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वार्षिक प्रतिवेदन
ANNUAL REPORT
2016-17

भा.कृ.अनु.प.-कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थान,
लुधियाना - 141004

ICAR-Agricultural Technology Application Research Institute
Ludhiana - 141004

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वार्षिक प्रतिवेदन

Annual Report 2016-17

भाकृअनुप
ICAR

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PREFACE

From its inception, Krishi Vigyan Kendras (KVKs) has established itself as a front runner in extension activities and served as 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 74 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. During 2016-17, a new initiative on skill development training was also added in which 16 KVKs this zone has conducted 33 courses on skill development training in agricultural covering 11 job roles for 200 hrs. Apart from this, a mega event to popularize the crop insurance scheme was successfully implemented by 62 KVKs by active participation of four Cabinet Ministers benefiting more than 37,000 farmers of northern India.

The other salient activities during the year mainly comprises of active role of all the Extension Directorates in technological backstopping under seven State Agriculture Universities and eight Agricultural Technology Information Centers. Along with this, as mandated activities of these KVKs, more than 600 On farm trails and about 50 technologies were refined by the KVK scientists through 3393 trials, Similarly more than fourteen thousand frontline demonstrations were conducted covering an area of 3543.77 ha. During this year, KVKs have organized a total of 7251 capacity development programmes for 1.95 lakh participants and 54653 extension programmes for 9.98 lakh farmers respectively from zone-1.

In collaboration with National Mission on Oilseeds and Oil palm (NMOOP), 2025 cluster frontline demonstrations were conducted in an area of 810.00 ha. in oilseeds and 4536 CFLDs in pulses in an area of 1442.1 ha. Similarly, 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.

In this endeavor, 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 our 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: 14 July, 2017

(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
BCR	-	Benefit Cost Ratio
CIPHET	-	Central Institute of Post Harvest Engineering and Technology, Ludhiana
CITH	-	Central Institute of Temperate Horticulture, Srinagar
CPRI	-	Central Potato Research Institute, Shimla
CRIDA	-	Central Research Institute for Dryland Agriculture, Hyderabad
CSSRI	-	Central Soil Salinity Research Institute, Karnal
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
MIDH	-	Mission for Integrated Development of Horticulture
NABARD	-	National Bank for Agriculture and Rural Development
NARS	-	National Agricultural Research System
NDRI	-	National Dairy Research Institute, Karnal
NGO	-	Non-Government Organization
NICRA	-	National Innovations in Climate Resilient Agriculture
NRM	-	Natural Resource Management
OFT	-	On Farm Testing
PAU	-	Punjab Agricultural University, Ludhiana
RCT	-	Resource Conservation Technology
RMP	-	Research Management Position
SAC	-	Scientific Advisory Committee
SAU	-	State Agricultural University
TDC	-	Technology Demonstration Component
TSP	-	Tribal Sub Plan
UMMB	-	Urea Molasses Mineral Block
YVM	-	Yellow Vein Mosaic
ZCU	-	Zonal Coordinating Unit
ZPD	-	Zonal Project Directorate
ZPMC	-	Zonal Programme Management Committee

कार्यकारी सारांश

कृषि विस्तार प्रभाग, उप–महानिदेशक (कृषि प्रसार) की अध्यक्षता में देश में स्थापित आठ कृषि प्रौद्योगिकियों अनुप्रयोग अनुसंधान संस्थान के माध्यम से कृषि विज्ञान केन्द्रों की प्रगति पर नजर रखता है। 31 मार्च 2017 तक, क्षेत्र–1 के अन्तर्गत 74 कृषि विज्ञान केन्द्र हैं (पंजाब में 22, हरियाणा में 18, दिल्ली में 01, हिमाचल प्रदेश में 13 तथा जम्मू कश्मीर मे 20)।

कृषि विज्ञान केन्द्रों द्वारा प्रौद्योगिकियों का अंकलन एवं संशोधन, राज्य कृषि विश्व विद्ययालायों तथा भारतीय कृषि अनुसंधान परिषद के संस्थानों तथा किसानों एवं अन्य हितधारकों की भागीदारी के साथ किया जाता हैं। रिपोर्टिगं वर्ष के दौरान मुख्य उपलब्धियां संक्षेप में इस प्रकार है।

1. प्रौद्योगिकी आकलन और संशोधन

❖ 568 प्रौद्योगिकी मूल्यांकन में 3393 परीक्षणों के माध्यम से केवीके द्वारा कुल 622 ओएफटी सहित 54 प्रौद्योगिकी का शोधन किया गया।

❖ फसलों के तहत, केवीके द्वारा विभिन्न प्रकार के क्षेत्रों में 2627 परीक्षणों का आयोजन किया जाता है जैसे कि किस्मों का मूल्यांकन (139), एकीकृत पोषण प्रबंधन (95), एकीकृत रोग प्रबंधन (60), एकीकृत कीट प्रबंधन (52), एकीकृत फसल प्रबंधन (44) और एकीकृत घास प्रबंधन (37)।

❖ पशुधन और मत्स्य प्रौद्योगिकी के तहत, केवीके ने पोषण प्रबंधन (19), बीमारी प्रबंधन (16) सहित छह विषयगत क्षेत्रों पर 44 तकनीकों का मूल्यांकन किया।

❖ एकीकृत फसल प्रबंधन (10), एकीकृत पोषक प्रबंधन (7), एकीकृत रोग प्रबंधन (7), एकीकृत कीट प्रबंधन (12), एकीकृत घास प्रबंधन सहित (7), संसाधन संरक्षण प्रौद्योगिकी (4), मूल्य संवर्द्धन (1) जैसे सात विषयगत क्षेत्रों पर केवीके द्वारा फसलों के तहत 309 परीक्षणों के माध्यम से कुल 48 प्रौद्योगिकियां का संशोधन किया गया ।

2. अग्रिम पंक्ति प्रदर्शन

❖ वर्ष के दौरान, 14751 प्रदर्शन के माध्यम से अनाज और बाजरा में कुल 5221, 2650 तिलहन, 1191 दालों, 2013 सब्जी और मसालों, 129 फलों, 105 फूलों, चारा फसलों पर 1158, वाणिज्यिक फसलों पर 508, पशुधन और मत्स्य पालन पर 910 तथा अन्य पहलुओं जैसेकि मशरूम का उत्पादन (279), वर्मीकंपोस्ट (89), खेत के औजारों (220) और घरेलू विज्ञान संबंधी गतिविधियों (278) पर 3543.77 हेक्टर क्षेत्र में 910 इकाईयों में प्रदर्शन लगाए गए।

❖ वर्ष के दौरान 1911.02 हेक्टर क्षेत्र को कवर करने वाले विभिन्न अनाज और बाजरा फसलों में कुल 5221 प्रदर्शन आयोजित किए गए थे । धान में, औसत उपज पंजाब, हरियाणा, दिल्ली, हिमाचल प्रदेश और जम्मू और कश्मीर राज्यों में 33.46 क्विंटल/हेक्टेयर से लेकर 64.71 वर्ग/हेक्टेयर तक रही, जो कि उनके संबंधित चेक मे 26.84 क्विं/हेक्टेयर से 62.19 क्विं/हेक्टेयर रही । बासमती चावल में, औसत उपज पंजाब और हरियाणा में 42.35 क्विंटल/हेक्टेयर से 47.25 क्विंटल/हेक्टेयर सामने आई, जो कि 40.80 क्विं /हेक्टेयर से 44.61 क्विं/हेक्टेयर के मुकाबले अपने संबंधित चेक से अधिक थी । पंजाब, हिमाचल प्रदेश एवं जम्मू –कश्मीर राज्यों में मक्का के मामले में, औसत उपज प्रदर्शन में 34.80 क्विं/ हेक्टेयर से लेकर 40.19 क्विं/ हेक्टेयर की तुलना मे संबंधित चेक मे 25.86 क्विं/हेक्टेयर से लेकर 34.20 क्विं/हेक्टेयर रही ।

❖ वर्ष भर के दौरान 813.43 हेक्टर क्षेत्र मे विभिन्न तेल–बीज की फसलों के कुल 2650 प्रदर्शन किए गए। सरसों के प्रदर्शन मे स्थानीय चेक में पंजाब (10.83%), हरियाणा (27.94), दिल्ली (8. 22%) एवं जम्मू–कश्मीर (31.71) में औसत वृद्धि दर्ज की गई। पंजाब में, स्थानीय चेक पर अफ्रीकी सरसों (15.60%:) और कैनोला सरसों (21.35%) के प्रदर्शन मे औसत वृद्धि दर्ज की गई थी। गोबी सरसों के मामले में, पंजाब (25.2 9%), हिमाचल प्रदेश (37.16%) और जम्मू–कश्मीर (32.9 4) में किसानो की परंपरागत प्रथा से अधिक औसत उपज दर्ज की गयी । पंजाब (26.0 9%) और हरियाणा (19 .30%) में स्थानीय चेक पर राया खेती में प्रदर्शित प्रौद्योगिकियों के कारण उपज में वृद्धि हुई। स्थानीय चेक मे अन्य तिलहनों जैसे सूरजमुखी, तिल, मूंगफली और सोयाबीन के प्रदर्शन उपज में भी वृद्धि देखी गयी ।

❖ पंजाब में 191, हिमाचल प्रदेश में 671, हरियाणा में 671 और जम्मू और कश्मीर में 239 में 153.08 हेक्टेयर क्षेत्रफल में दलहनी फसलों के कुल 1191 प्रदर्शन किए गए।

❖ पंजाब में 141, हरियाणा में 150, हिमाचल प्रदेश में 723 और जम्मू–कश्मीर में 999 सहित 143.82 हेक्टेयर क्षेत्र को कवर करने वाले विभिन्न सब्जी और मसाला फसलों में कुल 2013 प्रदर्शन आयोजित किए गए । सभी राज्यों और फसलों में सब्जियों और मसाले की खेती के लिए किए गए तकनीक–प्रदर्शन स्थानीय चेक से बेहतर साबित हुए । फलों के मामले में, विभिन्न फल जैसेकि पेरू, किनो, सेब, बेर, खुबानी, अनार और आम पर कुल 129 प्रदर्शन (20.22 हेक्टेयर) का

आयोजन किया गया । साल में 18.10 हेक्टर क्षेत्र में मैरीगोल्ड फूल पर कुल105 प्रदर्शन किए गए ।

❖ वर्ष के दौरान 195.10 हेक्टर क्षेत्र को कवर करने वाले विभिन्न चारा फसलों पर कुल 1158 प्रदर्शन का आयोजन किया गया था। विभिन्न राज्यों में चारा फसलों पर एफएलडी इस प्रकार रहारू पंजाब में 267, हरियाणा में 81, हिमाचल में 63 और जम्मू–कश्मीर में 747।

3. क्षमता विकास

❖ रिपोर्टिंग अवधि के दौरान कृषि विज्ञान केन्द्रों ने 1.95 लाख प्रतिभागियों के लिए कुल 7251 क्षमता विकास कार्यक्रमों का आयोजन किया । 7251 कार्यक्रमों में से 87.20 प्रतिशत कार्यक्रम प्रतिभागियों की आवश्यकता पर आधारित थे तथा शेष कार्यक्रम प्रायोजित एवं व्यवसायिक थे ।

❖ कुल 5003 पाठ्यक्रम जिसमे 92563 कृषकों एवं 37279 कृषक महिलाओं के लिए आयोजित किए गए। सबसे ज्यादा कार्यक्रम फसल उत्पादन (899) उसके बाद पादप संरक्षण (849) एवं बागवानी (854) पर आयोजित किए गए। महिला कृषकों की सबसे ज्यादा भागीदारी गृह–विज्ञान, महिला सशक्तिकरण (18720) तथा बागवानी (5041) के कार्यक्रमों में रही ।

❖ ग्रामीण युवकों के लिए 880 कार्यक्रमों का आयोजन किया गया । इन कार्यक्रमों में 24226 प्रतिभागियों में से 8248 महिलाएं (34.04 प्रतिशत) थीं ।

❖ प्रसार कर्मियों के लिए कुल 440 कार्यक्रमों का आयोजन किया गया जिसमें 9241 प्रतिभागियों ने हिस्सा लिया। इनमें से जम्मू–कश्मीर के कृषि विज्ञान केन्द्रों ने 128 कार्यक्रम आयोजित किए, जबकि हरियाणा के कृषि विज्ञान केन्द्रों ने 152 कार्यक्रम आयोजित किए । इन कार्यक्रमों में 15.84 प्रतिशत अनुसूचित जाति एवं जनजाति समुदाय की तथा 28.17 प्रतिशत महिलाओं की भागीदारी रही ।

❖ क्षेत्र के ज्यादातर कृषि विज्ञान केंद्रों ने कृषकों, कृषक महिलाओं, ग्रामीण युवकों एवं प्रसार कर्मियों के फायदे के लिए प्रायोजित कार्यक्रम आयोजित किए । कुल प्रायोजित कार्यक्रमों 313 हिमाचल प्रदेश, 135 तथा पंजाब में 63 कार्यक्रम आयोजित किए गए।

❖ रिपोर्टिंग अवधि के दौरान 615 व्यवसायिक कार्यक्रम, 16055 प्रतिभागियों के लिए आयोजित किए गए । पंजाब तथा हरियाणा में क्रमशः 245 (6355 प्रतिभागी), तथा 202 (7287 प्रतिभागी) कार्यक्रम आयोजित किए गए । सबसे ज्यादा आय बनाने वाली गतिविधियों मे प्रमुख क्षेत्र फसल टेक्नोलॉजी (278) और मूल्यसंवर्धन (130) पर आयोजित किए गए।

4. अग्रिम पंक्ति प्रसार कार्यक्रम

कृषि विज्ञान केन्द्रों नें कुल 54653 प्रसार कार्यक्रम आयोजित किए जिनके द्वारा 9.98 लाख किसानों एवं 0.18 लाख प्रसार कर्मियों के बीच विभिन्न पहलुओं पर जागरूकता फैलाई गई जिनमें मुख्य हैं :– किस्म प्रदर्शन, उत्पादन प्रौद्यौगिकी, संसाधन संरक्षण प्रौद्यौगिकी, संरक्षित खेती, बागवानी, पुष्प उत्पादन, जाल घर प्रौद्यौगिकी, समन्वित कीट एवं रोग प्रबंधन,पशु स्वास्थ्य एवं पोषण, पशुधन उत्पादन, मुर्गीपालन, मानवपोषण, आदि। इसके अलावा कृषि विज्ञान केन्द्रों नें अखबार (1549), प्रसार साहित्य (1823), लोकप्रिय लेख (388), रेडियो वार्ता (318), दूरदर्शन वार्ता (319) के माध्यम से भी विभिन्न प्रौद्योगिकियों को लोकप्रिय बनाया।

