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वार्षिक प्रतिवेदन

Annual Report
2017-18

भाकृअनुप
ICAR

भा.कृ.अनु.प.–कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थान,
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PREFACE

Krishi Vigyan Kendras (KVKs) have been established as the front runners in extension activities and are the focal point for assessment, refinement and demonstration of frontline technologies for overall agricultural development in the country. In view of the changing scenario of agriculture and to address the newer challenges, KVKs are actively involved in implementation of these need based programmes along with their routine activities. In this venture, Agricultural Technology Application Research Institute (ATARI), Ludhiana vested with the responsibility of coordination and monitoring the 69 Krishi Vigyan Kendras of Zone-I comprising Punjab, Haryana, Himachal Pradesh, Jammu & Kashmir and Delhi.

The farmers require not only knowledge and understanding of the intricacy of technologies, but also need skills in various complex agricultural operations for adoption on their farms. In this regards, many of the KVKs made liaisoning with National Horticulture Mission (NHM), Rasthtriya Krishi Vikas Yojna (RKVY), National Fisheries Development Board (NFDB), Hyderabad, Hindustan Insecticides Limited (MIDH Scheme of GOI) etc. for organizing various trainings and awareness programme among farming community as a part of their linkage and collaborative activities.

I extend my gratitude and sincere thanks to Dr. T Mohapatra, Secretary, DARE and Director General, ICAR; Dr. A K Singh, Deputy Director General (Agricultural Extension); Dr. V P Chahal and Dr. Randhir Singh, ADGs (Agricultural Extension) for their valuable advice and guidance. I also extend my thanks and acknowledgement to all the Vice-Chancellors, Directors of Extension Education from the State Agricultural Universities, Programme Coordinators of KVKs, ATIC managers and all the staff of KVKs for their whole heartily contribution throughout the year.

It is my privilege to put before you the salient achievements in the form of this Annual Report with joy, duly acknowledging the sincere inputs of the dedicated team of editorial board and KVK scientists, also look forward to the feedback from the readers. I am sure that the efforts of the institute will bear fruits in near future with overall agricultural development in India.

Place: Ludhiana

Date: 12 July 2018

(Rajbir Singh)

Contents

Acronyms

ARYA	-	Attracting and Retaining Youth in Agriculture
ATARI	-	Agricultural Technology Application Research Institute
ATIC	-	Agricultural Technology Information Center
ATMA	-	Agricultural Technology Management Agency
CRIDA	-	Central Research Institute for Dryland Agriculture, Hyderabad
CAZRI	-	Central Arid Zone Research Institute, Jodhpur
DMR	-	Directorate of Mushroom Research, Solan
Farmer's FIRST	-	Farmer's Farm, Innovations, Resource, Science and Technology
HRD	-	Human Resource Development
ICAR	-	Indian Council of Agricultural Research
ICM	-	Integrated Crop Management
IDM	-	Integrated Disease Management
IDPM	-	Integrated Disease and Pest Management
IFS	-	Integrated Farming System
IIHR	-	Indian Institute of Horticultual Research, Bangaluru
IIMR	-	Indian Institute of Maize Research, New Delhi
IIWBR	-	Indian Institute of Wheat and Barley Research, Karnal
INM	-	Integrated Nutrient Management
IPM	-	Integrated Pest Management
IWM	-	Integrated Weed Management
KMA	-	Kisan Mobile Advisory
KVK	-	Krishi Vigyan Kendra
LCC	-	Leaf Colour Chart
MANAGE	-	National Institute of Agricultural Extension Management, Hyderabad
MGMG	-	Mera Gaon Mera Gaurav
NABARD	-	National Bank for Agriculture and Rural Development
NICRA	-	National Innovations in Climate Resilient Agriculture
NRM	-	Natural Resource Management
OFT	-	On Farm Testing

PAU	-	Punjab Agricultural University, Ludhiana
SAC	-	Scientific Advisory Committee
SAU	-	State Agricultural University
TSP	-	Tribal Sub Plan
ZCU	-	Zonal Coordinating Unit
ZPD	-	Zonal Project Directorate

कार्यकारी सारांश

आई.सी.ए.आर संस्थानों, राज्य कृषि विश्वविद्यालयों, कृषि विभाग और गैर–सरकारी संगठनों की छतरी के तहत भारतीय कृषि अनुसंधान परिषद (आई.सी.ए.आर) द्वारा कृषि विज्ञान केंद्रों (के.वी.के) का एक नेटवर्क स्थापित किया गया है, जिसका उद्देश्य मूल्यांकन, परिष्करण और प्रदर्शन करना है । आईसीएआर–कृषि विस्तार प्रभाग, उप महानिदेशक (कृषि विस्तार) की अध्याक्षता में देश के विभिन्न हिस्सों में स्थित ग्यारह कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थान के माध्यम से कृषि विज्ञान केन्द्रों की प्रगति पर नजर रखता है और समीक्षा करता है। आईसीएआर–अटारी, क्षेत्र–1, लुधियाना, भारतीय कृषि अनुसंधान परिषद के प्रौद्योगिकी प्रसार परियोजनाओं की योजना, निगरानी, समीक्षा और समर्थन अपने 69 कृषि विज्ञान केन्द्रों पंजाब (22), हिमाचल प्रदेश (13), उत्तराखंड (13) और जम्मू–कश्मीर (20) द्वारा करता है।

राज्य कृषि विश्वविद्यालयों और आईसीएआर संस्थानों से तकनीकी बैकस्टॉपिंग और प्रणाली में किसानों और अन्य हितधारकों के साथ साझेदारी के साथ कृषि विज्ञान केन्द्रों द्वारा प्रौद्योगिकियों का आकलन और परिष्करण किया जाता है । कृषि विज्ञान केन्द्र हितधारकों के लिए आवश्यकता आधारित क्षमता विकास कार्यक्रम आयोजित करते हैं और उपयुक्त अग्रपंक्ति प्रसार कार्यक्रमों के माध्यम से बेहतर कृषि प्रौद्योगिकियों के बारे में जागरूकता पैदा करते हैं । प्रौद्योगिकियों के प्रारंभिक प्रयास को सुविधाजनक बनाने के लिए गुणवत्ता वाले बीज, रोपण सामग्री, पशुधन नस्लों, पशु उत्पादों और द्वि–उत्पादों का उत्पादन और आपूर्ति भी की जा है। इस प्रकार, कृषि विज्ञान केन्द्र, जिले की कृषि अर्थव्यवस्था के लिए ज्ञान और संसाधन केंद्र के रूप में कार्य कर रहे हैं । रिपोर्टिंग वर्ष के दौरान प्रमुख उपलब्धियों को संक्षेप में सारांशित किया गया है:

प्रौद्योगिकी आकलन एवं परिष्करण

2848 परीक्षणों के माध्यम से कुल 512 ओ.एफ.टी आयोजित किए गए । इनमें से रिपोर्टिंग अवधि के दौरान, फसलों पर 425 ओ.एफ.टी, पशुधन, कुक्कुट, मत्स्य पालन पर 73 तथा अन्य पहलुओं पर 14 ओ.एफ.टी. आयोजित किए गए थे । कृषि विज्ञान केन्द्रों द्वारा फसलों के तहत, कुल 349 प्रौद्योगिकियों का मूल्यांकन 1810 परीक्षण द्वारा किया गया जिसमे कि विभिन्न किस्मों का मूल्यांकन (95), एकीकृत पोषक प्रबंधन (36), एकीकृत रोग प्रबंधन (48), एकीकृत कीट प्रबंधन (47), एकीकृत फसल प्रबंधन (56), एकीकृत खरपतवार प्रबंधन (11) विषयगत क्षेत्रों में किया गया । अन्य विषयगत क्षेत्रों में मूल्यांकन की गई प्रौद्योगिकियों इस प्रकार से है: तकनीकें प्रसंस्करण और मूल्यवर्धन (23), संसाधन संरक्षण प्रौद्योगिकी (13), कृषि मशीनरी (12), एकीकृत कृषि प्रणाली (4) एवं भंडारण तकनीक (4) ।

अग्रिम पंक्ति प्रदर्शन

कुल 13928 प्रदर्शनों द्वारा जिसमे 6225 अनाज और बाजरा, 1362 तिलहनों, 1243 दालों, 1889 सब्जी और मसालों, 212 फल, 77 फूलों, 777 चारा फसलों, 178 वाणिज्यिक फसलों, 861 पशुधन और मत्स्य पालन, 444 अन्य पहलुओं जैसे कि मशरूम उत्पादन (131), कृषि उपकरण (28) तथा गृह विज्ञान से संबंधित गतिविधियां (285) पर प्रदर्शन आयोजित किए गए, जो कि 2549.12 हेक्टेयर और 3541 इकाइयों के क्षेत्र को कवर करते थे ।

क्षमता विकास

रिपोर्टिंग अवधि के दौरान कृषि विज्ञान केन्द्रों ने 1.47 लाख प्रतिभागियों के लिए कुल 5901 क्षमता विकास कार्यक्रम आयोजित किए । जिसमे कि 5901 पाठ्यक्रमों में से 5077 आवश्यक पाठ्यक्रम थे और शेष प्रायोजित एवं व्यावसायिक पाठ्यक्रम थे । कुल 3969 पाठ्यक्रम आयोजित किए गए जिनमें 59148 किसानो और 37971 खेतिहर महिलाओं को प्रशिक्षित किया गया।

दालों पर सामूहिक अग्रिमपंक्ति प्रदर्शन

खरीफ, रबी और गर्मी के मौसम के दौरान चार राज्यों में 1400.33 हेक्टेयर क्षेत्र में कुल 6510 अग्रिम पंक्ति प्रदर्शन आयोजित किए गए । स्थानीय चेक किस्मों पर अग्रिम पंक्ति प्रदर्शन के तहत उपज 10.3% (ग्रीष्मकालीन मूंग, हिमाचल प्रदेश) से 68% (राजमा, हिमाचल प्रदेश) के बीच बढ़ी।

तिलहन पर सामूहिक अग्रिमपंक्ति प्रदर्शन

खरीफ और रबी मौसम के दौरान चार राज्यों में 780 हेक्टेयर क्षेत्र में कुल 1950 अग्रिम पंक्ति प्रदर्शन आयोजित किए गए । पंजाब में इन अग्रिम पंक्ति प्रदर्शन के तहत औसत उपज 19.80 क्विंटलध्हेक्टेयर थी जो चेक उपज से 17.6% अधिक थी । 6908 किसानों के लाभ के लिए, विचाराधीन अवधि के दौरान 237 विस्तार गतिविधियों की गयी । इसके अलावा, इस परियोजना के तहत 2408 किसानों को लाभ पहुंचाने के लिए 98 प्रशिक्षण कार्यक्रम भी आयोजित किए गए।

जनजातीय उप योजना (टी०एस०पी)

जनजातीय उप योजना के तहत क्षेत्र–1 के कृषि विज्ञान केन्द्रों द्वारा 199 ओएफटी, 2435 एफएलडी, 534 प्रशिक्षण (15359 प्रतिभागियों), 5038 अन्य विस्तार पाठ्यक्रम (31677 प्रतिभागियों) का आयोजन किया गया और किसान मोबाइल एडवाइजरी सर्विसेज (2.34 लाख प्रतिभागियों) के तहत 1237 विभिन्न मूल संदेश भेजे गए ।

जलवायु अनूरूप कृषि पर राष्ट्रीय पहल (निकरा)

क्षेत्र–1 के जलवायु की दृष्टि से सर्वाधिक संवेदनशील 13 जिलों में लागू की गई निकरा परियोजना में प्राकृतिक संसाधन प्रबंधन मॉड्यूल के तहत 1320 किसानों को लाभान्वित किया, जबकि यह संख्या क्रमशः 1915, 2534 एवं 1411 फसल उत्पादन, पशुधन और मत्स्यपालन एवं संस्थागत हस्तक्षेप मॉड्यूल के तहत थी । इस परियोजना के तहत 3977 किसानों को जलवायु अनूरूप कृषि के विभिन्न पहलुओं पर 194 पाठ्यक्रमों के माध्यम से प्रशिक्षित किया गया था । इस परियोजना ने 481 अन्य विस्तार गतिविधियों के माध्यम से 10153 किसानों को भी लाभान्वित किया ।

पादपकिस्म और किसानों के अधिकार अधिनियम का संरक्षण (पीपीवी एंड एफआरए)

वर्ष 2017–18 के दौरान 1973 के किसानों को लाभान्वित क्षेत्र–1 में पीपीवी और एफआरए पर बारह जागरूकता कार्यक्रम आयोजित किए गए थे ।

आर्या

2017–18 के दौरान क्षेत्र–1 में बीस प्रशिक्षण पाठ्यक्रम आयोजित किए गए थे, जिसने इस परियोजना के तहत 472 ग्रामीण युवाओं को लाभान्वित किया था ।

फार्मर फर्स्ट कार्यक्रम

इस कार्यक्रम के तहत 4760 किसानों को लाभान्वित करने के लिए 129 प्रशिक्षण पाठ्यक्रम आयोजित किए गए । इसके अलावा, 8 जागरूकता शिविर और 20 एक्सपोजर विजिट भी आयोजित की गईं, जिसमें क्रमशः 663 और 759 किसानों को लाभान्वित किया गया ।

अन्य प्रसार गतिविधियां

2017–18 के दौरान क्षेत्र–1 के कृषि विज्ञान केन्द्रों ने 67288 अन्य प्रसार गतिविधियों का आयोजन किया, जिसमें 18.09 लाख किसानों को लाभ हुआ, जिनमें से 13. 98 लाख पंजाब से थे, इसके बाद जम्मू–कश्मीर से 1.92 लाख, उत्तराखंड से 1.28 लाख और हिमाचल प्रदेश से 0.90 लाख थे ।

कृषि विज्ञान केन्द्रों के अभिसरण एवं कार्यात्मक संबंध

कृषि समुदाय के बीच विभिन्न प्रशिक्षण और जागरूकता कार्यक्रम आयोजित करने के लिए कृषि विज्ञान केन्द्रों ने अभिसरण एवं संपर्क गतिविधियों के अंतर्गत राष्ट्रीय बागवानी मिशन (एन एच एम), राष्ट्रीय कृषि विकास योजना (आर के वी वाई), राष्ट्रीय मत्स्य विकास विकास बोर्ड (एन एफ डी बी), हैदराबाद, कृषि कौशल परिषद (ए एस सी आई) के साथ कुशलतापूर्वक सहयोग किया है ।

किसान मोबाइल सलाहकार

क्षेत्र–1 में, 13222 लाख किसानों को 5422 टेक्स्ट संदेशों के साथ किसान मोबाइल सलाहकारों के माध्यम से लाभान्वित किया गया । फसलों से संबंधित लगभग 55% टेक्स्ट संदेश, पशुधन के लिए 19%, 11% विविध, जागरूकता पर 8%, मौसम की जानकारी पर 5% और विपणन संबंधी जानकारी पर 2: संदेश भेजे गए ।

नई पहल

2017–18 के दौरान जलवायु तन्यक एकीकृत कृषि प्रणाली प्रदर्शन ईकाइयां, संकल्प से सिद्धी, मेरा गाँव मेरा गौरव और कृषि विकास कौशल प्रशिक्षण जैसी विभिन्न नई पहलों को क्षेत्र–1 के कृषि विज्ञान केन्द्रों द्वारा आयोजित किया गया था।

तकनीकी अदानों का उत्पादन

कृषि विज्ञान केन्द्रों ने 22742 किसानों को विभिन्न फसलों की 12618 क्विंटल बीज सामग्री का उत्पादन और आपूर्ति की है। कृषि विज्ञान केन्द्रों ने विभिन्न फसलों की 109. 85 लाख पौधों की रोपणध्रोपण सामग्री का उत्पादन किया तथा ?88.68 का 0.18 लाख पशुधन, 1252 किसानों को वितरित किया गया । कृषि विज्ञान केन्द्रों ने 15.71 क्विंटल बायो–उर्वरकों,168.6 क्विंटल खाद और 1440 बायो–एजेंटों का उत्पादन और आपूर्ति हितधारक किसानों के लिए की है।

मृदा, पानी और पौधे के नमूने

वर्ष के दौरान, इस क्षेत्र के कृषि विज्ञान केन्द्रों ने कुल 24795 नमूनों का विश्लेषण किया है जिसमें 19302 मिट्टी के नमूने, 2965 पानी के नमूने और 2232 पौधे के नमूने शामिल हैं ।

कृषि प्रौद्योगिकी सूचना केंद्र (एटिक)

वर्ष के दौरान आठ कृषि प्रौद्योगिकी सूचना केन्द्रो के विभिन्न लाभार्थियों द्वारा किए गए शैक्षणिक भ्रमण की संख्या में 23221 तकनीकी सलाह, जबकि 88230 किसानों ने मेजबान संस्थानों द्वारा विकसित उत्पादों को प्राप्त करने के लिए किए गए । एटिक में मृदा और जल परीक्षण सुविधाओं का इस्तेमाल 13359 किसानों द्वारा किया गया था। एटिक द्वारा अपने अंतिम उपयोगकर्ताओं को 21792 किताबें और 182337 तकनीकी बुलेटिन प्रदान किए गए । बीज, रोपण सामग्री और अन्य उत्पादों और सेवाओं की बिक्री से उत्पन्न राजस्व ? 94.64 लाख रहा ।

विस्तार शिक्षा निदेशालय

विभिन्न विश्वविद्यालयों और उनके विस्तार शिक्षा निदेशालयों के अधिकारियों ने 46 वैज्ञानिक सलाहकार समिति की बैठकों में भाग लिया है । इसी प्रकार, विभिन्न कृषि विज्ञान केन्द्रों द्वारा आयोजित कार्यक्रमों जैसे कि 47 खेत दिवसो, 27 कार्यशालयों, सेमिनार एवं किसान वैज्ञानिक बातचीत, 18 प्रौद्योगिकी सप्ताह, 142 प्रशिक्षण कार्यक्रम, 208 कृषि परीक्षण (ओ एफ टी) और 583 फ्रंट लाइन प्रदर्शन (एफ एल डी) में भाग लिया ।

फसल अवशेष प्रबंधन

2017–18 के दौरान कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थान, क्षेत्र–1 और उसके कृषि विज्ञान केन्द्रों द्वारा फसल अवशेष प्रबंधन के तहत बड़ी संख्या में कार्यक्रम आयोजित किए गए ।

Executive Summary

A network of Krishi Vigyan Kendras (KVKs) has been established by Indian Council of Agricultural Research (ICAR) under the umbrella of ICAR institutes, State Agricultural Universities, State Department of Agriculture and Non-Government Organizations with an aim to assess, refine and demonstrate technologies in agricultural and allied sectors. ICAR-Division of Agriculture Extension headed by the Deputy Director General (Agricultural Extension) monitors and reviews the progress of KVKs through its eleven Agricultural Technology Application of Research Institute (ICAR-ATARI) located in different parts of the country. ICAR-ATARI, Zone-I, Ludhiana plans, monitors, reviews and supports ICAR initiated technology dissemination projects mainly 69 KVKS of Punjab (22), Himachal Pradesh (13), Uttarakhand (13) and Jammu & Kashmir (20).

Assessment and refinement of technologies are carried out by the KVKs with technological backstopping from SAUs and ICAR institutes and partnering with farmers and other stakeholders in the system. KVKs organize need-based capacity development programmes for the stakeholders and create awareness about improved agricultural technologies through appropriate frontline extension programmes. Production and supply of quality seeds, planting materials, livestock breeds, animal products and bi-products are also being undertaken to facilitate initial uptake of technologies. Thus, KVKs are serving as knowledge and resource centres for agricultural economy of the district. Salient achievements during the reporting year are summarized as follows:

Technology Assessment and Refinement

A total of 512 OFTs were conducted through 2848 trials. Out of these, 425 OFTs on crops, 73 on livestock, poultry, fisheries and 14 on others aspects were conducted during the reporting period. Under crops, a total of 349 technologies assessed by KVKs by conducting 1810 trials in thematic areas such as varietal evaluation (95), integrated nutrient management (36), integrated disease management (48), integrated pest management (47), integrated crop management (56), and integrated weed management (11). Technologies assessed in other thematic areas are processing & value addition (23), resource conservation technology (13), farm machinery (12), integrated farming system (4) and storage techniques (4).

Frontline Demonstrations

A total of 13928 demonstrations including 6225 cereal & millets, 1362 on oilseeds, 1243 pulses, 1889 on vegetable & spices, 212 fruit crops, 77 on flowers, 777 on fodder crops, 178 on commercial crops, 861 on livestock & fisheries, 444 on other aspects viz. mushroom production (131), farm implements (28) and home science related activities (285) were conducted covering an area of 2549.12 ha and 3541 units.

Capacity Development

KVKs have organized a total of 5901 capacity development programmes for 1.47 lakh participants during the reporting period. Out of 5901 courses, 5077 were the need based courses and the rest were sponsored and vocational courses. A total of 3969 courses were organized for farmers and farmwomen wherein 59148 men and 37971 women were trained.

Cluster Frontline Demonstration on Pulses

A total of 6510 FLDs were conducted on an area of 1400.33 ha in four states during *kharif*, *rabi* and summer season. The FLD yield increased between 10.3% (Summer Moong, HP) to 68% (Rajmash, HP) over the local check varieties.

Cluster Frontline Demonstrations on Oilseeds

A total of 1950 FLDs were conducted on an area of 780 ha in four states during *kharif* and *rabi* seasons. In Punjab the average yield under these FLDs was 19.80 q/ha which was 17.6% higher than the check yield. For the benefit of 6908 farmers, 237 different extension activates were conducted during the period under consideration. Moreover, 98 training programmes were conducted to benefit 2408 farmers under this project.

Tribal Sub Plan

Under TSP the KVKs of Zone-1 conducted 199 OFTs, 2435 FLDs, 534 trainings (15359 participants), 5038 other extension courses (31677 participants) and delivered 1237 different text messages under Kisan Mobile Advisory Services (2.34 lakh participants).

NICRA

National Innovations in Climate Resilient Agriculture (NICRA) project implemented in 13 most vulnerable districts of Zone-1 benefitted 1320 farmers under Natural Resource Management module while this number was 1915, 2534 and 1411 under Crop Production Livestock and Fisheries and Institutional Interventions modules, respectively. Under this project 3977 farmers were trained through 194 courses on various aspects of climate resilient agriculture. The project also benefited 10153 farmers through 481 other extension activities.

PPV&FRA

Twelve awareness programs on PPV&FRA were organised in Zone-1 benefiting 1973 farmers during the year 2017-18.

ARYA

Twenty two training courses were conducted in Zone-1 during 2017-18 that benefited 472 rural youth under this project.

Farmers FIRST Program

Under this program 129 training courses were conducted benefiting 4760 farmers. In addition, 8 awareness camps and 20 exposure visits were also conducted in which 663 and 759 farmers were benefited, respectively.

Other Extension Activities

KVKs of Zone-1 organised 67288 other extension activities during 2017-18 benefiting 18.09 lakh farmers out of which 13.98 lakh were from Punjab followed by 1.92 lakh from J&K, 1.28 lakh from Uttarakhand and 0.90 lakh from HP.

Convergence and Linkages of KVKs

KVKs efficiently collaborated with National Horticulture Mission (NHM), Rasthtriya Krishi Vikas Yojna (RKVY), National Fisheries Development Board (NFDB), Hyderabad, Agriculture Skill Council of India (ASCI) for organizing various training and awareness programme among farming community as a part of their linkage and collaborative activities.

Kisan Mobile Advisory

In Zone-1, 13.82 lakh farmers were benefited through Kisan Mobile Advisories with 5422 text messages. About 55% of text messages related to crops followed by 19% for livestock, 11% miscellaneous, 8% on awareness, 5% on weather information and 2% on marketing related information.

New Initiatives

Various new initiatives such as climate resilient IFS Demo Units, Sankalp Se Siddhi, Mera Gaon Mera Gaurav and Skill Development Trainings in Agriculture were organised by the KVKs of Zone-1 during 2017-18.

Production of technological inputs

KVKs have produced and supplied 12618 q of seed material of different crops to 22742 farmers. KVKs produced 109.85 lakh plant-lets/ planting material of different crops and distributed 0.18 lakh livestock worth ? 88.68 which were supplied to 1252 farmers.

KVKs have produced and supplied 15.71 q of bio-fertilizers, 168.6 q of compost and 1440 bio-agents for supplying to stakeholder farmers.

Soil, Water and Plant Samples

During the year, KVKs of this zone have analysed a total of 24795 samples including 19302 soil samples, 2965 water samples, and 2232 plant samples.

Agricultural Technology Information Centres (ATIC)

During the year from these eight ATICs the number of visits performed by the various beneficiaries includes 23221 visited for technical advice whereas, as much as 88230 farmers' visited to obtain products developed by the host institutes. Soil and water testing facilities at ATICs were used by 13359 farmers. As much as 21792 books and 182337 technical bulletins were provided by the ATICs to its end users. The revenue generated by sale of seeds, planting materials and other products and services by them were ? 94.64 lakh.

Directorate of Extension Education

Directorates of Extension Education of various universities and their officials have participated in 46 Scientific Advisory Committee meeting. Similarly, they have attended 47 Field days, 27 workshops Seminars and farmer scientist interactions, 18 technology weeks, 142 Trainings programs, 208 On Farm Testing (OFT) and 583 Front Line Demonstrations (FLD) programs organized by various KVKs.

Crop Residue Management

Large number of events were organised under Crop Residue Management by the ICAR-ATARI Zone-1 and its KVKs during 2017-18.

Chapter 1

ABOUT ICAR-ATARIs AND KVKs

1.1 Genesis of ICAR-ATARIs

ICAR established eight Zonal Coordinating Units (ZCUs) in September 1979 to monitor and coordinate Lab to Land Programme (LLP) launched on the eve of ICAR's Golden Jubilee celebrations. Zonal Coordinating Unit for Zone-I had its office in Punjab Agricultural University (PAU), Ludhiana. The Unit was converted into a Plan Scheme in 1986 with additional staff and objective of monitoring/ transfer of technology projects of ICAR *viz*. KVKs, Trainers Training Centers, National Demonstration Scheme, Operational Research Project, Scheduled Caste & Schedule Tribe Project, Special Project on Oilseeds and National Pulse Project (started in 1990-91).

The Zonal Coordinating Units were upgraded as Zonal Project Directorates during the XI Five Year Plan (2009) with the same staff strength and infrastructure. The Zonal Coordinators were accordingly re-designated as Zonal Project Directors with upgraded financial and administrative powers akin to the Directors of other ICAR institutes. In July 2015, Zonal Project Directorates were upgraded as Agricultural Technology Application Research Institutes (ICAR-ATARI) with added responsibilities and functions including research.

KVK system represents a network of Krishi Vigyan Kendras (KVKs) that functions as a pivot for transfer of technology all over the country under the umbrella of ICAR institutes, State Agricultural Universities (SAUs), State Department of Agriculture and Non-Government Organizations (NGOs) with the objective of assessment, refinement and demonstration of technologies in agricultural and allied sectors. ICAR-Division of Agriculture Extension headed by the Deputy Director General (Agricultural Extension) monitors and reviews the progress of KVKs through its elevenAgricultural Technology Application of Research Institutes (ICAR-ATARIs) located in different parts of the country. Details of newly created and reorganized ICAR-ATARIs in the country have been given in Table 1.1.

1.1.2 Mandate of ATARIs

Mandate of the ICAR-Agricultural Technology Application Research Institutes is as follows:

Table 1.1: Details of all ICAR-ATARIs in India

Zone	HQ	KVKs (No.)	Names of States/ UTs administered (No.)
I	**Ludhiana**	69	Himachal Pradesh, J&K, Punjab and Uttarakhand (4)
II	**Jodhpur**	62	Delhi, Haryana and Rajasthan (3)
III	**Kanpur**	75	Uttar Pradesh (1)
IV	**Patna**	63	Bihar and Jharkhand (2)
V	**Kolkata**	59	Andaman & Nicobar Islands, Odisha and West Bengal (3)
VI	**Guwahati**	45	Arunachal Pradesh, Assam and Sikkim (3)
VII	**Barapani**	43	Manipur, Meghalaya, Mizoram, Nagaland and Tripura (5)
VIII	**Pune**	79	Goa,Gujarat and Maharashtra (3)
IX	**Jabalpur**	76	Chhattisgarh and Madhya Pradesh (2)
X	**Hyderabad**	73	Andhra Pradesh, Puducherry, Tamil Nadu and Telangana (4)
XI	**Bengaluru**	48	Karnataka, Kerala and Lakshadweep (3)

- Coordination and monitoring of technology application and Frontline Extension Education Programs
- Strengthening Agricultural Extension Research and Knowledge Management

1.1.3 Major Functions of ICAR-ATARI's

- To formulate, implement, guide, monitor and evaluate strategies of technology assessment refinement and demonstration programs in the zone.
- To initiate, plan, coordinate and execute the extension research to support and improve technology dissemination system.
- To link KVK efforts to strengthen approaches *viz.* consortium, convergence, PPP, farmer led extension and market led extension in the zone.
- To dovetail technology application programs by coordinating and fostering linkages with technology generation and delivery system and other stakeholders of agriculture development in the zone.
- To coordinate with State/Central government Agencies, Credit institutions and any other organization for successful implementation of KVK programs.
- To maintain liaison with ICAR and other relevant Institutes present over the zone and elsewhere as well as all Subject Matter Division at headquarters for the betterment of the overall functional proficiency of KVK system in the zone.
- To create agro-climate zone-wise database and impact analysis.

1.2 ICAR-ATARI, Zone-I, Ludhiana

Zonal Coordination Unit (ZCU) was established at Ludhiana in 1979 by the Agricultural Extension Division of theIndian Council of Agricultural Research,to monitor and coordinate transfer of technology projects/ activities. The states of Punjab, Haryana, New Delhi, Himachal Pradesh and Jammu & Kashmir came under the jurisdiction of Zone-1 at that time. These transfer of technology projects/ activities were merged and implemented under KVK scheme in 1992 and onwards. The Zonal Coordination Unit, Ludhiana was upgraded as Zonal Project Directorate (ICAR-ZPD) in March, 2009 which was subsequently further upgraded as ICAR-Agricultural Technology Application Research Institute (ICAR-ATARI) in July, 2015. Presently (2017-18 onwards), the ICAR-ATARI for the Zone-I situated at Ludhiana is engaged in planning, monitoring, reviewing and facilitating ICAR initiated technology dissemination projects mainly *Krishi Vigyan Kendras*(KVKs) of Punjab, Himachal Pradesh, Jammu & Kashmir and Uttarakhand.

1.2.1 Staff

At ICAR-ATARI for Zone-1, total staff strength of 18 has been sanctioned and as on 31 March 2018 out of these sanctioned posts, 12 have been filled while 6 are laying vacant Annexure-V.

1.3 Krishi Vigyan Kendras

Krishi Vigyan Kendras (KVKs), also known as Agriculture Science Centres, are grass root level scheme that have been designed and nurtured by ICAR for the past four decades to address issues related to technology assessment and dissemination in agriculture. So far, ICAR has established 690 KVKs across the country under varied host organizations *viz.* SAUs, ICAR Institutes, Central institutes/ Deemed Universities, State Government, Public Sector Undertakings and NGOs.

1.3.1 Establishment of KVKs

The Education Commission, Government of India (1964-66), under the chairmanship of Dr. DS Kothari, recommended 'application of science to productive processes, including agriculture' and 'vocationalization of secondary and agricultural education'. These recommendations were subsequently reviewed by the Planning Commission of India and Inter-Ministerial Committee and were further recommended by a Committee set up by ICAR under the Chairmanship of Dr. Mohan Singh Mehta (1973) which ultimately found the ground of reality in 1974 with the establishment of India's first Krishi Vigyan Kendra (Agriculture Science Centre) in Puducherry under the aegis of the ICAR, New Delhi through its Division of Agricultural Extension. Zone-I got its first KVK in the district of Karnal in 1976 under ICAR-National Dairy Research Institute, Karnal. On 31 March 2018, The ATARI Zone-1 have 69 KVKs functioning under their

jurisdiction. The details of these KVKs, regarding their establishment and contact details, have been given in Annexure I.

1.3.2 Mandate of KVKs

The ICAR Standing Committee on Agricultural Education, headed by Dr. Mohan Singh Mehta, observed that the KVKs are of national importance and are expected to look after the empowerment of the farming community through trainings and other means for improving the socio-economic conditions of the farmers. Taking into account the essence behind the establishment of KVKs, their mandate is assessment, refinement and demonstration of technologies/ products to cater to the needs of farming community, extension personnel and other stakeholders in their respective district. In order to accomplish this, KVKs are carrying out the following activities.

1. Conducting on-farm testing to identify the location specificity of agricultural technologies under various farming systems.
2. Organizing frontline demonstrations to establish production potential of various crops and enterprises on the farmers' fields.
3. Organizing need based training of farmers to update their knowledge and skills in modern agricultural technologies related to technology assessment, refinement and demonstration and training of extension personnel to orient them in the frontier areas of technology development.
4. Creating awareness about improved technologies to larger masses through appropriate extension programmes.
5. Production and supply of good quality seeds and planting materials, livestock, poultry and fisheries breeds and products and various bio-products to the farming community.
6. Work as resource and knowledge centre of agricultural technology for supporting initiatives of public, private and voluntary sector for improving the agricultural economy of the district.

1.3.3 Manpower

Human resources play imperative role in realizing the vision and objectives of various institutions including the KVK system. Accordingly, staff strength of 16 has been sanctioned for each of the KVKs, which includes one Programme Coordinator, six Subject Matter Specialists, three Programme Assistants, two Administrative staff, two Drivers and two Supporting Staff. For the 69 KVKs of this zone, the total sanctioned strength is 1104, out of which, 818 are in position as on 31 March 2018. The category wise staff position of each KVK is detailed in Annexure-III.

1.3.4 Infrastructural Facilities

The basic infrastructural facilities are mandatory for any research and development organization including the KVKs to accomplish their mandated activities. ICAR have been proactive in providing these infrastructural facilities to their KVKs. In the Zone-1, 62 KVKs do possess their Administrative Building, 52 KVKs have Farmer's hostel, 46 KVKs have staff quarters, 23 KVKs have been provided with the rain water harvesting units, 27 KVKs have threshing floors and 52 KVKs of the zone have demonstration units with them at the end of year 2017-18. As on 31 March 2017, 59 KVKs had Jeep/ cars with them, while 53 KVKs had two-wheelers and 48 possessed tractors. The details of the infrastructural facilities available in the KVKs have been provided in Annexure IV.

1.3.5 Scientific Advisory Committee

As per the guidelines issued by the Council, all KVKs have constituted their Scientific Advisory Committees (SAC) under the Chairmanship of the Head of the host organization. KVKs have to conduct SAC meetings twice a year to get technical and scientific guidance in achieving their targets more effectively and efficiently.

1.3.6 Thrust Areas of KVKs

As per the agro-ecological conditions, cropping pattern and farming systems of districts, the KVKs decide the thrust areas and work accordingly. For the KVKs of this zone, the major thrust areas have been grouped in two categories *i.e.* those of Plain States and the ones working in Hill States.

1.3.6.1 Plain State (Punjab)

- Soil & water conservation and improvement of soil health
- Crop diversification
- Hybrid seed production
- Integrated Nutrient/Pest/Weed Management in different crops
- Popularization of resource conservation technologies

- Improvement in the productivity of livestock
- Management of repeat breeding in dairy animals
- Clean milk production and processing of dairy products
- Drudgery reduction of farm-women
- Value addition in agricultural products
- Supplementary source of income for farm-women
- Self employment for rural youth
- Use of information and communication technologies

1.3.6.2. Hill States (HP, J&K and UK)

- Water conservation and management
- Promotion of exotic and off-season temperate vegetable cultivation
- Protected cultivation of low volume and high value crops
- Rejuvenation of old orchards
- Integrated Nutrient/ Pest/ Weed Management
- Promoting vermi-compost and organic farming
- Promoting cultivation of medicinal and aromatic plants
- Improvement in the productivity of livestock
- Drudgery reduction of farmwomen

Chapter 2

TECHNOLOGY ASSESSMENT AND REFINEMENT

Technologies developed by National Agricultural Research System are tested by the Krishi Vigyan Kendras for their location specificity involving farmers as partners through the Technology Assessment and Refinement process. On-farm testing (OFT) is the research conducted in participatory mode involving farming community, extension personnel and scientist. OFT is an indispensable tool for developing and validating farming technologies and improves the reliability of crop management decisions. The goal of OFT is to determine how different management options perform compared to one another under specific agro-eco situation and cropping system. The specific objective of the OFT is to develop recommendations for solving major field problems of representative groups of farmers. Farmers participate at every step of the research right from identification of problems, their prioritization, laying out and managing experiments, and evaluating results Participatory Rural Appraisal (PRA) is conducted to identify the problems faced by the farmers and based on the priority of the problems, OFT is formulated. During the period under report, KVKs of Zone-1 assessed 437 technologies (362 related to crops, 61 related to livestock & fisheries and 14 related to others) by conducting 2448 trials (Table 2.1). Furthermore, the KVKs also refined 75 technologies, including 63 related to crops and 12 related to livestock & fisheries through 400 trials at different locations.

2.1 Technology Assessment

A total of 346 technologies were assessed by KVKs under crops by conducting 1802 trials in thematic areas such as Varietal Evaluation (95), Integrated Crop Management (56), Integrated Nutrient Management (36), Integrated Disease Management (48), Integrated Pest Management (47), and Integrated Weed Management (11).Technologies assessed in other thematic areas are Processing & Value Addition (23), Resource Conservation Technology (13), Farm Machinery (12) Integrated Farming System (4) and Storage Techniques (4) as shown in Table 2.2.

