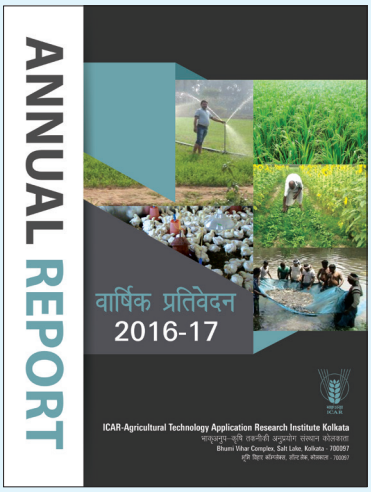
वार्षिक प्रतिवेदन
ANNUAL REPORT

2016 -17

ICAR-Agricultural Technology Application Research Institute Kolkata
Indian Council of Agricultural Research
Salt Lake, Kolkata-700 097



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PREFACE

To meet out the huge demand of food items for existing human population and to work towards doubling farmers' income and to mitigate the effect of changing global climate, a large number of new and improved agricultural technologies were implemented in the farmers' field through KVKs of Zone II under the technical guidance of ICAR-Agricultural Technology Application Research Institute (ATARI), Kolkata for augmenting agricultural production. In this aspect, ICAR-ATARI, Kolkata under Indian Council of Agricultural Research (ICAR) took various new initiatives,viz., Skill Development programme, Attracting and Retaining Youth in Agriculture (ARYA) scheme, Seed Hub programme, Farmers FIRST programme etc. during the year 2016-17 in addition to the regular guidance of 89 KVKs which were reflected/ showcased in this Annual Report.

Annual Report of this Institute depicts the salient achievements of ICAR-ATARI, Kolkata in developing functional linkage with various stakeholders, performance of Directorates of Extension Education of State Agricultural Universities and 84 KVKs of this Zone. It has been represented in a very systematic manner to enable a clear vision about this Institute, mode of functioning and contribution of KVKs towards the progress in agriculture. In this document, all mandated activities of KVKs i.e. on-farm trials (OFT), front line demonstrations (FLD), training programmes, seed and planting materials production, revenue and resource generation, soil and water samples analyzed, publication, mobile advisory provided, special programmes organized and many others are represented under various chapters to make various stakeholders understand the importance of KVK system in present-day agriculture. Moreover, the responsibility of Directorates of Extension Education of various agricultural Universities in overseeing KVK activities and providing technological backstopping to the KVKs under their jurisdictions have also been incorporated in this report.

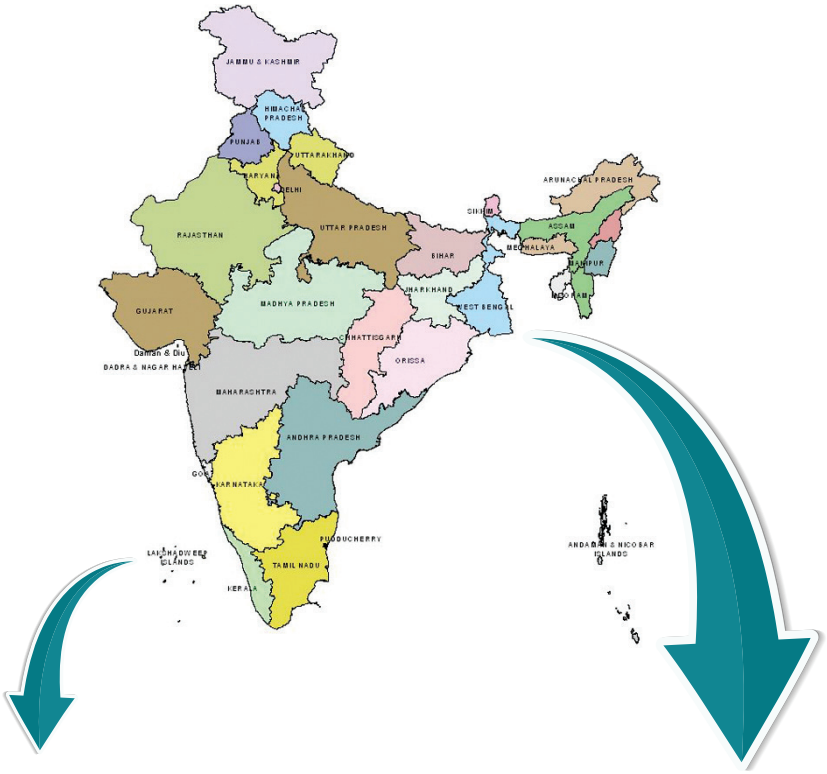
My sincere thanks are due to all Programme Coordinators and the staff members of KVKs of Zone II, all Host Organizations and Indian Council of Agricultural Research, New Delhi for their whole-hearted contribution of relevant information for compiling this report within the stipulated time. I also extend my thanks to all the staff members of ICAR-ATARI Kolkata, especially Scientists, Young Professional, Senior Research Fellows, Data Entry Operators, Private Secretary to the Director of this Institute for their help in data analysis, compilation work and in preparing the draft of this manuscript for bringing out this Annual Report in scheduled time. The contribution from all the corners is duly acknowledged.

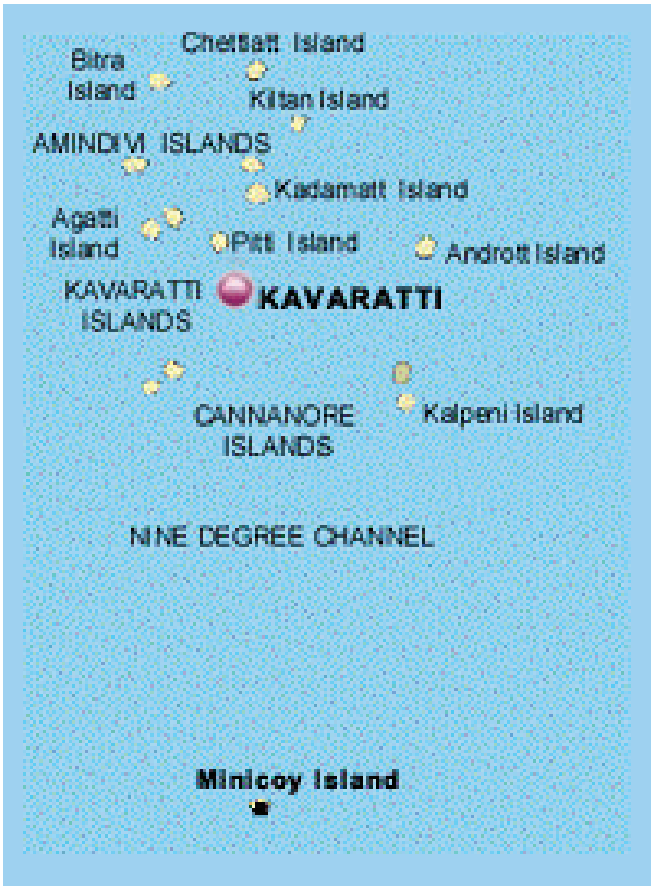
Kolkata
06.07.2017

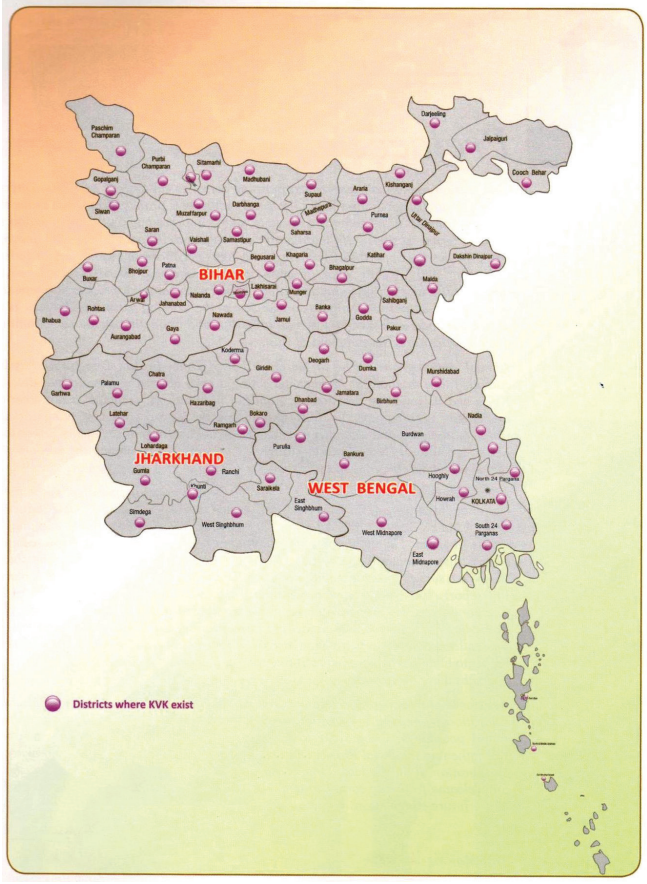
Director

KVKs UNDER ICAR-ATARI KOLKATA

WEST BENGAL, BIHAR, JHARKHAND, ANDAMAN AND NICOBAR ISLANDS AND LAKSHADWEEP







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कार्यकारी सारांश

भारतीय कृषि अनुसंधान परिषद द्वारा भाकृअनुप-कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थानों (अटारी) के क्षेत्रीय परियोजना निदेशालय के दर्जे को बढ़ाते हुए, उन्हें प्रौद्योगिकी अनुप्रयोग और अग्रपंक्ति विस्तार शिक्षा कार्यक्रम में समन्वय करने तथा कृषि विस्तार अनुसंधान एवं ज्ञान प्रबंधन का सुदृढ़ीकरण करने के लिए विशेष जिम्मेदारियां सौंपी गई थी। इन दोनों क्षेत्रों में अपने दायित्वों का निर्वहन करने हेतु भाकृअनुप.अटारी, कोलकाता ने अपने क्रियाकलापों को ऐसी प्रक्रिया में नियोजित किया जिससे कि बिहार, झारखंड, पश्चिम बंगाल और अंडमान एवं निकोबार द्वीपसमूह में कार्यरत 89 कृषि विज्ञान केंद्रों (केवीके) के सशक्त नेटवर्क को शामिल करते हुए बड़ी संख्या में खेतीहर समूदाय को प्रौद्योगिकी और सूचना संबंधी सहायता सुव्यस्थित रूप से उपलब्ध कराई जा सके और एक समयबद्ध प्रक्रिया में चिन्हित लाभार्थियों/ क्षेत्रों के लाभार्थ अनेक प्रमुख कार्यक्रमों का कार्यान्वयन किया जा सके। भाकृअनुप-अटारी, कोलकाता द्वारा पिछले एक वर्ष के दौरान अपनाई गई प्रक्रिया से कृषि विज्ञान केंद्रों ने तथा समग्र रूप से संस्थान ने महत्वपूर्ण उपलब्धियाँ हासिल की है।

अधिकांश छोटे, सीमांत और भूमिहीन किसानों को लाभ पहुँचाने के उद्देश्य से भारत सरकार ने हाल ही में विभिन्न कल्याणकारी योजनाओं की घोषणा की है, जिनका कार्यान्वयन मूल स्तर पर किया जाना है। भाकृअनुप-अटारी, कोलकाता ने अलग-अलग श्रेणी के लाभार्थियों के विभिन्न मुद्दों को हल करने हेतु इस अवसर का लाभ लेने के लिए पूरजोर तरीके से पहलें आरंभ की हैं ताकि प्रधान मंत्री फसल बीमा योजना, मृदा स्वास्थ्य कार्ड वितरण, खरीफ और रबी मौसमों से पहले किसान सम्मेलन, तिलहन और दलहन फसलों पर सामूहिक अग्रपंक्ति प्रदर्शन कार्यक्रम, मेरा गांव मेरा गौरव, कौशल विकास, बीज हब, कृषि की और युवाओं को आकर्षित करने व उन्हें जुड़े रखे जाने हेतु कार्यक्रम, कृषि पोर्टल, वित्तीय प्रबंधन प्रणाली सहित प्रबंधन सूचना प्रणाली, स्वच्छ भारत अभियान जैसे कार्यक्रमों तथा अन्य कार्यक्रमों के कार्यान्वयन के जरिए उन लोगों तक पहूंचा जा सके, जो अभी तक प्रौद्योगिकीय एवं सूचना संबंधी लाभ से वंचित हैं। इसके अलावा, भाकृअनुप-अटारी, कोलकाता ने किसानों, ग्रामीण युवाओं तथा अन्य हितधारकों के कल्याण के लिए चिन्हित कृषि विज्ञान केंद्रों के माध्यम से जनजातीय उप योजना, राष्ट्रीय कृषि जलवायू अनूकूलन नवोन्मेषन, फार्मर्स फर्स्ट, जलवायु अनूकूलन कृषि प्रणाली मॉडल आदि जैसे प्रमुख कार्यक्रमों को संचालित करने में प्रमुख भूमिका निभाई है।

खेतीहर समुदाय के सर्वांगीण विकास के लिए राष्ट्रीय मात्स्यकी विकास बोर्ड, राष्ट्रीय नारियल विकास बोर्ड, सीआईएमएमवाईटी, मेनेज, समेती जैसे राष्ट्रीय एवं अंतर्राष्ट्रीय संगठनों तथा राज्य कृषि विश्वविद्यालयों और इस अंचल में एवं अन्य क्षेत्रों में स्थित भाकृअनुप संस्थानों के साथ सहयोगात्मक कार्यक्रमों को आरंभ करने की भी आवश्यकता महसूस की गई। इन संगठनों के पास उपलब्ध प्रौद्योगिकियों/ विशेषज्ञता का अटारी के स्तर पर विश्लेषण किया गया ताकि सशक्त कृषि विज्ञान केंद्रों के नेटवर्क के माध्यम से फील्ड स्तर पर इनका कार्यान्वयन वास्तविक रूप से किया जा सके। इस प्रक्रिया से प्रमाणिक कृषि विधियों के साथ खेतीहर समुदाय के साथ, उनके कल्याण हेतु, कार्य करने में काफी सहजता प्राप्त हुई। भाकृअनुप-अटारी, कोलकाता द्वारा पिछले एक वर्ष के दौरान किए गए प्रयासों से न केवल किसानों का फसलों का उत्पादन और उत्पादकता बढ़ाने में काफी सहायता मिली है, बल्कि युवाओं को स्व-रोजगार के रूप में आजीविका के वैकल्पिक स्रोत की खोज करने में भी सहायता प्राप्त हुई है।

भाकृअनुप-अटारी, कोलकाता की प्रमुख जिम्मेदारी कृषि विज्ञान केंद्रों के क्रियाकलापों को रूपरेखा देने, उनकी निगरानी करने, उनका मार्गदर्शन करने तथा उनका मूल्यांकन करने की है जिससे कि कृषि और संबद्ध क्षेत्रों पर निर्भर खेतीहर समुदाय को प्रौद्योगिकीय एवं सूचना संबंधी सहायता उपलब्ध कराने हेतु कृषि विज्ञान केंद्रों को अपनी पूर्ण क्षमता के अनुरूप कार्य करने में सहायता दी जा सके। इसके परिणामस्वरूप, कृषि विज्ञान केंद्रों ने आँचलिक स्तरीय समीक्षा कार्यशाला के माध्यम से अनुमोदन प्राप्त करने हेतु पूरे वर्ष के दौरान किए जाने वाले कार्यों की अनुसूची की कार्य योजना तैयार की। भाकृअनुप-अटारी, कोलकाता के पर्यवेक्षण के तहत कार्य योजना तैयार करने और इसका कार्यान्वयन किए जाने से इस अंचल के अंतर्गत आने वाले कृषि विज्ञान केंद्रों को 238390 किसानों और कृषिरत महिलाओं को ज्ञान और कौशल प्रदान करने हेतु 7937 प्रशिक्षण कार्यक्रमों का आयोजन करने में सहायता प्रदान की गई। किसानों को अपनी आर्थिक स्थिति में सुधार लाने हेतु उन्नत कृषि और संबद्ध प्रौद्योगिकियों को अपनाए जाने हेतु संस्थान द्वारा प्रदान किए गए इस प्रकार के कौशल की भूमिका अहम थी। कृषि और संबद्ध विज्ञान संबंधी बारबार महसूस की जाने वाली समस्याओं से निपटने के लिए स्थान विशिष्ट समाधान प्रदान करना संस्थान के लिए एक चिंता का विषय था, पर इन मुद्दों को समेकित फसल प्रबंधन, समेकित रोग प्रबंधन, समेकित नाशीजीव प्रबंधन, समेकित पोषण प्रबंधन, किस्मगत मूल्यांकन, खरपतवार प्रबंधन, कृषि औजार, मूल्य वर्धन, नीरस कार्य में कमी, आहार और चारा, पोषण प्रबंधन, नस्ल मूल्यांकन तथा अन्य विषयों जैसे अनेक विषयपरक क्षेत्रों में ऑनलाइन परीक्षणों के माध्यम से कृषि विज्ञान केंद्रों द्वारा हल किया गया। किसानों द्वारा खेती करने में महसूस की जा रही समस्याओं का समाधान करने हेतु सबसे अधिक उपयुक्त प्रौद्योगिकी की खोज करने हेतु कृषि विज्ञान केंद्रों द्वारा 6632 भिन्न स्थानों में प्रमाणित प्रौद्योगिकियों के लिए विशिष्ट स्थान का निर्धारण करने हेतु कुल मिलाकर 669 ऑफ-फार्म परीक्षण आयोजित किए गए।

देश में कृषि विकास की धीमी गति के लिए प्रायः उन्नत प्रौद्योगिकियों की उपलबधता को एक कारण माना जाता रहा है। नई प्रौद्योगिकियों की उपलब्धता को सुलभ बनाने तथा अधिक से अधिक स्थानों में उनके फील्ड अनुप्रयोग हेतु इस अंचल के अंतर्गत आने वाले कृषि विज्ञान केंद्रों ने भाकृअनुप-अटारी और राज्य कृषि विश्वविद्यालयों के विस्तार शिक्षा निदेशालयों के पर्यवेक्षण के तहत दलहन, तिलहन, अनाज, सब्जियों, पशुधन, मात्स्यकी, कृषि औजारों तथा अन्य अनेक उद्यमों पर बड़े पैमाने पर अग्रपंक्ति प्रदर्शन कार्यक्रम आयोजित किए ताकि राज्य विस्तार कार्यविधि की प्रौद्योगिकी प्रसार प्रणाली के मुख्य क्षेत्रों में इस प्रकार की उन्नत प्रौद्योगिकियों को उपलब्ध कराया जा सके। इस प्रक्रिया में, अग्रपंक्ति प्रदर्शन कार्यक्रम के माध्यम से तिलहन, दलहन और अन्य फसलों के अंतर्गत 33504.0 हैक्टेयर से अधिक का क्षेत्रफल शामिल किया गया; पशुधन में 20994 अग्रपंक्ति प्रदर्शन कार्यक्रम के माध्यम से 270.0 हैक्टेयर जल निकायों को शामिल किया गया; 5221 उद्यमों को स्थापित किया गया तथा 543.3 हैक्टेयर क्षेत्रफल में कृषि उपकरणों और औजारों का प्रयोग किया गया। तिलहन, दलहन तथा अन्य फसलों पर किए गए अगप्रक्ति प्रदर्शनों के फलस्वरूप, पारंपरिक कृषि विधियों की तुलना में, 25.35 प्रतिशत उपज लाभ प्राप्त किया गया, जबकि सब्जियों में उपज लाभ 50 प्रतिशत से भी अधिक था। लागत:लाभ अनुपात के आधार पर आर्थिक दृष्टि से लाभ, 4 से 5 गुणा अधिक था।

कृषि के तहत चावल परती भूमि के विशाल क्षेत्र को शामिल करने तथा गैर.पारंपरिक क्षेत्रों में दलहन व तिलहन फसलों को लोकप्रिय बनाने के उद्देश्य के साथ दलहन और तिलहन फसलों पर पूर्ण रूप से किए गए एकीकृत अग्रपंक्ति प्रदर्शन तिलहन और दलहन फसलों के समग्र उत्पादन एवं उत्पादकता को बढ़ाने में काफी प्रभावकारी साबित हुए। समस्त तीन फसल मौसमों, यानी कि खरीफ, रबी और ग्रीष्म ऋतु में किए गए प्रदर्शनों से खरीफ में स्थानीय जांच किस्मों की तुलना में 1.67 से लेकर 4.6 क्विंटल प्रति हैक्टेयर की अधिक उपज प्राप्त की गई, जबकि रबी मौसम के दौरान उपज लाभ 2.22 से लेकर 3.99 क्विंटल प्रति हैक्टेयर के बीच था। लेकिन, दलहन फसलों में खरीफ के बजाय रबी के दौरान उपज लाभ अधिक प्राप्त किया गया। इसी प्रकार से, तिलहन फसलों में खरीफ में 0.92 से 3.62 क्विंटल प्रति हैक्टेयर का उपज लाभ प्राप्त किया गया और रबी मौसम में उपज लाभ 1.52 से लेकर 3.65 क्विंटल पति हैक्टेयर था। ग्रीष्म ऋतु में, दलहन और तिलहन फसलों के निष्पादन का विश्लेषण नहीं किया जा सका, क्योंकि फसल कटाई कार्य पूर्ण नहीं हुआ था।

भाकृअनुप-अटारी, कोलकाता ने कृषि विज्ञान केंद्रों के फार्म और ग्राम बीजोत्पादन कार्यक्रम के माध्यम से फसलों, सब्जियों, नकदी फसलों तथा अन्य फसलों के गुणवत्तापूर्ण बीज सामग्री के उत्पादन पर विशेष ध्यान दिया। कृषि विज्ञान केंद्रों के प्रयासों से 222824. 27 क्विंटल बीजोत्पादन किया गया जिसका उपयोग किसानों द्वारा किया जाएगा। चिन्हित किसानों की सहभागिता तथा बीज ग्राम सिद्धांत का कार्यान्वयन काफी कारगर सिद्ध हुआ क्योंकि केवल ग्राम बीज कार्यक्रम के माध्यम से 196396.5 क्विंटल बीजों का उत्पादन किया गया। रोपण सामगियों, फल फसलों, सजावटी पादपों, रोपण फसलों, वन्य प्रजातियों तथा विभिन्न प्रजातियों के पादपों के उत्पादन के संबंध में भी इसी तरह के प्रयास किए गए जिनके कारण सब्जी पौधों की 3602306 रोपण सामग्रियों के उत्पादन किया गया। उत्पादित बीजों और रोपण सामग्रियों से असंख्य किसानों को अपने खेतों में उपयोग करने हेतु गुणवत्तापूर्ण बीज और रोपण सामग्रियां प्राप्त करने में सहायता मिली।

बीज और रोपण सामग्रियों के उत्पादन के अलावा, कृषि विज्ञान केंद्रों ने किसानों के हित में 165781 कि. ग्रा. बायोप्रॉडक्ट और 396513 बायो-एजेंटों तथा केंचुएं भी उत्पादित किए। पशुधन के संदर्भ में, माँस, कुक्कुट, मछली फिंगरलिंग तथा सजावटी मछलियों का भारी मात्रा में उत्पादन किया गया। इससे एक ओर कृषि विज्ञान केंद्रों को आय प्राप्त हुई और दूसरी ओर किसानों को सामग्रियां उपलब्ध कराई गईं।

मृदा और जल नूमनों का विश्लेषण तथा किसानों को मृदा कार्ड का वितरण पिछले एक वर्ष के दौरान एक और महत्वपूर्ण कार्य था। संबंधित विभागों के साथ संयुक्त रूप से कृषि विज्ञान केंद्रों को पर्याप्त मात्रा में मृदा विश्लेषण किटें उपलब्ध कराई गईं। किसानों को मृदा स्वास्थ्य कार्ड उपलब्ध कराने हेतु 63666 मृदा नमूनों का विश्लेषण किया गया। इस प्रयास से 3455 गांवों के 133281 किसानों को अपनी मृदा और जल नमूनों की जांच कराने तथा मृदा स्वास्थ्य कार्ड प्राप्त करने का लाभ मिला।

कृषि विज्ञान केंद्रों ने समूचे अंचल में जिन अन्य कुछ कार्यक्रमों का आयोजन किया, उनमें प्रौद्योगिकी सप्ताह समारोह, कृषि की महत्ता के बारे में जागरूकता फैलाने हेतु ग्रामीण विद्यालयों से संपर्क साधना, विशेष दिवस समारोह, खरीफ और रबी मौसमों के आरंभ होने से पहले सम्मेलन, प्रधान मंत्री फसल बीमा योजना के बारे में जागरूकता सृजित करने संबंधी कार्यक्रम आदि शामिल थे। माननीय केंद्रीय/ राज्य कृषि मंत्रियों, संसद सदस्यों, विधायकों तथा अन्य महत्वपूर्ण महानुभावों की गरिमामयी मौजूदगी से न केवल उपरोक्त कार्यक्रमों की आकर्षणता बढ़ी, अपितु ये कार्यक्रम इस अंचल में कृषि विकास कार्यक्रम चलाए जाने में असंख्य किसानों को सन्निहत करने में भी काफी कारगर सिद्ध हुए।

देश में शुरू की गई कृषि विकास की मुहिम में जनजातीय किसानों को शामिल करने हेतु इस अंचल के कृषि विज्ञान केंद्रों ने कृषि और संबद्ध साधनों के जरिए जनजातीय किसानों की जिंदगी खुशहाल बनाने हेतु जनजातीय उप योजना का उपयोग प्रभावकारी ढंग से किया। इस अंचल में 46 कृषि विज्ञान केंद्रों ने जनजातीय किसानों को प्रशिक्षण और इनपुट सहायता प्रदान कर तथा जनजातीय गांवों

में उपयोग हेतु परिसंपत्ति सृजित कर 610.0 लाख रूपयों की राशि से कृषि में जनजातीय आबादी की भागीदारी सुनिश्चित करने के लिए इस प्रकार की विशेष पहल की। प्रशिक्षण कार्यक्रम, अग्रपंक्ति प्रदर्शन, बीज और रोपण सामग्री उत्पादन, मृदा और जल नमूनों का विश्लेषण, मोबाइल कृषि एडवाइजरी तथा अनेक कार्यक्रमों का आयोजन करने के पश्चात स्प्रेयर, रिज मेकर, पंप सेट, वीडर आदि जैसी अनेक परिसंपत्तियां सृजित की गईं। उपरोक्त कार्यक्रमों के परिणामस्वरूप, विभिन्न जनजातीय किसानों/युवाओं को कृषि और संबद्ध क्षेत्रों के माध्यम से अपनी सामाजिक-आर्थिक स्थिति में सुधार लाने में सहायता मिली।

राष्ट्रीय जलवायु अनुकूल कृषि नवोन्मेषन (एनआईसीआरए) की पहलों से जलवायु पर पैनी नजर रखते हुए, उसमें विचलन से निपटने हेतु किसानों के साथ कार्य करने का अवसर प्राप्त हुआ। प्रौद्योगिकीय सहायता, मानव संसाधन विकास और खेतीहर समुदाय के समग्र सशक्तीकरण के आधार पर, चिन्हित कृषि विज्ञान केंद्रों (17) ने अपनी कार्य योजना के माध्यम से जलवायु संवेदनशील जिलों में किसानों की जरूरतों की पूर्ति की जिनसे उन्हें बाढ़, सूखा, गरमी और ढंडी हवाओं, अनियमित बारिश तथा अन्य संवेदनशील जलवायु स्थितियों से निपटने में सहायता प्राप्त हुई। चिन्हित मौसमगत उतार-चढ़ावों के आधार पर, किसानों का राहत पहुंचाने के लिए उनके गांवों में नमी संरक्षण, जल संचयन, कृत्रिम भूजल पुनर्भरण, जल बचत सिंचाई विधियों सहित जल संसाधन प्रबंधन कार्यक्रम चलाया गया। प्रतिकूल जलवायु स्थितियों में भी पर्याप्त प्रतिलाभ हासिल करने के उद्देश्य से गेहूं में शून्य जुताई, चावल में रोगग्रस्त भूमि में भूमि सुधार, एसआरआई, बैंगन आदि में आरबीएफ जैसे कार्यों को सफलतापूर्वक किया गया। एनआईसीआरए (निक्रा) द्वारा अंगीकृत गांवों में 121 जलसंचयन संरचनाओं को विकसित किया गया जिनमें 52446.0 क्यूबिक जल को संचित किया जा सकता है। ठोस अपशिष्ट से उत्पादित 450 क्विंटल कम्पोस्ट को मृदा में मिलाया गया जिससे पिछले वर्ष के दौरान 75 हजार कार्बन प्राच्छादन किया गया। फसल उत्पादन के संबंध में, शुरू की गई नई किस्में (सहभागी, अंजलि, नवीन, अभिशेक) खेतों की स्थिति के अनुरूप, अनुकूलनता बनाए रखने में सफल रहीं जिसके फलस्वरूप स्थानीय जांच किस्म की तुलना में अधिक उपज प्राप्त की गई। लवण सहिष्णु और बाढ़ सहिष्णु धान किस्मों का निष्पादन भी अलग-अलग गांवों में काफी अच्छा था जिससे जलवायु के खतरे से सफलतापूर्वक निपटा गया। संस्थान द्वारा वर्ष के दौरान कुछ अन्य महत्वपूर्ण पहलें भी की गईं, जैसे कि रबी फसलों की बुवाई तय समय से पहले करना, चावल की ऐरोबिक और सीधी बुवाई, देरी से मानसून आने की स्थिति में सामूदायिक नर्सरी, स्थान विशिष्ट फसल प्रणाली आदि जैसे कार्य शामिल हैं, जो उपज और संसाधनों के उपयोग के आधार पर, काफी लाभकारी साबित हुए। पशुधन में, गांवों में अयोजित किए गए चारा उत्पादन और व्यापक टीकारण कैम्प से विभिन्न प्रकार के रोगों, जैसे कि पीपीआर, रानीखेत तथा अन्य रोगों को रोकने में सहायता मिली। इसके अलावा, ग्राम मौसमविज्ञान केंद्र के जरिए संस्थानिक पहलों, जैसे कि बीज बैंक, चारा बैंक, कमोडिटी समूह, कस्टम हायरिंग प्रणाली, सामूहिक विपणन समूह तथा मौसमविज्ञान सूचकांक आधारित बीमा और जलवायु के बारे में दी गई जानकारी से असंख्य किसानों को जलवायु संबंधी खतरों से निपटने के लिए अपनाई जानी वाली कार्यनीतियों से अवगत कराया गया। कस्टम हायरिंग केंद्रों तथा कृषि विज्ञान केंद्रों द्वारा स्थापित वीसीआरएमसी से किसानों को 311412.00 रुपयों की आय प्राप्त करने में सहायता प्राप्त हुई। नए कृषि औजार निर्मित कर उन्हें गांवों में किराये के आधार पर उपलब्ध कराने तथा जलवायु के कारण उत्पन्न किसी खतरे की स्थिति से निपटने के लिए वीसीआरएमसी के पास वर्तमान में 1434531.00 रुपयों की राशि उपलब्ध है।

किसानों, युवाओं और अन्य हितधारकों के समग्र विकास से जुड़े मुद्दों को हल करने हेतु भाकृअनुप-अटारी, कोलकाता के स्तर पर की गई अन्य नई पहलों में सीएसआईएसए-भाकृअनुप सहयोगात्मक परियोजना, विभिन्न उद्यमों में कृषि विज्ञान केंद्रों के लिए एएससीआई के साथ कौशल विकास प्रशिक्षण कार्यक्रम, बीज हब, मेरा गांव मेरा गौरव, कृषि की ओर युवाओं को आकर्षित करने व उन्हें जुड़े रखने हेतु पहल, पीपीवी एवं एफआर, एनएफडीबी, फार्मर्स फर्सट तथा अन्य पहलें शामिल हैं।

केवीके नॉलेज नेटवर्क/केवीके पोर्टल, कृषि पोर्टल, एमआईएस-एफएमएस, पीएफएमएस पोर्टल सुविधा, कॉमन सर्च इंजनों का प्रयोग करते हुए कृषि विज्ञान केंद्रों द्वारा ऑनलाइन रिपोर्टिंग के कार्यान्वयन तथा संस्थान की वेबसाइट के अद्यतन के माध्यम से आईसीटी के उपयुक्त अनुप्रयोग पर भी विशेष ध्यान दिया गया। ये सुविधाएं समस्त हितधारकों के बीच संचार प्रक्रिया को बढ़ाने में काफी अधिक उपयोगी सिद्ध हुई हैं।

भाकृअनुप-अटारी, कोलकाता के कार्य-प्रदर्शन की परिणामोन्मुखी समीक्षा में संस्थान के लगभग समस्त क्रियाकलापों में उल्लेखनीय उपलब्धियों की झलक देखने को मिलती है। कृषि विज्ञान केंद्रों को निधियां जारी करने और उनकी निगरानी करने में, उत्कृष्ट संभावित परिणामों के लिए विभिन्न क्रियाकलापों में कार्मिको की सहभागिता सुनिश्चित करने में तथा प्रशिक्षण संबंधी आवश्यकता, वित्तीय मामलों और अन्य सभी संबंधित क्षेत्रों में मांग को सुव्यस्थित रूप से आगे बढ़ाने में संस्थान के वित्तीय एवं प्रशासनिक प्रबंधन की भूमिका काफी संतोषजनक पाई गई। विस्तार शिक्षा निदेशालय द्वारा प्रौद्योगिकीय सहायता के रूप में दिए गए योगदान तथा एटीआईसी के माध्यम से इनपुट एवं सूचना उपलब्ध कराए जाने से भी कृषि विज्ञान केंद्रों और भाकृअनुप-अटारी, कोलकाता के अधिदेशित क्रियाकलापों को वांछित प्रक्रिया में पूरा करने में सहायता प्राप्त हुई।

EXECUTIVE SUMMARY

ICAR-Agricultural Technology Application Research Institutes (ATARIs) have been assigned with specific responsibilities to coordinate and monitoring technology application and frontline extension education programme as well as strengthening agricultural extension research and knowledge management while upgrading it from Zonal Project Directorates by Indian Council of Agricultural Research. In discharging its duties to meet the both ends, ICAR-ATARI, Kolkata planned its activities in such a manner as to involve the strong network of 89 KVKs functioning in Bihar, Jharkhand, West Bengal and A&N Islands towards providing technological and information support in a systematic way among the large number of farming community and implementing a number of flagship programmes of ICAR/GoI for the benefit of identified beneficiaries/areas in a time bound manner. The process adopted by ICAR-ATARI, Kolkata during last one year has resulted into significant achievements both in the part of KVKs and the Institute as a whole.

In providing benefit to the large number of small, marginal and landless farmers, GoI in the recent past has come up with a number of welfare schemes for its implementation at the grass root level. ICAR-ATARI, Kolkata has taken up the initiatives in true spirit to cash on the opportunity to reach the unreached through implementation of the programmes like Pradhan Manti Fasal Bima Yojana, distribution of Soil Health Card, Pre-kharif and Pre-rabi Kisan Sammelan, Clustered Frontline Demonstration programme on Oilseed and Pulse crops, Mera Gaon Mera Gaurav, Skill Development, Seed Hub, Attracting and Retaining Youth in Agriculture, KRISHI Portal, Management Information System including Financial Management System, Swachh Bharat Abhiyan and others to address various issues for different categories of beneficiaries. In addition, ICAR-ATARI, Kolkata has also been instrumental in carrying out other flagship programmes like Tribal Sub Plan, National Innovations in Climate Resilient Agriculture, Farmer FIRST, Climate Resilient Farming System Model etc. through the identified KVKs for the welfare of farmers, rural youths and other stakeholders.

All-round development of the farming community also necessitated in taking up collaborative programmes with national and international organizations like National Fisheries Development Board, National Coconut Development Board, CIMMYT, MANAGE, SAMETI besides State Agricultural Universities and ICAR Institutes located in this zone and elsewhere. The technologies/expertise available with such organizations have been synthesized at the ATARI level for its actual field implementation through the vibrant KVK network. The process has facilitated to work on with the proven methods involving the farming community for their very own benefit. The endeavour put forth by ICAR-ATARI, Kolkata during last one year has immensely benefited the farmers to augment production and productivity of crops even in crunch situation as well as the youths to find out alternate source of livelihood in the form of self-employment.

Formulation, monitoring, guiding and evaluation of KVK activities have been the major responsibility of ICAR-ATARI, Kolkata to enable the KVKs to perform up to its potential in providing technological and information support to the farming community dependent on agriculture and allied sectors. The KVKs, in turn, prepared the action plan for round-the-year performance schedule to get it approved through state and zonal level review workshop. Formulation of plan of action and its implementation under the supervision of ICAR-ATARI, Kolkata enabled the KVKs of this zone to conduct 7937 number of training courses to provide knowledge and skill to 238390 number of farmers and farm-women. The skill so provided acted as the guiding force for the farmers to practice improved agricultural and allied technologies to uplift their economic condition. Providing location specific solution to the recurring agricultural and allied problems was another area of concern which was addressed by the KVKs through conducting on-farm trials in the farmers' field in a number of thematic areas like integrated crop management, integrated disease management, integrated pest management, integrated nutrition management, varietal evaluation, weed management, farm implements, value addition, drudgery reduction, feed and fodder, nutrition management, breed evaluation and many more. Altogether 669 number of On-Farm Trials were conducted by the KVKs to assess location specificity of proven technologies in 6632 different locations to find out most suitable technology against the problems faced by the farmers in their farming.

Dearth of improved technologies is often attributed to the slow pace of agricultural development in this country. To facilitate the availability of newer technologies as well as its field application in the larger areas, KVKs of this zone under supervision of ICAR-ATARI and Directorates of Extension Education of State Agricultural Universities took up large-scale frontline demonstration programmes on pulse, oilseed, cereal, vegetables, livestock, fishery, farm implements and many other enterprises to feed such technologies in the mainstay of technology dissemination system of State extension mechanism. In the process, more than 33504.0 ha area could be brought under

frontline demonstration programme in oilseed, pulse and other crops; 20994 number of frontline demonstration in livestock and 270.0 ha of water bodies for fishery; 5221 number of enterprises and 543.3 ha in farm tools and implements. The demonstrations conducted on oilseed, pulse and other crops provided yield advantage over the traditional practices to the range of 25.35 per cent whereas in vegetables it was more than 50 per cent. The monetary benefit was also accrued to the extent of 4 to 5 times in terms of benefit:cost ratio.

Clustered frontline demonstrations conducted exclusively on pulse and oilseed crops with a primary focus to being vast rice-fallow under cultivation and popularize pulse and oilseed crops in non-traditional areas, proved to be effective in overall production and productivity of oilseed and pulse crops. Demonstration conducted in all three cropping seasons i.e. Kharif, Rabi and Summer on pulse crops gave an yield difference of 1.67 to 4.6 q/ha against local check in Kharif whereas it was 2.22 to 3.99 q/ha during Rabi season. However, the pulse crops produced uniform higher yield during Rabi than in Kharif. Likewise, in oilseed crops, a variation of 0.92 to 3.62 q/ha in yield was recorded in Kharif season and it was 1.52 to 3.65 q/ha in Rabi season. The performance of both pulse and oilseed crops during summer could not be analyzed as harvesting was not completed.

ICAR-ATARI, Kolkata laid special emphasis on production of quality seed material of crops, vegetables, cash crops and others both through utilization of KVK farm and village seed production programme. The efforts of the KVK resulted into production of 222824.27 q of seeds for its use by the farmers. The involvement of identified farmers as well as implementation of seed village concept was instrumental in producing 196396.5 q of seeds through village seed programme alone. The same efforts were extended in the case of production of planting materials also who resulted into production of 3602306 number of planting materials of vegetable seedlings, fruit crops, ornamental plants, plantation crops, forest species and many others. Both the produced seeds and planting materials helped a large number of farmers to get quality seed and planting materials for its use in their farm.

Apart from seed and planting materials, the KVKs also produced 165781 kg of bio-product and 396513 number of bio-agents and earthworm for the benefit of the farmers. In livestock front, meat, egg, poultry, fish fingerling and ornamental fish were produced in a good number to earn revenue by the KVKs as well as making available to farmers.

Analysis of soil and water sample as well as providing soil health card to the farmers was another important activity accomplished during last one year. In a collaborative mode with line departments and through making available adequate number of soil analysis kit to the KVKs. 63666 number of such samples could be analyzed to provide soil health card to the farmers. The endeavour benefitted 133281 number of farmers across 3455 number of villages to get soil and water sample tested and obtaining soil health card.

Celebration of technology week, approaching rural schools to create awareness about the importance of agriculture, celebration of special day, celebration of pre-kharif and pre-rabi sammelan, creation of awareness about Pradhan Mantri Fasal Bima Yojana etc. were some other programmes organized by the KVKs across the zone. The presence of Hon'ble Union/State Minister, Member of Parliament, Member of State Legislative Assembly and other important personalities made such programmes quite attractive and successful to involve many farmers in agricultural development programme carried out in this zone.

In a view to assimilate the tribal people in the agricultural development process initiated across the country, Tribal Sub Plan was effectively utilized by the KVKs of this zone in bringing prosperity among tribal through agricultural and allied means. In this zone, 46 KVKs have taken up this special initiative to involve tribal population in agriculture through providing training, input support and creation of asset with the fund support of Rs.610.0 lakh. The assets like sprayers, ridge maker, pump set, weeder etc. were created followed in addition to conducting training programmes, on-farm trials, frontline demonstration, seed and planting material production, soil and water sample analysis, providing mobile agro-advisory and celebration of various programmes. The process has helped good number of tribal farmers/youths to improve their socio-economic condition through agriculture and allied sectors.

The ongoing National Innovations in Climate Resilient Agriculture (NICRA) continued to provide the opportunity to work with farmers to address current climatic variability with watching responses. The identified KVKs (17 numbers) through their plan of action addressed the requirement of farmers residing in climatically vulnerable districts in terms of technological support, human resource development and overall empowerment of farming community to enable them to cope up with vulnerable climatic conditions like flood, drought, heat and cold wave, erratic rainfall and others. Based on the identified vagaries, natural resource management including moisture conservation, water harvesting, artificial ground water recharge, water saving irrigation methods etc. were promoted in the villages to provide respite to the farmers.

The technologies like zero tillage operation in wheat, land shaping with ail cultivation, SRI, LEWA in rice, RBF in brinjal etc. were successfully implemented to get substantial return during adverse climatic condition. In this NICRA adopted villages, 121 number of rainwater harvesting structures were developed to store 52446.0 cu.m. of water. Execution of various interventions increased the cropping intensity up to 250 per cent. Compost produced to the extent of 450 q from solid waste was added to the soil through which 75 thousand carbon sequestrations were done during last one year. In crop production, varieties introduced like Sahbhagi, Anjali, Naveen, Abhishek could adapt the situation in the field and produced higher yield over local check. Salt tolerant and flood tolerant paddy varieties performed equally well in different villages to successfully counter the vulnerability of climate. Other important interventions include advancement of planting date of rabi crops, aerobic and direct seeding of rice, community nursery for delayed monsoon, location specific intercropping systems etc. proved quite beneficial in terms of yield and utilization of resources. In livestock, fodder production and large-scale vaccination camp organized in the villages prevented the livestock from various diseases like PPR, Ranikhet and others. In addition, institutional interventions like seed bank, fodder bank, commodity group, custom hiring system, collective marketing group and weather index based insurance and climate literacy through village weather station made large number of farmers aware of the strategies to cope up with climatic vulnerability. The custom hiring centres and VCRMC formed by the KVKs helped the farmers to generate revenue worth Rs.311412.00 and the existing revenue with VCRMC is Rs.1434531.00 for making newer implements available in the villages on hiring basis and take up various productive initiatives in the event of climate vulnerability.

Other new initiatives taken at ICAR-ATARI, Kolkata level includes implementation of CSISA-ICAR collaborative project, Phase-III Skill Development Training programme with SCI for KVKs in different enterprises, Seed Hub, Mera Gaon Mera Gaurav, Attracting and Retaining Youth in Agriculture, PPV&FR, NFDB, Farmer FIRST and other to address the issue of all-round development of farmers, youths and other stakeholders.