5. प्रौद्यौगिकी आदानों का उत्पादन

रिपोर्टिंग अवधि के दौरान, कृषि विज्ञान केन्द्रों द्वारा विभिन्न फसलों का 18645.32 क्विंटल बीज, 161.75 क्विंटल जैविक खाद तथा 28.52 जैव कारक का उत्पादन कर किसानों को उपलब्ध कराया गया। इसके अलावा, कृषि विज्ञान केन्द्रों द्वारा 15.39 लाख रोपण सामग्री तथा 9998 लाख पशुधन एवं मछली बीज भी उत्पादित कर किसानों को उपलब्ध कराया गया।

6. मिट्टी, पानी एवं पौधों के परिक्षण का विश्लेषण

वर्ष के दौरान इस क्षेत्र के कृषि विज्ञान केन्द्रो ने 28,236 मिट्टी के नमूनों, 4528 पानी के नमूनों और 3,219 संयंत्र के नमूनों सहित कुल 28,236 नमूनों का विश्लेषण किया । इस सुविधा का लाभ उठाने वाले 6804 गांवों के 21,999 किसान थे और केवीके ने इस सेवा से 2,19,412 रुपए का राजस्व प्राप्त किया । इस दौरान, 2880 गांवों के 9,078 किसानों को कृषि विज्ञान केन्द्रो ने 12,301 मिट्टी के स्वास्थ्य कार्ड भी वितरित किए हैं।

7. कृषि प्रौद्योगिकी सूचना केंद्र

इस क्षेत्र के 8 कृषि प्रौद्योगिकी सूचना केंद्रों ने इस वर्ष के दौरान विभिन्न लाभार्थियों द्वारा किए गए भ्रमण की संख्या जिनमें 41,879 तकनीकी सलाह हेतु, जबकि 2,63,717 किसान प्रौद्योगिकी आदान खरीदने हेतु आए । इन केंद्रों ने 9860 लाभार्थियों को प्रशिक्षण प्रदान किया तथा मिट्टी और पानी परीक्षण सुविधाओं का उपयोग 7,955 किसानों द्वारा किया गया। इसके साथ ही 1,44,782 पुस्तकें और 7,414 तकनीकी बुलिटनों को ATIC द्वारा प्रदान किया गया ।

8. प्रसार निदेशालयों द्वारा तकनीकी समर्थन

प्रसार निदेशक तथा उनके अधिनस्थों ने 64 वैज्ञानिक सलाहकार समिति की बैठकों, 59 खेत दिवसों, 126 प्रशिक्षण कार्यक्रमों, तथा 33 प्रौद्योगिकी सप्ताहों के आयोजन में हिस्सा

लिया। इन निदेशालयों ने के.वी.के. कर्मियों के लिए 25 कार्यशाला, संगोष्ठी का आयोजन किया । इसके अलावा इन्होने 232 ओ.एफ.टी., 318 एफ.एल.डी. का भी आयोजन किया।

9. पादप किस्म और किसान अधिकार संरक्षम प्रधिकरण' (पीपीवी एंड एफआरए)

आई.सी.ए.आर–अटारी, क्षेत्र–1 के विविधीकृत प्रयासों में 'पादपकिस्म और किसान अधिकार संरक्षम प्रधिकरण' (पीपीवी एंड एफआरए), कृषि मंत्रालय, भारत सरकार के साथ पादप किस्म, किसान और पादप उत्पादकों के अधिकारों के संरक्षण के लिए प्रभावशाली प्रणाली स्थापित करने के साथ–साथ पादपों की नई किस्मों के विकास को प्रोत्साहित करने से संबंधित सहयोगी कार्यक्रम शामिल है। 'पादप और किसान अधिकार संरक्षण' विषय पर संस्थान द्वारा एक विशेष कार्यशाला करने के साथ–साथ 19 कृषि विज्ञान केन्द्रों द्वारा 3747 के.वी.के के वैज्ञानिको, पुरूष एवं महिला किसानों के लिए 29 जागरुकता एवं प्रशिक्षिण कार्यक्रमों का आयोजन भी किया गया ।

10. जलवायु अनुरूप कृषि में नवोन्मेष

वर्ष 2016–17 के दौरान एन.आर.एम. से सम्बंधित तकनीकों को 1038 किसानों के 865 है. क्षेत्र पर प्रदर्शित किया गया। फसल उत्पादन के अंतर्गत, 984.28 है. क्षेत्र में विभिन्न तकनीकों पर 2183 प्रदर्शन किए गये।

पशुपालन एवं मछलीपालन मोड्यूल के अंतर्गत, 3540 दुधारु पशुओं में डिवर्मिंग, लवण मिश्रण की खिलाई, उनके स्वास्थ्य की जाँच, कृत्रिम गर्भाधान आदि किया गया। साइलेज बनाने की विधि 147 किसानों को प्रदर्शित की गयी। इनके अलावा, चारा हेतु मक्का, जई तथा ज्वार की उत्पादन तकनीक 124 किसानों के 136 है. क्षेत्र पर प्रदर्शित की गई। संस्थागत हस्तक्षेप के अंतर्गत, 200 किसानों द्वारा 400 है. क्षेत्र में बीज का उत्पादन कर बीज बैंक बनाया गया। कस्टम हायरिंग केंद्रों में रखे कृषि यंत्रों का उपयोग 699 किसानों द्वारा 667.48 है. क्षेत्र में समय से विभिन्न कृषि कार्य करने हेतु किए गए। 4693 किसानों के लिए जलवायु परिवर्तन से सम्बंधित 242 क्षमता विकास कार्यक्रम व 432 प्रसार कार्यक्रम आयोजित किए गए।

11. दलहन पर समूह अग्रिम पंक्ति प्रदर्शन

इस परियोजना के तहत, दलहन पर अग्रिम पंक्ति प्रदर्शन के लिए थे। खरीफ, रबी और गर्मी के मौसम में चार राज्यों में 1442.1 हेक्टेयर क्षेत्र में कुल 4536 अग्रिम पंक्ति प्रदर्शन का आयोजन किया गया। दलहन पर अग्रिम पंक्ति प्रदर्शन के संचालन के लिए केवीके को रु 7,500 / हेक्टेयर आवंटित किया गया था ।

12. तिलहन पर समूह अग्रिमपंकित प्रदर्शन

इस परियोजना के तहत 10.8 हेक्टेयर में मूंगफली, 82.5 में हेक्टेयर तिल और 3.60 हेक्टेयर में सूरजमुखी पर अग्रिमपंक्ति प्रदर्शनियाँ लगाई गई। रबी की ऋतु के दौरान 589.7 हैक्टेयर पर सरसों की प्रदर्शनियाँ लगाई गई। गीष्म ऋतु के दौरान 220 पंक्ति प्रदर्शनियों 81.09 हैक्टेयर क्षेत्र में सूरजमुखी और सरसों की प्रदर्शनी लगाई गई।

13. पूर्व रबी सम्मेलन

क्षेत्र–1 के 49 कृषि विज्ञान केन्द्रों द्वारा आयोजित कार्यक्रमों में कुल 21311 किसानों और 1131 विस्तार– कार्यकर्ताओं ने भाग लिया । किसानों को शिक्षित और वितरित करने के लिए साहित्य के रूप मे पुस्तिकाएं, फोल्डर्स आदि भी तैयार व वितरित किए गए ।

14. जनजातीय उप–योजना

आई.सी.ए.आर–अटारी, क्षेत्र–1, मे कुल नौ कृषि विज्ञान केन्द्र जनजातीय उप–योजना योजना के तहत कवर किए गए। 2016–17 के दौरान, टीएसपी के तहत कृषि विज्ञान केन्द्रों ने 64 खेत–परीक्षण (ओएफटी) और फ्रंट लाइन डेमोस्ट्रेशन (FLD) को 1036.7 हेक्टेयर क्षेत्र में आयोजित किया। टीएसपी के तहत आयोजित विस्तार कार्यक्रमों में से कुल 37,385 हितधारकों की संख्या ने भाग लिया । इस दौरान कुल 12934 संख्या में किसानों और 679 विस्तार कर्मियों को प्रशिक्षित भी किया गया। केवीके ने 1.65 लाख की अच्छी गुणवत्ता वाली रोपण सामग्री और 94.62 टन बीज ग्रामीण महिलाओं और युवाओं के बीच वितरण के लिए तैयार किया ।

15. जीवन की गुणवत्ता में सुधार के लिए कृषक महिलाओं का सशक्तिकरण

यह परियोजना आई.सी.ए.आर–CIWA भुवनेश्वर एवं आई. सी.ए.आर–अटारी क्षेत्र–1 के सहयोग से कृषि विज्ञान केन्द्र पटियाला, पंजाब में लागू की गई थी। इसके तहत नाभा ब्लॉक में से चार गांवः बीना हेरी, कोट खुर्द, हिआँ कलान और हिआँ खुर्द को डेटा संग्रह के लिए चुना गया था। कुल मिला कर डेटा संग्रह के लिए 120 कृषक परिवारों का चयन किया गया था। मूल्यांकन के दौरान यह पाया गया कि 39.16 प्रतिशत महिलाओं 26–33 वर्ष के आयु के समूह में पाए गए,केवल 23.33 प्रतिशत महिलाओं प्राथमिक स्तर और 82.5 प्रतिशत तक शिक्षित थी, अभी भी ग्रामीण स्तर पर लड़कियों की शादी 18 साल से पहले की जा रही है। पचपन प्रतिशत महिलाये सामान्य वजन की पाए गयी, 25 प्रतिशत कम वजन तथा 4 प्रतिशत माहिलाए मोटापे से ग्रस्त पायी गयी । औसत बुनियादी चयापचय–दर ग्रामीण

महिलाओं मे 23.01 पायी गयी, जो कि महिलाओं के लिए सामान्य श्रेणी में था। इस वर्ष, महिलाओं की आय सृजन में सुधार के लिए के लिए चौदह कौशल–विकास कार्यक्रम के.वी.के. पटियाला द्वारा आयोजित किए गए। छह फोल्डर और एक प्रशिक्षण मैनुअल क्षमता निर्माण कार्यक्रमों के दौरान इन महिलाओं को साहित्य के रूप में वितरित किए गए। कृषि और संबद्ध गतिविधियों के दौरान मुद्रा और कठिन परिश्रम को कम करने के टूल जैसे कि बेहतर दरांती, कपास दस्ताने, मक्का शेलर, परिक्रामी मल, सब्जी फसल कटाई और दो पहिया कुदाल आदि महिलाओं मे वितरित किए गए ।

16. युवा को कृषि की ओर आकर्षित करना एवं उसे कृषि कार्य में बनाए रखना

आर्या परियोजना के तहत, कृषि संबंधित उद्यमों की स्थापना के लिए ग्रामीण युवाओं को विशिष्ट कौशल आधारित प्रशिक्षण और तकनीकी सहायता प्रदान करने के लिए गुड़गांव, भटिंडा, हमीरपुर और कठुआ के कृषि विज्ञान केन्द्रों का चयन किया गया । वर्ष के दौरान, कुल 526 ग्रामीण युवाओं को प्रशिक्षित किया गया है और उन्हे स्वयं के उद्यम स्थापित करने के लिए केवीके द्वारा समर्थित किया जा रहा है।

17. फार्मर फर्स्ट परियोजना

फार्मर फर्स्ट परियोजना के अंतर्गत जोन –1 के तहत विभिन्न आई.सी.ए.आर संस्थानों और राज्य कृषि विश्वविद्यालयों (एस.ए.यू) की 11 परियोजनाओं को मंजूरी दी गई । सभी 11 परियोजनाएँ छह आई.सी.ए.आर संस्थानों और क्षेत्र पांच राज्य कृषि–विश्वविद्यालयों द्वारा कार्यान्वित हो रही है ।

18. कौशल विकास कार्यक्रम

कौशल विकास प्रशिक्षण के तहत, जोन –1 के 16 कृषि विज्ञान केन्द्रों ने (पंजाब –6, हरियाणा –4, हिमाचल प्रदेश –3, जम्मू–कश्मीर –2 और दिल्ली –1) 200 घंटे या उससे अधिक की कृषि में कौशल विकास प्रशिक्षण (एस.डी.टी) प्रदान किए । ए.एस.सी.आई के नियमों के अनुसार युवाओं के लिए अलग–अलग नौकरी की भूमिका में कुल 33 कौशल विकास प्रशिक्षण 659 ग्रामीण युवाओं के लिए आयोजित किए गए।

19. एकीकृत खेती प्रणाली आईएफएस

आईएफएस के तहत, वर्ष के दौरान, आई.सी.ए.आर ने 13 कृषि विज्ञान केन्द्र (पंजाब –4, हरियाणा –4, हिमाचल प्रदेश –2, जम्मू–कश्मीर –3) को कुल 39 लाख रुपये की राशि जिसमे वर्तमान मे 19.50 लाख रुपये जलवायु तन्यक एकीकृत खेती प्रणाली प्रदर्शन इकाईयों की स्थापना के लिए जारी कर दिये गए है ।

20. अवशेषों के प्रबंधन के लिए अभियान

अवशेषों को जलाने और उपलब्ध प्रौद्योगिकियों/हस्तक्षेपों के खराब प्रभावों के बारे में जागरुकता पैदा करने के लिए पंजाब और हरियाणा के कृषि विज्ञान केन्द्रों ने जन–जागरण अभियान का आयोजन किया। 16 अप्रैल से 1 मई 2016 तक और 16 अक्टूबर से 11 नवंबर, 2017 तक खेत के अवशेष, खेत में और कमाएं, जलाएं नहीं विषय पर यह अभियान आयोजित किए गए थे । इस दौरान नारे व निबंध लेखन प्रतियोगिताओं, एक्सपोजर विजिट, व्याख्यान, फील्ड दौरे, समूह बैठकें, किसान सभाएँ, प्रभात फेरी, प्रदर्शन, आदि जैसी विभिन्न गतिविधियों का आयोजन किया गया। साथ ही किसानों को जलवायु के अनुकूल अवशेष प्रबंधन के बारे में किसान मोबाइल सलाहकारों के माध्यम से संपर्क किया गया।

Executive Summary

ICAR-Division of Agricultural Extension headed by the Deputy Director General (Agricultural Extension) monitors and reviews the progress of KVKs through its eight 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 74 KVKS of Punjab (22), Haryana (18), Delhi (1), Himachal Pradesh (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. Salient achievements during the reporting year are summarized as follows:

1. Technology Assessment and Refinement

- A total of 622 OFTs were conducted including 568 on technology assessment and 54 on technology refinement by KVKs through 3393 trials.
- Under crops, a total of 508 technologies assessed by KVKs by conducting 2627 trials in thematic areas such as varietal evaluation (139), integrated nutrient management (95), integrated disease management (60), integrated pest management (52), integrated crop management (44), and integrated weed management (37).
- Under livestock and fishery technologies, KVKs assessed 44 technologies on six thematic areas including nutrition management (19), disease management (16).
- A total of 48 technologies refined through 309 trials under crops by KVKs on seven thematic areas including integrated crop management (10), integrated nutrient management (7), integrated disease management (7), integrated pest management (12), integrated weed management (7) resource conservation technology (4) and value addition (1).