Table 2.1: Technology assessment and refinement by the KVKs of Zone-1 during 2017-18

Particulars	Crops		Livestock & fisheries		Others		Total	
	No. of OFTs	No. of trials	No. of OFTs	No. of trials	No. of OFTs	No. of trials	No. of OFTs	No. of trials
Assessment	362	1880	61	488	14	80	437	2448
Refinement	63	274	12	126	0	0	75	400
Total	**425**	**2154**	**73**	**614**	**14**	**80**	**512**	**2848**

Table 2.2: Thematic area wise technologies assessed under crops

Thematic area	No. of KVKs	No. of crops/ enterprise	No. of OFTs	No. of Trials
Varietal evaluation	37	45	95	447
Integrated crop management	27	22	56	227
Integrated nutrient management	18	19	36	175
Integrated disease management	29	20	48	218
Integrated pest management	29	25	47	234
Integrated weed management	9	9	11	52
Resource conservation technology	10	7	13	53
Integrated Farming System	3	4	4	25
Farm machinery	8	4	12	40
Processing & value addition	16	13	23	309
Storage Techniques	4	2	4	30
Total (Zone-1)			**349**	**1810**

The figures depicted in Table 2.3 indicate that maximum crop related technologies (106) were assessed by KVKs of Punjab by conducting 595 trials at different locations followed by Himachal Pradesh (95). KVKs of Jammu & Kashmir assessed 89 technologies by conducting 355 trials whereas KVKs of Uttarakhand assessed 59 technologies at 421 locations.

Table 2.3: State wise technologies assessed under crops

Thematic areas	No. of crops	No. of technologies	No. of trials
Punjab	36	106	595
Himachal Pradesh	34	95	439
Jammu & Kashmir	45	89	355
Uttarakhand	29	59	421
Total (Zone-1)		**349**	**1810**

In case of livestock & fisheries, KVKs assessed 61 technologies on six thematic areas by conducting 488 trials. There 29 technologies assessed under Nutrition Management followed by Disease Management (21). Technologies assessed in other thematic areas are Evaluation of Breeds (6), Production & Management (3), Feed &Fodder (1) and Value Addition (1) as shown in Table 2.4.

Table 2.4: Thematic area wise technologies assessed under livestock & fisheries

Thematic areas	No. of type of animal	No. of OFTs	No. of trials	No. of KVKs
Evaluation of breeds	1	6	68	6
Nutrition management	7	29	232	22
Disease management	6	21	167	18
Production and management	2	3	13	3
Feed and fodder	1	1	3	1
Value addition	1	1	5	1
Total (Zone-1)		**61**	**488**	

State wise details of technologies assessed under livestock & fisheries are given in Table 2.5. KVKs of Punjab assessed 26 technologies through 156 trials and KVKs of Jammu & Kashmir assessed 16 technologies through 147 trials while 11 technologies were assessed by KVKs of Uttarakhand and 8 technologies assessed by Himachal Pradesh through 149 and 36 trials respectively.

Table 2.5: State wise technologies assessed under livestock & fisheries

Thematic areas	No. of type of animal	No. of tech.	No. of trials
Punjab	7	26	156
Himachal Pradesh	3	8	36
Jammu & Kashmir	4	16	147
Uttarakhand	5	11	149
Total (Zone-1)		**61**	**488**

As depicted in Table 2.6, total of 14 technologies assessed related to various enterprises by conducting 80 trials by KVKs of Punjab, Himachal Pradesh, Jammu & Kashmir and Uttarakhand.

2.2 Technology Refinement

Table 2.7 reveals that a total of 54 technologies refined through 221 trials under crops by KVKs on 6 thematic areas including Integrated Crop Management (14), Integrated Nutrient Management (11), Integrated Disease Management (10), Integrated Pest Management (12), Integrated Weed Management (6) and Integrated farming system (1). State wise details of technologies refined are given in Table 2.8.

In case of livestock & fisheries, KVKs refined 12 technologies on three thematic areas by conducting 126 trials. There were 7 technologies refined under nutrition management, 7 in Disease Management and one in Feed & Fodder area as depicted in Table 2.9. State wise details of technologies refined under livestock & fisheries are given in Table 2.10.

Table 2.6: Details of technologies assessed in other areas

Thematic areas	No. Crops/ Enterprises	No. of OFTs	No. of trials	No. of KVKs
Punjab				
Small Scale Income Generation Enterprises	4	4	21	4
Drudgery Reduction	1	1	10	1
Total (Punjab)		**5**	**31**	
Himachal Pradesh				
Mushroom Cultivation	1	2	15	1
Total (Himachal Pradesh)	**1**	**2**	**15**	**1**
Jammu & Kashmir				
Small Scale Income Generation	4	4	14	3
Total (Jammu and Kashmir)		**4**	**14**	
Uttarakhand				
Small Scale Income Generation Enterprises	1	1	5	1
Drudgery Reduction	3	3	25	3
Total (Uttarakhand)		**4**	**30**	
Total (Zone-1)		**14**	**80**	

Table 2.7: Thematic area wise technologies refined under crops

Thematic areas	No. of KVKs	No. crops/ Enterprises	No. of OFTs	No. of trials
Integrated Crop Management	11	11	14	47
Integrated Nutrient Management	8	7	11	37
Integrated Disease Management	7	4	10	49
Integrated Pest Management	10	10	12	57
Integrated Weed Management	6	5	6	27
Integrated Farming System	1	1	1	4
Total (Zone-1)			**54**	**221**

Table 2.8: State wise technologies refined under crops

Thematic areas	No. of crops	No. of technologies	No. of trials
Punjab	11	17	54
Himachal Pradesh	8	11	49
Jammu & Kashmir	19	23	103
Uttarakhand	3	3	15
Total (Zone-1)		**54**	**220**

Table 2.9: Thematic area wise of technologies refined under livestock & fisheries

Thematic areas	No. of type of animal	No. of OFTs	No. of trials	No. of KVKs
Nutrition Management	4	7	33	7
Feed and Fodder	1	1	10	1
Disease management	3	4	83	3
Total (Zone-1)		**12**	**126**	

Table 2.10: State wise technologies refined under livestock & fisheries

Thematic areas	No. of type of animal	No. of tech.	No. of trials
Punjab	3	6	21
Jammu & Kashmir	2	6	105
Total (Zone-1)		**12**	**126**

2.3 Location Specific Technologies

2.3.1 Technology Refinement

2.3.1.1 Integrated Pest Management

Problem definition: High Incidence of tomato pinworm *Tuta absoluta* pest in tomato under open and protected conditions

Technology refined: Tomato pinworm, *Tuta absoluta* (Meyrick) is a serious invasive insect pest known as the tomato leaf miner. It originated from South America and the major host crops for this new pest are solanaceous vegetables like tomato, potato, brinjal and legume crops like common beans. *T. absoluta* is considered to be the most serious threat for tomato production worldwide and has potential to cause 50 to 100 per cent loss in yield and fruit quality. There are 10-12 generations of this pest in a year under favourable conditions. Fruits infested by *T. absoluta* could be identified by presence of characteristics pin holes. Tomato being an important cash crop under protected and open conditions has been infested by the pest since last two years. The pest is fast emerging as a serious threat to tomato cultivation under protected as well as open conditions, KVK Mandi henceforth conducted separate on farm trials for its management in the district at different locations during

2017-18. Results of the trials revealed that installation of pheromone trap @ 5/ha + Flubendamide@ 0.12% at flowering or Azadirachtin @ 0.03 % at 15 days interval not only reduced incidence of *Tuta absoluta* but also increased yield and profitability followed by Pheromone trap @ 5/ha + Indoxacarb @ 1 ml/ l sprays at 15 days interval (two sprays) compared to farmers practice..

Problem definition: Heavy infestation of mites and sucking pests in capsicum under protected conditions

Technology refined: Protected cultivation has fast emerged as a boon for marginal and small hilly farmers as per unit returns from protected cultivation of vegetables is about 10 folds higher compared to open conditions. Capsicum is a remunerative crop grown under protected conditions in districts Mandi & Hamirpur. The crop is subject to very high sprays of insecticides, but the farmers have poor knowledge about symptoms of sucking pests and mite attack and proper management. Hence KVK Mandi conducted on farm trials for integrated management of sucking pests in

Polyhouse visit by Director ATARI Dr. Rajbir Singh

capsicum under protected conditions. Results of the trial revealed that neem cake @ 30 g/ m^2 at the time of soil preparation+ installation of yellow sticky traps @ 1 trap/ 10 m^2+ drenching with imidacloprid (100 ml of 0.5 ml/ L) + Fipronil 2ml and Bifenthrin 1ml/ (need based) and neem cake @ 30 g/ m^2 at the time of soil preparation+ installation of yellow sticky traps @ 1 trap/ 10 m^2+ drenching with imida (100 ml of 0.5 ml/ L) + Spiromecifen 1ml/L (need based) not only reduced incidence of sucking pests under protected conditions but also increased yield and profitability

KVK Hamirpur also conducted OFTs for assessment of one new miticides and university recommended miticide against mites in capsicum (Hybrid Manhuttan) under protected conditions. The results of the study indicated that spray of Spiromesifen 22.9SC @ 1ml/l at 15 days interval recorded highest yield (38 q/250 m^2 polyhouse) followed by spray of sulphur 80WP @3ml/l at 15 days interval (35 q/250 m^2 polyhouse). The benefit cost ratio was 2.71 and 2.50 in these treatments, respectively as compared to 1.88 in farmers' practice. The mite infestation was 16 and 18 per cent in these treatments as compared to 35 per cent in control.

Problem definition: High incidence of wax moth

Technology refined: Wax moth is a great menace in bee colonies if allowed to get out of hand and will destroy brood comb in a very short time if unchecked. Keeping this in view on farm trials were conducted by KVK Moga, Punjab in 2017-18 on Integrated management of

Training on Bee Keeping

wax moth in *Apis mellifera* colonies at three locations with three treatments *viz.* use of sulphur directly on bottom board + use of formic acid (farmers practice), use of 300g sulphur/ 16 chambers fumigated combs (recommended practice) and use of 300g sulphur / 16 chambers fumigated combs + use of wax moth traps (refined practice). The refined practice of colony management had more bee strength (09.5±0.5), less incidence of wax moth infested frames (0.17±0.76) and higher yield of honey (21.20 kg/ colony) as compared to other treatments. Refined practice has highest BC ratio of 2.54 as compared to recommended practice (2.27) and farmers practice (2.02).

2.3.2 Technology Assessment

2.3.2.1 Integrated Nutrient Management

Problem definition: Poor fruit yield and quality of apple due to calcium and boron deficiency

Technology assessed: Apple being the principal fruit crop of the state of Jammu & Kashmir. Of late it has been realized that calcium and boron are very important nutrients which can improve yield and quality of apple. In this endeavour, On farm trials (OFTs) were conducted by KVK- Anantnag (SKUAST- Kashmir) to assess the effect of different sources and concentrations of calcium and boron on yield and quality of apple. The results of the trials were very promising as there was a significant improvement in both yield and quality of apple at all the locations in the consecutive years. The results clearly revealed that calcium and boron regardless of source and concentration improved both yield and quality of

apple over control. However, calcium as $CaCl_2$ (dehydrated) @ 0.3 % and boron as boric acid @ 0.15 % proved to be the best treatment over other treatments wherein, an average enhancement of yield to the tune of 17 % and quality to the tune of 31 % was achieved.

Problem definition: Low yield of rice due to zinc deficiency

Technology assessed: *Khaira* disease is a major problem in rice crop experienced by the farmers in Barnala district of Punjab state. This disease is caused due to the zinc deficiency in soil. Further, intensive rice-wheat monoculture with short duration modern high yielding varieties on the same piece of land aggravated this problem in the region. Farmers generally apply over dose of nitrogen and phosphorus than recommended

and the same time ignore the micro nutrients application. Imbalance use of fertilizers not only induces the deficiency of micro nutrients which also reduce yield. In order to rectify this problem KVK Barnala conducted On Farm Trials to assess the zinc coating on urea for higher productivity of rice. The results of trials revealed that the coating of 2% zinc (hypetahydrate) recorded 6.84% increase in average yield as compared to farmers practice.

Problem definition: Low yield of rice due to loss of nutrients in soils.

Technology Assessed: Rice is a major crop of Haridwar district of Uttarakhand but stagnation in rice yield is major problem in many areas. As a set pattern and mind set farmers are very much reluctant to apply basal dose of recommended fertilizer in rice crop which ultimately results in poor yield. Foliar application of water soluble fertilizers proved to be a very good option particularly for the areas where application of fertilizers leads to loss of nutrient in the soil. Hence, KVK Dhanauri (Haridwar) assessed the response of foliar spray in rice crop by conducting OFT during Kharif 2017 on 2.0 ha area of ten locations. Farmers make use of 100 kg Nitrogen and 60 Kg P_2O_5 only under farmer's practice. In one treatment 100% recommended NPK fertilizers were applied in rice and added one spray of soluble NPK (18:18:18) at the stage of vegetative growth. Another treatment comprised of fertilizers mentioned in above treatment with additional one spray of micronutrient (Zn) was sprayed at grain formation stage. The results indicated that foliar application of NPK with one spray of micronutrient (Zn) at grain formation stage along with recommended dose of NPK as basal dose proved to the best and beneficial option to the farmers. It shows an increase in rice productivity of rice about 24% other than farmers practice.

Problem definition: Low yields of chickpea under rainfed conditions

Technology assessed: KVK Bilaspur conducted On Farm Trial to assess the effect of application of urea at flowering stage on productivity of chickpea under rainfed conditions. For this, chickpea crop was applied with 2% urea spray at flowering stage in addition to recommended FYM @ 10 tonnes/ha + Recommended

Farmers interacting on quality seed production of Chick pea crop at KVK

N:P:K (30:60:30). The data revealed that under rainfed conditions FYM @ 10 tonnes/ha + Recommended

Training on mushroom

N:P:K (30:60:30)+ 2% urea spray at flowering stage recorded 49.1 % higher yield over farmers practice (FYM @ 3-4 tonnes/ha) and 2.2 % higher yield over recommended practice i.e. FYM @ 10 tonnes/ha + Recommended N:P:K (30:60:30). Other parameters such as number of branches, pods/ plant and grains/pod, and benefit- cost ratio were also recorded higher with the application of recommended dose of FYM, fertilizers and 2% urea spray at flowering stage.

Problem definition: Indiscriminate use of chemical fertilizers resulting in higher cost of cultivation and environmental pollution

Technology assessed: Wheat is the major crop in the district Rupnagar. Farmers are not using biofertilizers in wheat crop and are resorting to indiscriminate usage of chemical fertilizers resulting in higher cost of cultivation and environmental pollution. In order to assess the efficacy of biofertilizers, KVK Ropar conducted on farm trial on use of biofertilizers along with recommended dose of fertilizers at four locations in the district. Results of the trials revealed that inoculating wheat seed with biofertilizers significantly enhanced the grain yield. Application of biofertilizers Biofertilizer (Consortium+PSB) + RDF along with of recommended N (120 kg/ha) and P (60 kg/ha) recorded highest grain yield (53.8 q/ha), which was statistically at

par (53.2 q/ha) with the application of biofertlizers along with 75% of recommended N (90 kg/ha) and P (45 kg/ha) in wheat, thereby helps in 25% saving of N and P fertilizer.

Problem definition*:* Hollowness of garlic bulbs due to potassium deficiency leading to unmarketable bulbs

Technology assessed: Garlic (*Allium sativum* L.) is the second most widely cultivated *Alliums* after onion and has long been recognized all over the world as valuable spice for food and a popular remedy for various ailments and physiological disorders. Garlic (*Allium sativum* L.) is an important cash crop of Kullu, Mandi and Sirmour districts of Himachal Pradesh and as a source of livelihood of small and marginal farmers. Himachal Pradesh, a hill state in northern India under western Himalayas has witnessed a sharp increase in garlic producing area during last decade, especially in Kullu district which occupies an area of 1200 ha out of 3600 ha of the state. The bulbs produced in the state are also qualitatively better than the other garlic growing states in the country. However, during the last few years, its production has been affected by imbalanced use of potassium fertilizers resulting into hollowness of bulbs upto 20-25%. Therefore, KVK, Kullu conducted on farm trial (OFT) at five locations in different cluster villages to study the effect of potassium application through soil as well as foliar on bulb yield, per cent hollowness and economics of popular garlic variety ' GHC-1'. The results revealed that the basal application

of K_2O@60kg/ha + N:P @ 125:75 kg + FYM @ 20 t/ ha (RDF) + 2 sprays of NPK 0:0:50@0.5% starting from bulbing stage at 10 days interval provided the highest bulb yield of garlic cv. 'GHC-1' (12.56 t/ha) along with the maximum B:C ratio (3.57) compared to the FP (9.54 t/ha). The said treatment also produced minimum hollowness of bulbs (1.50%) as compared to 15.90 % in case of farmers practice.

Problem definition: Low yield in garlic due to non use of sulphur

Technology assessed: Importance and impact of Sulphur in garlic

Garlic is becoming an alternative income generating spice crop in the mid and high hills of the Sirmour district in the Tomato-Garlic cropping sequence. It is one of the most remunerative crops of the district and cultivated in an area of about 2500 ha. Productivity and quality of the produces is not up to the mark due to imbalanced and inadequate use of nutrients particularly omitting sulphur. This element is required for quality particularly pungency of cloves as well as enhancing its productivity. KVK Sirmaur conducted on farm trials and assessed the effect of Sulphur in garlic. Results of the trails revealed that recommended NPK + Sulphur @ 37.5 kg /ha through Gypsum found effective in enhancing the yield of the garlic crop. This treatment resulted in highest yield (15.2 t/ha) and highest B:C Ratio (3.65).

2.3.2.2. Integrated Pest Management

Problem definition: High incidence of root rot wilt complex, powdery mildew and leaf miner in peas

Technology assessed: Garden Pea is one of the important off-season cash crops in the entire valley of Lahaul. Being off-season crop the farmers of the district sell the green pods at a premium price at their doorstep. Presently it is cultivated in an in area of about 1069 hectares with the annual production of 11759 tonnes. In order to reduce the losses caused by insect-pests and diseases, KVK Lahaul & Spiti-1 at Kukumseri conducted on farm trial on integrated management of insect- pests and diseases in garden pea at five locations in the district. Results of the trials revealed that seed treatment with carbendazim @ 2.5 g/kg seed followed by spray of lambda-cyhalothrin @ 0.004% + cabendazim @ 0.1% followed by acetamiprid @0.005% + haxaconazol @ 0.05% at 15 days intervals

FLDs on cucumber at atribal farmer field at Talwara

starting at 50% flowering found effective to reduce the incidence of leaf miner and diseases in pea. This treatment resulted in minimum leaf miner infestation (15.80 %), less incidence of root rot/wilt (14.60%), powdery mildew (12.28%) and white rot (0.25%), and gave the highest yield (122.32q/ha) along with the maximum B:C ratio (5.43) as compared to the farmers' practice (95.40q/ha).

Problem definition: Low bottle gourd production due to heavy infestation of red pumpkin beetle

Technology assessed: Bottle gourd is an important vegetable crop grown by the farmers in hilly Reasi district of Jammu and Kashmir. However, infestation of red pumpkin beetle is a serious problem in bottle gourd causing huge economic losses to the bottle gourd growers. Hence, KVK, Reasi conducted on farm trials to manage this problem. Spray of chloropyriphos 20 EC @ 2ml/ litre of water was not so effective (193 qt./ha) for the management of this problem. Application of acetamitrid 1gm /litre of water gave the highest yield i.e. 210 qt/ha. The benefit cost ratio was also found higher (3.18) following this treatment. It is therefore suggested that this treatment should be popularized through FLDs for the effective management of red pumpkin beetle.

Problem definition: High incidence of maize stem borer

Technology assessed: Maize is an important crop in the district Rupnagar. It is cultivated in an in area of about 20,000 hectares. The incidence of maize stem borer especially in block Nurpur bedi and Anandpur Sahib of the district is a serious threat to realize the optimum returns. Farmers are resorting to indiscriminate usage of pesticides resulting in higher cost of cultivation and environmental pollution, in order to assess the efficacy of biocontrol measures, KVK Ropar conducted on farm trial on bio control of maize stem borer at four locations in the district. Results of the trials revealed that use of Tricho-cards @ 1,00,000 eggs/ ha fixed at 100 spots on seven day old crop reduced the population significantly with crop yield of 46 q/ha and repetition of Tricho-cards after seven days of previous installation @ 1,00,000 eggs/ acre fixed at 100 spots reduced the population significantly with crop yield of 46.25q/ha as compared to 43 q/ha in the farmers' practice which uses un-recommended pesticides.

Problem definition: Substantial reduction (30-40%) in marketable yield of brinjal due to shoot and fruit borer

Technology assessed: Vegetable cultivation is practiced in many villages of Una district particularly the plain areas adjoining Punjab. Brinjal is one of the important vegetable crops grown year round by the farmers in these villages. However, farmers suffer substantial losses due to fruit damage by shoot and fruit borer, *Leucinodes orbonalis*. The brinjal fruits attacked by this pest are rendered unmarketable because such fruits bear exit holes of the pest along with excreta. In order to manage this pest, farmers usually resort to heavy use of pesticides *viz.* {Chlorantraniliprole 18.5% SC (Coragen)} at frequent intervals inflicting irreparable loss to the agro-ecosystem by decimating natural bio-control agents. The fruits of heavily sprayed crops are actually unfit from health perspective too, as such fruits support heavy pesticide loads. Therefore, KVK Una conducted OFTs aimed to minimize the pesticide spray by including pheromone traps in the assessed technology along with emamectin benzoate. The results revealed that two sprays of emamectin benzoate 5% SG (0.4 g/L) at 15 days interval and installation of pheromone traps (25/ha) recorded lower shoot and fruit infestation (3.4, 3.6%) as compared to lambda cyhalothrin 5 EC (0.8 ml/L) (4.9, 4.7%) plus pheromone traps (25/ha). The plots receiving repeated sprays of chlorantraniliprole 18.5% SC recorded highest shoot and fruit infestation of 8.6 and 8.5 per cent,

respectively. The fruit yields obtained from plots sprayed with emamectin benzoate 5% SG (0.4 g/L), lambda cyhalothrin 5 EC (0.8 ml/L) and the chlorantraniliprole 18.5% SC was 282.7, 258.8 and 237.4 q/ha, respectively.

Problem definition: High incidence of fruit flies in ash gourd

Technology assessed: The area under vegetables in Hoshiarpur district is around 31311 ha and ash gourd is cultivated in the sub-mountainous belt of the district. The area under ash gourd in the district is about 200 ha. During rainy season, fruit fly is a major insect-pest that adversely affects the yield as well as quality of ash gourd. The farmers use un-recommended spray mixtures, which is not only harmful to the human health but also affects the environment adversely. KVK, Hoshiarpur conducted on farm trail for the management of fruit flies in ash gourd. The results of the trial revealed that per cent fruit infestation was minimum (17.8%) by the use of bait spray containing 0.05% Malathion+ 1% gur/sugar solution (20 ml Malathion 50 EC and 200g gur/sugar in 20 liters of water) and clean cultivation practices (as recommended by PAU, Ludhiana) followed 18.2 % of fruit infestation by the use of pheromone lure based traps by HPKVV, Palampur, HP (Practice under test) and fruit infestation of 23.5 % was noticed by the use of un-recommended pesticide mixture -profenophos 40% + cypermethrin 4% @ 625 ml/ha (Farmer practice). The maximum yield of ashgourd (314.5 q/ha) was obtained for the treatment viz., the bait spray containing 0.05% malathion, 1% gur/ sugar and minimum (270.5 q/ha) by the use of un-recommended pesticide mixture by the farmers. Pheromone lure based traps were effective in controlling the incidence of the pest. The recommendation of pheromone lure based trap is eco-friendly approach for pest management. Moreover, the recommended pesticide, malathion is not available at local level, therefore farmers use un-recommended spray mixtures.

Problem definition: Low yield due to heavy infestation of fruit fly in tomato.

Technology assessed: The solanaceous vegetable crop mainly tomato is an important vegetable crop of district Uttarkashi. During the last decades, the tomato crop was

Diagnostic visit to Darlaghat

severely affected by fruit flies resulting about 20-30 per cent yield losses. To overcome the problem, KVK Uttarkashi laid out OFTs on management of fruit fles in tomato at five tomato growing areas of Uttarkashi district. The results revealed that the incidence of fruit flies was found significantly lowest with the use of methyl eugenol trap (@ 1 trap/ 3 Nali. The fruit yield (256.2 q/ha) was also recorded higher with methyl eugenol trap. The maximum benefit cost ratio (4.49) was observed in same treatment followed by spary of insecticides (Malathion 50 EC@ 1 ml/ liter water). Ther use of methyl eugenol trap was found more effective in decreasing pest incidence by 12.0 per cent with yield increase of 26.39 per cent as compared to control.

2.3.2.3 Integrated Disease Management

Problem definition: Low yield of tomato due to high incidence of late blight

Technology assessed: Tomato is the most important cash crop of district Solan. The crop has gained immense popularity in Solan district due to conducive agro climatic conditions for its cultivation during summer months as opposed to the plains, thereby giving it the status of off-season vegetable crop which brings lucrative returns to the farmers. Tomato is cultivated over an area of about 5000 hectares in the district. Of the various biotic factors causing reduction in yield, late blight caused by *Phytophthora infestans* cause huge loss to the crop. Under congenial environmental conditions, yield losses up to 95 per cent have been recorded due to

late blight. Earlier, farmers were using Ridomil Gold (Metalaxy l8% plus mancozeb 64% @0.25%) for the management of this disease. However, as per CIB recommendations, Ridomil Gold has been banned for use in tomato crop. Therefore, there was need to evaluate recommended chemicals for the management of late blight in tomato.

In order to evaluate new fungicides, KVK Solan conducted on farm trials for the management of late blight in Aljho village of Kandaghat block which is endemic region to this disease. Perusal of the data revealed that Cabrio Top (Metiram 55% + pyraclostrobin 5%) followed by Curzate M8 (Cymoxanil 8% + 64% mancozeb) was found more efficacious than Ridomil Gold (farmer's practice) for the management of late blight exhibiting 41.89 and 29.32 per cent reduction in disease severity, respectively. Spray of Cabrio Top@ 0.2% with the initiation of frost followed by sprays of copper oxychloride (0.3%)/ mancozeb (0.25%)/ hexacap (0.25%) at 7-10 days intervals resulted in maximum fruit yield (780 q/ha), highest net returns (₹ 22,97,500/ha) and highest B:C ratio (6.31).

Problem definition: Low yield of chillies due to high incidence of wilt in chillies.

Dignitaries visit to KVK Leh

Technology assessed: Chilli (*Capsicum annuum* L.) is one of the important cash crop of Kashmir valley. Wilt is an important disease of chilli crop causing significant reduction in yield. It is a complex disease which cannot

Training on vegetables

be controlled by any single method. Hence integrated approach has to be formulated to tackle the menace. KVK Bandipora conducted on farm trial on integrated management of chilli wilt at three locations in the district. Results of the trials revealed that seed treatment with *Trichoderma viride and* Soil application of FYM impregnated with *Trichoderma viride* followed by seedling dip in *Trichoderma viride* suspension and transplanting on raised bed with controlled irrigation reduced the incidence of chilli wilt to 16.66% as against 42.33% in farmers practice.

Problem definition: Russetting in Pear

Technology Assessed: Pear is one of the important temperate fruit crop of district Budgam with about 1806 ha area and 8342 MT production. The marketability of produce was severely affected by russetting disease and the problem was persistent in variety William Bartlet (Farash) of Pear. KVK Budgam, henceforth conducted an OFT on efficacy of different chemicals in controlling russetting at three locations namely Hapatnar,Nagbal & Dalwan of District Budgam. Results of trial revealed that spray of Wettable Sulphur @ 700 gm + Kaolin @ 200 gms + Boric Acid @ 100 gms per 100 l of water resulted in only 7.5% russetted lenticels accounting for 92.5% reduction in disease as against farmers practice of no spray at all.

Problem definition: High incidence of early blight disease in potato

Technology assessed: Early blight in potato is very common in Ladakh region and farming community of

Ladakh region are not aware about the causes of disease. In order to overcome this KVK Leh conducted OFT on early bligh management in 5 villages (viz. Chuchot, Stakna, Martselang, Basgo and Saspol) of the district. Results of the trial revealed that spraying of crop with Mancozeb 75 WP (0.3%) performed better than crop rotation and farmer practice as evident by less incidence of disease. People are now aware about this disease and its management.

Problem definition: High incidence of apple canker resulting in loss of vigour, fruit rot, premature leaf fall and plant mortality

Technology assessed: In the valley of Kashmir, horticulture particularly apple cultivation has attained the status of an industry. However the industry is in jeopardize owing to the qualitative and quantitative losses due to the onslaught of several diseases, and canker is one of the significant impediment which threaten the very existence of fruit trees. During the last few years the canker disease has became most prevalent in the district Pulwama due to harsh summers and winters, faulty pruning and training practices and soil moisture stress. Accordingly KVK Pulwama conducted on farm trials in three different locations of the district in order to devise a module for the efficient management of canker disease. The results revealed that the scarification of the cankerous portion along with healthy portion about one inch followed by dressing with fungicidal paste of carbendazim 50 WP + copper oxychloride 50 WP + water @ 1:2:9 resulted in appearance of disease free cambium (1.12cm) in all the scarified areas. Further no reoccurrence of the disease was observed in the assessed technology as recorded in the farmers' practice.

Problem definition: Losses due to Buckeye rot disease.

Technology assessed: Tomato is fast becoming major cash crop of the district Sirmour after ginger. The crop is planted in the month of April/May and fruits are ready from June onwards. It is cultivated in an area of about 2200 hectares. The incidence of buck eye rot is a serious threat to economic viability of this crop. KVK Sirmour conducted on farm trials for the management of buck eye rot in tomato. Results of the trials revealed that staking and removal of lower leaves, spray of Antracol (0.25%) followed by Indofil M 45 (0.25%) at 15 days interval found effective in managing the disease incidence and enhancing the fruit yield. This treatment resulted in minimum disease incidence (6.6%), highest marketable yield (22.7 t/ha) and highest B: C Ratio (2.84).

Problem definition: Drying of apple trees due to root rot disease

Technology assessed: District Shopian is called fruit bowl of Kashmir, which has 21,666 ha area under apple cultivation. The apple contributes around 8000 crores to exchequer every year. Due to profitability, more and more areas are coming under this crop. Over the years, with some bad practices of growers like, addition of excessive fertilizer near tree trunks, injuries to main roots with implements and excessive supply of irrigation, root rot of apple is turning out as major cause of concern for the growers. The symptoms of root rot include, week leaves, loss of dark green colour and ceasing of new annual growth. Since it is well known fact that managing any plant disease exclusively with chemicals is having deleterious effects, so KVK Shopian conducted an OFT on management of root rot by *Trichoderma harzianum* at three locations. The treatments comprised of opening & exposing of roots and applying any fungicides (farmers practice); adding of *Trichoderma harzianum* with decomposed cow dung at 1: 5 ratio and opening and exposing roots, removing affected roots parts and using paste of carbendazin + mancozeb + linseed oil @ 1:2:9 ratio at cut ends followed by drenching with solution of carbendazin @ 0.1% + Mancozeb @0.3%. All the treatments reduced the problem of root rot, however third treatment resulted in recovery of 80 per cent trees followed by *Trichoderma* treated trees with a recovery of 47 per cent. The least recovery (20%) was recorded in farmers practice.

Problem definition: Heavy tuber loss (70-80%) due to severe incidence of late blight of potato

Technology assessed: Multiple crops of potato are taken by the farmers in many pockets of Una district. The area under this crop has further increased due to land reclamation following Swan river channelization. However, late blight of potato causes heavy damage to the crop. Since the disease spreads very fast under congenial weather conditions, the farmers usually resort to preventive sprays of a variety of fungicides including metalaxyl 8% + mancozeb 64% (3g/L). The frequent sprays not only lead to cost escalation but many a times fail to check the disease spread. The KVK assessed the efficacy of a new fungicide Sectin (fenamidone 10% + mancozeb 50% (3g/L) along with seed treatment with *Trichoderma harzianum* (5.0 g/L). The results revealed that seed treatment with *Trichoderma harzianum*(5.0 g/L) and 2 sprays of Sectin (fenamidone 10% + Mancozeb 50%) @3.0 g/L effectively checked the disease (disease incidence- 1.8%) resulting in highest yield (305.3 q/ha). The recommended practice of 2 sprays of metalaxyl 8% + mancozeb 64% @(3.0 g/L) and 4 spray of dithane M 45 (2.0 g/L) proved second best (disease incidence- 6.4%) and yielded 262.4 q/ha as compared to repeated spray of metalaxyl 8% + mancozeb 64% (3.0 g/L) (disease incidence- 17.4% and yield - 208.6 q/ha) practiced by the farmers.

Problem definition: Low yield in pigeon pea due to high incidence of *Fusarium* wilt and spiral nematodes (*Helicotylenchus* spp).

Technology assessed: Pigeon pea is a potential *kharif* pulse crop in rainfed areas of district Bageshwar, but *Fusarium* wilt and spiral nematode- *Helicotylenchus* spp are serious problems associated with the crop deterring its fast adoption among farmers. Its acceptance among farmers otherwise is high because of its short duration (145-150 days) which is perfectly fitting in the existing cropping cycle-wheat-pigeon pea. But since last two years high incidence (up to 40 %) of *Fusarium* wilt and nematodes has been observed. Hence, KVK Bageshwar laid out on farm trials for the management of these biotic stresses comprising of three treatments viz. no treatment (farmers practice), seed treatment with *Trichoderma harzianum* (5 g/kg seed) + soil application of *Trichoderma harzianum* through compost (250 g/q compost) + Neem cake (5 q/ha) and seed treatment with Thiram @ 2g/kg seed + soil drenching with carbendazim @ 0.01% + Neemagon @ 0.2%. Results showed that maximum yield (11.50 q/ha) was obtained with third treatment followed by 9.5 qt/ha in second while in farmer's practice the yield obtained was 8.5 qt/ha.

2.3.2.4 Weed Management

Problem definition: High infestation of weeds in blackgram crop

Technology assessed: In intensive cropping system

pulses can be good crops in the district SBS Nagar (Punjab). Weed management is an important operation for any successful crop production programme. Due to unavailability of labour, weed management is considered as very important and economical method. Blackgram is an important pulse crop grown by the farmers in SBS Nagar of Punjab state. However, high infestation of weeds is the major problems faced by the farmers in the region. KVK Langroya (SBS Nagar) conducted On Farm Trial to assess the effect of imazethapyr as a post-emergence herbicide in blackgram. As per PAU recommendations, pre emergence herbicides pendimethalin @ 1000 ml/acre is the only recommended herbicide in this crop. Hence, imazathyper as post emergence herbicide was assessed with three different doses *i.e.,* imazethapyr @ 150, 250 and 350 ml/acre. Results of the OFTs reported that less weed infestation was observed by the application of imazethapyr @ 250 ml/acre after 25-30 days after sowing. The results of the trial concluded that imazethypar as post emergence herbicides should be advocated in blackgram growing areas.

Problem definition: Low yield of walnut due to mistletoe infection (Parasitic plant weed).

Technology assessed: Walnut is an important cash crop of Kashmir as well as of District Budgam. In recent years mistletoe infestation in walnut is a major problem of farmers of district Budgam that causes severe losses resulting in to low yield. Henceforth, an OFT was conducted to assess the performance of pruning and pruning + application of chemicals on the growth of parasitic plant. Results of the trial revealed that pruning + Ethaphon (10%) application were found effective in controlling the parasitic weed. In three months the four percent re-growth of mistletoe was observed.

2.3.2.5 Varietal Evaluation

Problem definition: Incidence of yellow rust and low yields in prevalent wheat cultivars under timely sown conditions

Technology assessed: Wheat is an important cereal crop grown during Rabi season in district Mandi, however incidence of yellow rust and low yields is resulting in poor returns. New high yielding wheat cultivars resistant to yellow rust are therefore required to be promoted in the region for making cereal based crops more profitable Hence, KVK Mandi conducted on farm trial to assess the performance of new HYVs of wheat cultivars under timely sown conditions in the district. Three varieties viz. HPW-236 (FP), HS-562 and HPW 368 was tested through OFT in order to assess the performance of these varieties. Data on different parameters like plant height, No. of tillers, disease incidence and grain yield was recorded. The results revealed that HS 562 not only outperformed the other cultivars in terms of yield (37.42q/ha) and other characters but also the incidence of yellow rust was almost negligible (5S) in the variety. The grain yield of HPR 368 was also at par (36.05q/ha) with HS 562.

Problem definition*:* Low yield of existing varieties/ hybrids of capsicum under protected conditions of district Hamirpur.

Technology assessed: Capsicum is the main crop grown under protected cultivation in district Hamirpur. The farmers are not having proper knowledge of the high yielding hybrids suitable for cultivation under protected conditions. KVK Hamirpur conducted on farm trials to evaluate the production potential of new hybrids of capsicum under protected conditions. The results of the trials indicated that Natasha hybrid gave highest yield (60 q/250 m^2 polyhouse) followed by Indra (48 q/250 m^2 polyhouse). The benefit cost ratio was also highest 5.6 and 4.5, respectively in these hybrids.

Problem definition: Bacterial wilt in existing cultivars

of brinjal

Technology assessed: Of late, during the summer season, solanaceous vegetables especially brinjal completely succumb due to the incidence of bacterial wilt disease in mid hill areas of district Kangra of Himachal Pradesh and the farmers are abandoning the cultivation of this crop. Indian Institute of Horticulture Research, Hessarghatta, Bangalore has developed some bacterial wilt disease resistant varieties and these varieties were evaluated and their performance was assessed in the farmers fields for higher yields as well as disease resistance. The varieties were tested at four locations and the results indicated that the highest yield of 310.0 q/ha was recorded in the hybrid Arka Anand with 95% plant survival, however, the fruit colour was whitish green, which has limited consumer preference. Whereas in other varieties (Arka Keshav and Arka Nidhi) the plant survival was also 90-95 per cent with purple fruits but the yields was significantly low ranging from 225-250 q/ha. The farmer's variety could yield only 155.0 q/ha.