The appropriate use of ICT has also been given adequate emphasis through implementation of KVK Knowledge Network/KVK Portal, KRISHI Portal, MIS-FMS, PFMS Portal facility, online reporting by KVKs using common search engines and regular updation of institute website. The facilities have been immensely beneficial to accelerate the communication process among all the stakeholders.

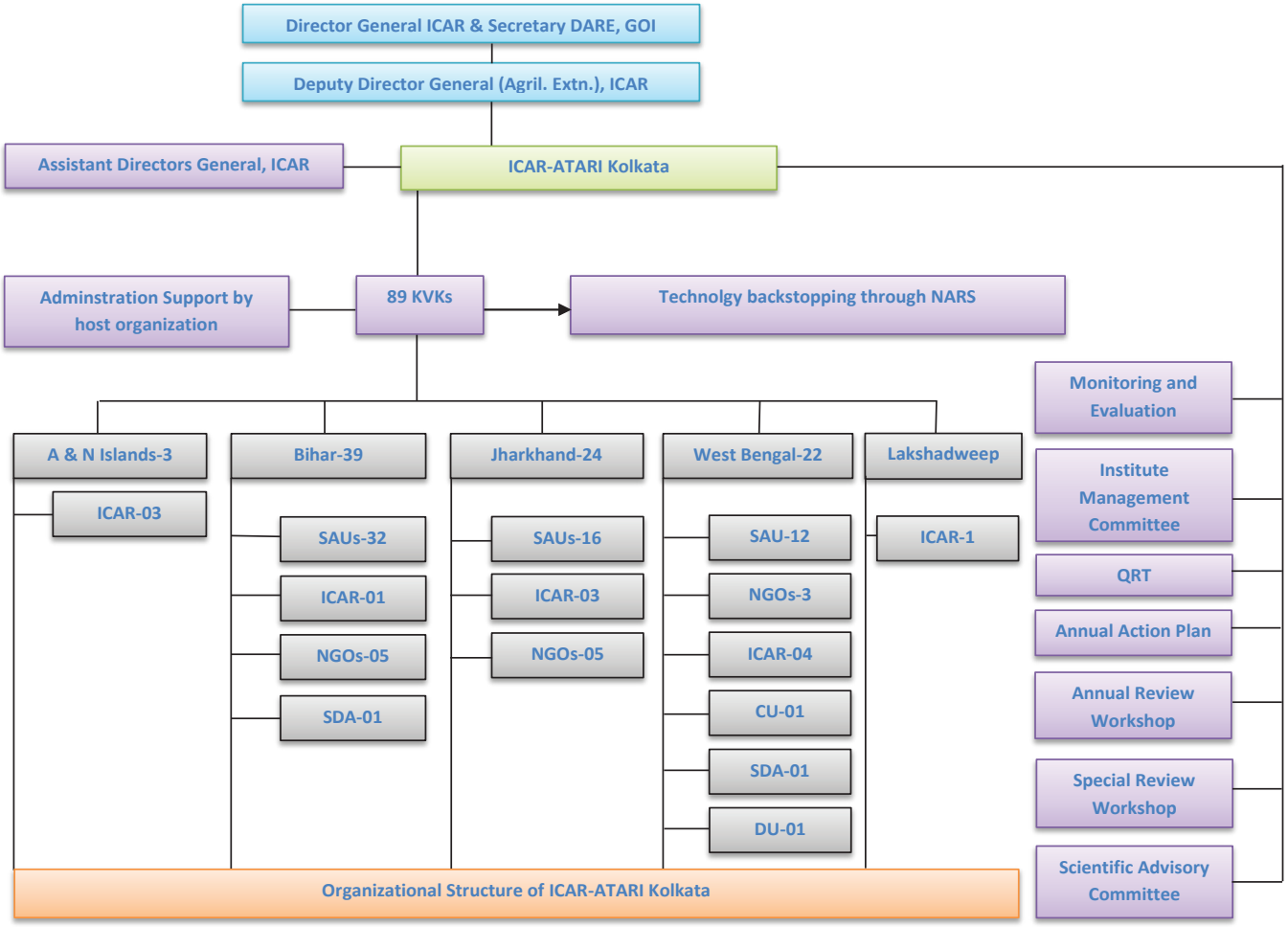
An objective review of the performance of ICAR-ATARI, Kolkata presents glimpses of substantial achievements in almost all spheres of its activities. The financial and administrative management of the institute was quite satisfactory in respect of release of fund to KVKs and its monitoring, involvement of the personnel in various activities for best possible outcome and systematically putting up the requirement in respect of training need, financial matter and all other related areas. The contribution of Directorate of Extension Education in providing technological backstopping and making input and information available through ATICs also helped in accomplishment of the mandated activities of the KVK as well as ICAR-ATARI, Kolkata in a desired manner.

1. ORGANIZATIONAL STRUCTURE AND STAFF POSITION

ICAR–Agricultural Technology Application Research Institute Kolkata is the part of Division of Agricultural Extension, Indian Council of Agricultural Research, New Delhi. It is among the eight Agricultural Technology Application Research Institutes of the country which are monitoring 680 KVKs. With the upgradation of Zonal Project Directorates to Agricultural Technology Application Research Institutes, the mandate as well as sanctioned strength has also been revised.

1.1 PROFILE

The Division of Agricultural Extension is headed by Deputy Director General (AE) under Director General, DARE, ICAR, New Delhi and has ICAR-ATARIs and KVKs at Zonal and District level, respectively.



1.2 BUDGET PROVISION

Among the most important activities of ICAR-ATARI Kolkata, decision on financial matters was taken based on assessing the submitted budget requirement, placing demand for fund, receiving funds and subsequent releasing of fund. Funds allocated for running the Institute, its 89 KVKs and 6 Directorates of Extension Education of the SAUs of this Zone were successfully managed. During the year 2016-17, a sum of Rs 10120.0 lakh has been provided to the KVKs in different as per detailed below.

Table: Budget in respect of ICAR-Agricultural Technology Application Research Institute, Kolkata & KVKs under Zone- II during 2016-17

(Rs. in lakh)

ICAR-ATARI, Kolkata/KVK	Recurring						Non-Recurring					Revol. Fund	Grand total
	P.&A.	T.A.	H.R.D.	Cont.	TSP Cont.	Total	Equip. & furn	Works	Lib.	Vehicle	Total		
ICAR-ATARI, Kolkata	180.00	12.40	3.05	53.60	0.00	249.05	0.84	40.97	0.00	0.00	41.81	0.00	290.86
State Agricultural University													
BAU, Sabour, Bihar (20)	1486.68	29.40	10.00	519.06	0.00	2045.14	16.50	123.50	0.00	56.00	196.00	0.00	2241.14
RAU, Pusa, Bihar (12)	641.00	17.00	5.50	256.55	0.00	920.05	29.50	315.00	0.00	8.00	352.50	3.00	1275.55
BAU, Ranchi, Jharkhand (16)	793.04	21.40	11.00	170.24	195.00	1190.68	83.04	27.67	0.00	0.00	110.71	0.00	1301.39
UBKV, Coochbehar, West Bengal (5)	415.86	7.40	2.50	82.94	18.00	526.70	4.00	0.00	0.00	0.00	4.00	0.00	530.70
BCKV, Nadia, West Bengal (4)	272.75	3.90	1.50	65.00	8.00	351.15	15.50	150.00	0.00	0.00	165.50	3.00	519.65
WBUA&FS, Kolkata (3)	216.00	4.50	1.50	61.80	9.00	292.80	4.00	71.61	0.00	8.00	83.61	0.00	376.41
ICAR													
CIARI, A&N Islands (4)	282.75	6.85	2.00	68.60	16.00	376.20	13.62	21.07	0.00	0.00	34.69	0.00	410.89
ICAR RCER, Patna, Bihar (2)	130.00	3.00	1.00	28.00	8.00	170.00	2.00	34.50	0.00	0.00	36.50	0.00	206.50
CRRI, Cuttack, Orissa (1)	54.00	1.20	0.50	10.00	6.00	71.70	0.00	0.00	0.00	0.00	0.00	0.00	71.70
IINRG, Ranchi (1)	16.70	1.00	0.50	2.00	16.00	36.20	9.50	40.00	0.00	0.00	49.50	0.00	85.70
CRIJAF, West Bengal (2)	74.00	2.00	0.50	19.00	3.00	98.50	10.50	0.00	0.00	0.00	10.50	3.00	112.00
CISH, Lucknow (1)	0.00	0.30	0.00	6.00	0.00	6.30	11.50	107.44	0.00	0.00	118.94	3.00	128.24
NDRI, Karnal (1)	0.00	0.30	0.00	4.00	0.00	4.30	11.50	64.00	0.00	0.00	75.50	3.00	82.80
Central Univerisity, Visva Bharati, West Bengal (1)	136.00	1.50	0.50	16.00	4.00	158.00	0.00	0.00	0.00	0.00	0.00		158.00
Deemed Univerisity, RKMVU, West Bengal (1)	97.06	1.50	0.50	21.00	3.00	123.06	6.75	151.18	0.00	0.00	157.93		280.99
State Govt. Undertaking													
SCADA, Bihar (1)	95.55	1.50	0.50	16.00	0.00	113.55	2.00	0.00	0.00	0.00	2.00	0.00	115.55

ICAR-ATARI, Kolkata/KVK	Recurring						Non-Recurring					Revol. Fund	Grand total
	P.&A.	T.A.	H.R.D.	Cont.	TSP Cont.	Total	Equip. & furn	Works	Lib.	Vehicle	Total		
WBCADC, Kolkata (1)	33.20	0.80	0.50	6.00	3.00	43.50	0.00	0.00	0.00	0.00	0.00		43.50
NGO													
Bihar (5)	403.80	7.30	2.50	79.84	8.00	501.44	26.00	46.36	0.00	8.00	80.36	0.00	581.80
Jharkhand (5)	537.48	7.40	2.50	65.25	51.00	663.63	44.75	24.05	0.00	0.00	68.80	0.00	732.43
West Bengal (3)	344.13	4.60	1.50	61.57	12.00	423.80	2.00	29.15	0.00	0.00	31.15	0.00	454.95
Strengthening of DEEs													
DEE, BAU, Sabour, Bihar	0.00	2.00	6.00	13.50	0.00	21.50	0.00	30.00	0.00	0.00	30.00	0.00	51.50
DEE, RAU, Pusa, Bihar	0.00	1.50	4.00	10.75	0.00	16.25	0.00	0.00	0.00	0.00	0.00	0.00	16.25
DEE, BAU, Ranchi, Jharkhand	0.00	2.50	5.00	12.25	0.00	19.75	0.00	0.00	0.00	0.00	0.00	0.00	19.75
DEE, UBKV, Coochbehar, WB	0.00	1.00	2.50	7.00	0.00	10.50	0.00	0.00	0.00	0.00	0.00	0.00	10.50
DEE, BCKV, Nadia, WB	0.00	1.00	2.50	7.25	0.00	10.75	0.00	0.00	0.00	0.00	0.00	0.00	10.75
DEE, WBUA&FS, Kolkata, WB	0.00	1.00	2.00	7.50	0.00	10.50	0.00	0.00	0.00	0.00	0.00	0.00	10.50
GRAND TOTAL	6210.00	144.25	70.05	1670.70	360.00	8455.00	293.50	1276.50	0.00	80.00	1650.00	15.00	10120.00

2. KRISHI VIGYAN KENDRA

Krishi Vigyan Kendra (KVK), which is spreading over 680 districts of the country, is an organization at district level to organize frontline extension activities. It aims at technology assessment and refinement system, dissemination of technology generated by the Universities/ Research Institutes, supply of critical inputs and reaching out to the farmers with different solutions of their farming problems. KVK also provides technological expertise to different state and central government agencies involved in agricultural research and extension. In addition, it implements several schemes of central and state government at district level. Recently, KVKs have been entrusted with implementation of several National Flagship programmes, viz., Soil Health Card, PMFBY, Swachh Bharat Abhiyan, Skill Development in Agriculture and many others.

STATE-WISE DISTRIBUTION OF KVK

During 2016-17, under ICAR-ATARI, Kolkata a total 89 KVKs were working in three states of eastern India as well as in two UT. Host organization-wise distribution showed 60 KVKs under SAU, 12 under ICAR, 13 under NGOs, 2 under State Government undertaking, 1 each under Deemed University and Central University as mentioned in the following table.

Table: State wise status of Krishi Vigyan Kendras

Name of the State	No. of Districts	No. of KVKs under						TOTAL
		SAU	ICAR	DU	CU	NGO	SDA	
Bihar	38	32	1	-	-	5	1	39
Jharkhand	24	16	3	-	-	5	-	24
West Bengal	21	12	4	1	1	3	1	22
A&N Islands	3	-	3	-	-	-	-	3
Lakshadweep	1	-	1	-	-	-	-	1
Total	87	60	12	1	1	13	2	89

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

Table: Host organization wise status of Krishi Vigyan Kendras

Sl. No.	State/UT	Host Institution	Total
1.	A & N Islands(3)	Central Agricultural Research Institute, (ICAR) Port Blair	3
2.	Bihar (39)	Rajendra Agricultural University, Pusa, Samastipur	12
		Bihar Agricultural University , Bhagalpur	20
		ICAR Research Complex for Eastern Region, Patna	1
		Sone Command Area Development Agency, (SDA) Bhojpur	1
		Shrama Bharti, Khadigram, Jamui (NGO)	1
		Vanavasi Seva Kendra, Bhabhua, Kaimur (NGO)	1
		S.K. Chaudhary Educational Trust, Madhubani (NGO)	1
		Gram Nirman Mandal, Nawada (NGO)	1
		Samata Seva Kendra, Sitamarhi (NGO)	1
3.	Jharkhand (24)	Birsa Agricultural University, Kanke, Ranchi	16
		Central Rice Research Institute, (ICAR) Cuttack	1
		Ram Krishna Mission Ashram, Ranchi (NGO)	1
		Holy Cross, Hazaribag (NGO)	1
		Vikas Bharati, Gumla (NGO)	1
		Santhal Paharia, Deoghar (NGO)*	1
		Garmin Vikas Trust, Godda (NGO)	1
		Indian Institute of Resins and Gum, Namkum, Ranchi	1
		ICAR Research Complex for Eastern Region, Patna	1

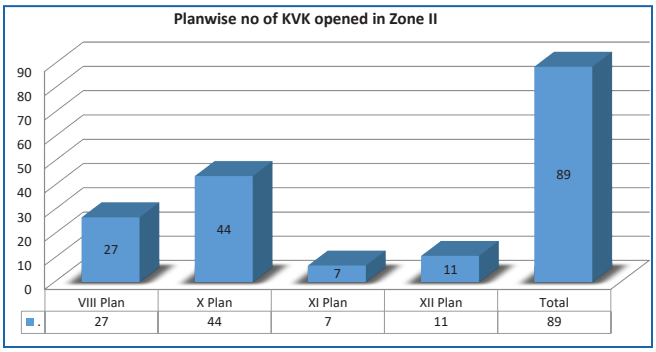
Sl. No.	State/UT	Host Institution	Total
4.	West Bengal (22)	Bidhan Chandra Krishi Viswavidyalaya, Nadia	4
		Uttar Banga Krishi Viswavidyalaya, Coochbehar	5
		West Bengal University of Animal & Fishery Sciences, Kolkata	3
		Visva Bharati, Bolpur, Santiniketan (CU)	1
		ICAR-Central Research Institute for Jute and Allied Fibres, Barrackpore, N 24 Pgs.	2
		ICAR-National Dairy Research Institute, ERS, Kalyani, Nadia	1
		ICAR- Central Institute for Semi-Arid Horticulture, Regional Station Malda	1
		W.B. Comprehensive Area Development Corporation, (SDA) Kolkata	1
		Kalyan, Purulia (NGO)	1
		Seva Bharati, West Midnapore (NGO)	1
		Rama Krishna Ashram, South 24-Parganas (NGO)	1
		Ram Krishna Mission Vivekananda Universty, Belur Math	1
5.	Lakshadweep (1)	Central Agricultural Research Institute, (ICAR) Port Blair	1
	Total		**89**

* Presently under state administration

GENESIS OF KRISHI VIGYAN KENDRA

Establishment of KVK started in the year 1974 at Pondicherry under Tamil Nadu Agricultural University as a result of recommendation of Dr. Mohan Singh Mehta Committee appointed by ICAR in 1973. Then Planning Commission approved establishment of KVK during different plans leading to number of KVKs to 680 at present. In the state of West Bengal, number of larger districts are more which leads to establishment of additional KVKs in 11 districts. Out of which 4 KVKs has already been established. During V Year Plan 18 KVKs were established, 12 KVKs opened during 1979, 14 during 1981, 44 during VI Five Year Plan were also started. Thus at the end of VI Plan 89 KVKs had started functioning. During VII Plan 20 new KVKs were established. Success of the KVK in the field of technology assessment and refinement resulted in 74 KVKs sanctioned in 1992-93 and 78 KVKs during 1992-97 taking the total number of KVK to 261 during VIII Plan. Following the Prime Ministers' Independent Day speech on 15th August, 2015 i.e. declaration of one KVK in each rural district. Indian Council of Agricultural Research established 668 KVKs across the country till the end of XII Five Year Plan.

Under ICAR-Agricultural Technology Application Research Institute Kolkata with its jurisdiction of Bihar, Jharkhand, West Bengal and A&N Islands established 89 KVKs as on March 2017. The KVKs in the district of East Midnapore, West Bengal have made functional. Proposal for opening KVKs in larger districts like Murshidabad, Burdwan is under consideration by the Council. There are also proposal for opening new KVKs in Bihar, Jharkhand and West Bengal. The planwise growth of the KVKs under Zone-II are shown in the below graph. It indicated establishment of maximum KVK (44) during X plan, 8 in XI plan and 11 during XII plan.



Mandate: The mandate of Krishi Vigyan Kendras is to assess, refine and demonstrate technologies/products to cater to the needs of farming community, extension personnel and other stakeholders in the district. In order to accomplish the aim, KVKs carry out the following activities:

- Conduct on-farm trials to identify the location specificity of agricultural technologies under various farming systems.
- Organize frontline demonstrations to establish production potential of various crops and enterprises on the farmers' fields.
- Organize need based training for farmers to update their knowledge and skills on modern agricultural technologies and provide training to extension personnel to orient them in the frontier areas of technology development.
- Create awareness about improved agricultural technologies among various clientele groups through appropriate extension programmes.

- Produce quality seeds, planting materials, livestock breeds, animal products, bio-products etc. as per the demand and supply the same to different clienteles.
- Work as knowledge and resource centre of agricultural technologies to support the initiatives of public, private and voluntary sectors for improving the agricultural economy of the district.

Manpower: Staff strength provided to each KVK was 16 which includes one Programme Coordinator, six Subject Matter Specialists, three Programme Assistants, two administrative staff, two drivers and two supporting staff. Accordingly, the total sanctioned staff for 89 KVKs of Zone II is 1424, out of which 903 (75 per cent) are in position. Details of state wise and category wise staff strength of KVKs are furnished in the following table:

Table: Staff position in KVK

Staff Position	A&N Islands and Lakshwadeep	Bihar	Jharkhand	West Bengal	Zone II
Programme Coordinator	2	25	10	12	49
Subject Matter Specialist	16	163	91	76	346
Prog. Assistant	0	25	15	11	51
Others	14	235	82	126	457
TOTAL	**32**	**448**	**198**	**225**	**903**

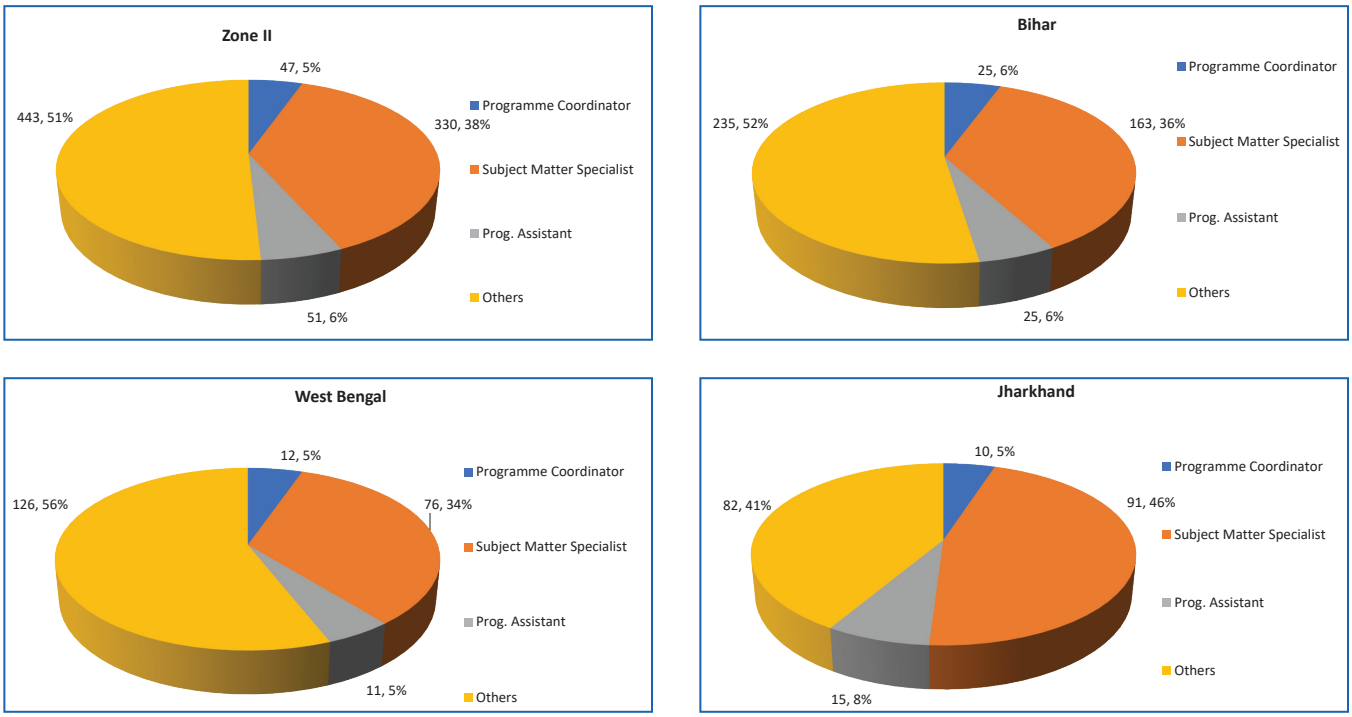


Fig : Filled up position in different staff categories in zone II

Table: Category-wise staff position

Name of State	PC			SMS			Farm Manager			PA (Computer)			PA (Lab. Tech)			Others			TOTAL		
	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V
A & N Islands	3	2	1	18	15	3	3	2	1	3	2	1	3	0	3	18	10	8	48	31	17
Lakshadwip	1	0	1	6	1	5	1	0	1	1	0	1	1	0	1	6	0	6	16	1	15
Bihar	39	25	14	234	163	71	39	25	14	39	32	7	39	25	14	234	178	56	624	448	176
Jharkhand	24	10	14	144	91	53	24	12	12	24	12	12	24	15	9	144	58	86	384	198	186
West Bengal	22	12	10	132	76	56	22	13	9	22	15	7	22	11	11	132	98	34	352	225	127
Total	**89**	**49**	**40**	**534**	**346**	**188**	**89**	**52**	**37**	**89**	**61**	**28**	**89**	**51**	**38**	**534**	**344**	**190**	**1424**	**903**	**521**

REVOLVING FUND

Since the KVKs have been provided revolving fund as one time seed money for making KVK farm self sufficient in terms of resources through seed/ sapling production, use of ponds for fish production and establishment of horticulture orchards. Income generated was used for improvement of the farm. Revolving fund reported by 68 KVKs of Zone-II where revolving fund scheme is operating accumulated a net balance was Rs. 12.46 crore as on 1st April, 2017. In the year 2015-16, a substantial amount of fund i.e. 11.08 core was generated by the KVKs of Zone II through revolving fund scheme. As far state was concerned, Bihar KVKs earned the amount of Rs. 587.59 lakh, West Bengal of 540.84 lakh and Jharkhand of Rs. 117.65 lakh through this scheme in the year 2016-17. The detail status of revolving fund of KVKs under Zone II has been presented in table given bellow.

Table: Status of operating revolving scheme by the KVKs

State	Year	Opening balance as on 1st April	Income during the year	Expenditure during the year	Net balance in hand as on 1st April of each year
Bihar	2014-15	38255227.58	38275613.65	30444336.75	46082,288.91
	2015-16	46200651.83	34788307.02	24856843.98	56038131.89
	2016-17	55958390.64	33154976.60	22283393.53	58759381.83
Jharkhand	2014-15	6083146.00	7846378.00	6169381.00	7420363.00
	2015-16	7222459.00	12066455.00	9892821.00	9991272.00
	2016-17	10218035.00	8214650.00	6805933.02	11765466.98
West Bengal	2014-15	21937157.30	28641930.75	22075822.66	32022934.40
	2015-16	32482430.78	41136204.18	31453049.25	44821396.61
	2016-17	45715716.61	41976310.41	1163887679	54084697.34
Total	2014-15	66275530.88	74763922.4	58689540.41	85525586.31
	2015-16	85905541.61	87990966.2	66202714.23	110850800.5
	2016-17	111892142.3	83345937.01	1192977006	124609546.2

Infrastructure facilities: In order to enable the KVKs to accomplish its set objectives, KVKs have been provided with number of infrastructure facilities like administrative building, farmers' hostel, staff quarter, demonstration unit, soil and water testing laboratories, rain water harvesting structure with micro-irrigation facilities, portable carp hatchery, IFS model, E-connectivity, technology information unit vehicles etc. In most of the cases, KVKs utilize the facilities for the cause of the farmers to demonstrate the benefit of proper management practices. The details of infrastructure facilities available with the KVKs are given in Table. No additional infrastructure was provided to KVK in last financial year.

Table: State-wise details of infrastructure available with KVKs

Name of the state	Admn. Bldg.	Farmer Hostel	Demo. Unit	Staff Qtrs	Rain Water Harvesting Structures	Soil and Water Testing Lab	Minimal Processing Facility	Carp Hatchery	Integrated Farming System Units	e-linkage Facility	Technology Information Unit	Mini Seed Processing Facility	Provision of 25 KVA Silent Genset	Micro Nutrient Analysis Facilities	Solar Panel
A&N Islands	1	1	2	1	0	1	0	1	0	1	0	0	1	0	0
Bihar	38	38	49	38	2	25	0	1	7	5	2	0	15	0	1
Jharkhand	22	22	34	21	20	20	3	2	6	4	1	0	7	1	2
West Bengal	18	18	32	15	6	13	6	8	9	5	1	0	0	0	0
Total	**79**	**79**	**117**	**75**	**28**	**59**	**9**	**12**	**22**	**15**	**4**	**0**	**23**	**1**	**3**

Thrust area: Thrust areas are identified based on the prevailing agro-ecological situation, existing cropping pattern and farming systems and expectation of the district economy on agriculture. Accordingly, KVKs are working on the following thrust areas:

1. Productivity enhancement of cereals, pulses and oilseeds
2. Production of quality inputs like seed of major crops, planting materials etc. and breeds of livestock
3. Capacity building among rural youths towards self-employment
4. Integrated nutrient, pest and disease management
5. Establishment of farming system in the region
6. Empowerment of women in terms of improved nutrition, income and drudgery reduction through technological literacy
7. Value addition, processing and market facilitation of household and commercial enterprises
8. Use of resource conservation technology
9. Major initiative to combat climate change in the region.
10. Contingency planning for monsoon
11. Initiative for growth of fodder technology
12. Water harvesting and watershed management
13. Small scale mechanization for reducing cost and drudgery

3. ABOUT AGRICULTURAL TECHNOLOGY APPLICATION RESEARCH INSTITUTE (ATARI), KOLKATA

The network of 680 Krishi Vigyan Kendras spread across the country is the part of Division of agricultural Extension of ICAR. Deputy Director General (AE) who looks after the administrative, financial and overall functioning of KVK. Agricultural Technology Application Research Institutes (ATARIs) are looking after monitoring the KVK system in the state and district level. The Division of Agricultural Extension of ICAR is supported by eight erstwhile Zonal Project Directorates (now Agricultural Technology Application Research Institutes (ATARIs). The objective of the Institute is to plan, monitor, evaluate and guide and monitor the programmes of the KVK and judge the performance of KVKs time to time.

Genesis: The Zonal Project Directorate (erstwhile Zonal Coordinating Unit), Zone-II began its journey from the office premises located within the Directorate of Extension Education Complex of B.C.K.V., Mohanpur, Nadia, West Bengal with the specific objective to monitor and evaluate the Lab to Land Programme (LLP), country wide launched in the year 1979 in celebration of the ICAR Golden Jubilee Year and drawing fund support from the Cess Fund of ICAR. Alongside, it was entrusted with the responsibility to monitor and guide the activities of KVKs which were gradually coming up that time with great future promise as District Level First Line Agricultural Institutions. The initial operational jurisdiction of the Unit was spread over West Bengal, Orissa and A&N Islands. However, due to demanding administrative reasons, the state of Bihar was subsequently brought under the fold of Zone-II in the year 1991 in lieu of Orissa, which was then shifted under Zone VII. The jurisdiction of ZPD was further extended to include the newly created state of Jharkhand in the year 2000. After ten years of its operation from B.C.K.V., the office of the then ZPD-II was shifted to Veterinary College Campus, Belgachia, Kolkata for required infrastructural facilities. However, conversion of Veterinary College in to West Bengal University of Animal and Fishery Sciences again necessitated the Unit to shift its office to NBSS&LUP Campus, Salt Lake, Kolkata in the year 1996. During those years of instability in office housing, nevertheless, the Unit went on widening its service domains creditably in the form of successful implementation of a score of ICAR supported programmes like Operational Research Project, National Demonstration and All India Coordinated Research Project on Scheduled Caste and Scheduled Tribe. Besides, special projects on Frontline Demonstrations under National Oilseed Production Programme (NOPP) and under National Pulse Production Programme (NPPP) were also carried out. Front Line Demonstrations on Farm Implements and Cotton were also initiated by this Unit in this Zone. Finally, the Zonal Coordinating Unit has been upgraded to Zonal Project Directorate in the pattern of other Project Directorates / Institutes of ICAR including administrative and financial power since 2009. The Directorate moved to its new administrative building in Salt Lake, Kolkata in 2013. Since July 2015, this Directorate has been renamed as Agricultural Technology Application Research Institute, Kolkata.

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

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

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

- Formulate, implement, monitor, guide and evaluate the programmes and activities of KVKs.
- Coordinate the work relating to KVKs and ATICs implemented through various agencies such as SAUs, ICAR institutes, voluntary agencies and development departments.
- Coordinate with State/Central Government organizations, financial institutions and other organizations for successful implementation of programmes.
- Partnering with Directorates of Extension Education of SAUs in assured technological backstopping to KVKs and appropriate overseeing of KVK activities.
- Strengthening the Directorates of Extension Education of SAUs with financial support.
- Serve as feedback mechanism from the projects to research and extension systems.
- Implementing projects of ICAR like NICRA, NIFTD and others.
- Maintain close liaison with ICAR headquarter particularly with Division of Agricultural Extension for preparing reports, write ups and other important documents.

Staff: The Agricultural Technology Application Research Institute, Kolkata is having total sanctioned staff strength of 18, out of which 14 were filled up on 31.03.2017.

Table: Staff strength of Agricultural Technology Application Research Institute, Kolkata

Category	Sanctioned	Filled
Director (RMP)	1	0
Scientific	6	6
Technical	1	1
Administrative	8	6
Skilled Supporting Staff (Gr. II)	2	1
Total	**18**	**14**

INSTITUTE MANAGEMENT COMMITTEE

Institute Management Committee meeting for Agricultural Technology Application Research Institute, Kolkata was held on 13th January, 2017. The members were apprised of the functioning of Agricultural Technology Application Research Institute, Kolkata, achievements and various initiatives taken to monitor the activities of the KVK. In the course of discussion initiative taken in the field of research and technological backstopping was also discussed. Suggestions of the members were taken for the effective functioning of the Institute. Approval for the proposed agenda items was also taken.

NEW INITIATIVES OF ATARI KOLKATA

Agricultural Technology Application Research Institute, Kolkata, besides performing its regular monitoring activities, also encouraged the KVKs of this zone to get them involved in a number of programmes depending on the farmers need in the district and technical capability of the KVKs to better contribute towards growth of agriculture and allied sectors. Some of the flagship programmes which were undertaken by KVKs during 2016-17 and newly conceived ATARI activities are enlisted as under:-

- Skill Development Training Programmes (ASCI)
- Krishi Vigyan Kendra (KVK) Knowledge Network/ KVK Portal
- Seed Hub
- Attracting and Retaining Youth in Agriculture (ARYA)
- Farmer FIRST Programme
- Celebration of Swachhta Pakhwada 2016
- Implementation of CSISA-ICAR Collaborative Project Phase-III
- NFDB funded Capacity Building Training Programme
- KRISHI Portal
- Management Information System including Financial Management System (MIS-FMS) under ICAR-ERP
- Online reporting by KVKs

4. ACHIEVEMENTS

4.1 TECHNOLOGY ASSESSMENT AND REFINEMENT

In fulfilling the most important part of the revised mandate, 89 KVKs of this Zone worked towards successful application of implementable technologies in the field of agriculture and allied sectors. In technology application front, the KVKs assessed, refined and demonstrated various agricultural technologies and imparted training on various crop, livestock fishery related technologies extending their practical aspects for betterment of the farming community and other stakeholders. During 2016-17, a total of 83 KVKs of Zone-II conducted on-farm trials with an objective to assess and refine the technologies developed by different institutions in agriculture and allied sectors. Specifically prioritized area of assessing the technologies by KVKs sometimes demanded refinement of the technologies through either KVKs or the research institutions. The technologies, which were assessed and refined, included those in the areas of crop production, insect-pest and disease management, nutrient management, feed and fodder management, livestock production and health management, drudgery reduction, value addition and other areas. About 20 thematic areas were identified for assessment and refinement of technologies and presented in following table.

Improved technologies related to crop production, livestock production, fish production, drudgery reduction and value addition etc. have been assessed to provide technological solution to the farming community pertaining to various aspects of agriculture and allied areas. During the year 2016-17, the KVKs conducted 669 on-farm trials in 6632 locations to assess and refine a total of 403 technologies. Among various thematic areas, technologies were tested in integrated crop management through 135 on-farm trials, followed by integrated nutrient management (128 on-farm trials), integrated disease management (58 on-farm trials), integrated pest management (57 on-farm trials), varietal evaluation (46 on-farm trials), weed management (38 on-farm trials), integrated farming system (26 on-farm trials) and others. In livestock sector, the highest number (34) of on-farm trial was conducted in the area of livestock nutritional management followed by livestock production and management (20 on-farm trials). In fishery, 28 on-farm trials were conducted during this year.

State-wise analysis of on-farm trials conducted showed that KVKs of Andaman and Nicobar Islands carried out a total of 20 on-farm trials distributed in 157 locations, the corresponding values for the states Bihar were 322 and 3458, for Jharkhand were 188 and 1744, for West Bengal were 139 and 1273, respectively. A total of 61 on-farm trials were conducted by KVKs of Bihar in integrated nutrient management, 41 by KVKs of Jharkhand and 24 by KVKs of West Bengal in the same thematic area. The other important areas for the KVKs of Bihar were integrated crop management (58 on-farm trials), integrated disease management (34 on-farm trials), weed management (28 on-farm trials) and integrated pest management (26 on-farm trials) etc. In Jharkhand, integrated crop management was the most important thematic area with 44 number of on-farm trials followed by integrated nutrient management (41 on-farm trials) integrated pest management (18 on-farm trials), livestock nutrition management (13 on-farm trials) and others. In West Bengal, integrated crop management was the most important thematic area (28 on-farm trials) followed by integrated nutrient management (24 on-farm trials), integrated disease management (14 on-farm trials) and fishery (12 on-farm trials) etc. The feedback on the performance of the technologies has also been brought to the notice of research and extension wing for their effective dissemination in the entire zone. Some of the on-farm trials conducted by the KVKs are presented below with table, photographs and relevant information.

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

Thematic Area	A & N Islands		Bihar		Jharkhand		West Bengal		Total	
	No. of location	No. of OFT	No. of location	No. of OFT	No. of location	No. of OFT	No. of location	No. of OFT	No. of location	No. of OFT
Integrated Crop Management (ICM)	47	5	503	58	387	44	180	28	1117	135
Integrated Disease Management (IDM)	10	1	307	34	87	9	123	14	527	58
Integrated Nutrient Management (INM)	15	2	501	61	387	41	204	24	1107	128
Integrated Pest Management (IPM)	4	1	236	26	153	18	102	12	495	57
Varietal Evaluation (VE)	3	1	220	23	112	12	87	10	422	46
Weed Management (WM)			236	28	60	7	21	3	317	38
Storage Technology (ST)			10	1	45	5	30	3	85	9
Value Addition (VA)			104	10	57	8	10	1	171	19

Thematic Area	A & N Islands		Bihar		Jharkhand		West Bengal		Total	
	No. of location	No. of OFT	No. of location	No. of OFT	No. of location	No. of OFT	No. of location	No. of OFT	No. of location	No. of OFT
Resource Conservation Technology (RCT)			20	1	10	1			30	2
Integrated Farming System (IFS)	10	1	112	12	109	10	20	3	251	26
Drudgery Reduction (DR)			30	3					30	3
Farm Implements & machineries (FIM)			64	7	10	1	10	1	84	9
Food and nutrition (F&N)	10	1	100	10	20	2	28	2	158	15
Others	0		50	5	10	1	20	2	80	8
Total	**99**	**12**	**2493**	**279**	**1447**	**159**	**835**	**103**	**4874**	**553**
Production and Management (P&M)	11	2	342	5	55	5	94	8	502	20
Nutrition management (NM)	30	4	367	12	136	13	57	5	590	34
Fishery	17	2	87	10	34	4	136	12	274	28
Feed and fodder			10	1			85	2	95	3
Breed Evaluation (BE)			16	2	32	4	53	5	101	11
Disease management			103	10	40	3	2	2	145	15
Total	**58**	**8**	**925**	**40**	**297**	**29**	**427**	**34**	**1707**	**111**
Enterprise			40	3			11	2	51	5
Grant Total	**157**	**20**	**3458**	**322**	**1744**	**188**	**1273**	**139**	**6632**	**669**

ANDAMAN AND NICOBAR ISLANDS

KVK Port Blair

Thematic area: Integrated nutrient management

Evaluation of various nitrogen management measures in rice

Rice is a major consumer of nitrogenous fertilizer but the efficiency of nitrogen (N) use is very poor. Paddy crop utilizes hardly 30-40% of applied N to the soil while the remaining portion of about 60–70% is lost by various ways such as leaching, denitrification and volatilization etc. It is widely recognized that about 50% N applied through ordinary urea to the soil is lost and as such as this situation poses as serious problem in maximizing paddy production, because of low recovery of applied N fertilizer and adverse effects on the environment. Input efficiency of N is one of the lowest among the plant nutrients due to high losses, which, in turn, contributes substantially to environmental pollution and further depletion of stocks of non-renewable energy sources used in fertilizer production. Keeping this in view, four technical options including Farmers' practice were evaluated through conducting a multi-locational trial involving 5 replications each.

Application of N increased significantly the number of panicles m^{-2} and number of grains per panicle over Farmers' practice. TO-III (Leaf Colour Chart based N application with 25kg N/ha@<4) recorded significantly higher number of panicles m^{-2} and number of grains $panicle^{-1}$ followed by TO-II (Leaf Colour Chart based N with 20kg N/ha@<4) than other treatment groups. Production of number of panicles m^{-2} under TO-II and TO-III (358 and 341 m^{-2} respectively) was at par with each other. With respect to N management, TO-II produced significantly higher grain yield of 49.2q/ha. The highest nitrogen use efficiencies such as agronomic efficiency, physiological efficiency and recovery efficiency and partial factor productivity were observed under TO-II. The gross and net returns of Rs. 49200/- and Rs. 25100/-, respectively, were also recorded in TO-II with B: C ratio of 2.04.

Table: Effect of various LCC based N management measures in rice

Technology option	No of trials	Yield components				Grain yield (q/ha)	Straw yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C ratio
		No of panicle/ m2	Panicle length	Filled grains panicle	Test weight (g)						
FP: Farmers' practice (No fertilizer application)	5	258	21.3	112.4	19.7	39.2	52.7	22750	39100	16350	1.72
TO-I: Recommended dose of N (90 kg/ha in two splits)	5	289	24.5	129.1	20.6	43.4	59.4	24840	44500	19660	1.79
TO-II: Leaf Colour Chart (LCC) based N application (20kg N/ ha@<4)	5	358	25.7	152.7	21.8	49.2	63.5	24100	49200	25100	2.04
TO-III: Leaf Colour Chart (LCC) based N application (25kg N/ ha@<4)	5	341	25.3	145.8	21.7	48.5	61.8	24350	48400	24050	1.99

JHARKHAND

KVK Bokaro

Thematic area: Integrated disease management

Assessment of various control measures for damping off disease in tomato crop

Tomato is a very important crop grown in Bokaro district. High mortality of tomato seedling due to occurrence of damping off disease has been identified as a critical problem in cultivation of this vegetable crop. In order to address this issue, KVK Bokaro carried out a multi-locational trial at 10 different locations for identifying the most effective control measure for the disease. Result of the experiment indicated that TO-III, i.e., Soil treatment with *Trichoderma viridae* @3.0 g/m^2 alongwith seed treatment with *Trichoderma viridae* @4g/100g seed, was effective in managing damping off disease in tomato with the recorded yield of 156.24q/ha, while the net return was recorded to be Rs. 397320/- with a B:C ratio of 5.50.

Table: Effect of various control measures for damping off disease in tomato

Technology option	% of no. of plant		% of Wt. of plant		Yield (q/ha)	Gross return (Rs.)	Net return	B:C ratio
	Healthy	Damaged	Healthy	Damaged				
FP: Farmers' practice (1.5 kg FYM/m^2 + fungicide after disease appearance with Mancozeb @ 3-4 g/lit water)	12.54	12.85	11.63	12.44	95.35	286050	214930	3.0
TO-I: Soil solarization of seed bed (150-200 micron polythene) + karanj cake @ 400g/m^2	8.53	7.93	8.25	8.62	138.62	415860	344610	4.8
TO-II: Soil solarization + soil treatment with *Trichoderma viridae* @ 3.0 g/m^2	7.42	6.86	7.43	7.55	149.46	448380	377080	5.2
TO-III: Soil treatment with *Trichoderma viridae* @3.0 g/m2 + seed treatment with *Trichoderma viridae* @4g/100g seed	6.57	6.24	6.33	6.54	156.24	468720	397320	5.5

KVK Chatra

Thematic area: Livestock health management

Assessment of the efficacy of various anti-diarrheal therapies in kids

Poor growth and mortality due to diarrhea and associated diseases in kids was major problem identified in goat farming. To solve this problem, KVK Chatra conducted a field trial at 10 different locations involving 100 animals to assess the efficacy of anti-diarrheal formulations in kids. Results showed that TO-I (Neblon @ 20-40 g/ day at 3 times daily with fresh water) gave the lowest mortality rate of 10% and the highest body weight of 12.67 kg in 9 months of age with the highest body growth (329.61 g/ day). In respect to TO-II (Norflox-TZ (200mg) per day @ 2 times daily with fresh water), the corresponding values

were less than TO-I. The B:C ratio of 5.35 was found in TO-I followed by TO-II. In controlling the diarrheal disease of kids, this technology (TO-I) was recommended for micro level situation as the farmers' reaction was very positive about the herbal formulation because of its easy availability and absence of any side effect.