2. Frontline Demonstration

- A total of 14751 demonstrations including 5221on cereal & millets, 2650 on oilseeds, 1191 pulses, 2013 on vegetable & spices, 129 fruit crops, 105 on flowers, 1158 on fodder crops, 508 on commercial crops, 910 on livestock & fisheries, 886 on other aspects viz. mushroom production (279), vermicompost (89), farm implements (220) and home science related activities (278) were conducted covering an area of 3543.77 ha and 910 units.
- A total of 5221 demonstrations were conducted in various cereal and millet crops covering an area of 1911.02 ha during the year. In paddy, the average yield ranged from 33.46 q/ha to 64.71q/ha under frontline demonstrations in Punjab, Haryana, Delhi, Himachal Pradesh and Jammu & Kashmir states as compared to 26.84 q/ha to 62.19 q/ha in their respective check. In basmati rice, the average yield ranged from 42.35 q/ha to 47.25 q/ha under frontline demonstrations in Punjab and Haryana states as compared to 40.80 q/ha to 44.61 q/ha in their respective check. In case of maize, the average yield of demonstration ranged from 34.80 q/ha to 40.19 q/ha in Punjab, Himachal Pradesh and Jammu & Kashmir states as compared to 25.86 q/ha to 34.20 q/ha in their respective check.
- A total of 2650 demonstrations were conducted in various oilseeds crops covering an area of 813.43 ha during the year. The average increased yield of mustard demonstration was recorded over local check in Punjab (10.83%), Haryana (27.94), Delhi (8.22%) and Jammu & Kashmir (31.71). In Punjab, the average increased yield of demonstrations on African sarson (15.06%) and Canola sarson (21.35%) was recorded over local check. In case of Gobhi sarson, the average increased yield was observed in Punjab (25.29%), Himachal Pradesh (37.16%) and Jammu & Kashmir (32.94%) over farmer's practices. Increased yield due to technologies demonstrated in raya cultivation was observed in Punjab (26.09%) and Haryana (19.30%) over local check. Increase in demonstration yield of other oilseeds viz. sunflower, sesame, groundnut and soybean was also observed over local check.
- A total of 1191 demonstrations were conducted in various pulse crops covering an area of 153.08 ha including 191 in Punjab, 90 in Haryana, 671 in Himachal Pradesh and 239 in Jammu & Kashmir.

- A total of 2013 demonstrations were conducted in various vegetable & spice crops covering an area of 143.82 ha. These demonstrations were comprised of 141 in Punjab, 150 in Haryana, 723 in Himachal Pradesh and 999 in Jammu & Kashmir. Technologies demonstrated for the cultivation of vegetables & spices found to be performed better over local check across all the states and crops. In case of fruits, a total of 129 demonstrations (20.22 ha) were conducted on various fruits crops viz. guava, kinnow, apple, plum, apricot, pomegranate and mango. A total of 105 demonstrations on marigold flower were also conducted in an area of 18.10 ha during the year.
- Under fodder crops, a total of 1158 demonstrations were conducted on various fodder crops covering an area of 195.10 ha during the year. The state wise break up of FLDs on fodder crops includes 267 in Punjab, 81 in Haryana, 63 in Himachal Pradesh and 747 in Jammu & Kashmir.

3. Capacity Development

KVKs have organized a total of 7251 capacity development programmes for 1.95 lakh participants during the reporting period. Out of 7251 courses, 87.20 per cent were the need based courses and the rest were sponsored and vocational courses.

- A total of 5003 courses were organized for farmers and farmwomen wherein 92563 and 37279 were trained, respectively. Most number of courses were organized on crop production (899) followed by plant protection (849) and horticulture (804). Maximum participation of women farmers was recorded in the area of home science/women empowerment (18720) followed by horticulture (5041).
- A total of 880 courses were organized for rural youth. Out of a total of 24226 participants, 8248 (34.04%) were women.
- A total of 440 courses were organized for extension functionaries with a participation of 9241 personnel. KVKs of Jammu & Kashmir organized 128 courses whereas Haryana organized 152 courses. Extent of participation of SC/ST and women extension functionaries was 15.84 and 28.17%, respectively.
- Most of the KVKs in the Zone organized sponsored programmes for the benefit of farmers, farmwomen, rural youth and extension functionaries. Out of a total of 313 courses, KVKs of Himachal Pradesh organized 135 courses, Punjab organized 63 courses and Jammu & Kashmir organized 54 courses.
- During the reporting period, 615 vocational programmes were organized by the KVKs, with the participation of 16055 participants. In Punjab, KVKs organized 245 courses with a participation of 6355 participants. Haryana KVKs organized 202 courses with a participation of 7287 participants. Income generation activities was the leading area (278 courses) followed by post harvest technology and value addition (130 courses).

4. Frontline Extension Programmes

A total of 54653 extension programmes were organized through different methods and means wherein technologies related to agriculture and allied sectors were appraised among 9.98 lakh farmers, and 0.18 lakh extension personnel on various aspects. In respect of utilizing mass media, KVKs popularized technologies through extension literature (1823), newspaper coverage (1549), popular articles (388), radio talks (318) and TV talks (319)

5. Production of technological inputs

KVKs have produced and supplied 18645.32 q of seed material. KVKs produced 15.39 lakh plantlets/ seedlings of different crops and 9998 numbers of livestock and fisheries worth ₹ 61.05 and ₹ 14.26 lakh and supplied to 12601 and 716 farmers respectively. KVKs have produced and supplied 161.75 q bio-fertilizers and 28.52 q bio-agents worth ₹ 1.98 and ₹ 3.48 lakh.

6. Soil, Water and Plant Analysis

During the year, KVKs of this Zone have analysed a total of 28,236 samples including 20,489 soil samples, 4528 water samples, and 3,219 plant samples. There were 21,999 farmers from 6804 villages who have availed this facility and KVKs earned ₹ 2,19,412 from this service. The KVKs have also distributed 12,301 soil health cards to 9,078 farmers from 2880 villages.

7. Agricultural Technology Information Centres (ATIC)

During the year from the eight ATICs the number of visits performed by the various beneficiaries includes

41,879 visited for technical advice whereas, as much as 2,63717 farmers's visited to obtain products developed by the host institutes. ATICs have provided trainings to 9860 beneficiaries. Soil and water testing facilities at ATICs were used by 7,955 farmers. As much as 1,44,782 books and 7,414 technical bulletins were provided by the ATICs to its end users.

8. Technological backstopping by Directorate of Extension

Directorates of Extension Education of various universities and their officials have participated in 64 Scientific Advisory Committee meeting. Similarly, they have attended 59 Field days, 126 workshops Seminars and farmer scientist interactions, 33 technology weeks, 132 Trainings programmes, 232 OFT and 318 FLD programmes organized by various KVKs.

9. Plant Protection Varieties and Farmer's Rights Authority (PPV &FRA)

The diversified efforts of ICAR-ATARI also included a collaborative programme with PPV&FRA, Ministry of Agriculture, Govt. of India towards establishment of an effective system to protect plant varieties, the rights of farmers and to encourage the development of new varieties of plants, organizing awareness programmes about the PPVFRA act and authority, capacity building for conserving traditional varieties, strengthening farmers' participation in agricultural research and extension and guiding farmers in applying and receiving recognitions. Along with organizing one sensitization workshop for the KVK personnel and farmers by the Institute, 17 KVKs in Zone-I organized awareness cum training programme for the farmers of their districts. Overall, 19 KVKs conducted the 29 training programmes for 3747 KVK personnel, farmers and farm women

10. National Innovations in Climate Resilient Agriculture (NICRA)

- During 2016-17, 865 ha area has been covered under NRM related interventions with 1038 farmers.
- Under crop production module, 2183 demonstrations were carried out on an area of 984.28 ha.
- Under livestock and fisheries module, KVKs covered 3540 dairy animals & 1441 poultry birds. Silage making for availability of green fodder during lean period has been demonstrated by total 147 farmers. Besides, fodder production technologies for maize, oat and sorghum were demonstrated on 136 ha area with 124 farmers.
- Under institutional interventions module, 400 ha area was covered for seed production by 200 farmers. Custom hiring centres provided farm implements to 699 farmers and 667.48 ha area.
- A Total of 242 capacity building programs and 432 extension programmes were organized.

11. Cluster Frontline Demonstrations on Pulses

Under the project "Cluster Frontline Demonstration on Pulses 2016-17", the KVKs were provided ₹7,500/ha for FLDs on pulses. A total of 4536 FLDs were conducted on an area of 1442.1 ha in four states during *kharif*, *rabi* and summer season.

12. Cluster Frontline Demonstration on Oilseeds

Under the project "Cluster Frontline Demonstration on Oilseed" 2016-17, 10.8 ha area was covered in groundnut, 82.5 ha in sesame and 3.60 ha area in sunflower in kharif while 70.7 ha area was covered under rapeseed & mustard in rabi season. During the Rabi season 2016-17, 589.7 ha area was covered under rapeseed & mustard. In summer season 190 FLDs were conducting in an area of 81.09 ha.

13. Pre-Rabi Sammelan

A total of 21311 farmers and 1131 extension functionaries participated in the programmes organized by 49 KVKs of Zone-I. Literature for farmers in the form of booklets, folders, pamphlets etc. was provided to educate the farmers.

14. Tribal Sub-Plan (TSP)

In ICAR-ATARI, Zone-I, 9 KVKs were covered under TSP scheme. During the 2016-17 year, KVKs under the TSP organized 64 OFT and FLD in 1036.7 ha area. A total of 37385 stakeholders attended the extension programmes organized by the KVKs under TSP. A total of 12934 farmers and 679 extension personnel were trained during the reported period. KVKs under TSP produced 1.65 lakh good quality plantlets/ seedlings and 94.62 tonnes of seed for distribution among farmers.

15. Empowerment of farm women for improved quality of life

ICAR-CIWA Bhubaneswar in collaboration with ICAR-ATARI, Zone-I started a project for a period of

two years starting from 2015 till 2017 with project outlay of ₹11.45 lakh. This project was implemented in KVK Patiala selecting four villages namely Bina Heri, Kot Khurd, Hiana Kalan and Hiana Khurd from Nabha Block. A total of 120 farm families were selected for data collection and it was found that 39.16 % were in the age group of 26-33 years, 23.33 % women were educated up to primary level and 82.5 % rural women got married after attaining the age of 18 years while the rest were married before the age of 18 years. Fifty five percent women were found to be of normal weight, 25 % were underweight and 4 % of women were found to be obese. Fourteen skill development programmes were organized during 2016-17 by KVK Patiala on campus as well off-campus for the women for improving their income.

16. Attracting and Retaining Youth in Agriculture (ARYA)

Under ARYA project, KVKs of Gurgaon, Bathinda, Hamirpur and Kathua were selected for providing specific skill based trainings and technical support to rural youth for establishing agriculture related enterprises. During the year, 526 rural youth have been trained and are being supported by the KVKs to establish their own enterprises.

17. Farmer's FIRST programme (FFP)

Under FFP, 11 projects were sanctioned by ICAR to ICAR institutes and SAUs under Zone-I. All 11 projects were implemented including six by ICAR institutes and five by SAUs of the zone.

18. Skill development programme

Under Skill development training programmes, 16 KVKs of Zone-I (Punjab-6, Haryana-4, Himachal Pradesh-3, Jammu & Kashmir-2 and Delhi-1) imparted Skill Development Training (SDT) in agriculture of 200 hrs or more in different job roles for the youths as per norms of ASCI. A total of 33 skill development trainings were conducted by the KVKs in 11 different job roles to 659 rural youths.

19. Integrated Framing System (IFS)

Under IFS, during the year, the ICAR has sanctioned an amount of ₹39.00 lakh to 13 KVKs (Punjab - 4, Haryana - 4, Himachal Pradesh -2, Jammu & Kashmir - 3) and ₹19.50 lakh was released for establishing climate resilient integrated farming system demonstration units at 13 KVKs of this zone.

20. Campaign against residue burning

KVKs of Punjab and Haryana organized mass awareness campaigns aginst residue burning from 16th April to 1st May 2016 and from October 16 to November 11, 2017. Different activities were organized like slogan and essay writing competitions, exposure visits, lectures, field visits, group meetings, *Kisan gostis*, village *sandhya pheris*, demonstrations, etc.

Chapter 1

ABOUT AGRICULTURAL TECHNOLOGY APPLICATION RESEARCH INSTITUTE

A network of Krishi Vigyan Kendras (KVKs) functions as a focal point 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 an aim to assess, refine and demonstrate technologies in agricultural and allied sectors. Agricultural Extension Division, ICAR, to monitor transfer of technology projects, established Zonal Coordination Unit (ZCU) at Ludhiana in 1979. The ZCU was upgraded as Zonal Project Directorate (ZPD) in March, 2009 and again upgraded as Agricultural Technology Application Research Institute (ICAR-ATARI) in July, 2015. Presently, ICAR-ATARI, Zone-I, Ludhiana is engaged in planning, monitoring, reviewing and supporting ICAR initiated technology dissemination centres mainly KVKs of Punjab, Haryana, Delhi, Himachal Pradesh and Jammu & Kashmir. ICAR-Division of Agriculture Extension headed by the Deputy Director General (Agricultural Extension) monitors and reviews the progress of KVKs through its eight ICAR-ATARI located in different parts of the country.