Problem definition: Low productivity of old traditional wheat varieties grown in hilly area of district Kathua

Technology assessed: Wheat is important cereal crop of Kathua district and is grown in 44584 hectare area of the district. Due to cultivation of old/ traditional wheat varieties grown in hilly area, the productivity is quite low. To overcome the problem of low productivity in hilly region KVK Kathua conducted On Farm Trials (OFTs) at five locations to evaluate new wheat varieties under hilly region. The results of the OFT revealed that HS-507 and HS-490 recorded 29.5% and 24.5 % increase in grain yield over traditional variety (HS-240) with B:C ratio 3.0 and 2.6 respectively, as compared to farmers practice HS-240.

Problem definition: Low yield of capsicum due to high incidence of bacterial wilt under protected conditions

Technology assessed: Capsicum (*Capsicum annuum L*) is one of the most important high value cash crops being grown by the farmers of Himachal Pradesh under protected conditions as the State Agricultural and Horticultural departments are providing 85 % subsidies to the farmers for the construction of polyhouse. Presently, commercial cultivars or hybrids are being grown by the farmers to exploit this fruitful situation. However, majority of these cultivars or hybrids succumbs to the pressure of bacterial wilt caused by *Ralstonia solanacearum (Smith) resulting in partial to complete failure (90% crop loss) of this crop*. Since the pathogen is soil borne and the chemical control measures i.e. use of antibiotics being too costly, utilization of bacterial wilt resistant hybrids/ varieties seems to be the appropriate approach. Hence, KVK Kullu conducted on farm trial (OFT) at four locations in cluster villages to study the performance of bacterial wilt resistant hybrids under protected conditions of

capsicum. The revealed that hybrid 'Asha' gave the maximum fruit yield of capsicum (1.809 t/250 m^2 unit of polyhouse) along with the maximum B:C ratio (2.27) and the said also showed highly resistant reaction to bacterial wilt (4.33 % incidence) closely followed by hybrid Orobelle, which recorded fruit yield of 1.747 t/250 m^2 unit of polyhouse along with highly resistant reaction to bacterial wilt (8.66 % incidence). The commercial hybrid Indra (FP) produced the lowest fruit yield i.e. 1.403 t/250 m^2 unit of polyhouse and fell into moderately resistant category of bacterial wilt (25.66 % incidence).

Problem definition: Late maturity of cucumber hybrids under protected conditions

Technology assessed: Farmers of Changthang were growing leafy vegetables mostly in green houses during summers. However, greenhouses can offer crop cultivation of Solanaceous and Cucurbitaceous vegetables. Moreover, vegetables diversification is also required for nutritional security. Among all the hybrids tried by KVK Nyoma, cucumber hybrid Aviva recorded highest yield (381.25 q/ha). However, early crop has been observed in Aviva and Vista genotypes, which was very much liked by the farmers. Despite of good yield, hybrid SH-1 and SH-2 were less preferred by farmers due to late maturity. Highest B:C ratio was observed in Aviva (1.75) followed by SH-2 (1.63) and Vista (1.58). Therefore, Aviva may be recommended for cultivation in greenhouses during summers in Changthang region.

Problem definition: High infestation of yellow rust in existing wheat varieties

Technology assessed: Yellow rust in the non recommended wheat varieties are the major problem of the farmers in district Ropar. Moreover, the variety HD-2967 available for cultivation have become prone to yellow rust, leading to decline in the overall grain yield during the past few years. KVK Ropar conducted on farm trials to assess the performance of wheat varieties viz. Unnat PBW 343, PBW Zn 1, PBW 725, PBW 677, HD 2967, HD 3086, WH 1105, HPW 368, HPW 349 and Barbett under irrigated conditions of Ropar district. The data of the OFT revealed that Unnat PBW 343, PBW Zn 1, PBW 725, PBW 677, WH 1105 and HD 3086 was found resistant, variety HPW 368, HPW 349 moderately resistant whereas variety HD 2967 and barbett was found susceptible against yellow rust.

Problem definition: Reduction in yield due to the incidence of bacterial wilt in tomato

Technology assessed: Solan district of Himachal Pradesh is known for the quality production of tomato and is a source of livelihood for small and marginal farmers. Incidence of bacterial wilt has emerged as a major threat in the production of tomato which has lead to the indiscriminate use of fungicides, thereby causing environmental pollution. Keeping in view the problems being faced by the farmers, KVK, Solan conducted On Farm Trial (OFT) on the evaluation of hybrids for increased yield and resistance to wilt at ten locations in the district. Three hybrids viz., SUN-7711, US-2853 and Red Gold were compared with the hybrids grown by the farmer's. Results of the trial indicated that hybrid, SUN-7711 recorded its superiority over all other hybrids for yield (710 q/ha) and B: C ratio (4.09). Incidence of wilt was also recorded minimum in SUN-7711 (15.5 %).

2.3.2.6 Integrated Crop Management

Likewise in district Bandipora where paddy is cultivated over an area of 9800 ha with an average yield of 52 q/ha Planting more than 12 seedlings per hill by farmers results in high seed rate, poor tillering and stand. KVK Bandipora conducted on farm trials on effect of age of seedling and number of seedlings per hill exploiting system of rice intensification (SRI) technology on yield of paddy at three different locations in the district. Results of the trial revealed that planting of 18 day old seedlings (2 seedlings per hill) produced 88 quintals/ha of paddy as compared to 66 quintals/ha (farmers practice) with an increase of 33% over check.

Problem definition: Lower income due to improper cropping system

Technology assessed: Farmers of district are following Rice- Wheat cropping system over the years. The yield, profitability and cropping intensity of this system needs to be increased by introducing new cropping system. To address this problem, KVK, Pithoragarh conducted on-farm trial to assess the performance of different

cropping system for increasing yield and profitability. Rice-vegetable pea- green coriander was found to be the most profitable cropping sequence for the region resulting in rice equivalent yield of 164.4 q/ha.

Problem definition Prolonged drought during growth period causing excessive fruit drop and reduction in size and quality of apple

Technology assessed: Apple is one of the most important cash crop of district Shimla, but prolonged drought during growth period causes excessive fruit drop, reduction in size & quality of apple and returns of the farmers. An OFT was therefore laid out in the district by KVK Shimla to assess the effect of mulching practices to check fruit drop and improve fruit size and yield in apple. The OFT was conducted at five locations comprising three treatment viz. black polythene mulch; grass mulch and un mulched control. In both the mulch treatments, fruit drop was comparatively less; fruit yield and quality was improved due to more availability of nutrients and soil moisture compared to farmers practice. Black polythene mulching was found giving maximum fruit yield of 19.6 t/ha followed by grass mulch (16.2 t/ha).

Problem definition: Low yield and inferior quality of apple due to faulty pruning

Technology assessed: Apple is the major fruit of the J&K. District Srinagar has an area of 1410 hectares under apple. Alternate bearing, defective pruning and training are some of the causes which not only deteriorate its quality but reduce its yield also. Reports indicate that faulty pruning practiced by the orchardists is the cause behind these factors. Keeping this in view, KVK Srinagar conducted an OFT at four locations of the district wherein three pruning methods *viz*. 10% pruning level (farmers practice), 25% pruning (recommended practice) and 35% pruning level (assessed practice). The results revealed that there was 15-20% increase in the yield with high quality of apple at 35% pruning level as compared with the 10% pruning level adopted by farmers.

2.3.2.7 Crop Residue Management

Problem definition: Burning of paddy straw

Technology assessed: Paddy-wheat is the main crop rotation in Bhatinda district of Punjab. After harvest of paddy, farmers generally burn the paddy crop residues, which not only causes environmental pollution but also

great loss of nutrients and beneficial insects/pathogens. To manage the paddy straw an OFT on different methods of sowing of wheat after paddy crop was conducted by KVK Bhatinda. Results of the trial revealed that sowing of wheat after using chopper cum spreader & incorporation and normal sowing gave maximum yield (57.0 q/ha) of wheat crop as compared to sowing of wheat with happy seeder (55.2 q/ha) after harvesting of paddy crop.

Problem definition: Management of paddy residue before sowing of wheat

Technology assessed: KVK Hoshiarpur conducted on farm trials on comparative performance of wheat sowing in paddy residue conditions viz. sowing with seed cum fertilizer drill after burning of paddy residue (farmers' practice); sowing of wheat with Happy Seeder after the operation of Super SMS combine (recommended practice) and sowing of wheat with spatial no till drill after Super SMS Straw combine (Practice under test). The yield of wheat crop sown with Happy Seeder after the harvesting of paddy with Super SMS combine was highest (59.3 q/ha) along with improvement in soil health and environmental protection followed by the conventional practice of wheat sowing (56.8 q/ha). The practice of wheat sowing with Happy Seeder saves not only the cost of cultivation and but also one pre sowing irrigation (*rauni).* Timely sowing of wheat in paddy residue conditions is possible with Happy Seeder. The Benefit Cost (BC) ratio was highest (4.21) for the direct sown wheat with Happy Seeder after the operation of Super SMS combine.

Problem definition: Management of paddy residue and environmental pollution due to burning of paddy residue

Technology assessed: Paddy-wheat is the major cereal based cropping system practiced in Moga district of Punjab. Generally, farmers harvest the rice crop with combine harvester in the region. The paddy residues are left behind after the harvesting of paddy. In order to sow the next wheat crop, paddy residue is generally burnt, that causes environmental pollution. IN order to combat such practice, KVK Moga conducted on farm trials and assessed performance of sowing of wheat through happy seeder and roto seed drill in comparison to farmer practice (paddy residue burning). It was observed that although farmer practice got the maximum yield of 55.37 q/ha followed by happy seeder (53.34 q/ha) and roto seed drill (52.32 q/ha), but the intangible environmental benefits of avoiding of burning of crop residue are worth more than the slight loss of yields. On the other hand B:C ratio was least (2.71) in case of farmer practice and maximum (3.61) in happy seeder followed by roto seed drill (3.34). The added advantage of Happy Seeder and Roto Seed Drill is sowing of wheat in paddy residues without burning.

Problem definition: Environmental pollution and soil health deterioration due to paddy straw burning

Technology assessed: Environmental pollution and soil health deterioration due to paddy straw burning is a major problem in the district. So, KVK Faridkot conducted on farm trials on comparative evaluation of different resource conservation techniques for wheat sowing. Sowing wheat after harvesting paddy with combine with SMS gives highest yield in comparison to other sowing methods. Chopping of straw before sowing leads to accumulation of straw at one place and hence creates hindrance at the time of sowing. Harvesting then chopping followed by rotavator increases number of operations without much change in the yield. Sowing directly with happy seeder after harvesting with combine and SMS resulted in saving of ₹2500-3000/- per ha. Moreover weed population was 35-40% less in happy seeder plot in comparison to the conventional method of sowing. Lodging percentage in case of happy seeder sown crop was almost nil as compared to conventional method. Sowing of wheat with happy seeder after harvesting with combine with SMS could be a possible solution for straw burning.

2.3.2.8 Mushroom cultivation

Problem definition: Non availability of cereal straw in some parts of district

Technology assessed: Mushroom cultivation is a popular venture for quick income generation and supplementation of farm income, but non availability of technical knowhow and quality compost is the main constraint for its non-adoption in district Kangra.

Keeping in view these problems, farmers' were encouraged to adopt oyster mushroom cultivation instead of white button mushroom which is easier, involves less investment and gives higher and early returns. Cereal straws are costlier, used for feeding cattle, and other agricultural purposes, so combinations of cereal and legume substrates for oyster mushroom cultivation were evaluated by KVK Kangra at ten locations in different combinations. Both straw substrates were evaluated in ratio of 1:3, 1:1 and 3:1. Yield was recorded in terms of biological efficiency and it was observed that combination of paddy straw + soybean straw (1:1) and paddy straw + soybean straw (3:1) were on par in terms of biological efficiency (80-84%) with each other and with individual substrates used for cultivation of oyster mushroom indicating that in case of non availability of cereal straw, combination of legume straw with cereal straw can be used to prepare substrate for oyster mushroom cultivation. Yield varied between 1.6 to 1.8 Kg/ 2Kg of dry straw depending upon the up-keep of bags by famers.

2.3.2.9 Drudgery Reduction

Problem definition: Labour intensive weed management in vegetables

Technology assessed: Reduced work efficiency of farm women, use of old tools in agricultural operations and non availability of improved agriculture tools are the major constraint of women in hilly areas of Uttrakhand. In hilly areas women are the back bone of Agriculture as they are engaged in agriculture as well as home activities for more than 18 hours. Realizing the issue, KVK Almora conducted on farm trial to assess the use of wheel hoe to save time and labour. Results indicated that wheel hoe is less tiring and very useful for weeding operation in vegetables.

2.3.2.10 Livestock Management

Problem definition: Steep fall in milk yield of buffaloes after peak

Technology assessed: The amount of energy required for maintenance of body tissues and milk production exceeds the amount of energy available from diet leading to negative energy balance during early lactation in dairy animals. Inclusion of bypass fat in the ration of dairy animals increases calorific density of ration thus increasing intake and efficiency of energy utilization, especially during periparturient period. Adding protected fat to the dairy rations can positively affect the efficiency of dairy animals through its greater energy content and the energetic efficiency of lipids is more as compared to carbohydrates or proteins, which is reflected in increased milk production. It has been observed that there is steep fall in milk yield after the peak which results in reduction in milk yield and the lactation length in buffaloes and the farmers experience a great monetary loss due to this. To address this issue on farm trial was conducted in buffaloes by KVK Amritsar. Supplementation of bypass fat was done to the treatment group. Control group was given basal diet (green fodder + concentrate mixture + wheat straw) as per the nutrients requirements. Feeding of bypass fat (prilled fat) 150 grams per day to the animals in treatment group showed 9.3 per cent increase in milk yield over the control group. Feeding of bypass fat resulted in benefit of ₹29.60 per animal with net return (profit) of ₹17.30 per animal per day.

Problem definition: High energy requirements in higher milk producing crossbred cows

Technology assessed: Dairy animals are important for milk production in India and farmers are not feeding the higher milk producing animals as per their requirements. This is the main reason that dairy crossbred animals especially higher yielder cows are not performing as per their potential. The role of feeding bypass fat thus becomes more important under such conditions. Therefore, KVK, Sangrur conducted on farm trials to assess the effect of feeding bypass fat on production performance in cross bred cows at five locations. The investigation revealed that the feeding of animals with bypass fat @ 200 gm per day gave maximum average milk yield of 21.6 kg per day with the highest BC ratio of 1:2.20 followed by feeding of bypass fat @ 150 gm per day with average milk yield of 20.7 kg per day and BC ratio of 1:2.14.

Problem definition: High incidence of post calving anoestrous condition in buffalo resulting in huge economic loss in dairy farming.

Technology assessed: Buffalo is the main milking animals (58%) in the district Bageshwar. Farmers adopted stall feeding method for buffalo rearing. The average milk production in buffalo is 4.58 litre per day in the district. As per district statistical diary 2016-17, the incidence of anoestrous condition is about 30-40 percent in post calving buffaloes. Farmers are facing economic losses due to high cost of rearing and low milk production. KVK Bageshwar conducted on farm trials to assess the effect of three treatments viz. use of mustard oil cake during winter season (farmers' practice), using Anthelmentics and feed supplements/ mineral mixture @ 50 g/ animal/ day till 60 days and use of anthelmentics + feed supplements/ mineral mixture @ 50 g/ animal/ day till 60 days + use of Janova herbal capsules to correct the hormonal deficiencies to reduce the incidence of anoestrous condition in buffaloes. In farmers practice, only 10 percent animals were recovered in oestrous condition, while in second and third treatments, about 40 and 90 percent animals were recovered in oestrous condition, respectively. It showed that heavy infestation of parasites and hormonal deficiencies leads to anoestrous condition in post calving buffaloes.

Problem definition: Low eggs production/ year and low body weight.

Technology assessed: Farmers of the area were raising desi birds since long but due to the low production and performance, farmers were no more interested in backyard poultry rearing. Keeping in view the problem of the farmers, KVK Budgam introduced improved breeds (Kroiler) under OFT for comparative evaluation of local and improved breed. The data revealed that there is huge difference between production performance with respect to local and improved breeds. Eggs production of desi birds was found as 90-100 eggs/ year and adult body weight was 1.5-2 kg; whereas in improved breed (Kroiler) egg production recorded was 180-190 eggs/ year with adult body weight of 3.5-4.5 kg. It is evident from the results that due to introduction of Kroiler, the overall income of farmers has doubled.

Problem definition: High feeding cost of animals during harsh winter in Kashmir valley

Technology assessed: In animal production, over 70 per cent of the cost of production accounts for feeding only. Valley of Kashmir though blessed with having good number of alpine and sub alpine supporting sheep grazing during summer season. But, due to inclement weather conditions and snowfall during winter months (November to April), these pastures and community grazing lands are covered with snow and the farmers are left with paddy straw as the only major source of fodder. The paddy straw being low in nutrients required by animals fails to satisfy the nutritional requirement of animals. As such fortification of paddy straw by urea,

molasses, salt and mineral mixtures could enhance its nutritional value and hence animal production during lean periods. Realizing that sheep farmers spend more on concentrate feeds in absence of green fodder and quality dry fodder in Kashmir valley, KVK-Ganderbal laid five number of OFTs on the fortification of paddy straw by different ingredients viz. urea, molasses, salt and mineral mixtures with a view to enhance its nutritional value wherein fertilizer grade urea serve as protein, molasses as energy and salt with mineral mixture as energy source. To 100 kgs of chaffed fodder, urea, molasses, salt, mineral mixtures were added @ 5, 10, 1 and 2 per cent, respectively. The trial revealed that fortification with urea, molasses, salt and mineral mixtures together in the aforesaid concentrations resulted into increase of the crude protein, average dry grass intake per day and average daily gain per day from 3.40, 745 and 72.4 to 7.25, 798 and 96.6, respectively. While as there was decrease of dry matter from 91 to 56 per cent and decrease in feed cost per animal per day by 15 per cent.

Problem definition: Frequent occurrence of mastitis in dairy animals

Technology assessed: Mastitis in dairy animals is considered as multi-factorial disease, which leads to huge economic losses by reducing the quality and quantity of the milk. Although bacteria are considered to be the main causative agent for mastitis, beside this farm management practices are found to be associated with this disease. Mastitis is one such infection, which not only alters the composition of milk but also decrease milk yield. Un-hygienic milking practices and delay in detection of sub clinical mastitis are important contributing factors in high incidences of mastitis. In India, the annual economic loss due to mastitis is estimated to be more than 7000 crores. In order to manage this disease, KVK Gurdaspur conducted on farm trials at three locations by using different treatments viz. no teat dip after milking (FP), post milking teat dip with iodine (0.5%) (RP) and use of trisodium citrate + teat dip. It was found that there was no incidence of mastitis using trisodium citrate along with post milking teat dipping with iodine (0.5% solution).

Considering the significance of this disease for dairy farmers, KVK, S.A.S. Nagar (Mohali) also conducted on farm trials to assess the effect of different teat dip in post milking management of lactating buffaloes. This trial was conducted at 10 dairy farms having 3 lactating buffaloes each. Farmers were not using teat dip in post milking of dairy animal and followed only pre-milking wash with normal tap water. The teat dip with betadine + glycerin (3:1) along with pre-milking wash with KMnO4 solution (RP) and Filmadine (8% lactic acid) teat dip along with pre-milking wash with KMnO4 solution (commercial formulation) were assessed for mastitis management. The dairy animals under different treatments were tested with California Mastitis Test (CMT) periodically for detection of subclinical mastitis. The incidence of mastitis in second (RP) and third treatment (commercial formulation) was 10 and 30 per cent, respectively compared to 70 per cent in farmers practice. The observations clearly indicated that the animals treated with betadine + glycerin (3:1) teat dip along with pre-milking wash with KMnO4 solution showed less prevalence of mastitis than that of using commercial teat dip and control. The average milk yield was found 9.2 kg in farmers practice whereas it was 26.63 per cent (11.65 kg) higher in second and 17.39 per cent (10.8 kg) higher in third treatment as compared to control group. The average fat per cent in milk was 5.71, 6.39 and 6.14; solid not fat percent 9.12, 9.26 and 9.16; protein per cent 3.26, 3.32 and 3.27; and lactose per cent was 4.30, 4.47 add 4.36 in control, second and third treatment$_2$ respectively. Recommended practice, teat dip with betadine + glycerine (3:1) along with pre-milking wash of teats with KMnO4 is easy to formulate, cheaper and quite effective in prevention of mastitis in buffaloes.

Problem definition: Scarcity of feed resources/ utilization of unconventional available feed stuffs

Technology assessed: In recent years, farmers in Kathua district are facing deficiency of feedstuffs for feeding of livestock population. KVK Kathua conducted on farm trials at four locations to evaluate maize cobs as a replacement for wheat straw. The

results of the OFT showed that 100 per cent replacement of wheat straw with chopped maize cobs and 50 per cent replacement of wheat straw with maize cobs resulted in 5.7 litre and 5.2 litre milk production per animal per day, respectively compared to 4.5 litre in farmers practice (wheat straw).

Problem definition: Imbalanced feeding of dairy animals

Technology assessed: Feeding of dairy animals is an important aspect of dairy farming. About 65-70 percent expenditure occur on feeding in dairy farming. Due to less area under fodder cultivation and non-availability of fodder uniformly throughout the year, farmer rely more on feed or grains and oil cakes to meet the nutrition requirement of animal. Feeding of feed and feed ingredients increases cost of production. Besides this, feeding of excessive feed and feed ingredients increase incidence of digestive problems such as acidosis and lameness in dairy animals. KVK Patiala conducted on farm trails to assess the effect of feeding TMR (total mixed ration) v/s conventional feeding methods on production and reproductive performance in dairy animals. Feeding of TMR is associated with higher milk production (26% higher than feeding of grains and oilseed cakes and 1.8 % higher than balanced feed). Feeding of TMR associated with slightly higher fat percentage, better conception rate and reduced the incidence of acidosis in dairy animals.

Problem definition: Shortage of carp seed and heavy mortality rate in nursery ponds

Technology assessed: Availability of quality fingerling size carp seeds is a major problem in district Tarn Taran. Fish farmers are purchasing fish spawn which was 1/2 to 1 inch size from reputed government fish hatcheries and directly stocking in the production ponds. Because of predation by birds and other aquatic animals in production ponds very low survival rate and fish yield was obtained. KVK, Tarn Taran conducted on farm trial (OFT) on growing spawn up to fingerling stage by constructing separate small nursery ponds besides the production pond at two locations in the district. Results of the trails revealed that in nursery pond management growing up to fingerling stage by stocking of spawn 3 lac/ 0.1ha for 60 days increased yield by 62 per cent over routine practices with increment of 10 per cent survival rate and highest BC ratio of 1.73.

2.3.2.11 Value Addition

Problem definition: Short shelf life of hill Lemon (Galgal) juice

Technology assessed: Hill lemon (Galgal) is found in abundance in Mandi district of Himachal Pradesh. Farm women used to preserve its juice for adding it as a souring agent in making various food preparations. But due to short shelf life of this juice, the trend of preserving is declining. Keeping this in view, KVK, Mandi conducted an OFT on "Assessment of various treatments on the shelf life of hill Lemon (Galgal) juice"; in which galgal juice was boiled until there is any foam formation. Addition of 20 g salt/l of juice and topping of this juice with 20 ml oil was taken as 1st treatment. Boiling of juice by adding 0.50g Sodium Benzoate /l of juice as preservative was the 2nd treatment and preservation of boiled juice with 0.70g Potassium metabisulphite /l of juice was considered as 3rd treatment. Based on the evaluation of shelf life parameter it was observed that boiling of juice by adding 20g salt and top dressing of layer of 20 ml mustard oil has increased its shelf life up to 8 months.

Chapter 3

FRONTLINE DEMONSTRATIONS

Frontline demonstrations (FLDs) were conducted by KVKs to demonstrate the production potential of newly released crop varieties and production technologies in crops, livestock and fisheries for enhancing production and income generation through successful technologies and agriculture related enterprises on the farmers' fields in a given farming system. During the period under report, a total of 13928 demonstrations were conducted covering an area of 2549.12 ha and 3541 units. Under crops, 11963 FLDs were conducted by the KVKs of Zone-I. Maximum demonstrations were conducted in cereal & millets (5221) followed by vegetables & spices (1889), oilseeds (1362), pulse crops (1243), fodder crops (777), Commercial crops (212), fruits (178), and flowers (77) in an area of 2549.12 ha. Further, the KVKs also conducted 1521 FLDs related to livestock & fisheries and 444 other demonstrations (Table 3.1).

3.1 Cereals & Millets

A total of 6225 demonstrations on various cereal and millet crops were conducted, covering an area of 1840.36 ha, during the year 2017-18 by the KVKs of Zone-I. The state wise break up of FLDs on cereal & millet crops includes 2186 demonstrations in Punjab, 466 in Himachal Pradesh, 1997 in Jammu & Kashmir and 1576 in Uttarakhand. The state wise details of results of FLDs are presented as under:

3.1.1 Punjab

A total of 2186 demonstrations on cereal crops, covering an area of 1161.60 ha, were conducted by KVKs of Punjab at farmers' field during the year under report (Table 3.2). During Kharif season, 422 demonstrations of paddy, 126 of basmati, 299 of maize and during Rabi season, 1323 demonstrations of wheat and 16 of barley were conducted. The average yield of demonstrations on paddy and basmati was found to be

Table 3.1: Overview of Frontline Demonstrations conducted in Zone-1

Crops category	No.	Area (ha)	Units
Cereals & millets	6225	1840.36	-
Oilseeds	1362	187.73	-
Pulses	1243	164.47	-
Vegetable & spices	1889	131.19	-
Fruit crop	212	21.80	-
Flowers	77	3.80	-
Fodder crops	777	132.57	-
Commercial crops	178	67.20	-
Total	**11963**	**2549.12**	**-**
Livestock & fisheries			
Dairy	861	-	1712
Sheep & Goat	12	-	65
Poultry	593	-	1740
Fisheries	54	-	-
Pig	1	-	24
Total	**1521**	**-**	**3541**
Others			
Mushroom production	131	-	-
Farm implements	28	-	-
Home science	285	-	-
Total	**444**	**-**	**-**
Grand total	**13,928**	**2549.12**	**3541**

Table 3.2: Frontline demonstrations on cereals conducted in Punjab

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ. of Demo		Econ. of Check	
				Demo	Check		Net return	BCR	Net return	BCR
Paddy	8	422	321.2	74.37	72.43	2.68	79816	3.40	77162	3.21
Basmati	6	126	47.4	46.32	44.09	5.07	98264	3.83	91347	3.47
Maize	6	299	130.0	43.34	38.24	13.34	25605	1.78	19611	1.61
Wheat	8	1323	658.0	52.45	50.07	4.77	61616	3.13	56499	2.88
Barley	1	16	5.0	39.30	37.20	5.65	33640	2.54	30280	2.39
		2186	**1161.6**							

Econ= Economics; Demo= demonstrations; BCR = B.C ratio

74.37 and 46.32 q/ha as compared to local check yield of 72.43 and 44.09 q/ha, which is an increase of 2.68 and 5.07 per cent, respectively. The BC ratio of demonstration on paddy and basmati was also found to be higher (3.40& 3.83) in comparison to local check (3.21 & 3.47) respectively. The average yield of demonstrations on maize was found to be 43.34 q/ha as compared to 38.24 q/ha of local check, which is 13.34 per cent higher. In case of wheat, the average yield of demonstrations was observed to be 52.45 q/ha as compared to 50.07 q/ha of local check, which is 4.77 per cent higher. The BC ratio of demonstration (1.78) was found higher as compared to local check (1.61). The average yield of demonstrations of barley was found to be 39.30 q/ha which is 5.065 per cent higher in comparison to check. Similarly, BC ratio of demonstration was also found higher as compared to local check. Technologies such as water management, Integrated Disease Management, Integrated Pest Management, Integrated Weed Management, Integrated Nutrient Management, Resource Conservation Technologies and improved varieties of paddy, basmati, maize and wheat have led to gain in yield as compared to farmers' practices.

3.1.2 Himachal Pradesh

A total of 466 demonstrations on cereal crops were conducted by KVKs of Himachal Pradesh covering an area of 103.45 ha during the year under report including 118 demonstrations of paddy, 69 of maize and 279 of wheat (Table 3.3). The average yield of demonstrations on paddy was recorded 37.96 q/ha as compared to local check yield of 31.41 q/ha, which is an increase of 24.20.83 per cent yield over local check. The BC ratio of demonstration was found to be higher (2.27) than the local check (2.07). The average yield of demonstrations on maize was found to be 32.77 q/ha as compared to 28.23 q/ha of local check, which is an increase of 16.06 per cent yield over local check. The BC ratio of maize demonstrations was found to be higher (2.22) than the local check (1.99). In case of wheat, the demonstration yield was observed to be 34.00 q/ha as compared to 27.84 q/ha of local check, which is an increase of 22.16 per cent over local check. The BC ratio of wheat demonstration (2.20) was found higher than the local check (1.96). Technologies such as Integrated Disease Management, Integrated Pest Management, Integrated Weed Management, Integrated Nutrient Management and improved varieties of paddy, maize and wheat have led to gain in yield as compared to farmers' practices.

Table 3.3: Frontline demonstrations on cereals conducted in Himachal Pradesh

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ. of Demo		Econ. of Check	
				Demo	Check		Net Return	BCR	Net Return	BCR
Paddy	4	118	29.62	37.96	31.41	20.83	40063	2.27	28987	2.07
Maize	3	69	21.75	32.77	28.23	16.06	25637	2.22	19930	1.99
Wheat	7	279	52.08	34.00	27.84	22.16	29625	2.20	21602	1.96
		466	**103.45**							

3.1.3 Jammu & Kashmir

A total of 1997 demonstrations on cereal crops were conducted by KVKs of Jammu & Kashmir covering an area of 466.15 ha during the year under report including 899 demonstrations of paddy, 667 of maize and 431 of wheat (Table 3.4). The average yield of demonstrations on paddy crop was recorded 55.42 q/ha, which is an increase of 25.10 per cent yield over local check. The BC ratio of demonstration was found to be higher (2.84) than the local check (2.67). The average yield of demonstrations on maize was found to be 41.04 q/ha, which is an increase of 38.62 per cent yield over local check. The BC ratio of maize demonstrations was found to be higher (2.80) than the local check (2.19). In case of wheat, the demonstration yield was observed to be 38.94 q/ha, which is an increase of 38.94 per cent over local check. The BC ratio of wheat demonstration (2.95) was found higher than the local check (2.29). Technologies such as Integrated Disease Management, Integrated Pest Management, Integrated Weed Management, Integrated Nutrient Management and improved varieties of paddy, maize, wheat and barley have led to gain in yield as compared to farmers' practices.

3.1.4 Uttarakhand

A total of 1576 demonstrations on cereals & millets were conducted by KVKs of Uttarakhand covering an area of 109.16 ha during the year under report including 363 demonstrations of paddy, 2 of basmati, 69 of maize, 607 of wheat, 22 of barley, 339 of finger millets, 154 of Barnyard millets and 20 of ragi (Table 3.5). The average yield of demonstrations on paddy and basmati was recorded 42.47 and 34.30 q/ha, which is an increase of 27.04 and 47.84 per cent, respectively. The BC ratio of paddy and basmati was also found to be higher in case of demonstration (2.42 & 2.58) in comparison to local check (1.87 & 1.94), respectively. The average yield of demonstrations of maize was recorded 42.10 q/ha, which 48.76 per cent higher than the local check. The BC ratio of maize demonstrators was also found to be higher (3.55) in comparison to local check (2.89), respectively. In case of wheat and barley, the average yield of demonstrations was observed to be 29.14 and 18.70 q/ha, which is 28.59 and 33.57 per cent higher, respectively. The BC ratio of wheat and barley was found 2.09 and 1.59 which is higher as compared to local check (1.82 and 1.31),

Table 3.4: Frontline demonstrations on cereals conducted in Jammu & Kashmir

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ. of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Paddy	9	899	184.50	55.42	44.30	25.10	89099	2.84	76823	2.67
Maize	12	667	169.15	41.04	29.61	38.62	59789	2.80	38125	2.19
Wheat	9	431	112.50	34.89	25.11	38.94	45233	2.95	27934	2.29
		1997	**466.15**							

Table 3.5: Frontline demonstrations on cereals and millets conducted in UK

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Paddy	8	363	30.16	42.47	33.43	27.04	40687	2.42	24390	1.87
Basmati	1	2	0.04	34.30	23.20	47.84	52550	2.58	23500	1.94
Maize	2	69	4.00	42.10	28.30	48.76	63443	3.55	40778	2.89
Wheat	8	607	53.56	29.14	22.66	28.59	27680	2.09	19196	1.82
Barley	1	22	0.80	18.70	14.00	33.57	9680	1.59	4600	1.31
Finger millets	6	339	13.60	14.84	10.90	36.18	18138	2.45	11760	2.05
Barnyard millets	2	154	6.00	15.09	11.59	30.25	20189	2.80	14496	2.46
Ragi	1	20	1.00	13.20	11.30	16.81	12850	1.95	10100	1.81
		1576	**109.16**							

respectively. The average yield of Finger millet, barnyard millet and ragi was observed to 14.84, 15.09 and 13.20 q/ha, respectively. It is 36.18, 30.25 and 16.81 per cent, respectively increase over local check. The BC ratio was also observed higher in case of demonstrations of all three crops as compared to local check. Technologies such as water management, Integrated Disease Management, Integrated Pest Management, Integrated Weed Management, Integrated Nutrient Management, Resource Conservation Technologies and improved varieties of paddy, basmati, wheat, barley and pearl millet have led to gain in yield as compared to farmers' practices.

3.2 Oilseeds

A total of 1362 demonstrations were conducted in various oilseeds crops covering an area of 187.73 ha during the year by the KVKs of Zone-I. The state wise break up of FLDs conducted on oilseed crops includes 167 in Punjab, 83 in Himachal Pradesh, 401 in Jammu & Kashmir and 711 in Uttarakhand. The state wise details of results of FLDs on oilseed crops are presented as under:

3.2.1 Punjab

A total of 167 demonstrations on oilseed crops were conducted by KVKs of Punjab covering an area of 67.40 ha during the year under report including 25 demonstrations of mustard, 55 of gobhi sarson, 56 of sesame, 20 of ground nut and 11 of soybean (Table 3.6). Technology demonstrated on various crops under oilseeds performed better over local check. The increase in demonstration yield over local check varies from 10.68 to 36.64 percent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated Crop Management, Integrated Nutrient Management, Integrated Disease Management, Integrated Pest Management, and improved varieties of various oilseed crops have led to gain in yield as compared to farmers' practices.

Table 3.6: Frontline demonstrations on oilseeds conducted in Punjab

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econo of demos		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Mustard	1	25	10.00	21.35	19.29	10.68	58965	5.33	52476	5.00
Gobhi sarson	2	55	20.80	21.55	18.45	16.80	46325	3.45	35250	2.86
Sesame	3	56	31.60	5.98	5.00	19.67	16814	1.96	11271	1.65
Groundnut	1	20	1.00	19.95	14.60	36.64	21868	1.47	5905	1.13
Soyabean	1	11	4.00	12.40	11.20	10.71	3787	1.12	241	1.01
		167	**67.40**							

3.2.2 Himachal Pradesh

A total of 83 demonstrations on oilseed crops were conducted by KVKs of Himachal Pradesh covering an area of 11.08 ha during the year under report including 38 of brown sarson, 30 of toria, and 15 of soybean (Table 3.7). Technology demonstrated on various crops under oilseeds performed better over local check. The increase in demonstration yield over local check varies from 19.31 to 35.71 percent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated Crop Management, Integrated Nutrient Management, Integrated Disease Management, Integrated Pest Management, and improved varieties of various oilseed crops have led to gain in yield as compared to farmers' practices.x

3.2.3 Jammu & Kashmir

A total of 401 demonstrations on oilseed crops were conducted by KVKs of Jammu & Kashmir covering an area of 65.96 ha during the year under report including 144 of brown sarson, 173 of gobhi sarson, and 84 of sesame (Table 3.8). Technology demonstrated on various crops under oilseeds performed better over local check. The increase in demonstration yield over local check varies from 37.18 to 50.77 per cent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated Nutrient Management, Integrated Disease Management, Integrated Pest Management, and improved varieties of various oilseed crops have led to gain in yield as compared to farmers' practices.

Table 3.7: Frontline demonstrations on oilseeds conducted in Himachal Pradesh

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Brown sarson	1	38	5.28	5.40	4.50	20.00	7300	1.75	4300	1.51
Toria	2	30	3.80	9.05	7.59	19.31	9157	1.27	4944	1.16
Soyabean	1	15	2.00	7.60	5.60	35.71	10000	1.60	6300	1.47
		83	**11.08**							

Table 3.8: Frontline demonstrations on oilseeds conducted in Jammu & Kashmir

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Brown Sarson	7	144	36.96	11.31	8.24	37.18	30123	2.12	15932	1.65
Gobhi Sarson	3	173	18.00	9.33	6.65	40.23	33708	3.69	16080	2.32
Sesame	2	84	11.00	4.90	3.24	50.77	33650	4.56	19900	3.40
		401	**65.96**							

3.2.4 Uttarakhand

A total of 711 demonstrations on oilseed crops were conducted by KVKs of Uttarakhand covering an area of 43.29 ha during the year under report including 123 demonstrations on mustard, 112 on toria, 12 on sesame and 464 on soybean (Table 3.9). Technology demonstrated on various crops under oilseeds performed better over local check. The increase in demonstration yield over local check varies from 27.93 to 38.17 per cent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated Crop Management, Integrated Nutrient Management, Integrated Disease Management, Integrated Pest Management, and improved varieties of various oilseed crops have led to gain in yield as compared to farmers' practices.