Table: Efficacy of different anti-diahrroeal formulations in kids

Technology option	Technical Parameters					Economic Parameters		
	Body weight (kg)			Mortality %	Avg. daily gain (g/ day)	Gross Income (Rs./ha)	Net Income (Rs./ha)	B:C ratio
	3 months (Group wt)	6 months (Group wt)	9 months (Group wt)					
FP: Farmers' practices (250 g Jaggery (Gur) + 250 g Barely flour + 4-6 spoon salt dissolved in 3 lit of water (given 3 times/day)	5.300 (53.00)	6.900 (41.4)	10.200 (61.20)	40	45.55	18360	12160	2.96
TO-I: Neblon (20 - 40 gram) per day (3 times with fresh water)	5.500 (55.00)	8.260 (74.32)	12.670 (114.03)	10	329.61	34209	27809	5.35
TO-II: Norflox – TZ (200 mg)/day (2 times with fresh water)	5.400 (54.00)	7.930 (71.37)	12.320 (110.88)	10	316.00	33264	26664	5.04

KVK Giridih

Thematic area: Varietal evaluation

Assessment of different varieties of maize for medium land situation of Giridih district

Maize is an important cereal crop covering an extensive area of uplands and medium lands during kharif season. A large area particularly of resource poor farmers is still under traditional / local variety which is low yielding and poorly responsive to crop management practices. Evaluation and introduction of high yielding varieties was felt necessary for improving production and productivity of this crop in this area. To address this, KVK Giridih took up a multi-locational trial in 10 different locations involving four treatment groups for identifying the most suitable maize variety of the district. It was evident from the trial that TO-I (Variety CMH 08-282) recorded the highest yield of 66.2 q/ha and B:C ratio of 2.29. Other variety like JH-10655 (TO-II) showed the yield of 62.3 q/ha and B:C ratio of 2.17 while the variety HQPM-5 (TO-III) recorded the yield of 59.6 q/ha and B:C ratio of 2.07). They almost showed at par capability to each other and better yield in comparison to Farmers' variety, i.e., Kanchan.

Table: Yield and yield attributing characters of different maize varieties

Technology option	Plant height (cm)	Length of cob (cm)	Av. grain wt (gm)/cob	Grain yield (q/ha)	B:C ratio
FP: Farmers' practice (Kanchan)	171.60	12.55	45.52	34.1	1.70
TO-I: CMH 08-282	177.25	18.06	71.03	66.2	2.29
TO-II: JH-10655	174.35	16.10	66.31	62.3	2.17
TO-III: HQPM-5	173.20	15.2	62.4	59.6	2.07

KVK Gumla

Thematic area: Integrated Nutrient Management

Evaluation of applying different levels of sulphur on the yield of onion

Low yield of onion due to poor fertilizer management has been identified as a major problem of onion growers in Gumla district. In order to solve this problem, a field trial was conducted by KVK Gumla at 10 different locations involving various doses of sulphur application alongwith the fertilizer combinations. It was found that TO-II, i.e., application of recommended dose of NPK 100:50:60 kg/ha along with a basal application of sulpur @ 15 kg/ ha, recorded the highest bulb diameter (6.16 cm), bulb weight (132.40 gm) and yield (147.25 q/ha), which were significantly higher than FP (FYM 25 q/ha + 50:40:20 kg NPK/ha) and TO-I (FP + Sulphur @ 25 kg/ha as a basal application). The yield enhancement was 35.27% and 8.49% over FP and TO-I, respectively. The net return (Rs. 121200) and B:C ratio (3.18) in TO-II was also higher than FP and TO-I.

Table: Effect of different levels of sulphur on the yield of onion

Technology option	No. of trials	Yield components				Cost of cultivation (Rs./ha)	Gross income (Rs./ha)	Net income (Rs / ha)	B:C ratio
		Bulb diameter (cm)	Plant height (cm)	Weight/ bulb (gm)	Yield (q/ha)				
FP: FYM 25 q/ha + 50:40:20 kg NPK/ha	10	4.82	38.67	71.44	108.85	48500	130620	82120	2.69
TO-I: FP + Sulphur @ 25 kg/ha as a basal application	10	5.64	43.90	102.57	135.72	52500	162864	110364	3.10
TO-II: Recommended dose of NPK 100:50:60 kg/ha + Sulphur @ 15 kg/ ha as a basal application	10	6.16	50.60	132.40	147.25	55500	176700	121200	3.18
SEm+		0.15	1.58	2.95	1.76				
CD(P=0.05)		0.46	4.47	8.77	5.24				

KVK Hazaribag

Thematic area: Integrated nutrient management

Assessment of various doses of potassium application on yield and uptake of nutrients by cowpea

Reduced yield due to lack of potassium application in cowpea was identified as a major problem for cowpea growers in the district. Moreover, the soil status of the area also depicted the potassium deficiency. Keeping this in view, a multi-locational trial was designed and carried out by KVK Hazaribag at 12 different locations of the district. The results of the experiment showed that TO-II (Application of potassium @ 60 kg/ha) was the best practice for cultivation of cowpea because it yielded the highest crop (151.28 q/ha) with B:C ratio of 2.01.

Table: Effect of potassium application on yield of cowpea

Technology option	No. of trials	Average yield (Q/ha)	Net Profit (Rs/ha)	B:C ratio
FP: Farmers' practice (Application of potassium @ 20 kg/ha)	12	120.28	134460	1.26
TO-I: Application of potassium @ 40 kg/ha	12	151.28	196460	1.85
TO-II: Application of potassium @ 60 kg/ha	12	150.96	213820	2.01

Table: Nutrient status of the soil in experimental plots under different treatments

Technology option	Initial soil status					Final soil status				
	pH	O.C%	Available N(kg/ha)	Available P(kg/ha)	Available K (kg/ha)	pH	O.C%	Available N(kg/ha)	Available P(kg/ha)	Available K (kg/ha)
FP	5.7	0.40	221	9.2	252	5.7	0.38	228	9.1	251.0
TO-I	5.7	0.40	221	9.2	252	5.6	0.38	226	9.3	252.0
TO-II	5.7	0.40	221	9.2	252	5.7	0.40	224	9.4	254.0

KVK Ranchi

Thematic area: Integrated pest management

Assessment of various control measures of soft rot disease in improving productivity of ginger

Soft rot disease is a major factor affecting the production and productivity of ginger in Ranchi and adjoining districts. The disease usually occurs due to fungal infestation and there are many control measures for this. Based on the location specific resources, KVK Ranchi conducted a field trial at 10 different locations of Ranchi district to assess the production and economic parameters of ginger by adopting the control measures for soft rot disease like seed treatment and intercropping. The results of the trial indicated that TO-II (Seed treatment through Carbendazim 50% WP and use of *Trichoderma* 5kg/ha in field + Lime 2.5 kg + Application of bleaching power @ 200 gm/100m^2 15 days before final land preparation and use intercropping with 5:1 Ginger + Turmeric) increased the yield to 249.68q/ha and was proved to be superior to the Farmers' practice. The B:C ratio (4.25) was also found highest in this treatment group.

Table: Effect of different control measures on productivity of ginger

Technology option	No. of trials	Yield component			% reduction in rhizome rot	Total Yield (q/ha)	Net return (Rs./ha)	B:C ratio
		Ginger	Turmeric	Damage yield				
FP: Farmers' practice (No seed treatment and intercropping)	10	180.16	-	33.87	-	214.03	278060	3.07
TO-I: Seed treatment through Carbendazim 50% WP and use of Trichoderma 5kg/ha in field	10	225.37	-	18.86	87	244.59	329180	3.95
TO-II: TO-I + Liming @ 2.5 kg + Application of bleaching powder @ 200 gm/100m^2 15 days before final land preparation and use intercropping with 5:1 Ginger + Turmeric	10	207.93	62.64	8.06	93.8	249.69	334380	4.15




KVK Palamu

Thematic area: Human nutrition

Assessment of nutrient content of health mix prepared from locally available food resources

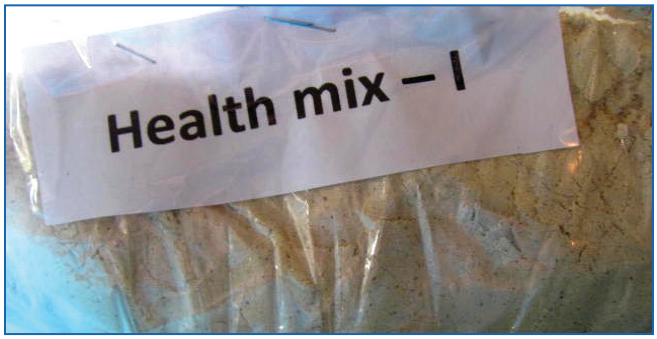
Nutritional imbalance in food materials leads to malnutrition in consumers. In Palamu district, the incidence of malnutrition among the farm women is common problem leading to worsening human health problems. To address this issue, a cost-effective food mix was attempted to prepare from the locally available resources by KVK, Palamu through conducting a field trial involving farm women. Selected farm women were imparted training prior to conducting the trial. The field trial was conducted at their home with their participation, so that they watch the process of each level of operation. Experimental data were collected involving their active participation, so that they become well acquainted about the performance of each treatment. Finally, TO-II (A low-cost, highly nutritious and easy-to-adopt home scale method) was found better than FP (Unprocessed maize flour).

Table: Nutrient content of health mix prepared from locally available food resources

Technology option	Proximate composition of foods (%)							General acceptability *	Storage period (month)	Cost of Production	Net Return	B:C ratio
	Moisture	Crude protein	Fat	Crude fiber	Ash	CHO	Energy (K.cal.)					
FP: Farmers' practice (Use of unprocessed maize flour)	14.9	10.2	3.4	2.2	2.0	65.0	340	Like slightly (4)	0.5	20	25	1.25
TO-I: Health mix food -1 (Maize-100gm, whole mung-100gm, skimmed milk powder-300 gm, groundnut-100gm, sugar powder-400gm, chocolate powder-50gm)	3.41	10.41	5.06	2.02	1.7	78.50	400	Very much (2)	6	80	50	1.62

Technology option	Proximate composition of foods (%)							General acceptability *	Storage period (month)	Cost of Production	Net Return	B:C ratio
	Moisture	Crude protein	Fat	Crude fiber	Ash	CHO	Energy (K.cal.)					
TO-II: Health mix food-2 (Maize-100gm, Bengal gram-100gm, til-150gm, skimmed milk powder-300 gm, sugar powder-400gm, chocolate powder-50gm)	2.90	15.22	8.04	2.28	1.8	71.26	425	Like extremely (1)	6	90	60	1.67

* 9 point hedonic scale



KVK Simdega

Thematic area: Integrated pest management

Assessment of performance of different pest management practices for shoot and fruit borer and fruit rot disease in brinjal

Low productivity and profitability as well as higher insecticidal load were identified as the key problem in cultivation of brinjal in the district. The productivity loss due to incidence of shoot and fruit borer and fruit rot disease was a common problem among most of the brinjal growers. Further, the indiscriminate use of insecticides for these problems was evident. Keeping this in view, a multi-locational field trial was conducted by KVK Simdega for assessing the efficacy of various bio-formulation based pest management practices in controlling these problems. It was found that TO-II, i.e., Application of Neem cake @ 250 kg/ha (20-25 g/pit) at the time of transplanting followed by 4 foliar spray (Neemban @ 5ml/litre+ Ridomil @ 0.25% at 15 days interval, initiating spraying at 45 days after transplanting, produced the lowest infested plants, highest yield and net return.

Table: Efficacy of various bio-formulation based pest management practices in brinjal

Technology option	No. of trials	Infestation Percentage (%)	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C ratio
FP: Farmers' practice (Spray of Malathion/ Cypermethrin @2-3ml/lt of water)	10	43	85.5	42500	89950	47450	2.34
TO-I: Use of pheromone traps (@12 traps/ ha) + Mechanical destruction of infested shoots and fruits	10	24	106	47500	111500	64000	2.35
TO-II: Application of Neem cake @ 250 kg/ ha (20-25 g/ pit) at the time of transplanting followed by 4 foliar spray (Neemban @ 5 ml/L+ Ridomil @ 0.25% at 15 days interval, initiating spraying at 45 days after transplanting	10	8.5	150.5	57500	158400	100900	2.75
TO-III: Neemban @ 5 ml/lt+ Ridomil @ 0.25% at 15 days interval initiating spraying at 45 days after transplanting	10	10.5	138.5	54500	145600	91100	2.67

WEST BENGAL

KVK Coochbehar

Thematic area: Integrated disease management

Assessment of various advanced protection technologies in improving productivity of lentil

Low productivity due to infestation of soil borne pathogens has been identified as a major problem for lentil growers in Coochbehar district. To solve this problem, KVK Coochbehar took up a field trial at 8 different locations involving the technologies relating to soil fumigation and seed treatment etc. For selection of farmers a group meeting was organized from where a few farmers were selected considering the production system and farming situation. Ultimately 8 no. of farmers were selected from primary list after in situ visit of the farmers' field. It was revealed from the experiment that TO-III (Seed treatment with captan @ 0.25% followed by prophylactic spray of said chemical @ 0.20%) was the best option as it resulted in the highest yield (10.30 q/ha) and consequently highest net return as well as B:C ratio. TO-I (Soil treatment with bio-agent *T. viridae* @ 7.5 kg/ha) has also been found to be a promising technology in reducing infestation of soil borne pathogen, ultimately resulting higher yield (9.0q/ha).

Technology option	No. of trials	Yield (q/ha.)	No. of infected plants/sqm	Gross Cost (Rs./ha)	Gross income (Rs/ha)	Net return (Rs./ha)	B:C ratio
FP: Farmers' practice (Cultivation without seed and soil treatment)	8	6.9	17 (22.7%)	16300	34500	18200	2.12
TO-I: Soil treatment with bio-agent *T. viridae* @ 7.5 kg/ha	8	9.0	9 (12.0%)	17900	45000	27100	2.51
TO-II: Soil treatment by fumigation with residues of previous crop	8	8.1	10 (13.3%)	17400	40500	23100	2.33
TO-III: Seed treatment with captan @ 0.25% followed by prophylactic spray of said chemical @ 0.20%	8	10.30	5 (6.7%)	18600	51500	32900	2.77
CD at 5%		0.96	1.12				

KVK Dakshin Dinajpur

Thematic area: Breed improvement

Evaluation of various improved duck breeds in Dakshin Dinajpur district

Low productivity of indigenous duck under backyard farming practices was found to be a critical problem in duck rearing. To address this issue, KVK Dakshin Dinajpur took up a field trial to assess the performance of various breeds of duck under backyard system of rearing. The results revealed that TO-I, i.e., White Pekinese breed showed better performance in terms of weight gain as well as egg production followed by B:C ratio. Therefore, it may be concluded that the White Pekinese breed may be introduced for large scale rural farming practices as meat or dual purpose breed for sustainable and better profitability in rural Broiler Duck farming in the area.

Table: Comparative performance of various breeds of duck under backyard system of rearing

Technology options	No. of trials	Weight grain from day old upto prodn. age (gm)			Egg Prodn. Upto 72 weeks	Rearing cost (Rs./Bird/ Laying priod)	Gross return (Rs./ Bird/ Laying)	Net return (Rs./Bird/ Laying period)	B:C. ratio
		Day old wt (gm)	72 weeks wt (gm)	Age of 1st laying					
FP: Farmers' practice (Indigenous duck)	21	21	1423	207	57	285	478	193	1.68
TO-I: White Pekinese breed		32	3152	197	163	456	1539	1083	3.38
TO-II: Indian Runner breed		34	2549	182	176	493	1637	1130	3.32
SEm (±)		1.52	34.35	4.93	3.64	--	--	--	--
CD (P=0.05)		4.57	102.11	14.72	10.78	--	-	-	-

KVK Hooghly

Thematic area: Plant protection

Assessment of performance of different pesticides for management of leaf curl viral disease of capsicum

Attack of leaf curl viral disease leading to low yield of capsicum has been identified as a major problem of this important cash crop of the district. To combat this, a multi-locational trial was carried out by KVK Hooghly at 10 different locations involving various crop and plant

protection measures. It was observed that TO-II (2-3 rows of border crops of Maize/ Jowar/ Bazra all around the capsicum plot & spray NSKE 0.5% alternate with Thiomethoxam 0.2g/litre of water) was more effective for management of leaf curl viral disease. Low disease severity (6.70%) and highest yield (283.6q/ha) was observed in TO-II. So, the TO-II was found as the best option. Farmers were satisfied with the result because the farmers were convinced to manage the viral disease with maize plantation in border of the capsicum plot which restricts the movement of white fly in the field.

Table: Efficacy of different pesticides for management of leaf curl viral disease of capsicum

Technology option	No. of trials	Disease severity (%)	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net Return (Rs / ha)	B:C ratio
FP: Farmers' practice (Application of Profenophos @ 1.5ml/l)	10	24.63	186.9	217500	373800	156300	1.71
TO-I: 2-3 rows of border crops of Maize/Jowar/Bazra all around the capsicum plot & spray NSKE 0.5% alternate with Imidachloprid 0.3ml/litre of water	10	14.33	243.5	221250	487000	265750	2.20
TO-II: 2-3 rows of border crops of Maize/Jowar/Bazra all around the capsicum plot & spray NSKE 0.5% alternate with Thiomethoxam 0.2g/litre of water	10	6.70	283.6	232500	567200	334700	2.43
TO-III: 2-3 rows of border crops of Maize/Jowar/Bazra all around the capsicum plot & spray NSKE 0.5% alternate with Acetamipride 0.3g/litre of water	10	9.57	247.1	223000	494200	271200	2.21
SEm+		0.80	0.86	-	-	-	-
CD (P=0.05)		2.48	2.65	-	-	-	-

KVK Murshidabad

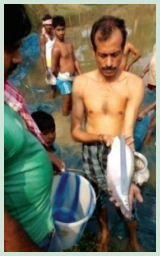
Thematic area: Fishery management

Assessment of Chital (*Chitala chitala*) and Tilapia (*Oreochromis mossambicus*) culture in seasonal fish pond in Murshidabad district

Lack of knowledge of farmers on feeding habit of chital has been a serious concern for low fish yield in the district. Chital fishes are carnivorous and predator in nature. They generally eat various types of small fish, shrimp, snail, and aquatic insects. After hatching the yolk sac remains attached up to a week in this time for which there is no need for any food. After 7 days chital fish spawns normally take zooplankton. After that they start to eat small fishes, shrimps, snails, and aquatic insects. If we stock this species in this composite fish culture system in pond, they will totally prey upon this. The spawns, fry and fingerlings of IMC and other exotic carps whatever available in this culture pond system will be eaten away. This OFT was conducted among 21 farmers' fields of different adoptive villages. It was found that TO-II (Chital + Tilapia (stocking rate of chital 3000 nos. /ha) (1:100) or Tilapia 150 kg (37.5 kg male and 112.5 kg female tilapia) + 2- 4 bati (100ml bati) silver carp spawn/ha) gave better production. The two species were selected for this trial - one was Tilapia and another was Silver Carp spawns. Significant production was found to the tune of 21.0 q/ha in TO-I and 25.66 q/ha in TO-II against the Farmers' practices (16.29 q/ha). The average weights of chital were 0.85 kg, 0.8 kg and 1.2 kg in TO-II, TO-I and FP, respectively.

Table: Performance of chital (*C. chitala*) culture with Tilapia (*O. mossambicus*) in seasonal fish pond

Technology option	No. of trials	Yield (q/ha)	Cost of cultivation (Rs./ ha)	Gross. Return (Rs./ ha)	Net Return (Rs./ ha)	B:C ratio
FP: Farmers' practice (Composite fish culture system (15000 nos. /ha) + chital (75 nos. / ha))	7	16.29	94875.0	192150	97275.0	2.0
TO-I: Chital + Tilapia (stocking rate chital 1500 nos. / ha) (1:100) or 150 kg (37.5 kg male and 112.5 kg female tilapia) + 2- 4 bati (100ml bati) silver carp spawn/ha	7	21.0	145500.0	396000.0	250250.0	2.8
TO-II: Chital + Tilapia (stocking rate of chital 3000 nos. / ha) (1:100) or Tilapia 150 kg (37.5 kg male and 112.5 kg female tilapia) + 2- 4 bati (100ml bati) silver carp spawn/ha	7	25.66	141750.0	473130.0	331380.0	3.2




KVK Nadia

Thematic area: Crop diversification

Profitability enhancement of commercial banana (var. Grand Nain) enterprise through High Density Planting (HDP) in Nadia district

Non-profitable banana cultivation due to declining productivity of commercial banana has been identified as a major problem of the district leading to less utilization of space and other natural resources and thus resulting in less remuneration from the crop. In order to address this problem, a field trial was undertaken by KVK Nadia through adopting high density planting. Results indicated that both the TO-I and TO-II, i.e., HDP has no negative effect on plant height and pseudo-stem girth as well as the % of bunch emergence at 9 month after planting (MAP). Both the options were statistically at par with the normal square row method of planting. As the % of bunch emergence has not been affected by HDP, the no. of bunch emergence per unit area (bigha) exhibited significant increase over the Farmers' practice. It may be concluded that TO-I, i.e., Single row and 2 plant/pit, spacing 1.8m x 2.25 m (4800 plant/ha), was the best among the options assessed.

Table: Evaluation of different HDP practices for improving performance of commercial banana

Technology option	Plant height (cm) at 9 MAP	Pseudo stem girth (cm) at 9 MAP	% bunch emergence at 9 MAP	No. of bunch emergence / unit area (bigha) at 9 MAP
FP: Farmers' practice (Single row and1 plant/pit, spacing 1.8m x 1.8 m (3000plant/ha))	198.59	72.56	40.47	161.89
TO-I: Single row and 2 plant/pit, spacing 1.8m x 2.25 m (4800 plant/ha)	188.17	61.80	35.86	229.47
TO-II: Paired row and 1 plant/pit, spacing 1.3m x 1.3 m x 2.2m (4200 plant/ha).	197.27	67.41	38.17	217.58
SEm+	2.91	2.97	1.58	9.32
CD(P=0.05)	NS	NS	NS	29.05

KVK South 24 Parganas (Nimpith)

Thematic area: Cropping system

Assessment of profitability through cropping system in medium land under minimum irrigation facility during Rabi-Summer season

Generally, after cultivation of sunflower the land remains fallow due to non-availability of irrigation water. Thus, the profitability from this cropping system is less. To address this issue, a multi-locational trial was planned and carried out by KVK South 24 Parganas (Nimpith). In this trial, the 3rd crop like green gram or til has been taken under rain-fed situation to achieve maximum profit from a unit area. The results indicated that the higher net return in TO-I (Paddy (var.IET-5656)–Mustard (var.-Jumka)-Moong (PDM-84-139) with 2 irrigation) technology option -1 was recorded with the highest B:C ratio. After three years of observation, it was recommended that the Paddy-Mustard-Moong cropping system (TO-I) was profitable and sustainable in place of Paddy-Sunflower cropping system.

Table: Performance of different cropping system

Technology option	No. of trials	Crop	Av. Diameter/ length of pod/capsule/ panicle(cm)	No. of filled seeds/ panicle/ pod/head	1000 seed weight. (g)	Grain yield(q/ ha)	Cost of Cultivation (Rs./ha)	Gross return (Rs./ ha)	Net return (Rs./ ha)	Total return in cropping system (Rs./ha)	BC ratio
FP: Farmer's practice (Paddy (Var. IET-5656) followed by Sunflower (var. PAC-36) with 2 irrigation)	7	Paddy	21.5	138.2	22.9	38.42	35528	56630	21102	29928	1.43
		Sun flower	16.5	859.3	47.7	14.28	34014	42840	8826		
TO-I: Paddy (var. IET-5656) –Mustard (var.-Jumka)-Moong (PDM-84-139) with 2 irrigation	7	Paddy	21.4	140.4	23.2	38.5	35781	57750	21969	41360	1.46
		Mustard	6.2	22.1	3.5	8.1	29524	36352	6828		
		Moong	6.9	10.3	32.2	6.85	25112	37675	12563		
TO-II: Paddy (var. IET-5656) –Mustard (var.-Jumka)-Til (Tilottama) with 2 irrigation	7	Paddy	21.6	139.7	22.8	38.37	35700	57555	21855	34375	1.39
		Mustard	6	21.6	3.3	7.95	29483	35679	6196		
		Sesame	3.5	59.7	4	7.26	22716	29040	6324		
SEm ±			0.074*	1.544*	0.09*	0.013*					
CD(0.05)			NS	3.89	NS	NS					

Soil status

Before	Organic Carbon %	pH	EC (ds/m)	Available N (kg/ ha)	Available P2O5 (kg/ha)	Available K2o (kg/ ha)
	0.42	6.45	0.66	228.4	29.5	379.4
After						
FP	0.42	6.45	0.66	229.1	29.5	380.3
TO-I	0.46	6.45	0.66	238.7	31.2	397.2
TO-II	0.43	6.45	0.66	233.3	30.4	381.8


Farmers practice (Paddy –Sunflower)


Tech.-Option -1(Paddy- Mustard-Greengram)


Tech.-Option -2 (Paddy- Mustard-Sesame)

KVK Purulia

Thematic area: Post harvest management

Assessment of low cost technology for retaining seed viability of groundnut during post-rainy season

The groundnut cultivation in Purulia district has undergone a dramatic change since last 7-10 years. Area of groundnut cultivation is increasing day by day very rapidly. Groundnut is becoming a popular cash crop during rainy season in Purulia. Rapid loss of seed viability has become a major problem of Kharif produce of groundnut, since 4 – 6 months of storage about 50 % viability is lost. Such seeds if sown in field give poor germination and patchy crop stand. To solve this problem, a field trial was conducted on the low cost technologies for minimization of storage loss of groundnut seed at 10 different locations of the district involving the crop variety (cv. TAG-24). The results of the trial showed that the yield of TO-II (Storing of thoroughly dried pods in a Polythene lined gunny bags along with Calcium Chloride ($CaCl_2$) @ 10 g/Kg pods.) out-yielded other options. The retention of higher seed viability and vigour in the properly dried and stored with calcium chloride within polyethylene lined gunny bags was due to lower drying temperatures and lowered pod moisture during initial storage period. The storage method was found to be effective for retaining acceptable seed viability and vigour till the following kharif season groundnut sowing time.

Table: Effect of low cost technology for retaining seed viability of groundnut during post-rainy season in Purulia

Technology option	No. of Trials	Yield (q/ ha)	Seed Germination (%) Storage Period (month)					Field emer-gence (%)	Gross Cost (Rs/ ha)	Gross Return (Rs/ha)	Net Return (Rs/ha)	B:C ratio
			0	2	4	6	8					
FP: Farmers' practice (Storing thoroughly dried pods of Groundnut in gunny bags (approx. 30 kg pods / gunny bags))	10	0.60	89.73	86.2	39.7	12.5	5.3	4.0	16900	2600	(-) 14300	0.15
TO-I: Storing of thoroughly dried pods in a polythene lined gunny bags (approx. 30 kg pods / gunny bag)	10	1.32	89.73	85.5	48.3	15.2	11.6	9.0	17200	6200	(-) 11000	0.36
TO-II: Storing of thoroughly dried pods in Polythene lined gunny bags along with Calcium Chloride (CaCl2) @ 10 g/Kg pods.	10	9.87	89.75	87.6	81.3	79.5	72.5	70.2	21600	49300	27700	2.28
CD at 5%		0.33										

BIHAR

KVK Araria

Thematic area: Mushroom production

Assessment of performance of Oyster mushroom production grown in various congenial substrates

Wild mushroom is used as a food items by the farm women in the district. Lack of knowledge on the scientific mushroom production was identified as the problem in using such items as food. In an attempt for addressing this issue, a multi-locational trial was taken up by Araria KVK at 10 different locations involving the willing farm women. The result of the trial indicated that TO-I (Use of only wheat straw) was found to be much better substrate for the production of oyster mushroom followed by the combination of maize straw and wheat straw.

Table: Performance of various congenial substrates for oyster mushroom production

Technology option	No. of trials	Yield component			Blackness and Dryness	Yield	Cost of Cultivation (Rs)	Gross Return (Rs)	Net Return (Rs)	B:C ratio
		No. of branches flower	No. of mushroom flower per bag	Weight of flower (gm)						
FP: Farmers' practice (Use of wild mushroom)	10	Less	8-9	200-300	30-40 %	1.5	160	422	262	1.63
TO-I: Wheat straw (100 %) in hot water treatment +500 g of oyster mushroom spawn	10	More	8-9	500	10-20 %	1.95	168	460	292	1.73

Technology option	No. of trials	Yield component			Blackness and Dryness	Yield	Cost of Cultivation (Rs)	Gross Return (Rs)	Net Return (Rs)	B:C ratio
		No. of branches flower	No. of mushroom flower per bag	Weight of flower (gm)						
TO-II: Paddy straw + Wheat Straw (1: 1 ratio) in hot water treatment +500 g of oyster mushroom	10	Less	6-7	150-200	60-70 %	1.2	150	400	250	1.66
TO-III: Maize straw + wheat straw (1 : 1 ratio), Blanching + 50 g gram flour + 500 g of oyster mushroom spawn.	10	less	6-7	100-200	60-70 %	1.2	150	400	250	1.66

KVK Arwal

Thematic area: Integrated nutrient management

Assessment of performance of boron and zinc sulphate on productivity of cauliflower

Farmers use mainly major nutrients for enhancing yield but they scarcely use the micro nutrients like zinc and boron, which have the capability in improving the quality and quantity of cauliflower production. This non-usage of micro nutrients has been a critical problem contributing to reduced productivity of cauliflower. To address this issue, KVK Arwal undertook a field trial at 10 different locations for assessing the performance of cauliflower as affected by application of boron and zinc sulphate. The results showed that TO-III, i.e., Balanced fertilization through recommended dose of NPK fertilizers @ 100 kg N, 80 kg P and 80 kg K per hectare applied before transplanting along with application of zinc sulphate @20 kg/ha significantly increased cauliflower yield, marketability, and farmers' net income. Higher yields of better quality achieved through such nutrient management with lowered production costs and increased farmers' profit.

Table: Effect of applying boron and zinc sulphate on production of cauliflower

Technology option	Diameter of curd (cm)	Days taken in curd initiation	Curd weight(gm)	Yield (q/ha.)	Cost of cultivation (Rs/ha.)	Gross profit (Rs/ha.)	Net profit (Rs/ha.)	B:C ratio
FP: Farmers' practice (Use of major nutrients like NPK only)	12.68	58.25	680.94	292.88	123262	407103	283840	3.30
TO-I: RDF of NPK + Borax @10 kg/ha	16.97	69.50	875.25	365.50	119725	505265	385539	4.22
TO-II: RDF of NPK + Zinc sulphate @10 kg/ha	14.54	60.50	777.50	323.23	121750	448970	327219	3.68
TO-III: RDF of NPK + Zinc sulphate @20 kg/ha	15.30	66.25	803.39	334.04	119548	464315	344767	3.88
TO-IV: RDF of NPK + Borax @20 kg/ha	13.80	59.98	729.22	305.25	122984	424297	301312	3.45

KVK Aurangabad

Thematic area: Integrated weed management

Assessment of different combinations of herbicides for weed control in direct seeded paddy

High infestation of weed in direct seeded paddy resulted into low yield in the district in recent years. To solve this problem, a multi-locational field trial was conducted by KVK Aurangabad at 6 different locations for assessment of various combinations of weedicides in controlling weeds in paddy. Results revealed that the highest no. of effective tillers/ m^2 was recorded with TO-III (331). The highest grain/panicle was recorded with TO-II. The highest grain yield of 4683 kg/ha was recorded with TO-II. Highest net return and B:C ratio recorded with TO-II (Pendimethaline @1.0 kg a.i./ha PE followed Bispyribac sodium@20g a.i./ha+ Pyrezosulfuran @25g a.i./ha (POE) 25 DAS).

Table: Performance of various combinations of herbicides for weed control in direct seeded paddy

Technology option	No. of trials	No. of effective tillers	No. of grains/ Panicle	1000 grain weight(g)	Weed density (g/m^2) at 30DAS	Weed density (g/m^2) at 60DAS	Weed dry weight (g/m^2) at 30DAS	Weed dry weight at 60DAS
FP: Farmers' practice (On hand weeding at 35-40 Days After Sowing, DAS)	6	215	149	22.5	22.62	38.37	12.36	34.56
TO-I: Pendimethaline @1.0 kg a.i./ha PE followed by bispyribac sodium@20g a.i./ ha(25 DAS) POE	6	296	159	23.1	8.75	8.53	2.63	6.51
TO-II: Pendimethaline @1.0 kg a.i./ha PE followed Bispyribac sodium@20g a.i./ ha+ Pyrezosulfuran @25g a.i./ha(POE) 25 DAS	6	327	172	24.0	3.25	5.21	3.24	4.57
TO-III: Pendimethaline @1.0 kg a.i./ha PE followed Azimosulfuron 20g a.i./ha+ Bispyribac sodium@20g a.i./ha (POE) 25 DAS	6	331	170	24.1	3.18	5.70	3.85	3.92

Table: Efficacy of various combinations of herbicides for weed control in direct seeded paddy

Technology option	Yield (q/ha)	Straw yield(q/ha)	HI (%)	Cost of cultivation (Rs)	Gross Income(Rs)	Net return (Rs)	B:C ratio
FP: Farmers' practice (On hand weeding at 35-40 Days After Sowing, DAS)	3036	4858	38.5	32800	45846	13046	1.40
TO-I: Pendimethaline @1.0 kg a.i./ha PE followed by bispyribac sodium@20g a.i./ ha(25 DAS) POE	4307	5325	44.8	27650	63465	35815	2.30
TO-II: Pendimethaline @1.0 kg a.i./ha PE followed Bispyribac sodium@20g a.i./ ha+ Pyrezosulfuran @25g a.i./ha(POE) 25 DAS	4683	5612	45.5	28250	68826	40576	2.44
TO-III: Pendimethaline @1.0 kg a.i./ha PE followed Azimosulfuron 20g a.i./ha+ Bispyribac sodium@20g a.i./ha (POE) 25 DAS	4586	5684	46.6	28350	67592	39242	2.38

KVK Banka

Thematic area: Integrated weed management

Evaluation of performance of different herbicides to control weed flora in wheat (*Triticum aestivum* L.)

Wheat is a major crop in Banka district, which is grown in maximum area of cultivable land in Rabi season. Weeds are major problem in wheat cultivation, especially grasses and broad-leaved weeds. Due to, severe infestation of weeds namely *Phalaris minor, Chenopodium album*, Ban palak (*Rumex retroflexus), Vicia sativa, Anagalis arvensis* etc., low filling of grain, loss of yield upto 20-50% , high cost of cultivation and high nutrient requirement through organic and inorganic fertilizer are identified as critical hindrance in wheat cultivation through transplantation. In order to solve this problem, a field trial was conducted by KVK Banka at 10 different locations. The results showed that the highest grain yield, net return and B:C ratio were recorded in TO-IV, i.e., Sulfosulfuron 75% WG @ 25gm ai/ha+ Metsulfuron methyl 20% WP @ 10gm ai/ha at 30 days after sowing. Further, farmers also expressed their keen interest in the above treatment to control weeds in wheat crop.

Table: Performance of different herbicides to control weed flora in wheat

Technology option	No. of trials	No. of effective tillers/m row length		No. of grains/ spike	Spike/ m^2	Test Wt.	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C ratio
		60 DAS	90 DAS								
FP: Farmers' practice (No weeding)	10	44	40	26.4	275	39.2	20.10	23200	36180	12980	1.55

Technology option	No. of trials	No. of effective tillers/m row length		No. of grains/ spike	Spike/ m²	Test Wt.	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C ratio
		60 DAS	90 DAS								
TO-I: Isoproturon 75% WP@1.0kg ai/ha at 30 days after sowing	10	50	46	34.20	320	39.3	29.40	25400	52920	27520	2.08
TO-II: Sulfosulfuron 75% WG @ 50gm ai/ha at 30 days after sowing	10	61	57	39.80	336	39.9	36.34	26700	65412	38712	2.45
TO-III: Metsulfuron methyl 20% WP @ 20gm ai/ha at 30 days after sowing	10	66	61	42.60	339	39.8	37.37	27100	67266	40166	2.48
TO-IV: Sulfosulfuron 75% WG @ 25gm ai/ha+ Metsulfuron methyl 20% WP @ 10gm ai/ha at 30 days after sowing	10	70	66	49.9	342	40.1	39.20	27900	70560	42660	2.52

KVK Buxar

Thematic area: Varietal evaluation

Assessment of yield performance of garden pea varieties

Garden pea is an important crop of the district Buxar and there has been an increasing trend of the area covered under this crop. Farmers are growing local variety of garden pea which gives poor yield in the district. Improved varieties are available for testing their performance. Therefore, a field trial was designed and carried out by KVK Buxar at 10 different locations to assess the yield performance of various improved garden pea varieties. It was evident

from the trial that TO-I (Swarna Mukti variety) yielded the highest (125 q/ha) with the highest B:C ratio of 3.30. Due to better pod yield of Garden pea variety Swarna Mukti and farmers' acceptability, the variety was recommended for undertaking FLD in the district.

Table: Performance of different varieties of garden pea

Technology option	No. of trials	Yield component		Yield (q/ha) Green Pod	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C ratio
		No of Pod/ plant	No of grains/ pod					
FP: Farmers' practice (Local Variety)	10	7.5	7.0	80.0	45000	96000	51000	2.13
TO-I: Swarna Mukti	10	8.0	10.0	125.0	45000	150000	105000	3.30
TO-II: Kashi Udai	10	9.0	8.5	95.5	45000	114600	69600	2.54

KVK Gaya

Thematic area: Integrated disease management

Evaluation of efficacy of various control measures against root rot and wilt complex in lentil

Lentil has been a very important pulse crop of the district Gaya and there is a growing concern over the yield loss upto 30-35% due to root rot and wilt complex. Root rot and wilt complex pathogen survives in soil and it is very difficult to manage the disease after emergence. Therefore, seed/ soil treatment was considered to be the only way to manage the disease. It has also been found that the farmers scarcely do the seed treatment to get rid of the problem. Keeping this in view, a field trial was conducted by KVK Gaya at 10 different locations to evaluate the control measures available to mitigate the problem in lentil. It was found that TO-I (Seed treatment with *Trichoderma* species @10g / kg + soil application @5kg/ha with FYM before sowing) provided the highest protection to the plant with 2% mortality resulting in the highest B:C ratio (4.55).

Table: Efficacy of various control measures against root rot and wilt complex in lentil

Technology option	No. of trials	Disease/ insect pest incidence (%)	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C ratio
FP: Farmers' practice (No seed treatment)	10	22	12.0	16000	60000	44000	3.75
TO-I: Seed treatment with *Trichoderma* species @10g /kg + soil application @5kg/ha with FYM before sowing	10	2	15.8	17350	79000	61650	4.55
TO-II: Seed treatment with Mancozeb + Carbendazim @ 2g/ kg	10	12	14.2	16116	71000	54884	4.40

KVK Kaimur

Thematic area: Feeding management

Determination of effect of feed supplements as probiotics on commercial broiler

Commercial small scale broiler farming has become a way of life of the farmers of the district. Again, poor growth in body weight due to lack of feed supplements was being encountered in recent years. Use of antibiotic growth enhancing substances has been found to have their inherent problem of developing anti-microbial resistance in consumers. Keeping the seriousness of the issue in view, a multi-locational field trial was designed and conducted at 6 different locations to determine the effect of using probiotic feed supplements on the growth rate of broiler poultry birds under commercial set-up. Analysis of the experimental data revealed that the highest body weight (1.40 kg) gained by a bird in 28 days was found in TO-III (FP + probiotic supplementation @ 100 gm/100kg of feed) resulting in the highest B:C ration of 1.39. So the use of probiotics with concentrate (100 gm/100 kg of feed) was recommended for commercial poultry farming.

Technology option	Av. Body wt. gain in 28 days (kg/ bird)	Production cost (Rs./bird)	Gross Return (Rs./bird)	Net return (Rs./bird)	B:C ratio
FP: Farmers' practice (Commercial feed)	1.0	110.00	86.80	23.20	1.27
TO-I: FP + Probiotics (50gm/ 100kg feed)	1.22	134.20	103.30	30.90	1.32
TO-II: FP + Probiotics (75gm/ 100 kg feed)	1.32	145.20	109.20	36.00	1.33
TO-III: FP + Probiotics (100gm/ 100 kg feed)	1.40	154.00	116.30	37.70	1.39
SEM ±	0.056				
CD (5%)	0.019				

KVK Katihar

Thematic area: Integrated weed management

Assessment of various weed management practices in improving growth and yield of jute

In the district of Katihar, the jute growers are facing loss in their cop yield in recent years. Jute crop is heavily infested with common weeds during the crop growth period resulting in poor crop growth and loss in crop yield. The integrated method of weed management practices through chemical and mechanical ways helps in reducing weed population and also reduces cost of cultivation. Keeping this in view, a field trial was conducted by KVK Katihar at 10 different locations to evaluate the weed management practices. Results indicated that TO-I (Hand weeding at 15 and 35 DAS) gave the highest fibre yield (27.91 q/ha) but TO-III (Application of quizalofop ethyl @ 60 gm a.i./ ha) resulted in highest net return (Rs 39400/ha) and B:C ratio 2.42.

Table: Effect of different treatment on growth and yield attributes of jute

Technology option	Plant height (cm)	Basal diameter (cm)	Green plant weight (q/ha)	Fibre yield (q/ha)	Weed biomass (q/ha)		Cost of cultivation (Rs/ha)	Gross return (Rs/ ha)	Net return (Rs/ ha)	B:C ratio
					15 DAS	35 DAS				
FP: Farmers' practice (Hand weeding at 30 DAS)	264	1.41	255.43	22.65	2.16	3.29	13500	26900	13400	1.99
TO-I: Hand weeding at 15 and 35 DAS	292	1.82	298.35	27.91	2.38	2.00	27100	56625	29525	2.08
TO-II: Pretilachlore @ 0.9 kg ai/ha pre emergence	269	1.67	249.32	24.92	1.09	3.01	31600	69775	38175	2.20
TO-III: Quizalofop ethyl @60 gm a.i /ha at 25 DAS	283	1.80	278.75	26.84	2018	2.38	27000	62300	35300	2.31

Table: Physico-chemical properties of experimental soil

Experimental Soil	Available nutrients (Kg ha^{-1})		
	N	P	K
Initial	202.5	28.4	186
Final	186.0	26.3	195

KVK Khagaria

Thematic area: Integrated crop management

Assessment of performance of different varieties of soybean in Khagaria district

Low return in kharif maize and upland paddy in the district during recent years has been encountered by the farmers. To address this issue, a new crop, soybean was introduced in the existing rice-wheat, rice-maize and maize-maize cropping systems. In order to assess the performance of different varieties of soybean in Khagaria district, a field trial was carried out by KVK Khagaria at 4 different locations. It was observed that the highest yield of 22.30 q/ha and B:C ratio of 2.25 were found with TO-III (PS-1241) followed by yield of TO-I (PS-1042).

Table: Performance of different varieties of soybean in Khagaria district

Technology option	No. of trials	Yield (q/ha)	Cost of Cultivation (Rs/ha)	Gross Return (Rs/ha)	Net Return (Rs/ha)	B : C ratio
FP: Farmers' practice (JS-335)	04	18.60	29700	55800	26100	1.88
TO-I: PS-1042	04	21.70	29700	65100	35400	2.19
TO-II: PS-1225	04	20.40	29700	61200	31500	2.06
TO-IV: PS-1241	04	22.30	29700	66900	37200	2.25

KVK Kishanganj

Thematic area: Production and management technology

Effect of mulching on soil moisture, plant growth and yield of pineapple (*Ananas comosus* (L.) Merr.)

A trial was conducted on farmers filed to test the effect of mulching on soil moisture, plant growth and yield of pineapple. The performance of the pineapple crops varies in relation to mulching throughout its life cycle regardless of the relative low water requirement and weed infestation. Improving soil water distribution at a particular stage of development may increase productivity, The result showed that the significantly higher fruit yield (483.2 q/ha)was recorded in TO-III (Black polyethylene mulching) in comparison to other methods of mulching and minimum in FP (342.4 q/ha). The black mulched pineapple plot reflected favourable effect on yield component and reduced weed infestation thereby increased the yield. This treatment also recorded higher B:C ratio (2.52) compared to the others. Farmers were convinced to use this technology for pineapple cultivation.