1.1 Genesis

ICAR established 8 ZCUs in September 1979 to monitor and coordinate Lab to Land Programme (LLP) launched on the eve of ICAR's Golden Jubilee celebrations in 1979. ZCU, Zone-I had its office at PAU, Ludhiana. The states of Punjab, Haryana, New Delhi, Himachal Pradesh and Jammu & Kashmir come under the jurisdiction of Zone-1. 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 and Special Project on Oilseeds. During 1990-91, National Pulse Project was started.

The ZCUs were upgraded as ZPDs during the XI Five Year Plan (2009) with the same staffing pattern and infrastructure. The Zonal Coordinators were re-designated as Zonal Project Directors with financial and administrative powers akin to the Directors of other ICAR institutes. In July 2015, ZPDs were upgraded as ICAR-ATARI with added responsibilities and functions including research.

1.2 Mandate

Mandate of the ICAR-ATARI is as follows:

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

1.3 Major Functions

- 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 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.

1.4 Budget

Budget of the institute for the year 2016-17 has been given in Table 1.

Table 1: Head wise budget for the year 2016-17 (₹ in lakh)

RE 2016-17 in r/o ATARI, KVK & DEEs of Zone-I					
Name of the Zone	**Budget Head**	**Other ***	**NEH**	**TSP**	**Total**
ICAR-ATARI, Zone-I	Grant in Aid-Capital	6.88	0.00	0.00	**6.88**
	Grant in Aid-Salary	103.85	0.00	0.00	**103.85**
	Grant in Aid-General	62.64	0.00	0.00	**62.64**
	Total	**173.37**	**0.00**	**0.00**	**173.37**
KVKs + DEEs	Grant in Aid-Capital	843.12	0.00	100.00	**943.12**
	Grant in Aid-Salary	6942.15	0.00	0.00	**6942.15**
	Grant in Aid-General	1711.36	0.00	130.00	**1841.36**
	Total	**9496.63**	**0.00**	**230.00**	**9726.63**
Total	**Grant in Aid-Capital**	850.00	0.00	100.00	**950.00**
	Grant in Aid-Salary	7046.00	0.00	0.00	**7046.00**
	Grant in Aid-General	1774.00	0.00	130.00	**1904.00**
	Total	**9670.00**	**0.00**	**230.00**	**9900.00**

* other than NEH and TSP

Chapter 2

ABOUT KRISHI VIGYAN KENDRAS

KVK, a grass root level scheme has been designed and nurtured by ICAR for the past four decades to address issues related to technology dissemination in agriculture. So far, ICAR has established 680 KVKs across the country under different host organizations like SAUs, ICAR Institutes, Central institutes/Deemed Universities, State Government, Public Sector Undertakings and NGOs.

2.1 Establishment of KVKs

The Education Commission, Govt. of India 1964-66, under the chairmanship of Dr. D.S. Kothari, recommended 'application of science to productive processes, including agriculture' and 'vocationalization of secondary and agricultural education.' These recommendations were subsequently reviewed by the then Planning Commission of India and Inter-Ministerial Committee and further recommended by a Committee set up by ICAR under the Chairmanship of Dr. Mohan Singh Mehta (1973), found the ground of reality in 1974 with the establishment of India's first KVK 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-NDRI. A total of 74 KVKs are functional including four newly established KVKs in the zone as on 31st March, 2017. The details regarding the establishment of KVKs in the zone are given in Annexure I.

2.2 Mandate

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 as such improving their socio-economic conditions. Taking into account the essence behind the establishment of KVKs, its mandate is assessment, refinement and demonstration of technologies/products to cater to the needs of farming community, extension personnel and other stakeholders in the 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.

2.3 Manpower

In order to realize the vision and objectives of KVK system, human resource is essential. Accordingly, staff strength of 16 is sanctioned for the KVKs, which include one Programme Coordinator, six Subject Matter Specialists, three Programme Assistants, two Administrative staff, two Drivers and two Supporting Staff. For the 70 KVKs in the zone, the total sanctioned strength is 1120, out of which, 879 are in position as on 31st March, 2017. The category wise staff of each KVK is detailed in Annexure IV.

2.4 Infrastructure Facilities

To accomplish the mandate of KVKs, they require some basic infrastructural facilities. ICAR has been keen to provide these infrastructural facilities to the KVKs. In the zone, 60 KVKs own their Administrative Building, 51 KVKs have Farmer's hostel, 45 KVKs have staff quarters, 19 KVKs have been provided with the rain water harvesting unit, 26 KVKs have threshing floors and 49 KVKs of the zone have demonstration units. As on 31st March, 2017, 59 KVKs have Jeeps, 56 KVKs

Table 2: State wise summary of infrastructure in KVKs

Infrastructure	Punjab	H.P.	J&K	Delhi	Haryana	Total
Administrative Building	19	10	12	1	18	60
Farmers Hostel	15	12	9	0	15	51
Staff Quarters	14	9	9	0	13	45
Demo Units	14	10	12	0	13	49
Fencing	8	4	7	0	9	28
Rain Water harvesting system	6	7	1	0	5	19
Threshing floor	12	7	2	1	4	26
Farm go-down	6	4	3	1	4	18
IFS system	2	0	0	0	0	2
Implement Shed	1	0	0	0	1	2
Tractor	17	10	10	2	18	57
Jeep	17	10	16	2	14	59
Motor Cycle/ two wheeler	12	10	11	1	11	45
Scooter	7	0	1	1	2	11

have two-wheelers and 57 have tractors. The details of the infrastructural facilities available in the KVKs have been provided in Table 2.

2.5 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. The details of SAC meetings conducted by KVKs during the year have been compiled and furnished in Annexure II. During the year, a total of 5 KVKs have conducted stipulated 2 meetings and 29 KVKs have conducted one meeting.

2.6 Thrust Areas

As per 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 can be grouped in two categories i.e. those of Plain States and Hill States.

Plain States (Punjab, Haryana and Delhi)

- 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 farmwomen
- Value addition in agricultural products
- Supplementary source of income for farmwomen
- Self employment for rural youth
- Use of information and communication technologies.

Hill States (H.P. and J&K)

- 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 farm women.

Chapter 3

ACHIEVEMENTS

3.1 Krishi Vigyan Kendras

Achievements under each of the major activities carried out by the KVKs of Zone-I are described in this section.

3.1.1 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 particular 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. In this, 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 568 technologies (508 related to crops, 44 related to livestock & fisheries and 16 related to others) by conducting 3049 trials. Furthermore, the KVKs refined 54 technologies, including 48 related to crops and six related to livestock & fisheries through 344 trials (Table 3).

3.1.1.1 Technology Assessment

A total of 508 technologies assessed by KVKs under crops by conducting 2627 trials in thematic areas such as Varietal Evaluation (139), Integrated Nutrient Management (95), Integrated Disease Management (60), Integrated Pest Management (52), Integrated Crop Management (44), and Integrated Weed Management (37).Technologies assessed in other thematic areas are Processing & Value Addition (30), Resource Conservation Technology (26), Farm Machinery (12), Integrated Farming System (10), and Storage Techniques (3) as shown in Table 4.

The figures depicted in Table 5 indicate that maximum number of crop related technologies (171) were assessed by KVKs of Punjab through 531trials followed byHaryana (126). KVKs of Jammu & Kashmir assessed 109 technologies by conducting 483 trials whereas KVKs of Himachal Pradesh assessed 95 technologies at 439 locations. The sole KVK of Delhi assessed six technologies at 25 locations.

In case of livestock & fisheries, KVKs assessed 44 technologies on six thematic areas by conducting 310 trials. There were 19 technologies assessed under Nutrition Management followed by Disease Management (16). Technologies assessed in other thematic areas are Evaluation of Breeds (4), Production & Management (3), Feed &Fodder (1) and Value Addition (1) as shown in Table 6.

Table 3: Technology assessment and refinement by the KVKs of Zone-1 during 2016-17 in terms of No. of OFTs and Trials

Particulars	Crops		Livestock & fisheries		Others		Total	
	OFTs	Trials	OFTs	Trials	OFTs	Trials	OFTs	Trials
Assessment	508	2627	44	310	16	112	568	3049
Refinement	48	309	6	35	0	0	54	344
Total	**556**	**2936**	**50**	**345**	**16**	**112**	**622**	**3393**

Table 4: Thematic area wise technologies assessed under crops

Thematic area	No. of KVKs	No. of crops/enterprise	No. of OFTs	No. of Trials
Varietal evaluation	44	44	139	717
Integrated crop management	25	28	44	292
Integrated nutrient management	39	34	95	400
Integrated disease management	37	28	60	268
Integrated pest management	29	25	52	236
Integrated weed management	24	19	37	124
Resource conservation technology	20	10	26	93
Integrated farming systems	5	9	10	72
Farm machinery	9	7	12	40
Processing & value addition	19	18	30	349
Storage techniques	3	3	3	36
Total			**508**	**2627**

Table 5: State wise technologies assessed under crops

The matic areas	No. of Crops	No. of tech.	No. of trials
Punjab	46	171	531
Haryana	33	126	1149
Delhi	5	6	25
Himachal Pradesh	32	96	439
Jammu & Kashmir	34	109	483
Total	**73**	**508**	**2627**

Table 6: 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	4	26	4
Nutrition management	6	19	158	16
Disease management	6	16	101	15
Production and management	1	3	8	1
Feed and fodder	1	1	12	1
Value addition	1	1	5	1
Total	**9**	**44**	**310**	24

State wise details of technologies assessed under livestock & fisheries are given in Table 7. KVKs of Punjab assessed 16 technologies through 60 trials and KVKs of Jammu & Kashmir assessed 18 technologies through 152 trials while six technologies were assessed by KVKs of Himachal Pradesh through 53 trials. Haryana and Delhi assessed two technologies each through 33 and 12 trials, respectively.

As depicted in Table 8, a total of 16 technologies assessed related to various enterprises by conducting112 trials by KVKs of Punjab, Haryana, and Delhi.

3.1.1.2. Technology Refinement

Table 9 reveals that a total of 48 technologies refined through 309 trials under crops by KVKs on seven thematic areas including Integrated Crop Management (10), Integrated Nutrient Management (7), Integrated Disease Management (7), Integrated Pest Management (12), Integrated Weed Management (7) Resource Conservation Technology (4) and Value Addition (1). State wise details of technologies refined are given in Table 10.

In case of livestock & fisheries, KVKs refined six technologies on three thematic areas by conducting 35 trials. There were four technologies refined under Nutrition management and one each in Production & Management and Feed & Fodder area as depicted in Table 11. State wise details of technologies refined under livestock & fisheries are given in Table 12.

Table 7: State wise technologies assessed under livestock & fisheries

Thematic areas	No. of type of animal	No. of technologies	No. of trials
Punjab	5	16	60
Haryana	2	2	33
Delhi	2	2	12
Himachal Pradesh	4	6	53
Jammu & Kashmir	7	18	152
Total	**9**	**44**	**310**

Table 8: Details of technologies assessed in other areas

Thematic areas	No. Crops/ Enterprises	No. of OFTs	No. of trials	No. of KVKs
Punjab				
Apiculture	1	1	10	1
Mushroom Cultivation	1	1	5	1
Small Scale Income Generating Enterprises	3	7	43	7
Drudgery reduction	1	1	1	1
Total (Punjab)	**6**	**10**	**59**	**10**
Haryana				
Mushroom Cultivation	1	1	7	1
Drudgery Reduction	3	4	41	2
Total (Haryana)	**4**	**5**	**48**	**3**
Delhi				
Drudgery Reduction	1	1	5	1
Total (Delhi)	**1**	**1**	**5**	**1**
Total	**8**	**16**	**112**	**14**

Table 9: Thematic area wise technologies refined under crops

Thematic areas	No. of KVKs	No. c rops/ Enterprises	No. of OFTs	No. of trials
Integrated Crop Management	8	9	10	100
Integrated Nutrient Management	6	6	7	36
Integrated Disease Management	7	5	7	43
Integrated Pest Management	7	11	12	76
Integrated Weed Management	6	7	7	28
Resource Conservation technology	4	3	4	21
Processing & value addition	1	1	1	5
Total	**22**	**25**	**48**	**309**

Table 10: State wise technologies refined under crops

Thematic areas	No. of crops	No. of tech.	No. of trials
Punjab	7	9	63
Haryana	9	14	116
Himachal Pradesh	7	8	39
Jammu & Kashmir	14	17	91
Total	**25**	**48**	**309**

Table 11: 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
Production & Management	1	1	7	1
Nutrition Management	4	4	23	4
Feed and Fodder	1	1	5	1
Total	**5**	**6**	**35**	**6**

Table 12: State wise technologies refined under livestock & fisheries

Thematic areas	No. of type of animal	No. of tech.	No. of trials
Punjab	2	3	21
Haryana	1	1	5
Jammu & Kashmir	2	2	9
Total	**5**	**6**	**35**

Location specific technologies

A. Varietal Evaluation

1. Assessment of tomato, capsicum and cucumber cultivars under protected conditions in Himachal Pradesh

KVK Sirmour, KVK Hamirpur and KVK Mandi conducted on farm trials to assess performance of tomato, capsicum and cucumber cultivars under protected conditions. In Sirmour district, Palam Tomato Hybrid and Avtar recorded 7.3 and 6.8 q/250m^2 of yield, respectively as compared to 6.15q/250m^2 from Naveen 2000+ (FP). Palam Tomato Hybrid also recorded least (12.8 %) buckeye rot disease incidence as compared to 30.2 % in Naveen 2000+. KVK Hamirpur conducted on farm trials to evaluate the performance of different hybrids namely Natasha and Indra of capsicum along with hybrid used by the farmers. The data shows that the hybrid Natasha gave highest BC ratio of 7.33 followed by Indra with BC ratio 5.73. Both hybrids performed better over the hybrid grown by the farmers and were satisfied with their performance. Among the performance of cucumber hybrids in Mandi district, Hilton recorded highest yield (28.37q/250m^2) provided a net returns of Rs. 59515 followed by Kian under farmers practice.

2. Assessing the performance of newly introduced nectarines (*Prunus persica* Var. *nucipersica)* in Himachal Pradesh

Stone fruits especially peach, plum and apricot had once brought revolution and improved the socio-economic conditions of people of Solan district. But of late, the area, production and productivity has slowly declined due to monoculture of varieties apart from other reasons. Hence, it was felt necessary to introduce nectarines for obtaining better economic returns. Therefore KVK, Solan has conducted an On Farm Trial on performance of newly introduced nectarines at three locations in the district. Results of the trial revealed that, among the varieties tested, the Yield of May Fire was obtained in the last week of May, 2016 whereas, that of Snow Queen in 2nd week of June, 2016 which were earlier than the traditional cultivar, July Elberta (end of 1st week of July). Maximum yield (130.91 q/ha) was obtained in Mayfire but had a minimum average fruit weight (50.56g) which can be overcome by thinning methods. However, Snow Queen recorded better fruit weight (111.73 g) than May Fire. Better TSS was also recorded in Snow Queen (12^{0}Brix) as compared to May Fire(9.4^{0}Brix). The farmers are very impressed with the size of the fruits and earliness in fruiting that can possibly fetch a better price in the market.