3.3 Pulses

A total of 1243 demonstrations were conducted on various pulse crops covering an area of 164.47 ha during the year by the KVKs of Zone-I. The state wise break up of FLDs conducted on pulse crops includes 173 in Punjab, 91 in Himachal Pradesh, 536 in Jammu & Kashmir and 443 in Uttarakhand. The state wise details of results of FLDs on pulse crops are presented as under:

3.3.1 Punjab

A total of 173 demonstrations on pulse crops were conducted by KVKs of Punjab covering an area of 46.80 ha during the year under report including 59 demonstrations of moong, 25 of lentil and 138 of lentil (Table 3.10). Technology demonstrated on various crops under pulse performed better over local check. The increase in demonstration yield over local check varies from 6.56 to 18.75 per cent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated Nutrient Management, Integrated Disease Management, Integrated Pest Management, Integrated Weed Management and improved varieties of various pulse crops have led to gain in yield as compared to farmers' practices.

Table 3.9: Frontline demonstrations on oilseeds conducted in Uttarakhand

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of demos		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Mustard	4	123	12.66	16.04	12.10	32.51	33564	2.57	23972	2.21
Toria	4	112	11.50	8.02	6.27	27.93	9242	1.90	5983	1.66
Sesame	1	12	3.00	7.53	5.45	38.17	23090	2.20	14178	1.83
Soyabean	6	464	16.13	17.83	12.96	37.56	31260	2.43	22036	2.22
		711	**43.29**							

Table 3.10: Frontline demonstrations on pulses conducted in Punjab

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Moong	1	10	4.00	11.21	10.52	6.56	25454	2.59	23067	2.45
Lentil	1	25	10.00	7.25	6.38	13.73	20500	2.30	15000	1.89
Chickpea	4	138	32.80	13.87	11.68	18.75	35164	2.58	25510	2.08
		173	**46.8**							

3.3.2 Himachal Pradesh

A total of 91 demonstrations on pulse crops were conducted by KVKs of Punjab covering an area of 10.00 ha during the year under report including 17 demonstrations of cowpea, 40 of rajmash, 16 of black gram and 18 of chickpea (Table 3.11). Technology demonstrated on various crops under pulse performed better over local check. The increase in demonstration yield over local check varies from 21.52 to 43.24 per cent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated Nutrient Management, Integrated Disease Management, Integrated Pest Management, Integrated Weed Management and improved varieties of various pulse crops have led to gain in yield as compared to farmers' practices.

3.3.3 Jammu & Kashmir

A total of 536 demonstrations on pulse crops were conducted by KVKs of Punjab covering an area of 83.67 ha during the year under report including 34 demonstrations of black gram, 24 of moong, 360 rajmash, 10 of lentil, 68 of pea and 40 of chickpea (Table 3.12). Technology demonstrated on various crops under pulse performed better over local check. The increase in demonstration yield over local check varies from 20.55 to 54.26 per cent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated Nutrient Management, Integrated Disease Management, Integrated Pest Management, Integrated Weed Management and improved varieties of various pulse crops have led to gain in yield as compared to farmers' practices.

Table 3.11: Frontline demonstrations on pulses conducted in Himachal Pradesh

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Cowpea	1	17	2	10.60	7.40	43.24	44700	3.37	28900	2.86
Rajmash	1	40	4	10.05	8.27	21.52	45923	1.84	31719	1.62
Blackgram	1	16	2	12.20	9.60	27.08	54300	3.87	42100	3.72
Chickpea	1	18	2	12.50	10.20	22.55	56100	3.97	45700	3.95
		91	**10**							

Table 3.12: Frontline demonstrations on pulses conducted in Jammu & Kashmir

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Blackgram	1	34	3.60	4.00	3.00	33.33	22000	1.81	13950	1.52
Moong	1	24	3.00	8.80	7.30	20.55	41348	3.00	25312	2.42
Rajmash	5	360	52.97	6.58	4.79	37.29	44979	2.43	24924	1.76
Lentil	1	10	1.00	3.50	2.70	29.63	71470	2.46	46250	2.07
Pea	3	68	13.60	17.17	12.50	37.33	60667	2.26	30083	1.69
Chickpea	2	40	9.50	7.25	4.70	54.26	36800	3.94	16400	2.37
		536	**83.67**							

3.3.4 Uttarakhand

A total of 443 demonstrations on pulse crops were conducted by KVKs of Uttarakhand covering an area of 24 ha during the year under report including 175 demonstrations of pigeon pea, 60 of cowpea, 45 of horsegram, 36 of blackgram and 127 of lentil (Table 3.13). Technology demonstrated on various crops under pulse performed better over local check. The increase in demonstration yield over local check varies from 18.08 to 47.01 per cent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated Nutrient Management, Integrated Disease Management, Integrated Pest Management, Integrated Weed Management and improved varieties of various pulse crops have led to gain in yield as compared to farmers' practices.

3.4 Vegetable & spice crops

A total of 1889 demonstrations were conducted in various vegetable & spice crops covering an area of 138.19 ha during the year by the KVKs of Zone-I. The state wise break up of FLDs on vegetable and spice crops includes 137 demonstrations in Punjab, 700 in Himachal Pradesh, and 359 in Jammu & Kashmir and 693 in Uttarakhand. The state wise details of results of FLDs on vegetable & spice crops are presented as under:

3.4.5 Punjab

A total of 137 demonstrations on vegetable & spice crops were conducted by KVKs of Punjab covering an area of 19.29 ha during the year under report including 74 demonstrations of pea, 2 of potato, 25 of broccoli, 8 of okra, 10 each of radish & carrot and 8 of garlic (Table 3.14). Technology demonstrated on various crops under vegetables performed better over local check. The increase in demonstration yield over local check varies from 3.85 to 16.11 per cent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated Nutrient Management, Integrated Disease Management, Integrated Pest Management, Integrated Weed Management and improved varieties of various pulse crops have led to gain in yield as compared to farmers' practices.

Table 3.13: Frontline demonstrations on pulses conducted in Uttarakhand

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Pigeon pea	2	175	12	14.26	9.70	47.01	89624	5.04	45827	3.64
Cow pea	1	60	2	15.10	11.90	26.89	54893	4.77	41291	4.07
Horsegram	3	45	2	9.00	6.80	32.35	32700	2.97	21633	2.45
Blackgram	1	36	2	7.73	5.92	30.57	33263	3.54	23589	2.98
Lentil	2	127	6	6.63	5.62	18.08	19866	2.31	15189	2.06
		443	**24.0**							

Table 3.14: Frontline demonstrations on vegetable & spice crops conducted in Punjab

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Pea	4	74	16.11	116	105	10.40	50322	1.95	44473	1.90
Potato	1	2	0.40	270	260	3.85	56525	2.64	53840	2.32
Broccoli	1	25	1.25	182	174	4.60	213700	3.76	200900	3.59
Okra	1	8	0.40	133	113	17.70	37300	2.30	38000	2.19
Radish	1	10	0.50	590	565	4.42	117900	2.33	109150	2.23
Carrot	1	10	0.50	490	422	16.11	344820	4.28	204400	3.25
Garlic	1	8	0.13	123	115	6.96	33248	1.48	23335	1.32
		137	**19.29**							

3.4.2 Himachal Pradesh

A total of 700 demonstrations on vegetable & spice crops were conducted by KVKs of Himachal Pradesh covering an area of 73.50 ha during the year under report including 45 demonstrations of tomato, 9 of brinjal, 6 of capsicum, 49 of cauliflower, 88 of bottle gourd, 80 of cucumber, 24 of okra, 57 of French bean, 197 of pea, 7 of elephant foot yam, 10 of garlic, 64 of onion, 10 of ginger, 9 of turmeric and 45 of potato (Table 3.15). Technology demonstrated on various crops under vegetables performed better over local check. The increase in demonstration yield over local check varies from 15.71 to 86.67 per cent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated Nutrient Management, Integrated Disease Management, Integrated Pest Management, Integrated Weed Management and improved varieties of various pulse crops have led to gain in yield as local check.

3.4.3 Jammu & Kashmir

A total of 359 demonstrations on vegetable & spice crops were conducted by KVKs of Jammu & Kashmir covering an area of 18.27 ha during the year under report including 7 demonstrations of brinjal, 20 of

Table 3.15: Frontline demonstrations on vegetable crops conducted in Himachal Pradesh

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Tomato	5	45	3.90	387.39	316.74	22.31	365286	3.85	293510	3.35
Brinjal	1	9	0.50	280.00	150.00	86.67	230000	5.60	200000	5.00
Capsicum	2	6	0.44	215.00	170.00	26.47	722500	2.00	351500	1.49
Cauliflower	4	49	2.48	252.05	209.57	20.27	327806	4.70	261267	4.09
Bottle gourd	3	88	6.14	214.12	166.66	28.48	190052	3.51	118388	2.74
Cucumber	4	80	7.86	254.63	220.05	15.71	180175	3.91	138700	2.98
Okra	2	24	1.14	141.68	93.75	51.13	98045	3.70	59016	2.78
French bean	2	57	1.40	178.98	147.45	21.38	86072	2.23	68446	2.06
Pea	6	197	39.30	140.81	118.61	18.72	238475	3.74	188610	3.15
Elephant foot yam	1	7	0.24	396.00	308.50	28.36	310000	1.76	162500	1.41
Garlic	1	10	1.00	100.20	65.20	53.68	135400	3.08	76400	2.41
Onion	6	64	3.88	188.85	134.99	39.90	191302	3.96	119233	2.95
Ginger	1	10	0.80	183.00	155.00	18.06	64140	1.54	40000	1.35
Turmeric	2	9	0.22	169.50	135.50	25.09	176250	3.81	135250	3.34
Potato	3	45	4.20	233.48	195.75	19.27	323820	3.20	212665	2.50
		700	**73.50**							

tomato, 32 of okra, 34 of knoll khol, 15 of carrot, 8 of Chinese cabbage, 110 of kale, 38 of methi, 40 of coriander, 20 of onion, 5 of radish and 30 of pea (Table3.16). Technology demonstrated on various crops under vegetables performed better over local check. The increase in demonstration yield over local check varies from 7.14 to 64.68 percent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated Nutrient Management, Integrated Disease Management, Integrated Pest Management, Integrated Weed Management and improved varieties of various pulse crops have led to gain in yield as local check.

3.4.4 Uttarakhand

A total of 693 demonstrations on vegetable & spice crops were conducted by KVKs of Uttarakhand covering an area of 27.13 ha during the year under report including 86 demonstrations of tomato, 51 of capsicum, 20 of cabbage, 5 of cauliflower, 5 of broccoli, 35 of French bean, 286 of pea, 15 of potato, 17 of garlic, 93 of onion, 8 of turmeric and 32 of coriander (Table 3.17).

Table 3.16: Frontline demonstrations on vegetable crops conducted in Jammu & Kashmir

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Brinjal	1	7	0.37	172	155	10.97	112000	2.87	99000	2.77
Tomato	2	20	1.00	359	218	64.68	395000	2.11	100500	1.34
Okra	2	32	2.30	87	69	26.09	95775	3.51	66188	2.86
Knol-khol	3	34	2.10	233	196	18.88	113567	2.74	83167	2.37
Carrot	1	15	0.74	205	160	28.13	117000	3.60	90000	3.50
Chinese cabbage	1	8	0.01	277	212	30.66	555020	2.33	276500	1.77
Kale	1	110	5.52	200	168	19.05	141000	4.20	110000	3.75
Methi	1	38	1.90	62	49	26.53	140000	4.50	123800	4.35
Coriander	1	40	2.00	50	41	21.95	145000	5.14	115100	4.54
Onion	1	20	1.00	340	225	51.11	279900	1.70	65000	1.17
Radish	1	5	0.25	212	170	24.71	134000	4.19	97000	3.55
Peas	1	30	1.08	15	14	7.14	33000	1.59	3600	1.07
		359	**18.27**							

Table 3.17: Frontline demonstrations on vegetable& spice crops conducted in Uttarakhand

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Tomato	3	86	4.22	338.70	195.65	73.12	341975	4.53	169650	2.93
Capsicum	3	51	1.30	158.93	127.56	24.59	353753	3.53	79100	1.62
Cabbage	2	20	1.00	362.65	304.25	19.19	125258	3.02	88450	2.53
Cauliflower	1	5	0.50	501.50	408.00	22.92	218900	3.67	130000	2.76
Broccoli	1	5	0.50	280.50	204.00	37.50	194500	3.26	89200	2.21
French bean	2	35	1.00	85.15	59.75	42.51	120116	4.07	65231	2.92
Okra	1	60	2.00	109.50	84.50	29.59	125400	4.23	95500	4.06
Pea	7	266	8.35	113.90	84.18	35.41	135513	3.49	78155	2.56
Potato	1	15	2.00	222.00	161.00	37.89	152000	3.17	100400	2.66
Garlic	1	17	0.70	88.67	66.87	32.60	140795	2.12	96400	1.93
Onion	4	93	3.00	245.20	176.33	39.06	193638	3.37	122513	2.63
Turmeric	1	8	0.16	191.25	158.00	21.04	247500	2.83	190000	2.51
Coriander	2	32	2.40	39.50	29.10	35.75	127300	4.07	85230	3.32
		693	**27.13**							

Technology demonstrated on various crops under vegetables performed better over local check. The increase in demonstration yield over local check varies from 19.19 to 73.12 per cent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated Nutrient Management, Integrated Disease Management, Integrated Pest Management, Integrated Weed Management and improved varieties of various pulse crops have led to gain in yield as local check.

3.5 Fruits

A total of 212 demonstrations on various fruits crops were conducted covering an area of 21.80 ha during the year by the KVKs of Zone-I. Technology demonstrated on various fruit crops viz. Guava, Kinnow, apple, plum, apricot, pomegranate, pear and mango, performed better over local check. The increase in demonstration yield over local check varies from 3.04 to 40.94 per cent (Table 3.18). The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated Disease Management, Integrated Pest Management, Integrated Weed Management and improved varieties of various fruits crops have led to gain in yield as local check.

3.6 Flowers

A total of 77 demonstrations were conducted on marigold flower covering an area of 3.8 ha during the year by the KVKs of Zone-I. Technology demonstrated performed better over local check and an increase in demonstration yield over local check varies from 26.49

Table 3.18: Frontline demonstrations on fruit crops conducted by KVKs

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Guava (Pb)	4	114	7.70	239.3	212.6	12.55	258663	3.13	208165	2.66
Kinnow (Pb)	1	7	3.60	198.5	154.0	28.90	35710	1.32	10800	1.11
Apple (HP)	4	66	8.38	127.7	96.6	32.28	412570	3.68	295960	3.01
Plum (HP)	1	5	0.24	143.2	109.2	31.14	272252	4.18	156652	3.54
Apricot (HP)	1	5	0.24	132.1	93.7	40.94	254475	4.36	128530	3.18
Pomegranate (HP)	1	5	0.40	187.0	169.0	10.65	323500	3.25	261500	2.62
Mango (HP)	1	5	0.24	35.0	26.3	33.33	35000	1.50	7060	1.11
Pear (Punjab)	1	5	1.00	485.3	471.0	3.04	1190000	5.49	1152000	5.41
		212	**21.8**							

to 42.76 per cent (Table 3.19). The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated Crop Management and improved varieties of marigold have led to gain in yield as local check.

3.7 Fodder crops

A total of 777 demonstrations on various fodder crops were conducted covering an area of 132.57 ha during the year by the KVKs of Zone-I. The state wise break up of FLDs on fodder crops includes 164 demonstrations of Punjab, 55 of Himachal Pradesh, 459 of Jammu & Kashmir and 99 of Uttarakhand. The state wise details of results of FLDs on fodder crops are presented as under:

3.7.1 Punjab

A total of 164 demonstrations on fodder crops were conducted by KVKs of Punjab covering an area of 33.70 ha during the period under report including 106 demonstrations of maize, 20 of berseem, 15 of oats and 23 of ryegrass (Table 3.20). Technology demonstrated

Table 3.19: Frontline demonstrations on flowers conducted by KVKs

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Marigold (HP)	2	20	0.80	329.50	260.50	26.49	281124	1.46	113950	1.19
Marigold (J&K)	2	57	3.00	157.25	110.15	42.76	310525	6.65	187650	4.47
		77	**3.80**							

Table 3.20: Frontline demonstrations on fodder crops conducted in Punjab

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Maize	5	106	25.90	440.58	390.75	12.75	43235	2.72	36507	2.43
Barseem	2	20	2.50	955.00	869.00	9.90	49950	3.30	43430	3.09
Oats	2	15	1.30	621.44	507.62	22.42	60468	4.24	36414	2.95
Ryegrass	1	23	4.00	1038.00	1013.00	2.47	46700	1.56	36777	1.41
		164	**33.70**							

on various fodder crops performed better over local check. The increase in demonstration yield over local check varies from 2.47 to 22.42 per cent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Integrated Crop Management technologies and improved varieties of various fodder crops have led to gain in fodder yield over local check.

3.7.2 Himachal Pradesh

A total of 55 demonstrations on fodder crops were conducted by KVKs of Himachal Pradesh covering an area of 5.2 ha during the period under report including 15 demonstrations of maize, 30 of oat and 10 of red clover (Table 3.21). Technology demonstrated on various fodder crops performed better over local check. The increase in demonstration yield over local check

Table 3.21: Frontline demonstrations on fodder crops conducted in Himachal Pradesh

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Maize	1	15	1.2	303.00	202.00	50.00	22185	1.99	7270	1.36
Oats	2	30	3.0	301.95	255.50	18.18	32450	2.07	23748	1.85
Red clover	1	10	1.0	291.80	220.00	32.64	2942	1.11	3412	1.02
		55	**5.2**							

varies from 18.18 to 50.00 per cent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Integrated Crop Management technologies and improved varieties of various fodder crops have led to gain in fodder yield over local check.

3.7.3 Jammu & Kashmir

A total of 459 demonstrations on fodder crops were conducted by KVKs of Jammu & Kashmir covering an area of 88.67 ha during the period under report including 23 demonstrations of sorghum, 54 of berseem and 382 of oat (Table 3.22). Technology demonstrated on various fodder crops performed better over local check. The increase in demonstration yield over local check varies from 14.13 to 31.15 per cent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Integrated Crop Management technologies and improved varieties of various fodder crops have led to gain in fodder yield over local check.

3.7.4 Uttarakhand

A total of 99 demonstrations on fodder crops were conducted by KVKs of Uttarakhand covering an area of 5.0 ha during the year of 2017-18 including 25 demonstrations of each sorghum & barseem and 49 of oat (Table 3.23). Technology demonstrated on various fodder crops performed better over local check. The increase in demonstration yield over local check varies from 41.28 to 80.02 per cent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Integrated Crop Management technologies and improved varieties of various fodder crops have led to gain in fodder yield over local check.

3.8 Commercial crops

Under commercial crops, KVKs conducted demonstration only on cotton. A total of 178 demonstrations on cotton were conducted covering an area of 67.20 ha during the year by the KVKs of Zone-I. The average yield of demonstration was found to be

Table 3.22: Frontline demonstrations on fodder crops conducted in Jammu & Kashmir

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Sorghum	1	23	2.00	282.00	216.00	30.56	14400	2.17	8450	1.93
Barseem	2	54	5.00	525.00	460.00	14.13	33890	2.46	29400	2.28
Oats	10	382	81.67	276.33	210.69	31.15	35579	2.61	21931	2.08
		459	**88.67**							

Table 3.23: Frontline demonstrations on fodder crops conducted in UK

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Sorghum	1	25	1	931.60	517.50	80.02	46110	1.98	5050	1.11
Barseem	1	25	1	844.00	594.22	42.03	54948	2.87	30672	2.07
Oats	2	49	3	392.42	277.75	41.28	60492	3.66	41325	3.02
		99	**5**							

Table 3.24: Frontline demonstrations on commercial crops conducted by KVKs

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Econ of Demo		Econ of check	
				Demo	Check		Net return	BCR	Net return	BCR
Cotton (Punjab)	2	178	67.20	20.51	18.08	13.44	62896	2.58	49562	2.22

20.51 q/ha, which is 13.44 per cent higher as compared to local check (Table 3.24). The BC ratio of demonstration (2.58) was found higher than local check (2.22). Technologies such as Integrated Pest Management and Integrated Nutrient Management in cotton have led to gain in yield over local check.

3.9 Livestock and poultry

KVKs of Zone-I also conducted 1521 demonstrations on mineral mixture and balanced feeding in cattle/buffaloes, parasites in sheep & goat, backyard poultry, and fisheries. The dairy technologies like use of mineral mixture; vitamin A&E and silage feeding have resulted in increase in milk yield of animals.

3.10 Other demonstrations

KVKs of Zone-I also conducted 131 demonstrations on mushroom production and 285 demonstrations on various aspects related to home science. In case of farm implements, KVKs conducted 28 demonstrations on *Direct Seeding of Rice* (DSR), wheat sowing by happy seeder and zero till drill.

Chapter 4

CAPACITY DEVELOPMENT

Under capacity development 5901 capacity building courses were organized by the KVKs in which approx. 1.47 lakh stakeholders got benefited. Out of 5901 courses, 1866 courses were organized by 22 KVKs of Punjab, 1700 courses by 21 KVKs of Jammu & Kashmir, 1337 courses by 13 KVKs of Himachal Pradesh and 998 courses by 13 KVKs of Uttrakhand. Eighty six per cent of these courses (5077) were organized to meet the needs of farmers/farmwomen/ rural youth (young farmers) and extension functionaries. KVKs organized 472 vocational training courses benefitting 11762 participants, including mostly the rural youth, young women and school dropouts. Besides these need based courses, KVKs organized 352 sponsored courses for 13579 participants. The state-wise number of courses and the participants in these different categories of capacity building programmes organized by the KVKs during the reported period is given in Table 4.1.

4.1 Training courses for farmers and farm women

A total of 3969 capacity building courses were organized for farmers and farm women by the KVKs during the period under report, involving approx. 0.97 lakh participants (Table 4.2). The maximum number 1085 courses were organized in 21 KVKs Jammu & Kashmir, followed by 1080 courses in Punjab, 958 courses in Himachal Pradesh and 846 courses in Uttrakhand. These courses involved 59148 men and 37971 women as participants. The state-wise participation of SC/ST community and farmwomen

Table 4.1: Details of training courses organized by the KVKs

State/ UT	No. of KVKs	Need Based Training Courses		Sponsored Training Courses		Vocational Training Courses		Total	
		No.	Participants	No.	Participants	No.	Participants	No.	Participants
Punjab	22	1530	31459	37	1457	299	6836	1866	39752
Himachal Pradesh	13	1049	31277	222	8701	66	1578	1337	41556
Uttrakhand	13	959	20749	17	448	22	346	998	21543
Jammu & Kashmir	21	1539	38365	76	2973	85	3002	1700	44340
Total	**69**	**5077**	**121850**	**352**	**13579**	**472**	**11762**	**5901**	**147191**

Table: 4.2: State wise details of trainings courses organized for farmers/ farm women.

State/UT	No. of Courses	Participants								
		Others			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Punjab	1080	12649	3664	16313	2609	2107	4716	15258	5771	21029
Himachal Pradesh	958	7585	9207	16792	5951	6091	12042	13536	15298	28834
Uttrakhand	846	6229	7477	13706	2571	2663	5234	8800	10140	18940
Jammu & Kashmir	1085	15798	2554	18352	5756	4208	9964	21554	6762	28316
Total	**3969**	**42261**	**22902**	**65163**	**16887**	**15069**	**31956**	**59148**	**37971**	**97119**

Training on home science/women empowerment at KVK, Fatehgarh Sahib

Training on protected cultivation at KVK, Faridkot

Training for farm women at KVK, Udham Singh Nagar

Training on seed production of Onion at KVK, Uttrakashi

reveals the fact that Himachal Pradesh had better participation of SC/ST (31956 out of 97119 participants) and Himachal Pradesh had better participation women participants (15298 out of 37971 women participants).

Capacity building courses for farmers and farm women were organized in the 11 major thematic areas related to Agriculture and Allied sectors, the details of which are given in Table 4.3. Most number of courses were organized on Horticulture (854) followed by Plant Protection (592), Home science/Women empowerment (575) and Soil Health and Fertility Management (465). The maximum participation of trainee farmers was recorded in Horticulture (22109) followed by (15890) participants in Plant Protection. The maximum number of farm women participated in Home Science/Women empowerment training programme (11592) followed by Horticulture (6536) and Crop Production (4942). The specific training aspects under the major themes of training are given in Table 4.3.

Table: 4.3 Thematic area wise details of trainings courses organized for farmers/ farm women.

Thematic Area	No. of Courses	Participants								
		Others			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Horticulture	854	11584	4058	15642	3989	2478	6467	15573	6536	22109
Plant Protection	592	8070	2266	10336	3399	2155	5554	11469	4421	15890
Home Sci/Women Emp.	575	1149	8043	9192	545	3549	4094	1694	11592	13286
Crop Production	520	5545	2729	8274	2824	2213	5037	8369	4942	13311
Soil Health & Fert. Mgt.	465	5816	1860	7676	2360	1659	4019	8176	3519	11695
LPM	432	4844	1479	6323	1434	1188	2622	6278	2667	8945
Cap. Building & Group Dym.	208	1827	1343	3170	941	958	1899	2768	2301	5069
Agro-forestry	121	1259	543	1802	486	146	632	1745	689	2434
Agril. Engineering	84	864	298	1162	242	252	494	1106	550	1656
Fisheries	73	831	153	984	327	166	493	1158	319	1477
Production of Inputs at site	45	472	130	602	340	305	645	812	435	1247
Total	**3969**	**42261**	**22902**	**65163**	**16887**	**15069**	**31956**	**59148**	**37971**	**97119**

Note: Emp-Empowerment; LPM-Livestock Production and Management; Fert. Mgt.- Fertility Management; Cap.- Capacity; Dym.-Dynamics

4.2 Training courses for rural youth

KVKs trained 17547 rural youth by organizing a total of 763 training courses. The state wise distribution of these training courses reveal that 319 courses were organized in Punjab, followed by 297 courses in Jammu & Kashmir, 76 courses in Uttrakhand and 71 courses in Himachal Pradesh. The number of rural youth who participated in the KVK training courses revealed that 7362 participants were recorded highest in Punjab followed by 7156 participants in Jammu & Kashmir, 1884 participants in Himachal Pradesh and 1145 participants in Uttrakhand. The details are given in Table 4.4. Among 17547 rural youth trained, 7581 were SC/ST (43.02 per cent) and 6919 (39.43 per cent) were young farm women.

Table 4.4: State wise details of training courses organized for rural youth

State/UT	No. of Courses	Participants								
		Others			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Punjab	319	3862	1637	5499	729	1134	1863	4591	2771	7362
Himachal Pradesh	71	584	516	1100	435	349	784	1019	865	1884
Uttrakhand	76	432	491	923	94	128	222	526	619	1145
Jammu & Kashmir	297	1951	493	2444	2541	2171	4712	4492	2664	7156
Total	**763**	**6829**	**3137**	**9966**	**3799**	**3782**	**7581**	**10628**	**6919**	**17547**

Training on Poultry at KVK, Nawashahar

Training on Vermicompost at KVK, Champwat

Training on Fish farming at KVK, Udham Singh Nagar

Training on of shredder cum chopper at KVK, Bathinda

The courses for capacity building for rural youth were organized in the different thematic areas related to Agriculture and Allied sectors, the details of which are given in Table 4.5. The maximum number of courses were organized on Post harvest and Value Addition (202) followed by Mushroom Production (81), Beekeeping (68) and Rural Crafts for women (58). The maximum participation was also recorded in Post harvest and Value Addition (4795) followed by Beekeeping courses (1847) and Mushroom Production (1488) by the young farmers. The maximum number of young farm women participated in Post harvest and Value Addition (3138) followed by rural crafts (1065) and Poultry Production (448). The specific training aspects under the major themes of training are given in Table 4.5.

Table 4.5: Thematic area wise details of trainings courses organized for Rural Youth.

Thematic Area	No. of Courses	Participants								
		Others			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Post Hav & VA	202	211	1237	1448	1446	1901	3347	1657	3138	4795
Mushroom prod.	81	783	191	974	328	186	514	1111	377	1488
Bee-keeping	68	1198	280	1478	284	85	369	1482	365	1847
Rural Crafts	58	12	528	540	24	537	561	36	1065	1101
Poultry production	46	429	103	532	298	345	643	727	448	1175
Integrated farming	34	237	73	310	149	115	264	386	188	574
Dairying	33	619	133	752	78	41	119	697	174	871
Organic inputs prod.	31	355	113	468	94	55	149	449	168	617
Fish hav & pro tech.	31	164	33	197	218	287	505	382	320	702
Sheep & goat rearing	24	395	129	524	78	28	106	473	157	630
Seed production	23	267	36	303	47	19	66	314	55	369
Trg/Prun of orch	21	174	23	197	173	60	233	347	83	430
Piggery	19	580	13	593	82	3	85	662	16	678
Nur Mgt of Hort Crops	18	247	33	280	58	16	74	305	49	354
Planting material prod.	17	121	23	144	103	25	128	224	48	272
Prot Cult of VC	17	214	85	299	35	18	53	249	103	352
Commercial fruit prod.	14	65	16	81	72	14	86	137	30	167
Repair/maint. FMI	13	147	16	163	120	17	137	267	33	300
Para vets	6	47	5	52	104	30	134	151	35	186
Soil Testing	6	552	67	619	0	0	0	552	67	619
Rabbit farming	1	12	0	12	8	0	8	20	0	20
Total	**763**	**6829**	**3137**	**9966**	**3799**	**3782**	**7581**	**10628**	**6919**	**17547**

Post Hav & VA = Post Harvest and value addition; Prod.-Production; tech-Technology;
Trg/Prun of orch= Training and pruning of orchards;
Nur Mgt of Hort Crop= Nursery Management of Horticulture crops
Prot Cult of VC = Protected cultivation of vegetable crops;
Repair/main. FMI= Repair & maintenance of farm machinery & implements

Vocational Training on Mushroom Cultivation

4.3 Extension functionaries

The state wise details of capacity building courses organized for extension functionaries were organized by the KVKs and the participation level are given in Table 4.6. The data indicated that a total of 345 courses were organized with a participation of 7184 extension functionaries. Among the different states, 157 courses in Jammu & Kashmir followed by 131 courses in Punjab, 37 courses in Uttrakhand and 20 courses in Himachal Pradesh. In terms of participation, about 42.70 per cent of these participants were recorded in Punjab (3068 out of a total of 7184). The extent of SC/ST and women participation in different states indicates that Jammu & Kashmir recorded highest participation from SC/ST community (739 out of a total of 1821) and Punjab recorded highest women extension functionaries (893 out of a total of 1844).

Training on honey extraction at KVK, Nawashahar

Table 4.6: State wise details of training course organized for extension functionaries

State/UT	No. of Courses	Participants								
		Others			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Punjab	131	1750	594	2344	425	299	724	2175	893	3068
Himachal Pradesh	20	134	124	258	176	125	301	310	249	559
Uttrakhand	37	401	206	607	19	38	57	420	244	664
Jammu & Kashmir	157	1897	257	2154	538	201	739	2435	458	2893
Total	**345**	**4182**	**1181**	**5363**	**1158**	**663**	**1821**	**5340**	**1844**	**7184**

Method demonstration on mechanical transplanting of paddy on 27-6-17 at KVK, Hoshiarpur

The details of training courses organized thematic area wise for extension functionaries during the year are given in Table 4.7. The maximum participation was recorded in the area of productivity enhancement in field crops where in 65 courses (out of 345) attracted 1263 extension functionaries (out of a total of 7184). Other areas of interest for extension functionaries were Integrated Pest Management (50 courses, 1126 participants) and Integrated Nutrient Management (30 courses, 814 participants). The majority participation of women extension functionaries was in the area of women and child care (621 out of 1844) followed by low cost and nutrient efficient diet designing (330 out of 1844).

4.4 Sponsored training courses

A total of 352 sponsored training courses were organized by the KVKs during the reporting period (Table 4.8). The state of Himachal Pradesh organized maximum number of sponsored training courses 222 courses followed by Jammu & Kashmir 76 courses and Punjab 37 courses during the reported period. The extent of participation was highest in Himachal Pradesh with 8701 participants, followed by Jammu & Kashmir with 2973 participants, Punjab with 1457 participants and Uttrakhand with 448 participants. Out of 13579 participants, 5329 were from SC/ST community (39.24 per cent) and 2444 were women participants.

Table 4.7: Thematic area wise details of trainings courses organized for extension functionaries.

Thematic Area	No. of Courses	Participants								
		Others			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Productivity enhancement in field crops	65	1004	158	1162	95	6	101	1099	164	1263
Integrated Pest Management	50	813	45	858	210	58	268	1023	103	1126
Integrated Nutrient management	30	574	50	624	18	52	190	712	102	814
Women and Child care	30	90	412	502	26	209	235	116	621	737
Protected cultivation technology	24	276	39	315	95	31	126	371	70	441
Production and use of organic inputs	22	200	104	304	175	96	271	375	200	575
Rejuvenation of old orchards	20	263	10	273	15	1	16	278	11	289
Management in farm animals	20	226	22	248	16	16	32	242	38	280
Livestock feed and fodder production	20	179	3	182	88	3	91	267	6	273
Low cost & nutrient efficient diet designing	15	0	248	248	0	82	82	0	330	330
Repair/maint. FMI	8	103	9	112	124	5	129	227	14	241
Household food security	8	49	59	108	0	28	28	49	87	136
Gender mainstreaming through SHGs	8	39	0	39	8	0	8	47	0	47
Information networking among farmers	7	149	4	153	48	0	48	197	4	201
Capacity building for ICT application	7	87	3	90	43	3	46	130	6	136
Formation and Management of SHGs	5	41	13	54	7	23	30	48	36	84
Group Dynamics and farmers organization	3	47	2	49	0	0	0	47	2	49
WTO and IPR issues	3	42	0	42	70	50	120	112	50	162
Total	**345**	**4182**	**1181**	**5363**	**1158**	**663**	**1821**	**5340**	**1844**	**7184**

Repair and maintenance of farm machinery and implements

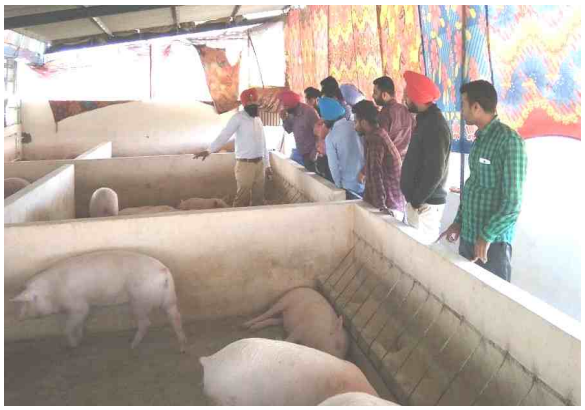
Table 4.8: State wise details of sponsored training courses organized and distribution of participants

State/UT	No. of Courses	General			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Punjab	37	540	91	631	387	439	826	927	530	1457
Himachal Pradesh	222	3169	2476	5645	1709	1347	3056	4878	3823	8701
Uttrakhand	17	148	205	353	66	29	95	214	234	448
Jammu & Kashmir	76	968	653	1621	723	629	1352	1691	1282	2973
Total	**352**	**4825**	**3425**	**8250**	**2885**	**2444**	**5329**	**7710**	**5869**	**13579**

Training on Tractor Operator at KVK sponsored at KVK, Hoshiarpur

Training on Mushroom farming at KVK, Kathua

Training on farm machinery at KVK, Faridkot



Training on pig farming at KVK, Amritsar

Under sponsored training courses category, it was organized under 8 thematic areas in which 110 courses were conducted on an area of the crop production and management followed by 77 in the area of Agriculture Extension and 74 courses in Post Harvest & Value Addition with a participation of 3743, 5373 and 2196 participants respectively. The details of sponsored trainings are described in Table 4.9.

4.5 Vocational training courses

During the reporting period, 472 vocational training

courses were organized by KVKs with the participation of 11762 stakeholders. In Punjab, KVKs organized 299 courses with a participation of 6836 participants. In Jammu & Kashmir, KVKs organized 85 courses with 3002 participants. The details of number of courses and participants in each State/UT of the Zone-I are given in Table 4.10. The participation of women was encouraging in vocational training courses with a participation of 42.74 per cent (5028 out of 11762).

Vocational training courses were organized on five major thematic areas as provided in details Table 4.11. Most of the courses were conducted on income generating activities (198 out of 472) courses for 4314 participants. Livestock and fisheries were the second most preferred area for vocational training with 104 courses and 2952 participants.

Table 4.9 : Thematic area wise details of sponsored training courses organized and distribution of participants

Thematic Area	No. of Courses	No. of Participants		
		Male	Female	Total
Crop production and management	110	2087	1656	3743
Agriculture Extension	77	3134	2239	5373
Post harvest technology & value addition	74	1469	727	2196
Income generation	47	464	351	815
Home Science	25	170	657	827
Livestock production & fisheries	14	206	187	393
Farm machinery	4	175	42	217
Dairy farming	1	5	10	15
Total	**352**	**7710**	**5869**	**13579**

Table 4.10: State wise details of vocational training courses and distribution of participants in Zone-1

State	No. of Courses	No. of Participants		
		Male	Female	Total
Punjab	299	3917	2919	6836
Himachal Pradesh	66	778	800	1578
Uttrakhand	22	246	100	346
Jammu & Kashmir	85	1793	1209	3002
Total	**472**	**6734**	**5028**	**11762**

Table 4.11: Thematic area wise details of vocational training courses organized and distribution of participants

Thematic area wise	No. of Courses	No. of Participants		
		Male	Female	Total
Income generation	198	2276	2038	4314
Livestock production & Fisheries	104	2248	704	2952
Crop production and management	86	988	843	1831
Post harvest technology & value addition	74	685	1315	2000
Agriculture Extension	10	537	128	665
Total	**472**	**6734**	**5028**	**11762**

Training on fortification of poor quality fodder at KVK, Gandarbal

Training for control of Kurmula at KVK Bageshwar

KVKs are documenting the effect of training courses on the back home situation of participants through necessary follow up actions and feedback programmes from the farmers. Further they are also identifying farmers as well as resource persons for conducting training courses for different stakeholders for capacity building.