Table: Effect of mulching on soil moisture, plant growth and yield of pineapple

Technology option	No. of leaf at flowering	Plant height at flowering (cm)	50 % flowering in days	First fruit harvest in days	Fruit length (cm)	Fruit weight (kg)	Total fruit weight (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs /ha)	B:C ratio
FP: Farmers' practice (Traditional cultivation)	47.2	112.04	426.4	545.2	19.6	1.15	342.4	271000	342400	105640	1.39
TO-I: Dry grasses mulching	50.6	113.68	421.4	538.8	22.68	1.64	431.6	270000	517920	247920	1.92
TO-II: Straw mulching	51.8	114.76	421.4	537.6	22.96	1.69	445.8	275000	579540	304540	2.11
TO-III: Black poly-ethylene mulching	54.8	116.46	409.2	524.4	25.5	1.87	483.2	268000	676480	408480	2.52
CV (%)	3.89	4.90	5.56	6.40	7.90	6.76	10.65				
CD at 5%	1.34	1.42	3.21	2.94	0.93	0.06	16.01				

KVK Lakhisarai

Thematic area: Weed management

Assessment of various weed control measures in improving yield of onion

Production loss in onion due to high incidence of weed has been identified as a major problem. To solve this problem, a multi-locational field trial was taken up at 10 different locations for evaluating the effect of different weed control measures on yield of onion. The results of the trial revealed that TO-I (Combined spray of pendimethaline 30 EC @ 2.5 ml/lt & quizalojob ethyl 5EC @ 1.75 ml/lt at planting and at 30 DAT) showed better weed control and bulb yield than TO-II and FP.

Table: Effect of various weed control measures on yield of onion

Technology option	No. of trials	Weed/ m^2	Bulb yield (q/ha)	Gross cost	Gross return	Net return (Rs./ha)	B : C ratio
FP: Farmers' practice (Use of pendimethalin)	10	108	195.2	75187	170800	97613	2.33
TO-I: Combined spray of pendimethalin 30EC @2.5 ml/lt & quizalofob ethyl 5EC@1.75ml/lt at planting and at 30 DAT	10	35	294	85387	257250	171863	3.01
TO-II: Combined spray of oxyflorofen 23.5 EC @ 1 ml/lt & quizalofob ethyl 5 EC @ 1.75 ml/lt at planting & 30 DAT	10	77	282.5	85387	247187.5	161800.5	2.89

KVK Madhepura

Thematic area: Vegetable production

Assessment of performance of different cultivars of onion for higher yield and quality

Farmer grows traditional variety of onion having low yield and gets less productivity and profitability. In order to solve this problem, KVK Madhepura took up a field trial at 7 different locations for assessing the yield performance of onion varieties. It was revealed from the trial that TO-I (cv. Nasik Red) was found significantly superior in yield (202.61 q/ha), plant ht. (50.04 cm), no. of leaves (12.60) and wt. of onion bulb (127.90 g) in comparison to other varieties including the farmers' one. Highest B:C ratio was also observed in this option.

Table: Performance of different cultivars of onion for higher yield and quality

Technology option	Plant ht. (cm)	No. of leaves	Wt. of bulb (g)	Yield (q/ha)	Cost of cultivation (Rs. /ha)	Gross return (Rs. /ha)	Net return (Rs. /ha)	B:C ratio
FP: Farmers' practice (Light Red)	40.87	8.47	60.98	136.53	74345	136530	62185	1.84
TO-I: Nasik Red	50.04	12.60	127.90	202.61	77349	202610	125261	2.62
TO-II: Agrifound Light red	45.39	10.18	111.07	172.84	83350	172840	89490	2.07
TO-III: Patna Deshi	43.04	8.71	95.91	150.17	78348	150170	71822	1.92

KVK Nalanda

Thematic area: Integrated nutrient management

Assessment of various methods of boron application on the productivity of mustard

Mustard is the most important oilseed crop in this area. The average yield of mustard is very low in the district. The low yield of mustard has been attributed to lack of application of micronutrients. Therefore, a trial was planned and carried out by KVK Nalanda at 8 different locations for evaluating the methods of applying boron (a major micronutrient) in the yield and other production parameters of mustard. Results revealed that the highest yield of 14.6 q/ha was recorded in TO-I (Farmer's practices (N:P:K:: 90:40:20 kg/ha)+16 kg Borax/ha during land preparation) with a recorded B:C ratio of 4.22.

Table: Effect of methods of boron application on productivity of mustard

Technology option	No. of trials	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs/ha)	Net return (Rs./ha)	B:C ratio
FP: Farmers' practice (N:P:K:: 90:40:20 kg/ha)	8	11.8	16200	59000	42800	3.64
TO-I: Farmers' practice (N:P:K:: 90:40:20 kg/ha.)+16 kg Borax/ha during land preparation	8	14.6	17280	73000	55720	4.22
TO-II: Farmers' practice (N:P:K:: 90:40:20 kg/ha.)+0.5% boron as foliar spray twice at 25-30 DAS & 45-50 DAS.	8	13.9	17850	69000	51150	3.87
$SE_m \pm$		0.69				
C.D (P=0.05)		2.08				

Table: Initial and final soil properties of experimental plots

Stage	PH	O. C. (%)	Available nutrients (kg/ha)			Available Boron (mg/kg)
			N	P_2O_5	K_2O	
Initial	7.26	0.580	237.9	28.58	177.0	0.479
Final	7.27	0.586	242.7	28.77	173.3	0.487

KVK Samastipur

Thematic area: Disease management

Assessment of impact of dry cow therapy as an intervention for prevention of mastitis

Mastitis is a major problem in dairy industry. High incidence of sub-clinical mastitis in high yielding dairy cows is a major problem of dairy industry. The treatment is very costly when clinical mastitis is diagnosed and many times one or more teat may be blocked and milk yield reduced by 25-50%. If diagnosed earlier and dry cow therapy is adopted, the valuable milch animal may be saved from clinical mastitis. Keeping this in view, a multi-locational field trial was planned and conducted on 21 dairy cows for assessing the effect of dry cow therapy. In this trial, one animal had sub-clinical form of mastitis after employing TO-I, i.e., Dry cow therapy with Spectramas DC at last day of milking, whereas in case of TO-II, (Dry cow therapy with Spectramas DC at last day of milking alongwith Intavita H@ 5 ml i.m.), no animal showed sub-clinical form of mastitis after calving. Therefore, it can be concluded that TO-II, i.e., Dry cow therapy with Spectramas DC at last day of milking with Intavita H @ 5 ml i.m. was very useful to prevent sub-clinical form of mastitis.

Table: Efficacy of dry cow therapy in treatment of sub-clinical mastitis

Technology Option	No. of trials	Total milk yield after calving in 30 days (lt)	% incidence of sub-clinical mastitis after test with CMT kit	% of mastitis incidence after treatment	Av. Milk yield per animal per day	Av. Feeding cost + Treatment cost for sub-clinical mastitis	Gross return (Rs.)	Net Return (Rs.)	B:C ratio
FP: Farmers' practice (No dry cow therapy)	7	2110	100	71.43	10.05	31500	63300	31800	2.0
TO-I: Dry cow therapy with Spectramas DC at last day of milking	7	2545	100	14.28	12.12	36988	76350	39362	2.06
TO-II: TO-I + Intavita H 5ml i.m.	7	2610	100	0.00	12.43	37303	78300	40997	2.09

4.2 FRONTLINE DEMONSTRATIONS

Frontline Demonstration (FLD) is a unique approach to provide a direct interface between technology developers and end users of the technology. It is a form of applied research on latest notified/released varieties alongwith component or full package of practices on identified farmers' fields to exhibit the potentiality of the technology to comparatively large number of farmers with the involvement of research scientists, extension personnel and other agencies. It also provides the opportunity to analyze the production performance of the technologies for scientific feedback. In the process of such demonstration, the KVKs of Zone-II took up the programme to enhance the production and productivity of major pulse, oilseed, cereal, vegetable, cash crops and others through planning and executing frontline demonstration programme across the zone consisting of the states of Bihar, Jharkhand, West Bengal and Union Territory of A&N Islands. Frontline demonstrations were conducted both during Kharif 2016 and Rabi 2016-17 by the KVKs for an area of 7020.04 ha to involve 22379 number of farmers of this zone.

Table: State wise details of Frontline Demonstration

State	Rabi Oilseeds		Kharif Oilseeds		Rabi Pulses		Kharif Pulses		Other than Oilseed and Pulse		Total	
	No.of Farmers	Area (ha)	No.of Farmers	Area (ha)	No.of Farmers	Area (ha)	No.of Farmers	Area (ha)	No.of Farmers	Area (ha)/No.	No.of Farmers	Area (ha)
A&N	0	0	0	0	0	0	0	0	16	8	16	8
Bihar	852	338.4	50	8	1418	503.89	593	181.53	4932	1707.28	7845	2739.1
Jharkand	1728	621	862	251.5	1254	352.3	1514	486.3	4291	1654.5	9649	3365.6
West Bengal	1026	252.8	285	47.06	734	153.5	308	44.44	2516	409.54	4869	907.34
Total	3606	1212.2	1197	306.56	3406	1009.69	2415	712.27	11755	3779.32	22379	7020.04

A look into the performance of KVKs in overall demonstration programme indicates that an area of 1212.2 was brought under rabi oilseeds, 306.56 ha under kharif oilseeds, 1009.69 ha under rabi pulses and 712.27 ha under kharif pulses. Number of demonstrations conducted in oilseed and pulse as well as both the seasons were 3606, 1197, 3406 and 2415 for rabi oilseed, kharif oilseed, rabi pulse and kharif pulse, respectively. In addition, 11755 number of demonstrations were also conducted in crops other than oilseed and pulse for an area of 3779.32 ha.

A further analysis of frontline demonstration conducted by KVKs indicates that the KVKs of Jharkhand brought more area under demonstration programme on oilseed crops both in rabi and kharif season (621.0 and 251.5 ha, respectively) than KVKs of other two states, i.e., Bihar and West Bengal. Involvement of farmers in both the seasons was also more in respect of Jharkhand KVKs accounting to 1728 and 862 in rabi and kharif oilseeds, respectively. The KVKs of Bihar, on the other hand, brought 338.4 ha and 8.0 ha during rabi and kharif oilseed demonstrations, respectively, with 852 and 50 programmes (number of farmers). The KVKs of West Bengal, during the same period brought 252.8 ha and 47.06 ha under frontline demonstration on rabi and kharif oilseeds where the involvement of farmers was to the extent of 1026 and 285, respectively.

In frontline demonstration on pulse crops, the KVKs of Bihar had a fair performance with coverage of 503.89 ha in rabi and 181.53 ha in kharif season. Altogether 1418 and 593 number of demonstration was conducted to achieve the coverage. The KVKs of Jharkhand could bring 352.3 ha through involvement of 1254 farmers during rabi pulse demonstration and 486.3 ha in kharif pulse with involvement of 1514 farmers. In respect of KVKs of West Bengal, the acreage under frontline demonstration on rabi pulses was 153.5 ha and 44.44 ha under kharif pulses. The involvement of farmers in both the seasons was 734 and 308, respectively.

Frontline demonstration conducted on other than oilseed and pulse crops by the KVKs shows that 27.0 ha was brought under demonstration by the KVKs of A&N Islands where 32 farmers were involved. In Bihar, the KVKs brought 10504.28 ha under demonstration programmes on crops other than oilseed and pulse through involvement of 7598 farmers whereas it was 10730.5 ha and 4601 number of farmers in respect of KVKs of Jharkhand and 9002.33 ha and 4508 number of farmers for the KVKs of West Bengal.

4.2.1 Kharif Oilseeds

In kharif 2016, soybean, ground nut, niger and sesame were selected by the KVKs to take up frontline demonstration programme. However, the crops were not uniformly demonstrated n all the states, i.e., Bihar, Jharkhand and West Bengal. Among the identified crops, soybean was only demonstrated in Bihar for an area of 8.0 ha with the involvement of 50 farmers. The yield advantage recorded against local check was to the tune of 25.72 per cent with 2.26 BC ratio. Ground nut, on the other hand, was demonstrated in Jharkhand and West Bengal by the KVKs of respective states. Area covered under frontline demonstration was 80.0 ha in Jharkhand and 47.06 ha in West Bengal. Increase in yield with the demonstrated varieties was 55.6 per cent in Jharkhand and 34.5 per cent in West Bengal. Economic gain was also higher in the case of Jharkhand in terms of benefit-cost ratio (2.2) over West Bengal (2.1). Niger and sesame were demonstrated in Jharkhand only for an area of 161.5 ha and 10.0 ha, respectively. In both the crops, demonstrated varieties produced higher yield over local check and the extent of increase in yield was 56.7 and 41.0 per cent, respectively.

Table: Frontline Demonstration on Kharif Oilseeds

Sl. No.	Crop	State	No. of Farmers	Area (ha)	Yield(q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
					Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
1	Soybean	Bihar	50	8	14.5	11.5	25.72	17750	45975	28225	2.6	16150	36420	20270	2.26
		Total	50	8											
2	Groundnut	Jharkand	321	80	14.7	9.67	55.6	28665	72385	43720	2.24	22695	47306	29613	2.22
		West Bengal	285	47.06	17.48	13.46	34.46	35335	68270	39081.66	1.95	60910	48066.66	58531.33	2.09
		Total	606	127.06											
3	Niger	Jharkand	516	161.5	5.28	3.55	56.7	10332.9	19946	9613.09	1.43	10196.9	16756.73	6650.73	1.19
		Total	516	161.5											
4	Sesame	Jharkand	25	10	3.1	2.2	41	10500	20150	9650	1.91	9000	14300	5300	1.59
		Total	25	10											
		Total Kharif Oilseeds	11197	306.56											

4.2.2 Rabi Oilseeds

The KVKs of this zone identified mustard, linseed, sunflower, toria, sesame and ground nut for demonstration in rabi 2016-17 as oilseed crops. However, only mustard, linseed and sesame were demonstrated in Bihar, Jharkhand and West Bengal whereas sunflower and ground nut in West Bengal and toria in Jharkhand.

Table: Frontline Demonstration on Rabi Oilseeds

Sl. No.	Crop	State	No.of Farmers	Area (ha)	Yield(q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
					Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
1	Mustard	Bihar	760	306.4	12.69	9.43	35.54	16916.18	46309.63	29537.8	2.77	15979.61	34977.75	20806.63	2.31
		Jharkand	1198	428	11.66	5.93	49.14	17501.95	43687.16	26265.21	2.49	16894.11	33708.95	16816.84	1.79
		West Bengal	617	152.2	12.48	8.6	28.37	21314.75	42804.67	21658.67	2.06	18655	31705.08	13050.08	1.57
		Total	2575	886.6											
2	Linseed	Bihar	20	5	8.2	6.5	26	8515	20820	12305	2.45	7510	16050	8540	2.14
		Jharkand	190	68	7.4	4.84	56.06	14574.38	58355	23043.13	1.41	13348	20203.13	7247.5	1.27
		West Bengal	100	30.6	5.25	3.85	36.36	8100	15750	7650	1.94	6200	11550	5350	1.86
		Total	310	103.6											
3	Sunflower	West Bengal	75	25	13.32	11.37	17.56	31812	53280	21468	1.67	28875	41720	12845	1.44
		Total	75	25											
4	Toria	Jharkand	3	1	6.03	4.5	34	14190	24120	9930	1.7	14050	18000	3950	1.28
		Total	3	1											
5	Sesame	Bihar	47	25	4.9	3.68	32.19	9375	23700	14325	2.53	8525	18075	8645	2.11
		Jharkand	169	64	4.73	3.16	52.6	13800	28606.25	14806.25	1.75	13350.75	28325	14224.25	1.96
		West Bengal	175	25	9.36	7.78	20.3	21322	37440	16118	1.75	19840	31120	11280	1.56
		Total	391	114											
6	Groundnut	West Bengal	59	20	18.3	17.2	6.35	48750	91500	42750	1.88	48000	86600	38000	1.79
		Total	59	20											
		Total Rabi Oilseeds	3606	1212.2											

Crop-wise performance of the oilseed crops indicates that increase in yield of mustard was highest (49.14%) in Jharkhand followed by Bihar (35.54%) and West Bengal (28.37%). However, the economic gain in terms of benefit-cost ratio was more in Bihar (2.31) followed by Jharkhand (1.79) and West Bengal (1.57). In respect of linseed, increase in yield again was more in Jharkhand (56.06%) followed by West Bengal (36.36%) and Bihar (26.0%). However, in terms of benefit-cost ratio, it was highest in Bihar (2.14) followed by West Bengal (1.86) and Jharkhand (1.27). It implies that though higher yield was recorded in Jharkhand with improved varieties/technologies, cost of cultivation also increased simultaneously which needs to look into by the KVKs to provide more monetary benefit to the farmers. Performance of sesame in rabi 2016-17 indicates the identical trend in terms of increase in yield as it was highest in Jharkhand (52.6%). KVKs of Bihar recorded overall increase in yield to the extent of 32.19 per cent whereas it was 20.3 per cent in West Bengal. Benefit-cost ratio was though worked out more (2.11) in Bihar, it was nearly same (1.96) in respect of Jharkhand. Sunflower was only demonstrated in West Bengal so as ground nut whereas toria only in Jharkhand. In both sunflower and ground nut, increase in yield was 17.56 and 6.35, respectively, with benefit-cost ratio of 1.44 and 1.79. In toria, 34 per cent, increase in yield was recorded with 1.28 benefit-cost ratio.

4.2.3 Kharif Pulse

In conducting frontline demonstrations in Kharif 2016 for pulse crops, the KVKs of this zone selected red gram, black gram, green gram, horse gram and cowpea as the major crops. Of the identified pulse crops, red gram and green gram were demonstrated in Bihar, Jharkhand and West Bengal whereas black gram in Jharkhand and West Bengal, cow pea in Bihar and Jharkhand and horse gram only in Jharkhand. Yield performance of individual pulse crop indicates that in red gram, an increase of 56.68 per

cent was recorded in Bihar over local check with 2.85 benefit-cost ratio. In Jharkhand though increase in yield was recorded 37.44 per cent in demonstration over local check, benefit-cost ratio was worked out as high as 3.42. In respect of KVKs of West Bengal the increase was to the tune of 47.2 per cent but benefit-cost ratio was only 1.78. In green gram, average demonstration yield was recorded 77.14 per cent higher over local check in West Bengal whereas it was 56.26 per cent in Jharkhand and 32.51 per cent in Bihar. However, both in Bihar and Jharkhand, benefit-cost ratio (2.58 and 2.5, respectively) was much higher than that of West Bengal (1.86). In respect of black gram, average increase in demonstration yield over local check was recorded 49.11 per cent in Jharkhand and 38.32 per cent in West Bengal. However, benefit-cost ratio was almost identical in both the states (2.3). In horse gram, the KVKs of Jharkhand recorded 47.34 per cent higher yield over local check with 2.62 benefit-cost ratio. Frontline demonstration conducted on cowpea in Bihar and Jharkhand resulted 22.42 per cent higher yield in Bihar and 31.0 per cent in Jharkhand. However, monetary return in terms of benefit-cost ratio was more in Bihar (2.87) than Jharkhand (2.01). The other parameters of demonstration conducted in kharif pulse are given in Table.

Table: Frontline Demonstration on Kharif Pulses

Sl. No.	Crop	State	No.of Farmers	Area (ha)	Yield (q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
					Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
1	Red gram	Bihar	317	133	15.22	9.74	56.68	13178	48432	35981.5	3.86	11783	31886	20812.5	2.85
		Jharkand	830	263.6	15.36	11.43	37.44	20958.33	82201.67	61243.33	4.39	19886.67	61323.33	41436.67	3.42
		West Bengal	33	2.93	10.05	7.15	47.2	26000	53650	27650	1.94	17385	30820	18435	1.78
		Total	214	39.93											
2	Black gram	Jharkand	253	81.2	10.42	8.05	49.11	20794.5	54068.38	33848.88	2.66	20346.25	47909.75	28438.5	2.35
		West Bengal	261	40.32	10.06	7.25	38.32	20556.25	54340	33788.25	2.76	17983	39437.5	21454.5	2.28
		Total	514	121.52											
3	Green gram	Bihar	71	22.5	8.37	6.31	32.51	17150	53670.67	36437.33	3.11	15730	40581.33	24838	2.58
		Jharkand	115	42	8.85	5.78	56.26	19014.4	45775	20829	2.18	19461.6	50778	31316.4	2.5
		West Bengal	14	1.19	6.2	3.5	77.14	20750	40800	20050	1.96	16200	30400	14200	1.86
		Total	200	65.69											
4	Horse gram	Jharkand	296	97.5	7.97	5.63	47.34	10352	30681.67	20329.67	2.26	10611.83	29236.67	18624.83	2.62
		Total	296	97.5											
5	Cowpea	Bihar	200	25.03	91.87	74.85	22.42	37700	142003.57	104275	3.86	35215.71	102540.71	67325	2.87
		Jharkand	20	2	273.25	208.5	31	124200	327900	203700	2.64	124200	250200	126000	2.01
		Total	220	27.03											
		Total Kharif Pulses	2415	712.27											

4.2.4 Rabi Pulse

The KVKs of Zone-II conducted frontline demonstration in rabi 2016-17 with good number of pulse crops like lentil, chickpea, field pea, gram, green gram, pea, moong, lobia and vegetable pea. Among the pulse crops, lentil, chickpea, field pea and green gram were demonstrated in Bihar, Jharkhand and West Bengal and the crops like gram and pea in Bihar and Jharkhand and moong, lobia and vegetable pea only in Bihar. In lentil, the KVKs of Jharkhand recorded higher average increase in demonstration yield of 37.99 per cent with 3.1 benefit-cost ratio followed by KVKs of Bihar with 30.25 per cent increase in average demonstration yield and 2.87 benefit-ratio over local check and West Bengal with 27.25 per cent increase in average yield and 2.31 benefit-cost ratio. However, in respect of areas brought under frontline demonstration on lentil, only 16.83 ha was covered under frontline demonstration in Jharkhand whereas it was 307.89 ha in Bihar and 65.5 ha in West Bengal. In chick pea, KVKs of Jharkhand brought 173.47 ha area under frontline demonstration programmes against 79.0 ha in Bihar and 40.0 ha in West Bengal. In respect of performance, increase in average demonstration

yield over local check to the extent of 49.5 per cent was recorded in West Bengal followed by 40.15 per cent in Bihar and 34.15 per cent in Jharkhand. However, benefit-cost ratio was highest in Bihar (2.69) and lowest in West Bengal (1.66). In field pea, KVKs of Jharkhand brought 54.0 ha area under frontline demonstration programme followed by KVKs of Bihar (30.0 ha) and KVKs of West Bengal (15.0 ha). However, highest benefit-cost ratio was worked out in average demonstration yield over local check. KVKs of Jharkhand recorded 39.63 per cent increase whereas it was 25.34 per cent in Bihar and 11.08 in West Bengal. Another pulse crop, gram was demonstrated in Bihar and Jharkhand for a total area of 115.0 ha of which 80.0 ha in Jharkhand and 35.0 ha in Bihar. The demonstration resulted 40.83 per cent increase in yield over local check in Jharkhand and 27.13 per cent in Bihar. However, higher monetary benefit in terms of benefit-cost ratio was worked out in Bihar (3.12) over Jharkhand (2.51). Frontline demonstration on green gram was conducted by the KVKs of Bihar, Jharkhand and West Bengal during rabi 2016-17 for an area of 62.0 ha. Highest coverage was recorded in West Bengal (33.0 ha) and the lowest was in Bihar (6.0 ha). However, higher yield increase in demonstration was observed in Bihar (44.2%) followed by Jharkhand (41.03%) and West Bengal (26.12%). The KVKs of Jharkhand recorded highest monetary benefit in terms of benefit-cost ratio which was worked out as 2.89. KVKs of West Bengal worked out the benefit-cost ratio of 2.11 and that of Bihar 1.58. In another frontline demonstration programme, pea was taken up by KVKs of Bihar and Jharkhand for an area of 26.0 ha. Average increase in demonstration yield over local check was recorded 60.32 per cent in Jharkhand and 26.86 in Bihar. However, no noticeable difference was found in respect of benefit-cost ratio in the case of pea demonstration programme. Moong, lobia and vegetable pea were three other pulse crops demonstrated by the KVKs of Bihar in rabi 2016-17. Average increase in demonstration yield recorded for the three crops was 38.0, 9.5 and 66.8 per cent, respectively. In respect of benefit-cost ratio, lobia was most profitable crop with 4.18 benefit-cost ratio followed by vegetable pea (2.59) and moong (2.3). The details of demonstration conducted on pulse crops during Kharif 2016-17 are given in Table.

Table: Frontline Demonstration on Rabi Pulses

Sl. No.	Crop	State	No.of Farmers	Area (ha)	Yield (q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
					Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
1	Lentil	Bihar	743	307.89	15.32	11.57	30.25	21059.3	68087.45	47028.15	3.4	20103.17	55624.24	34975.61	2.87
		Jharkand	64	16.83	11.48	8.3	37.99	17328.33	50966.67	34055	2.98	16498.33	48720.83	32232.5	3.1
		West Bengal	357	65.5	10.44	8.28	27.25	19368.75	53957.5	34588.75	2.8	17373.75	40493.13	23119.38	2.31
		Total	1164	390.22											
2	Chickpea	Bihar	201	79	14.22	10.25	40.15	23056.33	68588	45531.67	3	20876.67	55086.67	34210	2.69
		Jharkand	552	173.47	14.37	10.8	34.15	37810.38	75443.13	50007.75	2.94	23489.5	57269.38	37698.63	2.44
		West Bengal	118	40	13.38	9.41	49.5	29937.5	60250	30312.5	1.99	25787.5	45750	19962.5	1.66
		Total	871	292.47											
3	Field Pea	Bihar	106	30	17	13.57	25.34	16025	58008	41983	5.19	15692.5	55947	40254.5	4.8
		Jharkand	227	54	14.62	10.55	39.63	24959	57473	33314	2.42	21802	41295	19493	1.94
		West Bengal	73	15	9.5	8.28	11.08	24775	44460	19685	1.8	23837.5	39675	15837.5	1.67
		Total	406	99											
4	Gram	Bihar	98	35	16.93	12.27	27.13	20628.33	69356.67	48728.33	2.77	20695	64663.33	43968.33	3.12
		Jharkand	270	80	15.88	10.55	40.83	19842.5	63750	43907.5	3.55	20196	49325	29129	2.51
		Total	368	115											
5	Greengram	Bihar	36	6	9.95	6.5	44.2	21395	44230	22835	2.18	18000	27260	9260	1.58
		Jharkand	127	23	10.23	7.3	41.03	19315.67	66666.67	47351	3.54	17044	47666.67	30622.67	2.89
		West Bengal	186	33	9.53	7.58	26.12	19982.67	47573.33	27590.67	2.45	18320.67	37726.67	19406	2.11
		Total	349	62											
6	Pea	Bihar	150	21	17.45	13.9	26.86	23687.5	56700	33012.5	2.39	23241	45525	22284	1.94
		Jharkand	14	5	20.2	12.6	60.32	22000	60600	38600	2.75	21000	37800	16800	1.8

Sl. No.	Crop	State	No.of Farmers	Area (ha)	Yield (q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
					Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
		Total	164	26											
7	Moong	Bihar	45	20	10.45	7.55	38	18050	51610	33560	2.56	15300	38340	23040	2.3
		Total	45	20											
8	Lobia	Bihar	37	4	90	82.2	9.5	30160	135000	104840	4.48	29450	123300	93850	4.18
		Total	37	4											
9	Vegetable Pea	Bihar	2	1	12.35	7.4	66.8	16325	61750	45398	3.78	14245	37000	22755	2.59
		Total	2	1											
		Total Rabi Pulses	3406	1009.69											

4.2.5 Other Crops

In addition to pulse and oilseed crops, demonstrations were conducted by the KVKs of A&N Islands, Bihar, Jharkhand and West Bengal on cereals, vegetables, cash crops, flowers, spices and other crops for an area of 3779.32 ha. In paddy, an area of 2485.03 ha was brought under demonstration by the KVKs of Bihar, Jharkhand, West Bengal and A&N Islands. The increase in yield in demonstration over local check was almost uniform except for the KVKs of Jharkhand where slightly higher (30.27%) yield benefit was recorded. The benefit-cost ratio, however, ranged from 1.11 to 1.68, the lowest was in A&N Islands and highest in Bihar.

In wheat, KVKs of Bihar, Jharkhand and West Bengal brought 181.17 ha under demonstration programme. Advantage in yield in the demonstration over local check was between 21 to 27 per cent with highest benefit-cost ratio of 1.82 worked out in Bihar.

In another cereal crop, maize, demonstration was conducted in an area of 90.71 ha by the KVKs of Bihar, Jharkhand and West Bengal. Average demonstration yield over local check was highest (42.27%) in Jharkhand but benefit-cost ratio was more in Bihar (2.69).

Among the other crops demonstrated by the KVKs, oat produced highest average demonstration yield in West Bengal (162.73%) over local check and cabbage yielded lowest increase (7.41%) in West Bengal. Crops produced higher yield in demonstration over local check include okra, onion, ragi, bittergourd, marigold and cauliflower which was more than 50 per cent. The other demonstrated crops ranged from 13 to 50 per cent. In respect of benefit-cost ratio, crops like brinjal, cabbage, broccoli, bitter gourd, okra and sponge gourd provided more than 3 whereas it was in the range of 1 to 2.9. The details are given in the following Table.

Table: Frontline Demonstration on Other Crops

Sl. No.	Crop	State	No. of Farmers	Area (ha)	Yield (q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
					Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
1	Paddy	A&N	4	1	41.5	34	21.35	35000	46750	11750	1.34	35000	38800	3800	1.11
		Bihar	2567	1204.53	43.35	36.12	21.41	26446.35	68580.97	36075.07	2.35	26834.82	53374.56	19918	1.68
		Jharkand	2717	1084.5	38.16	29.83	30.27	28398.89	61110.19	32681.67	1.96	26830	45263.04	18118.22	1.5
		West Bengal	899	195	53.18	50.4	20.02	33842.39	56090.86	22240.25	1.65	32393.39	46709.25	14387.29	1.45
		Total	6187	2485.03											

Sl. No.	Crop	State	No. of Farmers	Area (ha)	Yield (q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
					Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
2	Wheat	Bihar	318	77.84	40.26	32.04	24.1	27365.09	64035	36669.91	2.32	25665.09	50508.86	24843.77	1.82
		Jharkand	247	81	34.58	27.4	26.6	30271.79	53895.5	23624.29	1.81	29850.71	41217.5	12795.36	1.44
		West Bengal	157	22.33	40.84	27.47	21.01	23857.33	44387.67	20530.33	1.88	25540.67	36150	10609.33	1.42
		Total	722	181.17											
3	Maize	Bihar	50	20	79.2	70	13.14	32343	89200	56856	2.75	29641	80000	50358	2.69
		Jharkand	307	68	37.9	27.52	42.27	22562.6	56644.2	34081.6	2.51	19407.6	34701.6	15336	1.44
		West Bengal	40	2.71	33.36	24.97	32	15475	25556	10081	1.69	14375	20102	5727	1.44
		Total	397	90.71											
4	Brinjal	Bihar	211	26.55	292.15	230.27	26.94	50594.7	227605	169810.3	4.05	54451	174892.3	120521.3	3.27
		Jharkand	102	16.3	365.42	299.14	30.32	84263.01	260411.41	238114.26	3.81	84477.94	275673.47	191195.52	3.17
		West Bengal	97	11.48	283.36	217.08	40.16	92562	228151.6	135589.6	2.49	93328.4	160473.2	67144.8	1.72
		Total	410	54.33											
5	Cauli flower	Bihar	246	37.78	1084.81	858.2	27.24	51782.4	175806.4	126359	3.5	52184	138024.2	85840.2	2.61
		Jharkand	62	2.11	273.1	238.17	14.67	61247.33	188414.17	127166.83	3.05	60179.33	142900	82720.67	2.37
		West Bengal	38	1.03	242.33	228.73	54	126987.5	450675	323687.5	3.28	100048.13	243375	143326.88	2.33
		Total	346	40.92											
6	Onion	Bihar	75	5	184.6	135.05	12.78	45366	1338536.67	168170.67	4.37	45436.33	136866.67	91430.33	2.91
		Jharkand	16	3	272	168	61.9	48000	178000	13000	3.7	42000	110000	68000	2.61
		West Bengal	118	9.26	142.83	89.58	28.05	226128	587041.67	360913.67	2.48	229587.6	532750	303162.4	1.99
		Total	209	17.26	599.43										
7	Tomato	Bihar	206	23.45	342.58	259	33.5	70965.73	287180.76	163396.85	3.17	71314.59	176597.18	95873.5	2.32
		Jharkand	210	50.56	469.83	344.01	38.76	77012.41	301213.96	224423.78	4.04	70638.74	180638.09	152443.8	3.2
		West Bengal	47	5.29	359.38	269.9	37.61	116325	203700	139962.5	2.22	120625	192437.5	84600	1.67
		Total	463	79.3											
8	Potato	Bihar	32	5.3	225.5	190	17.67	95975	201600	105625	2.1	85615	169200	83585	1.98
		Jharkand	3	6	205.6	170.2	17.22	86300	185040	98740	2.14	85500	153180	67680	1.79
		West Bengal	34	4.1	289.5	248.5	16.13	130125	144750	14625	1.1	126375	124250	13375	0.98
		Total	69	15.4											
9	Cabbage	Jharkand	10	0.5	360	304	18.43	76800	361280	283200	3.69	88450	352000	282000	3.19
		West Bengal	37	1.6	7670.33	4217.33	7.41	48650	171766.67	123116.67	3.45	19833.33	91933.33	72100	2.29
		Total	47	2.1											
10	Broccoli	Jharkand	36	1.23	152.4	125	37.6	63700	226460	162760	3.57	56500	200500	144000	3.5
		West Bengal	98	3.53	158.22	206.67	32.43	108624	270260	162356	2.65	87533.33	172650	85116.67	2.17
		Total	134	4.76											
11	Chilli	West Bengal	38	3.01	135.1	94.9	39.88	105123.2	321640	216516.8	3.35	99495	228596	119901	2.54
		Total	38	3.01											

Sl. No.	Crop	State	No. of Farmers	Area (ha)	Yield (q/ha)		Increase (%)	Economics of Demonstration (Rs/ha)				Economics of Check (Rs/ha)			
					Demo	Check		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
12	Cucumber	Bihar	20	0.5	63.05	52.8	16.25	90	189	99	2.1	58	104	46	1.79
		West Bengal	100	10.31	314.95	253.57	27.81	139780	695584	191304	2.47	137660	266982	129272	1.95
		Total	120	10.81											
13	Bitter gourd	A&N	5	2				15260	26923	11663	1.76				
		Jharkand	10	1	140	80	75	38000	140000	100000	3.68	25000	80000	55000	3.2
		West Bengal	12	2.06	234.53	175.33	33.15	82345	185940	103595	2.3	74850	135950	61100	1.83
		Total	27	5.06											
14	Turmeric	Bihar	67	19.63	341.67	259.33	36.79	303333.33	938500	635166.67	3.16	268000	700333.33	435666.67	2.7
		West Bengal	57	3.64	242.52	198.38	29.67	131207	282720	365893	2.26	131312.5	210912.5	79600	1.68
		Total	124	23.27											
15	Oat	Bihar	26	3	525	4.38	19.9	20210	80400	60190	2.98	18940	67380	48390	2.55
		Jharkand	1	6	210.6	187.4	12.38	25750	42120	16370	1.64	24150	37480	13330	1.55
		West Bengal	24	2.28	365.4	234.85	162.73	11035	18610.5	7575.5	1.69	11220	18150	6930	1.62
		Total	51	11.28											
16	Okara	A&N	3	2				19500	39621	20121	2.03				
		Bihar	89	5	168.68	127.6	30.43	44815	160380	115565	3.79	43767.5	126600	82832.5	2.91
		Jharkand	25	3	22.92	70.6	52.57	24680	107720	83040	4.36	27200	105900	78700	3.89
		West Bengal	7	0.5	126	87.5	44	53166	113400	60234	2.1	40600	78750	38150	1.93
		Total	124	10.5											
17	Jute	Bihar	142	46	23.05	828.83	36.41	27128	65343.33	38215.33	2.41	27465	43995	16530	1.6
		West Bengal	153	26	31.33	26.3	20.11	48001.5	93246.33	43894.83	2.12	48015.33	75857.33	27853.67	1.68
		Total	295	72											
18	Ragi	Bihar	9	2	16.9	11.4	32.54	21500	50700	29200	2.50	18200	342000	16000	1.90
		Jharkand	81	30	23.25	15.5	56.17	21250	44412.5	23162.5	2.13	19000	28875	9875	1.51
		West Bengal	16	2	7.7	6.1	26	22250	24500	22250	2.1	11000	18000	17600	1.63
		Total	106	34											
19	Marrigold	Bihar	14	2.25	137.95	93.15	27.35	38012.5	122962.5	84950	3.15	34887.5	83125	48237.5	2.45
		Jharkand	13	0.8	129.21	80.16	59.51	57250	172562.5	115312.5	3.03	75250	107740	59990	2.16
		Total	27	3.05											
20	Sponge Gourd	Bihar	92	7.25	154.67	119.73	27.68	30733.33	150033.33	119300	4.97	30566.67	112360	81793.33	3.73
		Jharkand	8	1	180	128	40.63	21,200	90,000	68,800	4.25	21,000	64,000	43,000	3.05
		Total	100	8.25											
21	Others	A&N	4	3											
		Bihar	768	221.2											
		Jharkand	443	299.5											
		West Bengal	544	103.41											
		Total	1759	627.11											
		Total Other Crops	11755	3779.32											

An overall analysis of frontline demonstration conducted by the KVKs of this zone indicates that the KVKs of Jharkhand performed better in terms of area coverage, increase in average demonstration yield and benefit-cost ratio. Increase in yield, benefit-cost ratio and acreage for demonstration were much less in West Bengal which needs adequate attention. However, the KVKs of this zone have proved the superiority of improved varieties/technologies in the farmers' field which need to upscale for the benefit of the farming community.

4.2.6 Livestock and Fishery

Frontline demonstration was also conducted in livestock and fishery related breed, feed, vaccination, deworming, pond management, stoking density, fish fingerling production and other areas by the KVKs of A&N Islands, Bihar, Jharkhand and West Bengal. In livestock, 3475 number of farmers were involved in such demonstration for the benefit of 20994 livestock. Out of the total number of farmers, 2149 number of farmers were involved in Bihar, 1065 in West Bengal, 248 in Jharkhand and 13 in A&N Islands. However, in terms of livestock, 8827 number of livestock were brought under improved rearing practices in Jharkhand followed by 8194 in Bihar, 3960 in West Bengal and 13 in A&N Islands.

In fishery, 540 number of demonstrations were taken up by the KVKs to cover an water area of 269.93 ha. In respect of both the involvement of farmers and water area brought under demonstration, West Bengal KVKs were ahead of other states and Union Territory with 383 number of farmers and 126.93 ha water area, respectively. In Bihar, the corresponding figures were 122 and 106, in Jharkhand, it was 33 and 33 and in A&N Islands, it was 2 and 4, respectively. The details are given in Table.

Table: Frontline Demonstration on Livestock and Fishery

Sl. No.	Category	State	No.of Farmers	Area (ha)/No
1	Livestock	A&N	13	13
		Bihar	2149	8194
		Jharkand	248	8827
		West Bengal	1065	3960
		Total	3475	20994
2	Fishery	A&N	2	4
		Bihar	122	106
		Jharkand	33	33
		West Bengal	383	126.93
		Total	540	269.93

4.2.7 Enterprise

Apart from conducting demonstration on crops, livestock and fishery, the KVKs also demonstrated various enterprises in the farmers' places to exhibit its relative advantage over conventional practices and/or introduce newer enterprises. In the process, altogether 5221 demonstrations were conducted on enterprises like vermicompost, bee keeping, value addition, mushroom production, backyard livestock rearing, homestead vegetable cultivation, feed production, azolla cultivation and many more. During last one year, 5221 number of such enterprises were demonstrated for the benefit of 969 small and resource poor farmers of this zone. In demonstrating enterprises, KVKs of West Bengal involved 544 number of farmers with 4506 number of enterprises followed by KVKs of Bihar for 395 farmers and 497 enterprises, Jharkhand 29 farmers with 216 enterprises and one farmer for two enterprises in A&N Islands. The details are given in Table.

Table: Frontline Demonstration on Enterprise

Sl. No.	Category	State	No. of Farmers	Area (ha)/No
1	Enterprise	A&N	1	2
		Bihar	395	497
		Jharkand	29	216
		West Bengal	544	4506
		Total	969	5221

4.2.8 Implement

Various farm tools and implements were also demonstrated in this zone for the benefit of 3615 number of farmers. The tools and implements were demonstrated in 543.32 ha area. The KVKs of Jharkhand brought 336.5 ha area for such demonstrations involving 2717 number of farmers followed by 547 farmers to cover 79.32 ha area in West Bengal and 345 farmers to cover 124.5 ha in the case of KVKs of Bihar. The implements saved the labour requirement, seed rate, enhanced water use efficiency and reduced drudgery to certain extent. The details are given in the Table.

Table: Frontline Demonstration on Implement

Sl. No.	Category	State	No.of Farmers	Area (ha)/No
1	Implement	A&N	6	3
		Bihar	345	124.5
		Jharkand	2717	336.5
		West Bengal	547	79.32
		Total	3615	543.32

4.3 CLUSTERED FRONTLINE DEMONSTRATION

With a view to bring large areas of rice fallow under frontline demonstrations and enhance the production as well as productivity of pulse and oilseed crops, the ambitious programme of Department of Agriculture & Cooperation and Farmers Welfare, Govt. of India has been implemented during Kharif 2016 and Rabi 2016-17 through the KVKs of Bihar, Jharkhand and West Bengal. In order to achieve the total target earmarked by DAC&FW, a series of workshop was conducted at ICAR-ATARI, Kolkata, Bihar and Jharkhand to enable the KVKs to cover as much area as possible both in pulse and oilseed crops. However, due to certain limiting factors, the entire targeted area could not be brought under clustered frontline demonstration programme.

4.3.1 Pulses

In CFLD on pulse crops during Kharif 2016, pigeon pea, black gram, green gram and horse gram were taken up for demonstration as per the communication received from DAC&FW. Altogether 2130 ha was allotted for kharif pulses of which 1946 ha could be finally brought under demonstration programme. All the four crops except horse gram were demonstrated in Bihar, Jharkhand and West Bengal and horse gram was demonstrated only in Jharkhand. Performance analysis of individual pulse crop indicates that in pigeon pea, 40 to 44 percent increase in average yield under demonstration was recorded in the three states. In black gram, no demonstration was conducted in Bihar though the KVKs of Jharkhand and West Bengal brought 430 ha under CFLD programme. In respect of yield enhancement, the KVKs of Jharkhand reported as average increase of demonstration yield to the extent of 45.45 per cent whereas it was 41.27 per cent in respect of KVKs of West Bengal. In green gram, average increase in demonstration yield was highest in Bihar (57.97%) followed by Jharkhand (45.79%) and West Bengal (38.0%). In horse gram, an area of 90.0 ha was brought under the CFLD programme by the KVKs of Jharkhand. The increase in average demonstration yield over local check was 29.73 per cent. The details are given in Table.

Table: Cluster Frontline Demonstration on Kharif Pulses during 2016-17

Sl. No	Crops	State	Target of FLD Approved		Achievement of FLD		Average yield (q/ha)		yield increase (%)	Difference of yield between demo and local (q/ha)
			No of Demonstration	Area (in ha)	No of Demonstration	Achievement Area (in ha)	Demo	Local		
1	Pigeon pea	Bihar	1650	660	1553	621	15.75	11.15	41.26	4.60
		Jharkhand	1400	560	1388	555	12.80	8.88	44.14	3.92
		West Bengal	200	80	172	80	10.64	7.60	40.00	3.04
2	Black gram	Bihar	125	50	0	0	0	0	0.00	0.00
		Jharkhand	500	200	500	200	9.92	6.82	45.45	3.10
		West Bengal	575	230	611	230	8.66	6.13	41.27	2.53
3	Green gram	Bihar	125	50	25	10	10.90	6.90	57.97	4.00
		Jharkhand	275	110	275	110	9.01	6.18	45.79	2.83
		West Bengal	200	80	128	50	6.06	4.39	38.04	1.67
4	Horse gram	Jharkhand	275	110	225	90	7.20	5.55	29.73	1.65
Total Kharif Season			5325	2130	4877	1946				

In Rabi 2016-17, lentil, chick pea and field pea were brought under clustered demonstration programme by the KVKs of Bihar, Jharkhand and West Bengal to cover an area of 3150.0 ha. However, lentil was demonstrated in Bihar and West Bengal only. The performance of demonstration in lentil shows that 40.30 per cent average increase was recorded in Bihar whereas it was 29.60 per cent in West Bengal. In chick pea, the KVKs of West Bengal recorded an average increase in yield to the extent of 45.99 per cent against 40.79 per cent in Jharkhand and 39.60 per cent in Bihar. Another pulse crop, field pea taken up for demonstration produced 37 to 41 per cent higher yield in all the three states. The details are given in Table.