3. Assessing the performance of early maturing scented cultivars of paddy in Jammu & Kashmir

Paddy is an important crop grown in Jammu and Kathua district of Jammu & Kashmir. In Kathua district it is grown in an area of 28872 ha with production of 967219 quintals. In Jammu district, the area under paddy is about 42000 ha out of which 34000 ha area is under basmati varieties. The cultivation of traditional cultivars such as Pusa 1121, Jaya and Sharbati takes long time to mature and thus results in delaying of wheat sowing. KVKs of Jammu & Kashmir particularly KVK Jammu and KVK Kathua conducted on farm trials and assessed the performance of early maturing scented cultivars of paddy in the region.

In Kathua district, the results of OFT revealed that Pusa-1612 recorded highest yield (4570 kg/ha), with B:C ratio (1:2.7). Pusa-1612 have (18.9/hill) no. of effective tillers per hill with 15-20 days early maturity as compared to Pusa -1121 (farmers practice). Pusa -1509 also provided more yield (4290kg/ha) with 20-25 days earliness in maturity over farmers practice. In Jammu district, Pusa 1612 also recorded maximum 13.6 % increase in grain yield over farmer's practice with 10-15 days earlier maturity. Pusa-1509 also provided 4.5% increase in grain yield over farmer's practice with 20-23 days earlier maturity. Due to early maturity of The cultivation of these varieties has also offered the scope for taking up wheat, berseem and in some areas potato crop and thus increased the avenues for farmers. So, it is recommended that these early maturing new scented varieties should be up scaled through FLDs in the region.

4. Assessment of high yielding wheat varieties in Kathua and Jammu districts of Jammu & Kashmir

Wheat is an important rabi season cereal crop grown in Jammu and Kashmir state. In recent years, farmers of the state were experiencing severe losses due to low yield in prevalent wheat varieties. Moreover, the prevalent variety (HD-2967) has become prone to yellow rust, leading to decline in the overall grain yield during the past few years. Henceforth, KVK Kathua and

Jammu assessed the performance of new high yielding varieties through on farm trials conducted in their respective districts.

In Kathua district, HD 3086 recorded maximum yield (44.9q/ha) as compared to farmers practice (HD 2967). Wheat variety WH-1105 also provided grain yield of 43.8q/ha which was significantly superior over farmer's practice. Furthermore, both the varieties were found highly resistant to yellow rust. Similar trend was also observed in Jammu district where both these varieties recorded 20.4 % and 10.8 % increase in grain yield, respectively as compared to HD 2967 (farmers' practice). Both the varieties (HD-3086 & WH 1105) have not shown any symptom of yellow rust during the season whereas HD-2967 got affected with yellow rust disease.

5. Assessing the performance of high yielding varieties of oats to combat fodder scarcity in Jammu & Kashmir

Animal rearing is the integral part for the livelihood of the farmers of Jammu & Kashmir state. However, availability of fodder is a major problem for the people of this area and cultivation of Oats has gained popularity in this area in the last few years. The low yield of green fodder is a matter of concern due to cultivation of old varieties. Hence, KVK Poonch and Nyoma conducted on farm trials to evaluate the production potential of new varieties in the region.

In Poonch district of Jammu & Kashmir, the results of the trial indicated that oat variety Palampur-1 out yielded all other varieties and gave 40.7 % higher green fodder yield over farmer's variety (Kent). Palampur-1 remained greener for longer duration as compared to Kent. The results of OFT conducted by KVK Nyoma revealed that Shalimar Oat-1 followed by Sabzar gave higher fresh straw yield as well as dry straw yield as compared to the farmer's practice. Shalimar Oat-1 recorded straw yield to the tune of 105.25 q/ha followed by 99.74 q/ha in Sabzar and 66.15 q/ha in Farmer's practice, respectively.

6. Assessing the performance of new wheat varieties under timely sown conditions in Panipat and Rewari districts of Haryana

The Rice-Wheat cropping system (RWCS) is being practiced over 10 million ha in the Indo Gangetic Plains of India. The Rice –Wheat cropping system is still more dominant in District Panipat. The net sown area in the district is about 100000 ha. The wheat crop occupies from 82000-85000 ha in different years. Yellow rust has become a problem in wheat crop and therefore rust resistant varieties with good yield potential are required. KVK, Panipat conducted on farm trials to assess the performance of new promising yellow rust resistant wheat varieties WH 1105, HD 3086 & DBW 88 under the agro ecological condition of Panipat district of Haryana. The data of OFT revealed that wheat variety HD 2967 was found superior than other varieties in terms of yield and returns. No incidence of yellow rust was observed this year at any of the locations. In Rewari district, wheat crop is grown in about 40.00 % area of total cultivated area. KVK Rewari also conducted on farm trial to assess the performance of high yield varieties of wheat. For this, WH-1105, WH-1080 and HD-2967 (Farmers practice) were evaluated through the OFT. The data of OFT revealed that the performance of HD-2967 was better than other varieties.

B. Integrated Crop Management

7. Assessment of different seed rates of early pea crop for enhanced yield in Punjab

Pea is an important vegetable crop of Amritsar district. This crop is sown early in the month of September and late sown wheat is taken by the farmers in December. The farmers are using higher seed rate (200-250 kg)/ha of early pea varieties, whereas the PAU recommendation is 112.5 kg/ha. An OFT was therefore conducted to assess the optimum seed rate for higher yields and returns. The results of OFT revealed that seed rate of 137.5 kg seed/ha gave higher yield of 91.00 q/ha as compared to farmer practice. The practice not only saved the precious seed resource but also resulted in higher returns and profits.

8. Assessment of planting methods for mortality, curd weight and yield in early cauliflower in Punjab

KVK Ludhiana conducted on farm trial impact of on planting methods on mortality, curd weight and yield in early cauliflower to find out optimum planting method for early cauliflower. The results showed that transplanting of cauliflower on ridges 60 cm apart at 20 cm plant to plant spacing recorded highest average curd weight (416 gm), marketable yield (141.4 q/ha) and least mortality of seedlings after transplanting (20.5 %) compared to transplanting on flat beds at 45x30 cm spacing.

9. Assessment of sowing times of okra for seed yield and yellow vein mosaic virus incidence in Punjab

Sowing time of okra for seed production in Punjab is 2nd fortnight of June both under Farmers' practice and as per university recommendation. The seed crop of okra sown during 2nd fortnight of June generally matures in 90-100 days and the flowering starts 40-45 DAS, which coincides with last week of July. This reproductive flush has to endure the attack of jassid and whitefly due to prevalence of cloudy weather conditions at that time, resulting in high incidence of yellow vein mosaic virus and drastic reduction in seed yield accounting for substantial losses to the seed growers. KVK Faridkot henceforth conducted on farm trial to find out the optimum date for okra sowing for high yields and minimum YVMV incidence. The highest seed yield was observed in crop sown on May 1 (1245 kg/ha), followed by crop sown on May 15 (1203 kg/ha) but further delay in sowing to June 15 through May 30 resulted in progressive and significant reduction in seed yield of okra. The crop sown on May 30 gave seed yield of 805 kg/ha and that sown on June 15 recorded meager seed yield of 468 kg/ha. The higher seed yield under earlier sowing can be ascribed to less incidence of YVMV and plant hopper, which was higher under late sown conditions. So, the ideal time for sowing of okra for seed crop is first fortnight of May.

10. Assessment of different spacing for yield in brinjal in Jammu & Kashmir

Brinjal is an important vegetable crop grown by the farmers in Reasi district of Jammu and Kashmir. Farmers of the district are lacking the awareness on the spacing of the brinjal crop due to which the yield in brinjal is very less. The odd even sowing of brinjal is causing low yield in brinjal causing huge loss to the farmers. Hence, KVK Reasi conducted an on farm trial to assess the optimum spacing for higher yield and better returns in brinjal. The results revealed that highest brinjal yield of 155 q/ha were recorded with spacing of 90x60cm, followed by 140 q/ha in case of 60x45cm spacing. The benefit cost ratio was also found higher former spacing, hence it is inferred that this practice need populariztion through front line demonstrations for large scale adoption in brinjal.

11. Assessing performance of scented paddy (Cv. Pusa 1509 & HPR 2612) under different transplanting dates after the harvest of summer tomato in Balh valley of Himachal Pradesh

KVK Mandi conducted on farm trial to assess the effect of different transplanting dates on yield components of scented paddy (Cv. HPR 2612 & Pusa 1509) after the harvest of summer tomato in Balh valley. The results of the OFT revealed that HPR 2612 transplanted on 20 July recorded highest yield (43.75 q/ha) and matured early (95 days after transplanting) as compared to HPR 2612 transplanted on 25th July took 99 days to mature after transplanting. Under farmer's practice where transplanting of paddy hybrid Dhanya 834 was done on 15-20th July took 102 days to mature after transplanting. Likewise, Pusa 1509 transplanted on 20 July recorded highest yield (41.25 q/ha) and matured early (95 days after transplanting) as compared to other transplanting dates. This technology not only lead to an additional crop during the fallow period but also lead to a profitable cropping sequence with less disease occurrence in the new crop rotation involving paddy and vegetable crops. It is therefore recommended to upscale the technology through FLDs among the farmers after the harvest of summer tomato in the region.

12. Enhancement of fruit set in apple in areas experiencing bad weather during flowering in Himachal Pradesh

Low fruit set in apple was observed as major hindrance for harnessing optimum and quality apple yield in the areas experiencing bad weather during flowering. KVK Chamba, therefore conducted on farm trial to assess the effect of placement of bouquets + bee hives and placement of bouquets + beehives + boric acid @ 0.1%. Treatment comprising placement of bouquets + beehives + application of 0.1% boric acid, resulted in maximum fruit set and yield. Significantly higher yield of 3790 kg per hectare was observed with BC ratio of 3.25 following this practice, hence the practice need large scale adoption through FLDs.

Likewise, in district Shimla mulcing practices were assessed to check fruit drop and improve fruit size in apple. The OFT was conducted at five locations comprising three treatment *viz*. black polythene mulch, grass mulch and un mulched control. In all the locations

under study fruit drop was comparatively less, fruit yield and quality was improved due to more availability of nutrients and soil moisture following mulching. Black polythene mulching resulted in maximum fruit yield of 22.6 t/ha followed by grass mulch (18.2 t/ha).

13. Assessment of different management modules pre harvest fruit drop and yield of Kinnow in Haryana

Kinnow is an important citrus crop grown in 250 ha in district Rewari and a source of livelihood for farmers of national capital region. The main problem in the region is pre harvest fruit drop in Kinnow due to insect attack and Zn deficiency.

KVK Rampura, Rewari conducted on farm trial on integrated management of pre harvest fruit drop at three locations in the district. Results of the OFT revealed that two foliar spray of 20 ppm NAA (12 g), 0.5 % ZnSo4 (3 kg), bavistin (600 g) and lime (1.5 kg) in 550 liters of water per acre in the month of July and September + three foliar spray of Rogor 0.25% (dimethoate 30 EC) in the month of August, September and October were found effective in controlling pre harvest fruit drop and enhancing the fruit yield. This practice resulted in minimum pre harvest fruit drop up to 5 per cent, produced highest marketable yield 35 t/ha and highest B:C ratio of 8.75 compared to other treatments evaluated.

C. Integrated Nutrient Management

14. Assessing the effect foliar application of water soluble fertilizers on productivity of wheat in Punjab

KVK Barnala, KVK Mansa and KVK Sangrur conducted on farm trials to assess the effect of foliar application of water soluble fertilizers on productivity of wheat in their respective districts. In Barnala district, results of the trials revealed that foliar application of N:P:K (19:19:19) @ 1% at maximum tillering and two spray of (K) multi potassium (13:0:45) @1.0 % after heading at 7-10 days interval recorded 7.09 % increase in average grain yield with higher benefit cost ratio as compared to farmers' practice. In Mansa district, KVK Mansa assessed the effect of foliar application of manganese sulphate ($MnSO_4$) on wheat crop grown on light textured soils under rice-wheat cropping system. The results revealed that four sprays of 0.5% $MnSO_4$ resulted in 28.8% increase in wheat grain yield with productivity of 50.5 q/ ha, compared with farmer's practice. It was also observed that four foliar sprays of 0.5% $MnSO_4$ resulted in complete amelioration of Mn deficiency and disappearance of deficiency symptoms on wheat crop. In Sangrur district, on farm trail on efficient management of manganese deficiency in wheat was executed by KVK Sangrur. The results indicated that manganese deficiency in wheat could be managed by doing one spray of chelated $MnSO_4$ (0.1%) after 1st irrigation.

15. Management of phosphorus in potato in Punjab

KVK Amritsar and Patiala conducted on farm trials to evaluate the effect of different levels of phosphorus on yield of Potato. In Amritsar district, results revealed that application of 362.5 kg Urea, 275 kg DAP and100 kg MOP/ha gave the highest yield of Potato (352.00 q/ha) along with the maximum B:C ratio (1.43:1) compared to the Farmers' practice (351.50 q/ha). Results of the trial conducted by KVK Patiala revealed that application of 50 kg/ha phosphorus through SSP along with 10 ton/ha farm yard manure resulted in higher yield over the farmer's practice.

16. Assessing the effect of potash, sulphur and consortium (biofertilizer) on yield and quality parameters in onion in Punjab

KVK Jalandhar and KVK Ropar conducted of farm trials to assess the effect of potash, sulphur and consortium (biofertilizer) on productivity of onion. In Jalandhar district, among the methods of planting, flat planting is recommended method of planting by Punjab Agricultural University Ludhiana but farmers of district Jalandhar mostly practiced the bed planting as sole crop or intercrop with other vegetable crops. They claimed that comparatively larger size bulbs are obtained with bed planting which fetch better profit in market. Similarly, storage life of onion is also important factor to sell the onion in off season for better profit market. Punjab soils are rich in potassium and its application is recommended only on soil test basis in most of field crops. Similarly, deficiency of sulphur is observed in light texture soils. But it has been observed that majority of farmers are not aware about balance use of potassium and sulphur along with nitrogen and phosphorus in onion. However, this on farm trial was undertaken by

KVK Jalandhar to find out the effect of potash and sulfur application along with recommended doses of nitrogen and phosphorus for higher yield and storability of onion under different planting methods in onion. It was found that application of potash (50Kg/ ha) and sulphur (4 kg/ha) with recommended dose of Nitrogen (100Kg/ha) and phosphorus (50kg/ha) provided higher yield (339.6 q/ha. The other quality characters like sprouting (2.38 %) and rooting (12.18 %) and physiological weight loss at 30 and 90 days of harvest (10.22 and 20.50 %) respectively was found better in this treatment.