Inservice training on beekeeping

Chapter 5

OTHER PROJECTS AND PLANS

5.1 CFLDs on Oilseed

To boost the indigenous production of oilseed in India, "Cluster Frontline Demonstrations on Oilseed" project was initiated by the Department (CFLDs) of Ministry of Agriculture Cooperation and Farmer's Welfare (DAC&FW) with cooperation of Division of Extension Education, ICAR, New Delhi since the year 2015-16 till date. The main objective for conducting Cluster Frontline Demonstrations to show the production potential of notified oilseed varieties and package of practices & technologies generated in oilseed for higher production, better productivity and remunerative profitability for the farmers. The project was implemented by ICAR-ATARI through Krishi Vigyan Kendras (KVKs) since 2015 to 2018 with the aim to enhance the oilseed production in the country.

During the reported period, the project was implemented through 38 KVKs of the states of, Punjab, Himachal Pradesh and Jammu and Kashmir of ICAR-ATARI, Zone-I. The budget for each crop *i.e* groundnut ₹8500/ha, rapeseed & mustard ₹6000/ha and sesame ₹5000/ha was provided to the respective KVKs for providing critical inputs like seed, biofertilizers etc. to the farmers for conducting demonstrations. During the year 2017-18, 780 ha area was allotted (Table 5.1), for CFLDs on oilseed however, 82.40 ha area was demonstrated during *Kharif* season (Table 5.2), 587.50 ha area was demonstrated by the KVKs in the farmers'

Table 5.1: Details of state-wise and crop wise details of allotted, conducted and deficit CFLDs on Oilseeds

State/ Crop	Allotted		Conducted during Kharif/ Rabi/ Summer		Area converted to Rapeseed & Mustard*	
	Demo. (No.)	Area (ha)	Demo. (No.)	Area (ha)	Demo. (No.)	Area (ha)
Punjab						
Groundnut	100	40.00	81	32.40	19	7.60
Sesame	75	30.00	50	20.00	25	10.00
Rapeseed & Mustard	1150	460.00	1130	452.00	20	8.00
Uttrakhand						
Rapeseed & Mustard	100	40.00	-	-	100	40.00
Himachal Pradesh						
Sesame	50	20.00	50	20.00	-	-
Rapeseed & Mustard	150	60.00	138	55.28	12	4.72
Jammu&Kashmir						
Sesame	25	10.00	25	10.00	-	-
Rapeseed & Mustard	300	120.00	201	80.30	99	39.70
Grand total	**1950**	**780.00**	**1675**	**669.98**	**275**	**110.02**

*: Deficient area converted to Rapeseed & mustard in lieu of Ground nut & Sesame etc.

fields during *Rabi* season (Table 5.3) and 110.02 ha area could not be covered under demonstrations during 2017-18.

During *kharif* season, total 206 CFLDs were laid on an area of 82.40 ha on groundnut and sesame crops. In Punjab, 5.60 per cent and 23.10 per cent higher yield was recorded from the demonstrations of sesame and groundnut respectively. In sesame, 32.80 per cent higher yield was reported in Himachal Pradesh, similarly; in Jammu & Kashmir 65.70 per cent higher yield was recorded in comparison with the local check.

Sowing of Groundnut at KVK Bathinda

Table 5.2: Details of CFLDs on oilseeds conducted during Kharif season 2017-18

Sr. No	KVKs	Crop	Varieties demonstrated	Conducted		Yield (q/ha)		Increase in yield (%)
				No. of Demo	Area in (ha)	Demo	Local check	
1	Bathinda	Groundnut	TG-37A	31	12.40	23.80	22.20	7.20
	Hoshiarpur	Groundnut	TG 37 A	50	20.00	13.30	11.50	15.70
	Total Pb. (Groundnut)			**81**	**32.40**	**18.60**	**15.10**	**23.10**
2	Bathinda	Sesame	Pb. Til No. 2	25	10.00	6.20	5.70	8.80
	Hoshiarpur	Sesame	Pb. Til No. 2	25	10.00	4.25	4.00	6.30
	Total Pb. (Sesame)			**50**	**20.00**	**5.20**	**4.90**	**5.60**
3	Kangra	Sesame	LTK-4	25	10.00	5.41	4.16	30.00
4	Sirmaur	Sesame	LTK-4	25	10.00	4.10	3.00	36.70
	Total HP			**50**	**20.00**	**4.80**	**3.60**	**32.80**
5	Reasi	Sesame	PB-1,RD-51	25	10.00	5.80	3.50	65.70
	Total J&K			**25**	**10.00**	**5.80**	**3.50**	**65.70**
	Grand Total			**206**	**82.40**			

Demonstrations on Sesame crop at KVK Hoshiarpur

Demonstration on Sesame crop at KVK Sirmour

Table 5.3: Details of CFLDs on oilseeds conducted by the KVKs during Rabi season

Sr. No	Name of the KVK	Demonstration				Check yield (qtl/ha)	Increase in yield (%)
		Varieties	No.	Area (ha)	Yield (qtl/ha)		
1.	Amritsar	GSC 7	50	20.00	22.02	14.35	53.40
2.	Bathinda	GSC 7	75	30.00	22.05	21.02	4.90
3.	Ferozpur	GSC 7	50	20.00	20.03	16.08	24.60
4.	Faridkot	GSC 7	50	20.00	20.30	16.82	20.70
5.	Fatehgarh Shahib	GSC 7	50	20.00	19.75	18.50	6.80
6.	Gurdaspur	GSC 7	50	20.00	20.07	17.34	15.70
7.	Hoshiarpur	GSC 7	50	20.00	17.00	14.45	17.60
8.	Jalandhar	GSC 7	50	20.00	21.24	15.23	39.50
9.	Kapurthala	GSC 7	50	20.00	23.01	17.58	30.90
10.	Ludhiana	GSC 7	50	20.00	20.31	19.50	4.20
11.	Moga	GSC 7	50	20.00	21.61	19.46	11.00
12.	Muktsar	GSC 7	50	20.00	19.22	17.50	9.80
13.	Nawashahar	GSC 7	50	20.00	19.02	14.50	31.20
14.	Patiala	GSC 7	30	12.00	21.12	16.50	28.00
15.	Ropar	GSC 7	75	30.00	19.69	15.33	28.40
16.	Sangrur	GSC 7	25	10.00	22.70	18.60	22.00
17.	Barnala	GSC 7	100	40.00	19.24	12.02	60.10
18.	Mohali	GSC 7	75	30.00	20.86	15.49	34.70
19.	Tarn Taran	GSC 7	50	20.00	19.30	13.01	48.30
20.	Fazilka	RH-0749	100	40.00	19.80	16.83	17.60
	Total (Punjab)		**1130**	**452.00**	**20.40**	**16.30**	**25.60**
21.	Bilaspur	Neelam	25	10.00	10.50	6.50	61.50
22.	Chamba	HPN-3	25	10.00	5.80	3.93	47.60
23.	Hamirpur	KBS-3	13	5.28	5.30	4.50	17.80
24.	Kangra	GSC 7,KBS-3	25	10.00	10.83	7.83	38.30
25.	Mandi	ONK-1	25	10.00	6.13	5.50	11.50
26.	Sirmaur	Bhawani	25	10.00	8.50	7.00	21.40
	Total (Himachal Pradesh)		**138**	**55.28**			
27.	Anantnag	KS-101	25	10.00	8.80	7.60	15.80

5.1.1 Rapeseed & Mustard

The cluster demonstrations were conducted on rapeseed & mustard by 36 KVKs of Punjab, Himachal Pradesh and Jammu & Kashmir. A total of 1469 CFLDs were conducted on rapeseed & mustard on an area of 587.58 ha. In Rapeseed & Mustard CFLDs, 25.60 per cent, 61.50 per cent and 96.80 per cent higher yield was recorded as compared to local check in Punjab, Himachal Pradesh (Bilaspur district) and Jammu & Kashmir (Reasi district of Jammu). While conducting cluster demonstrations, the technologies like improved varieties, seed treatment, line sowing of crop, different intercropping systems, integrated pest management (IPM) etc. were demonstrated at the farmer's field. The varieties demonstrated in CFLDs were namely GSC-7, KBS-3, RH-0749, Shalimar-BS1, KS-101, ONK-1, RSPR 01 and DGS-1 by the KVKs during the reported period.

5.1.2 Extension activities to demonstrate improved technologies

Extension activities play an important role to disseminate the technologies and other related issues in CFLDs to the grass root level. During the year, 237 extension activities were conducted by the KVKs for creating awareness among the farmers across the states of Zone-1 in which as many as 6908 farmers actively participated (Table 5.4). The extension activities comprised of farmers-scientists interaction, method demonstrations on scientific practices, field days, awareness camps, kisan goshties, message on Whatsapp, etc. KVKs also organized 98 training programmes for up scaling the technologies generated by SAUs in which 2408 farmers actively participated (Table 5.5).

5.1.3 Training programmes

The training programme on Cluster Frontline Demonstrations on Oilseeds 2017-18 was organized by ICAR-ATARI, Ludhiana on December 7 & 8, 2017. In this training programme, scientists from ICAR-ATARI, Zone-I and twenty five Programme Coordinators (PCs) and Subject Matter Specialists from KVKs of Punjab were participated. During the training programme lectures from experts from Oilseed section, Department of Plant breeding was organized. Besides this field visits to PAU experimental farm was also organized for the trainees during the two days programme.

Table 5.4: Extension activities conducted by the KVKs for the farmers under CFLD on oilseed

Sr. No	Extension activities	No. of activities	No. of Farmers
1.	Farmer scientist interaction	21	527
2.	Kisan Goshti	30	930
3.	Field day	43	3479
4.	Field visit	99	1323
5.	Monitoring	21	166
6.	Group Discussion	12	268
7.	Lecture/Seminar	3	86
8.	Diagnostic visit	8	129
	Total	**237**	**6908**

Monitoring of Raya crop at KVK Ludhiana

Training Programme on CFLD Oilseed

Table 5.5: Training programmes conducted by KVKs during 2017-18

Sr. No	Training programmes	No. of activities	No. of Farmers
1	Training on Sesame and Groundnut	38	951
2	Training on Rapeseed &Mustard	60	1457
	Total	**98**	**2408**

Monitoring of gobhi sarson field at Jhunir

5.2 CFLDs on Pulses

Department of Agriculture, Cooperation & Farmers Welfare (DAC&FW), MoA&FW, Government of India approved the project "Cluster Frontline Demonstrations (CFLDs) on Pulses 2017-18" with the aim increasing the area, productivity and production of pulse crops under National Food Security Mission (NFSM). Under the project, for conducting frontline demonstrations (FLDs) on pulses in the states of Punjab, Himachal Pradesh, Uttarakhand and Jammu and Kashmir, a total budget of ₹1.25crore was sanctioned to ICAR-ATARI, Zone-I, Ludhiana. The project provided for ₹7,500/ha for the KVKs conducting FLDs on pulses viz. pigeon pea, rajmash, horsegram, chickpea, lentil, field pea, black gram and green gram. Moreover, the KVKs which conducted FLDs in at least 50 ha and more area either in Kharif, Rabi and summer season were allowed to hire a Pulses Technology Agent (PTA) for six months with the pay of ₹10,000/month to assist the execution of the project.

During the year, frontline demonstrations on different pulse crops were conducted on 1400.33 ha area in the states of Zone-I (Table 5.6). The highest area covered under demonstrations was on summer green gram (420 ha) followed by chickpea (330.60 ha). Similarly, highest number of demonstrations were conducted in the state of Punjab (798 ha) followed by Uttarakhand (216.73 ha).

5.2.1 Kharif season

Frontline demonstrations on pulses viz. green gram,

Table 5.6: Crop-wise and state-wise area (ha) of demonstrations under CFLD Pulses 2017-18

State/crop	Kharif				Rabi			Summer		Total
	Black Gram	Green Gram	Rajmash	Horse gram	Chick pea	Field pea	Lentil	Green Gram	Black Gram	
Punjab	10.00	40.00	--	--	240.00	10.00	50.00	420.00	28.00	**798.00**
Himachal Pradesh	97.00	20.00	--	--	63.60	10.00	--	--	--	**190.60**
Jammu & Kashmir	40.00	17.00	79.20	--	20.00	38.80	--	--	--	**195.00**
Uttarakhand	28.73	--	--	8.00	7.00	--	173.00	--	--	**216.73**
Total	**175.73**	**77.00**	**79.20**	**8.00**	**330.60**	**58.80**	**223.00**	**420.00**	**28.00**	**1400.33**

Table 5.7: Details of Frontline Demonstrations conducted during *Kharif* 2017-18

State	Crop	Variety	FLDs		Yield (q/ha)		Increase in yield (%)
			No.	Area (ha)	Demo	Check	
Punjab	Greengram	ML 2056	100	40.00	11.3	9.7	16.5
	Blackgram	Mash 114	26	10.00	7.2	5.4	33.6
HP	Blackgram	Palampur 93, Him Mash 1, UG 218	550	97.00	7.7	6.0	30.2
	Greengram	SML 668	109	20.00	8.1	6.8	19.6
	Greengram	KM 2241	73	17.00	8.5	6.4	32.6
J&K	Rajmash	Gureezi Rajmash, Madew Rajmash, BR-104, Red canadian	420	79.20	8.9	7.0	25.7
	Blackgram	Shekher-3, Pant U 31	320	40.00	5.4	3.9	40.0
UK	Horsegram	VLG15, VLG19 and VL GAHAT-10	100	8.00	10.0	7.9	29.4
	Blackgram	PU 31	88	28.73	8.0	5.6	44.2

black gram, rajmash and horse gram were conducted to popularize improved cultivation practices. The yields obtained in the demonstrations, compared to that of the local checks, were found to be significantly higher ranging from 16.5 per cent to 44.2 per cent (Table 5.7). The highest yield increased was recorded in black gram crop in Uttarakhand followed by black gram (40.0%) in Jammu & Kashmir. This increase in yield can be attributed to the use of improved varieties and following scientifically better practices compared to existing practices on the farmers' fields.

5.2.2 Rabi season

Scientific cultivation and improved practices of Chickpea, lentil and field pea crops were demonstrated in the states of the zone. Demonstration fields recorded significantly higher yields compared to the local check fields such as in Punjab demonstrations on chickpea recorded 22.6 per cent higher yield and that on lentil recorded 16.9 percent higher yield (Table 5.8). Similarly, demonstrations on chickpea in both Himachal Pradesh as well as Jammu & Kashmir recorded more than 35 per cent higher yields as compared to local check. Moreover, lentil demonstrations in Uttarakhand recorded 36.9 percent higher yield compared to that of local check.

5.2.3 Summer season

As many as 1038 demonstrations on summer green gram and black gram were conducted on 448 ha area in the state of Punjab (Table 5.9). The crop is in the field on the date of reporting.

5.2.4 Summer season (2016-17)

KVKs of Zone-I conducted frontline demonstrations on 751.55 ha area during summer 2016-

Table 5.8: Details of Frontline Demonstrations conducted during *Rabi* 2017-18

State	Crop	Variety	FLDs		Yield (q/ha)		Increase in yield (%)
			No.	Area	Demo	Check	
Punjab	Chickpea	PBG 7, PBG 5, GNG 1581	696	240.0	17.2	14.2	22.6
	Lentil	LL 931	214	50.0	10.4	8.9	16.9
	Field pea	Punjab 89	35	10.0	14.9	13.3	12.5
HP	Chickpea	Himachal Chana 2, GPF 2, GNG 1581, HC 5, Aman 515 (CSJ-515)	329	63.6	8.0	5.8	37.2
	Lentil	Vipasha	49	10.0	6.3	5.6	12.5
J&K	Chickpea	GNG 1581, PG 186	220	20.0	7.4	5.4	37.5
	Field pea	Prakash, Gurezi pea, Rachina, Shalimar Pea-1, Punjab 89	211	38.8	1.8	1.5	20.0
UK	Chickpea	Pant G 186	19	7.0	14.5	10.2	23.1
	Lentil	PL 8, VL Masoor 514	1875	173.0	9.5	7.0	36.9

Table 5.9: Details of frontline demonstrations conducted during summer 2017-18

State	Crop	Variety	FLDs	
			No.	Area (ha)
Punjab	Green gram	SML 668, SML 832	964	420.00
	Black gram	Mash 1008	74	28.00

Table 5.10: Performance of Demonstrations on Pulses during summer season under CFLD Pulses 2016-17

State	Crop	Variety	FLD		Yield (q/ha)		Yield Increase %
			No.s	Area (ha)	Demo	Local	
Punjab	Green Gram	SML 668, SML 832	925	406.0	10.2	8.2	23.8
	Black Gram	Mash 1008	97	37.6	10.4	8.8	17.8
Haryana	Green Gram	SML 668, MH 421	674	290.0	7.1	5.6	30.9
HP	Green Gram	SML 668	50	10.0	7.5	6.8	10.3
	Rajmash	Baspa, Jwala, Triloki and Kailash	25	4.5	20.5	12.2	68.0
J&K	Green Gram	Uttara, PU-31	34	3.5	6.2	4.9	26.5

17 on crops like green gram, black gram and rajmash. Demonstrations on rajmash in Himachal Pradesh recorded an average yield of 20.5q/ha, which was 68.0 percent higher than that of the local check (Table 5.10). Similarly, in Punjab, demonstrations on black gram recorded 17.8 percent higher average yield than that of local check. The average yield increase of 23.8 percent was observed in demonstrations on green gram in Punjab as compared to local check; whereas, it was 30.9 percent in Haryana, 10.3 percent in Himachal Pradesh and 26.5 percent in Jammu & Kashmir.

5.3 NICRA

National Innovations in Climate Resilient Agriculture (NICRA) is a network project of the Indian Council of Agriculture Research (ICAR) which aims to enhance resilience of Indian agriculture to climate change and climate variability. The Technology Demonstration Component (TDC) of NICRA is being implemented through KVKs of 121 most climatically vulnerable districts across the country with an objective to demonstrate the existing technologies with National Agriculture Research system (NARS) to cope up with climate variability on farmers' fields and make the Indian agriculture climate resilient. In Zone-I, 13 most vulnerable districts which are covered under Technology Demonstration Component (TDC) of NICRA are namely, Bathinda, Faridkot, Fatehgarh Sahib, Ropar, Hamirpur, Kinnaur, Kullu, Chamba, Kathua, Pulwama, Bandipora, Tehri garhwal and Uttarkashi.

The interventions being implemented are categorized under four modules, i.e. natural resource management, crop production, livestock and fisheries, and institutional interventions. Besides, capacity building to participating farmers on the tools and new technologies to be adopted to mitigate the climate related adversaries in crop production and animal husbandry is also being addressed. The achievements during the year are detailed as under:-

5.3.1 Module I: Natural Resource Management (NRM)

Under NRM, different interventions like in-situ moisture conservation, water harvesting and recycling for supplemental irrigation, water saving irrigation methods, vermin-composting and green manuring for soil health improvement and fertility management, use of baler-cum-knotter were followed. Under these interventions, 1320 farmers were benefitted in selected NICRA villages (Table 5.11).

Table 5.11: Details of NRM activities implemented under NICRA by KVKs of Zone-1

Intervention	Technology demonstrated	No. of farmers	Area (ha)
In-situ moisture conservation	Sowing of wheat/summer moong with Happy Seeder/Zero Till Drill in residual moisture condition, plastic mulching in cucurbits, laser leveling, fodder grass on farm bunds and ploughing across the slope	628	406.6
Water harvesting and recycling for supplemental irrigation	Rain water harvesting structure and renovation of farm ponds	130	7.5
Water saving irrigation methods	Use of Tensiometer for irrigation scheduling in paddy	74	24.6
Green manuring for soil health improvement	Cultivation of green manuring crops	135	36.0
Vermi-composting	Use of vermi-compost for soil health improvement	174	54.0
Alternate energy source	Biogas Plant and Folding two step solar cooker	13	7.0
Any other- Efficient management of paddy stubbles-Baler-cum-knotter	Use of paddy stubbles for soil health/fertility	148	178.0
Conservation tillage	Conservation tillage	18	27.0
Total		**1320**	**740.6**

5.3.2 Module II: Crop Production

Under this module, different crop were grown in the farmers fields to demonstrate effectiveness of drought tolerant varieties, location specific intercropping systems with high sustainable yield index, nutrient management, pest and disease management, short duration varieties, water saving paddy cultivation methods etc. As many as 1915 farmers were involved to demonstrate these improved climate resilient technologies and demonstrations were laid on 480 ha area (Table 5.12).

Table 5.12: Details of Crop Production module implemented under NICRA by KVKs of Zone-1

Interventions	No. of. farmers	Area (ha)
Contingency crop planning	20	8.0
Crop diversification	323	37.6
Drought tolerant varieties	580	182.5
Location specific intercropping systems with high sustainable yield index	20	0.1
Low water requiring crops	25	2.3
Nutrient management	40	16.0
Pest and disease management	94	10.1
Short duration varieties	594	109.8
Varietal evaluation	125	31.8
Water saving paddy cultivation methods (SRI, aerobic, direct seeding)	94	82.2
Total	**1915**	**480.2**

5.3.3 Module III: Livestock and Fisheries

Different interventions like animal health check up camp, breed up-gradation, de-worming in livestock, mitigation of mineral deficiencies in animals, preventive vaccination, fodder Production, hay making etc. were followed in NICRA villages of Zone-I. Under these activities, 2537 farmers were benefitted through 303 demonstrations (Table 5.13).

5.3.4 Module IV: Institutional Interventions

This module consists of interventions such as fodder bank, custom hiring centre, Mechanization through custom hiring for timely planting etc. Custom hiring centers in NICRA villages provided required farm implements to 721 farmers which were utilized for 369.73 ha area to carry out timely operations besides reducing the cost of cultivation. Under these interventions, services were provided to 1411 farmers (Table 5.14).

5.3.5 Capacity Building

During 2017-18, 194 different capacity building programs were conducted for 3977 farmers including 1348 farm women on various need based aspects like crop management, enterprises for self employment, live stock management, management of horticultural crops, nutritional garden etc (Table 5.15).

Table 5.13: Details of livestock and fisheries activities implemented under NICRA by KVKs

Intervention	No. of demos	No. of farmers	Units
Animal health check up camp	6	247	404
Artificial Insemination (No. of animals)	1	19	26
Breed up gradation (No. of animals)	4	101	184
De-worming in livestock (No. of animals)	9	389	869
Improved shelters for reducing heat stress in livestock (Units)	28	148	234
Mitigation of mineral deficiencies in animals	9	325	417
Popularization of backyard poultry (No. of birds)	4	385	541
Preventive vaccination (No. of animals)	7	464	1044
Fodder Production (ha)	200	232	114
Hay Making (Units)	35	224	307
Total	**303**	**2534**	**4140**

Table 5.14: Details of institutional interventions implemented under NICRA by KVKs

Interventions	No. of farmers	Units
Fodder bank (ha)	234	3.5
Custom hiring centre (ha)	721	369.7
Mechanization through custom hiring for timely planting (ha)	241	85.0
Climate literacy through a village level weather station	164	13.0
Seed bank (ha)	51	22.8
Total	**1411**	**494.1**

Table 5.15: Details of capacity building programmes carried out under NICRA by KVKs

Thematic area	No. of courses	No. of farmers trained		
		Male	Females	Total
Crop management	16	255	85	305
Enterprises for self employment	19	267	162	429
Farm implements and machineries	5	39	10	21
Fodder and feed management	15	317	162	454
Forest tree/ agro forestry plantation	2	40	0	40
Irrigation management	2	20	14	34
Live stock management	15	219	71	290
Management of horticultural crops	22	365	151	480
Natural resource management	10	148	13	121
NICRA awareness	3	96	43	139
Nutritional garden	6	94	44	78
Pest and disease management	25	394	126	478
Post harvest technology	2	4	20	24
Resource conservation technology	3	72	57	129
Seed production	3	71	4	47
Soil health management	10	202	81	193
Vegetable production	16	186	137	333
Water saving	3	60	15	75
Awareness on abuse on social issues	2	22	8	30
Nutrient management	3	70	0	70
Home Science	8	0	127	127
Crop Diversification	4	62	18	80
Total	**194**	**3003**	**1348**	**3977**

5.3.6 Extension Activities

For creating awareness about the impact of the climate resilient technologies, a number of extension activities were organized by KVKs under NICRA at the KVK farms as well as in the NICRA villages. Total 481extension programmes were organized by the KVKs of the Zone-I in which 10153 farmers participated which included 2973 farmwomen. The detail of the extension activities are presented in the Table 5.16.

Table 5.16: Details of Extension Activities carried out under NICRA by KVKs

Name of the activities	Number of programs	No. of beneficiaries		
		Male	Female	Total
Exposure visit of farmers	15	384	97	481
Strengthen -SHG	4	22	16	38
Strengthen -Kissan club	1	15	0	15
Integrated farming system	7	42	15	57
Field days	33	1221	340	1561
Method demonstrations	82	989	432	1421
Awareness Camps	157	2914	990	3904
Group dynamics	103	968	431	1399
Kissan Mela	1	40	5	45
Women awareness	12	31	272	303
Agro advisory services	66	590	339	929
Total	**481**	**7216**	**2937**	**10153**

5.4 Tribal Sub Plan

The Tribal Sub-Plan (TSP) is a strategy for the rapid socio-economic development of tribal people. It forms a part of annual Plan of a State/UT. The TSP is applicable in 23 States and 2 UTs which are: Andhra Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Goa, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Rajasthan, Sikkim, Tamil Nadu, Telangana, Tripura, Uttar Pradesh, Uttarakhand, West Bengal, Andaman & Nicobar Island and Daman & Diu.

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. The creation of productive assets in favor of Scheduled Tribes is to sustain the growth through development efforts. Fifteen KVKs of three states of ICAR-ATARI, Ludhiana were selected for this scheme during the year 2017-18. Three KVKs of Himachal Pradesh, three KVKs from Jammu & Kashmir and six KVKs from Uttrakhand are under the project of Tribal

Table 5.17: Details of activities undertaken by KVKs under TSP in Zone-1

Name of the State/KVK	OFT	FLD	Trainings		Extension Activities		KMAS	
	No. & Trials	Area & No.	No. of Courses	Participants	No. of Courses	Participants	No. of Farmers	No. of Messages
Himachal Pradesh								
Chamba	9 (47)	41.49 (560)	79	1868	828	5763	-	-
Kinnaur	7 (22)	10.38 (57)	33	1127	2867	5490	1000	9
Lahaul & Spiti	5 (27)	43.20 (245)	43	1121	346	9019	-	-
Total	**21 (96)**	**95.07 (862)**	**155**	**4116**	**4041**	**20272**	**1000**	**9**
Uttrakhand								
Chamoli	3 (5)	30.09 (569)	63	1373	245	3369	-	-
Dehradun	4 (55)	41.50 (264)	271	7966	1248	9092	3068	-
Pithoragarh	13(104)	48.50 (705)	115	2201	2417	14983	19	4
US Nagar	2 (15)	46.16 (220)	26	616	-	-	884	440
Uttarkashi	7 (20)	40.50 (677)	59	3203	1128	4233	229950	793
Total	**29(199)**	**206.75(2435)**	**534**	**15359**	**5038**	**31677**	**233921**	**1237**
Jammu & Kashmir								
Poonch	5 (23)	42.40 (231)	52	1132	575	2154	11440	11
Rajouri	8 (35)	81.35 (460)	52	960	294	6285	2500	52
Reasi	9 (36)	58.00 (635)	66	1482	17489	1508	75	75
Kargil	6 (23)	10.70 (140)	92	2450	15741	86768	-	-
Leh	3 (27)	2.15 (50)	71	2477	239	346	432	0
Leh Add.	4 (52)	2. 90 (133)	52	1285	640	-	3362	14
Total	**35(196)**	**197.50(1649)**	**385**	**9786**	**34978**	**97061**	**17809**	**152**
Grand Total	**85 (491)**	**499.32 (4946)**	**1074**	**29261**	**44057**	**149010**	**252730**	**1398**

Sub Plan. A total of ₹ 224 lakh during 2017-18 were earmarked during the period for selected KVKs of this Zone.

During the 2017-18 year, KVKs under the TSP scheme conducted 85 OFT and FLDs in 499.32 ha area in farmers' fields (Table 5.17). A total of 1074 training courses were organized in which 15359 farmers and extension personnel attended the programmes during the reported period. A total of 149010 stakeholders attended the extension activities organized by the KVKs under TSP. With the help of ICT a total of 1398 messages were sent to 252730 farmers during the reported period.

During the reported period KVKs under TSP produced 8.86 lakh number of good quality planting material and 78.94 tonnes of seed for distribution among farmers (Table 5.18). KVKs also conducted the demonstrations of dairy animals and poultry birds to the farmers to augment their income. A total of 9 FLDs for 247 livestock farmers were conducted on the farmers' field.

Table 5.18: Details of seed planting material production and live stock FLDs by the KVKs under TSP in Zone-1

Name of the State/KVK	Seed Prod. (Qtl.)	Planting material (Nos.)	FLD on Live stock and finger lings (in No.)	
			No. of FLDs	No. of Demo.
Himachal Pradesh				
Chamba	63.50	31924	-	-
Kinnaur	-	2043	-	-
Lahaul Spiti	464.50	-	-	-
Total	**528.00**	**33967**	**-**	**-**
Uttrakhand				
Chamoli	-	13698	1	30
Dehradun	70.10	63925	2	60
Pithoragarh	-	327590	2	60
US Nagar	68.82	-	-	-
Uttarkashi	29.81	229950	-	-
Total	**168.72**	**635163**	**5**	**110**
Jammu & Kashmir				
Poonch	13.00	-	-	-
Rajouri	23.20	3100	1	60
Reasi	43.45	12000	2	57
Kargil	13.00	49100	-	-
Leh	-	134131	1	20
Leh Additional	-	18475	-	-
Total	**92.65**	**216806**	**4**	**137**
Grand Total	**789.36**	**885936**	**9**	**247**

Table 5.19: Details of soil, water, plant samples and soil health cards issued to the farmers by the KVKs during the year.

States	Soil Samples		Water Samples		Plant Samples		No. of SHC Issued
	No.	No. of farmers	No.	No. of farmers	No.	No. of farmers	
Uttarakhand	555	1202	737	737	0	0	1131
Himachal Pradesh	459	416	285	253	0	0	329
Jammu& Kashmir	692	885	154	154	72	72	577
Grand Total	**1706**	**2503**	**1176**	**1144**	**72**	**72**	**2037**

SHC = Soil Health Cards

During the year a total of 1706 soil, water and plant samples from 15 KVKs working among tribals were tested by the KVKs of the farmers from the selected villages. A total of 2037 soil health cards were issued to the farmers for testing their soil samples by the KVKs staff under TSP programme during the year (Table 5.19).

5.5 Awareness on PPV&FRA

The Ministry of Agriculture and Farmers Welfare encourages registration of farmer's varieties of crops under Protection of Plant varieties and Farmers Right Act 2001 (PPV&FRA). The Authority encourages Protection for new plant varieties, essentially derived varieties, extant varieties and farmers' varieties. This act has recognized farmers as innovators, conservers, breeders, preservers of plants and plants varieties in addition to cultivators. The farmers' varieties and extant varieties need not fulfil the requirements of newness. There is a special provision for compensation to the farmers in case material supplied is not meeting the expected performance. The authority has waved the fees for the farmers and there is provision for benefit sharing for the farmers varieties also.

During the reported period 11 KVKs (8 KVKs in Himachal Pradesh, 2 KVKs of Jammu & Kashmir and one KVK in Uttrakhand) of Zone-I organized 12 awareness programmes for the 1973 farmers (Table 5.20). The dignitaries from Member of Legislative Assembly, Officers of PPV& FR Authority, State Agriculture Universities and Panchayat Members graced on the occasion of these programmes. The major activities of these programmes included exhibition of farmers' on varieties of various crops, information from eminent scientists, group discussions among the farmers and scientists, possible farmer varieties to be sent for the registration, award applications for the farmers under PPV& FRA. Pamphlets about the farmers' rights were also distributed by four KVKs of H.P and one KVK published a booklet about the guidelines of the PPV& FR Authority for the farmers.

Table 5.20: Details of awareness programmes conducted under PPV&FRA by KVKs of Zone-I

S.No	Name of the KVK	Dates	No. of farmers	Dignitaries visits	Supplementary input
1.	Chamba	17.03.2018	400	3	--
2.	Kinnuar	20.04.2018	153	5	Pamphlet
3.	Shimla	06.04.2018	200	1	--
4.	Solan	20.03.2018	150	3	--
5.	Kullu	19.02.2018	150	3	Exhibition Pamplet #
6	Kangra	03 02 2018	127	3	Exhibition
7.	Lahual & Spiti	19.04.2018	128	2	Exhibition and Pamphlet
8	Bilaspur	12 04 2018	190	4	Exhibition and Pamphlet
9	Leh additional	12 12 2017 23.12.2017	70 80	5	--
10.	Budgam	25.11.2017	165	3	Booklet
11.	Uttarkashi	17.03.2018	160	2	--
Grand Total		**12**	**1973**	**34**	

*Five KVKs of CSKHPKV, Palampur, Himachal Pradesh got their funds revalidated 4 lakhs
Mandi. Kullu, Lahual & Spiti, Kangra and Bilaspur; # Krishak Adhikar- Paud Kisam aur Krishak Addhikar Sanrakshan Adhiniym

KVKs of Uttrakhand and scientist from ICAR-ATARI attended the Regional workshop and Agro biodiversity Exhibition on 15th January 2018 at IISR, Lucknow, Uttar Pradesh *and* National Seminar on Farmers' Rights and Agro-biodiversity Exhibition on 23-24th February 2018 at ICAR-IIVR, Varanasi. Eight KVKs of Uttrakhand participated and exhibited the seed and planting material collected from the farmers of their districts.

5.6 ARYA

The ICAR project "Attracting and Retaining Youth in Agriculture (ARYA)" is aimed at entrepreneurial development of youth in rural areas to take up different agriculture, allied and service sector enterprises for sustainable income and gainful employment. ARYA centres, selected KVKs, identified potential youth and trained them on entrepreneurship development skills by providing a basket of options to start agricultural ventures for self employment. In Zone-I, four KVKs namely KVK Haridwar in Uttarakhand; KVK Bathinda in Punjab; KVK Hamirpur in Himachal Pradesh and KVK Kathua in Jammu and Kashmir are implementing the project.

Division of Agricultural Extension, ICAR, New Delhi sanctioned ₹45 lakh (Revised Estimate) to the institute during 2017-18 for implementing the project in Zone-I. A total of 22 training programmes were organized by the ARYA centres during the year in which 472 rural youths got benefitted (Table 5.21). These trainings included theory based lectures, method demonstrations, hands-on-practice as well as exposure visit to successful enterprises. Rural youth were trained on various agricultural & allied enterprises viz. bee keeping, value addition & processing, mushroom cultivation, poultry farming, protected cultivation and nursery raising of vegetables and commercial floriculture.

5.7 Farmer FIRST Programme

It is an ICAR initiative to move beyond the production and productivity and to privilege the complex, diverse and risk prone realities of majority of the farmers through enhancing farmers-scientists contact with multi stake holders-participation. The focus is on Farmer's Farm, Innovations, Resources Science and Technology (FIRST). Many aspects are multiple or multi; multiple stakeholders, multiple perspectives, multiple realities, multi-functional agriculture, multi-method approaches. There are concepts and domains that are new or new in emphasis like food systems, trade, market chains, value chains, innovation pathways and most of all innovation systems.

The project is conceptualized to deal with focus (i) Enabling involvement of researchers for various interaction with farm conditions, problem orientation, exchange of knoweldge between farmers and other stakeholders, prioritization of problems and setting of research agenda; (ii) Integrating components of technology for application in different agro-ecosystems with focus on innovations and feedback; (iii) Building partnerships involving different stakeholders; development of rural based institutions; agro-

Table 5.21: Progress of Attracting and Retaining Youth in Agriculture during 2017-18

KVK & Enterprises	Training programmes (No.)	Rural Youth benefitted (No.)
Bathinda: Bee Keeping, Value addition & Processing, Mushroom Cultivation & Poultry Farming	4	140
Haridwar: Mushroom Cultivation & Poultry Farming	2	70
Hamirpur: Mushroom Cultivation, Protected Cultivation and nursery raising of vegetables & Post-harvest and value addition	4	97
Kathua: Mushroom cultivation, Value addition, Commercial Floriculture & Poultry farming	12	165
Total	**22**	**472**

ecosystems and stakeholders analysis and impact studies and (iv) Using the platform of the project having commodity institutions as partners to develop commodity specific contents for e-enabled knowledge sharing. It is envisaged that project will provide a platform of creating linkages, capacity building technology adaptation and application, on-site input management, feedback and institution building.

There are seven Farmer FIRST Projects sanctioned to ICAR institutes and State Agricultural Universities during the period under report to Zone-I (Table 5.22).

Component-wise achievements under farmer FIRST programme are presented herewith:

Component I: Enhancing Farmer-Scientist Interface

Farmer FIRST projects under Zone-I had organized various programmes for enhancing farmer-scientist interface as presented in Table 5.23. A total of 129 trainings were conducted on various relevant aspects under respective projects for competency development in which 4760 farmers benefitted. Besides trainings, 8 awareness camps and 20 exposure visits were conducted during the period under report.