Table: Cluster Frontline Demonstration on Rabi Pulses during 2016-17

Sl. No	Crops	State	Target of FLD Approved		Achievement of FLD		Average yield (q/ha)		yield increase (%)	Difference of yield between demo and local (q/ha)
			No of Demonstration	Area (in ha)	No of Demonstration	Achievement Area (in ha)	Demo	Local		
1	Lentil	Bihar	2650	1060	2974	1189.75	13.89	9.90	40.30	3.99
		Jharkhand	0	0	0	0	0.00	0.00	0.00	0.00
		West Bengal	875	350	825	330	9.72	7.50	29.60	2.22
2	Chick pea	Bihar	1450	580	1316	526.25	12.41	8.89	39.60	3.52
		Jharkhand	1175	470	1150	460	12.46	8.85	40.79	3.61
		West Bengal	225	90	200	80	9.65	6.61	45.99	3.04
3	Field pea	Bihar	925	370	626	250.25	12.49	9.02	38.47	3.47
		Jharkhand	225	90	200	80	13.29	9.42	41.08	3.87
		West Bengal	350	140	350	140	12.15	8.88	36.82	3.27
Total Rabi Season			7875	3150	7641	3056.25				

Summer Pulse: Clustered frontline demonstration was also taken by the KVKs of Bihar, Jharkhand and West Bengal on green gram and black gram to cover an area of 1380.0 ha against the target of 1390.0 ha. In green gram, highest area was covered by KVKs of Bihar (460.0 ha) whereas in Jharkhand, 38.0 ha was brought under demonstration and 34.0 ha in West Bengal. In black gram, 200.0 ha was brought under demonstration programme in this zone of which 130.0 ha in Jharkhand, 40.0 ha in Bihar and 30.0 ha in West Bengal. The results of the demonstration are awaited till the compilation of report. However, the details of target and achievement in terms of area allotment and crop-wise/state-wise distribution of area are given at Table.

Table: Cluster Frontline Demonstration on Summer Pulses during 2016-17

Name of Crop	State	Target of FLD approved		Achievement of FLD	
		No. of Demo	Area (ha)	No. of Demo	Area (ha)
Green Gram	Bihar	1175	470	1150	460
	Jharkhand	975	390	950	380
	West Bengal	825	330	850	340
Total		2975	1190	2950	1180
Black Gram	Bihar	100	40	100	40
	Jharkhand	325	130	325	130
	West Bengal	75	30	75	30
Total		500	200	500	200
Grand Total		3475	1390	3450	1380




4.3.2 Oilseeds

Clustered frontline demonstration was also conducted in oilseed crops both in Kharif 2016, and rabi and summer 2016-17 by the KVKs of this zone. In kharif, ground nut, sesame, niger and soybean were demonstrated in 1116.8 ha against the allotted target of 1540.0 ha. Ground nut, which was demonstrated in Jharkhand and West Bengal for an area of 410.0 ha produced 40.48 per cent more yield over local check but it was only 14.5 per cent in respect of KVKs of West Bengal. Sesame covered an area of 438.8 ha in all the states and the increase in yield was in the range of 31 to 42 per cent, highest increase being recorded in Jharkhand. Another oilseed crop, niger was demonstrated in Bihar and Jharkhand to cover an area of 250.0 ha. The increase in average demonstration yield was in the range of 36 to 41 per cent. The KVKs of Bihar conducted clustered frontline demonstration programme in soybean for an area of 20.0 ha. An average increase in demonstration yield of 16.67 per cent was recorded by the KVKs. The details are given in Table.

Table: Cluster Frontline Demonstration on Kharif Oilseed during 2016-17

Name of crop	State	Target of FLD approved		Achievements of FLD		Yield (qtl/ha)		Increase %	Difference in yield (q/ha)
		No. of Demo	Area (ha)	No. of Demo	Area (ha)	Demo field	Local		
Groundnut	Jharkhand	825	330	794	290	11.85	8.23	40.48	3.62
	West Bengal	675	270	472	120	7.6	6.08	14.50	1.52
	Total	1500	600	1266	410				
Sesame	Bihar	550	220	273	111.8	4.675	3.40	35.73	1.27
	Jharkhand	600	240	633	285	4.43	3.10	42.17	1.32
	West Bengal	550	220	119	40	9.36	7.13	31.33	2.24
	Total	1700	680	1025	436.8				
Niger	Bihar	75	30	67	30	3.17	2.25	40.89	0.92
	Jharkhand	525	210	550	220	5.15	3.80	36.43	1.35
	Total	600	240	617	250				
Soybean	Bihar	50	20	50	20	21.7	18.6	16.67	3.1
	Total	50	20	50	20				
	Grand Total	3850	1540	2958	1116.8				

In rabi 2016-17, rapeseed and mustard and linseed were demonstrated by the KVKs of all three states for an area of 2812.5 ha against the target of 3000.0 ha. In rapeseed and mustard, the KVKs of Jharkhand reported 57.17 per cent increase in demonstration yield over local check against 39.38 per cent of Bihar and 37.38 per cent of West Bengal.

In linseed, the demonstration programme in clustered mode produced 27 to 35 per cent higher yield over the local check. The KVKs of Jharkhand recorded the highest increase of 35.16 per cent whereas it was 28.27 per cent in West Bengal and 27.41 per cent in Bihar.

Table: Cluster Frontline Demonstration on Rabi Oilseed during 2016-17

Name of crop	State	Target of FLD approved		Achievements of FLD		Yield (qtl/ha)		Increase %	Difference in yield (Qtl/ha)
		No. of Demo	Area (ha)	No. of Demo	Area (ha)	Demo field	Local		
Rapesed & Mustard	Bihar	2550	1020	2416	1025	12.86	9.20	39.38	3.65
	Jharkhand	1650	660	1706	700	10.32	6.69	57.17	3.63
	West Bengal	1275	510	1874	550	12.29	8.99	37.38	3.30
	Total	5475	2190	5996	2275				
Linseed	Bihar	1075	430	674	247.5	7.13	5.15	27.41	1.98
	Jharkhand	425	170	353	150	6.31	4.52	35.16	1.79
	West Bengal	525	210	463	140	6.25	4.72	28.27	1.52
	Total	2025	810	1490	537.5				
	Grand Total	7500	3000	7486	2812.5				

Clustered frontline demonstration was also conducted during summer 2017 for an area of 1120.0 ha against the allotted area of 640.0 ha. The crops identified were sesame, sunflower and ground nut. As the results of the demonstration are awaited, performance appraisal could not be taken up. However, the state-wise target and actual conduct of demonstration are given at Table.

Table: Cluster Frontline Demonstration on Summer Oilseed during 2016-17

Name of crop	State	Target of FLD approved		Achievements of FLD	
		No. of Demo	Area (ha)	No. of Demo	Area (ha)
Sesame	Bihar	325	130	395	160
	Jharkhand	100	40	82	40
	West Bengal	550	220	1097	410
	Total	975	390	1574	610
Sunflower	Bihar	650	260	764	330
	Total	625	250	764	330
Groundnut	West Bengal	0	0	452	180
	Total	0	0	452	180
	Grand Total	1600	640	2790	1120
	Total	12950	5180	13234	5049.3

4.4 TRAINING ACHIEVEMENTS

4.4.1 Practicing Farmers

The sustainable development of agriculture, among other factors, depends on the appropriate application of improved agricultural practices by the farming communities. The faster improvement of agriculture and allied sectors needs adequate knowledge and skill for its application in the actual field condition. Hence, providing knowledge and skill to the practicing farmers is pre-requisite in developing agriculture through adoption/application of advanced agricultural technologies. The farmers and farm-women registered their names in large number to acquire improved knowledge and skill in different areas of crop production, horticulture, fruit management, ornamental plant cultivation, plantation crop management, livestock production and management, home science and women empowerment, agricultural engineering, plant protection, fisheries development, production of inputs at site, capacity building and group dynamics, agro-forestry and other areas. Rural youths, on the other hand, enrolled their names to obtain training in more specific areas which are considered to have potentiality for enterprise development in the respective districts. In respect of extension functionaries, the assessment of training need was made by the concerned departments/organizations. KVK helped them to refresh their knowledge mainly in the areas of frontier technology generation and application. In imparting training to farmers, rural youths and extension functionaries, the KVKs resorted to on-campus and off-campus condition as per the requirement of training course curriculum. As the farmers need field application of newly generated technologies/practices, emphasis was given by the KVKs concentrated on providing more number of on-campus training programmes.

Table: Training conducted for farmers and farm women

State	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Andaman & Nicobar	57	649	408	1057	0	0	0	376	286	662	1025	694	1719
Bihar	4377	80480	16355	96835	15481	7803	23284	3400	2190	5590	99361	26348	125709
Jharkhand	1740	11050	4442	15492	2865	2072	4937	20722	12353	33075	36785	18869	56212
West Bengal	1763	20391	6395	26786	11308	4918	16226	7081	4657	11738	38780	15970	54750
Total	7937	112570	27600	140170	29654	14793	44447	31579	19486	51065	175951	61881	238390

The training programmes organized by the KVKs during 2016-17 altogether were 7937 in number covering 238390 farmers. Out of these, 73066 numbers of farmers attended in on-campus training (2384 number of courses at KVK campus), whereas, 165324 farmers participated in 5553 number of courses conducted in the villages as off-campus training. Participation of farm women in these training programmes was significant which constituted about 25.95% of the beneficiaries.

As close look on training programmes of rural youths and girls showed that 30984 rural youths were provided training through 1300 training programmes conducted at KVKs whereas about 34784 youths were participated in 928 training programmes organized outside KVKs. For extension functionaries 443 off-campus courses were conducted where 17503 participants were benefitted. In contrast 498 courses were organized for 16403 participants in respect of on-campus programmes. The cumulative figures of training programme for rural youths were 65768 and 33906 for extension functionaries. The number of courses was 2228 and 941 for rural youth and extension functionaries, respectively.

Table: Training conducted for rural youths

State	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Andaman & Nicobar	27	318	256	574	0	0	0	96	98	194	414	354	768
Bihar	1063	14959	6015	20974	3165	2262	5427	740	832	1572	18864	9109	27973
Jharkhand	602	9297	1303	10600	2038	592	2630	7170	2857	10027	18505	4752	23257
West Bengal	536	5129	1783	6912	3097	1241	4338	1347	1173	2520	9573	4197	13770
Total	2228	29703	9357	39060	8300	4095	12395	9353	4960	14313	47356	18412	65768

Group-wise trend of participation in the entire zone in respect of training organized for farmers' portrays that nearly twenty six per cent (25.95%) women constituted the total participants with highest percentage recorded in A&N Islands (40.37%). In Bihar, 21 per cent of the total participants were women, in Jharkhand the percentage was 33.6 and it was just above 29 per cent in the case of West Bengal.

Table: Training conducted for extension functionaries

State	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Andaman & Nicobar	0	0	0	0	0	0	0	0	0	0	0	0	0
Bihar	569	15157	2085	17242	2445	531	2976	333	698	1031	17935	3314	21249
Jharkhand	205	2926	346	3272	432	116	548	3289	504	3793	6647	966	7613
West Bengal	167	2377	739	3116	971	537	1508	281	139	420	3629	1415	5044
Total	941	20460	3170	23630	3848	1184	5032	3903	1341	5244	28211	5695	33906

Participation of girls in the training programmes organized for rural youths, however, depicts a little increase where 28 per cent of the participants were girls. State/Union Territory –wise analysis of the participation showed that the participation of girls was to the extent of the 46% in A&N Islands, 32.56 per cent in Bihar, in Jharkhand it was 20.4 per cent and it was 30.5 per cent in the case of West Bengal.

In respect of extension functionaries, only 16.8 per cent women contributed the total participants in the zone though it was as high as 28 per cent in the case of West Bengal followed by 15.6 per cent in Bihar. In Jharkhand, only 12.7 per cent of the total participants was women.

Detailed analysis of category-wise training programmes organized by the KVKs of Zone-II indicates that out of total 7937 programmes, 1787 courses were conducted in crop production related areas, 1267 in horticulture, 1166 in livestock production and management, 1063 in plant protection, 857 in home science and women empowerment, 689 in soil health and fertility management, 419 in agricultural engineering, 260 in fisheries, 120 in production of inputs, 241 in capacity building and group dynamics, 38 in agro-forestry and 30 other areas. In respect of participation by the farmers, 59574 farmers and farm-women took part in crop production related training programmes, 30305 in plant protection related thematic areas; 37442 in horticulture including vegetable, fruit, ornamental plants, plantation crops, tuber crops, spices and medicinal and aromatic plants; 20421 in soil health and fertility management, 34617 in livestock production and management; 22913 in home science; 11814 in agricultural engineering; 7482 in fisheries; 7692 in capacity building; 1057 in agro-forestry and 1439 in other areas.

A further classification of thematic area-wise training programmes organized by the KVKs reveals that altogether 1787 number of courses were conducted by the KVKs for 48626 farmers and 10390 farm women in crop production thematic area. Among various sub-thematic areas, highest number of courses (591) was offered in integrated pest management followed by Cultivation of vegetables (501), integrated crop management (408) and integrated disease management (316). Other sub-thematic areas in order of courses organized were goat farming (305), seed production (302), general crop cultivation (276), disease management in livestock (237), integrated nutrient management (217), feed management (185), dairy management (182), poultry management (163), weed management (162), value addition (156), resource conservation technologies (136), repair and maintenance of farm machinery and implements (127), soil and water testing (111), cropping system (106), soil fertility management (106), kitchen gardening (104), nursery raising (104), income generation activities for empowerment of rural women (93), production of low volume and high value crops (87), integrated farming (86), crop diversification (85), off-season vegetable cultivation (84), installation and maintenance of micro irrigation systems (84) and others (Table).

In horticulture as a whole, 1267 number of courses were organized for 37442 farmers of which 9558 were women (25.53%). Among seven sub-thematic areas, highest number of courses was offered in cultivation of vegetable crops (852) for 25527 number of farmers followed by cultivation of fruit (271 courses for 7761 farmers), ornamental plants (33 courses for 1046 farmers) and others.

Livestock production and management was the third-most important area of training both in respect of number of courses offered and participation of farmers took place. In this thematic area, 1166 numbers of training programmes was organized for 34617 farmers. Goat farming and disease management were the two major areas where 305 and 237

number of training programmes were conducted by the KVKs for 9791 and 6975 number of farmers, respectively.

Plant protection was another important thematic area both in terms of training programmes organized and participation of farmers. The KVKs organized 1063 number of courses for the benefit of 30305 farmers of which 5047 (16.65%) participants were farm-women. In terms of courses offered and participation took place, home science /women empowerment was the next important thematic area where 857 courses were conducted for 22913 farmers. However, nearly 68.7 per cent of the participants were women. In the areas of value addition and kitchen and nutritional gardening, participation of farmers was more compared to other thematic areas, otherwise all other sub-thematic areas were dominated by farm women only. Soil health and fertility management was one of the important thematic areas of the training programme conducted where 689 numbers of courses covered for 20421 numbers of farmers. Repair and maintenance of farm machinery and implements was the most important sub-thematic area under agricultural engineering thematic area both in terms of courses conducted and farmers participated. In this thematic area, 419 numbers of courses were offered to 11814 farmers out of which 127 courses were in repair and maintenance of farm machinery. The participation of farmers in this sub-thematic area was to the extent of 3605 number or 30.5 per cent. Installation and maintenance of micro-irrigation systems was the second-most important area where 84 courses were offered to 2697 farmers. The overall participation of farm-women was to the tune of 14 per cent. In fisheries, 260 numbers of courses were conducted by the KVKs for the participation of 7482 farmers and farm-women. However, the participation of farm-women was recorded as high as 18.56 per cent. Among various sub-thematic areas, composite fish culture attracted most number of participants (1853) followed by integrated fish farming, carp fry and fingerling rearing and others.

KVKs also conducted 241 number of courses for 7692 farmers and farm-women in capacity building and group dynamics. Major areas covered in this thematic area included women legal rights (58 number), formation and management of SHGs (50 number), entrepreneurial development of farmers/youths (49 number of courses), group dynamics (43 courses), leadership development (31 number) and others. However, highest number of participation was recorded in women legal rights (2333) followed by formation and management of SHGs (1513), entrepreneurial development of farmers/youths (1434), group dynamics (1290) and others. Training programme under the thematic area of Production of inputs were conducted for 3634 participants. Seed production and vermicompost production were two major areas of training. The KVKs also covered agro-forestry through this training courses and 38 number of courses were organized in this thematic systems IFS and production technologies were the major areas where 510 and 311 farmers, respectively, participated. The overall analysis of the training programmes organized by the KVKs of Zone-II indicates that KVKs have tried to provide required skill and knowledge to the farmers and farm-women in various aspects to enable them to enhance the production and productivity of crops, livestock, fishery and all other areas. Moreover, concentration on certain areas like group dynamics, women empowerment, production of inputs at site etc. has helped the farm-women in improving their socio-economic condition through SHG/group formation which is a welcome step on the part of KVKs.

Table: Training programme for farmers and farm women

Thematic Area	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
I. Crop Production													
Weed Management	162	2695	415	3110	822	233	1055	483	277	760	4000	925	4925
Resource Conservation Technologies	136	2592	249	2841	567	127	694	411	207	618	3570	583	4153
Cropping Systems	106	1739	135	1874	446	193	639	450	162	612	2635	490	3125
Crop Diversification	85	1145	161	1306	522	63	585	459	207	666	2126	431	2557
Integrated Farming	86	1177	224	1401	212	92	304	419	597	1016	1808	913	2721
Water management	80	1666	101	1767	331	49	380	289	124	413	4434	276	4710
Seed production	302	5198	651	5849	1143	189	1332	2805	1274	4079	9146	2114	11260

Thematic Area	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Nursery management	63	945	112	1057	245	71	316	330	204	534	1520	387	1907
Integrated Crop Management	408	6829	828	7657	1556	400	1956	2183	776	2959	10568	2004	12572
Fodder production	24	298	93	391	118	29	147	146	89	235	562	211	773
Production of organic inputs	59	767	236	1003	199	134	333	208	118	326	1174	488	1662
Others, (cultivation of crops)	276	3954	559	4513	1022	308	1330	2107	701	2808	7083	1568	9209
Total	1787	29005	3764	32769	7183	1888	9071	10290	4736	15026	48626	10390	59574
II. Horticulture													
a) Vegetable Crops													
Production of low volume and high value crops	87	1026	202	1228	412	114	526	344	147	491	1782	463	2245
Off-season vegetables	84	1130	287	1417	308	158	466	513	273	786	1951	718	2669
Nursery raising	104	1359	458	1817	263	255	518	645	322	967	2267	1035	3302
Export potential vegetables	22	307	66	373	137	61	198	93	14	107	537	141	678
Grading and standardization	15	269	13	282	35	10	45	41	12	53	345	35	380
Protective cultivation (Green Houses, Shade Net etc.)	39	632	86	718	133	47	180	149	51	200	914	184	1098
Others, if any (Cultivation of Vegetable)	501	6746	1905	8651	1835	1414	3249	2013	1242	3255	10594	4561	15155
Total	852	11469	3017	14486	3123	2059	5182	3798	2061	5859	18390	7137	25527
b) Fruits													
Training and Pruning	10	196	20	216	29	0	29	12	0	12	237	20	257
Layout and Management of Orchards	69	811	101	912	309	83	392	321	199	520	1441	383	1824
Cultivation of Fruit	61	854	99	953	244	47	291	277	102	379	1375	248	1623
Management of young plants/ orchards	38	712	77	789	215	36	251	79	39	118	1006	152	1158
Rejuvenation of old orchards	13	177	43	220	32	27	59	101	36	137	310	106	416
Export potential fruits	6	95	4	99	23	2	25	2	0	2	120	6	126
Micro irrigation systems of orchards	22	592	92	684	112	30	142	85	32	117	789	154	943
Plant propagation techniques	28	353	49	402	121	27	148	142	48	190	616	124	740

Thematic Area	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Others, if any(INM)	24	255	103	358	131	62	193	93	30	123	479	195	674
Total	271	4045	588	4633	1216	314	1530	1112	486	1598	6373	1388	7761
c) Ornamental Plants													
Nursery Management	14	154	37	191	53	30	83	127	43	170	334	110	444
Management of potted plants	1	0	0	0	0	0	0	20	6	26	20	6	26
Export potential of ornamental plants	3	12	4	16	8	4	12	33	83	116	53	91	144
Propagation techniques of Ornamental Plants	4	47	7	54	57	8	65	20	10	30	124	25	149
Others, if any	11	119	26	145	66	20	86	44	8	52	229	54	283
Total	33	332	74	406	184	62	246	244	150	394	760	286	1046
d) Plantation crops													
Production and Management technology	22	244	68	312	197	39	236	87	61	148	528	168	696
Processing and value addition	6	48	39	87	53	7	60	5	9	14	106	55	161
Others, if any	3	41	6	47	29	8	37	6	8	14	76	22	98
Total	31	333	113	446	279	54	333	98	78	176	710	245	955
e) Tuber crops													
Production and Management technology	23	278	51	329	83	32	115	149	73	222	510	156	666
Processing and value addition	5	117	4	121	6	0	6	0	0	0	123	4	127
Others, if any	3	0	0	0	0	0	0	54	20	74	54	20	74
Total	31	395	55	450	89	32	121	203	93	296	687	180	867
f) Spices													
Production and Management technology	25	225	50	275	170	57	227	144	68	212	539	175	714
Processing and value addition	3	13	18	31	17	14	31	13	16	29	43	48	91
Others, if any	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	28	238	68	306	187	71	258	157	84	241	582	223	805
g) Medicinal and Aromatic Plants													
Nursery management	2	25	6	31	12	6	18	2	0	2	39	12	51
Production and management technology	8	142	14	156	31	4	35	20	3	23	193	21	214
Post harvest technology and value addition	10	99	12	111	18	6	24	27	31	58	144	49	193

Thematic Area	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Others, if any	1	6	1	7	0	16	16	0	0	0	6	17	23
Total	21	272	33	305	61	32	93	49	34	83	382	99	481
III. Soil Health and Fertility Management													
Soil fertility management	106	1464	345	1809	326	71	397	532	245	777	2322	661	2983
Soil and Water Conservation	53	669	75	744	131	30	161	377	121	498	1177	226	1403
Integrated Nutrient Management	217	3966	671	4637	765	254	1019	709	301	1010	5440	1226	6666
Production and use of organic inputs	68	918	211	1129	293	43	336	367	221	588	1578	475	2053
Management of Problematic soils	27	444	23	467	98	14	112	187	41	228	729	78	807
Micro nutrient deficiency in crops	41	594	34	628	188	41	229	194	107	301	976	182	1158
Nutrient Use Efficiency	33	518	67	585	96	11	107	136	91	227	750	169	919
Soil and Water Testing	111	2066	282	2348	432	105	537	440	187	627	2938	574	3512
Others, if any	33	430	54	484	132	28	160	189	87	276	751	169	920
Total	689	11069	1762	12831	2461	597	3058	3131	1401	4532	16661	3760	20421
IV. Livestock Production and Management													
Dairy Management	182	2991	617	3608	820	350	1170	363	329	692	4174	1296	5470
Poultry Management	163	1387	773	2160	607	505	1112	742	635	1377	2736	1913	4649
Piggery Management	66	230	56	286	188	139	327	449	447	896	867	642	1509
Rabbit Management	2	12	8	20	14	10	24	2	0	2	28	18	46
Disease Management	237	3609	913	4522	781	460	1241	720	492	1212	5110	1865	6975
Feed management	185	2824	756	3580	662	309	971	424	357	781	3910	1422	5332
Production of quality animal products	26	453	91	544	107	28	135	83	83	166	643	202	845
Others, if any Goat farming	305	3838	1182	5020	1053	722	1775	1790	1206	2996	6681	3110	9791
Total	1166	15344	4396	19740	4232	2523	6755	4573	3549	8122	24149	10468	34617
V. Home Science/Women empowerment													
Household food security by kitchen gardening and nutrition gardening	104	813	999	1812	149	405	554	109	355	464	1071	1759	2830
Design and development of low/minimum cost diet	48	222	380	602	97	325	422	25	98	123	344	803	1147

Thematic Area	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Designing and development for high nutrient efficiency diet	39	170	451	621	87	159	246	72	69	141	329	679	1008
Minimization of nutrient loss in processing	32	106	433	539	21	95	116	41	69	110	168	597	765
Gender mainstreaming through SHGs	24	95	222	317	30	103	133	26	142	168	151	467	618
Storage loss minimization techniques	54	637	473	1110	140	170	310	89	69	158	866	712	1578
Enterprise development	62	441	585	1026	93	188	281	57	294	351	591	1067	1658
Value addition	156	666	1657	2323	174	605	779	98	544	642	938	2806	3744
Income generation activities for empowerment of rural Women	93	396	906	1302	144	421	565	170	453	623	710	1780	2490
Location specific drudgery reduction technologies	34	124	392	516	40	177	217	119	116	235	283	685	968
Rural Crafts	18	49	190	239	10	89	99	0	91	91	59	370	429
Women and child care	66	87	767	854	83	617	700	52	282	334	222	1666	1888
Others, if any	127	759	1271	2030	414	736	1150	261	349	610	1434	2356	3790
Total	857	4565	8726	13291	1482	4090	5572	1119	2931	4050	7166	15747	22913
VI. Agril. Engineering													
Installation and maintenance of micro irrigation systems	84	1664	188	1852	328	56	384	355	106	461	2347	350	2697
Use of Plastics in farming practices	24	480	25	505	67	24	91	72	7	79	619	56	675
Production of small tools and implements	28	331	75	406	114	68	182	91	38	129	536	181	717
Repair and maintenance of farm machinery and implements	127	2277	202	2479	535	181	716	309	101	410	3121	484	3605
Small scale processing and value addition	17	132	6	138	85	36	121	127	103	230	344	145	489
Post Harvest Technology	27	409	35	444	125	43	168	87	59	146	621	137	758
Others, if any	112	1759	115	1874	408	55	463	411	125	536	2578	295	2873
Total	419	7052	646	7698	1662	463	2125	1452	539	1991	10166	1648	11814

Thematic Area	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
VII. Plant Protection													
Integrated Pest Management	591	10296	1247	11543	2497	626	3123	1917	792	2709	14710	2665	17375
Integrated Disease Management	316	5749	616	6365	1163	337	1500	614	515	1129	7526	1468	8994
Bio-control of pests and diseases	39	640	68	708	135	38	173	161	60	221	936	166	1102
Production of bio control agents and bio pesticides	32	514	46	560	186	18	204	56	99	155	756	163	919
Other/INM in Sugarcane	85	762	309	1071	319	119	438	249	157	406	1330	585	1915
Total	1063	17961	2286	20247	4300	1138	5438	2997	1623	4620	25258	5047	30305
VIII. Fisheries													
Integrated fish farming	42	614	122	736	238	84	322	262	87	349	1114	293	1407
Carp breeding and hatchery management	15	205	5	210	98	15	113	48	43	91	351	63	414
Carp fry and fingerling rearing	28	365	57	422	122	37	159	160	33	193	647	127	774
Composite fish culture & fish disease	70	1054	194	1248	232	77	309	236	60	296	1522	331	1853
Hatchery management and culture of freshwater prawn	6	85	19	104	28	12	40	24	6	30	137	37	174
Breeding and culture of ornamental fishes	6	93	37	130	18	13	31	2	3	5	113	53	166
Portable plastic carp hatchery	5	139	7	146	21	4	25	7	0	7	167	11	178
Pen culture of fish and prawn	2	26	0	26	14	0	14	2	0	2	42	0	42
Shrimp farming	1	7	3	10	14	6	20	0	0	0	21	9	30
Edible oyster farming	0	0	0	0	0	0	0	0	0	0	0	0	0
Pearl culture	0	0	0	0	0	0	0	0	0	0	0	0	0
Fish processing and value addition	2	20	1	21	21	2	23	28	21	49	69	24	93
Others, if any	83	1320	251	1571	417	150	567	174	39	213	1911	440	2351
Total	260	3928	696	4624	1223	400	1623	943	292	1235	6094	1388	7482
IX. Production of Inputs at site													
Seed Production	46	761	54	815	257	38	295	285	23	308	1303	115	1418
Planting material production	6	69	13	82	30	0	30	71	22	93	170	35	205

Thematic Area	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Bio-agents production	1	19	2	21	3	1	4	0	0	0	22	3	25
Bio-pesticides production	9	69	19	88	23	19	42	65	52	117	157	90	247
Bio-fertilizer production	5	42	2	44	25	6	31	28	19	47	95	27	122
Vermi-compost production	30	300	99	399	149	51	200	113	117	230	562	267	829
Organic manures production	5	45	6	51	80	4	84	48	35	83	173	45	218
Production of fry and fingerlings	3	45	8	53	28	8	36	0	0	0	73	16	89
Production of Bee-colonies and wax sheets	2	40	0	40	15	0	15	0	0	0	55	0	55
Small tools and implements	1	6	4	10	0	4	4	7	7	14	13	15	28
Production of livestock feed and fodder	10	122	50	172	61	22	83	18	59	77	201	131	332
Production of Fish feed	0	0	0	0	0	0	0	0	0	0	0	0	0
Others, if any	2	5	0	5	28	7	35	20	6	26	53	13	66
Total	120	1523	257	1780	699	160	859	655	340	995	2877	757	3634
X. Capacity Building and Group Dynamics													
Leadership development	31	389	82	471	127	66	193	62	88	150	578	236	814
Group dynamics	43	788	129	917	141	86	227	78	68	146	1007	283	1290
Formation and Management of SHGs	50	722	225	947	137	140	277	50	239	289	909	604	1513
Mobilization of social capital	8	98	5	103	24	4	28	22	74	96	144	83	227
Entrepreneurial development of farmers/youths	49	642	130	772	116	92	208	191	263	454	949	485	1434
WTO and IPR issues	2	4	23	27	3	20	23	0	31	31	7	74	81
Others, if any	58	1312	231	1543	282	232	514	191	85	276	1785	548	2333
Total	241	3955	825	4780	830	640	1470	594	848	1442	5379	2313	7692
XI Agro-forestry													
Production technologies	11	117	17	134	38	40	78	25	74	99	180	131	311
Nursery management	9	151	28	179	14	3	17	40	0	40	205	31	236
Integrated Farming Systems	18	214	91	305	87	56	143	34	28	62	335	175	510
Total	38	482	136	618	139	99	238	99	102	201	720	337	1057
XII. Other	**30**	**602**	**158**	**760**	**304**	**171**	**475**	**65**	**139**	**204**	**971**	**468**	**1439**
TOTAL	7937	112570	27600	140170	29654	14793	44447	31579	19486	51065	175951	61881	238390

4.4.2 Rural youth:

The KVKs of Zone-II with an aim to boost the youths' future in a planned way conducted enterprise-potential training programmes for a large number of rural youths to make them self-employed through their own efforts and acquired managerial and related skill. In the course of inculcating knowledge and skill, the KVKs conducted 2228 number of training programmes for benefit of 65768 rural youths and girls. Among the participants 18.9% were in the category of Schedule Caste and 21.8% in Schedule Tribe. In terms of preferred courses, mushroom production was mostly preferred by trainees. A total of 196 courses were offered for 5051 rural youths while training on seed production attracted 4504 people from the rural youths for 159 courses. Sheep and goat farming was taken by 3916 person in 138 courses, Dairying was chosen by 3177 participants in 121 courses, value addition in 89 courses for 2200 trainees, poultry production in 79 courses for 1745 trainees, integrated farming in 77 courses for 2478 trainees, vermiculture in 76 courses for 1892 trainees and post harvest technology in 56 courses for 1436 trainees were other important domain. Overall picture showed that rural youths and girls have relied on the training from the KVKs for self employment generation and additional income.

Table: Training programme for rural youth

Thematic Area	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Mushroom Production	196	1628	1613	3241	391	585	976	321	513	834	2340	2711	5051
Bee-keeping	55	676	135	811	174	80	254	214	34	248	1064	249	1313
Integrated farming	77	885	177	1062	197	78	275	911	230	1141	1993	485	2478
Seed production	159	2450	297	2747	791	64	855	726	176	902	3967	537	4504
Production of organic inputs	51	505	129	634	169	68	237	332	159	491	1006	356	1362
Planting material production	59	755	148	903	196	30	226	165	65	230	1116	243	1359
Vermi-culture	76	637	158	795	229	157	386	352	359	711	1218	674	1892
Sericulture	11	99	5	104	26	0	26	55	2	57	180	7	187
Protected cultivation of vegetable crops	65	645	121	766	250	83	333	198	129	327	1093	333	1426
Commercial fruit production	39	623	87	710	273	41	314	157	33	190	1053	161	1214
Repair and maintenance of farm machinery and implements	60	919	65	984	177	28	205	125	71	196	1221	164	1385

Thematic Area	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Nursery Management of Horticulture crops	80	1242	190	1432	277	70	347	238	64	302	1757	324	2081
Training and pruning of orchards	10	120	37	157	29	9	38	54	20	74	203	66	269
Value addition	89	364	967	1331	86	396	482	125	262	387	575	1625	2200
Production of quality animal products	13	107	80	187	67	69	136	7	38	45	181	187	368
Dairying	121	1572	395	1967	414	232	646	238	326	564	2224	953	3177
Sheep and goat rearing	138	1706	558	2264	474	436	910	341	401	742	2521	1395	3916
Quail farming	5	82	22	104	32	5	37	37	6	43	151	33	184
Piggery	29	153	27	180	107	19	126	243	197	440	503	243	746
Rabbit farming	4	15	1	16	23	6	29	36	29	65	74	36	110
Poultry production	79	707	224	931	184	141	325	216	273	489	1107	638	1745
Ornamental fisheries	10	90	108	198	28	43	71	28	27	55	146	178	324
Enterprise development	31	348	190	538	57	83	140	122	35	157	527	308	835
Para vets	8	62	20	82	14	14	28	66	12	78	142	46	188
Para extension workers	30	1465	128	1593	229	30	259	455	0	455	2149	158	2307
Composite fish culture	36	474	130	604	150	33	183	24	36	60	648	199	847
Cold water fisheries	0	0	0	0	0	0	0	0	0	0	0	0	0
Fish harvest and processing technology	8	84	22	106	6	0	6	2	0	2	92	22	114
Fry and fingerling rearing	10	133	2	135	53	0	53	12	0	12	198	2	200
Small scale processing	11	98	106	204	41	31	72	13	6	19	152	143	295
Post Harvest Technology	56	386	445	831	107	220	327	113	165	278	606	830	1436
Tailoring and Stitching	48	49	473	522	36	230	266	3	203	206	88	906	994
Rural Crafts	52	101	447	548	14	93	107	33	141	174	148	681	829
Others, if any	512	10523	1850	12373	2999	721	3720	3391	948	4339	16913	3519	20432
TOTAL	2228	29703	9357	39060	8300	4095	12395	9353	4960	14313	47356	18412	65768

4.4.3 Extension functionaries

Extension functionaries of State Government Departments play key role in disseminating agricultural technologies among the larger farming communities. But majority of the extension functionaries do not have adequate knowledge of upgraded technologies. In this context KVKs play an important role in updating technological knowledge and skill in the frontier areas of the agriculture and allied sectors. During last year, 941 courses were organized for 33906 extension functionaries in different areas of production, capacity development and management of agriculture and livestock. Out of the total extension functionaries trained, 16.8% were female functionaries. The functionaries trained were 14.84% from schedule caste and 15.47% were from schedule tribe category. Among the field chosen for updating of knowledge were productivity enhancement in field crops, Integrated Pest Management, and Integrated Nutrient management were in top of the list. As many as 134 courses were organized for 5262 extension functionaries in the field of productivity enhancement in field crops. At the same time 116 courses in Integrated Pest Management for 4035 person and 114 courses in integrated nutrient management for 3953 person were conducted by the KVKs. Rejuvenation of old orchards, Protected cultivation technology, Formation and Management of SHGs, Management in farm animals and Livestock feed and fodder production are other important thematic areas as per as training of extension functionaries are concerned. In Rejuvenation of old orchards area 74 courses were organized for 2847 number of extension staff. The details were given in following Table. In order to extend the benefit to large number of extension worker, these categories of training includes line department officials, teachers, NGO staff and other agricultural related workers of the districts.

Table: Training programme for extension functionaries

Thematic Area	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Productivity enhancement in field crops	134	3465	241	3706	609	55	664	807	85	892	4881	381	5262
Integrated Pest Management	116	2955	310	3265	471	69	540	175	55	230	3601	434	4035
Integrated Nutrient management	114	2461	271	2732	454	47	501	642	78	720	3557	396	3953
Rejuvenation of old orchards	74	1991	214	2205	226	44	270	343	29	372	2560	287	2847
Protected cultivation technology	56	1165	219	1384	164	21	185	128	28	156	1457	268	1725
Formation and Management of SHGs	55	1063	183	1246	150	127	277	161	19	180	1374	329	1703
Group Dynamics and farmers organization	36	495	213	708	54	82	136	102	39	141	651	334	985
Information networking among farmers	17	555	13	568	110	29	139	779	9	788	1444	51	1495
Capacity building for ICT application	14	121	125	246	82	44	126	53	18	71	256	187	443

Thematic Area	No. of Courses	No. of Participants									Grand Total		
		Other			SC			ST					
		M	F	T	M	F	T	M	F	T	M	F	T
Care and maintenance of farm machinery and implements	27	597	62	659	152	35	187	24	5	29	773	102	875
WTO and IPR issues	14	302	64	366	56	16	72	10	2	12	368	82	450
Management in farm animals	55	1218	241	1459	385	150	535	146	286	432	1749	677	2426
Livestock feed and fodder production	58	1013	156	1169	371	184	555	158	353	511	1542	693	2235
Household food security	18	308	74	382	103	33	136	36	44	80	447	151	598
Women and Child care	19	238	187	425	32	105	137	8	105	113	278	397	675
Low cost and nutrient efficient diet designing	24	636	117	753	101	55	156	39	41	80	776	213	989
Production and use of organic inputs	23	401	22	423	76	6	82	75	8	83	552	36	588
Gender mainstreaming through SHGs	33	413	136	549	115	63	178	70	76	146	598	275	873
Others, if any	54	1063	322	1385	137	19	156	147	61	208	1347	402	1749
TOTAL	941	20460	3170	23630	3848	1184	5032	3903	1341	5244	28211	5695	33906

4.4.4 Sponsored training programme

Outreach of KVKs of Zone-II in almost every corner of the district has not only helped the farming community in receiving need-based support and information back-up but also attracted different organizations engaged in agricultural development activities to come in close contact with KVKs. Visit and interaction with KVKs and farming community convinced them to solicit help and guidance from KVKs in better implementation of their plan of action. At the same time, the organizations felt it appropriate to utilize the expertise of KVKs in upbringing the knowledge and skill of their target beneficiary through HRD programmes of KVKs. A number of govt. and other organizations are approaching the KVKs to get their clienteles trained in various aspects of agricultural development, livestock rearing, fishery, post-harvest technology and value addition, farm machinery, women empowerment/home science, capacity building etc. The KVKs, on the other hand, have tried to fulfil the expectations of those organizations apart from working on the mandated activities. In the process of sharing expertise with those organizations, the KVKs trained 104026 numbers of farmers, youths and other stakeholders during last one year by offering 1592 number of courses of varied duration.

The major areas covered by the KVKs were crop production and management, agricultural extension, livestock and fishery, production and value addition, farm machinery, post-harvest technology and value addition and others. Among the identified thematic areas, highest number of courses (389) was offered in crop production and management for 32157 participants followed by agricultural extension (328) for 31704, livestock and fisheries (308 no.) for 9345 participants, production and value addition (295 no.) for 19856 beneficiaries and others. The trend of participation indicates that the sponsoring organizations preferred to get their clientele trained in those areas where the participants might start their own venture for self-employment.

Table: Sponsored training conducted by Zone-II

Area of training	No. of courses	General			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop production and management										
Increasing production and productivity of crops	320	23154	2898	26052	2864	744	3608	26018	3642	29660
Commercial production of vegetables	69	1428	176	1604	680	213	893	2108	389	2497
Total	389	24582	3074	27656	3544	957	4501	28126	4031	32157
Production and value addition										
Fruit Plants	34	375	85	460	71	25	96	446	110	556
Ornamental plants	0	0	0	0	0	0	0	0	0	0
Spices crops	4	162	20	182	64	36	100	226	56	282
Soil health and fertility management	39	2013	159	2172	326	59	385	2339	218	2557
Production of Inputs at site	11	267	7	274	124	4	128	391	11	402
Methods of protective cultivation	5	92	0	92	77	4	81	169	4	173
Others (pl. specify)	202	12170	946	13116	2262	508	2770	14432	1454	15886
Total	295	15079	1217	16296	2924	636	3560	18003	1853	19856
Post harvest technology and value addition										
Processing and value addition	6	796	6	802	67	3	70	863	9	872
Others (pl. specify)	21	891	166	1057	142	192	334	1033	358	1391
Total	27	1687	172	1859	209	195	404	1896	367	2263
Farm machinery										
Farm machinery, tools and implements	17	2123	119	2242	283	47	330	2406	166	2572
Others (pl. specify)	55	1804	63	1867	421	66	487	2225	129	2354
Total	72	3927	182	4109	704	113	817	4631	295	4926
Livestock and fisheries										
Livestock production and management	125	919	432	1351	1047	791	1838	1966	1223	3189
Animal Nutrition Management	12	389	85	474	85	38	123	474	123	597
Animal Disease Management	24	580	338	918	81	150	231	661	488	1149
Fisheries Nutrition	4	83	22	105	25	6	31	108	28	136
Fisheries Management	84	1142	251	1393	468	163	631	1610	414	2024
Others (pl. specify)	59	1205	399	1604	516	130	646	1721	529	2250
Total	308	4318	1527	5845	2222	1278	3500	6540	2805	9345
Home Science										
Household nutritional security	7	105	47	152	53	49	102	158	96	254
Economic empowerment of women	8	358	205	563	12	24	36	370	229	599
Drudgery reduction of women	2	46	27	73	15	8	23	61	35	96
Others (pl. specify)	156	1312	749	2061	318	447	765	1630	1196	2826
Total	173	1821	1028	2849	398	528	926	2219	1556	3775
Agricultural Extension										
Capacity Building and Group Dynamics	32	813	317	1130	308	322	630	1121	639	1760
Others (pl. specify)	296	24289	1695	25984	2822	1138	3960	27111	2833	29944
Total	328	25102	2012	27114	3130	1460	4590	28232	3472	31704
GRAND TOTAL	1592	76516	9212	85728	13131	5167	18298	89647	14379	104026

4.4.5 Vocational training programme

Addressing unemployment problem of the rural youths as well as retaining them in agriculture has been one of the major accomplishments of the KVKs of the Zone. Based on the potential of agro-based enterprise in the district, the KVKs identified areas like crop production and management, integrated crop management, post-harvest technology and value addition, livestock and fisheries, income generating activities and agriculture extension to enable the youths to develop their own enterprise/ consultancy as a source of their livelihood. In most of the cases, financial/credit institutions were associated to help the youths overcome their anxiety in the case of enterprise development.