In Ropar district, where KVK Ropar assessed the effect of application of consortium (biofertilizer) in onion crop, it was revealed that highest yield of 375 q/ha was obtained in the treatment where consortium @10 kg was applied in addition to 50 ton FYM, NPK application @100:50:50 kg/ha which was followed by 350 q/ha where N was applied @75kg/ha. Under the farmers practice yield of 275 q/ha was obtained where only FYM @10 ton, NPK @100:50:50 kg/ha were applied and no consortium is applied.

17. Effect of postharvest application of urea on fruiting and yield of litchi cv. Dehradun

Litchi is an important fruit crop grown in the sub mountainous zone of Punjab. It is cultivated in an area of about 1900 hectares and every year area under its cultivation is increasing. Punjab Agricultural University has recommended 1600 g of urea, half of which should be applied in the middle of February and the other half in the middle of April after fruit set. A feedback was given by the many farmers that if urea should be applied after fruit harvesting (in July) results in increase fruit yield in the coming season. In order to ascertain the facts KVK Gurdaspur conducted OFT on three locations in the district. Results of the trials revealed that Urea 1600g + 1000 g/plant (after harvesting) resulted in significantly improved yield than recommended practice in 20 years old plants. This treatment resulted in maximum fruit yield (81.38 kg/plant) with BC ratio of 8.04.

18. Integrated nutrient management in apple for increasing productivity of apple in Jammu and Kashmir

Apple is the most important temperate fruit crop of India mostly grown in Jammu and Kashmir. Imbalanced use of fertilizer application in apple is one of the main reasons for low productivity in the region. Imbalanced nutrition in apple causes low fruit set and higher fruit drop resulting in to poor yield. Henceforth, KVKs of Jammu & Kashmir viz. KVK Pulwama, Poonch, and Gandarbal conducted on farm trials on Integrated Nutrient Management in apple for increasing productivity of apple in their respective districts.

Poor fruit set in apple was a major problem experienced by the farmers in the jurisdiction of KVK Pulwama. Accordingly, on farm trial was conducted in the district by KVK and results revealed that significant increase in fruit set of 77% with simultaneous increase in fruit retention of 63% was observed with the application of two sprays at pink bud stage, first with Paushak @ 2ml/l and second with Boron @1g/l followed by third spray again with Paushak @ 2ml/l at petal fall stage. The results of on farm trials conducted by KVK Poonch indicated that soil application of balanced dose of manures and fertilizers at right time improved the fruit quality of apple and also increased yield by 5% over farmers practice. In Gandarbal district, application of K_2SO_4 @ 0.4% + Boron @ 0.1%+ $ZnSO_4$ @0.4% significantly reduced the fruit drop by 32.56%. KVK Ganderbal also assessed the effect of potassium in apple crop and results of the trails revealed that the highest yield of 208.29 kg/tree was recorded with application of MoP @3500g in four split doses.

19. Integrated nutrient management for enhancing productivity of wheat in Haryana

KVKs of Haryana (Rohtak and Gurugram) conducted on farm trials on integrated nutrient management for enhancing productivity of wheat. In Rohtak district, Farmers generally use nitrogenous fertilizers (urea) or nitrogenous and complex fertilizers (mostly urea and DAP), ignoring the application of potash and other deficient nutrients. In order to assess the effect of balanced fertilizer application on wheat yield the KVK Rohtak conducted the OFT. The results of OFTs revealed that fertilizer application on soil test basis provided highest yield (60.5 q/ha) as compared to recommended doses of chemical fertilizers (59.0 q/ha) and without K application (56.5 q/ha). In Gurugram district, the results of OFT indicated that application of FYM @10 ton/ ha along with bio-fertilizer (PSB & Azotobactor) and 75% NPK on soil test basis was found effective in improvement of soil organic carbon and

enhancing crop productivity. This treatment (FYM+bio-fertilizer+NPK) resulted highest grain yield 64.2q/ha and straw yield (101 q/ha).

20. Enhancing fruit yield and quality of apple through application of Potassium and boron in Himachal Pradesh

KVK Shimla conducted on farm trials to assess the effect of application of Potassium and boron on productivity and quality of the apple. The results of the trials revealed that application of K_2O @700g per tree along with two foliar spray of KNO_3 @ 0.5 % after fruit set and one month later was found best for getting good fruit yield of quality fruits, especially in low and mid hill area of the district. For managing the problem of fruit cracking, internal and external corking in apple, the results of the OFT revealed that first application of boric acid @ 200 gram in 200 litres of water at pink bud stage and second application in the month of May was found best in respect of fruit yield and quality of apple in the district.

21. Integrated nutrient management through bio-fertilizers application in garden pea in high hill dry temperate zone of Himachal Pradesh

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. The unscientific and indiscriminate use of fertilizer in garden has led to lower yields as well as deterioration of soil health in the tribal district. In order to increase the crop yields and improve soil health, KVK Lahaul & Spiti at Kukumseri conducted on farm trial on Integrated nutrient management along with bio-fertilizers [rhizobium and phosphorus solubilizing bacteria (PSB)] on garden Pea at seven locations in the district. Results of the trials revealed that 100% NPK (20:60:30) + 20t/ha FYM + seed treatment with Rhizobium + soil application of PSB gave the best results in term of green pod yield. The highest yield of 100.1 q/ha of garden pea was obtained when 100% NPK (20:60:30) + 20t/ha FYM + seed treatment with Rhizobium + soil application of PSB were applied to the crop. The yield was 15 % higher over the farmers' practice (NPK @35:32:16).

22. Integrated Nutrient management in black-gram in Hamirpur district of Himachal Pradesh

From last few years' farmers of the Hamirpur district are reluctant to cultivate pulses in their fields due to low crop yield. The non adoption of proper cultivation practices and imbalanced nutrient management is major reason responsible for low yield. Keeping this fact into consideration, KVK Hamirpur conducted OFTs on Integrated Nutrient management in blackgram to assess the effect of application of fertilizers along with seed inoculation with bio-fertilizers. The results revealed that seed inoculation with bio-fertilizer (PSB + Rhizobium @100gm/10kg) + 100% NPK @20:40:20kg/ha resulted in to highest crop yield of 8.1 q/ha *i.e.* 65.3 % higher as compared to farmers practice (4.9 q/ha).

D. Resource Conservation

23. Assessment of modified system of rice intensification (SRI) for higher productivity in Anantnag and Bandipora districts of Jammu & Kashmir

Throughout the district Anantnag farmers cultivate paddy without any consideration to optimum spacing, plant density and scientific irrigation management. These practices result in poor yield, low quality of produce and high disease incidence. An OFT on modified system of rice intensification for higher productivity was conducted by KVK Anantnag. It was found that the crop performed better under SRI technique as compared to farmers practice w.r.t number of effective tillers/hill (21), productivity (69 q/ha) and harvest index (0.47) compared to corresponding value of 15, 61 and 0.32 in farmers practice. Farmer obtained additional net return of Rs. 14112/ha under SRI technique.

Likewise, KVK Bandipora conducted an OFT to assess the effect of age and number of seedlings per hill on yield of paddy through SRI system by transplanting. The results revealed that 1 seedling of 18 days old and 2 seedlings of 18 days old recorded an increase of 23.88 per cent and 31.34 per cent, respectively.

24. Assessment of decomposition techniques for slaughter house waste management in Jammu & Kashmir

KVK Kargil conducted on farm trial to assess decomposition techniques for slaughter house waste

management and it was observed that effective microbe (EM) technology in addition to missing of saw dust reduced decomposition period by 3 months. The decomposition technique proved efficient for rapid decomposition, stink management and ultimately resource conservation.

25. Comparative evaluation of different wheat sowing techniques in Haryana

The results of OFT conducted by KVK Jind to assess the performance of wheat crop sown by broadcasting/ rotavator or zero tillage or happy seeder drill in paddy-wheat cropping system revealed that wheat sown by zero tillage or happy seeder gave increased grain yield by 3-9% and saving in irrigation water by 10-15% over broadcasted or rotavator sown crop. In district Jhajjar, sowing with happy seeder and ZT gave 4.4 and 0.6 % higher yield than farmer's practice, respectively. Sowing with happy seeder gave higher yield. Method and result demonstration, farmer's training, field visits and group meeting were organized and farmers showed positive response for of tested technology.

26. Realizing higher profit through intercropping of cucumber in Punjab

Low tunnel technology cultivation is one of the profitable enterprises for innovative farmers of the Punjab. During winter season, heavy frost cause severe losses to the vegetable growers. This technology has been proved very beneficial by getting early crop of capsicum and cucumber. But it was observed that farmers were practicing intercropping of cucumber with capsicum under LTT to get more returns at same installation cost of structure. OFT was planned at KVK, Sangrur to analyse the returns by intercropping of cucumber with sponge gourd. It was observed that although intercropping of cucumber with capsicum gave higher profit (Rs.6,70,000) but B:C ratio (3.65:1) was better in intercropping of cucumber with sponge gourd.

27. Assessment of wheat sowing methods after paddy for resource conservation in Punjab

There is great problem for managing paddy straw without burning it. It can be possible either by removing it from fields or by incorporating it in the farm itself. Lifting of straw from fields is laborious and costly affair. So the option left is incorporation of straw in the fields. The problem is more severe where farmers has to grow vegetable crops as they need a very well prepared land so in order to assess the effect of incorporation of straw on potato yield, KVK Kapurthala conducted OFTs in the niche area of crop. The straw was incorporated with the help of reversible plough after chopping it with mulcher. The control treatment was with the crop grown in fields of prepared after burning the straw. It was observed that there is 2-3 % increase in the yield of crop where straw was incorporated. Farmers also felt that the quality of crop was better which fetches higher price in market.

KVK Moga on the other hand, conducted on farm trial and assessed performance of sowing of wheat through PAU Happy Seeder (press wheel) machine after operating the stubble shaver only and sowing of wheat through happy seeder machine in standing stubble only in comparison to farmer practice (paddy residue burning). It was observed that yield obtained from Happy seeder/PAU Happy Seeder technology was at par as compared to farmer practice (wheat sown after burning of crop residue).

KVK Faridkot also conducted on farm trial to assess the various methods of sowing in wheat and the results showed that zero tillage sowing accounted for the highest yield of 4925 kg/ha followed by roto drill (4750 kg/ha) and conventional (4550 kg/ha). Zero tiilage in wheat helped save ₹2000/ha. Besides, it is a good method to check environmental pollution owing to stubble burning. Roto drill helps save time and improves soil health. Further, it improves water holding capacity of soil due to incorporation of crop residue.

28. Assessment of cost and resource effective method of paddy cultivation in Punjab

Labour shortage, higher labour cost and luxurious water consumption during paddy cultivation is a big problem. To solve this problem to some extent PAU, Ludhiana has developed direct seeded rice technology. KVK Faridkot conducted on farm trial to assess the cost and resource effective method of paddy cultivation. Results showed that direct seeding was beneficial in terms of duration (took 7-8 days less for maturity) and water productivity (saved 4-5 irrigations). In addition, there was labour saving of ₹4000/ha. Though the yields obtained were at par among transplanted and direct seeded rice, yet the farmer is getting saving in labour and water. The yield under conventional paddy cultivation was 7050 kg/ha whereas, under direct seeding irrigated condition, yield was 7170 kg/ha and under direct

seeding in dry field followed by irrigation, it was 7120 kg/ha. Due to overlying facts, this technology is picking up among the farmers of the district.

E. Farm Machinery

29. Assessment of sowing methods for resource conservation in Haryana

During the recent years, the farmers of Haryana are experiencing the problem of residue management and delay sowing of wheat. Dominance of Rice-wheat cropping system has led to decreasing fertility, depletion of water table and enhancement of cost of cultivation. Resource conservation technologies are therefore need of the hour to save the precious resources. Hence OFTs were conducted on different methods of sowing of wheat in Kurukshetra and Rewari districts. At Kurukshetra, the data of OFTs revealed that wheat fields sown with Happy Seeder gave 47.2 qt./ha than conventional sowing (43.8 qt./ha) thus saving precious resources, increasing yield as well as timely sowing of the crop.

High cost of cultivation of wheat (6-7 ploughings) after harvesting of kharif crops necessitated the use of zero-tillage- seed- cum- fertilizer drill machine is an alternate for reducing the cost of land preparation. KVK Rewari therefore conducted on farm trial (OFT) to assess the zero tillage machine to reduce the cost of cultivation as well as weed control. Data revealed that the additional net returns of ₹7122 per ha over farmers practice was obtained with B: C ratio of 3.58. The land preparation cost was reduced to ₹7500/- per ha and the average yield obtained was 55.5 q/ha compared to 55.0 qt/ ha of farmers practices.

30. Comparative performance of wheat crop sown with different methods under straw management conditions in Punjab

The burning of paddy straw is common and easy method chosen by farmers for disposing paddy straw. The burning of straw causes environmental pollution leading to many diseases. In addition, burning also decreases the efficiency of some herbicides used for controlling weeds in wheat crop and deteriorates the soil health, micro flora and fauna. In view of the losses associated with the burning of paddy residue lot of efforts are needed to find ways and means to efficiently utilize the surplus paddy straw. Keeping this in view, on farm trials (OFTs) of wheat sowing with different methods was conducted by KVK Ludhiana and Hoshiarpur for the management of paddy straw. It was observed that the crop yield with happy seeder after stubble shaver was highest (52.5 q/ha) as compared to wheat sowing with roto-seeder after paddy straw chopper (51.3 q/ha) and wheat sowing with conventional seed cum fertilizer drill (50.5 q/ha) in Ludhiana. Moreover it saved about 17 % water in case of Happy seeder as compared to other two methods. In addition it saves about 60% expenditure in farm operations as compared to wheat sowing with conventional drill and roto seeder after paddy straw chopper respectively.

