পতিবার, ২৯ সেপ্টেম্বর ২০২২
সুন্দরবন বাঁচাতে ম্যানগ্রোভ গাছ লাগানো হল নিমপীঠ
রামকৃষ্ণ আশ্রম কৃষি বিজ্ঞান কেন্দ্রের উদ্যোগে

Expenditure details during 2022-23

Sn	Name of the ATARI /KVK	Sanction for the year 2022-23						Expenditure for the year 2022-23						Closing balance 2022-23		
		GENERAL			CAPITAL		Total	GENERAL			CAPITAL		Total	GENERAL	CAPITAL	Total
		Operational	TA	SC Sub-Plan	Equipment	SC Sub-Plan		Operational	TA	SC Sub-Plan	Equip-ment	SC Sub-Plan				
1	ATARI	649800	198100	0	0	0	847900	649746	198082	0	0	0	847828	72	0	72
2	Ganjam	878000	60000	0	115000	0	1053000	878000	60000	0	115000	0	1053000	0	0	0
3	Kalahandi	780000	5000	0	115000	0	900000	780000	5000	0	115000	0	900000	0	0	0
4	Kendrapara	1047900	80000	0	115000	0	1242900	1047900	80000	0	115000	0	1242900	0	0	0
5	Port Blair	801306	28694	0	50000	0	880000	800339	28694	0	50000	0	879033	967	0	967
6	Jagatsinghpur	854700	60000	0	115000	0	1029700	854700	60000	0	115000	0	1029700	0	0	0
7	Puri	850000	80000	0	115000	0	1045000	850000	80000	0	115000	0	1045000	0	0	0
8	Bhadrak	850000	50000	0	115000	0	1015000	850000	21301	0	115000	0	986301	28699	0	28699
9	Keonjhar	769700	50000	0	115000	0	934700	769700	50000	0	115000	0	934700	0	0	0
10	Murshidabad	890000	30000	0	115000	0	1035000	889999	30000	0	115000	0	1034999	1	0	1
11	Bolangir	762100	25000	0	115000	0	902100	762100	25000	0	115000	0	902100	0	0	0
12	Dhenkanal	941000	44000	0	115000	0	1100000	941000	44000	0	115000	0	1100000	0	0	0
13	Purulia	805000	80000	0	115000	0	1000000	805000	80000	0	115000	0	1000000	0	0	0
14	Darjeeling	856000	74000	0	115000	0	1045000	812706	74000	0	106404	0	993110	43294	8596	51890
15	Coochbehar	0	0	1748000	0	300000	2048000	0	0	1748000	0	298153	2046153	0	1847	1847
16	Malda	0	0	987000	0	100000	1087000	0	0	903999	0	100000	1003999	83001	0	83001
17	South 24 Parganas	0	0	1758000	0	300000	2058000	0	0	1758000	0	300000	2058000	0	00	14968*
18	North 24 Parganas	0	0	1372000	0	300000	1672000	0	0	1372000	0	300000	1672000	0	0	0
	Total	**11735506**	**864794**	**5865000**	**1430000**	**1000000**	**20895300**	**11734484**	**836077**	**5781999**	**1430000**	**998153**	**20780713**	**156034**	**10443**	**181445**

*Bank interest

भाकृअनुप
ICAR

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किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद

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