Vocational training in different areas of crop production, livestock rearing, fishery, post harvest technology value addition are the part of KVK training programme which helps in building trained manpower who can take up self employment in different areas of rural farming. Vocational courses being of longer duration, helps in upgrading the skill and knowledge of the rural youths and farmers. During the year 2016-17, KVKs of Zone-II organized 2735 courses in different areas of agriculture and allied sectors which covered 7156 rural boys and 4493 rural girls. Among the beneficiaries 8175 were in general category and 3474 were in SC/ST category. Category wise analysis of vocational training showed that rural youths and girls preferred mostly training in mushroom production i.e. 895 rural boys and 914 girls were trained through 393 courses during the year. As per preference of the trainees, composite fish culture stood second where 905 participants were trained through 206 courses. Commercial vegetable production was on demand by many of the trainees, 910 rural youth took this training through 191 courses. Tailoring, stitching, embroidery, dying etc. were preferred by 519 rural girls and they were trained through 171 courses. Altogether 657 participants were trained in dairy farming in 172 courses. Similarly, 651 rural youths had chosen poultry farming as their desired vocation and was trained through 192 courses. Commercial fruit production, vermicomposting, repair and maintenance of farm machinery and implements, organic farming, rural crafts were the other areas preferred by trainees.

Table: Vocational training conducted in Zone-II

Area of Training	No. of courses	General			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop production and management										
Commercial floriculture	12	29	31	60	11	14	25	40	45	85
Commercial fruit production	167	267	52	319	113	21	134	380	73	453
Commercial vegetable production	191	400	240	640	168	102	270	568	342	910
Total	370	696	323	1019	292	137	429	988	460	1448
Integrated crop management										
Organic farming	0	0	0	0	0	0	0	0	0	0
Others (pl. specify)	183	683	199	882	291	86	377	974	285	1259
Total	183	683	199	882	291	86	377	974	285	1259
Post harvest technology and value addition										
Value addition	54	27	114	141	11	49	60	38	163	201
Others (pl. specify)	61	8	316	324	3	136	139	11	452	463
Total	115	35	430	465	14	185	199	49	615	664
Livestock and fisheries										
Dairy farming	172	327	138	465	136	56	192	463	194	657
Composite fish culture	206	501	135	636	212	57	269	713	192	905
Sheep and goat rearing	74	235	101	336	98	45	143	333	146	479
Piggery	23	61	56	117	26	23	49	87	79	166
Poultry farming	192	282	174	456	120	75	195	402	249	651
Others (pl. specify)	102	125	31	156	52	13	65	177	44	221
Total	769	1531	635	2166	644	269	913	2175	904	3079

Area of Training	No. of courses	General			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Income generation activities										
Vermicomposting	135	289	77	366	124	33	157	413	110	523
Production of bio-agents, bio-pesticides, bio-fertilizers etc.	0	0	0	0	0	0	0	0	0	0
Repair and maintenance of farm machinery and implements	114	228	10	238	96	4	100	324	14	338
Rural Crafts	42	0	63	63	0	27	27	0	90	90
Seed production	96	273	59	332	117	27	144	390	86	476
Sericulture	0	0	0	0	0	0	0	0	0	0
Mushroom cultivation	393	629	640	1269	266	274	540	895	914	1809
Nursery, grafting etc.	0	0	0	0	0	0	0	0	0	0
Tailoring, stitching, embroidery, dying etc.	171	0	364	364	0	155	155	0	519	519
Agril. Para-workers, para-vet training	20	33	1	34	14	1	15	47	2	49
Others (pl. specify)	292	476	340	816	205	144	349	681	484	1165
Total	1263	1928	1554	3482	822	665	1487	2750	2219	4969
Agricultural Extension										
Capacity building and group dynamics	0	0	0	0	0	0	0	0	0	0
Others (pl. specify)	35	154	7	161	66	3	69	220	10	230
Total	35	154	7	161	66	3	69	220	10	230
Grand Total	2735	5027	3148	8175	2129	1345	3474	7156	4493	11649

4.5 EXTENSION PROGRAMMES

In creating awareness among farmers about the benefit of advanced agricultural and allied technologies, scientific livestock rearing, fish fingerling production, soil testing, group farming and other related aspects, the KVKs of Zone-II organized 167266 number of various extension activities to reach out 1540041 farmers and extension officials. Among the beneficiaries farmers constituted 1495815 numbers of participants and 44226 were extension officials. Gender-wise classification indicates that 260230 numbers of farm women took part in various extension activities against 1235585 numbers of farmers. In respect of extension officials, however, 13810 members were women extension officials and 21424 were male extension officials. The overall participation trend indicates that nearly 18% of the total participants belonged to women category. In respect of programme organized, Advisory service was the most important programme for the KVKs where 21799 number of advisory services were provided to 168150 number of farmers and farmwomen. The second most important category was workshop where 19018 numbers of programmes were organized by the KVKs to facilitate 61600 beneficiaries. The KVKs also extended their expertise through delivering 18346 number of lectures as resource person for 74635 farmers. The KVK personnel also paid visit 14220 times to the farmers' field to interact with 40109 numbers of farmers and farmwomen where as 35019 farmers and farm women visited different KVKs in 17200 occasions. KVKs conducted diagnostic visits for 3472 times to provide solution against crop/ livestock related problem of 29138 numbers of farmers. Method demonstration was also very important activity of KVKs where 47223 farmers were benefited by organizing 17428 numbers of programme. KVKs had conducted as many as 17322 numbers of farmer seminars where 69364 beneficiaries participated. Other important extension activities carried out by the KVKs include conducting kisan gosthi, field day, film show, group meeting, soil test campaign, self-help group mahilamandal and farm science club, conveners' meet, celebration of important days and others.

Table: Extension activities organized by Zone-II

Nature of Extension Activity	No. of activities	Farmers			Extension Officials			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Field Day	1278	29609	6378	35987	1288	563	1851	30897	6941	37838
Kisan Mela	444	178413	67237	245650	5117	1830	6947	183530	69067	252597
Kisan Ghosthi	1832	75036	18815	93851	3675	1166	4841	78711	19981	98692
Exhibition	1412	64530	16894	81424	2438	1073	3511	66968	17967	84935
Film Show	5878	42268	10568	52836	1262	523	1785	43530	11091	54621
Method Demonstrations	17428	35178	7406	42584	3262	1377	4639	38440	8783	47223
Farmers Seminar	17322	58016	9230	67246	1103	1015	2118	59119	10245	69364
Workshop	19018	49571	9011	58582	2613	405	3018	52184	9416	61600
Group meetings	17552	161030	8245	169275	769	579	1348	161799	8824	170623
Lectures delivered as resource persons	18346	57265	11337	68602	3279	2754	6033	60544	14091	74635
Advisory Services	21799	136830	29848	166678	1234	238	1472	138064	30086	168150
Scientific visit to farmers field	14220	31384	7406	38790	400	919	1319	31784	8325	40109
Farmers visit to KVK	17200	27389	7105	34494	407	118	525	27796	7223	35019
Diagnostic visits	3472	23174	5483	28657	260	221	481	23434	5704	29138
Exposure visits	1840	13206	3552	16758	430	66	496	13636	3618	17254
Ex-trainees Sammelan	1983	11248	3322	14570	351	104	455	11599	3426	15025
Soil health Camp	675	5851	2452	8303	225	82	307	6076	2534	8610
Agri mobile clinic	760	7216	2230	9446	188	63	251	7404	2293	9697
Soil test campaigns	1355	10757	4405	15162	198	89	287	10955	4494	15449
Farm Science Club Conveners meet	1305	4755	2677	7432	198	40	238	4953	2717	7670
Self Help Group Conveners meetings	133	5835	2676	8511	294	169	463	6129	2845	8974
Mahila Mandals Conveners meetings	1218	14145	5632	19777	213	52	265	14358	5684	20042
Celebration of important days (specify)	480	129521	4977	134498	485	120	605	130006	5097	135103
Any Other (Specify)	316	63358	13344	76702	727	244	971	64085	13588	77673
Total	167266	1235585	260230	1495815	30416	13810	44226	1266001	274040	1540041

Table: Extension activities organized by different states

Nature of Extension Activity	A& N Islands		Bihar		Jharkhand		West Bengal	
	No. of activities	No. of participants	No. of activities	No. of participants	No. of activities	No. of participants	No. of activities	No. of participants
Field Day	17	673	770	19761	209	8048	282	9356
Kisan Mela	11	1415	147	54165	95	69161	191	127856
Kisan Ghosthi	5	1889	1075	55861	339	12992	413	27950
Exhibition	58	2247	863	26175	197	18097	294	38416
Film Show	37	248	4527	23941	933	15703	381	14729
Method Demonstrations	185	1230	13755	30856	3301	8033	187	7104
Farmers Seminar	130	624	13824	43582	3187	16591	181	8567
Workshop	82	256	14949	26247	2279	19810	1708	15287
Group meetings	261	473	12937	139643	929	10477	3425	20030
Lectures delivered as resource persons	172	252	7926	36096	7152	23813	3096	14474
Advisory Services	140	170	9271	119292	4389	25866	7999	22822
Scientific visit to farmers field	21	339	3744	14983	706	7780	9749	17007
Farmers visit to KVK	34	1069	12109	16829	3934	6216	1123	10905
Diagnostic visits	23	575	2120	8738	227	9975	1102	9850
Exposure visits	66	94	854	7321	585	4064	335	5775
Ex-trainees Sammelan	541	808	188	4661	1081	4520	173	5036
Soil health Camp	196	196	315	2752	91	2972	73	2690
Agri mobile clinic	68	149	581	3897	55	2817	56	2834
Soil test campaigns	2	55	54	3961	63	2669	1236	8764
Farm Science Club Conveners meet	1	40	1225	3650	30	1153	49	2827
Self Help Group Conveners meetings	9	273	51	1602	51	4984	22	2115
Mahila Mandals Conveners meetings	1001	5014	60	1751	88	1966	69	11311
Celebration of important days (specify)	11	960	85	120652	263	2238	121	11253
Any Other (Specify)	1	21	80	27017	134	14906	101	35729
Total	3072	19070	101510	793433	30318	294851	32366	432687

State-wise analysis of extension activities conducted by the KVKs indicates that the KVKs of Bihar carried out 101510 number of extension activities for the benefit of 793433 number of farmers, farmwomen and extension officials. Workshop (14949 number), farmer seminars (13824 numbers), method demonstration (13755 numbers), group meeting (12937 numbers), visit of farmers to KVK (12109 number), providing advisory services (9271 number), lecture deliberation as resource person (7926 numbers), visit of scientists to farmers' field (3744 times), diagnostic visit (2120 times), exhibition (863 numbers), kisan gosthi (1075 numbers), film show (4527 numbers), field day (770 number of activities) and others were the major activities taken by the KVKs of Bihar. In this process they ensured the participation of 139643 number of farmers in group meetings, 120652 farmers in celebration of different important days, 119292 farmers received the advisory services, 55861 attended the meetings conducted for kisan gosthi, 54165 took part in kishan mela, 16829 number of farmers visited KVKs, 23821 number of farmers got their problems treated by the KVK personnel during diagnostic visit, 36096 number of farmers attended lecture of KVK personnel, 23941 number of farmers watched film show, 19761 farmers witnessed performance of crop during field day, 43582 number of farmers took part in farmers seminar etc.

The KVKs of Jharkhand conducted 30318 number of various extension activities for 294851 number of farmers, farmwomen and extension officials. Major extension activities of the KVKs included advisory services, farmers' visit to KVKs, method demonstration, farmers seminar, workshops, diagnostic visit, scientists visit to farmers' field, kisan gosthi, field day, film show, soil test camping etc. With regard to participation, 69161 number of farmers were benefitted from the exhibition in kisan mela followed by advisory service rendered by KVKs in respective field situation (25866) and participation in different events where lecture was give by KVK personnel (23813). There were visit of 15703 farmers in film show in the KVKs. During field day, 8048 farmers were present whereas 7780 number of farmers got benefitted by the scientists visit to their field.

In organizing extension activities, the KVKs of West Bengal took up 32366 numbers of such activities for the benefit of 432687 numbers of farmers and extension personnel. In this state highest number of activities (9749) was conducted in organizing scientific visit to farmers field, providing advisory services to 22822 number of farmers through 7999 activities, diagnostic visit (1102 numbers) to provide agriculture and related problems to 9850 farmers. However, highest number of participants was in kisan mela (127856 number) and exhibition (38416 number). More than 14,000 farmers and extension officials attended lecture of KVK personnel also.

For the KVKs of A&N Islands, mahila mandals conveners meeting, ex-trainee sammelan and group meeting were three major extension activities conducted by the KVKs. Altogether, 3072 number of various extension activities were conducted for the benefit of 19070 farmers and farmwomen. Soil health camp, method demonstration, lectures delivered as resource person and advisory services, were other major four activities with substantial number of participants.

4.5.1 Other Extension activities

The KVKs also exercised for other means of communication like publishing through newspaper, radio/TV talks, writing popular article, preparing extension literature as well as organizing awareness camps etc. The KVKs of Zone-II conducted 18972 number of such extension activities for the benefit of farmers. The KVKs prepared and distributed 13292 extension literature depicting cultivation technique of crops, vegetables, fish rearing, livestock rearing etc. in local vernacular. Among all the states, KVKs of Jharkhand developed and distributed highest number (12981) of extension literature followed by Bihar (182) and West Bengal (122). KVK personnel delivered TV talk 234 times in Jharkhand, 145 times in Bihar, 120 times in West Bengal, and 12 times in A & N Islands. Activities of KVKs of Zone II also were published through newspaper by 2810 times.

Table: Other Extension Activities organized in different states

Nature of Extension Activity	No. of Activities			
	A& N Islands	Bihar	Jharkhand	West Bengal
Newspaper coverage	43	1882	686	199
Radio talks	12	362	128	95
TV talks	12	145	234	120
Popular articles	0	172	139	88
Extension Literature	7	182	12981	122
Animal Health Camp	7	88	38	1230
Total	81	2831	14206	1854

5. PRODUCTION OF SEED, PLANTING MATERIALS AND BIO-PRODUCTS

5.1 SEED

Production of seed by the KVKs (Farm and village seed production)

Seed is the most critical input which is needed by the farmers to maintain productivity of the crop. Due to limited land in the KVKs, seed production could not be done in large quantities in KVK farm. To cater to the need of the farmers, seed production has been initiated in the villages under the head of "village seed production". During the year 2016-17, the KVKs produced 222824.15 q of seeds of major crops like paddy, wheat, maize, mustard, linseed, niger, groundnut, red gram, chick pea, black gram, vegetables, spices, fodders etc. The seed production under village seed production scheme was 196440.59q. In total 1297415 farmers were benefitted from those seed production programme directly.

The seed production system of KVKs aims at production of major important varieties of cereals, pulses, oilseeds, vegetables, fruits etc. Major varieties in seed production are *Abhishek, MTU 7029, Prabhat, Swarna Sub 1, Pratima* in paddy; *HI 1563, DBW-17, DBW 39, PBW 580, HD 2985, K 307, HD 2824, WR 544, HD 2733, K 9107* etc. in wheat; *Pusa Mahak, Shavani, Rajendra suflam, B-54, Sita* in mustard; *Arka Bikash, Arkha Abha* in tomato; *GPU 28* in rai; *Birsa Arhar 1, Malviya 13, NDA 1* in redgram; *PG 186, Pusa 362* in chickpea; *TG 22, BAU 25* in groundnut; *Birsa niger 3, Birsa niger 1 in niger; HUL 57, KLS 218, DPL 62, PL 639* in lentil; *HUM-16* in greengram; *TKG 306* in sesame etc.

State-wise seed production by the KVKs

State-wise analysis of seed production showed that Bihar produced 39763.17 q of seed. In Jharkhand, seed production was 110960 q and in West Bengal it was 72101.1 q. The contribution of different crops in seed production programme were paddy 74.27%, lentil 7.68%, wheat 5.9%, mustard 4.18%, sugarcane 2.5%. Production of paddy seed was 165480.81 q, wheat 117350 q, mustard 9312.52 q, lentil 17108.14 q.

Table: State-wise seed production in KVKs

	Village	KVK Farm	Total
Bihar	29334.69	10428.48	39763.17
Jharkhand	108623.57	2336.43	110960.0
West Bengal	58438.25	13662.84	72101.1
Zone-II	196396.51	26427.75	222824.27

Table: Crop wise seed production in Zone-II

		Seed Production					
		Village seed			KVK seed		
Crop	Name of the crop	Quantity of seed (q)	Value (Rs)	Number of farmers	Quantity of seed (q)	Value (Rs)	Number of farmers
Cereals	Paddy	146397.72	218755610.00	114903.00	19083.09	16479253.5	431961
	Wheat	11350.08	18831810	8985	1918.19	3253369	177221
	Maize	266	4764000	2250	50.95	5010	2
Oilseeds	Mustard	9299.5	15882553	24184	299.47	908602	128973
	Toria	20	60000	0	0	0	0
	Linseed	1066.6	4926001	1467	12.78	75590	7
	Niger	80	0	0	4.22	34100	13
	Sesame	244.4	744020	950	18.33	118200	272
	Groundnut	267.32	1221340	246	6.92	54260	5
	Soybean	0	0	0	0.00	0	0
	Rai	216.5	600000	0	69.95	201250	101
	Sun Flower	1	4000	0	0.75	3750	0
	Toria	10	60000	0	0.00	0	0
Pulses	Redgram	141.5	2566200	363	54.16	607730	208
	Chickpea	1142.06	11009101	2181	36.85	312750	50
	Lentil	16858.6	109268301	18819	249.54	1187965	338

		Seed Production					
		Village seed			KVK seed		
Crop	Name of the crop	Quantity of seed (q)	Value (Rs)	Number of farmers	Quantity of seed (q)	Value (Rs)	Number of farmers
	Greengram	455.71	2711960	944	122.94	681550	546
	Blackgram	1818.7	12849400	1876	97.78	424628	389
	Pea	2032.3	7995616.8	2164	105.66	833652	114187
	Cowpea	0	0	0	17.16	106000	101
	Rajmash	0	0	0	1.63	0	0
Commercial crops	Potato	2142.1	1875000	70	490.00	436700	0
	Sugarcane	2500	750000	200	3081.05	391499	150
Vegetables	Okra	1	40000	0	4.26	47001	126
	Tomato	0	0	0	77.09	34500	67
	Palak	0	0	0	0.00	0	0
	Radish	0	0	0	150.00	1500	22
	Onion	0	0	0	18.40	0	0
	chilli	0	0	0	0.50	2500	50
	Brinjal	0	0	0	28.14	22500	0
	Lobia	0	0	0	101.25	24000	136
Flower crops	Flower	0	0	0	0.00	0	0
Spices	Coriander	0	0	0	2.00	0	0
	Ginger	0	0	0	17.25	97500	0
	Methi	0	0	0	0.00	0	0
	Turmeric	46	174400	10	81.29	193220	250056
	Fenugrick	0	0	0	0.00	0	0
Fodder crop seeds	Rice Bean	0	0	0	12.15	46000	20
	Barseem	0	0	0	0.00	0	0
Fiber crops	Jute	310	13000	280	7.26	64671	57
	Sunhemp	0	0	0	0.00	0	0
Forest Species		0	0	0	0.00	0	0
Others	Dhaincha	0	0	0	17.37	67371	54
	Broom Stick	0	0	0	0.00	0	0
	Elephant Footyam	0	0	0	215.14	410180	12512
	Sisbania	0	0	0	0.00	0	0
Total		196440.59	414442312.8	179892	26383.56	26925551.5	1117523

Table: State wise seed production (q)

		Bihar			Jharkhand			West Bengal			Total seed production		
Crop	Name of the crop	Quantity of seed (q)	Value (Rs)	Quantity of seed (q)	Quantity of seed (q)	Value (Rs)	Quantity of seed (q)	Quantity of seed (q)	Value (Rs)	Number of farmers	Quantity of seed (q)	Value (Rs)	Number of farmers
Cereals	Paddy	8438	16301545	6499	102964	202827434	504970	54079	16105885	35395	165481	235234864	546864
	Wheat	12659	20116187	9357	570	1851642	176590	40	117350	259	13268	22085179	186206
	Maize	0	0	0	1	2910	0	316	4766100	2252	317	4769010	2252
Oilseeds	Mustard	13	70032	386	2479	12760883	151571	6820	3158990	1099	9313	15989905	153056
	Toria	0	0	0	10	0	0	0	0	0	10	0	0
	Linseed	950	4727700	833	124	225891	621	5	48000	20	1079	5001591	1474
	Niger	0	2350	13	84	31750	0	0	0	0	84	34100	13
	Sesame	6	32760	4	176	613820	0	81	215640	1218	263	862220	1222
	Groundnut	0	0	0	32	17000	0	243	1258600	251	274	1275600	251
	Soybean	0	0	0	0	0	0	0	0	0	0	0	0
	Rai	86	201250	101	200	600000	0	0	0	0	286	801250	101
	Sunflower	0	0	0	1	3750	0	1	4000	0	2	7750	0
	Toria	10	60000	0	0	0	0	0	0	0	10	60000	0
Pulses	Redgram	126	817730	208	56	577200	267	14	1779000	96	196	3173930	571
	Chickpea	244	1614250	128	680	8173101	2103	256	1534500	0	1179	11321851	2231
	Lentil	8807	100813180	15091	470	5028576	3781	7831	4614510	285	17108	110456266	19157
	Greengram	159	893060	749	271	1327470	553	148	1172980	188	579	3393510	1490
	Blackgram	1039	8152000	357	535	1683388	380	342	3438640	1528	1916	13274028	2265
	Pea	73	422940	174	1928	7642629	116172	138	763700	5	2138	8829269	116351
	Cowpea	9	74800	100	3	30000	0	5	1200	1	17	106000	101
	Rajmash	2	0	0	0	0	0	0	0	0	2	0	0
Commercial crops	Potato	1522	1875700	70	218	436000	0	892	0	0	2632	2311700	70
	Sugarcane	5581	1141499	350	0	0	0	0	0	0	5581	1141499	350
Vegetables	Okra	4	42300	22	0	29625	0	1	15076	104	5	87001	126
	Tomato	0	2000	42	0	7000	0	77	25500	25	77	34500	67
	Palak							0	0	0	0	0	0
	Radish							150	1500	22	150	1500	22
	Onion							18	0	0	18	0	0
	Chilli							1	2500	50	1	2500	50

		Bihar			Jharkhand			West Bengal			Total seed production		
Crop	Name of the crop	Quantity of seed (q)	Value (Rs)	Quantity of seed (q)	Quantity of seed (q)	Value (Rs)	Quantity of seed (q)	Quantity of seed (q)	Value (Rs)	Number of farmers	Quantity of seed (q)	Value (Rs)	Number of farmers
	Brinjal	0	0	0	0	8000	0	28	14500	0	28	22500	0
	Lobia	1	23000	116	0	0	0	100	1000	20	101	24000	136
Flower crops	Flower												
Spices	Ginger	0	0	0	14	85500	0	3	12000	0	17	97500	0
	Turmeric	8	24300	19	21	43600	250000	99	299720	47	127	367620	250066
Fodder crop seeds	Rice Bean	0	0	0	12	46000	0	0	0	20	12	46000	20
	Barseem	0	0	0	0	0	0	0	0	0	0	0	0
Fiber crops	Jute	5	54260	57	0	0	0	312	23411	280	317	77671	337
Forest Species													0
Others	Dhaincha	9	43341	9	2	5430	0	7	18600	45	17	67371	54
	Elephant Foot yam	12	16425	4	110	330005	12500	93	63750	8	215	410180	12512
Total		39763	157522609	34689	110960	244388603	1219508	72101	39456652	43218	222824	441367864	1297415

5.2 PLANTING MATERIALS

Seedlings, saplings and other planting materials like grafts, gooties, bulbs etc. were produced to supply among the farmers of the neighbouring locality and the district. During 2016-17, 36.02 lakh no. of planting materials were produced by the KVKs which earned a revenue of Rs. 228.32 lakh. The number of beneficiaries covered under this programme was 42.9 lakh in Zone-II. Vegetable seedlings produced were 22.67 lakh. Fruit saplings produced were 71903. Forest species 0.48 lakh and medicinal and aromatic plant produced were 0.7 lakh. The major contributors were vegetable seedlings (59.36%) and fruit seedling (10.46%).

State-wise analysis showed that state of West Bengal produced 17.72 lakh planting materials (49.2%), followed by Bihar 10.55 lakh (29%) and Jharkhand produced 7.76 lakh (21.6%). The varieties of the different crops were Dushera, Amrapalli, Jardata (Mango), Guava- Allahabad Safeda, L-49, Lalit Midule, Lime-Pant lemon, Kagji, Papaya-Puysa Delicious, Ranchi local Banana, Litchi-Sahi, China, Cauliflower- Madhuri, Tomato-Swarna Sampada, Rupali, Capsicum, Chilli-Flame.

Table: Planting material Production

		BIHAR			JHARKHAND			WEST BENGAL			Total		
Comercial		Number	Value (Rs.)	Number of farmers	Number	Value (Rs.)	Number of farmers	Number	Value (Rs.)	Number of farmers	Number	Value (Rs.)	Number of farmers
Vegetable seedling	Cauliflower	86916	29043	621	43390	32290	323	95442	83094	1234	225748	144427	2178
	Brinjal	88765	39090	552	142938	119210	2376	162257	49845	2012	393960	208145	4940
	Tomato	162434	56903	1099	206866	158110	3221	209231	87073	1755	578531	302086	6075
	Chilli	29567	15439	263	48753	16609	7972	253322	114480	788	331642	146528	9023
	Bottle gourd	2008	20080	40	0	0	0	5020	30020	26	7028	50100	66
	Cabbage	9425	6722	311	31900	30900	314	129968	109507	1358	171293	147129	1983
	Capcicum	0	0	0	0	0	0	7970	12500	241	7970	12500	241
	Brocoli	0	0	0	1950	1800	25	56484	52036	450	58434	53836	475
	Other vegetable	283458	29600	82	54080	3092.5	8143	26247	145755	423	363785	178448	8648
Fruits	Banana	1905	17600	475	0	0	0	577	2666	25	2482	20266	500
	Mango	312859	15486505	10755	18807	597330	1139	12081	368854	1397	343747	16452689	13291
	Litchi	502	15875	81	950	2375	135	484	23200	45	1936	41450	261
	Guava	22731	626025	1448	4585	147750	2752	4759	369406	741	32075	1143181	4941
	Sapota	45	675	20	0	0	0	0	0	0	45	675	20
	Lemon	4866	138555	1182	1226	43210	143	820	20500	62	6912	202265	1387
	Anola	361	13765	66	0	0	0	2240	109600	441	2601	123365	507
	Papaya	27116	104872	1523	6850	38350	518	7204	37180	417	41170	180402	2458
	Pomegranate	601	15735	126	0	0	0	0	0	0	601	15735	126
	Jack fruit	705	4575	100	0	0	0	120	1200	12	825	5775	112
	Woodapple	270	8100	53	0	0	0	0	0	0	270	8100	53

		BIHAR			JHARKHAND			WEST BENGAL			Total		
Comercial		Number	Value (Rs.)	Number of farmers	Number	Value (Rs.)	Number of farmers	Number	Value (Rs.)	Number of farmers	Number	Value (Rs.)	Number of farmers
Citrus	315	8475	35	0	0	0	9292	123870	439	9607	132345	474	
Sweetorange	0	0	0	0	0	0	7700	423500	169	7700	423500	169	
Orange	95	1900	15	0	0	0	2000	44000	50	2095	45900	65	
Cashewnut	0	0	0	0	0	0	0	0	0	0	0	0	
Ornamental plants	Ornamental	5009	28230	2024	0	0	0	55415	88390	1029	60424	116620	3053
Medicinal and aromatic	Aloe Vera	1000	5000	0	30000	60000	3220	1100	2200	41	32100	67200	3261
	Lemon grass	10000	2500	50	28000	80000	0				38000	82500	50
Plantation	Arecanut	0	0	0	0	0	0	0	0	0	0	0	0
	Coconut	0	0	0	0	0	0	6420	30000	120	6420	30000	120
Spices	Black pepper	3	7770	0	31310	382100	80	5000	175000	78	36313	564870	158
Tuber		1298	18530	11	10250	30200	26	216051	415980	146	227599	464710	183
Fodder crop saplings		0	0	0	101800	1800	1800	365040	760600	172	466840	762400	1972
Forest Sp	Koronda	0	0	0	12000	3693	2169	16540	5000	66	28540	8693	2235
	Forest Sp	2117	24370	715	0	0	0	16800	336000	36	18917	360370	751
Other	Tuberose	252	3780	15	0	0	0	51588	152000	2000	51840	155780	2015
	Chrysenthemum	0	0	0	0	0	0	500	0	0	500	0	0
	Dahlia	0	0	0	0	0	0	2356	70680	108	2356	70680	108
	Marigold	0	0	0	0	0	0	42000	109200	4	42000	109200	4
	Total	1054622	16729714	21662	775655	1748819	34356	1772028	4353336	15885	3602306	22831869	71903

5.3 BIO-PRODUCTS

The KVKs of Zone-II also facilitated the supply of bio fertilizers, bio-pesticides and bio-agent, vermicompost, azolla, earthworm for use by the farmers. Vermicompost is very much in demand by the farmers. A large quantity of 161059 kg vermicompost was produced by the KVKs along with BGA 151510.5 kg, bio-fertilizers 4722 kg. Bio-agent 7221 kg and vermi wash 72000 litres. The production of bio product was maximum in Bihar i.e. 330104 kg having value of Rs. 396424/-.

Table: State wise Bio-product production by KVKs

Product Name	Name of the bio-product	Bihar			Jharkhand			West Bengal			Total		
		Quantity (kg)	Value (Rs.)	No. of Farmers	Quantity (kg)	Value (Rs.)	No. of Farmers	Quantity (kg)	Value (Rs.)	No. of Farmers	Quantity (kg)	Value (Rs.)	No. of Farmers
Bio Fertilisers	Vermicompost	107450	345300	239	11540	206000	65	42069	214690	642	161059	765990	946
	Bio Fertilisers	254	1524	0	2984	10420	139	1484	58400	137	4722	70344	276
Total		107704	346824	239	14524	216420	204	43553	273090	779	165781	836334	1222
Bio Agents	Bio Agent	400	28000	280	1674	116524	462	5147	422695	1037	7221	567219	1779
	Honey	0	0	0	0	0	0	0	0	0	0	0	0
	Vermi wash	72000	21600	85	0	0	0	0	0	0	72000	21600	85
	BGA	150000	0	0	1511	135206	1543	0	0	0	151511	135206	1543
Earthworm		0	0	0	0	45000	55	0	0	0	0	45000	55
Total		330104	396424	604	17709	513150	2264	48700	695785	1816	396513	1605359	4684

5.4 LIVESTOCK PRODUCTION

In order to provide quality materials to the farmers like livestock strain, poultry ducks, chicks, eggs, piglets, fingerlings spawn etc. KVK produced 9434 strains of broilers, 7673 strains of duals, 7793 ducklings for supply to the farmers. Indian carp 89.19 lakh, 1.81 lakh fingerlings and 363.75 lakh fish spawn, 6.78 lakh ornamental fishes were also produced by the KVKs.

Table: State wise livestock production in Zone-II

Particulars of Live stock	Bihar			Jharkhand			West Bengal			Total		
	Quantity (kg)	Value (Rs.)	No. of Farmers	Quantity (kg)	Value (Rs.)	No. of Farmers	Quantity (kg)	Value (Rs.)	No. of Farmers	Quantity (kg)	Value (Rs.)	No. of Farmers
Dairy animals												
Cows	69	98125	0	80	50000	0	80	2981173	137	229	3129298	137
Buffaloes	2	0	0	0	0	0	0	0	0	2	0	0
Calves	6	30000	0	36	59000	0	7	270000	29	49	359000	29
Other (Pl. specify) Goat	29	33920	10	82	123000	45	10399	796858	315	10510	953778	370
Poultry												
Broilers	1381	138116	988	300	25000	120	7753	626337	238	9434	789453	1346
Layers	25	0	0	0	0	0	1300	42608	74	1325	42608	74
Duals (broiler and layer)	65	6500	5	4100	117468	75	3508	106310	301	7673	230278	381
Ducks	46	11500	12	3050	140859	122	4697	170938	173	7793	323297	307
Egg	0	0	0	200	1000	0	2044	43250	96	2244	44250	96
Others (Pl. specify) Rabbit, Ornamental bird, feed, chicks etc.	0	0	0	0	0	0	501	60400	40	501	60400	40
Piggery												
Pig	0	0	0	0	0	0	28	132200	42	28	132200	42
Piglet	0	0	0	40	77000	30	40	113500	182	80	190500	212
Fisheries												
Indian carp	843.5	113110	108	40148	69625	88	850917	336995	448	891909	519730	644

Particulars of Live stock	Bihar			Jharkhand			West Bengal			Total		
	Quantity (kg)	Value (Rs.)	No. of Farmers	Quantity (kg)	Value (Rs.)	No. of Farmers	Quantity (kg)	Value (Rs.)	No. of Farmers	Quantity (kg)	Value (Rs.)	No. of Farmers
Mix carp	0	0	0	60	9000	0	0	0	0	60	9000	0
Fingerling	22800	26600	88	0	0	0	157491	499948	261	180291	526548	349
Fish spwan	36375015	232500	113	0	0	0	3.92	12250	17	36375018	244750	130
Others (Pl. specify) Ornamental fish, Carp fry, Exotic fish etc.				20000	10000	22	657862	386413	313	677862	396413	335
Total	36400281	690371	1324	68096	681952	502	1696632	6579180	2666	38165009	7951503	4492

6. SOIL AND WATER SAMPLE ANALYSIS AND "WORLD SOIL DAY" CELEBRATION

Through different awareness and training programmes, KVK scientists of this Zone tried to motivate farmers to test soil before any cultivation in their land to reduce indiscriminate use of fertilizers, and to control environmental and other health hazards. Not only that, scientists had also tested a large number of water samples in KVK laboratories supplied by the farmers for the quality analysis. During 2016-17, 62665 soil and 1001 water samples were tested from 3455 villages which benefitted 133281 farmers in this Zone. A minimum amount was charged from farmers for testing each soil sample. Thus, KVKs of ICAR-ATARI, Kolkata earned about Rs. 2.54 lakh during the period. The KVKs of this Zone celebrated "*World Soil Day*" on 5th December, 2016. On the occasion, KVKs organized various programmes like seminar, lectures, hands on training, awareness programme and so on. The distribution of soil health cards to the farmers by local MPs/ MLAs/ other Public Representatives was one of the major activities of KVKs on that day. From different states of this Zone, total 5189 persons participated in the soil day programme.

Table: Soil and water testing by KVKs in different states

State	Name of sample	Number of			Amount realized (Rs.)
		Samples	Farmers	Villages	
Andaman & Nicobar Islands	Soil	514	480	24	0
	Water	71	65	20	0
Sub-Total		585	545	44	0
Bihar	Soil	30679	32588	1394	1299728
	Water	52	26	5	0
Sub-Total		30731	32614	1399	1299728
Jharkhand	Soil	21871	81239	1416	778920
Sub-Total		21871	81239	1416	778920
West Bengal	Soil	9601	18005	553	460490
	Water	878	878	43	0
Sub-Total		10479	18883	596	460490
Total of Zone	Soil	62665	132312	3387	2539138
	Water	1001	969	68	0
Total		63666	133281	3455	2539138

7. SCIENTIFIC ADVISORY COMMITTEE MEETING

The Scientific Advisory Committee (SAC) Meeting is being organized by the KVKs every year to finalize the Action Plan for the coming year. As per the guidelines of ICAR, the committee comprises of representatives from ICAR-ATAR Kolkata, Host Organization, other nearby ICAR Institutes, State Agricultural Universities, development departments of the district, media personnel, financial institutions, progressive farmers and farm women and others. During the year 2016-17, out of total 83 KVKs of ICAR-ATARI, Kolkata, 77 conducted SAC meeting. Thirty eight KVKs of Bihar state conducted 38 SAC meeting and 24 KVKs of Jharkhand state conducted 24 meeting. In West Bengal, 18 KVKs organized 14 SAC meeting and 3 KVKs of Andaman & Nicobar Islands conducted one meeting during the period. The meeting was attended by 2513 participants. It was assured that all nominated members were present in the meeting.

State	No. of SAC Meeting	No. of Participants
A&N Islands	1	46
Bihar	38	1513
Jharkhand	24	642
West Bengal	14	312
TOTAL	77	2513

8. PUBLICATION BY KVKs

To highlight the achievements of research and other related activities, KVK scientists were actively involved during 2016-17 in preparing and publishing research papers, technical bulletins, newsletters, popular articles, leaflets/pamphlets, DVD/CD etc. to make it available to other KVKs, SAUs, ICAR institutes, line departments, ATMA, NABARD, other agencies, farmers and other stakeholders. A total of 1692 publications comprising of 164 research papers, 80 symposia papers, 61 newsletter, 230 popular articles, 160 books, 36 book chapters, 382 extension pamphlets/ literature,175 bulletins, 342 technical reports and 62 electronic publications were made by the KVK personnel of this Zone. The total number of circulation was 469268 during the period of report.

Table: Publication of KVKs in ICAR-ATARI, Kolkata

Type of publication	A & N Islands		Bihar		Jharkhand		West Bengal		Total	
	Number	Circulation	Number	Circulation	Number	Circulation	Number	Circulation	Number	Circulation
Research Paper	-	-	63	0	29	5000	72	101	164	5101
Seminar/ Conference/ symposia papers	5	-	25	1	12	1000	38	0	80	1001
Newsletter	-	-	28	24850	25	62000	8	180	61	87030
Popular Articles	1	-	76	29181	21	8700	132	1000	230	38881
Book	2	-	36	4500	18	8700	104	1440	160	14640
Book Chapter	1	-	15	0	1	1000	19	0	36	1000
Extension Pamphlets/ literature	3	-	153	130119	53	53500	173	38322	382	221941
Bulletins	-	-	67	38522	20	10200	88	7080	175	55802
Technical Reports	-	-	178	27296	28	1025	136	729	342	29050
Electronic Publication (CD/DVD/ etc)	-	-	45	14722	6	100	11	0	62	14822
Total	12	0	686	269191	213	151225	781	48852	1692	469268

9. CELEBRATION OF TECHNOLOGY WEEK BY KVKs

The KVKs use to showcase agriculture, livestock and fishery sector related recent technologies available with them in the form of "Technology Week Celebration'' to reduce the knowledge gap between farming community, researchers and research systems. It is organized in a very systematic manner to create interest and awareness even among common people. As technology week is celebrated in Public-private partnership (PPP) mode, there is opportunity to exchange their views using a common platform. During the year 2016-17, 39 KVKs of this Zone conducted 846 different activities benefitting around 1.92 lakh stakeholders. The authorities from ICAR-ATARI, Kolkata, concerned host organizations, KVK personnel, officials from line departments from the concerned state, NABARD, ATMA, lead bank of the district, IFFCO, Mahindra, input dealers, seed companies, NGOs, SHGs, marketing agencies, men and women farmers, rural youths and many others were present in the celebration. The 17 KVKs from West Bengal state organized highest number (585) of activities followed by 11 KVKs each from Jharkhand (199) and Bihar (62) state during 2016-17.

Table: Technology week celebration in different states in ICAR-ATARI, Kolkata

Type of Activities	Bihar		Jharkhand		West Bengal		Total	
	No. of Activities	No. of Participants	No. of Activities	No. of Participants	No. of Activities	No. of Participants	No. of Activities	No. of Participants
Gosthies	15	1941	20	1830	0	0	35	3771
Demonstration	10	400	11	1245	75	25677	96	27322
Exhibition	5	278	49	1263	106	32815	160	34356
Exposure Visit	5	278	3	235			8	513
Farmers Training	18	1060	14	370	37	4761	69	6191
Farmer-Scientist interaction	0	0	18	1131	30	4845	48	5976
Field visit	5	821	27	786	9	6917	41	8524
Flim Show	4	575	34	569	4	770	42	1914
Group discussion	0	0	0	0	1	58	1	58
Krishi Mela	0	0	0	0	15	11249	15	11249
Lectures Organized	0	0	22	236	0	0	22	236
Seminar	0	0	0	0	31	38787	31	38787
Animal health camp	0	0	0	0	0	0	0	0
Ex-trainees Meet	0	0	1	80	2	7726	3	7806
Soil testing Camp	0	0	0	4	173		173	4
Cultural Programme	0	0	0	0	19	20214	19	20214
Displaying of posters/ charts	0	0	0	0	60	850	60	850
Distribution of Organic Inputs	0	0	0	0	0	0	0	0
Krishi quiz	0	0	0	0	23	23731	23	23731
Plant health clinic	0	0	0	0	0	0	0	0
Publication of Extension Literatures	0	0	0	0	0	1	0	1
Total	62	5353	199	7749	585	178401	846	191503

10. TECHNOLOGICAL BACKSTOPPING BY DIRECTORATES OF EXTENSION EDUCATION

The process of technology transfer from Research Institutes/Agricultural Universities to the farmers' field and its feedback from the end users to the researchers play very important role for conducting different activities by the KVKs either in the form of on-farm-trial (OFT) or front line demonstration (FLD) or through organizing various training programmes/ health camps etc. Under the technological and administrative support of Directors of Extension Education (DEEs), all 83 KVKs of this Zone disseminated latest and most suitable agricultural technologies developed by the researchers of various institutes/ universities. For efficient transfer and use of technologies, 83 KVKs of ICAR-ATARI, Kolkata were distributed under the jurisdiction of 6 DEEs irrespective of any host organizations of the KVKs. The Extension Directorate of Bihar Agricultural University (BAU), Sabour, Bhagalpur was allotted with 25 KVKs; Dr. Rajendra Prasad Central Agricultural University (DRPCAU), Pusa, Samastipur with 13 KVKs; Birsa Agricultural University (BAU), Ranchi with 24 KVKs, Uttar Banga Krishi Viswavidyalaya (UBKV), Pundibari with 6 KVKs, West Bengal University of Animal and Fishery Sciences (WBUAFS), Belgachhia, Kolkata with 3 KVKs and Bidhan Chandra Krishi Viswavidyalaya (BCKV), Mohanpur, Nadia with 12 KVKs. During 2016-17, all the KVKs of this Zone were benefitted from the DEEs in various ways like supplying of seeds, planting materials, bio-products, livestock and poultry birds, livestock products, package of management practices for agriculture, livestock and fish farming, printed literatures, organizing HRD training for KVK personnel and many others.

Considering the demand of KVK personnel, to improve their skill for efficient transfer of technologies and to make the newly recruited staff of KVK aware of mandate and functioning of KVKs, all the Extension Directorate of this Zone conducted HRD programme throughout the year 2016-17. During the period under report, a total of 43 HRD programmes for 1673 KVK personnel were conducted. The area covered in those training programmes were documentation, soil health management, improving communication and extension skills, quality seed production, conducting front line demonstrations, livestock management during disaster, conducting health/ vaccination camp for animals, skill development in laboratory work, advance agriculture and allied technologies, mechanization in agriculture, scientific fish production, disease/ pest management and many others. The number of occasions, KVKs from different Directorates of this Zone were involved in such programmes, was 445 during 2016-17.

To oversee the activities of KVKs, DEEs and their officials visited KVKs for 478 occasions for different programmes including SAC meeting, field days celebration, technology week celebration, training programmes, interaction meeting, *Kisan Mela*, *Kisan Gosthi*, *Kisan Chaupal*, *Rabi* and *Kharif Campaign*, *World Soil Day* celebration, *Adibasi Divas* celebration, special programme celebration, monitoring of OFTS/ FLDs, monitoring of KVKs working etc. The DEEs of Bihar state visited their KVKs for 266 times (BAU, Sabour- 180 times and DRPCAU, Pusa- 86 times), DEE of Jharkhand state for 98 times, DEEs in West Bengal state for 114 times (BCKV, Nadia- 69 times; UBKV, Pundibari- 22 times and WBUAFS, Belgachhia- 23 times) during 2016-17. The overseeing of KVK activities by the DEEs is important to assess the technological needs of KVKs and to make the KVKs empowered with knowledge and skill. During the period under report, the DEE officials of BAU, Bhagalpur visited their OFT fields for 20 occasions and FLD fields also for 20 times to monitor the performance of *Sabour Ardhajal* rice varieties; *Sabour Shankar Makka 1 & 2* maize varieties; *Sabour Shreshth*, *Sabour Samridhi* and *Sabour Nirjal* wheat varieties; effective weed management in zero tillage, management module against mango hoppers etc. The DEE of DRPCAU, Pusa and officials visited 13 times for OFT fields and 22 times for FLD fields to follow up the performance of various cereal, pulses and oilseed crops, establishment of new orchards, farm mechanization, establishment of apiary technology and so on. A total of 11 times and 25 times were visited by DEE officials of BCKV, Mohanpur to oversee OFT and FLD fields, respectively. They inspected the field to assess the performance of different herbicide for controlling weeds in onion, drum seeder and SRI method in Boro paddy, improved poultry and duck breeds, different fungicides used in fruits and vine rot of pointed gourd, nutrient management for groundnut production and many others. The Directorate officials of BAU-Ranchi, UBKV, Pundibari and WBUAFS, Belgachhia also visited their OFT and FLD fields for the similar purposes.