In district Hoshiarpur, the results of OFTs revealed that the wheat sown with roto till drill in chopped paddy residue saves the cost of cultivation but the yield of wheat sown after incorporation of chopped paddy residue is highest. The grain yield was highest (56.50 q/ha) in wheat sown with zero till drill after incorporation of chopped paddy residue followed by wheat sown with zero till drill after incorporation of chopped paddy residue (56.45 q/ha) and lowest (56.38 q/ha) in wheat sown with seed cum fertilizer drill after burning of paddy residue.

31. Comparative performance of different methods of carrot sowing in Punjab

In broadcasting method of carrot sowing, there is uneven germination of seeds and uneven size of carrot roots and moreover more seed is required in broadcasting method of sowing. So, KVK Hoshiarpur assessed different methods of sowing of carrot i.e. broadcasting method, mechanical planting and ridge method of sowing during 2016-17. In mechanical planting of carrot, tractor operated inclined plate planter was used for direct planting of carrot seeds on beds at 67.5 cm spacing and the machine planted 4 rows on each bed with 10 cm spacing between rows and 8 cm between plants. The results revealed that the highest seed rate of 7.0-8.0 kg was used by broadcasting method, followed by 4.0-5.0 kg by ridge method of sowing, and lowest seed rate of 2.5-3.0 kg was used by mechanical planter. The maximum root weight of 67.5 t/ha was obtained in mechanical planting of carrots while the minimum root weight of 48 t/ha was obtained by broadcasting method of sowing of carrots. Farmers were satisfied with mechanical planting of carrots as no thinning is required in the mechanical planting of carrots.

F. Integrated Disease Management

32. Management of foot rot in basmati in Punjab

Paddy in general and basmati paddy in particular is an important crop grown by the farmers Punjab during *kharif* season. The basmati grown in Amritsar and Jalandhar districts is famous for its aroma and quality and thus have high export potential. However, foot rot is a serious disease causing economic losses to the farmers. This disease mainly spread from the seed. Farmers usually did not treat the seed before sowing and before transplanting of nursery in the field. Hence, KVK Amritsar and KVK Jalandhar conducted on farm trials to assess the effect of seed treatment on disease incidence and yield of basmati paddy. The results at Amritsar revealed that least disease incidence (4 %) and highest yield (50.2 q/ha) was recorded following seed treatment with bavistin +seedling dip in bavistin solution (0.2%). The benefit cost ratio was also found higher (1.89) following this practice.

Results of the trial at Jalandhar revealed that the lowest incidence of foot rot disease (0.031%), maximum yield (29.6 q/ha) and highest BC ratio (1.31) were observed following seed treatment with bavistin 50 WP @ 0.2% (20 g) + streptocycline @ 0.01% (1 g) dissolved in 10 liters of water for 12 h + seedling root dip with bavistin 50 WP (0.2%) for 6 hours before transplanting. This was closely followed by seed treatment with bavistin 50 WP @ 0.05% (5 g) + streptocycline @ 0.01% (1 g) dissolved in 10 liters of water for 12 h and smear the seeds with talc formulation of *Trichoderma harzianum* @ 15 g/kg of seed immediately before sowing in nursery and seedling root dip for 6 hours with *Trichoderma harzianum* @ 15 g/litre of water before transplanting with disease incidence of 0.039 %, yield (29.1 q/ha) and BC ratio (1.30) compared to foot rot disease incidence, yield and BC ratio of 0.128, 28.1 q/ha and 1.40, respectively.It is therefore suggested that the treatments should be popularized for the effective management of this disease.

33. Assessment of different modules for management of black scurf disease of potato in Punjab

Potato is an important cash crop and a source of livelihood in Punjab in general and many parts of district Jalandhar in particular. The incidence of black scurf is a serious threat affecting the quality and quantity of potato. Farmers are resorting to indiscriminate usage of different type of chemicals resulting in high residues in the marketable produce. In order to assess the efficacy of safer modules, KVK Jalandhar conducted on farm trial for the management of black surf disease through treatment of tubers at three locations in the district. Results of the trials revealed that minimum disease incidence (0.75%) resulted following tuber dip with monceren @ 2.5 ml/ litre for 10 minutes. Also there wa evident impact on quality of tubers, however there was insignificant effect on potato yield. Disease incidence following spray on tuber with monceren @ 2.5 ml/L and with azoxystrobin @ 2.5 ml/L was 1.30 and 1.00 per cent, respectively.

34. Assessment of different management modules for pre harvest fruit drop and yield of Kinnow in Punjab

Kinnow is an important citrus crop in some parts of Punjab. In district Ludhiana also, it is grown in substantial area where pre harvest fruit drop is a major concern. KVK Ludhiana therefore conducted an on farm trial for assessment of management modules for pre harvest fruit drop. Results of the trial revealed that both the treatments i.e. treatment comprising foliar application of 2,4-D sodium salt @ 5 g /acre (horticulture grade) + bavistin 50 WP (500g) or Ziram 27 SC (1250 ml) + 2,4-D sodium salt (5 g) or Propicononazole 25 EC (500 ml) +2,4-D (5 g) in mid April, August and September and two additional sprays of Ziram 27SC (1250 ml) or propiconazole 25 EC (500 ml) or bavistin 50 WP (500 g) in end July and September in 500 liters of water) and treatment comprising foliar application of salicylic acid (10 mg/ liter of water) + potassium nitrate (1%) + zinc sulphate (0.25 %) in the month of June, August and October were at par in reducing the fruit drop percentage while it was significantly higher compared to farmers practice. The fruit yield per plant was maximum following former treatment but closely followed by later treatment.

35. Assessment of management modules for disease management in apple in Jammu & Kashmir

Due to vast number of pesticides in the market and their use of farmers on the basis of recommendation of pesticide dealers, the cultivation of apple is not fetching the economic returns as per its potential. The problems of disease prevalence and pest infestation decrease the yield as well quality of apple. In order to assess management modules, OFTs were conducted by KVK

Anantnag. KVK Pulwama and KVK Bandipora on management of diseases in apple. It was found from the study that disease incidence (apple scab and alternaria) on fruits and leaves was significantly lower as compared to farmers practice in Anantnag following university recommended spray schedule, besides 37.7 % increase in grade A apples with 27% increase in net returns. At Pulwama & Bandipora, the data of OFTs revealed that treatment combination of scrapping + carbendazim 50WP(@1 part) + copper oxychloride 50WP (@2parts) + linseed oil (@ 9 parts) as per SKUAST-K recommendations applied at three months interval was effective in reducing canker size as compared to check, besides increasing the callus formation by 11.79%.

36. Management of Bakanae disease in paddy through seed treatment in Jammu & Kashmir

Paddy is the important cereal crop grown by the farmers in Kathua District during *kharif* season. The introduction of basmati varieties such as Pusa-1121 and others in the district have resulted in occurrence of many diseases in general and Bakanae (foot rot) disease in particular. Bakanae is a serious disease and causing huge economic losses every year to the crop. Therefore, KVK-Kathua conducted on farm trials at farmer's field to assess the efficacy of seed treatment and seedling dip treatment on disease incidence. The results of the OFT showed that seed treatment with carbendazim @ WP 2g/kg seed followed by seedling dip in carbendazim @ 0.2% increased the yield to the tune of 50.00% over farmers practice and 76.42% reduction in disease incidence of Bakanae (foot rot). Seed treatment with carbendazim 50WP@ 2g/kg seed also increased the yield to the tune of 22.9% and less incidence of disease as compared to farmers practice

37. Assessment of management practices against *Fusarium* root rot in summer squash in Haryana

The summer squash (*Chappan tinda*) is an important short duration cash crop grown in different parts of the district Gurgaon, which is a source of livelihood of small and marginal farmers of the district. The infection of *Fusarium* root rot in summer squash is a serious problem to realize the optimum returns. The farmers are not well aware about the management practices of the *Fusarium* root rot fungal disease. The farmers are using un-recommended pesticides resulting in environmental pollution and high residues in the marketable produce. To minimize the uses of chemical pesticides and effective management of the disease, KVK Gurgaon conducted on farm trials on the management of *Fusarium* root rot. Results of the trials revealed that the soil treatment with Carbendazim 50WP@ 2.5kg/ha and seed treatment with Carbendazim50WP@ 2.5gm/ kg seed found effective in minimizing the disease and enhancing the summer squash yield. The results showed 5.72% yield increase over the control plot the highest marketable yield 150.62 qt./ha and highest BC ratio of 1:3.35.

38. Effect of cobalt chloride at different time interval on parawilt incidence and yield of cotton in Haryana

Cotton is an important *kharif* crop in Jind district. It is cultivation in an area of about 70,000 hectares. In recent years cotton cultivation has witnessed some of the most pronounced changes in cultivar, agronomic and plant protection practices. The genetically modified cotton completely revolutionized the cotton protection technology. These alterations have brought in many new abiotic problems like para wilt. In order to assess the efficacy of cobalt chloride as foliar application at different time interval of the appearance of para wilt symptoms, the on farm trial was conducted during *kharif* 2016-17 at five locations. Results of the trials revealed that spray of 1.0 gm Cobalt chloride in 100 liters of water per acre at the onset of symptoms was found very effective followed by spray of cobalt chloride at 12 hours after onset of symptoms. This former treatment resulted in minimum disease incidence (1.7%) and highest yield (18.5 q/ha) and BC ratio (1.95:1) followed by latter treatment with disease incidence, yield and BC ratio of 3.1%, 17.0 q/ha and 1.77:1, respectively.

39. Assessment of integrated disease management modules in apple in Himachal Pradesh

Premature leaf fall due to *Marssonina coronaria* and untimely death of the apple trees due to canker has been noticed in some parts of the district. KVK Chamba conducted on farm trials for assessment of the management modules against apple canker comprising copper carbonate: red lead: enamel paint (1:1:1.5), carbendazim: white enamel paint (1:100) and Chaubattia paint at 10 locations. Treatment comprising carbendazim: white enamel paint (1:100) was found best in skin healing (48.4 %). Yield per hectare was observed

to be 3220 kg with BC ratio of 2.67 by the treatment. Farmers found that paints were easy to prepare, cheap and ingredients were easily available.

KVK Shimla on the other hand, laid out OFTs at five different locations comprising treatments: T1- spray of Mancozeb (600g/200L) at pink bud stage, Bavistin (100g/200L) at pea size, spray of mancozeb (600g) + carbedazim (100g) at walnut size, spray of dodine (150g) at fruit development, spray of ziram (600ml) 20 days before harvesting; T2- spray of difenconazole (30ml/200L) at pink bud, hexaconazole (100ml) at pea size, antracol (600g) at walnut stage, dodine (150g) after 20 days; T3- indiscriminate use of fungicides without disease appearance. Application of Mancozeb (600 g) at pink bud stage, Bavistin (100 g) at petal fall, Mancozeb (500g)+ Carbendazim (100 g) at walnut stage, Dodine (150g) after 20 days of last spray and Ziram (600ml) as a pre harvest spray provided 89 per cent control of the premature leaf fall followed by T2 (78 per cent disease control).

40. Assessment of management modules against Buckeye rot disease in tomato in Himachal Pradesh

Tomato is an important cash crop of district Sirmour and a source of livelihood for small and marginal farmers of the district. It is cultivated in an area of about 2158 hectares. The incidence of buck eye rot is a serious threat to realize the optimum returns. Farmers are using different types of systemic and contact fungicides resulting in environmental pollution and high residues in the market produce. KVK Sirmour conducted on farm trail on management of buck eye rot in tomato. Results of the trails revealed that staking and removal of lower leaves, spray of curzate (0.3%) followed by spray of Indofil M-45 (0.25%) at 15 days interval found effective in managing the disease and enhancing the fruit yield. This treatment resulted in minimum disease incidence (12.2%), highest marketable yield (23.8 t/ha) and highest B:C Ratio (2.91).

41. Integrated management of late blight of Potato in Himachal Pradesh

Potato is an important cash crop in many parts of district Kangra and a source of livelihood of small and marginal farmers. High incidence of blight in valley areas of the district is a serious threat to realize the optimum returns. Keeping in view the importance of crop and threats posed by regular appearance of disease, integrated management strategy from sowing to harvesting helped in decreasing the incidence and severity of disease and enhancing returns to farmers. Trails were laid by KVK Kangra at three locations using a new molecule Moximate. Seed treatment with Mancozeb @ 2.5g/ kg of seed followed by prophylactic spray of Ridomil MZ 72 (2.5 g/l) + sticker @ 2ml/ l at 40-45 days of crop controlled the disease at early stage and two sprays of Moximate 2.5g/l) + sticker @2ml/l at fortnight interval took care of secondary infections. The technology assessed performed well in all the OFTs by recording only 4.0 % disease severity and contributing 40 % increase in the yield over check plots. The cost benefit ratio also increased to 2.61 in trial plots to that of 1.57 in farmer's practice.

42. Integrated management of foliar diseases in capsicum grown under protected conditions in Himachal Pradesh

KVK Solan has conducted on farm trials for the management of foliar diseases under protected conditions. The data of the OFT revealed that three sprays of difenconazole @ 0.04% starting from the time of disease appearance at 15 days interval in April-May and three to four sprays of Streptocycline + copper oxychloride (0.01% +0.3%) at the time of disease appearance were found effective in reducing disease severity and enhancing fruit yield. Minimum disease severity (8.67 and 6.5% for powdery mildew and bacterial spot, respectively) maximum yield (250 q/ha) and highest B:C ratio (2.64) was observed in this treatment as compared to farmer's practice where maximum disease severity (33.2 and 24.5 % for powdery mildew and bacterial spot, respectively), minimum yield (160 q/ha) and BC ratio of only1.72 was achieved.

G. Integrated Pest Management

43. Assessment of integrated management modules against fruit flies in Punjab

KVK Kapurthala conducted on farm trial on integrated management of guava fruit fly in the district. As no stage of guava fruit fly is exposed, hence it is difficult to control this pest through the use of available synthetic contact insecticides which are effective only on the exposed stages in the life cycle of insects.

Keeping in view this thing, studies were planned to use integrated measures of fruit fly management. The results revealed that ploughing of fields in the month of June to expose the hidden pupal stages followed by drenching of the soil with chlorpyriphos, installation of pheromone traps containing methyl eugenol pheromone @ 40 traps per hectare, picking and destruction of infested and fallen fruits and foliar spray of sumicidine @ 2.4 ml/ liter of water at 10 days interval. The module was found effective in minimizing pest incidence and enhancing the fruit yield. This treatment resulted in minimum infested fruits (6.43%) and hence highest marketable yield and highest BC ratio (3.28).