Component II: Technology Assemblage, Application and Feedback

Module and centre-wise progress of technology assessment and demonstration has been presented below:

Table 5.22: List of Farmer's FIRST Project

S. No.	Name of Institute/University	Title of the project	Sanctioned amount (₹ in Lakh)
1	GADVASU, Ludhiana	Integrated approaches for livestock development: farmers context	51.80
2	CSK HPKV, Palampur	Transfer of improved farm production technologies for enhancement of rural livelihood security amongst the farm households of Kangra District of Himachal Pradesh	39.81
3	CIPHET, Ludhiana	Processing and value addition of agricultural produce for enhancing farmers income and employment in production catchment	43.50
4	PAU, Ludhiana	Technology Application and up-scaling for sustaining natural resources and augmenting farm income: farmers led market linked approach	42.99
5	SKAUST, Jammu	Exploring economic opportunities for farmers of kandi villages through application of proven rainfed technologies	34.50
6	ICAR-IISWC, Dehradoon	Farmer Participatory Technology Application for Sustainable Resource Management and Livelihood Security in North-Western Himalaya	51.00
7	GBPUAT, Pantnagar	Enhancing livelihood opportunities of the farming community in the mid-hills of uttarakhand	8.63

Table 5.23: Various extension activities conduted under Enhancing Farmer-Scientist Interface module

S. No.	ICAR Institute/SAU	Trainings		Awareness camps		Exposure visits	
		No.	Farmers	No.	Farmers	No.	Farmers
1.	PAU, Ludhiana	35	1035	4	300	10	300
2.	GADVASU, Ludhiana	49	2291	-	-	-	-
3.	ICAR-CIPHET, Ludhiana	3	146	-	-	-	-
4.	ICAR-IISWC, Dehradun	2	75	2	285	2	55
5.	CSKHPKV, Palampur	15	625	-	-	2	60
6.	SKUAST, Jammu	22	453	2	78	6	344
7.	GBPUAT, Pantnagar	3	135	-	-	-	-
	Total	**129**	**4760**	**8**	**663**	**20**	**759**

5.7.1 PAU, Ludhiana

5.7.1.1 NRM module

- A total of 300 demonstrations (0.4 ha each) on short duration varieties of paddy (200 demonstrations on PR 126 and 100 demonstrations on PR 121) for efficient water management were conducted. The average yield of PR 126 and PR 121 varieties found to be 80.60 q/ha and 80.69 q/ha, respectively. The B: C ratio of demonstrated varieties was observed to be 3.04 & 3.15 as compared to 2.66 and 2.84 of local check, respectively.
- A total of 50 demonstrations (*Var.* PR 121) on Direct Seeded Rice (DSR) by Lucky Seed Drill were conducted (0.4 ha each). The average yield of demonstrations as well as local check was found almost same (≈ 80q/ha). However, the B:C ratio of demonstrations (3.54) was found to be higher than farmers' practice (2.59).
- Demonstrations on Happy Seeder sown wheat for in-situ paddy straw management were conducted on 80 ha areas at 200 farmers' field. Average yield of demonstration plots (52.38q/ha of HD 3086 and 51.38 q/ha of PBW 725) was found slightly higher than the local check var HD 2967 (50.70q/ha). The B:C ratio of demonstrated varieties, HD 3086 & PBW 725 (3.36 & 3.20 respectively) was found higher than local check (2.46).

5.7.1.2 Diversification module

- A total of 100 demonstrations on summer moongbean (*Var.* SML 668) were conducted on an area of 25 ha in Rice-Wheat cropping system. As compared to the local check (9.38 q/ha), higher average yield was recorded in demonstrations (10.84 q/ha).
- Demonstrations on chickpea (*Var.* PBG 7) were conducted at 50 farmer's field. The average yield was 17.0 q/ha in demonstrations whereas 16.0 q/ha was reported in farmers' practice. The B:C ratio was found to be higher in demonstrations (2.35) over the local check (2.10).
- A total of 70 demonstrations, on Gobhi Sarson (*Var.* GSC 7) were conducted. The average yield was found to be 20.6 q/ha under demonstrations whereas 19.8 q/ha was recorded in local check. Higher B:C ratio was recorded under demonstrations (3.49) as compared to local check (2.89).

5.7.1.3 Subsidiary enterprises module

- Under beekeeping, 15 demonstrations were conducted that includes 4-5 colonies of bee hives, stand, hive tool, bee veil, honey bee colonies and comb foundations.
- For mushroom cultivation, total 39 demonstrations were laid in Chatha Nanehra and Taranji Khera villages. Apart from this farmers got training for cultivation and had shown keen interest.

5.7.1.4 Livestock based modules

- A total of 50 demonstrations were laid on deworming and feeding of mineral mixture of the animals. It was found that the milk production was increased upto a level of 1.0-1.5 kg/animals.
- For prevention and control of mastitis in dairy animal, the BTB cards were used to detect the mastitis symptoms. The post teat dip solution was used to prevent the mastitis in the dairy animals.

5.7.2 GADVASU, Ludhiana

5.7.2.1 Livestock feeding and management practices module

- A total of 525 demonstrations were conduted on mineral mixture and uromin lick managemnet. It has been reported that feeding to milch animals for 4 weeks resulted in 13.47% increase in milk production and 0.5% in fat.
- Under bypass fat intervention, total 550 intervention conduted. Feeding for 10 days to milch animals increase the milk production by 4.37% and 0.42% in fat percentage.
- To maintain the reproduction and health status of the animals, demonstrations were conducted for balanced feed formulation. About 30 families started preparing balanced feed as per the formulations and on an average increase 0.7- 1.0 kg milk with 0.2% fat has been observed.

5.7.2.2 Livestock health management module

- Demonstrations for Ectoparasite control (Fly end) were laid at 286 farmer's milch animals. Beneficiries reported that this technology is very useful to control the flies in the dairy sheds.
- For endo-parasite control (Deworming), total 363 farmer's milch animals selected. Increased in milk yield and health status of the animals was observed.

- A total of 94 animals were selected to conduct demonstrations on mastitis detection with SLS pedal and reagent and BTB papers (kit). The farmers are now able to detect the early mastitis at their farms.
- To prevent TRP and diphragmatic hernia (DH) with oral magnet therapy, total 26 trials were conducted. Now, farmers can protect their animals at the cost of ₹200 by following the technology.

5.7.2.3 Agronomy and horticulture module

- On maize variety J1006, 358 demonstrations were conducted on 15 ha area. The average yield was found to be 440 q/ha, that is higher than the local check (250q/ha).
- A total of 126 demonstrations were laid on Napier Bajra (*Var.* PBN 233) on 4.00 ha area and yield was found to be 2000-2500 q/ha with B:C ratio 1:1.6.
- For regular supply of fodder for milch animals, 107 demonstrations were conducted on bag silage. It has been recorded that use of bag silage reduced the feeding cost ₹ 75/day/animal and labour too.

5.7.3 ICAR-CIPHET, Ludhiana

5.7.3.1 Agro Processing Centre (APC) module

- Total 500 kg (₹24500) of greengram, lentil, black lentil and chickpea dal was processed. The profit of ₹ 7957 was recorded by selling the proccessed and packed dal. Processing cost was ₹1.50 per kg including packaging.

5.7.3.2 Honey processing module

- Total 200 kg of raw honey was processed and sold & ₹ 28600 profit was recorded. Under this, the processing cost was ₹27 per kg of the product (including ₹ 25/bottle).

5.7.4 ICAR-IISWC, Dehradun, Uttarakhand

5.7.4.1 Crop based module

- Demonstrations on wheat varieties VL-907 and VL892 were found to be better and quick in growth as compared to the HS-507. The maximum average yield (q/ha) was recorded in VL-907 (32-35) followed by VL-892 (28-32), HS-507 (22-25) and RR-21 local (14-18).
- A total of 88 demonstrations were conducted on lentil variety VLM-514. The average plant population and yield was recorded as 157/m^2 and 7-8 q/ha respectively.
- On hybrid 5222 of mustard, total 68 demonstrations conducted. As compared to the line sowing, better average yield was recorded in the broadcasted method owing to lack of sowing equipments.

5.7.4.2 Horticulture based module

- For backyard nutritional kitchen garden, total 200 demonstrations were conducted on winter vegetables namely radish, turnip, spinach, french bean, pea and bakla for household consumption. Apart from this, 800 drumstick plants of variety PKM-1 were too demonstrated.

5.7.5 CSKHPKV, Palampur

5.7.5.1 Crop based Intervention

The important interventions were conducted with an aim for improved high yielding variety/hybrid, proper sowing time, balanced fertilizer application and control of diseases of important crops.

- A total of 75 demonstrations were conduted on maize variety KH 517 on an area of 133 ha. The percentage increase in average yield was 33.5 over the local check. The recorded B:C ratio was 2.79 in demonstration plots while 2.39 in local check.
- On paddy varieties like Raja 369, HPR 1068, HPR 2143, Kasturi Basmati, HPR 2612, Kasturi Basmati (TLS) and HPR 2143 (TLS), 1925 ha area was covered with 1556 demonstrations. Kasturi Basmati and Kasturi Basmati (TLS) were new introduction to the projected area.
- Okra variety Adhunik was demonstrated on an area of 3.68 ha. Over the local check, 64.4 percent higher average yield was recorded from demonstrations. The B:C ratio was 2.80 in demonstrations fields & 1.85 in local check.
- A total of 14.45 ha area was covered by 289 demonstrations of wheat varieties like HPW 368, HPW 349 and HPW 155. Maximum increment in average yield was recorded in HPW 368 variety is 33.1 percent while lowest in HPW 155 is 17.2 percent.

5.7.5.2 Animal husbandry module

- A total of 300 demonstratons were conducted on mineral mixture for health care and nutritional aspects. Percentage increment in milk yield was 1-1.5 kg/day/animal over local unfed.

- Under milk ration interventions, 100 demonstrations were laid and increment in milk was found to be 1-1.5 kg/animal over local unfed.
- A total of 615 demonstrations were conduted for UMMB supplement and percentage increase over local unfed was 1-1.5 kg/animal recorded.

5.7.6 SKUAST, Jammu

5.7.6.1 Crop cultivation module

- A total of 756 demonstrations of maize variety Double Dekalb were conducted on 150 ha. Increase in average yield and income was found to be 46.8 and 70.92 percent respectivily over the local check.
- Wheat variety WH-1080 was demonstrated on 100 ha. From 500 demonstrations, the recorded average yield was 20.8 q/ha in demonstration while and 13.3 q/ha in local check.
- A total of, 50 demonstrations on marigold Pusa Narangi/Basanti cultivar were conducted on an area of 2.00 ha. The increment in yield was 48.5 percent over the local check. The recorded B:C ratio was found to be higher in demostration (2.31) over the local check (1.82).

5.7.6.2 Backyard nutritional kitchen garden module

- Summer vegetables okra, bitter gourd, bottle gourd and cucumber were demonstrated on an area of 10 ha on 257 farmer's fields.
- A total of 10 ha area was covered on winter vegetables like hybrid varieties like radish, fenugreek, cauliflower, cabbage and spinach.

5.7.6.3 Livestock module

- A total of 50 demonstrations were conducted on UMMB mineral supplements. The increase in milk production was 15.15/animal/day. The B:C ratio was found to be 3.01 in feeded while 1.86 in unfed.

5.7.6.4 Natural resource management

- A total of 10 ha area was covered under 35 demonstrations of Pusa Hydrogel. The increase in yield and income was 46.8 and 70.9 percent respectively over the local check.

5.7.6.5 Integrated farming system module

- RSPT-1 of variety of toria that was demonstrated on one ha area. Over the local check, increse in average yield and income was 15.8 and 25.9 percent respectivily. The B:C ratio in demonstration field found to be 2.84 while 1.74 in the local check.

5.7.7. GBPUAT, Pantnagar

5.7.7.1 Adoption of improved vegetable varieties module

- A total of 143 demonstrations on Brinjal variety Pant Samrat were conducted on 1.5 ha. As compared to the local check (137.5 q/ha), higher average yield was recorded in demonstrations (175 q/ha).
- Demonstrations on Coriander (Green) variety Pant Haritima were conducted on 143 farmer's field on 1.5 ha. The average yield was 62.5 q/ha in demonstrations whereas 43.5 q/ha in farmers' practice. The B:C ratio was found to be 1:2.4 under demonstrations.
- A total of 143 demonstrations of okra variety Parbhani Kranti were conducted on 1.5 ha. The recorded average yield was 87.5 q/ha under demonstrations whereas 55 q/ha in local check.
- Radish variety Japanese White was demonstrated on an area of 1.3 ha at 140 farmer's field. As compared to the local check (125 q/ha), higher average yield was recorded in demonstrations (162.5 q/ha). The recorded B:C ratio was 1:2.2 under demonstrations.
- On Fenugreek variety Pusa Early Bunching, 138 demonstrations were conducted on 1.4 ha. The average yield was 62.5 q/ha, that is higher than the local check (37.5 q/ha). The B:C ratio of demonstrations were 1:1.9.
- A total of 138 demonstrations of Spinach variety All Green were laid on 1.4 ha area. The average recorded yield was found to be 1000 q/ha which is higher than the local check (75 q/ha).
- Demonstrations on tomato hybrid Heemsohna were conducted on 1.3 ha at 140 farmer's field. The higher average yield was found to be under demonstrations (200 q/ha) over the local check (150 q/ha). In demonstrations, the recorded B:C ratio was 1:2.2.

5.7.7.2 Livestock module

- A total of 50 demonstrations were conducted on backyard poultry, each includes 20 chicks per family. The recorded B:C ratio was 1:2 under demonstrations.

5.7.7.3 Improved feeding practices module

- A total of 108 demonstrations were conducted on an area of 1.08 ha on improved fodder variety African Tall. As compared to the local check, higher yield was recorded under demonstrations.

Chapter 6

OTHER EXTENSION ACTIVITIES

6.1 Frontline Extension Programmes

6.1.1 Details of Frontline Extension programs

Various extension programmes carried out by KVKs as well as in coordination and collaboration with other line departments/ agencies working in the respective districts during the year 2017-18 are briefly presented here in Table 6.1.

To make farmers aware about the production potential of newly released technologies and economic benefits in their conditions, a total of 67,288 extension programmes were organized using different methods and means wherein technologies related to agriculture and allied sectors covering 17.82 lakh farmers and 0.26 lakh extension personnel on various aspects like varietal performance, production technologies, integrated pest and disease management, animal health and nutrition, production technologies of poultry, fisheries, human nutrition, etc (Table 6.1).

6.1.2 State-wise distribution

Table 6.2 indicates that KVKs in Punjab organized maximum number of extension activities

Table 6.1: Activity-wise details of extension activities organised and distribution of participants

Name of Activities	No.	Participants											
		Farmers (Others)			SC/ST (Farmers)			Extension Officials			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Advisory Services	34736	60298	10461	70759	11897	2114	14011	440	117	557	72635	12692	85327
Agri mobile clinic	27	2306	422	2728	186	112	298	14	1	15	2506	535	3041
Animal Health Camp	91	2364	316	2680	536	231	767	193	21	214	3093	568	3661
Awareness Camp	70	856	520	1376	261	175	436	29	15	44	1146	710	1856
Celebration of important days	636	28342	9906	38248	7552	4177	11729	1298	786	2084	37192	14869	52061
Diagnostic visits	5064	14444	4003	18447	4138	1938	6076	292	119	411	18874	6060	24934
Exhibition	478	352455	44362	396817	34446	13504	47950	2902	2338	5240	389803	60204	450007
Exposure visits	1049	8296	2368	10664	3993	1239	5232	468	101	569	12757	3708	16465
Extension Literature distributed	2445	45370	3951	49321	6802	2481	9283	709	349	1058	52881	6781	59662
Ex-trainees Sammelan	88	411	353	764	203	125	328	14	8	22	628	486	1114
Farm Science Club Conveners meet	24	358	48	406	0	12	12	10	2	12	368	62	430
Farmer Scientist Interaction	19	221	24	245	293	225	518	63	0	63	577	249	826
Farmers Seminar	151	15511	1321	16832	1010	444	1454	191	47	238	16712	1812	18524
Farmers visit to KVK	-	59703	12216	71919	12573	4791	17364	446	96	542	72722	17103	89825
Field Day	418	12431	2177	14608	3119	1033	4152	417	288	705	15967	3498	19465
Film Show	378	13117	3665	16782	2301	1239	3540	497	80	577	15915	4984	20899
Group meetings	366	4381	507	4888	978	308	1286	149	55	204	5508	870	6378
Kisan Ghosthi	779	23276	6288	29564	3856	1973	5829	799	253	1052	27931	8514	36445
Kisan Mela	117	229987	99505	329492	106977	58055	165032	2578	2115	4693	339542	159675	499217
Lectures as resource persons	4831	202099	22748	224847	51534	10211	61745	3964	2239	6203	257597	35198	292795
Mahila Mandals Conveners meetings	64	307	671	978	138	162	300	4	2	6	449	835	1284
Method Demonstrations	2192	18255	4054	22309	5166	2741	7907	330	170	500	23751	6965	30716
Monitoring Visit	6	161	0	161	0	0	0	9	9	18	170	9	179
Newspaper coverage	1656	0	0	0	0	0	0	0	0	0	0	0	0
Popular articles published	473	0	0	0	0	0	0	0	0	0	0	0	0
Scientific visit to farmers field	9960	33073	19356	52429	20324	3227	23551	477	198	675	53874	22781	76655
SHGConveners meetings	91	319	529	848	23	72	95	5	6	11	347	607	954
Soil health Camp	107	4866	798	5664	1148	436	1584	126	44	170	6140	1278	7418
Soil testing campaigns	104	4344	334	4678	514	138	652	55	8	63	4913	480	5393
TV talks	453	0	0	0	0	0	0	0	0	0	0	0	0
Radio Talks	322	0	0	0	0	0	0	0	0	0	0	0	0
Workshop	93	2569	259	2828	287	127	414	201	11	212	3057	397	3454
Total	**67288**	**1140120**	**251162**	**1391282**	**280255**	**111290**	**391545**	**16680**	**9478**	**26158**	**1437055**	**371930**	**1808985**

Table 6.2: State-wise details of frontline extension programmes organised and distribution of participants

State	No. of Activities	Participants											
		Farmers (Others)			SC/ST (Farmers)			Extension Officials			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Punjab	38355	869859	192579	1062438	230765	87362	318127	9850	7294	17144	1110474	287235	1397709
HP	6098	42741	18365	61106	15379	12371	27750	1092	537	1629	59212	31273	90485
J&K	11803	147782	11004	158786	25161	4480	29641	3349	632	3981	176292	16116	192408
Uttarakhand	11032	79738	29214	108952	8950	7077	16027	2389	1015	3404	91077	37306	128383
Total	**67288**	**1140120**	**251162**	**1391282**	**280255**	**111290**	**391545**	**16680**	**9478**	**26158**	**1437055**	**371930**	**1808985**

(38355) followed by Jammu & Kashmir (11803), Uttarakhand (11032) and Himachal Pradesh (6098). In order to disseminate various agriculture related technologies among farmers on a large scale, KVK collaborate and coordinate with the different development departments and private agencies for successful execution of frontline extension programmes.

6.1.3 Mass awareness

The KVKs of Zone-I also used print and electronic media for creating awareness about new technologies, activities and agri-enterprises, etc amongst farmers as reported in Table 6.3. In respect of utilizing mass media, KVKs popularized technologies by distributing extension literature (2445), ensuring newspaper coverage (1656), publishing popular articles (473), delivering radio talks (322) and TV talks (453). Further details of state-wise scenario of different mass media are also given in the Table.

6.2 Convergence and Linkages

KVKs work in collaboration with different line departments and organizations of the State and Central Government; well reputed NGOs working on different

Table 6.3: State-wise mass awareness among farmers through print and electronic media

Activity	Punjab	Himachal Pradesh	Jammu & Kashmir	Uttarakhand	Total
Extension Literature	1582	469	192	202	**2445**
Newspaper Coverage	836	122	489	209	**1656**
Popular Article	163	107	155	48	**473**
Radio Talks	135	30	111	46	**322**
TV Talks	148	16	245	44	**453**

aspects of agriculture and rural development for sharing experiences and expertise Table 6.4). Such collaborations with line departments will help the KVKs in arranging resources for carrying out different extension activities and developing demonstration and training infrastructure. Besides, many KVKs are working in collaboration with other government development agencies. Under National Horticulture Mission (NHM), the KVKs of Gurdaspur, Bathinda and Gurgaon provided Gardener's Training Course for six months; KVKs of Punjab provided vocational trainings on bee keeping while KVKs of Himachal Pradesh and Jammu & Kashmir provided trainings on different aspects of protected cultivation, horticulture and off-season cultivation of vegetables.

Table 6.4: List of organizations having linkage and collaboration with KVKs

S. No.	Organization/Departments
1.	State Government Departments, Block Development Offices, Department of Horticulture, Department of Public Relations, State Agriculture Department, Department of Animal Husbandry, Dairy Development Board, Department of Soil & Water Conservation, Punjab Energy Development Agency, Watershed Department, Punjab State Farmers Commission, Child Development Project Office, Forest Department, Department of Fisheries, Veterinary and Animal Husbandry, Department of Sheep Husbandry, Department of Floriculture, Sericulture Department, Farmers Associations and Group, State Seed Certificate and Organic Produce Certification Agency, District Collector Office, Social Justice Association of Ladakh
2.	Agriculture Technology Management Agency (ATMA) and Non-government Organizations (NGOs)
3.	State Agricultural Universities (SAUs) and ICAR Institutes (CIPHET, Ludhiana; CPRI, Shimla; DMR, Solan; IIMR, Punjab; CRIDA Hyderabad; CITH, Srinagar; IIHR, Bangalore; IARI, New Delhi; CAZRI, Jodhpur
4.	Central Government Departments and schemes: Central Poultry Development Organization (CPDO), Central Warehouse Corporation (CWC), Integrated Rural Development Programme (IRDP), Integrated Watershed Management Programme (IWMP), Kargil Development Project (KDP), Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), Rasthtriya Krishi Vikas Yojna (RKVY), Indian Farmers Fertilizer Cooperative Limited (IFFCO), National Committee on Plasticulture Application in Horticulture (NCPAH), North India Technical Consultancy Organization (NITCO), National Medicinal Plants Board (NMPB), National Seed Corporation (NSC), Department of Social Welfare (DSW), National Fertilizer Limited (NFL), Khadi and Village Industries Commission (KVIC), National Institute for Food Technology Enterprises Management (NIFTEM), Mid Himalayan Watershed Development Project (HWDP)
5.	Financial Institutes: (National Bank for Agriculture and Rural Development (NABARD), State Bank of India (SBI) and Punjab National Bank (PNB)
6.	Other organizations: (Punjab State Seed Certification Authority (PSSCA) , Cereal Systems Initiative for South Asia (CSISA) and Sir Ratan Tata Trust (SRTT), Nehru Yuva Kendra (NYK)
7.	Training Institutes: State Agricultural Management and Extension Training Institute (SAMETI), Rural Self Employment Training Institute (RSETI), PAMETI, Ludhiana
8.	Electronic and Print Media
9.	Privete Firms: Mahindra & Mahindra, Dhannuka, India Potash Limited, Bioveta, Mother Dairy, Crystal, Chambal Fertilizers, Adani Agri Logistics Pv t. Ltd, Insurance Companies
10.	ASCI
11.	International Agencies: Japan International Cooperation Agency

6.3 Kisan Mobile Advisory

Kisan Mobile Advisory has proved to be very important tool of quick and cost-effective information dissemination. Nearly 13.8 lakh farmers of Zone-1 were supplied with 5422 text messages through mobile SMS service during 2017-18 by the KVKs of this zone. The highest number of farmers (6.69 lakh) were reached through this service otherwise in the difficult state of J&K during this year. J&K was a leader among all Zone-1 states in respect to the number of text messages (3042) prepared and sent through this service. The Himachal Pradesh reached 4.67 lakh farmers through mobile SMS service followed by Punjab (2.39 lakh) and Uttarakhand with 7160 targeted farmers (Table 6.5). Out of the total text messages prepared for sending to farmers using Kisan Mobile Advisory Service about 55 per cent were related to crops followed by 19 per cent on livestock, 11 per cent on miscellaneous topics, 8 per cent related to awareness on various schemes and programmes, 5 per cent on weather related information and on 2 per cent on various marketing aspects (Figure 6.1).

Technology Week Celebration is an important activity at the KVKs to demonstrate and provide awareness, on latest technologies related to various aspects of agriculture, to the farmers. During 2017-18 forty-six KVKs of the Zone-1 organized Technology Week benefitting 49158 farmers through 2066 activities (Table 6.6).

This programme enabled the KVKs to strengthen linkages and collaboration with various line departments at the district level, as evident from the involvement of personnel from various departments in Kisan Goshties, lectures, fairs and farmers' visits. In addition, exhibitions, film shows, fairs and farm visits were organized. In these programmes 519 activities of publications were distributed among 9470 farmers followed by 282 q of quality seed (1463 farmers), 103 planting material activities (2311 farmers), 10 q bio-fertilizer (320 farmers) and 5 livestock distribution activities (200 farmers) for the upliftment of agriculture in Zone-1 states.

Table 6.5: Details of Kisan Mobile Advisory services in Zone-1 states (2017-18)

State	Farmers (No.)	Text Messages (No.)						
		Crops	Livestock	Weather	Marketing	Awareness	Misc	Total
HP	466638	205	13	0	6	45	87	356
J&K	669116	2050	672	132	11	68	109	3042
Pb	239129	472	171	153	53	201	236	1286
UK	7160	281	153	3	12	127	162	738
Total	**1382043**	**3008**	**1009**	**288**	**82**	**441**	**594**	**5422**

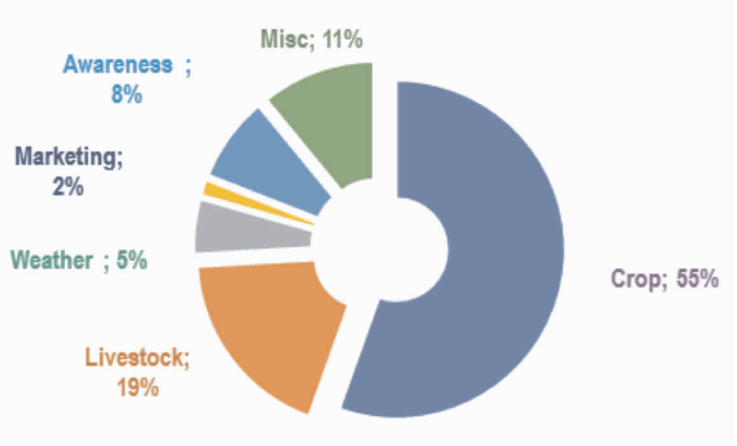


Figure 6.1: Subject-wise distribution of text messages prepared for sending to farmers using the Kisan Mobile Advisory Services

Table 6.6: Various activities organized during Technology Week Celebrations by the KVKs of Zone-1 (total =46)

Types of activities organized	Activities (No.)	Beneficiaries (No.)
Goshties	95	5236
Lectures	355	5096
Exhibition	94	14233
Film shows	95	2943
Fairs	3	714
Farm visits	355	5506
Diagnostic practical	150	1666
Distribution of publications	519	9470
Distribution of seed (q)	282	1463
Distribution of planting material	103	2311
Bio Fertilizer distribution (q)	10	320
Distribution of livestock specimen	5	200
Farmersbenefitted	**2066**	**49158**

6.4 Climate resilient IFS Demo units

In order to promote Integrated Farming System (IFS) that is culturally and socially acceptable to the local community, demonstration units were established at various KVKs. The emphasis of IFS is on multi cropping, rotational cropping, inter cropping, mixed-cropping practices with allied activities like horticulture, livestock, fishery, agro-forestry, apiculture, conservation/promotion of NTFPs etc to enable farmers not only in maximizing the farm returns for sustaining livelihood, but also to mitigate the impact of drought, flood or other extreme weather events. During the year, the ICAR has released an amount of ₹ 1.50 lakh to each KVK (Punjab-4, Uttarakhand-1, Himachal Pardesh-2, and Jammu & Kashmir-3) for establishing climate resilient integrated farming system demonstration units at KVK.

6.5 Sankalp Se Sidhi

Sankalp Se Sidhi Programme has been organized by the KVKs of Zone-I to commemorate the 75th Anniversary of Quit India Movement. During the period under report, a total of 60 KVKs of Zone-I organized this one day programme at district level (11 KVKs of Himachal Pradesh, 16 KVKs of Jammu & Kashmir, 21 KVKs of Punjab & 12 KVKs of Uttarakhand). A total of 30,622 persons participated in this programme organized at 60 places of the Zone-I. Besides 29234 farmers, 8 Union Ministers, 10 State Govt. Ministers, 10 MPs, 32 MLAs, 7 Chairman of Zila Panchayat, 16 DCs/DMs, 164 Bank officials and 1141 Govt. officials had participated in this programme at different places. At several places, the programme was also covered live by Doordarshan (29) and private channels (83) for reaching to the general public in far flung areas (Table 6.7).

Table 6.7: State-wise details of organization and participation in *Sankalp Se Sidhi* programme

State	No. of KVKs	Participants (No.)										TV coverage by	
		Union Ministers	MPs	SG Ministers	MLAs	Chairman ZP#	DC/ DM	Bank Officials	Farmers	Govt. Officials	Total	DD	Private channels
HP	11	1	6	2	5	2	1	20	6595	250	6882	7	12
J&K	16	2	2	5	9	0	10	68	7885	218	8199	11	46
Punjab	21	2	2	0	9	2	4	56	10668	359	11102	9	12
Uttarakhand	12	3	0	3	9	3	1	20	4086	314	4439	2	13
TOTAL	**60**	**8**	**10**	**10**	**32**	**7**	**16**	**164**	**29234**	**1141**	**30622**	**29**	**83**

#: SG: State Government; Zila Parishad

6.6 Mera Gaon Mera Gaurav

Mera Gaon-Mera Gaurav is an innovative initiative, which has improved the direct interface of scientists with the farmers and accelerated the lab to land approach. The objective of this initiative is to provide farmers with required information, knowledge and advisories on regular basis. Under this scheme, team of the scientists selected the villages and provides information to farmers on technical and other related aspects in a time frame through personal visits or through telecommunication. To be called "*Mera Gaun-Mera Gaurav*" (My Village-My Pride); the program seeks to imbibe a sense of ownership among the agriculture scientists of the country. The teams of scientists (139) covering 17 ICAR Institutes and State Agricultural Universities (SAUs) of four states of Zone-I involving 458 scientists carried out various activities under MGMG (Table 6.8). This scheme spread over 58 districts of four states of Zone-I covering 363 villages of 94 blocks.

The scientists organized various activities in the adopted villages during 2017-18 as presented in Table 6.9. They have conducted 1,107 visits to their respected adopted villages and contacted 15,188 farmers during 2017-2018. The teams also conducted 403 Interface meetings/ *Gosthies* in which 10,772 farmers participated.

In order to motivate farmers to adopt new agricultural technology/practices and to show the superiority, applicability, economic advantages of new technologies; scientists have conducted demonstrations in an area of 1776 ha in 4,454 farmers' field on various crop and agricultural practices. Scientists of this zone also provided 3,804 agro-advisory services by sending 28,314 SMSs to farmers' mobile phones of adopted villages. Scientific literature developed by ICAR Institutes and SAUs on various aspects also provided to 24,674 farmers so that farmers can use it later. Under this scheme, scientists also created linkages with other departments and agencies for the benefit of farmers of their adopted villages. Awareness amongst 19,879 farmers was created on various agricultural technologies, practices , schemes of different developments departments, crop insurance, *Swachhata Abhiyan* etc.

6.7 Skill Development Training in Agriculture

During 2017-18, six Krishi Vigyan Kendras of Zone-I (Punjab-3, Himachal Pardesh-1, Jammu & Kashmir-1 and Uttrakhand-1) organized Skill Development Training (SDT) in four job roles/QPs of 200 hrs for the youths so that they can start their own enterprise or get a job. A total of 6 skill development trainings were conducted by the KVKs in which 120 rural youths participated (Table 6.10).

Table 6.8: Summary of Zone-I under MGMG during 2017-18

No. of ICAR Institutes/ SAUs under MGMG	No. of total teams formed	No. of total scientists	No. of total villages adopted	No. of blocks covered	No. of districts covered
17	139	458	363	94	58

Table 6.9: Summary of activities organized under MGMG by institutes/SAUs

S. No.	Activity	No.	Farmer beneficiary (No.)
1.	Visit to village by teams	1107	15188
2.	Interface meeting/Goshthies	403	10772
3.	Training conducted	251	5200
4.	Demonstration conducted (ha)	1776	4454
5.	Mobile based advisories	3804	28314
6.	Literature support provided	190	24674
7.	Awareness created	336	19879
8.	Linkages developed with other agencies	124	3504

Table 6.10: Details of Agriculture Skill Development Trainings in Zone-1

S. No.	Job Role	No. of KVKs	No. of SDT Conducted	No. of Participants		
				Male	Female	Total
1	Agriculture Extension Service Provider	3	3	50	10	60
2	Tractor Operator	1	1	20	0	20
3	Quality Seed Grower	1	1	10	10	20
4	Dairy Farmer- Entrepreneur	1	1	15	5	20
	Total	**6**	**6**	**95**	**25**	**120**

Chapter 7

SUPPORT SERVICES BY KVK

7.1 Technological inputs

To achieve the potential yield in agriculture and allied sectors, timely availability of good quality seeds, planting materials, livestock breeds and bio-products are the primary requirement. In this direction, KVKs are actively involved in the production of quality seeds, planting materials, livestock material and bio-products and supply them to needy farmers.

7.1.1 Seed production

Krishi Vigyan Kendras have produced 9499.26 q seed of cereals, 239.77 q seed of oilseeds, 1874.24 q seed of pulses and distributed to farmers. Moreover, seeds of sunhemp, marigold and commercial crops like sugarcane, potato were also produced by the KVKs. In total, KVKs produced nearly 12618q seed, made that available to 22742 farmers and earned a total of ₹ 405.6 Lakh Table 7.1.

Among different states of the Zone, the highest total amount of seeds was produced by the KVKs of Punjab (10132.5q), followed by the KVKs of Uttarakhand (977.26q); whereas, 689.52q seed was produced in the state of Jammu & Kashmir and 819.05q seed produced by the KVKs of Himachal Pradesh Table 7.2.

Table 7.1: Details of Seed Produced by the KVKs of Zone-I

Crop	Quantity (q)	Value (₹)	Farmers (No.)
Cereals	9499.26	27461603	15480
Oilseeds	239.77	1058615	2746
Green manuring crops	2.40	9600	3
Pulses	1874.24	7730465	700
Commercial Crop	687.00	535000	45
Vegetable	110.96	1745153	3084
Flowers	0.02	0	0
Spices	5.88	18270	10
Fodder Crop	196.74	1992680	674
Others (Mushroom etc.)	2.05	8850	0
TOTAL	**12618.32**	**40560236**	**22742**

Table 7.2: State-wise details of seed production during 2017-18 (q)

Crop	Uttarakhand	Punjab	Jammu & Kashmir	Himachal Pradesh	Total
Cereals	818.10	7812.27	657.70	211.16	9499.27
Oilseeds	108.60	50.00	3.80	77.37	239.77
Green manuring crops	0.00	2.40	0.00	0.00	2.40
Pulses	37.96	1309.59	25.47	501.22	1874.24
Commercial Crop	0.00	687.00	0.00	0.00	687.00
Vegetable	10.11	76.23	0.48	24.14	110.96
Flowers	0.00	0.00	0.02	0.00	0.02
Spices	0.72	0.00	0.00	5.16	5.88
Fodder Crop	1.75	194.99	0.00	0.00	196.74
Others (Mushroom etc.)	0.00	0.00	2.05	0.00	2.05
Total	**977.27**	**10132.50**	**689.52**	**819.06**	**12618.32**

7.1.2 Planting Material

During the year, KVKs of Zone-I produced 10.98 lakh plantlets worth ₹71 lakh and distributed to 21729 farmers (Table 7.3). KVKs of Uttarakhand produced the highest numbers of plating material followed by Himachal Pradesh and Jammu & Kashmir (Table 7.4).

7.1.3 Livestock Production

During the year, KVKs of Zone-I produced as many as 18263 livestock including goats, cattle and poultry worth ₹8.87 lakh and distributed to 1252 farmers (Table 7.5). KVKs of the state of Punjab produced highest numbers (16579) of animals followed by KVKs of Uttarakhand and Jammu & Kashmir (Table 7.6).

Table 7.3: Production of planting material by the KVKs of Zone-I

Crops	Number	Value (₹)	Distributed to No. of farmers
Vegetable seedling	10738835	2084526	15681
Fruits	77184	4681130	5266
Ornamental plants	53083	152054	495
Plantation	3000	60000	0
Forest species	1820	12000	10
Fodder crop	92950	55275	253
Others	17430	56020	24
TOTAL	**10984302**	**7101005**	**21729**

Table 7.4: State-wise details of planting material production during 2017-18

Crops	Punjab	HP	Uttarakhand	J&K	Total
Vegetable seedlings	-	288017	10189450	261368	**10738835**
Fruits	4150	45450	13450	14134	**77184**
Ornamental plants	-	4283	40800	8000	**53083**
Plantation	-	-	-	3000	**3000**
Forest species	1120	-	-	700	**1820**
Fodder crop	250	-	88700	4000	**92950**
Others	1430	-	16000	-	**17430**
TOTAL	**6950**	**337750**	**10348400**	**291202**	**10984302**

Table 7.5: Production of livestock by the KVKs of Zone-I

Livestock	Number	Value (₹)	No. of farmers
Goat	8	4000	32
Cattle	25	603636	205
Poultry	18230	279135	1015
Total	**18263**	**886771**	**1252**

Table 7.6: State-wise production of livestock during 2017-18

State	Number	Value (₹)	No. of Farmer
Punjab	16579	314605	1093
Himachal Pradesh	10	118576	0
Jammu & Kashmir	571	33005	69
Uttarakhand	1103	420585	90
Total	**18263**	**886771**	**1252**

7.1.4 Bio-Products

Different bio-products are produced by the KVKs to provide input support to the farmers. KVKs of Zone-I, during 2017-18, produced 1570.8 kg bio-fertilizers namely Azotobacter, Rhizobium, PSB and Azolla worth ₹2.37 lakh and provided to 5151 farmers. Similarly, 16857 kg of different composts were produced, which were worth ₹1.58 lakh. Vermi-culture of worth ₹86850 was distributed among 420 farmers. Moreover, 1440 fruit fly traps (Palam trap) worth ₹86850 were produced and provided to 650 farmers (Table 7.7). Punjab followed by Himachal Pradesh was the leading state in this regards (Table 7.8).