During 2016-17, all Directorates under ICAR-ATARI, Kolkata were engaged in publishing a large number of literatures in the form of newsletter, diary, bulletin, magazine etc. in English and local languages covering all aspects related to agriculture and allied sectors for the benefit of farmers. The Directorate of BAU, Sabour published 8 such publications viz. *Bihar Ke Gaurav*

Kisan (Hindi), *Agri-entrepreneurs of Bihar* (English), *Bihar Kisan Diary 2017* (Hindi), *Krishi Calendar 2017* (Hindi), *Mrida Swastha Prabandhan Dwara Tikaoo Kheti* (Hindi), *Udyan Parshikhan Nirdeshika* (Hindi), *Krishi evam Samdadh Kshetrake Vishisth Kisan evam Vaigyanik* (Hindi), *Dalhan Utpadan (Samasya, Prabhadhan Ebom Unnati)*and more than 13 technological/varieties released during 2016-17. Similarly, BCKV-Mohanpur Directorate published 19 publications and 5 technological inventories, and RAU-Pusa released one publication.

During the year 2016-17, all 6 Directorates of this Zone supplied updated technologies and technological products to KVKs 316 times in the form of seeds, planting materials, biological products, livestock and poultry breeds, mineral mixture for animals, fish spawn/ fingerlings, apiary unit, mushroom spawn etc. The Directorate of BAU, Sabour supplied their products to KVKs 103 times whereas DRPCAU-Pusa Directorate supplied 47 times and BCKV, Mohanpur Directorate supplied 21 times under their jurisdiction.

11. AGRICULTURE TECHNOLOGY INFORMATION CENTRE

To deliver updated technologies available at the research institute/ state agricultural universities related to agriculture, animal husbandry and fishery sciences to the end users, i.e., farmers, Agricultural Technology Information Centre (ATIC) serves as a "*single window*" system which is usually present at the entrance of any institute. It enables farmers to access the desired information for solution to their problems. Under this Zone, the ATICs are being operated in Bihar state under Bihar Agricultural University (BAU), Sabour and Rajendra Agricultural University (RAU), Pusa; in Jharkhand state under Birsa Agricultural University (BAU), Ranchi; in West Bengal state under Bidhan Chandra Krishi Viswavidyalaya (BCKV), Mohanpur; and in the Union Territory of Andaman and Nicobar Islands under ICAR-Central Island Agricultural Research Institute (ICAR-CIARI), Port Blair.

The facilities available in ATIC are reception centre, exhibition/ technology museum, touch screen kiosk, sales counter, farmers' feedback register, video conferencing facility, library, cafeteria, community radio station etc. During 2016-17, ATICs were visited by 22984 farmers from different districts of this Zone. Out of which 9283 farmers visited for technology information, 2630 farmers for technology products, 2678 farmers for technology services and 8393 farmers for other purposes.

As far as technology information was concerned, 5603 farmers used kisan call centre to get the information on varieties/ hybrids, pest management, disease management, agro-techniques, soil and water conservation, post-harvest technology and value addition, and animal husbandry including fisheries during the year 2016-17. The majority of the farmers were interested in receiving information on disease management of various crops (1375), followed by information on pest management (962), crop varieties (805), animal husbandry and fishery (773), soil and water conservation (736), agro-techniques (530) and post-harvest technology and value addition (422). During the period, a total of 872 farmers were benefitted from video showing in the ATICs of this Zone. Seventy five farmers met their queries by sending letters to the concerned authorities of the ATICs. To fulfil the demands of farmers/ technocrats/ students, ATICs of this Zone were used for training of 1894 farmers/ technocrats/ students. Maximum farmers were interested on varietal training (439) followed by disease management (328), animal husbandry and fishery (293) and pest management (256). In addition, a large number of farmers got benefit from Kisan Gyan Rath and Mobile Veterinary Clinic services.

The farmers and other stakeholders were also provided with various types of publications either in the form of books, technical bulletins, CDs, DVDs etc. to gain/ update their knowledge. Sometimes, relevant literatures were supplied at minimum price or free of cost from the ATICs of this Zone. From ATICs, 19477 copies of books, 16466 copies of technical bulletins, 8658 copies of technical inventories, 558 CDs and 240 DVDs were sold which benefitted 55834 farmers. A substantial amount (Rs. 11.69 lakh) of revenue was generated from the ATICs during the period of 2016-17.

The ATIC of this Zone was also a potential source of supplying various technological products like seeds, planting materials, livestock, poultry birds, eggs, fish fingerlings, bio-products, bio-fertilizers, farm-produces, vermi-compost etc. Around 3600 quintals seed,1.17 lakh planting materials,541 pigs/goats, 3689 poultry birds, 364.02 lakh fish fingerlings, 222 quintals bio-products, 110 quintals vermi-compost materials and other agricultural produces were sold to the farmers from ATICs. A total of 38476 farmers were benefitted from sale of those technological products and a worth of Rs. 180.86 lakh revenue was generated during 2016-17. From the ATICs of this Zone, 2484 soil and water samples were tested and 435 plants were diagnosed for different diseases which benefitted total 7134 farmers.

12. HRD PROGRAMME

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

Sl. No.	Title of the programme	Organized at	Date	No. of Participants
1	Zonal Workshop on NICRA	ICAR-ATARI, Kolkata	20-21.04.2016	45
2	State Level Workshop of KVKs of West Bengal & A & N Islands	ICAR-ATARI, Kolkata	28.04.2016	58
3	State Level Workshop of KVKs of RAU, Pusa	BVC, Patna	02.05.2016	34
4	State Level Workshop of KVKs of BAU, Bhagalpur	BVC, Patna	03.05.2016	50
5	State Level Workshop for the KVKs of Jharkhand	BAU, Ranchi	06.05.2016	50
6	ZPMC 1st Meeting for screening of Farmers' FIRST projects (FFP)	ICAR-ATARI, Kolkata	13.05.2016	15
7	Interface Meeting on Enhancing the Preparedness of Agricultural Contingencies for West Bengal: Kharif 2016	ICAR-ATARI, Kolkata	31.05.2016	110
8	Workshop on NFDB funded fishery projects	ICAR-ATARI, Kolkata	08.06.2016	60
9	Meeting with the Hon'ble Secretary, DARE & DG ICAR	ICAR-ATARI, Kolkata	15.06.2016	
10	Meeting with Hon'ble Union Minister of Agriculture & FW	ICAR-ATARI, Kolkata	21.06.2016	30
11	ZPMC 2nd Meeting for screening of Farmers' FIRST projects	ICAR-ATARI, Kolkata	22.06.2016	8
12	Zonal workshop on CFLD of Pulses and Oilseeds with KVKs of ICAR-ATARI, Kolkata	NBSS&LUP, Kolkata	19.07.2016	99
13	Meeting on Pulse Seed Hub establishment at KVKs in Zone-II	ICAR-ATARI, Kolkata	22.09.2016	30
14	Meeting on KVK Portal and FMS-MIS Implementation	ICAR-ATARI, Kolkata	26.09.2016	24
15	First Zonal Group meeting (Zone-II & III) on implementation of Farmers FIRST Programme (FFP)	ICAR-ATARI, Kolkata	09.11.2016	30
16	ZPMC 3rd meeting with Committee members on FFP	ICAR-ATARI, Kolkata	19.11.2016	10
17	Review Workshop of CFLD on Pulse and Oilseeds for West Bengal	ICAR-ATARI, Kolkata	20.12.2016	25
18	Screening Committee Meeting for ICAR Award Application	ICAR-ATARI, Kolkata	26.12.2016	10
19	RE Meeting for finalization demand 2016-17	ICAR-ATARI, Kolkata	28.01.2017	16
20	Review meeting on Farmers First	ICAR Research Complex Patna	22.02.2017	21
21	Sensitization Workshop on "Technology application in Animal and Fishery Sciences" for Animal and Fishery Scientists of KVKs of West Bengal	ICAR-ATARI, Kolkata	16-17.03.2017	40

13. REVENUE GENERATION BY KVKS

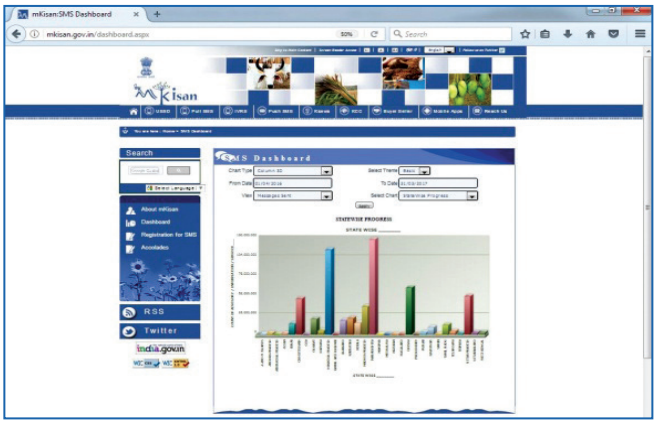
The KVK scientists of this Zone are actively involved in receiving funds from a large number of external sources through sanctioning projects in their favour. The projects include organizing additional training programmes, research projects, building infrastructural facilities etc. which help in supporting and strengthening of KVKs. The KVKs of ICAR-ATARI, Kolkata managed to get funds from State Department of Agriculture, Central Government, RKVY, NABARD, ATMA, NGOs, Zila Parishad and many other sources. Revenue of Rs. 3.94 crore was generated by the KVKs of ICAR-ATARI, Kolkata during 2016-17. Out of which, Andaman and Nicobar Islands KVKs generated fund about Rs. 92000, Bihar KVKs about Rs. 1.24 crore, Jharkhand about Rs. 76.83 lakh and West Bengal KVKs about Rs. 1.92 crore. As per individual KVK was concerned, Rohtas KVK (Rs. 21.95 lakh) from Bihar state, Gumla KVK (Rs. 34.32 lakh) from Jharkhand state and Nimpith KVK (Rs. 56.95 lakh) from West Bengal State earned maximum revenue compared to other KVKs of their respective state.

14. NATIONAL FARMERS' PORTAL

All Central and State Government organizations in agriculture & allied sectors, i.e., State Agriculture Universities, Krishi Vigyan Kendras, Agromet Forecasts Units of Indian Meteorological Department, ICAR Institutes, Organization in Animal Husbandry, Dairying & Fisheries etc. provide information/ services/ advisories to farmers by SMS in their language, preference of agricultural practices and locations through mKisan Portal. As part of agricultural extension (extending research from lab to the field), under the National e-Governance Plan-Agriculture (NeGP-A), various modes of delivery of services have been envisaged. These include internet, touch screen kiosks, agri-clinics, private kiosks, mass media, Common Service Centres, Kisan Call Centres, and integrated platforms in the departmental offices coupled with physical outreach of extension personnel equipped with pico-projectors and hand held devices. Since its inception, about 468 crore messages with 361704 advisories and more than 1400 crore SMSs have been sent to the Indian farmers. The supplied information includes crops, seeds, pesticides, farmers' insurance, farm machineries, storage, fertilizers, market price of agricultural produce, package of practices, various extension activities etc. There are also provisions of downloading different schemes, farm friendly handbook and like many other things. The portal can be accessed at *www.mkisan.gov.in.* The ICAR-ATARI, Kolkata as ADMIN activated the registration requests received from different KVKs of this Zone and ultimately, almost all KVKs of ICAR-ATARI, Kolkata have been registered. As on date, KVKs are providing different information to the farmers through sending messages. During 2016-17, KVKs of Andaman and Nicobar Islands, Bihar, Jharkhand and West Bengal sent 14, 726, 428 and 514 advisory, respectively which benefitted total 3.48 crore agricultural farmers.

Table: State wise distribution of SMS advisories and number of beneficiaries during 2016-17

Sl. No.	State	No. of Advisory Sent	No. of Beneficiaries
1	Andaman & Nicobar Islands	14	747
2	Bihar	726	13954410
3	Jharkhand	428	18355853
4	West Bengal	514	2538807
	Total	1682	34849817

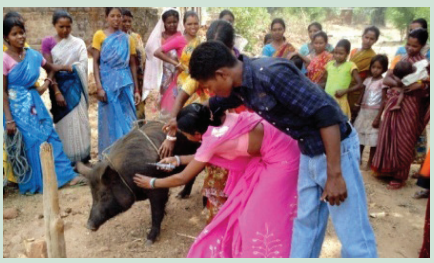


15. TRIBAL SUB PLAN

The Tribal Sub Plan (TSP) strategy of tribal development is a concept intended to address the issues of backwardness in tribal areas and tribal population in an integrated way. The aim is to minimize the gap between the livelihood of tribal people and general communities. Forty six KVKs of ICAR-ATARI, Kolkata were selected for this scheme during the year 2016-17. A total of Rs. 610 lakh was earmarked during the period for selected KVKs of this Zone. To uplift the livelihood of tribal people, KVKs under ICAR-ATARI, Kolkata conducted various agricultural and allied sectoral activities including agricultural farming, horticulture, animal husbandry, fish production, vocational training etc. throughout the year for providing direct benefit to the individual or families belonging to scheduled tribes. During the period under report, KVKs of this Zone created 3087 number of assets in the form of sprayer, weeder, agro-shed net, ridge maker, maize sheller, sickle, khurpi, seed bin/ drum, drip irritation kits, chaff cutter, poultry feeder and drinker, pheromone trap, water tank etc. for the tribal people in the concerned district. The KVKs conducted 172 on-farm-trials (OFT) for 52 technologies and also conducted 3422 frontline demonstrations (FLD). The KVK scientists trained about 1.14 lakh tribes including youths, farmers, farm women and extension personnel. A total of 1.94 lakh tribal farmers participated in different extension activities. In addition, tribal KVKs under this Zone produced 305.44 tonnes various seeds, 8.50 lakh planting materials and 7.30 lakh livestock strains and fish fingerlings in the tribal areas. About 0.18 lakh farmers tested their soil/ water/ plant/ manure samples from their district KVKs and more than 12 lakh farmers were benefitted by getting farm related SMSs. Online reporting system, through generating Google sheet, was developed by ICAR-ATARI, Kolkata for reporting from all concerned KVKs to ICAR-ATARIs during the period.

Table: Fund outlay and achievements of Tribal Sub Plan during 2016-17

State	Fund allotted during 2016-17 (Rs. in lakh)	Achievements in different activities during 2016-17	
A&N Islands	40.82	Asset creation (Sprayer, ridge maker, pump set, weeder etc.) (Number)	3087
Bihar	8.00	On-farm trials (Number)	172
Jharkhand	501.18	Frontline demonstrations (Number)	3422
West Bengal	60.00	Farmers' trained (in lakh)	1.0750
Total	610.00	Extension personnel trained (in lakh)	0.0672
		Participants in extension activities (in lakh)	1.9446
		Seed production (in tonnes)	305.44
		Planting material production (in lakh)	8.49576
		Livestock strains and fingerlings production (in lakh)	7.2982
		Soil, water, plant, manures samples testing (in lakh)	0.1822
		Provision of mobile agro-advisory to farmers (in lakh)	12.20
		Others (Number of programmes like Swachha Bharat Abhiyaan, Agriculture knowledge in rural school, International Adivasi Diwas, Planting material distribution, Vaccination camp etc.)	846



16. PROTECTION OF PLANT VARIETIES AND FARMERS' RIGHT

The Protection of Plant Varieties and Farmers' Rights Act (PPV&FR Act) seeks to address the rights of plant breeders and farmers on an equal footing. It affirms the necessity of recognizing and protecting the rights of farmers with respect to the contribution they make in conserving, improving and making Plant Genetic Resources (PGR) available for the development of new plant varieties.

The PPV&FR Act recognizes the multiple roles played by farmers in cultivating, conserving, developing and selecting varieties. With regard to developing or selecting varieties, the Act refers to the value added by farmers to wild species or traditional varieties/ landraces through selection and identification for their economic traits. Accordingly, farmers' rights encompass the roles of farmers as users, conservers and breeders.

As a collaborative approach, ICAR-ATARI Kolkata coordinated several programmes in 32 KVKs of Bihar, Jharkhand & West Bengal for crafting awareness among the farmers of the concerned districts during the period of 2016-17. The districts had the availability of number of traditional plant varieties and cultivated over long period of time. So far, 373 numbers of varieties have been identified for registration at PPV& FR level. Moreover, a good number of farmers have also been selected for different categories of award initiated by PPV & FRA.

17. NATIONAL INNOVATIONS IN CLIMATE RESILIENT AGRICULTURE - TECHNOLOGY DEMONSTRATION COMPONENT (NICRA-TDC)

A National Network Project, National Innovations in Climate Resilient Agriculture (NICRA) launched in 2011 to address the resilience of Indian agriculture to climate change and climate vulnerability through strategic research and technology demonstration. 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.

Technology Demonstration Component (TDC) of NICRA offers a great opportunity to work with farmers to address current climate variability with matching responses. Getting existing technologies into the hands of small and marginal farmers and developing new technologies like drought or flood tolerant crops to meet the demands of a changing climate also come under the purview of NICRA programme. Climatic vulnerability of selected 17 KVK districts of Bihar, Jharkhand, 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.

NATURAL RESOURCE MANAGEMENT

In situ moisture conservation, water harvesting and recycling for supplemental irrigation, improved drainage in flood prone areas, conservation tillage where appropriate, artificial ground water recharge, water saving irrigation methods and rainwater harvesting structure development were various NRM activities under NICRA.

In situ moisture conservation technologies have been demonstrated in 17 NICRA adopted villages covering 387 farmers in 85.5 ha area. Water harvesting and recycling for supplemental irrigation were demonstrated in NICRA adopted villages involving 1017 numbers of farmers. Conservation tillage in wheat, paddy, lentil, pea

and chickpea demonstrated in different adopted villages in an area of 188.5 ha of 312 numbers of farmers. The technologies followed mainly by zero tillage operation. Wheat with cultivation through ZTD showed maximum yield of 33- 42 q/ha. Zero tillage technology showed very promising results in pulse and oilseed cultivation. Pea (var. Arkel) gave highest economic return (B:C::2.85:1) among the pulse demonstration through ZTD. Land shaping with ail cultivation and rain water harvesting structure have

been constructed covering 1.07 ha area during post-kharif to mitigate the scarcity of irrigation water and increase in soil salinity. Artificial ground water recharge was done by field bunding, water management and through SRI by sub soiler in paddy covering 67.0 ha area in 90 farmers' fields. Ground water recharge through SRI by sub-soiler

recorded highest paddy yield (55.5 q/ha) and benefit: cost ratio (2.24). 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 78.0 ha in 325 farmers fields. Total of 121 number of rainwater harvesting structures have been developed which could store 524446.0 cu m of water. This intervention increased the cropping intensity to the maximum extent upto 250%. Around 450 q compost prepared from solid wastes was added to the soil through which 75000 mg/kg carbon sequestrations was done during 2016-17.

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 were various activities. Under crop production module introduction of drought resistant varieties of paddy, brinjal, niger, maize, pigeon pea, and ragi was demonstrated in 17 NICRA adopted villages involving 1899 number of farmers in

461.0 ha area. Drought tolerant paddy varieties like Sahbhagi, Anjali, Naveen, Abhishek were demonstrated in 218.0 ha areas of 607 number of farmers' field, among which Sahbhagi with drum seeder showed highest yield potential (49.0 q/ha) and economic return 2.38 with maximum increase (58%) as compared to local check.

Short duration variety of Potato Pokhraj gave maximum economic return (B:C ratio of 3.35). Salt tolerant varieties of paddy like CARI Dhan-5, Usar Dhan-5, Jarava, Geetanjali, SR-26B, Amalmona were introduced in 68.2 ha area in 158 farmers' fields. Javarva, Geetanjali and Amalmona varieties proved maximum salt tolerant potential by showing more economic return (BC ratio of 2.54). Flood tolerant varieties of paddy like Swarna sub 1 and Sabita were introduced through demonstration in

30.0 ha area in 122 farmers' fields. To avoid terminal heat stress, crops like rice, wheat, lentil, mustard, potato, etc. were sown in 13 days advance (avg) during rabi season. These demonstrations were carried out in eight NICRA adopted villages involving 347 number of farmers' fields. Water saving paddy cultivation through SRI, short duration

varieties, direct seeded rice, brown manuring etc. has been demonstrated in 219.0 ha area of 674 number of farmers' fields. These interventions were carried out in 14 NICRA adopted villages. Among all the interventions paddy cultivation with Sahbhagi variety showed highest increase in yield whereas paddy cultivation with variety Rajendra Sweta with ZTD gave maximum economic return in the tune of BC ratio of 2.95. To combat the situation of delayed monsoon intervention of staggered community nursery for paddy has become very popular in Bihar and Jharkhand. Seedlings of 25-30 days age were 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. However, Bihar experienced aberrant rainfall situations in 4 out of the previous 10 years impacting adversely rice production and livelihood of farmers. Delay in transplanting of paddy affects productivity as over-aged seedlings suffer from low tillering ability. Various crops of different crop duration and varieties have been promoted. Besides paddy other crops like cauliflower, brinjal, and tomato were followed for staggered nursery development. These interventions were demonstrated in 38.5 ha area of 220 farmers. These interventions were carried out in 10 NICRA adopted villages. Among all the demonstrations, the community nursery for cauliflower was the most promising one which showed highest increase in yield as well as economic return. Crop diversification through introducing new crops in prevailing cropping pattern was demonstrated in different NICRA adopted villages. These demonstrations were carried out in 140.5 ha area of 754 number of farmers' fields. Introduction of ol or EFY(var. Gajendra) in the cropping pattern showed the most promising one.

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 or excess water.

Community lands of an area of 170.0 ha involving 987 farmers utilized for different fodder production were demonstrated in ten different NICRA adopted villages. Berseem, oat, sudan chari, maize, hybrid napier were the major fodder produced in the programme. Of all these


demonstrations quality legume Sudan grass demonstrated showed maximum return (B:C:: 5.15:1). Adequate supply of fodder, either green or dry, is crucial to the livelihoods of livestock in 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. Improved fodder of rice bean and silage making were demonstrated in farmers fields. Silage making for 10 numbers and 1.6 ha of units showed very promising results. Various vaccination camps were organized against FMD of cattle; PPR against goat, Ranikhet of poultry, BQ vaccine, deworming etc. in all the NICRA adopted villages. Mortality rate reduced up to the extent of 98% and average increase in cattle milk yield upto 42% has been recorded after the vaccination camps organized.


Composite and cat fish rearing in the existing pond or in renovated pond were demonstrated in 122 farmers' fields of NICRA adopted villages. Khaki Campbell duck was also introduced through this intervention. Demonstration of rural backyard poultry (kuroiler, Nicobari fowl), Khaki Campbell duck, T x D breed of pig, mineral mixture and azolla as cattle feed were carried out in 421 number of farmers fields. Improved ornamental bird was introduced through this intervention which showed very promising results (B:C :: 4.90:1). Improved poultry shed recorded low mortality rate and reduced heat stress in shady area. 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 in improved shelter.

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 in 2258 number of farmers in the zone.




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.


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 rainfed 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 with 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 were presented in the following table.




Table. Revenue generated through Custom Hiring Centers and VCRMC in KVKs

Name of KVK	Revenue generated (Rs.) during 2016-17	
	From Custom Hiring Centres	Total under VCRMC
Aurangabad	17250.00	92150.00
Buxar	3240.00	30597.00
Chatra	37922.00	59482.00
Cooch Behar	19354.00	67340.00
East Singhbhum	25500.00	64600.00
Gumla	27156.00	127156.00
Jehanabad	18500.00	91663.00
Koderma	20470.00	40100.00
Malda	17050.00	37500.00
Nawada	25250.00	327641.00
Palamu	6600.00	24000.00
Port Blair	2380.00	30304.00
Saran	7000.00	67000.00
Supaul	20473.00	87485.00
South 24 Parganas	31913.00	226159.00
Godda	15000.00	45000.00
Banka	16354.00	16354.00
Total	311412.00	1434531.00

CAPACITY BUILDING

A total of 584 courses were conducted by all NICRA implementing KVKs under Capacity Building Programme

on various thematic areas benefitting 11425 farmers and farm women (8811 male and 2614 female) during 2016-17. Thematic areas covered were 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.


EXTENSION ACTIVITIES

NICRA implementing KVKs conducted a total of 1741 extension activities on various thematic areas benefitting 17121 practicing farmers and farm women (11584 males and 5537 females) during 2016-17. The extension activities were conducted on Method demonstrations, Agro advisory services, Awareness camp, Animal Health Camp, Krishak Chaupal, Kishan gosthi, Resource conservation


technologies, celebration of field and farmers' days, diagnostic visits, group discussion, Technology week, Kisan mela etc.

CONVERGENCE BY NICRA WITH ONGOING DEVELOPMENT PROGRAMMES

A number of interventions were taken up by NICRA KVKs during the year in convergence with developmental programmes which are operational at the village level. 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, deepening of drainage channels, 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 in various states. 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 material for silage making 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 programmes. 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 were carried out by each of the NICRA implementing KVKs with ongoing development programmes or schemes during 2016-17. The prominent development schemes are MGNREGA, National Micro and Minor Irrigation Scheme, Pradhan Mantri Gram Sadak Yojana, BASF, NABARD, Sunderban Development Board, IWMP, Forest Department, IAP Yojana, RKVY etc. NICRA implementing KVKs being part of the different convergence programmes generated an amount of Rs. 477.21 lakh during 2016-17.



18. PRADHAN MANTRI FASAL BIMA YOJANA (PMFBY) KISAN SAMMELAN

Initiative has been taken by Union Cabinet to protect the farmer against crop damage by natural disaster by implementing Pradhan Mantri Fasal Bima Yojana (PMFBY) by replacing the previously existed two crop insurance schemes- i) National Agricultural Insurance Scheme (NAIS) and ii) Modified NAIS. The scheme aims at supporting sustainable production in agriculture sector by way of - a) providing financial support to farmers suffering crop loss/damage arising out of unforeseen events, b) stabilizing the income of farmers to ensure their continuance in farming, c) encouraging farmers to adopt innovative and modern agricultural practices, and d) ensuring flow of credit to the agriculture sector which will contribute to food security, crop diversification and enhancing growth and competitiveness of agriculture sector besides protecting farmers from production risks. In this regard, all the KVKs under ICAR-ATARI, Kolkata have been given responsibility to sensitize the farming community towards the new insurance and to create awareness on different other schemes like soil health cards, production of organic inputs and water use efficiency etc. through organizing PMFBY Kisan Sammelan. During the year 2016-17, 73 KVKs from this Zone organized the programme involving local MPs, MLAs and other public representatives of the concerned districts. From the Union Territory of Andaman and Nicobar Islands, total 835 farmers participated in the meeting and from Bihar, Jharkhand and West Bengal state, the number of participants was 25437, 11469 and 8071 respectively. In addition to total 290 number of MPs, MLAs and other public representatives from different districts, 8 Central Ministers, 4 each from Bihar and Jharkhand graced the occasion.

Table: PMFBY Kisan Sammelan

Sl. No.	State / UT	No. of KVKs conducted PMFBY 2016-17	No. of Ministers attended	No. of MP/ MLA/ public representatives attended	No. of farmers attended
1	Andaman & Nicobar Islands	3	0	18	835
2	Bihar	36	4	132	25437
3	Jharkhand	17	4	43	11469
4	West Bengal	17	0	97	8071
	Total	73	8	290	45812

19. PRE-KHARIF AND PRE-RABI KISAN SAMMELAN

Under the banner of the Indian Council of Agricultural Research (ICAR), Ministry of Agriculture and Farmers' Welfare, the Pre-Kharif and Pre-Rabi Sammelan 2016-17 were organized by the KVKs of ICAR-ATARI, Kolkata to create awareness amongst the farmers and other stake holders about the latest agricultural technologies through using different extension methodologies and for wider publicity of the KVK. On the occasion, group meetings, film shows, exhibitions, demonstrations, seminars, lectures etc. were arranged by the KVK personnel to enrich the farmers with agricultural knowledge for developing and adopting various strategies for the ensuing crop season. During the period under report, Pre-Kharif and Pre-Rabi Sammelan were organized by 67 KVKs of which grand total of 38299 nos. of participants participated with august presence of 211 nos. public representative including MLA/ MP/ MIC.

Sl. No.	State / UT	No. of KVKs conducted Pre-Kharif	No. of KVKs conducted Pre-Rabi	Total No. of KVKs	No. of public representatives attended	No. of farmers attended
1	Andaman & Nicobar Islands	0	3	3	18	835
2	Bihar	6	27	33	116	23752
3	Jharkhand	5	9	14	39	3610
4	West Bengal	1	16	17	38	10102
	Total	12	55	67	211	38299




20. SPECIAL PROGRAMMES

20.1 SWACHH BHARAT ABHIYAN

As a part of mass movement of cleanliness, initiated by the Government of India, all the staff members of ICAR-ATARI, Kolkata including KVKs under this Zone picked up the broom to clean the dirt, garbage, debris, litters, other obnoxious/ unwanted materials from the office surroundings, roads, dwelling places etc. The KVKs of this Zone observed the cleanliness drive through sensitizing farmers/ villagers adopting the slogan "*Neither litter, nor let others litter*". A number of awareness programmes, sensitizing workshops and campaigns were carried out within KVKs and even in the remote villages for all categories of citizens. A sense of responsibility was evolved among the people to keep the environment clean. Scientists of KVKs made effort to train the people for making compost from different kinds of waste materials and also taught them in maintaining hygiene and sanitation in and around the houses. 70 KVKs under ICAR-ATARI, Kolkata conducted this abhiyan during last one year. State-wise data envisaged that Andaman & Nicobar Islands, Bihar, Jharkhand and West Bengal organized 26, 522, 209 and 140 programmes, respectively in various forms.

Table: Swachh Bharat Abhiyan

State	No. of observation/ programme	No. of KVK
A & N Islands	26	3
Bihar	522	34
Jharkhand	209	19
West Bengal	140	14
Total	897	70

20.2 CELEBRATION OF NATIONAL SCIENCE DAY

During the year 2016-17, the National Science Day was celebrated by a number of KVKs under ICAR-ATARI, Kolkata to popularise the benefits of scientific knowledge and its practical appropriation in day to day life. 24 KVKs observed National Science Day through organizing lectures, quiz competitions, debates, film shows, awareness camps, demonstrations, seminars, trainings, painting competitions etc. to inculcate the latest scientific knowledge on various issues related to agriculture, animal husbandry, fishery sciences and other day to day activities. Out of total 35 such different programmes, West Bengal and Jharkhand KVKs conducted each of 13 programmes followed by Bihar state conducted maximum programmes during the period.

Table: Celebration of National Science day

State	No. of observation	No. of KVK
A & N Islands	1	1
Bihar	8	7
Jharkhand	13	6
West Bengal	13	10
Total	35	24

20.3 NEHRU YUBA KENDRA TRAINING

Various need based training programme to the volunteers of Nehru Yuba Kendra (NYK) was organized. Need based training programmes particularly on mushroom cultivation, bee keeping, vermi-composting, protected vegetable cultivation etc. were organized for the rural youths to enrich their knowledge and skills with latest available technologies in the field of agri-based enterprises which could help them in generating employment. KVKs of A&N Island, Bihar and Jharkhand state has trained 510 persons in 11 programmes.

Table: Nehru Yuva Kendra Training

State	No. of training programme	No. of the Participant
A & N Islands	2	75
Bihar	2	86
Jharkhand	7	349
Total	11	510

20.4 BSF PERSONNEL TRAINING

The scientists of KVKs of this Zone extended their hands in educating BSF personnel available in their respective districts on various agricultural technologies for increasing production through utilizing existing resources. They were trained for horticultural production, grafting techniques, honey production, hi-tech agriculture, livestock rearing, fish rearing and so on. The KVK also established very good liaison between army personnel and local civilians. During the period under report, 5 KVKs from this Zone organized 15 training programmes to train 826 BSF jawans.

Table: BSF Personnel Training

State	No. of proramme	No. of participant	No. of KVK
Bihar	5	711	2
Jharkhand	5	15	1
West Bengal	5	100	2
Total	15	826	5

20.5 INCIDENCE OF LIVESTOCK DISEASES

In collaboration with National Institute of Veterinary Epidemiology and Disease Informatics (NIVEDI), Bengaluru the incidence of various livestock diseases was started reporting by the KVKs of ICAR-ATARI, Kolkata from the year 2013-14. Substantial numbers of livestock especially cattle, buffalo, sheep, goat, pig, duck, poultry were affected by various diseases like Foot and Mouth Disease (FMD), Black Quarter (BQ), Haemorrahagic Septicaemia (HS), *Peste des Petits Ruminants* (PPR), Goat Pox, Ranikhet causing huge economic loss. The KVKs of this Zone reported the incidence of such outbreaks and conducted awareness and vaccination camps to control livestock diseases. During 2016-17 KVKs of this zone has vaccinated 119096, of which 36072 animals were from Bihar, 29208 from Jharkhand and 53816 from West Bengal state.

Table: Vaccination programme against diseases in livestock

State	No. of animals vaccinated
Bihar	36072
Jharkhand	29208
West Bengal	53816
Total	119096

20.6 PROGRAMME ON RURAL AGRICULTURAL WORK EXPERIENCE (RAWE)

Students of various Agricultural Universities pursuing agricultural degree and ARS trainee probationers were assigned to undergo rural agricultural work experience (RAWE) at various KVKs of this zone. The sole purpose of such programme was to get acquainted with the overall agricultural scenario in rural India. Such trainees/ trainee officers were also associated with the Scientists and administrative staff of ATARI Kolkata in order to make a note of the activities of this institute. During 2016-17, a total of 696 trainees were carrying out such programme across three states of this zone.

Name of the State	No. of student/ ARS trained	No. of days stayed
Bihar	235	1876
Jharkhand	155	80
West Bengal	306	186
Total	696	2142

20.7 KVK IN RURAL SCHOOL

Agriculture has always been a basic priority for the society, and thus to know the role of agriculture in a society, KVK personnel extended their hands to the rural school with an objective to bring the youth in agriculture. 56 KVKs of ICAR-ATARI, Kolkata made an effort to motivate such young buds to inculcate the basic knowledge of agriculture through delivering lectures, showing audiovisuals, distributing leaflets and pamphlets, group discussion, presentations, organizing quizzes etc. 229 nos. of schools have been covered and 246 visit, have been made; the details are presented in Table.

Table: KVK in Rural School

State	No. of School	No. of Visit	No. of KVKs
A & N Islands	5	6	2
Bihar	77	77	22
Jharkhand	58	69	19
West Bengal	89	94	13
Total	229	246	56

21. TRAINING AND CAPACITY BUILDING

The process of Training Need Assessment (TNA) and preparation of Annual Training Plan (ATP) for all categories of employees were initiated last year. In continuation, ICAR-ATARI, Kolkata has performed TNA and prepared ATP for the year 2016-17 as well as 2017-18. For a continuous Human Resource Development (HRD) in the institute, such plans became instrumental and category-wise trainings planned and implemented have also been undertaken and completed trainings have successfully been uploaded in ERP system by individual employees. During the year 2016-17, out of 15 employees of the institute 10 persons were trained as per their identified skill deficiency areas like Leadership Development, Performance Monitoring and Evaluation System, MIS-FMS operating procedures etc.

Table: Annual training plan for the year 2016-17 w.r.t. ICAR-Agricultural Technology Application Research Institute, Kolkata

Sl. No.	Areas of training need	Proposed Institution	Duration	Tentative expenditure
1	Right to information; Leadership Development	ISTM/ NAARM	2/7 days	25000
2	Performance Monitoring and Evaluation System	ISTM/ NAARM	2/7 days	25000
3	Outcome budget	ISTM	2 days	25000
4	MIS-FMS operating procedures	IASRI	5 days	25000
5	MS Powerpoint	ISTM	3 days	20000
6	MIS-FMS operating procedures	IASRI	5 days	20000
7	MIS-FMS operating procedures	IASRI	5 days	20000
8	MIS-FMS operating procedures	IASRI	5 days	20000

Table: Physical targets and achievements for 2016-17

S. No.	Category	Total No. of Employees	No. of trainings planned for 2016-17 as per ATP	No. of employees undergone training during 2016-17	% realization of trainings planned during 2016-17
1	Scientist	6	3	3	100
2	Technical	1	1	0	0
3	Administrative & Finance	7	5	1	20
4	SSS	1	1	0	0
Total		15	10	4	40

22. राजभाषा

"हिन्दी पखवाड़ा – 2016" समारोह का आयोजन

कृषि तकनीकी अनुप्रयोग संस्थान, कोलकाता में दिनांक 14.09.2016 से दिनांक 29.09.2016 तक "हिन्दी पखवाड़ा – 2016" समारोह का आयोजन लगातार तीसरी साल के लिए किया गया। इन में संस्थान के सभी अधिकारी एवं कर्मचारी भाग लिया। संस्थान में 29.09.2016 को "हिन्दी पखवाड़ा – 2016" का समापन समारोह आयोजित की गयी। इस समापन समारोह की अध्यक्षता संस्थान के प्रभारी निदेशक डॉ. एस. के. राय ने की।

पखवाड़ा का समापन समारोह का शुभारंभ डॉ. एस. के. मंडल, प्रधान वैज्ञानिक के स्वागत भाषण से हुआ। तत्पश्चात डॉ. मंडल ने संस्थान में राजभाषा कार्यान्वयन की प्रगति प्रतिवेदन प्रस्तुत की। इस प्रतिवेदन में संस्थान से प्रकाशित हुए वार्षिक वैज्ञानिक पत्रिका "कृषि–पूर्वी किरण", हिन्दी में पत्राचार, सभी हिन्दी पत्रों में हिन्दी टिप्पणी देना, हिन्दी में छुटटी आदि के फर्म बनाना एवं रोज एक हिन्दी शब्द 'आज का शब्द' में लिखना इत्यादि के उल्लेख किए गए।

हिन्दी पखवाड़े के दौरान आयोजित हिन्दी काव्य पाठ प्रतियोगिता एवं हिन्दी अनुवाद प्रतियोगिता (तत्कालिक) के विजेताओं को पुरस्कार वितरित किए गए।

पखवाड़े के समापन समारोह में संस्थान के प्रभारी निदेशक डॉ. एस. के. राय ने अपने संबोधन में संस्थान के सभी अधिकारी एवं कर्मचारी के प्रशंसा करते हुए हिन्दी को और तेजी से बढ़ावा देने पर जोर दिए।


23. *MERA GAON MERA GAURAV* PROGRAMME

An innovative initiative "*Mera Gaon Mera Gaurav*" has been planned to promote the direct interface of scientists with the farmers to bridge the gap between lab and land. The objective of this scheme is to provide farmers with required information, knowledge and advisories on regular basis by adopting villages.

In Zone II, 17 ICAR Institutes and 1 SAU are implementing MGMG programme, so far, 621 villages have been covered for the benefit of 102548 farmers and total 439 field activities were conducted 2099 no. of messages were sent. The major activities performed included visit to village by teams, Interface meeting/*Goshthies* with farmers, providing training, conducting demonstrations, mobile based advisories, Literature support as per the agro-ecological conditions of the village, awareness and educating farmers through news papers, community radio etc.

ATARI	No. of institutes/ universities involved	Total No. of Groups formed	No. of Scientist Involved	No. of villages covered	No. of field activities conducted	No. of messages/ advisory sent	Farmers benefited (No.)
Kolkata (Zone-II)	17 ICAR-Institutes & 1 SAU (BAU)	86	360	621	439	2099	102548

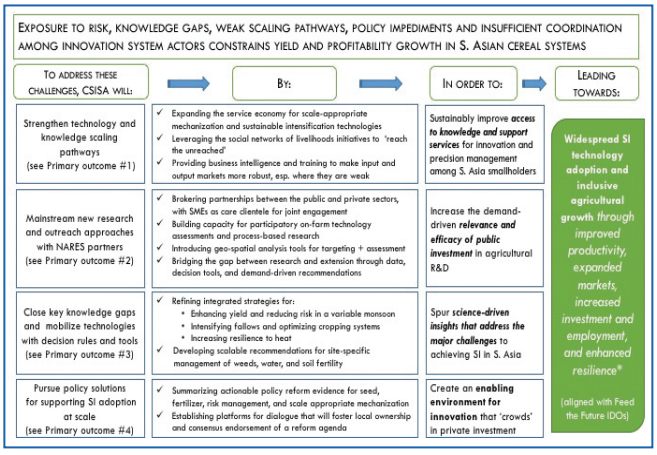


24. NEW INITIATIVES UNDERTAKEN

24.1 IMPLEMENTATION OF CSISA-ICAR COLLABORATIVE PROJECT PHASE-III

With a brief history of long collaboration of Cereal Systems Initiative in South Asia (CSISA) and Indian Council of Agricultural Research (ICAR), a mechanism of transfer of developed technologies was planned during the Phase-III of CSISA of CIMMYT and ICAR collaborative project. CSISA was first approved by DARE on December 28, 2008 with subsequent agreements to support specific collaborative activites with ICAR institutes sanctioned under this over-arching umbrella. In Phase II of CSISA (2012 – 2015), close collaborations were developed and executed through the Natural Resources Management Division's research institutes in Karnal (Central Soil Salinity Research Institute – CSSRI) and in Patna (Research Complex for the Eastern Region – RCER), primarily in the form of process-based field research at the 'research platforms' that were jointly established and managed by ICAR and CSISA scientists. Collaborations were also initiated with the Extension Division through a jointly sponsored and continuing dialogue on modernizing extension services that was launched at an event hosted by IFPRI and the University of Illinois in June, 2015.

The overarching goal of CSISA in Phase III (2016 – 2020) remained to support the widespread adoption of SI technologies to spur inclusive agricultural growth, both within the time-horizon of investment and beyond. CSISA's theory of change in Phase III was structured around four inter-linked primary outcomes and was coordinated by a fifth that ensures that potential synergies across the project was realized and lessons learnt during implementation was reflected in periodic strategy adjustments.



With ATARI Kolkata and 8 KVKs of Bihar

Goal:

To support wide spread adoption of sustainable intensification technologies to spur agricultural growth, both within the time horizon of the project and beyond.

Output:

- Conduct multi-location farmer's participatory trials and evaluation of integrated crop and resource management practices that enhance crop performance, resource use efficiency and farmer's income and revise the package of practices.
- Monitor, Evaluate and provide feedback on farmer's acceptance of new technologies and to sensitize policy and decision makers to develop policies that enable wider dissemination.
- Training of Trainers and development of training material including videos, fact sheets, tips, and leaflets for business development of service providers, dealers and extension agencies.
- Conduct research on participatory technology development and extension approaches.

Work plan for KVKs during 2016-17

Work plan would address the following issues/ challenges:-

Strengthen technology and knowledge scaling pathways

i. Creation or support for service providers for mechanisation
ii. Leveraging NGOs, SHGs to reach the unreached
iii. Providing business intelligences to private sector companies and their dealers and distributors.

Mainstream new research and outreach approaches with NARES partners

i. Developing partnership between public and private sectors
ii. ToTs for On farm technologies assessment
iii. GIS based tools for technologies targeting + assessment
iv. Bridging the gap between research and extension through evidence based data management and demand driven recommendations and their modifications wherever needed.

Close key knowledge gaps and mobilize technologies with decision rules and tools

i. Refining integrated strategies for enhancing yield and reducing risk in a variable monsoon (diversification

nursery enterprise, rice establishment methods, maize based cropping systems).

ii. Intensifying fallows and optimizing systems (bringing maize in kharif fallow, creating more space between sowing of crops in rabi season after harvesting rice and for using residual moisture bringing hybrids, short/ medium duration rice followed by long duration wheat etc.).

iii. Increasing resilience to heat(Early wheat sowing, ZT wheat and other crops in rotation, long duration wheat varieties and better bet agronomy based on cropping system).

Pursue policy solutions for supporting SI adoption at scale

i. Proper monitoring, evaluation and learning process based on diagnostic survey, impact assessment survey and other tools that help integrating the process of innovation and delivery of technologies in a Non-linear model.

ii. Data presentation in the Research and Extension councils of concerned SAUs and ICAR research institutions or NGOs, KVKs within the domain of each SAUs including the results in the package of recommendations wherever needed.

iii. Research on Extension methods that may change the way extension interacts with other actors at districts, regional and state level.

Guidelines- Coordination and implementation

- Selected KVKs to revisit the old recommendations and modify them if they lead to more gains with less investment.
- Concerned agronomist will be co-opted as Co-PI to strengthen the interface between research and extension at university or institution level.
- Each KVK or participant may determine one or two treatments based on local conditions but the data emerged from these activities will be shared with the concerned University or Institution to develop a consensus around a particular intervention.
- The work proposed here include cereal based cropping systems, mostly dealing with management of crops, cropping system including better bet agronomy within the domain of each KVK.
- Organize cross-site visits across networks of on-farm demonstrations that promote exchange of experience and knowledge among farmers and R & D workers on different approaches and production systems that emerge and evolve under different circumstances in 12 KVKs
- Intended to provide a frame work for KVK scientist to create data sets not only to provide an evidence based feedback to researcher but also to accumulate practical knowledge at farmers field on what works and what does not work. Protocol to be arranged by CSISA.
- KVKs administered by NGOs and ICAR should have shared interest in including all or part of their data for modifying recommendations at the level of the concerned SAU- DDG to decide the O&M for three ICAR KVKs.
- The work plan for CSISA project allows the scientist working in the project to cover the whole districts that represent all ecologies and any technology available anywhere in the system as dictated the treatment details.
- PI will be from concerned KVK and co-PI will be from the main campus of the university. Both will be nominated by the Director.

A total of Rs.34.95 lakh was allocated for this project during 2016-17.

Table: KVK-wise Work Plan of ICAR-CSISA Collaborative Project Phase-III during 2016-17

Sl. No.	ATARI/ Name of KVK	Proposed work plan
1.	ATARI Kolkata	Monitoring, supervising the implementation of work plan by participating KVKs of Bihar through regular review meetings, joint field visits and crop inspection etc.
2.	Bhojpur KVK	1. Performance of short duration (SDVs) and long duration varieties (LDVs) under different sowing schedules across ecologies. 2. Assessing the role of additional irrigation during terminal heat stress period during grain filling stage to beat the heat stress and its effect on wheat productivity 3. Response of wheat to fertilizer P applied in both rice &wheat and only in wheat in rice-wheat rotation. 4. Impact of herbicide application technology on performance of herbicide in wheat. 5. Boron deficiency induced sterility in wheat and its effect on the yield and yield attributes of wheat. 6. Potential of using pre-seeding herbicide like glyphosate applied immediately before sowing wheat under zero tillage.

Sl. No.	ATARI/ Name of KVK	Proposed work plan
		7. Quantifying the gains in wheat productivity through zero-tillage mediated advance sowing of wheat. 8. Response of nitrogen and phosphorus applied in timely shown and late shown wheat 9. Quantifying the adoption of recommended technologies related to individual components of crops in rotation. 10. Research on extension methods 11. Residue management in rice-wheat system
3.	Begusarai KVK	⦿ Similar to 1-10 of Bhojpur KVK ⦿ Crop establishment method in *Rabi Maize*
4.	Buxar KVK	⦿ Similar to 1-10 of Bhojpur KVK ⦿ Residue management in rice-wheat system
5.	East Champaran KVK	⦿ Similar to 1-10 of Bhojpur KVK ⦿ Crop establishment method in Rabi Maize
6.	Jamui KVK	⦿ Similar to 1-10 of Bhojpur KVK
7.	Rohtas KVK	⦿ Similar to 1-10 of Bhojpur KVK ⦿ Residue management in rice-wheat system
8.	Lakhisarai KVK	⦿ Similar to 1-10 of Bhojpur KVK
9.	Muzaffarpur KVK	⦿ Similar to 1-10 of Bhojpur KVK ⦿ Crop establishment method in *Rabi Maize*

24.2 SKILL DEVELOPMENT TRAINING PROGRAMMES (ASCI)

In collaboration with Agriculture Skill Council of India, Indian Council of Agricultural Research has taken an initiative of taking up entrepreneurship development programmes through imparting skill training by 100 KVKs during 2016-17. This was in consonance with the directives received from the Ministry of Skill Development and Entrepreneurship, Govt. of India. Out of 100 KVKs across the country, 12 KVKs of this Zone were assigned with the job of undertaking the training programmes in the line of ASCI norms. These KVKs were Birbhum, Burdwan, Darjeeling, Nadia, East Singhbhum, Gumla, Hazaribag, East Champaran, Jehanabad, Lakhisarai, Samastipur and Saran. Each of them was tasked with 2 training programmes during the year. A total of 9 Job Roles were covered under 24 Skill Development Training Programmes for 465 participants undertaken by 12 KVKs during 2016-17. During the year, a fund of Rs. 37.63 lakh was allocated to ATARI Kolkata for this purpose. The Job Role-wise details with the KVKs involved are given below:-

Table: Skill Development training undertaken by KVKs during 2016-17

State	Name of KVK	Job Role/QPs of trainings	Duration of training (hrs.)	No. of participants
Bihar	Saran	Mushroom grower	200	20
		Organic grower	200	20
	East Champaran	Bee Keeper	150	20
		Organic grower	200	20
	Samastipur	Seed Processing worker	130	20
		Broiler poultry farm worker	200	20
	Lakhisarai	Quality seed grower	200	20
		Mushroom grower	200	20
	Jehanabad	Bee keeper	150	20
		Broiler poultry farm worker	200	20
Jharkhand	East Singhbhum	Quality seed grower	200	20
		Organic grower	200	20

State	Name of KVK	Job Role/QPs of trainings	Duration of training (hrs.)	No. of participants
	Hazaribag	Seed Processing worker	130	20
		Mushroom grower	200	20
	Gumla	Mushroom grower	200	20
		Quality Seed grower	200	20
West Bengal	Birbhum	Animal Health worker	300	20
		Hatchery (Fishery) Production worker	200	20
	Darjeeling	Bee Keeper	150	20
		Broiler poultry farm worker	200	20
	Nadia	Solanaceous crop cultivator	180	20
		Quality seed grower	200	20
	Burdwan	Solanaceous crop cultivator	180	20
		Quality seed grower	200	20

Solanaceous Crop Cultivator (Burdwan, Nadia)

The course on Solanaceous Crop Cultivator involved cultivation of solanaceous crop as per the package of practices recommended for a particular agronomic climate zone, type of soil, rainfall pattern and climatic condition to achieve the yield as per the genetic potential of given variety and sell the produce as per the competitive market prices without distress sale. This course included all the scientific aspects of cultivation viz. seed and varietal selection, seedling raising, seed and soil treatment, nutrient management, water management, weed management, integrated pest and disease management and marketing of produce. It also took care of the environment friendly cultivation practice which is the most important need of modern production system. So in a nutshell this course offered a holistic approach towards the self sufficiency of farming community in respect of solanaceous crops. A total of 37 trainees were trained.

Quality Seed Grower (Burdwan, Nadia, Lakhisarai, East Singhbhum, Gumla)

Every farmer should able to access healthy seeds which are genetically pure, with high seed vigour and good germination percentage. Timely availability of good quality seeds at reasonable price ensures good yield and profit to the farmers. The seeds play a vital role in agriculture and acts as a carrier of the genetic potential of varieties. To ensure this the best way is to produce seed at village level. The training dealt with every aspects of seed production of major crops of the district such as paddy, lentil, mustard etc. the farmers were taught various aspects such as nursery management, land preparation, sowing, fertilizer application, weed management, disease and pest management, harvesting, post harvest handling etc. It also emphasized some applied aspects of seed production such as soil health maintenance, seed and its characteristics, seed germination and purity, seed certification process, storing of seeds etc. The total number of trainees trained for the job role was 99.

Mushroom Grower (Gumla, Hazaribagh, Lakhisarai, Saran)

The programme was conducted in order to train the participants for the job of a quality seed grower in the agriculture and allied sector/ industry and aims at building the key competencies in producing quality seed, grow and manage crops, maintain the quality of the produce

and become well versed with environment health and safety. The skills imparted during this training were soil sampling, field preparation, nursery raising, seed production & processing and Seed storage techniques. The training has a great potential for self-employment. Number of participants in training was 99.

Organic Grower (East Champaran, East Singhbhum, Saran)

The programme was aimed at developing/ imparting skill in various techniques associated with organic crop production like soil testing techniques, a*mritjal and amritmitti* preparation for organic farming, methods of organic inputs and animal feed preparation technique, organic fruit and vegetable cultivation methods, organic cereals and pulse production techniques, marketing strategy for organic products, medicinal and herbal plant production techniques etc. Number of participants in training was 60.

Seed Processing Worker (Hazaribagh, Samastipur)

Training on Seed Processing Worker mainly consist of understanding the importance of seed, collection of seed from seed grower, lab testing of seed for its moisture content and disease infestation, cleaning and grading, chemical treatment and storage. The trainees are also imparted the importance of safety measures at work place. Number of youths/trainees trained was 40.

Broiler Poultry Farm Worker (Darjeeling, Jehanabad, Samastipur)

Training on Broiler Poultry Farm Worker mainly consist of understanding of housing, feeding, visit management of broiler poultry and sanitary measures which include self-protection and health hazards. The skills imparted during trainingincluded site selection and preparation for poultry shed, brooding house management, vaccination procedure

and health care management, ingredient for feeds and its management and others. The total number of trainees trained for the job role was 59.

Bee Keeper (Darjeeling, East Champaran, Jehanabad)

A total of 51 rural youth/ farmer were trained on this job role in order to impart skills in the areas like management of bee hives, extraction of honey, preservation of honey and marketing.

Animal Health Worker (Birbhum)

The programme was dwsigned with both classroom and hands-on sessions for imparting skills on controlling/ restraining of animals, implementation of regular preventive health care programme, veterinary first aid services, artificial Insemination, assisting in breed conservation animal welfare and disaster management, assisting in veterinary extension services, knowledge and experience on small surgical procedure. No of youths/ trainees trained was 20.

Hatchery (Fishery) Production Worker (Birbhum)

This training has ample potential for wage employment in fish hatcheries. Regarding self-employment it requires development of infrastructure that requires good economic condition. The skill imparted during training included hatchery maintenance and cleaning by use of Chemicals and disinfectants, identification of Brooder Fish, preparation of pituitary gland hormone in a step wise method, selection of proper dose and method of injecting Brooder and preparation and use of nutritious feed for Brooders and spawn. Under this Job Role, 20 trainees were trained.

24.3 FARMER FIRST PROGRAMME

The term *"Farmer FIRST"* means the farmers' Farm, Innovations, Resources, Science and Technology (FIRST). The initiative was taken by ICAR to move beyond the production and productivity; to privilege the smallholder agriculture; and complex, diverse and risk prone realities of majority of the farmers through enhancing farmers-scientists interface. The basic concept is that the farmer will be in a centric role for research problem identification, prioritization, conduct of experiments and its management in farmers' field conditions. It emphasizes resource management, climate resilient agriculture, production management including storage, marketing, supply chains, value chains, innovation systems, information systems etc. With this concept, Agricultural Extension Division of ICAR, New Delhi invited project proposals for funding under Farmer FIRST Programme from ICAR Institutes/ Agricultural Universities and directed to submit the project proposal to the concerned ATARIs considering their Zone.

In three consecutive phases, this institute received a total of 14 project proposals from various ICAR Institutes/ Agricultural Universities under this zone. All the projects were screened by the Zonal Programme Management Committee (ZPMC) constituted by the Council and 7 projects were forwarded to the Programme Management Committee (ZPMC) at the Council level for consideration. Four projects, two for ICAR Institutes and two for state agricultural Universities, were sanctioned under ICAR-ATARI, Kolkata during 2016-17. The name of the institute, their project title, budget allotted for the project etc. are given below.

Table: Details of Farmer FIRST programme

Sl. No.	Name of the Institute	Title of project	Fund sanctioned during 2016-17 (Rs. in lakh)
1.	Bihar Agricultural University, Sabour, Bhagalpur, Bihar	"Cross Sectional Livelihood Improvement and Income Enhancement through Agro-Enterprise Diversification"	54.30
2.	Birsa Agricultural University, Ranchi, Jharkhand	"Technology integration for doubling farm income through participatory research and extension approaches in Ranchi district of Jharkhand"	56.33
3.	ICAR-NRC, Litchi, Muzaffarpur, Bihar	"Improved livelihood through good practices in agricultural production system"	45.95
4.	ICAR-IIAB, Ranchi, Jharkhand	"Enhancing food, nutritional and livelihood security of marginal and small farmers in Jharkhand through need based agricultural technologies"	7.40
Total			163.98




24.4 SEED HUB

Ministry of Agriculture and Farmers Welfare has developed a Rs 250 crore plan to create 100 hubs, each targeting to produce 100 tonnes of pulses seeds. In order to promote production of quality seeds of new varieties (released / notified) not older than 10 years State Governments can take up certified seeds of Pulses. The progress of seed hub project being implemented through 13 KVKs of different states (Bihar, Jharkhand & West Bengal) under Zone II. Pulses are the important commodities for nutritional securities and the efforts of the KVKs will be helpful to meet demand of pulses as well as to reduce imports. A total 3833.5 q production is expected from the Seed Hubs of Zone II during the period 2016-17.

Table: Performances of Seed Hubs under Zone II

Zone	No. of KVKs	Crop	Variety	Target (q)	Area sown (ha)	Production/ Expected production	Category of Seed (F/S, C/S or T/L)
II	13	Pigeon pea	NDA-2, Pusa-9, Naren dar Arahar1, Malvia 13, Bahar	629.0	74.4	610.0	C/S, T/L, F/S
		Black Gram	WBU-109 (Sulata), Uttra	400.0	35.0	63.0	C/S, F/S
		Green Gram	IPM 2-3, PDM-139, HUM-16	800.0	96.0	770.0	C/S, F/S
		Chick Pea	PG-186, P-256, GNG-1581, Pusa 372, KPG-59, CSJ-515, BGM-547	1320.0	141.1	1215.4	C/S, T/L, F/S
Lentil			HUL-57, WBL-77	1112.0	166.0	1024.6	C/S, T/L, F/S
		Field pea	HUDP-15, Dantewara Field Pea-1, Malviya Matar15, Azad P3	160.0	27.0	150.5	C/S, T/L, F/S
Total				4421	539.5	3833.5	


24.5 ATTRACTING AND RETAINING YOUTH IN AGRICULTURE (ARYA)

In a bid to attract and empower the rural youth to take up various Agriculture, allied and service sector enterprises for sustainable income and gainful employment and to enable them to establish network groups to take up resource and capital intensive activities like processing, value addition and marketing as well as to demonstrate functional linkage with different institutions and stakeholders, Indian Council of Agricultural Research has initiated a programme "Attracting and Retaining Youth in Agriculture" (ARYA) through 25 identified KVKs of this country. Accordingly, KVK East Champaran from Bihar, KVK Gumla from Jharkhand and KVK Nimpith from West Bengal carried out this programme under Zone-II. In implementing the programme, ICAR provided the fund support to ICAR-ATARI, Kolkata to the extent of Rs. 98 lakh. Altogether 492 rural youths were provided skill development training in entrepreneurial activities of which 198 youths established micro-enterprise units. The details of enterprises identified for this programme during 2016-17 by the KVKs were as follows-

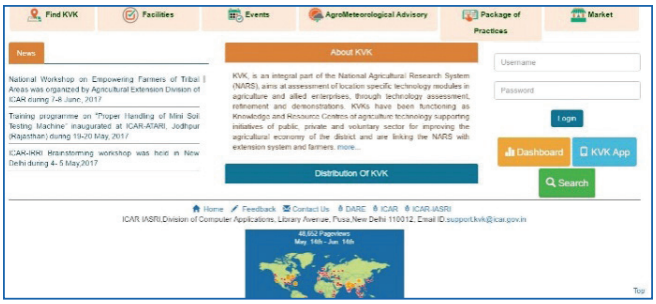
State	Name of the KVK	Total Expenditure (Rs. In Lakh)	Enterprises promoted	No of Unit	Coverage of farm youth group/no. of farmers benefitted	No. of youths involved	Skill imparted	Overall Success/ Impact
West Bengal	Nimpith	23.99	Betel vine lantation	50	25	5	Betel vine cultivation in hi-tech shade net ("boroz")	◉ Monthly income of Rs. 5400/- per youth ◉ Rs. 1.6 lakh per 0.05 ha (2 folds)
			Carp hatchery	1	50	4	Induced breeding technique with fish hormones	◉ Production of 8 million spawn with an income of Rs.20000.00 and subsequent income of Rs.92000.00 from fry and fingerling sale. ◉ Net income: 1.12 lakh/yr
			Asian catfish hatchery	1	28	4	Induced breeding of catfish with fish hormones and larval rearing technique	◉ Production of 1 lakh fry with an income of Rs.145000.00 from three cycles ◉ Net income: 1.45 lakh/yr
			Vanaraja poultry farming	60	46	30	Poultry farming, vaccination schedule and disease management	◉ Net profit: 0.49 lakh/farmer/yr
			Broiler duck (Pekin) farming	74	21	14	Farming and feeding management	Net profit: 0.68 lakh/ cycle Yearly income of Rs. 1.90 lakh to 2.20 lakh per unit
			Meat processing centre		67	1	Technique of grading and processing	
Bihar	East Champaran	31.99	Mushroom growers	25	25	25	Production technique of Oyster and Button mushroom, Spawn production technique, Value Addition	Monthly income of Rs 7000.00
			Fish spawn production	25	10	10	Production Technique of Fish Spawn, Induced Breeding technique through fish Hormones	

State	Name of the KVK	Total Expenditure (Rs. In Lakh)	Enterprises promoted	No of Unit	Coverage of farm youth group/no. of farmers benefitted	No. of youths involved	Skill imparted	Overall Success/ Impact
			Bee Grower	25	25	25	Honey Production, Processing & Value addition	Monthly income Rs. 15,000- 20,000/-
Jharkhand	Gumla	16.58	Pig Farming	20	65	20	Farming, Feeding & disease management	Average 05 no. of pigs and income Rs. 15,000-30,000/ farmer /year.
			Goat Farming	20	69	20	Farming, Feeding & disease management	Average 10 no. of Goats and income Rs. 15,000-30,000/ farmer /year.
			Lac Cultivation	20	41	20	Lac cultivation & processing	Average 10 no. of host plants and income of Rs. 10,000-15,000/ farmer /year.
			Bee Keeping	20	20	20	Honey Production, Processing & Value addition	Average 05 no. of Bee box and income of Rs. 10,000-15,000/ farmer / year.

24.6 KRISHI VIGYAN KENDRA (KVK) KNOWLEDGE NETWORK/ KVK PORTAL

As an integral part of National Agricultural Research System (NARS), Krishi Vigyan Kendra (KVK) of this country works on location specific technology application modules in agriculture, livestock, fishery and allied sectors through technology assessment, refinement and demonstrations. It also serves as Knowledge and Resource Centre of agricultural technology which supports public, private and voluntary sector for improving the agricultural economy of any given district and is linking the NARS with extension system and farmers. In addition, KVKs are producing quality technological products like seed, planting material, bio-agents, livestock, fish fingerlings etc. and make them available to farmers. The KVKs organize

frontline extension activities, identify and document selected farm innovations and converge with ongoing schemes and programs within their mandate. Again, with the evolution in Information Technology (IT) sector, dissemination of knowledge has become easy and handy day by day. Considering these things, ICAR has developed one portal named as KVK Knowledge Network for farmers and other stakeholders where various information about KVKs and various activities of KVKs have been uploaded by the KVK Scientists for quick dissemination of technologies in the country. The portal can be accessed at www.kvk.icar.gov.in.During the period under report, 80 KVKs of ICAR-ATARI, Kolkata have uploaded various information e.g. KVK profile report, facility available at the KVK, past and upcoming events, package of practices, status of Cluster Front Line Demonstration (CFLD) on Pulses and Oilseeds etc. in the portal. This portal is being continuously updated by the KVK Scientists as per direction of the competent authorities. The KVKs are also uploading Monthly Progress Report to the Portal.

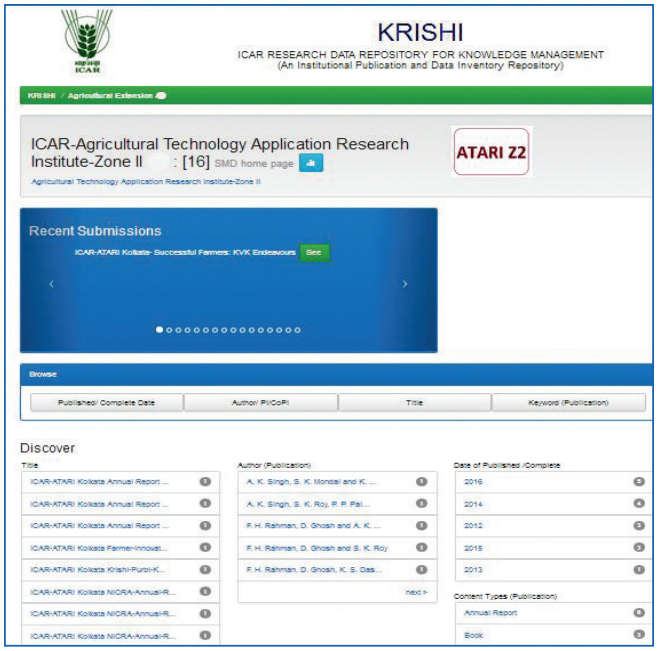


24.7 NFDB FUNDED CAPACITY BUILDING TRAINING PROGRAMME

The National Fisheries Development Board (NFDB) funded Capacity Building Training programme on Fishery was organized at 17 KVKs under ICAR-ATARI, Kolkata with the objective to increase fish production, to achieve doubling of exports and provide direct employment and to achieve Blue Revolution in the country. One workshop was organized for the KVK Scientists at the ICAR-ATARI, Kolkata in collaboration with NFDB, Hyderabad to identify the need based area of the particular district in which the training had to impart. Two KVKs from Andaman and Nicobar Islands, 5 KVKs from Bihar state and 10 KVKs from West Bengal state organized total 34 training programmes (two programmes by each KVK) on the identified areas. During the year 2016-17, a total of Rs. 14.93 lakh was sanctioned for the programmes by NFDB in three phases and an amount of Rs. 13.63 lakh was utilized by the KVKs for imparting training which benefitted around 800 fish farmers in this Zone.

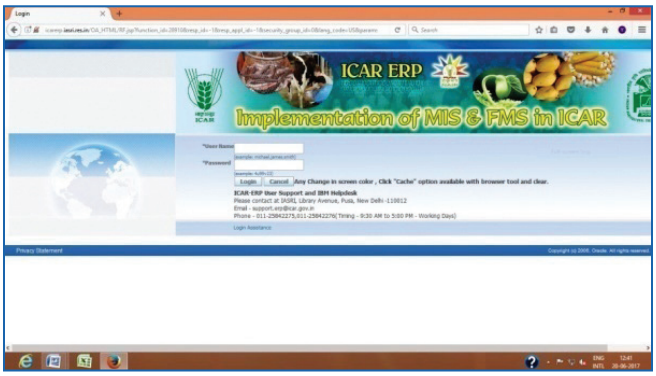
24.8 KRISHI PORTAL

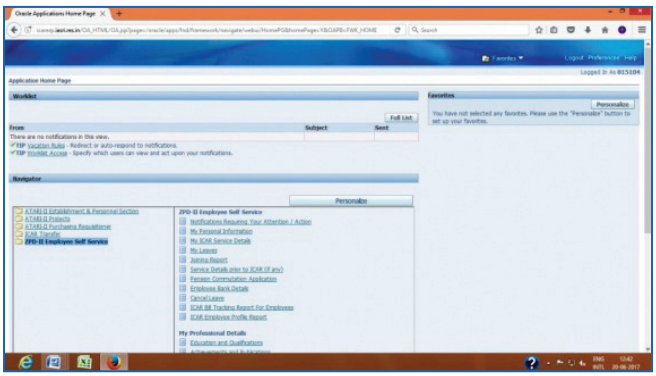
For implementation of research data management electronically in ICAR Institutes and digitization of agricultural research, *KRISHI* (Knowledge based Resources Information Systems Hub for Innovations in Agriculture) *Portal* has been developed as ICAR Research Data Repository for knowledge management. Data Inventory Repository aims at creating Meta Data Inventory through information related to data availability at Institute level. The portal consists of six repositories viz. technology, publication, experimental data, observational data survey data and geo-portal. The portal can be accessed at http://krishi.icar.gov.in. During the period of 2016-17, input data on latitude and longitude of all KVKs under this Zone was submitted to the concerned authority to put them in geo-portal. One brainstorming session was organized at this institute for all scientists on its use and uploading information in portal. As per guidelines of the council, various kinds of publications pertaining to this institute were also uploaded in this portal.



24.9 MANAGEMENT INFORMATION SYSTEM INCLUDING FINANCIAL MANAGEMENT SYSTEM (MIS-FMS) UNDER ICAR-ERP

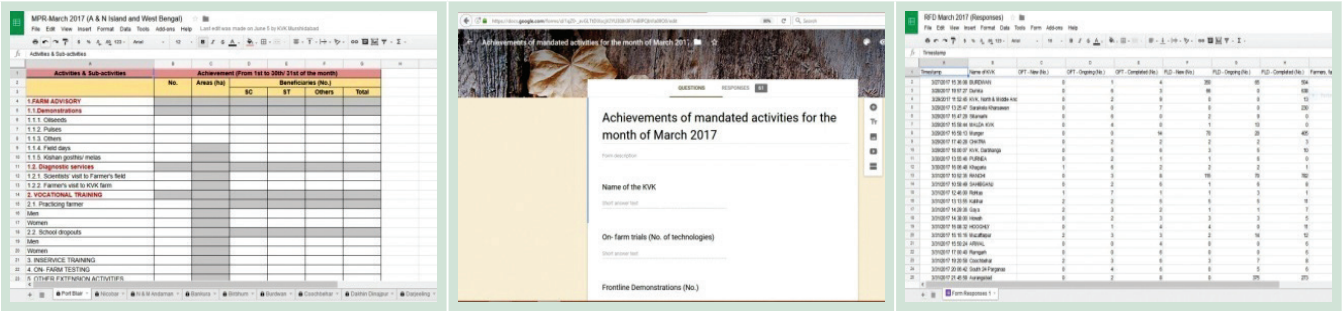
ICAR-ERP developed under NAIP project "Implementation of Management Information System (MIS) including Financial Management System (FMS) in ICAR" was initiated in the year 2015-16. Since September 2016, the system is regularly being updated for proper system management in respect of personnel and finance of the ICAR-ATARI Kolkata. There are five modules of MIS-FMS, viz., Financial management, Supply chain management (SCM), Human resource management (HRM), Payroll module and Project management. All the modules of the MIS-FMS are being regularly implemented in this institute under the coordination of the concerned Nodal Officer assisted by the required technical manpower. Leave and personal data management, payroll run, bill creation and processing, electronic payment etc. are various aspects of the system benefits being harvested through the use of MIS-FMS. Various system generated reports on HRM, FM, SCM and payslip etc. are regularly used for smooth office functioning.





24.10 ONLINE REPORTING BY KVKs

Keeping abreast with the revised mandates of the ATARIs, strengthening of monitoring activities was evident and with the enhanced thrust on the KVK system by national government, fast and successful monitoring of the KVK activities on the part of ATARIs became clear. The data collection and compilation is a basic methodology component in such monitoring activities. The World Wide Web (www) is increasingly used as a tool and platform for data collection and easier compilation. Again, Google is a worldwide recognized search engine. It also provides internet related services and products to a wide range of users at greater utility and lesser cost. Google also launched web based applications like Google docs, Google forms, Google drive, Google slides, Google sheets, etc., which have immense potential for increasing productivity of academicians, researchers, students, professionals and policy makers etc. The non-tampered analysis of the data with fullest authenticity is also possible within few seconds without any manual tabulation and coding. Further, the response rate of traditional methods of data collection is relatively less. This method was partially replaced by online method data collection using Google forms and sheets by ICAR-ATARI Kolkata for data collection on various aspects like Results Framework Document, Citizens'/ Clients' Charter, Monthly Progress Report, Skill Development Training, Swachh Bharat Abhiyan, Mandated activities of KVK and Soil analysis etc. During 2016-17, this was an attempt to partially the traditional methods as the traditional methods were cumbersome and time-consuming. Specific guidelines for filling up the forms and sheets were provided to all KVKs of the Zone for easy understanding and proper keying in.



24.11 CELEBRATION OF SWACHHTA PAKHWADA 2016

The cleanliness campaign, one of the important flagship programmes of Govt. of India was launched on 2nd October 2014 as Swachh Bharat Mission. In strengthening the cleanliness related activities, the Swachhta Pakhwada 2016 was launched with a big fan and fare in ICAR-ATARI Kolkata and its KVKs on 16th October 2016. The Swachhta Pakhwada was observed during 16th – 31st October 2016 by taking cleanliness oath (Swachhta Shapath) and by promising to improve cleanliness in the surrounding areas of the institute/ Kendra as well as in the nearby villages and also by emphasizing on the fast and clean disposal of official work. During the Pakhdawa, the staff of this institute/ KVKs strived for their sincere contribution towards the cause of overall cleanliness, sanitation aspects by adopting various means as separate dry and wet bins, vermicomposting, recycling of wastes etc. Daily reporting on the activities taken during the Pakhwada was done for national level compilation on the programme. The details of the activities undertaken at ATARI Kolkata as well as KVKs during the fortnight-long programme were presented as follows:-

At ICAR-ATARI, Kolkata

A programme on cleanliness drive was organized at ICAR-ATARI, Kolkata on 20.10.2016 as a part of celebrating Swachhta Pakhwara in which the premises of office were thoroughly cleaned by all the staff members. The bushes, grasses etc. were cleaned from around the office building and outside the main gate. The programme created awareness about the cleanliness in the nearby areas.

At KVKs under ICAR-ATARI, Kolkata

A total of 83 KVKs under ATARI Kolkata also celebrated the Swachhta Pakhwada 2016 during 16th-31st October 2016 at their respective offices/ adopted villages. The summary of the programmes undertaken by them has been tabulated as under:-

Sl. No.	Parameters	No. of KVKs performed	Brief details	Action photographs
1	Treatment of bio-degradable/non bio-degradable wasters	39	Awareness cum training programme on right method of compost and vermi-compost preparation was organized at KVK adopted villages.	
2	Steps taken for awareness in water conservation, etc.	83	Awareness cum training programme on how to optimally utilize the water for irrigating rabi crops was organized at KVK adopted villages.	
3	Identification of activities/ factors causing creation of dirt/ garbage	71	Some critical points were identified at village level which generally cause more dirty/ unhealthy environment through participation of villagers.	
4	After identification of the factors, the system adopted to maintain periodical cleaning, preventing measures taken and monitoring of the activities	63	Orientation and sensitization programme on sanitization and sustainable cleanliness was undertaken.	
5	Uploading of activities/ photographs of swachhta pakhwada and news / events emerged in print and electronic media and website	72	Regularly uploaded in the website and immerged in the print and electronic media.	
6	Involvement of VIPs in institutes' swachhta awareness programmes	6	Central and State Ministers/ Local public representatives attended the programme in few KVKs of this zone	

Sl. No.	Parameters	No. of KVKs performed	Brief details	Action photographs
7	Steps for transparency in works, motivation and participation of institutes officials/ staff	83	Awareness on vigilance, motivation was undertaken.	
8	Special work/ achievement during swachhtapakhwada	43	Swachhta oath taking was conducted	
9	Usage of eco-friendly technologies, lesser use of plastics, etc.	78	Awareness on these issues were discussed in detail	
10	Housekeeping, cleanliness in office buildings, rooms, labs, campus, residential area, etc.	83	Regular cleaning and housekeeping activities were undertaken by all the KVKs	
11	Punctuality and regularity of staff	83	Sensitization and motivation programme for maintaining punctuality and regularity of staff was undertaken	

24.12 INSTITUTE WEBSITE

The official website of ATARI Kolkata was launched with a new getup by replacing the existing domain name with the renaming of the institute. Regular in-house uploading of information was regularly carried out in order to maintain the dynamic nature of the website. The website of the institute was regularly updated for latest information on KVKs and their host organizations, personnel of ICAR-ATARI, Kolkata, district profiles, different ongoing programmes, publications, awards, news, recruitment details and many others. The website can be accessed through www.atarikolkata.org.

25. PERSONNEL (AS ON 31.03.2017)

Sl. No.	Name	Designation
1	Dr. S.K. Roy	Director (Acting)
2	Dr. P.P. Pal	Principal Scientist
3	Dr. S.K. Mondal	Principal Scientist
4	Dr. F.H. Rahman	Principal Scientist
5	Dr. K.S. Das	Principal Scientist
6	Dr. A. Halder	Principal Scientist
7	Shri D. Debnath	Driver (T-2)
8	Shri B. D. Mallick	Asst. Fin. & Acc. Officer
9	Shri S. Ghosh	Asstt. Adm. Officer
10	Smt. S. Pal	Pvt. Secretary

Sl. No.	Name	Designation
11	Shri A.D. Banik	UDC
12	Shri S. Saha	LDC
13	Shri N.D. Tripathy	LDC
14	Smt. A. Roy	SSS
15	Shri D. Ghosh	RA, NICRA-TDC
16	Ms. D. Datta	YP-II, MIS-FMS
17	Ms. B. Ghosh	SRF, CFLD-Oilseeds
18	Mrs. J. Basak	SRF, CFLD-Pulses
19	Shri S. Das	DEO, CFLD-Oilseeds
20	Shri S. Khutia	DEO, CFLD-Pulses

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INVITED LECTURES

Das K S. 2017. Documentation. Lecture delivered in seven days HRD Training Programme on "Modern Extension approaches for improved performance of extension system" for KVK Scientists of Dr Rajendra Prasad Central Agricultural University (RPCAU), Pusa Samastipur organized by DEE, RPCAU, Samastipur on 22.02.2017.

ABSTRACTS PRESENTED/ ACCEPTED/ IN NATIONAL/ INTERNATIONAL SEMINARS ETC.

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Ghosh D and Rahman F H. 2017. Use of Azolla as fertilizer supplement in rice cultivation and as feed supplement for livestock. Compendium on Invited Papers and Book of Abstracts of National Seminar on "Maximizing fertilizer use efficiency & environmental health for posterity" at RKMVU, Narendrapur WB on March 8, 2017.

Mondal S K, Das K S, Datta D, Ghosh D and Roy S K. 2016. Analytical study of field trials on livestock health and production by KVKs of Eastern India. In: Proceedings of HARMONY 2016 and National Conference on Harmony with nature in context of resource conservation and climate change held at VinobaBhave University, Hazaribag, Jharkhand on October 22-24, 2016.

Mukherjee S, Mukhopadhyay K, Raha S and Rahman F H. 2017. Assessment of integrated nutrient management on brinjal towards development of soil health without hampering yield. Compendium on Invited Papers and Book of Abstracts of National Seminar on "Maximizing fertilizer use efficiency & environmental health for posterity" at RKMVU, Narendrapur WB on March 8, 2017.

Rahman F H, Ghosh D, Mondal S K and Roy S K. 2016. Water Conservation Measures on Farm Production

in NICRA Adopted Eastern Indian Villages. Compendium of 81st Annual Convention and National Seminar of Indian Society of Soil Science at RVSKV Gwalior on Oct 20-23, 2016.

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Sharma A, Mandal M and Rahman F H. 2017. Environment friendly fish amino acid based organic manure to enhance the productivity of homestead garden. Compendium on Invited Papers and Book of Abstracts of National Seminar on "Maximizing fertilizer use efficiency & environmental health for posterity" at RKMVU, Narendrapur WB on March 8, 2017.

Taleb A, Rahman F H, Saha M, Roy U, Pathak P, Roy A and Patra S. 2017. Efficient nutrient management of wheat through nutrient expert based fertilizer recommendation in alluvial soil of Murshidabad district of West Bengal. Compendium on Invited Papers and Book of Abstracts of National Seminar on "Maximizing fertilizer use efficiency & environmental health for posterity" held at RKMVU, Narendrapur WB on March 8, 2017.

RECOGNITIONS OF SCIENTISTS

Dr. F. H. Rahman, Principal Scientist was conferred with Fellow of Indian Society of Extension Education 2016 at Rajmata Vijayaraje Scindia Krishi Viswa Vidyalaya, Gwalior, M.P.

Dr. K. S. Das, Principal Scientist was conferred with Reviewer of Excellence Award 2016 by Agricultural Research Communication Centre, Karnal, Haryana.

27. AWARDS

27.1 FARMERS AWARD

Name of KVK	Name of the Award	Name of the Farmer	Year	Conferring Authority	Amount (Rs.)	Purpose
A & N Islands						
N & M Andaman	Pandit Deen Dayal Upadhyaya Antyodhyay Krishi Puruskar	Shri Ashok Kmar Sarkar	2016	ICAR, New Delhi	50,000	Excellence in practicing new and innovative technologies adopted under IFS organic cultivation for sustainable farming
Bihar						
Arwal	Krishak Samman	Sri Ramesh Kumar	2017	BAU Sabour	-	Dairy, Fishery, Integrated cropping
Aurangabad	Krishi Karman	Sri Abhishek Kr. Singh	2016	Art of living	50000	Integrated farming
Banka	Mahindra Samriddhi Award-2016	Smt. Nitu Devi	2016	Mahindra & Mahindra Company	51000	For Mushroom production
	Pandit Deen Dayal Upadhyaya Antyodhyay Krishi Puruskar	Sri Deepak Kr. Singh	2016	ICAR, New Delhi	50000	Mushroom & Quail farming
Darbhanga	Abhinav Kisan Puraskar	Smt. Pushpa Jha	2017	-do-	5000	Encouragement to other farmers
East Champaran	Best farmer award	Sri Vijay Kr. Singh	2016	Dr. RPCAU, Pusa	5000	For best work in the field of DSR
Kishanganj	Kissan Samman	Sadik Samdani	2017	BAU, Sabour	-	Good work in Dairy
Madhepura	District Progressive Farmers Award	Sri Amol Yadav	2017	BAU, Sabour	-	For best performance in Dairy
Munger	Best farmers award	Sri Dhananjay Singh	2017	BAU, Sabour	-	Best work performance In agriculture

Name of KVK	Name of the Award	Name of the Farmer	Year	Conferring Authority	Amount (Rs.)	Purpose
Nalanda	Jagjivan Ram Abvhinav Puruskar (Zonal)	Sri Rakesh Kumar	2016	ICAR., New Delhi	50000	Outstanding work in organic farming
Rohtas	Best Innovative Farmer Award	Sri Vijay Kumar Singh	2017	ICAR, New Delhi	-	For Rice farmer
Samastipur	Kisan Abhinav Puraskar	Sri Sunil Kumar	2016	DRPCAU, Pusa	5000	IFS Module
Vaishali	Jagjiwan Ram Abhinav Kisan Puraskar	Sri Jitendra Kr. Singh	2016	ICAR	-	Best innovation in agriculture
Jharkhand						
Dhanbad	Progressive Farmer award	Girdhari Mahto	2017	BAU, Ranchi	-	Extension of Fish Farming
Dumka	Innovative Farmers Award	Meeru Murmu	2016	DRDA, Dumka	5000	Integrated farming
Hazaribag	Innovative and progressive farmer award	Sri Mahindra Prasad	2017	BAU, Ranchi	-	Innovation of Marker for SRI
	Progressive Self help Group	Smt Manju Devi	2017	BAU, Ranchi	-	Self Help Group
Ranchi	Innovative Farmers	Sri Sarwan Gupta	2017	ICAR, New Delhi	-	Nursery
	Pragatshil Award	Smt Shanti Devi	2017	IFFCO, Ranchi	-	Farming
West Bengal						
Birbhum	Hindustan Insecticide Limited (HIL) Farmer of the year award	Smt. Sukhodi Mardi	2017	Hindustan Insecticide Limited	-	To encourage progressive Rural youths of Tribal
Coochbehar	Krishak Ratna	Dipak Nandi	2016	Govt. of West Bengal	10000	For adopting scientific agronomic practices
Hooghly	Krishak Ratna	Ashis Sarkar	2016	Govt. of WB	25000	Vegetables
	Kriti Krishak (Block level)	Alok Kr. Das	2017	Govt. of WB	25000	SRI
	Krishak Ratna (District level)	Tarak Gayen	2016	Govt. of WB	25000	Horticulture
	Best Farmers Award (State Level)	Prabir Kr. Ghosh	2016	DRR-ICAR, Hyderabad	-	Agriculture
Howrah	Krishi Ratna	Mrs Sovarani Naskar	2016	Govt. of WB	25000	Piggery
Jalpaiguri	Mati Samman	Sri Mihir Ch. Roy	2017	Govt. of WB	25000	Adoption & Dissemination of new technology
Murshidabad	Krishi Samrat Samman	Abdul Mohit Khan	2016	Mahindra Samriddhi	51000	Poly-house Vegetable Cultivation
Nadia	Krishi Ratna Samman	Pintu Mondal	2016	ICAR-NIRJAF, Kolkata	-	For outstanding contribution in the field of jute and allied fibers
South 24 Pgs. (Narendrapur)	National Best Fish Farmer Award	Tapan Maity	2016	ICAR- CIFE Mumbai		Innovative farmers in Brackishwater on National Fish Farmer Day
South 24 Pgs. (Nimpith)	Plant Genome Saviour Community Award 2013-14	Sukdeb Nath	2016	PPVFRA, Govt. of India	1000000	Conservation of local cultivars and land races of Paddy
North 24 Pgs	Kriti Krishak	Mr. Charu Bag	2016	Govt. of West Bengal	25000	Best Agriculture practices
Purulia	Outstanding Progressive Farmer award	Sri Adhir Mahato	2017	ICAR, New Delhi	-	Agriculture

27.2 RECOGNITION OF KVKS

Name of KVK	Name of the Award	Year	Conferring Authority	Amount	Purpose
A & N Islands					
Port Blair	Best KVK Award	2016	CIARI, Port Blair	Certificate	For boosting the KVK persons
Bihar					
East Champaran	Best KVK, award	2016	Dr RPCAU, Pusa	Certificate	For best performance
Jehanabad	Eminent Scientist Award	2016	Samagra Vikas Welfare Society, Lucknow	Certificate	For best scientific contribution
Khagaria	Best KVK stall in Kisan Mela-2017	2017	BAU, Sabour	Certificate	For displaying agricultural technologies relevant for the district
Muzaffarpur	Young scientist award	2017	Society of human resource and innovation, Agra, U.P	Certificate	Outstanding contribution in the field of research and extension science
Nalanda	Best KVK Award (Zonal)	2016	ICAR, New Delhi	3,00,000	For outstanding work in extension
Jharkhand					
Koderma	Best KVK, Scientist Award	2016	ISSE, New Delhi	Certificate	Best KVK, Scientist Award
Ranchi	Pandit Deendayal Upadhyay Rashtriya Krishi Vigyan Protshahan Purashkar 2016 (Zone-IV)	2016	ICAR, New Delhi	2,25,000	Vital role in enhancement of productivity, profitability and livelihood improvement.
West Bengal					
Nimpith	Pandit Dindyal Uppadhaya Rashtriya Krishi Vlgyan Protshahan Puraskar (National)	2016	ICAR, New Delhi	25,00,000	Dedicated towards enhancement of productivity, profitiablity and income of farmers