Table 7.7: Production of Bio-products by the KVKs of Zone-I

Bio Product	Quantity (Kg.)	Value (₹)	No. of farmers
Bio-fertilizer			
Non Symbiotic Azotobacter	716	176000	4350
Rhizobium	43	6280	188
PSB	240	37800	496
Azolla	572	17050	117
Total	**1571**	**237130**	**5151**
Compost			
Vermi-compost	7157	147200	30
Compost	9500	9500	0
NADEP compost	200	1000	0
Total	**16857**	**157700**	**30**
Bio-agent			
Vermi-culture	905	86850	420
Palam fruit fly trap (Nos.)	1440	14400	650
	TOTAL	**496080**	**6251**

Table 7.8: State-wise details of production of Bio-products during 2017-18

State	Quantity (No.)	Quantity (Kg.)	Value (₹)	No. of farmers
Punjab	0	1454	220330	5162
Himachal Pradesh	1440	550	111000	1042
Uttarakhand	0	10857	109700	0
Jammu &Kashmir	0	6472	55050	47
Total	**1440**	**19333**	**496080**	**6251**

7.2 Soil, Water and Plant Analysis

During the period, KVKs of this Zone have analysed a total of 24,795 samples including 19,302 soil samples, 2965 water samples, and 2528 plant samples. There were 22,234 farmers from 6744 villages who have availed this facility and KVKs earned ₹2.65 lakh from this service (Table 7.9).The KVKs have also distributed 18,712 soil health cards to 15,883 farmers from 3631 villages (Table 7.10). Data in the Table showed state-wise samples analysed by KVKs and Punjab has analysed 11,363 soil samples followed by Jammu & Kashmir (4130), Himachal Pradesh (2281), and Uttarakhand (1528). Details of soil health cards (SHC) distributed by the KVKs during 2017-18 have been given in Table 7.11.

Table 7.9: Details of samples analysed during 2017-18

Particulars	No. of samples	No. of farmers	No. of villages	Charges (₹)
Soil	19302	18006	4595	237420
Water	2965	1996	1200	27780
Plant	2528	2232	949	0
Total	**24795**	**22234**	**6744**	**265200**

Table 7.10: State-wise samples analysed during 2017-18

State	Soil samples analysed				Water samples analysed				Plant samples analysed			
	No.	Farmer	Village	Charges (₹)	No.	Farmer	Village	Charges (₹)	No.	Farmer	Village	Charges (₹)
Punjab	11363	7557	2986	144790	2907	1973	1186	27780	2250	1998	831	0
Himachal Pradesh	2281	2161	676	1470	49	14	11	0	200	160	100	0
Jammu & Kashmir	4130	4404	571	84710	0	0	0	0	78	74	18	0
Uttarakhand	1528	3884	362	6450	9	9	3	0	0	0	0	0
Total	**19302**	**18006**	**4595**	**237420**	**2965**	**1996**	**1200**	**27780**	**2528**	**2232**	**949**	**0**

Table 7.11: State-wise details of Soil Health Cards distributed by KVKs during 2017-18

S. No.	State	SHC distributed (No.)	No. of farmers	No. of villages
1.	Punjab	8872	6390	2016
2.	Himachal Pradesh	1814	1784	604
3.	Jammu & Kashmir	3713	3609	664
4.	Uttarakhand	4313	4100	347
	Total	**18712**	**15883**	**3631**

7.2.1 World Soil Day Celebration

World Soil Day was celebrated by 57 KVKs of this zone on December 05, 2017 in which 12,049 farmers participated. During this programme, a total of 5135 Soil Health Cards were distributed to the farmers including 1510 of Punjab, 488 of Himachal Pradesh and 1800 of Jammu & Kashmir and 1337 of Uttarakhand (Table 7.12). On this occasion, KVKs also created awareness about soil testing, interpreting soil health cards, soil testing based fertilizer application, ill effects of excessive application of chemical fertilizers, balanced fertilizer application, Integrated Nutrient Management (INM) in different field and horticultural crops, Integrated Pest Management (IPM), etc. Similarly, many KVKs organized exhibitions for the farmers on soil health, soil sampling, soil testing techniques, good agricultural practices and soil and environment friendly technologies. Moreover, appropriate methods of soil sample collection were also demonstrated to the farmers.

7.3 Rain water harvesting units

Rainwater harvesting units with micro irrigation system were established in ten KVKs. A total of 15 training courses and 16 demonstrations were conducted and 30.35 q seed and 3,02,146 number of plantlets were produced utilizing this facility. Further, 3777 farmers and 337 officials visited these units and got acquainted with the rainwater harvesting technique.

Table 7.12: State-wise details of World Soil Day celebrated by KVKs

S. No.	State	No. of KVKS participated	No. of farmers Participated	No. of Soil Health Cards distributed
1.	Punjab	21	5165	1510
2.	Himachal Pradesh	4	1031	488
3.	Jammu & Kashmir	19	4342	1800
4.	Uttarakhand	13	1511	1337
	Total	**57**	**12049**	**5135**

Chapter 8

TECHNOLOGY BACKSTOPPING AT RESEARCH INSTITUTES

8.1 ATICS

Agricultural Technology Information Centres (ATICs) have been established under the National Agricultural Technology Project (NATP) of the ICAR in order to make farm worthy technologies, developed by various institutions, such as seed, planting material, technical knowhow, and publications etc. available to farmers. ATICs provide single window delivery system for technology information as well as products to the farmers with an objective to deliver quality. Various services provided by the ATICs of ATARI Zone-1 during 2017-18 have been presented in the Table 8.1.

Table 8.1: Details of activities conducted by ATICs during 2017-18

Sr. No.	Name of the ATIC	Farmers' units		Phone calls from famers (No.)	Soil & water samples tested (No.)
		Technical advice (No.)	Technology products (No.)		
1	PAU, Ludhiana	4737	62653	5170	12936
2	CPRI, Shimla	360	20	100	0
3	SKUAST-K, Srinagar	7875	1927	2685	43
4	Dr, YSPUH&F, Solan	2224	2873	165	380
5	CSKHPKV, Palampur	2177	6335	710	0
6	GBPUA&T Pantnagar	5848	14422	1988	0
	Total	**23221**	**88230**	**10818**	**13359**

8.1.1 Technology services

The six ATICs of this zone collectively conducted 23211 and 88230 farmers' visits in their respective institutes for providing technical guidance and technology products, respectively, during 2017-18. During the year under consideration the Zone-1 ATICs provided answers to the 10818 queries of the farmers under their jurisdiction or mandate. In the series of services provided the Zone-1 ATICs also tested 13359 soil and water samples of farmers (Table 8.1).

8.1.2 Delivering publications

ATICs have not been just a source of making farm inputs available to the farmers but they have also been acting as an important platform for selling or delivering publications to the intended clientele i.e. farmers. During 2017-18 ATICs of the Zone-1 sold/ delivered 245579 publications to the farmers earning ₹ 94.6 Lakh and benefitting nearly 2.4 Lakh farmers. Technical bulletins constituted about three fourth of the number of publications sold and sale of books contributed about 92% of the revenue generated through sale of publications (Table 8.2).

8.1.3 Technological products

Sale of technology products like seed, planting material, livestock and processed products etc. has been a highly popular activity at ATICs. During 2017-18 ATICs of this zone sold 21361 quintal quality of seeds and 3.87 Lakh plants/ planting material of different crops. Sale of 21235 livestock by the ATICs was another significant contribution by this system. All six ATICs of Zone-1 collectively generated a revenue of ₹ 9.7 crore by selling technology products only out or which sale of seeds contributed 81.5% followed by 13.4% by the sale of planting material and 2.06% by the sales of bio-products like bio-fertilizers/ pesticides etc. (Table 8.3).

8.2 Directorates of Extension

Directorates of Extension Education located in eight State Agricultural Universities *viz*., PAU Ludhiana, GADVASU Ludhiana, Dr. YSPUH&F Solan,

Table 8.2: Publications (print & electronic) sold by ATICs

S. No.	Particulars	Copies (No.)	Revenue (₹)	Farmers benefited (No.)
1	**Books**	21792	8697044	14607
2	**Technical bulletins**	182337	26870	182337
3	**Technology inventory**	10095	229825	10095
4	**CDs**	5	500	250
5	**Video films**	78	0	2359
6	**Others**	31272	509605	28883
	Total	245579	9463844	238531

CSKHPK Palampur, GBPUA&T Pantnagar, VCSGUUH&F Bharsar, SKUAST Jammu and SKUAST Kashmir provide adequate technological backstopping in agriculture and its allied sectors to their KVKs. The Directors of Extension Education and their officials coordinate and monitor the mandated activities of all the KVKs under their jurisdiction through Scientific Advisory Committee meetings, workshops, review-meetings, field visits and organize human resource development programmes for KVK staff on frontier areas of technologies. Further, they also provide technological products like improved seeds, planting materials, livestock, poultry breeds and fingerlings to various KVKs as per the requirements their stakeholder farmers.

Table 8.4 reveals that Directorates of Extension Education of various universities and their officials have participated in 46 Scientific Advisory Committee meeting. Similarly, they have attended 47 Field Days, 27 workshops Seminars and farmer scientist interactions, 18 technology weeks, 142 Trainings programmes, 208 On Farm Testing (OFT) and 583 Front Line Demonstrations (FLD) programmes organized by various KVKs. Moreover, 81 publications were also published by these Directorates of Extension Education

8.2.1 Technological inputs

These Directorates of Extension Education have published 81 different kinds of documents taking interest of stakeholder farmers into consideration. They have also provided the various technological inputs to KVKs such as 10,531 quintals of improved seeds of high yielding varieties, 3,22,666 number of planting materials and 13,851 packets of bio-fertilizers, more than 15,000 kg of mineral mixture, 9520 packets of UMM blocks and 200 kg of bypass fat were also

Table 8.3: Technological Products & Service Sales provided by ATICs

S. No.	Particulars	Quantity	Value (₹)
1	**Seeds (q)**	21361	78871465
2	**Planting materials (No.)**	387321	12990923
3	**Livestock (q)**	21235	807698
4	**Bio Products (q)**	696	1997790
5	**Processed Products (No.)**	5738	265029
6	**Mineral mixture (q)**	4420	314362
7	**Uromin Bricks (No.)**	3874	271180
8	**Farm implements (No.)**	20	61000
9	**Others (q)**	491	1197520
	Total		**96776967**

provided to the KVKs for demonstrations at farmers' fields (Table 8.5). In addition to this, one hundred sixty five numbers of services such as faecal matter analysis, de-worming, soil-water testing and other diagnostic services were facilitated for their farmers by these directorates.

Table 8.4: Details of Activities conducted by Directorates of Extension Education of SAUs

Directorates of Extension Education	SAC meetings Attended	Field Days	Workshops/ Seminars	Technology Weeks	Training Programs	Other Days	OFT	FLDs	Publications
PAU-Ludhiana	18	39	20	18	126	36	126	360	22
CSKHPKV, Palampur	8	0	2	0	6	2	27	36	4
SKUAST-Jammu	7	6	2	0	2	10	26	34	8
GADVASU - Ludhiana	1	1	1	0	5	4	25	96	24
GBPUA&T, Pantnagar	9	0	0	0	0	21	0	52	2
YSPUH&F, SOLAN	3	1	2	0	3	0	4	5	21
Total	**46**	**47**	**27**	**18**	**142**	**73**	**208**	**583**	**81**

Table 8.5: Details of Technological Products provided to KVKs

Directorates of Extension Education	Seed (q)	Planting material (No.)	Bio-products (No.)	Livestock breed (No.)	Livestock products			Poultry Breed (No.)	SWLT
					Mineral mix. (kg)	Bypaas fat	UMMB (No.)		
PAU-Ludhiana	16430.00	322300	31851	20	7200	0	9500	450	12936
CSKHPKV, Palampur	0.05	0	0	0	20	0	20	0	0
SKUAST-Jammu	6.20	286	0	0	0	0	0	0	0
GADVASU - Ludhiana	16.75	80	0	0	7800	200	1569	415	0
GBPUA&T, Pantnagar	77.91	0	0	0	0	0	0	0	0
YSPUH&F, SOLAN	0.00	0	0	0	0	0	0	0	0
Total	**16530.90**	**322666**	**31851**	**20**	**15020**	**200**	**9520**	**865**	**12936**

SWLT = Soil/water/leaf testing

Chapter 9

HUMAN RESOURCE DEVELOPMENT

The institute HRD cell is effectively implementing various Human Resource Development (HRD) programmes to make Institute as well as KVK staff abreast with the latest technological development, acquiring specific technical knowledge and skill and update in their subject matter so as to make them efficient to carry out their assignments in the organization as well as for their career development. Human Resource Development activity in the Institute is carried out by encouraging the scientists as well as

Table 9.1: Details of HRD programmes attended by ATARI staff during 2017-18

Sr. No.	Name of employee	Designation	Name of training	Duration	Organising Institution
1.	Dr. Preeti Mamgai	Sr. Scientist	Training of Master Trainers for Skill India Programme organized by ASCI	29-31 Jan 2018	GADVASU, Ludhiana
2.	Dr. Preeti Mamgai	Sr. Scientist	Promoting Farmer Producer Organizations - Issues and Challenges during	27-29 Nov 2017	PAMETI, Ludhiana
3.	Dr. Pragya Bhadauria	Scientist	Training Programme on Time and Stress Management	22-26 May 2017	EEI, Nilokheri at PAMETI, Ludhiana
4.	Dr. Pragya Bhadauria	Scientist	Training of Master Trainers for Skill India Programme	29-31 Jan 2018	ASCI, Gurgaon at GADVASU, Ludhiana
5.	Dr. Ashish Santosh Murai	Scientist	Promoting Farmer Producer Organizations - Issues and Challenges	27-29 Nov 2017	PAMETI, Ludhiana
6.	Sh. D C Sati	AF&AO	General Financial Rules-2017	19-21 July 2017	ISTM, New Delhi
7.	Mrs. Manjit Kaur	Assistant (Adm)	Refresher Course on Administration and Finance Management for Section Officers, AAO, AFAOs and Assistants of ICAR Headquarter and Institutes	23-29 June 2017	NAARM, Hyderabad
8	Mrs. Manjit Kaur	Assistant (Adm)	Management Development Programme on GeM and GFRs 2017	21-22 Aug 2017	NIFM, Faridabad
9	Ms. Indu Bagal	Assistant (Finance)	Refresher Course on Administration and Finance Management for Section Officers, AAO, AFAOs and Assistants of of ICAR Headquarter and Institutes	18-23 Jan 2018	NAARM, Hyderabad
10	Ms. Indu Bagal	Assistant (Finance)	Management Development Programme on GeM and GFRs 2017	18-19 Sep 2017	NIFM, Faridabad
11	Sh. Deepak Sharma	LDC	Management Development Programme on GeM and GFRs 2017	21-22 Aug 2017	NIFM, Faridabad
12	Sh. Raj Kumar	LDC	Management Development Programme on GeM and GFRs 2017	4-5 Sep 2017	NIFM, Faridabad

other staff members to undertake higher training, participate in seminars, conferences, symposia, trainings etc (Table 9.1). The KVK scientists are also encouraged to undertake subject specific trainings according to their area of work. Scientists are also motivated to act as resource persons/instructors for providing trainings to the extension personnel from state development agencies and SAUs/ ICAR Institutes. In this direction, this Institute has taken up a number of human resource development programmes during this year also (Table 9.2).

The institute has also organized different meetings/workshops/trainings with the purpose of updating knowledge, designing action plans, reviewing progress, inviting concerns of all the stakeholders of agriculture etc. These programs have helped the institute in monitoring the activities of KVKs and obtaining participation and inputs from other key stakeholders in improving the functioning of KVKs while dealing with issues of agriculture in the region.

Table 9.2: Details of trainings/workshops/meetings organized by ICAR-ATARI during 2017-18

S. No	Name of the programme organised	Duration	No. of participants	No. of KVKs	Venue
1	State Level Action Plan Meeting of KVKs of Himachal Pradesh	02.05.2017	30	13	CSK HPKV, Palampur
2	Action Plan Meeting of KVKs of Srinagar & Ladakh Region of Jammu & Kashmir	03.08.2017	40	13	SKUAST, Srinagar
3	Zonal Review-cum-Action Plan Workshop of KVKs of Zone-I under NICRA	18.08.2017	50	13	ICAR-ATARI, Ludhiana
4	Workshop of Messengers of KVKs under NICRA	17.10.2017	134	22	ICAR-ATARI, Ludhiana
5	Workshop on Mitigating Malnutrition through Farm Women Empowerment	17.10.2017	90	22	PAMETI Conference Hall, Ludhiana
6	Training programme on improved practices for oilseed production under Cluster demonstrations on oilseed 2017-18	7–8 .12.2017	20	20	PAMETI Conference Hall, Ludhiana
7	Annual Zonal Workshop of KVKs of Zone-I	28-30.12.2017	285	69	SKUAST, Jammu
8	ICAR-Line Department Meeting on “Maize-based Diversification of Cropping System in Punjab” under KVK scheme	27.01.2018	75	22	ICAR-CIPHET, Ludhiana
9	Stakeholder Dialogue for Sharing Key Learnings on Sustainable and Scalable Solutions for Rice Residue Management under NICRA	15.03.2018	170	22	ICAR-ATARI, Ludhiana
10	Meeting on crop residue management	26.03.2018	90	55	NASC Complex, New Delhi

Chapter 10

IMPORTANT EVENTS AND INITIATIVES

10.1 Crop Residue Management

10.1.1 Stakeholders' Meet on Residue Management

17 October, 2017; Ludhiana

ICAR-Agricultural Technology Application Research Institute (ICAR-ATARI), Zone-1, Ludhiana organized a "Stakeholders' Meet on Residue Management" on 17 October 2017 at its premises. The chief guest of this event was Dr. Trilochan Mohapatra, Secretary (DARE) and DG, ICAR.

Dr. T. Mohapatra expressed his sincere gratitude to the Punjab farmers for taking agricultural production to the new heights and stressed upon the need of proper management of rice straw as highlighted the seriousness of residue burning. He also urged all the stakeholders to join hand with KVKs in campaign against residue burning and become ambassador of this campaign. He honored seven *sarpanches* of villages where no residue burning was observed in the last year. He also awarded Ms. Sonali, 11th class student of Jind district of Haryana, for registering an FIR against her own father for residue burning. The chief guest also released a book titled "Vignettes of Farming Excellence", a CD on residue management "*Parali se Khushhali*". In the end, DG, ICAR and VC, PAU flagged-off Mobile Van which would travel across the state of Punjab to highlight technologies for residue management and different slogans.

Earlier, Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana formally welcomed the Chief Guest and other participants. He briefed the house about the seriousness of the issue of residue burning and efforts taken by the ICAR-ATARI and KVKs in curbing residue burning. He assured the DG, ICAR about taking every possible step to sensitize all the stakeholders in the region about the ill effects residue burning.

Dr. Ashok Kumar, Director (Extension), PAU, Ludhiana talked about the efforts of KVKs in promoting effective residue management in Punjab. He assured that burning will quite less during this session as about 1700 combine harvesters have been fitted with Super SMS and more than 1000 happy seeders have been purchased by farmers which will be quite effective in managing rice residue.

During the discussion, Programme Coordinators from KVKs of Bathinda, Faridkot, Fatehgarh Sahib, Ropar and Yamunanagar shared their experiences with residue management in NICRA villages. Many farmers shared their experience on rice residue and its alternate uses. An interaction session was also conducted to share varied experiences, to answer farmers' technical queries and to formulate a collaborative strategy for residue management. In the end, a strategic action plan was also formulated in which all KVKs in Punjab and Haryana will adopt a village where all out efforts will be exhibited to demonstrate various technologies for residue management.

10.1.2 Mass Campaign against Residue Burning

A mass campaign to create awareness about the ill effects of crop residue burning on soil, animal and human health and on environment was organized by 22 KVKs of Punjab. ICAR-ATARI, Ludhiana coordinated the campaign and KVKs organized various activities through active participation from farmers, school children, villagers and other stakeholders. Farmers were motivated to adopt different effective residue management technologies by organizing method and result

demonstrations, travel seminars, exposure visits, group meetings etc. All the stakeholders were sensitized by organizing kisan melas, sammellans, gosthis etc. Moreover, literature was distributed and advisories were issued through mobile SMS. Similarly, mass media platforms like radios and television were used as means to reach out to the wider audience.

Twenty Five villages across the state of Punjab were made residue burning free. Farmers from other villages were taken to these 25 villages to showcase the technological option available for residue management. Successful cases of effective residue management are being popularized and other farmers are also being motivated to desist from residue burning. The KVKs are also showcasing effective ways of managing crop residue through generating and demonstrating data on impact of residue management.

15 to 30 April 2017

The institute organized "Mass Campaign against Residue Burning" through its KVKs to sensitize all the stakeholders about the ill effects of crop residue burning on environmental, soil and human health as well as to

demonstrate various residue management technologies. The theme of the campaign was '*Khet Ke Avshesh, Khet Main*' (खेत के अवशेष, खेत में) which means keeping crop residues in the field itself. KVKs of Punjab organized a *Pakhwara* on mass awareness on residue burning during 15-30 April 2017 during harvesting season of wheat

6 October to 5 November 2017

KVKs of Punjab organized *Chetna Maas* (awareness month) from 6 Oct to 5 Nov 2017 during the harvesting season of paddy in which they conducted various mass awareness activities to popularize crop residues as means of soil health improvement, pollution

Table 10.1 Activities organized by KVKs of Punjab under the campaign

Name of Activity	Activities/ Events (No.)	Participants / Beneficiaries (No.)
Awareness camp/ *Mela*/ *Sammellan*	66	20586
Seminar/ *Kisan Goshti*/ Lecture	41	3280
Method Demonstration	884	35216
Result Demonstration	338	33800
Training	46	1380
Exposure visit / Field visit	89	3560
Group Meeting / *Panchayat* meeting	98	1984
Slogan and essay writing competition	33	1745
Village *Sandhya Pheri*	24	1740
SMS / Mobile advisory	109	512792
Literature distributed	47	235646

mitigation, increasing productivity and increasing sustainability and resilience of agriculture. Activities like slogan and essay writing competitions were organized for school children; exposure visits, *Kisan gostis*, demonstrations, etc. were organized for the farmers and village *sandhya pheris* were organized for sensitizing general population of the village (Table

10.1). KVKs also developed and distributed literatures such as folders, handouts, leaflets, pamphlets, etc. and issued mobile advisories to contact as many farmers as possible. An oath was also administered to the participants not to burn the crop residues and to adopt alternative straw management techniques. KVK scientists participated in TV programs like (**विचार विमर्श-पराली की इस परेशानी को तकनीकी की मदद से खुशहाली में कैसे बदला जा सकता है**) which were aired on 13 and 16 October 2017 on DD KISAN channel.

At least one Happy Seeder was given to each KVK for conducting method and result demonstrations on happy seeder sown wheat. The demonstrations were conducted at KVK farm as well as in the farmers' fields. At farmers' fields, the demonstrations were conducted in focused approach targeting the cluster of 2-3 villages.

10.1.3 Stakeholders' Dialogue on Residue Management

15 March 2018

One-day Stakeholder Dialogue on "Sharing Key Learnings on Sustainable and Scalable Solutions for Rice Residue Management" was organized at ICAR-ATARI, Ludhiana, Punjab by ICAR -ATARI, Ludhiana in collaboration with PAU Ludhiana, CIMMYT and BISA. About 150 stakeholders including researchers, farm innovators, progressive farmers, manufacturers, senior officials of Governments of Punjab and Haryana,

farmer commissions of Punjab and Haryana, NABARD, Punjab Pollution Control Board, ICAR institutes (IIMR, Ludhiana; CIPHET, Ludhiana; CSSRI, Karnal; IIWBR, Karnal; NDRI, Karna;, DMR, Solan and CPRI, Shimla), CIMMYT, BISA, Program Coordinators of KVKs, private companies etc. participated in this dialogue and shared their key learnings to make the robust implementation of strategies and action plans for out-scaling sustainable residue management solutions. Padma Bhushan Dr. R S Paroda graced the occasion as Chief Guest and Dr. B S Dhillon, Vice Chancellor, PAU chaired it while Dr. Ramesh Yadav, Chairman Haryana Farmer Commission and Dr. B S Sidhu, Commissioner Agriculture, Punjab were the Guests of Honour.

Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana explained the background, current situation of residue burning and the potential technological interventions for its management. He briefed the house about efforts made by ICAR-ATARI, KVKs, PAU, CCSHAU and other organizations like CIMMYT, BISA etc in association with agriculture and line departments in curbing residue burning.

10.1.4 Preparedness Meet of KVKs

26 March 2018

A Meeting was organised under the chairmanship of Dr. T Mohaptara, Secretary (DARE) and DG (ICAR) on Preparedness strategies for "Promotion of Mechanization for In-situ Management of Crop Residue in the states of Punjab, Haryana, Uttar Pradesh and NCT of Delhi" with PCs of the concerned KVKs.

Dr. Mohapatra highlighted the sequence of development in framing the scheme developed by ICAR and the expectations of the Government in addressing the issue of residue burning in holistic manner. He appreciated the role of ICAR-ATARI and KVKs who have done commendable work on this aspect. He urged the participants to work cohesively and systematically so that the message of residue management can reach to the last mile farmers.

Dr. A K Singh, DDG (Agri. Ext.) informed that the Information, Education and Communication (IEC) as part of the scheme is to be executed very shortly and the preparations and preparedness has to be started on war footing.

Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana highlighted different components of the Massive Campaign against Residue Burning initiated by KVKs.

10.2 Visits of dignitaries

9 May 2017, KVK Kangra

Sh. S S Ahluwalia, Union Minister of State for Agriculture & Farmers' Welfare and Parliamentary Affairs visited the Krishi Vigyan Kendra, Kangra on 9 May 2017 and chaired a *Kisan Goshthi*. The Minister said that farm officers and scientists should work hard to transfer the new scientific technologies to the fields as there is huge gap between laboratories and farms. He stated that traditional knowledge has its utility and integrated farming, animal husbandry, poultry, fishery, mushroom cultivation etc. are important to increase the per capita income of the farm families. He also enlightened the farmers about new plans of the Central Government such as Start-Up India, skill enhancement training etc. and urged the farming community to make

use of new programmes and schemes for better livelihood and income. Prof A K Sarial, Vice-Chancellor, CSAHPKV, Palampur apprised the minister that university has developed twenty models of enterprises which can enable the farmers to double their income by 2022.

21 May 2017, KVK Mandi

His Excellence, the Governor of Himachal Pradesh, Acharya Dev Vrat ji participated in Crop Seminar on Natural Farming as Chief Guest on 21 May 2017 at Bhangrotu village of Mandi district organized by the Krishi Vigyan Kendra, Mandi to motivate farmers and acquaint them with various organic farming technologies and harmful effect of indiscriminate use of pesticides. The Honourable Governor emphasized on the need to conserve local cattle breeds, local crop varieties, traditional knowledge, etc. for sustainable agricultural development. He also advised farmers for the adoption of organic farming in totality to meet out the growing demand of organic products in the adjoining states for doubling their income. Prof. A.K. Sarial, Vice-

Chancellor, CSAHPKV, Palampur deliberated upon the scope of organic farming in the state and need to reduce the cost of cultivation by practicing zero budget natural farming. Around 1000 farmers and farm women from 15 adjoining Panchayats of the area participated in this seminar.

21 June 2017, KVK Jalandhar at Nurmahal

Deputy Commissioner of Jalandhar District Sh V K Sharma visited KVK Jalandhar at Nurmahal on 21 June 2017. Dr Kuldeep Singh, Associate Director (Trainings) of the KVK showcased the activities of the KVK. Sh Sharma admired the work being carried out at KVK and showed his contentment over the facilities available at the KVK.

24 June 2017, Foundation Stone unveiling of KVK Tabo

Sh. J P Nadda, Union Minister of Health and Family Welfare, GOI unveiled the foundation stone of KVK Tabo, Lahual Spiti district of Himachal Pradesh on 24 June 2017. Sh. Nadda articulated the role of KVK for imparting technical knowledge which is the need of the time for the overall development of farming community in hostile climatic conditions. He urged the scientists to train the farmers in scientific production of apples and seabuckthorn berry as there is vast scope for production of these commodities for prosperity of tribal peasants. Sh. Kiren Rijiju, Union Minister of State for Home Affairs, Govt of India, Guest of honour of the programme, congratulated the farmers of Tabo region for the establishment of KVK. Dr H C Sharma, VC, YSPUH&F, Solan, Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana and Dr. V S Thakur, Director

Extension Education, YSPUH&F, Sloan were other distinguished guests at this occasion.

1 July 2017, KVK Mandi at Sunder Nagar and Kullu at Bajaura

Dr. A K Singh, DDG (Extension), ICAR graced the occasion of one day ex-trainee Sammelan cum farmer scientist interaction as chief guest at KVK Mandi at Sunder Nagar. Dr. A K Singh emphasized upon the need for adoption of latest technologies for enhancing the farm income. He appreciated the efforts being made by KVK for upscaling the latest technologies especially

protected cultivation, fruit fly management using Palam trap, value addition and diversification through off-season & exotic vegetables for the welfare of farming community in the district. At KVK Kullu at Bajaura, Dr Singh appreciated the efforts of KVK in the transfer of technologies especially of vegetables and fruit crops and linking women SHGs & NGOs for producing and marketing of value added nutritionally rich products for higher income. Dr. A K Singh also interacted with the shepherds near *Marhi* who apprised the DDG regarding various problems faced in sheep/goat rearing. Dr. Rajbir Singh, Director ICAR-ATARI, Zone I, Ludhiana highlighted need to use ICT tools for faster dissemination of technologies especially in the tough geographical terrains where reaching by all the stakeholders is not feasible.

10.3 Other Important events

10.3.1 NICRA-Zonal Review workshop

18 August 2017

ICAR-ATARI, Ludhiana organized the Zonal Review-cum-Action Plan workshop of NICRA project on 18 August 2017. Dr. A K Mehta, Former ADG (Extension), ICAR, New Delhi was the Chief Guest of the programme. Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana; Dr. Ashok Kumar, Director Extension Education, PAU, Ludhiana; Dr. R. K. Arora, Associate Director Extension, SKUAST, Jammu and Dr. J V N S Prasad, Co-PI NICRA, ICAR-CRIDA, Hyderabad were the other dignitaries present in this workshop. Dr. Mehta, urged KVKs to work in tandem with all the stakeholders for better implementation of the project. He emphasised that participatory approach is the key to success and asked the KVKs for all out efforts for involving farmers groups at grass root level.

Dr. Rajbir Singh described the achievements of KVKs of Zone-I under NICRA project and guided KVKs with the future strategy.

10.3.2 Workshop on Malnutrition

17 October 2017

ICAR-ATARI, Ludhiana, organized workshop on 'Mitigating Malnutrition through Farm-Women Empowerment'. More than 100 farm-women and KVK personnel participated in this workshop. Dr. T Mohapatra, Secretary DARE and DG, ICAR, being the chief guest of this event stressed upon women empowerment through proper education for tackling the grave situation of malnutrition in the country. He suggested popularization of nutritious foods, Nutrition Gardens, bio-fortified foods such as orange flesh sweet potato, and harnessing traditional wisdom on nutrition management through the involvement of grandmothers. Dr. Mohapatra raised a concern on widespread incidence of anaemia in the states of Punjab and Haryana especially among the women. Dr. Rajbir Singh, Director, ICAR-ATARI elaborated about various activities and programmes organized by KVKs in relation to celebration of National Nutrition Week and Breast Feeding Week. Dr. B S Dhillon, Vice-Chancellor, PAU Ludhiana stressed upon the role of women in combating malnutrition and leading the society in the right direction.

10.3.3 Review of KVKs of Kashmir and Ladakh

25 October 2017

The working of KVKs of Kashmir and Ladakh was reviewed by Shri S K Nayak IAS, Principal Secretary to Government of J&K, Prof Nazir Ahmad, Vice Chancellor SKUAST-Kashmir and Dr. A K Singh DDG (Extension), Dr. Rajbir Singh, Director, ICAR ATARI, Prof Mushtaq Ahmad and Director Extension, SKUAST-Kashmir. Deputy Director General (Agri. Ext.), ICAR New Delhi while addressing the stakeholders gave an overview of the mandates of KVKs and termed them as knowledge resource centres for technological back-stopping and forging synergy by working in partnership mode in the operational districts. Prof. Nazir Ahmad emphasized that KVKs have to work for doubling the farmers' income. Shri Nayak, expressed satisfaction over the working of KVKs but expressed that there existed tremendous scope for further improvement with highly qualified multidisciplinary scientific staff available at each KVK. He further

Chapter 11

PUBLICATIONS AND PERSONNEL

11.1 Publications

11.1.1 Research Articles

11.1.1.1 Impact Factor Journals

Arya Sushma, Kadian Mohinder, Rawal Sanjay, Luthra Satish, Rana Rajesh, Quiroz Roberto, Turin Cecilia, Mares Victor (2017) Poverty alleviation through potato cultivation in drylands of Thar Desert of Rajasthan, India 2015-16. *Potato Research* 60(1): 77-99. NAAS rating: 07.13

Choudhary M, Satta A, Jat H S, Yadav A K, Gathala M K, Sapkota T B, Das A, Sharma P C, Jat M L, Singh Rajbir, Ladha J K (2018) Changes in soil biology under conservation agriculture based sustainable intensification of cereal systems in Indo-Gangetic Plains. *Geoderma* 131: 193-204. NAAS rating: 10.04

Dukare A S, Paul S, Nambi E, Gupta R K, Singh Rajbir, Sharma K, Vishwakarma R K (2018) Exploitation of microbial antagonists for the control of postharvest diseases of fruits: a review. *Critical Reviews in Food Science and Nutrition* (Article in press) DOI:10.1080/10408398.2017.1417235. NAAS rating: 12.08

Jadoun YS, Jha SK, Bhadauria P, Gupta R and Singh R (2017) Constraints faced by Animal Husbandry Officials in the Implementation of Integrated Murrah Development Scheme (IMDS) in Haryana State. *Indian Journal of Animal Research*. 51(5): 944-947. NAAS rating: 6.02

Jat M L, Singh B, Stirling C M, Jat H S, Tetarwal J P, Jat R K, Singh Rajbir, Santiago L R, Shirsath P B (2018) Soil processes and wheat cropping under emerging climate change scenario in South Asia. *Advances in Agronomy* 148: 111-171. NAAS rating: 11.84

Mahajan G, Matloob A, Singh Rajbir, Singh V P, Chauhan B S (2018) Basmati rice in the Indian Subcontinent: Strategies to boost production and quality traits. *Advances in Agronomy* 151: (Article in press) DOI:10.1016/bs.agron.2018.04.002. NAAS rating: 11.84

Rana Rajesh K, Arya Sushma, Kumar Sanjay, Singh Dhiraj K, Cecilia T, Mares V, Quiroz R, and Kadian M S (2017) SWOT Analysis of Potato Cultivation under Arid Conditions in Western Rajasthan (India). *Indian Journal of Agricultural Sciences* 87(12): 1687-1694. NAAS rating: 6.21

Shirur Mahantesh, Shivalingegowda N S, Chandregowda M J and Rana Rajesh K (2017) Socio economic analysis of entrepreneurial behaviour of mushroom growers in Karnataka. *Indian Journal of Agricultural Sciences* 87(6): 840-845. NAAS rating: 6.21

Singh Rajbir, Mahajan G, Kaur S, Chauhan B S (2018) Issues and strategies for rice residue management to unravel winter smog in North India. *Current Science* 114(2): 2419. NAAS rating: 6.84

11.1.1.2 Non-Impact Factor Journals

Balakrishnan R, Singh P, Padaria R N, Satyapriya and Murai A S (2017) Teachers' Value for the Profession in Agricultural Higher Education System. *Indian Journal of Extension Education* 53(2): 93-96

Gupta R, Kaur D, Chopra S, Bhadauria P and Jadoun Y S (2017) Behavioural and Well Being Comparison of Broiler Chicks in the Different Cooling Regime during Hot-Dry and Hot-Humid Months of summer. *International Journal of Livestock Research*. 7(6):131-138.

Mamgai P, Singh N and Bala A (2017) Cluster Frontline demonstrations: A tool for productivity enhancement and dissemination of technologies for Rapeseed & Mustard in Northern Region. Journal of Community Mobilization

and Sustainable Development. 12(2): 197-200.

Mamgai P, Singh N and Bala A (2017) Enhancement in production of Sunflower in North India through conductance of Cluster Frontline demonstrations. Journal of Krishi Vigyan, 5(2): 67-69.

Murai A S, Vijayragavan K and Singh P (2017) Training Needs of Farmers about World Trade Organization Issues. Economic Affairs 62(4): 671-675.

Murai A S, Vijayragavan K and Singh P (2017) Training Needs of Agricultural Extension Personnel with Respect to World Trade Organization Issue. *Asian Journal of Agricultural Extension, Economics & Sociology* 17(4): 1-8.

Murai A S, Vijayragavan K and Singh P (2017) Developing an E-Learning Module. *International Journal of Farm Sciences* 7(3): 118-121.

Murai A S, Vijayragavan K and Singh P (2017) Training Needs of Farmers about World Trade Organization Issues. *Economic Affairs* 62(4): 671-675.

Rana Rajesh K, Martolia Renu and Singh Vikaram (2017) Trends in global potato processing industry- Evidence from patents' analysis with special reference to Chinese experience. *Potato Journal* 44(1): 37-44.

Shirur Mahantesh, Shivalingegowda N S, Chandregowda M J, Sunil and Rana Rajesh K (2017) An Exemplary Story of Growing Temperate Mushroom in Tropical Climate of Rural India: Lessons for Other Startups. *International Journal of Current Microbiology and Applied Sciences* 6(9): 2423-2433.

11.1.2 Technical/Popular Articles

Balakrishnan R, Murai AS, Bembem K, Kalnar Y and Kumar V (2017). Extension strategies for agri-business setups. Compendium of ICAR Sponsored Summer School on Competency Skill development in Post-harvest Processing and Value addition for start-ups/ Agri-enterprise conducted by ICAR-CIPHET, Ludhiana during September 5-25, 2017. 173-181.

Jadoun Y S, Bhadauria P, Verma H, Kansal S K and Singh J (2018) Integrated Farming System. FFP Folder-12 (in Punjabi), GADVASU, Ludhiana.

Murai A S, Balakrishnan R, Mamgai P and Bhadauria P (2017). Agro-Tourism for Doubling Farmers' Income. Biotech Articles. https://www.biotecharticles.com/Agriculture-Article/Agro-Tourism-for-Doubling-Farmers-Income-4267.html

Murai A S, Mamgai P, Bhadauria P and Kumar A (2017) Tale of geographical indication tag for basmati. *Indian farming* 67(06): 28-29.

मुराई, आ. सं. (2018). आयार्: युवाओं को कृषि आधारित व्यवसायों में उद्यमी बनाना. राजभाषा रश्मि. नगर राजभाषा कार्यान्वयन समिति, लुधियाना. अंक-19. 46-47.

मुराई, आ. सं. (2018). कषि-पर्यटनः एक प्रोंतिक अनुभव. राजभाषा रश्मि. नगर राजभाषा कार्यान्वयन समिति, लुधियाना. अंक-19. 4-5.

11.1.3 Books

Singh Rajbir, Kumar Arvind, Chahal V P and Singh A K (2017) Vignettes of Farming Excellence. ICAR-ATARI, Zone-1, Ludhiana, Punjab: 145p. (ISBN: 978-93-5291-211-7).

Singh Rajbir, Rana Rajesh K, Choudhary Monika, Mamgai Preeti, Chahal V P and Singh A K (2017) Mitigating Malnutrition through Farm-Women Empowerment. ICAR-ATARI-1, Ludhiana, Punjab: 126 p. *(ISBN: 978-93-5288-771-2).*

11.1.4 Technical Bulletin

Bhadauria P, Kumar A, Jadoun Y S, Verma H K and Bansal S K (2017) Management of Housing for Dairy Animals (In Hindi). FFP Bulletin, GADVASU, Ludhiana: 26 p.

Bhadauria P, Kumar A, Jadoun YS, Verma H and Kansal SK (2018). Dairy Pashuyo Ke liye Awass Prabandhan.FFP Bulletein-14 (in Hindi), GADVASU, Ludhiana: 26 p.

Mamgai P, Murai AS and Singh N (2017) Performance of Pulses in North-West India, ICAR-ATARI, Zone-I, Ludhiana. 68p.

11.1.5 Book chapters

Bhadauria P and Bhanja S K (2017). Practicing behavioural observations for assessment of welfare in poultry in Stress and Welfare: Concepts and Strategies for Addressing Current Challenges in Poultry Production. ICAR Sponsored Summer School organized by ICAR-Central Avian Research Institute, Izatnagar-243122, Bareilly, Uttar Pradesh, India during 6-26 September 2017: 296-310. (ISBN 978-93-5279-729-5).

Bhadauria P and Bhanja S K (2017). Collection, analysis and interpretation of welfare related data in Stress and Welfare: Concepts and Strategies for Addressing Current Challenges in Poultry Production. ICAR Sponsored Summer School organized by ICAR-Central Avian Research Institute, Izatnagar-243122, Bareilly, Uttar Pradesh, India during 6-26 September 2017: 311-323. (ISBN 978-93-5279-729-5). Kumar A (2017) Entrepreneurial behaviour of farmwomen. In, Advances in food processing and nutritional linkages for entrepreneurship development. PAU, Ludhiana: 314-319.

Mamgai P, Kumar A and Bala A (2017) Scientific Interventions for Minimizing Post Harvest Losses at Farmers' Doorstep. In, Advances in food processing and nutritional linkages for entrepreneurship development. PAU, Ludhiana: 281-287

Rana Rajesh K (2017) Precautions in Potato Processing Under Cottage Industry and Strategies for Marketing the Products, 1 November 2017. In, Advances in food processing and nutritional linkages for entrepreneurship development. PAU, Ludhiana: 248-254

Singh R and Mamgai P (2017) PPV& FRA Initiatives by ICAR-ATARI, Ludhiana, In, Singh A K, Mishra A, Chahal V P, Diwedi A P, Singh S R K, Raut A A and Athare T R (Eds.) Treasure of Biodiversity: Conservation by Farmers, Division of Agricultural Extension, ICAR, New Delhi: 5-17.

11.1.6 Presentation in conferences/Symposia/Seminars/other fora

Bhadauria P, Ahmad M A and Singh M (2018). Developing women entrepreneurship in Backyard Poultry Farming in North India through Krishi Vigyan Kendras in National Conference on Promoting Entrepreneurial growth through Innovative Approaches in Food Processing Sector' held at ICAR-CIPHET, Ludhiana during 16-17 March 2018.

Bhadauria P, Bhanja S K, Divya and Jadoun Y S (2017). Effect of floor versus cage rearing on growth, mortality and welfare of CARI Priya chicken. National Seminar on Livestock Resource Management under changing Climatic Scenario at SKUAST-K during 17-19 May 2017.

Bhadauria P, Lathwal S S, Jadoun Y S and Gupta R (2017). Assessing Nutritional Status of Normal and Lame Karan Fries Cows during Periparturient Period under Farm Management Condition. In, 2nd National Conference of Society for Veterinary and Animal Husbandry Extension (SVAHE) on Technological Interventions for Sustainable Livestock Production at F.V.Sc & A.H., SKUAST Jammu during 10-12 April 2017.

Gupta Rohit, Lathwal S S, Devi I, Kerketta S, Ahmad F, Bhadauria P, Jadoun Y S and Yajuvendra (2017). Identification of KF cattle individually by using their vocal acoustic features. National Seminar on Livestock Resource Management under changing Climatic Scenario at SKUAST-K during 17-19 May 2017.

Mamgai P and Kaur G (2017) Poster presented on "Empowerment of farm women for improved quality of life" In, National Seminar on "*Nutrition Sensitive Agriculture"* at ICAR Research Complex for NEH Region, Umiam, Meghalaya.

Mamgai P and Kaur G (2018) Empowering of farm women for achieving for achieving nutritional security. In, National Conference on Promoting Entrepreneurial growth through Innovative approaches in Food Processing Sector to be held at CIPHET Ludhiana, 17 March 2018.

Mamgai, P (2017) Lecture on harnessing the power of mobile phone delivered during training programme on ICT for effective knowledge delivery at PAMETI, Ludhiana.

Rana Rajesh K (2017) Adding Wings to Nutritional Awareness-Reaching the unreached in ATARI Zone-1 states. In, Workshop on Mitigating Malnutrition through Farm-Women Empowerment. 17 October 2017, PAMETI, PAU Ludhiana.

Singh Rajbir and Rana Rajesh K (2018) Extension Strategies for Doubling Farmers' Income for Food and Nutrition Security, 16 February 2018. In, National Conference on Sustainable Agriculture, Food and Nutritional Security-2018 at LPU, Phagwara.

11.1.7 Special Edited Book

Indian Council of Agricultural Research (2017) Symbol of Success-Pathway to Prosperity. Division of Agricultural Extension, ICAR, New Delhi. Pp116. ATARI Editorial Team. (ISBN: 978-81-7164-175-8).

11.2 Personnel

Existing staff position of the ICAR-Agricultural Technology Application Research Institute, Zone 1, Ludhiana as on March 31, 2018 :

11.2.1 Staff in Position

Category	Name	Designation
Research Management	Dr. Rajbir Singh	Director
Scientific	Dr. Rajesh K Rana	Principal Scientist (Agril. Econ.)
	Dr. Arvind Kumar	Principal Scientist (Agril. Ext.)
	Dr. Preeti Mamgai	Senior Scientist (HM)
	Dr. Pragya Bhadauria	Scientist (LPM)
	Dr. Ashish Santosh Murai	Scientist (Agril. Ext.)
Administrative	Sh. D.C. Sati	AF&AO
	Mrs. Manjit Kaur	Assistant
	Ms. Indu Bagal	Assistant
	Sh. Raj Kumar	LDC
	Sh. Deepak Sharma	LDC
Technical	Sh. Harbhajan Singh	Sr. Technical Officer (Driver)

11.2.2 Superannuation / Joining / Promotion/ Transfer

- ❖ Dr Rajesh K. Rana, Principal Scientist (Agricultural Economics) joined ICAR-ATARI Zone-1 on 15 July 2017 after getting transferred from ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi.
- ❖ Sh. Rajinder Raheja (UDC) wastransferred to ICAR-Central Instituteof Post-Harvest Engineering and Technology (CIPHET), Ludhiana on 31 May 2017.

11.3 Awards and recognitions

❖ Dr Rajbir Singh, Director, ICAR-ATARI received Swami Sahajanand Saraswati Outstanding Extension Scientist Award for the year 2017.

❖ Dr Rajesh K Rana, Principal Scientist, ICAR-ATARI was nominated by the ICAR as Member of the QRT of ICAR-National Institute of Biotic Stress Management, Raipur Chhattisgarh

ANNEXURES

CONTACT DETAILS OF KVKs under ICAR-ATARI, ZONE-1

Annexure-I

State/ District	Year of Sanction	Address	Telephone Number; email
Punjab			
Abohar	2016	ICAR-CIPHET, Malout, Hanumangarh Byepass-152116	09463975155; vinod.saharan@icar.gov.in
Amritsar	2004	Usman-143001	09855556672; kvkasr@gmail.com; kvkasr@pau.edu
Barnala	2012	Village & P.O Handiaya, Barnala - 148107	09023532377; 081960-80643; ddkvkbrnlgadvasu2013@rediffmail.com
Bathinda	1992	Dabwali Road, Near Kheti Bhawan-151001	09417732932; kvkbtd@pau.edu
Faridkot	1995	PAU Regional Research Station-151203	09855321902; kvkfdk@yahoo.com
Fatehgarh Sahib	2004	Shamsher Nagar, Sirhind-140406	08146570699; kvkfgs@pau.edu
Ferozepur	1990	VPO MalwaQadim– 152001	09501800488; kvkfzr@pau.edu; kvkfzr@gmail.com
Gurdaspur	1982	PAU Regional Research Station – 143521	09876610461; kvkgurdaspur@gmail.com
Hoshiarpur	1990	VPO Bahowal, P.O Mahilpur–146105	09815751900; kvk-hsp@pau.edu
Jalandhar	2006	Opposite-DIPS School, Nakodar Road, Nurmahal-144039	09888900329; kvk-jalandhar@pau.edu
Kapurthala	1990	J.J. Farm, Near New Grain Market, PO: Sheikhupur – 144620	09872745890; kvk-kapurthala@pau.edu; kvkkapurthala@gmail.com
Mansa	2006	Village Khokhar Khurd, P.O Khokhar Kalan, Mansa–151505	09417626843; kvkmansa@gmail.com; kvk-mansa@pau.edu
Moga	2005	Village Budh Singh Wala, Charik Road-140001	08146100796; kvk-moga@pau.edu
Mohali	2011	Village Majra, P.O Sayabe Majri, Sahibzada Ajit Singh Nagar-140103	09815700810; kvkmohali@gmail.com
Muktsar	2004	Goneana-152026	09855620914; kvkmuktsar@pau.edu
Nawanshahar	1995	VPO Langroya, Distt.-144516	09815547607; kvk_langroya@yahoo.co.in; kvknsr@pau.edu
Pathankot	2016	Village Gho, Shahpur Kandi Jugial Road Near Focal Point-145023	08146400233; kvkpathankot@gmail.com
Patiala	1992	Post Box No. 22, Patiala – 147 001	09417360460; 9464210460; kvkpatiala@gmail.com
Ropar	2004	PAU Regional Research Station, Haveli Kalan, Ropar–140001	09780090300; kvk-ropar@pau.edu
Samrala	2004	PAU Farm, Samrala, Ldh-141114	09417241604; kvksamrala@gmail.com; kvk-ludhiana@pau.edu
Sangrur	1995	Kheri, Sangrur–148001	09988111757; kvksangrur@gmail.com
Tarantarn	2011	Booh, P.O Harike-143412	09872974326; ddtkvktarntaran@gmail.com
Uttarakhand			
Almora	2004	Chaubatia, GBPUAT Ranikhet, Distt. Almora-263651 (Uttarakhand)	07500241508; kvkalmora@gmail.com sharmark1966@rediffmail.com

Annexure-I contd.

State/ District	Year of Sanction	Address	Telephone Number; email
Bageshwar	2007	VPKAS (ICAR) Sinduri-Baskhola (Kafligair), Distt. Bageshwar-263628 (Uttarakhand)	09410919676; kvkbageshwar@gmail.com, nawal.singh@icar.gov.in
Chamoli	2004	Gwaldam Distt. Chamoli-246441 (Uttarakhand)	7500241506; kvkchamoli@rediffmail.com
Champawat	1994	PO Gulchora, Lohaghat, Champawat-262524 (Uttarakhand)	09412162673; officerinchargekvklohaghat@gmail.com, pc_kvklohaghat@rediffmail.com
Dehradun	2004	Dhakrani, GBPUAT, PO. Herbertpur, Distt. Dehradun-248 001 (Uttarakhand)	08475001596;kvkdehradun@gmail.com, sssindia02@gmail.com
Haridwar	2004	Dhanauri, Distt. Haridwar-249404	08475002233; kvkharidwar@gmail.com, Puru968@gmail.com
Nainital	Not Available	Jeolikote Distt. Nainital-263135 (Uttarakhand)	07500241504,09412966838; kvknainital@rediffmail.com, vijaydoharey@gmail.com
PauriGarhwal	Not Available	VCSGCH, Bharsar, Via Chipalghat, Distt. Pauri Garhwal-246123 (Uttarakhand)	09795842175; kvkpaurigarhwal@gmail.com
Pithouragarh	Not Available	P.O. Gaina Aincholi, Distt. Pithouragarh-262501 (Uttarakhand)	09760226518; kvkpithoragarh@yahoo.com
Rudraprayag	2004	Jakhdhar, via Guptakashi Distt. Rudraprayag-246439 (Uttarakhand)	08475002277; kvkjakh@rediffmail.com
Tehri Garhwal	Not Available	GBPUAT, Hill Campus, Ranichauri , Distt. Tehri Garhwal-249199 (Uttarakhand)	08476004173; kvkranichauri@gmail.com
Udham Singh Nagar	2004	Bajpur Rd, Kashipur, Distt. Udham Singh Nagar-244713 (Uttarakhand)	07500241505, 09412655395; kvkkashipur@gmail.com
Uttarkashi	2004	Chinyalisaur, Distt. Uttarkashi-249196 (Uttarakhand)	09411521771; kvkchinyalisaur@gmail.com, vksachanji@gmail.com
Himachal Pradesh			
Bilaspur	2004	CSKHPKV, Research Sub Station, Berthin– 174029	09418054450; kvkbilaspurhp@gmail.com
Chamba	1991	P.O Saru –176310	09418409504; kvkchamba@yahoo.in
Hamirpur	1988	CSKHPKV, Bara -177044	09418112684; kvkhmr@gmail.com; kvkhmr@yahoo.in
Kangra	2000	Kangra–176001	09418112698; kvkkangra@yahoo.in; kvkkangra@gmail.com
Kinnaur	1995	Kinnaur at Reckong Peo, Kinnaur –172107	09418075449; kvkkinnaur1995@gmail.com
Kullu	1985	CSKHPKV, Bajaura -175125	09418118557; kvkkullu@gmail.com
Lahaul & Spiti-I	2004	CSKHPKV Regional Research Station, Kukumseri-175142	09418193270; pckvkls@gmail.com

Annexure-I contd.

State/ District	Year of Sanction	Address	Telephone Number; email
Lahaul&Spiti-II	2016	V.P.O Tabo, Sub Division Kaza-172113	094182-00677; 09418127451; bhupindert@gmail.com
Mandi	1994	Sundernagar–174402	09418222532; kvkmandihp@rediffmail.com
Shimla	1995	Near Petrol Pump, Rohru-171207	09459802063; 09418151577; kvkshimla@gmail.com
Sirmaur	1983	Regional Research Station, Dhaulakuan-173001	09418741695; kvksirmour@gmail.com
Solan	2004	P.O. & Teh. Kandaghat-173215	09418488190; kvkkghat@rediffmail.com
Una	1994	Rampur-174303	09418462867; pckvkuna@hotmail.com; pckvkuna@gmail.com
Jammu & Kashmir			
Anantnag	2012	Tehsil Dooru-192211	09419050073; 09906616078; zargarkvkang@gmail.com
Bandipora	2005	Potushai, Bandipora, Baramulla-193502	09419449748; pckvkbandipora@gmail.com
Baramulla	2013	Tangmarg-193402	07891210511; kvkbaramulla@gmail.com
Budgam	2013	Hamchipora-Khag-193411	09419017278; pckvkbudgam@gmail.com
Doda	2002	SKUAST, Gwari, Bhaderwah–182221	09796423952; 08803674762; kvkdoda@gmail.com
Gandarbal	2002	Gandarbal, Shuhama, P.B. No. 1277, GPO-190001	09419553703; 09419095742; pckvk_gbal@skuastkashmir.ac.in; kvkganderbal@gmail.com
Jammu	1992	SKUAST, R.S. Pura-181102	09419155273; kvkjammu@gmail.com
Kargil - I	2004	SKUAST-K-194103	09419219404; kvkkargil@gmail.com
Kargil-II	2017	Zanskar, District Kargil (J&K)	9469112113; rizwan60@gmail.com
Kathua	2008	Rajhani-184101	09419151649; kathuakvk@gmail.com
Kulgam	2005	Pombay-192101	09797138441; kvkkulgam@gmail.com
Kupwara	2005	Kupwara-193222	09797037698; pc.kvk.kupwara@gmail.com
Leh	1994	SKUAST-K, P.B. No. 146, Choglam Road, Housing Colony-194101	09419346290; kvkleh@yahoo.co.in
Nyoma (Leh Add.)	2013	Leh (Add.) Nyoma-194404	09418457408; kvknyoma@rediffmail.com; kvknyoma@gmail.com
Poonch	2007	Qazi Morha-185101	09469170031; kvkpoonch@gmail.com
Pulwama	1983	Malangpura, P.B. No. 1228, Distt. Pulwama, GPO-190001	09419440246; kvkpulwama@yahoo.co.in; pcpulwama@gmail.com
Rajouri	2002	SKUAST, Regional Research Station, VPO. Tandwal-185131	09419172382; kvkrajouri@gmail.com
Reasi	2005	Vill Tanda, Dera Baba Bahadur Singh, Teh. Reasi-182301	09697625519; kvkreasi@gmail.com
Samba	2016	Pulse Research Sub Station, Village Arazi-181141	09419139407; 09697180004; kvksamba@gmail.com
Shopian	2012	Balpora, Tehsil Shopian-192303	09622820981; pckvkshopian@gmail.com
Srinagar	2002	Srinagar, SKUAST-K, Old Airport, P.B. No. 823, GPO-191111	09419079152; kvksrinagar@hotmail.com

Annexure-II

KVK-WISE DETAILS OF VEHICLES

S. No	Name of KVK	Tractor	Jeep
Punjab			
1	Amritsar	1	1
2	Barnala	1	1
3	Bathinda	1	1
4	Faridkot	1	1
5	Fatehgarh Sahib	1	1
6	Ferozepur	1	1
7	Gurdaspur	1	1
8	Hoshiarpur	1	1
9	Jalandhar	1	1
10	Kapurthala	0	1
11	Mansa	1	1
12	Moga	1	1
13	Mohali	0	1
14	Muktsar	1	1
15	Nawanshahar	1	1
16	Patiala	1	1
17	Ropar	1	1
18	Samrala	1	1
19	Sangrur	0	0
20	Taran taran	0	1
21	Abohar	1	0
22	Pathankot	1	1
Total		**18**	**20**
Uttarakhand			
1	Almora	0	1
2	Bageshwar	0	1
3	Chamoli	0	0
4	Champawat	1	1
5	Dehradun	0	1
6	Haridwar	0	1
7	Nainital	0	1
8	Pauri Garhwal	0	1
9	Pithouragarh	0	1
10	Rudraprayag	0	1
11	Tehri Garhwal	NA	NA
12	U. S. Nagar	0	1
13	Uttarkashi	1	1
Total		**2**	**11**
Himachal Pradesh			
1	Bilaspur	1	0
2	Chamba	0	1
3	Hamirpur	1	1
4	Kangra	1	1
5	Kinnaur	0	1
6	Kullu	1	1
7	Lahual & Spiti	0	1
8	Mandi	1	1
9	Shimla	0	1
10	Sirmaur	1	1
11	Solan	0	1
12	Una	0	1
13	Lahual & Spiti(II)	0	0
Total		**6**	**11**
Jammu & Kashmir			
1	Anantnag	1	1
2	Bandipora	1	1
3	Baramulla	NA	NA
4	Budgam	0	1
5	Doda	0	0
6	Gandarbal	1	1
7	Jammu	1	1
8	Kargil	0	1
9	Kathua	0	0
10	Kulgam	0	1
11	Kupwara	1	1
12	Leh	1	1
13	Nyoma (Leh II)	0	1
14	Poonch	1	1
15	Pulwama	0	1
16	Rajouri	0	2
17	Reasi	1	1
18	Shopian	0	1
19	Srinagar	0	1
20	Samba	1	0
21	Zanskar	0	0
Total		**9**	**17**
Grand Total		**35**	**59**

Annexure-III

STAFF POSITION IN KVKs AS ON 31.03.2018

S. No.	Name of KVK	PC			SMS			Farm Manager			Programme Asistant			Computer Programmer			Assistant (Accountant)			Steno. Grade-3			Driver			Skilled supporing staff			TOTAL		
		S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V
	Himachal Pradesh																														
1	Bilaspur	1	1	0	6	4	2	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	1	1	16	13	3
2	Chamba	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
3	Hamirpur	1	1	0	6	6	0	1	1	0	1	1	0	1	0	1	1	1	0	1	1	0	2	1	1	2	1	1	16	13	3
4	Kangra	1	1	0	6	6	0	1	1	0	1	0	1	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	15	1
5	Kinnaur	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	15	1
6	Kullu	1	1	0	6	2	4	1	1	0	1	1	0	1	1	0	1	0	1	1	1	0	2	1	1	2	1	1	16	9	7
7	Lahual & Spiti I	1	1	0	6	2	4	1	1	0	1	1	0	1	0	1	1	1	0	1	0	1	2	1	1	2	1	1	16	8	8
8	Lahual & Spiti II	1	1	0	6	1	5	1	1	0	1	1	0	1	0	1	1	1	0	1	0	1	2	0	2	2	2	0	16	7	9
9	Mandi	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	2	1	1	2	1	1	16	13	3
10	Sirmour	1	1	0	6	4	2	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	0	2	2	1	1	16	11	5
11	Shimla	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	1	2	2	0	2	2	0	16	15	2
12	Solan	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
13	Una	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	2	1	1	2	0	2	16	11	5
	Jammu & Kashmir																														
14	Anantnag	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	2	1	1	2	1	1	16	11	5
15	Bandipora	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	2	2	0	2	2	0	16	14	2
16	Baramulla	1	1	0	6	0	6	1	0	1	1	0	1	1	1	0	1	1	0	1	0	1	2	0	2	2	1	1	16	3	13
17	Budgam	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	2	2	0	2	0	2	16	12	4
18	Doda	1	0	1	6	4	2	1	0	1	1	1	0	1	1	0	1	0	1	1	1	0	2	1	1	2	2	0	16	10	6
19	Gandarbal	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	2	2	0	2	1	1	16	12	4
20	Jammu	1	1	0	6	4	2	1	1	0	1	1	0	1	1	0	1	0	1	1	1	0	2	1	1	2	2	0	16	12	4
21	Kathua	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	0	1	1	1	0	2	2	0	2	2	0	16	14	2
22	Kargil	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	2	1	1	2	2	0	16	14	2
23	Kulgam	1	1	0	6	4	2	1	0	1	1	1	0	1	1	0	1	1	0	1	0	1	2	2	0	2	2	0	16	12	4
24	Kupwara	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	2	2	0	2	1	1	16	13	3
25	Leh	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
26	Nyoma (Leh II)	1	1	0	6	6	0	1	0	1	1	1	0	1	0	1	1	0	1	1	0	1	2	2	0	2	2	0	16	12	4
27	Poonch	1	0	1	6	3	3	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	1	1	16	11	5
28	Pulwama	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	2	2	0	2	1	1	16	14	2
29	Rajouri	1	0	1	6	5	1	1	0	1	1	0	1	1	1	0	1	0	1	1	1	0	2	2	0	2	2	0	16	11	5
30	Reasi	1	1	0	6	3	3	1	1	0	1	1	0	1	1	0	1	0	1	1	1	0	2	2	0	2	1	1	16	11	5
31	Samba	1	0	1	6	3	3	1	1	0	1	1	0	1	0	1	1	0	1	1	0	1	2	0	2	2	0	2	16	5	11
32	Shopian	1	1	0	6	5	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	2	2	0	2	16	6	10
33	Srinagar	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	1	1	2	2	0	16	15	1
34	Zanskar (Kargil-II)	1	1	0	6	0	6	1	0	1	1	1	0	1	0	1	1	1	0	1	1	0	2	1	1	2	1	1	16	6	10
	PUNJAB																														
35	Abohar (Fazilka)	1	0	1	6	0	6	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	2	2	0	2	16	0	16
36	Amritsar	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
37	Barnala	1	1	0	6	6	0	1	1	0	1	0	1	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	15	1
38	Bathinda	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	2	2	0	2	2	0	16	15	1
39	Faridkot	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	15	1
40	Fatehgarh Sahib	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	0	1	1	1	0	2	2	0	2	2	0	16	15	1
41	Ferozepur	1	1	0	6	4	2	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	2	2	0	2	2	0	16	13	3
42	Gurdaspur	1	1	0	6	6	0	1	1	0	1	1	0	1	0	1	1	1	0	1	1	0	2	2	0	2	1	1	16	14	2
43	Hoshiarpur	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	1	1	16	14	2
44	Jalandhar	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	0	1	1	1	0	2	2	0	2	1	1	16	14	2
45	Kapurthala	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
46	Ludhiana	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
47	Mansa	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	1	1	16	15	1
48	Moga	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	15	1
49	Mohali	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	3	0	16	17	0
50	Muktsar	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	1	1	16	15	1
51	Nawanshahar	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	15	1
52	Pathankot	1	0	1	6	4	2	1	1	0	1	0	1	1	0	1	1	1	0	1	0	1	2	1	1	2	0	2	16	7	9
53	Patiala	1	1	0	6	4	2	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	14	2
54	Ropar	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	2	2	0	2	2	0	16	15	1
55	Sangrur	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	1	1	2	2	0	16	14	2
56	Tarntaran	1	1	0	6	7	0	1	0	1	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	1
	Uattarakhand																														
57	Almora	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
58	Bageshwar	1	0	1	6	3	3	1	1	0	1	1	0	1	0	1	1	0	1	1	0	1	2	2	0	2	2	0	16	9	7
59	Chamoli	1	0	1	6	4	2	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	13	3
60	Champawat	1	1	0	6	3	3	1	0	1	1	1	0	1	1	0	1	1	0	1	1	0	2	0	2	2	1	1	16	9	7
61	Dehradun	1	1	0	6	4	2	1	0	1	1	1	0	1	1	0	1	2	0	1	0	1	2	0	2	2	1	1	16	10	7
62	Haridwar	1	1	0	6	4	2	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	14	2
63	Nainital	1	1	0	6	3	3	1	0	1	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	12	4
64	Pauri Garhwal	1	0	1	6	3	3	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	2	2	0	2	16	3	13
65	Pithouragarh	1	1	0	6	4	2	1	0	1	1	1	0	1	1	0	1	1	0	1	0	1	2	0	2	2	1	1	16	9	7
66	Rudraprayag	1	1	0	6	4	2	1	1	0	1	0	1	1	0	1	1	1	0	1	0	1	2	0	2	2	0	2	16	7	9
67	Tehri Garhwal	1	*	*	6	*	*	1	*	*	1	*	*	1	*	*	1	*	*	1	*	*	2	*	*	2	*	*	16	0	0
68	US Nagar	1	1	0	6	2	4	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	2	0	2	2	0	2	16	7	9
69	Uttarkashi	1	1	0	6	3	3	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	1	1	2	2	0	16	7	9

Note: PC= Programme Coordinator; S=Sanctioned; F=Field; V=Vacent; *=Not Available

Annexure-IV

STATE WISE SUMMARY OF INFRASTRUCTURE IN KVKs

Infrastructure	Himachal Pradesh	Jammu & Kashmir	Punjab	Uttarakhand	Total
Administrative Building	13	16	21	12	**62**
Farmers Hostel	12	9	19	12	**52**
Staff Quarters	10	9	15	12	**46**
Demo Units	11	13	16	12	**52**
Fencing	4	9	**6**	9	**28**
Rain Water Harvesting System	7	4	8	4	**23**
Threshing Floor	7	**1**	12	7	**27**
Farmer godown	4	3	7	5	**19**
IFS System	0	0	2	1	**3**
Implement shed	0	0	2	0	**2**
Tractor	**10**	**11**	18	9	**48**
Jeep/ Car	11	17	20	11	**59**
Motor cycle/Two Wheeler	10	**11**	21	11	**53**

Annexure-V

STAFF POSITION OF ICAR-ATARI, ZONE-I, LUDHIANA AS ON 31.03.2018

Sr. No.	Category	Cadre Strength	In-Position	Vacant
1.	Director	1	1	0
2.	Principal Scientist	1	1	0
3.	Senior Scientist	3	2	1
4.	Scientist	2	2	0
5.	Asstt. Finance & Accounts Officer	1	1	0
6.	Asstt. Admn. Officer	1	0	1
7.	Assistant	2	2	0
8.	Personal Assistant	1	0	1
9.	Upper Division Clerk	1	0	1
10.	Lower Division Clerk	2	2	0
11.	Skilled Support Staff	2	0	2
12.	Technical (Driver T-2)	1	1	0
	Total	**18**	**12**	**6**

Annexure-VI

LIST OF ONGOING PROJECTS AND SCHEMES AT ICAR-ATARI ZONE-1 DURING 2017-18

S.No	Title of Project/Programmes	Name of Investigators/ Nodal officers
Externally funded projects/programmes		
1.	National Innovations on Climate Resilient Agriculture (NICRA)-TDC component (with ICAR-CRIDA, Hyderabad)	NO: Dr. Ashish S. Murai CoNO: Dr. Pragya Bhadauria
2.	An Integrated Approach for Livestock Development: Farmer's context (with GADVASU)	CoPI: Dr. Pragya Bhadauria CoPI: Dr. Arvind Kumar
3.	Attracting and Retaining Youth in Agriculture (ARYA)	NO: Dr. Ashish S. Murai
4.	Cluster Frontline Demonstration on Rabi Pulses (CFLD)	NO: Dr. Ashish S. Murai CoNO: Dr. Preeti Mamgai
5.	Cluster Frontline Demonstration on Oilseeds (CFLD)	NO: Dr. Preeti Mamgai CoNO: Dr. Ashish S. Murai
6.	Farmer FIRST	NO: Dr. Arvind Kumar CoNO: Dr. Pragya Bhadauria
7.	Skill Development Programme	NO: Dr. Arvind Kumar CoNO: Dr. Ashish S. Murai
8.	Protection of Plant Varieties & Farmers' Right (PPV&FRA)	NO: Dr. Preeti Mamgai CoNO: Dr. Pragya Bhadauria
9.	Tribal Sub Plan (TSP)	NO: Dr. Preeti Mamgai
10.	Projects under District Agro Meteorological Unit (DAMU)	NO: Dr. Pragya Bhadauria
11.	ICAR-Krishi	NO: Dr. Pragya Bhadauria CoNO: Dr. Ashish S. Murai
Institutes projects		
1.	Study of interventions of Krishi Vigyan Kendras on Human Nutrition	PI: Dr. Preeti Mamgai CoPI: Dr. Rajesh K Rana CoPI: Dr. Arvind Kumar CoPI: Dr. Pragya Bhadauria CoPI: Dr. Ashish Murai
2.	Technology Application Behaviour of Basmati Rice Growers	PI: Dr. Ashish Murai CoPI: Dr. Arvind Kumar CoPI: Dr. Preeti Mamgai CoPI: Dr. Pragya Bhadauria
3.	Development of Livestock Technology Inventory and Up-scaling of suitable technologies for Profitable Livestock Production in Punjab	PI: Dr. Pragya Bhadauria CoPI: Dr. Arvind Kumar CoPI: Dr. Preeti Mamgai CoPI: Dr. Ashish Murai
4.	Identification and Documentation of Agri-Innovations in Zone-1 states	PI: Dr. Rajesh K Rana
5.	Impact of Soil Health Card Scheme and Neem Oil Coated Urea	PI: Dr. Rajesh K Rana

NO=Nodal Officer; CoNO=Co-Nodal Officer

Annexure-VII

BUDGET OF THE INSTITUTE FOR THE YEAR 2017-18

Revised Budget Estimate of ATARI Zone-1 (₹ in Lakh)

Name of the Zone	Budget Head	General	TSP	Total
ICAR ATARI, Zone-I	Capital	29.12	0.00	29.12
	Salary	140.90	0.00	140.90
	General	68.21	0.00	68.21
	Total	238.23	0.00	238.23
KVK+DEEs	Capital	429.75	0.00	429.75
	Salary	7189.10	0.00	7189.10
	General	1006.14	224.00	1230.14
	Total	8624.99	224.00	8848.99
Total	**Capital**	**458.87**	**0.00**	**458.87**
	Salary	**7330.00**	**0.00**	**7330.00**
	General	**1074.35**	**224.00**	**1298.35**
	Total	**8863.22**	**224.00**	**9087.22**

Annexure-VIII

DETAILS OF SAC MEETING CONDUCTED BY KVKS DURING 2017-18

Name of KVK	Date of SAC Meeting	Number of Participants
Punjab		
Amritsar	24.10.2017	21
Bathinda	27.10.2017	26
Faridkot	31.10.2017	37
Fatehgarh Sahib	09.10.2017	30
Ferozepur	17.11.2017	45
Gurdaspur	30.11.2017	37
Hoshiarpur	28.11.2017	41
Jalandhar	04.12.2017	14
Kapurthala	08.12.2017	7
Ludhiana	14.12.2017	31
Mansa	22.12.2017	38
Moga	19.01.2018	30
Muktsar	24.01.2018	19
Nawansheher	28.02.2018	7
Patiala	07.02.2018	30
Ropar	15.02.2018	16
Sangrur	27.02.2018	35
Pathankot	12.02.2018	28
Barnala	12.02.2018	18
Mohali	Not conducted	Nil
Tarn taran	Not conducted	Nil
Uttrakhand		
Almora	19.12.2017	24
Chamoli	20.12.2017	24
Champawat	20.03.2018	70
Dehradun	05.12.2017	16
Haridwar	04.12.2017	34
Nainital	11.12.2017	58
Pithouragarh	21.03.2018	12
Rudraprayag	21.12.2017	23
Udham Singh Nagar	27.07.2016	29
Pauri Garhwal	22.03.2018	15
Tehri Garhwal	24.03.2018	12
Bageshwar	13.03.2018	21
Uttarkashi	16.11.2017	38
Himachal Pradesh		
Bilaspur	24.03.2018	35
Chamba	26.12.2017	27

Name of KVK	Date of SAC Meeting	Number of Participants
Solan	Not conducted	Nil
Kullu	22.02.2018	16
Lahaul & Spiti	01.09.2017	27
Lahual & Spiti II*(Tabo)	Not conducted	Nil
Mandi	31.10.2017	13
Una	07.02.2018	25
Sirmour	12.03.2017	-
Shimla	24.08.2017	23
Kinnaur	29.03.2017	40
Hamirpur	19.03.2018	26
Kangra	14.03.2018	7
Jammu & Kashmir		
Anantnag	24.05.2017	250
Bandipora	01.05.2018	68
Budgam	05.05.2017	35
Jammu	26.03.2018	32
Kathua	22.03.2018	32
Kulgam	25.05.2018	39
Leh and Leh Additional	09.05.2018	131
Poonch	24.03.2018	13
Pulwama	25.09.2017	125
Rajouri	12.03.2018	17
Reasi	09.03.2018	13
Shopian	04.05.2018	60
Srinagar	24.04.2018	31
Kupwara	24.03.2018	102
Kargil	07.05.2018	7
Ganderbal	11.05.2017	50
Baramula	Not conducted	Nil
Doda	10.03.2018	23
Samba*	22.03.2017	16
Kargil -II	Not conducted	Nil