G. Integrated Pest Management

44. Integrated management of wax moth in *Apis mellifera* colonies in Punjab

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 laid by KVK Moga at five locations. Use of sulphur directly on bottom board and use of formic acid + Use of 300g sulphur/ 16 chambers fumigated combs was farmers practice. Second was use of 300g sulphur or 1 gram Aluminium phosphide/ 16 chambers fumigated combs which was recommended practice and was a refined practice. The refined practice of colony management i.e. use of 300g sulphur or 1 gram Aluminium phosphide/ 16 chambers fumigated combs + use of wax moth trap has more bee strength (8.17±1.25) less incidence of wax moth infested frames (0.83±0.76), and higher yield of honey (13.73 kg/ colony) as compared to other treatments. Refined practice has highest BC ratio of 4.88 as compared to farmer's practice which has 4.58 and 2.98 in case of recommended practice.

45. Assessment of management modules against whitefly in cotton in Haryana

Due to high incidence of white fly in cotton and indiscriminate use of chemical insecticides, KVK Rohtak conducted the on farm trials for the management of whitefly in cotton. The data revealed that use of recommended practice *i.e.* two sprays of Nimbecidine 300ppm @ 2.5 l/ha followed by Dimethoate 30EC @ 750 ml/ha was found most effective in reducing whitely population (89.3%) as compared to Nimbecidine followed by Thiomethoxam 25WG (82.3%).

46. Effect of management techniques on Diamond back moth incidence and yield of cauliflower in Haryana

The cauliflower is an important cash crop in different parts of district Gurgaon and source of livelihood of small and marginal farmers of the district. It is cultivated in area of about 2615 ha. The incidence of diamond back moth in cauliflower crop of the district is a serious threat to realize the optimum returns. The farmers resorts to indiscriminate uses of synthetic pyrethroids and persist pesticides resulting in environmental pollution and high residues in the marketable produce.

To minimize the uses of chemical pesticides, KVK Gurgaon conducted on farm trial for assessment of safer management modules against the pest. Results of the trials revealed that the two foliar spray of Emmamectin benzoate 5%SG@ 0.5g /L and two sprays of Azadirachtin @5ml/L alternatively at 10 days interval found effective in minimizing pest incidence and enhancing the cauliflower yield. The module resulted in minimum larval count (2 lavae/ sqm) compared to control (10 larvae/ sqm) and highest marketable yield (248.65 q/ha) and BC ratio (1:3.25).

47. Effect of a management module on the pest complex on apple in Jammu & Kashmir

Apple is the dominant fruit crop in Jammu and Kashmir and is backbone of economy in the state. Pulwama district covers an area of about 14.29 thousand hectares with an annual production of 1.39 lakh metric tonnes. The fruit is attacked by insect and mite pest complex during the entire growing season which include San Jose Scale (SJS), aphids (Woolly apple aphid and green aphid), apple leaf rollers and European red mite, and pose a serious threat in its cultivation in the district. Farmers are spraying pesticides in an indiscriminate and injudicious manner posing several problems of insecticide resistance, pest resurgence, secondary pest outbreaks and overall the environmental pollution. So in order to manage the pest complex efficiently and minimize the quantum of insecticides and acaricides on apple KVK Pulwama conducted on farm trial, which include a delayed dormant spray of a Horticulture Mineral Oil (HMO) impregnated with Ethion 50EC @ 1ml/l followed by second spray with an insecticide dimethoate 30 EC @ 1ml/l or methyl-o-

demeton 25 EC @ 0.8ml/l during pea size of the fruit and 3rd spray with a acaricide like Fenzaquin 10 EC @ 0.4 ml/l or Propergite 57 EC @ 1ml/l during fruit development stage-II. The results revealed a significant reduction with minimum incidence of San Jose Scale (7.83%), aphids (3.65%), leaf rollers (5.00%) and European red mite (5.98%) and highest marketable yield of 10.64 t/ha and BC ratio of 7.86.

48. Integrated management of Saffron thrips in Kashmir valley

During the last few years the saffron farmers in district Pulwama were alarmed due to the incidence and damage of saffron by thrips. Accordingly an on farm trial in saffron belt was laid to observe the impact of the recommended technology for the management of thrips which include soil application either with (Carbofuran 3G @ 37.5 kg/ha or Fipronil 0.3G @ 12.5kg/ha + alternate day picking of saffron). The results revealed a significant reduction of 77.27% with Fipronil 0.3G followed by Carbofuran 3G (65.25%) with marketable yield of 3.8 kg/ha and 3.7kg/ha and BC ratio of 3.9 and 4.0, respectively.

49. Integrated pest management in blackgram in Himachal Pradesh

Farmers are resorting to indiscriminating use of insecticides leading to serious ecological impact on fauna and flora. In order to assess the efficacy of the safer modules, KVK Sirmaur conducted on farm trial on integrated pest management in black gram at ten locations in the district. Results of the trial revealed that two sprays of Thiodicarb (0.075%) found effective in control of insects and minimized the losses caused to the crop. The treatment resulted in minimum insect infestation (2-3 %), highest yield (9.42 q/ha) and highest benefit-cost ratio (2.03) closely followed by two sprays of monocrotophos.

50. Integrated management insect- pest and diseases in cauliflower in Himachal Pradesh

The cold desert of Lahaul valley in Himachal is seeing sweeping changes with farmers replacing potato with cauliflower. The crop has gained commercial importance in the district because of congenial climatic and soil conditions and due to the handsome returns per unit area. At present, the total area under cauliflower cultivation is 450 hectares with the annual production of 10732.5 tonnes. In order to reduce the losses caused by insect-pests and diseases, KVK Kukumseri conducted on farm trial on integrated management of insect-pest and diseases in cauliflower at five locations in the district. Results of the trials revealed that one spray of Azadirachtin (Neembaan 0.15%) @5 ml/L at 30 DAT + Installation of pheromone trap (DBM) @12 Nos./ha (immediately after transplanting) followed by one spays of Malathion 50 EC (0.05%)+ Carbendazim (0.1%) 15 days intervals. This treatment resulted in minimum larval count of 0.32 per plant, less incidence of *Alternaria* leaf spot (1.68 %), black rot (5.6%) and downy mildew (1.76%), and gave the highest yield (304.2 q/ha) along with the maximum B:C ratio (3.74) compared to the farmers' practice (248.0q/ha).

H. Weed Management

51. Assessment of new herbicides for weed management in direct sown upland paddy in Himachal Pradesh

Paddy is a major cereal crop of Himachal Pradesh. Kangra and Mandi are the leading paddy growing districts in the state. Mostly the crop is grown under assured irrigation conditions but in some areas crop is also grown in rainfed conditions (Upland paddy- direct seeded). In upland paddy weeds are a major problem in its cultivation. The losses caused by weeds in upland paddy are up to 50%. Keeping in view these problems, a new post-emergence herbicide was tested in combination with butachlor as pre-emergence herbicide by KVK Kangra and Mandi.

In Kangra district, the results indicated that Pre-emergence application of butachlor @ 1.5Kg /ha followed by Post–emergence application of Bispyribac sodium 25gm /ha gave highest yield with an increase of 31.5% over check followed by Pre-emergence application of butachlor 1.5Kg /ha.

Similar trend was also observed in Mandi district where Post emergence herbicide application with Bispyribac sodium 25gm /ha in addition to the Pre-emergence application of butachlor 1.5Kg/ha resulted in the better management of weeds and higher yields. The dry matter accumulation at 70 days after sowing was 28.4 and net retruns was also found highest (₹20830/ha) in this treatment.

52. Weed management in wheat in Haryana

KVK Kaithal, KVK Panipat and KVK Gurugram conducted on farm trials on weed management in wheat in their respective districts. KVK, Kaithal conducted OFT on Effect of pre emergence herbicides on control of *Phalaris minor* on farmer's fields. The OFT results revealed that Pre emergence (stomp 30 EC @ 5 l/ha) + Post-emergence clodinofop 15 EC @ 400 ml/ha was found best to give 95 % control of weed flora and 5000 kg/ha of wheat yield whereas Post emergence herbicides clodinofop 15 EC @ 400 ml/ha gives 60% control of weeds and 4700 kg/ha of wheat yield.

In Panipat district, the performance of Pendimethalin based herbicide package was better than Post emergence application of Sulfosufuron,/ Clodinafop/ Pinoxaden+ Metsulfuron in terms of weed control & yield. Integration of Pre- emergence application of Pendimethalin @ 3.75 l/ha provided better control of weeds which translated in better yield and returns.

In Gurugram district, the results of OFT revealed that Carfentrazone + Sulfosulfiron and Metsulfuron recorded 9.46% & 5.90% increase in the grain yield respectively over farmers practice (2,4-D). These treatments also decreased the weed population by 83.62% and 39.35% respectively.

53. Weed management in berseem crop in Gurdaspur district of Punjab

KVK Gurdaspur conducted an OFT to assess the efficiency of different pre-emergence and post emergence herbicides in berseem weeds and crop selectivity at three locations. Results of trial revealed that there was the highest reduction in weed population with the application of Imazethapyr 10% SL @ 300 ml/ha (30.9/m^2) as compared to Pendimethalin 30 EC @ 2.5 l/ha (45.4/ m^2) and Fluchloralin 45 EC @ 1000 ml/ha (72.5/ m^2). Also, it was observed that higher green fodder yield (902.3 q/ha) than Fluchloralin 45 EC @ 1000 ml/ha (851.9 q/ha) and Pendimethalin 30 EC @ 2.5 l/ha (747.5 q/ha). The phtotoxicity in berseem was observed with the application of Pendimethalin 30 EC @ 2.5 l/ha which resulted lower green fodder yield.

I. Disease Management (Livestock)

54. Prevention of Mastitis in dairy animals in Punjab

Krishi Vigyan Kendra, Patiala conducted on-farm trial on management of mastitis disease in dairy animals. Results of the trial revealed that keeping the animals in standing position for half an hour after milking or teat dipping after each milking in herbal agents, followed by dipping in glycerine and iodine solution is effective in prevention of mastitis in dairy animals. It is also observed that enhancing immunity against mastitis improves the quality of milk for which vitamin E selenium and tri-sodium citrate have to be used in the ration.

J. Nutritional Management (Livestock)

55. Assessing the effect of UMMB feeding on the milk and wool yield of animals in Jammu & Kashmir

KVKs of Jammu & Kashmir particularly Pulwama, Kathua and Nyoma assessed the effect of UMMB feeding on milk yield of animals through on farm trials in their respective districts. In Kathua district, results of the trials revealed that feeding of the UMMB significantly increased milk production upto 0.8 litres in the cattle over a period of the 4 months. In Pulwama district, OFT results revealed that feeding of UMMB @ 400g/day/animal resulted in 6-10% increase in milk production and increased in dairy farmers' income by about 15%.

KVK Nyoma evaluated the effect of ASUMMB on the production in pashmina wool and results indicated that highest pashmina yield (287.50 gm) was observed in goats fed with ASUMMB followed by pellet fed goats (262.50gm). Both the treatment was significantly better than the farmers practice. Higher body weight was also recorded in goats fed with ASUMMB.

56. Assessment of the effect of feeding mineral mixture and de-wormer on production performance in cross bred cows

KVK, Sangrur conducted an on farm trial to assess the effect of feeding mineral mixture and de-wormer on production performance in cross bred cows. The results revealed that feeding animals with balanced diet supplemented with mineral mixture (@50 gm) after de-worming provided maximum milk yield with the highest BC ratio.

KVK, Gurdaspur was conducted an OFT on feeding of balanced diet along with urea molasses mineral block (Urominlick) on farmer's crossbred

heifers aged 17-18 months that had not come to heat and had no detectable genital abnormalities in three villages. Study revealed that there was 40% reduction in age at first calving was recorded by feeding of balanced diet and Uromin lick as compared to farmer's practice (Feeding of dry fodder, green fodder & concentrate). The fertility in delayed pubertal crossbred heifers under village management could be enhanced with Uromin lick supplementation (300 gm per day for 30 days).

57. Assessing the effect of supplementation of mineral mixture and vitamin AD3E on reproduction efficiency of Buffaloes in Haryana

Anoestrus is one of most common problem particularly in buffaloes in Gurugram district of Haryana which causes loss to the farmers in terms of less number of calves and low milk production. Deficiency of minerals & vitamins is one of the causes of Anoestrus. Due to high use of chemical, fertilizer and very low use of organic manure, the fields are deficient of certain minerals like calcium, phosphorus, copper, cobalt and others as a result the fodder crops are also not enriched with these elements. These minerals play an important role in reproduction of animals. The farmers in the area grow very little seasonal fodders so certain vitamins which are available from these fodders are not available to animals in required quantity. To test the effect of minerals & vitamin AD3E, trials were laid out at different locations by KVK Gurgram. After deworming the animals, mineral mixture was provided to 20 Buffaloes to be fed @ 50g/day in ration after calving for 3 months. 10 Buffaloes were taken as control group. Out of 20 Buffaloes, 10 Buffaloes were given 2 injections of vitamin AD3E @ 5ml on alternate days. The results of the trials revealed that 90% of buffaloes came into heat which were given mineral mixture & vitamin AD3E while 60% Buffaloes came into heat which were given only mineral mixture and only 40% Buffaloes came into heat in control group. It is therefore recommended that supplementation of mineral mixture along with use of vitamin AD3E should be promoted to improve reproductive efficiency in buffaloes in the region.

K. Mushroom Cultivation

58. Assessment of paddy straw as substitute for wheat straw for mushroom compost in Haryana

Seasonal growing of white button mushroom cultivation is very popular in Haryana. Farmers are growing white button mushroom on wheat straw. Since wheat straw is preferred dry fodder of livestock, it is becoming costlier day by day and is in short supply. On the other hand paddy straw is abundantly available and a huge quantity of paddy straw is brunt causing environment pollution and loss of nutrients in soil. KVK, Kaithal, henceforth conducted on farm trails to assess paddy straw as replacement of wheat straw for compost preparation by long method of composting. The results revealed that by using of 100 percent paddy straw as substrate provided almost equivalent yield but paddy straw is very cheap as compared to wheat straw. So paddy straw is an economic and more viable option in place of wheat straw or compost preparation.

59. Assessment of cereal and legume substrate combinations for oyster mushroom cultivation

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 in non adoption of this avocation. 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 straw is 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 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.

L. Agro Forestry

60. Assessment of *Salix* clones in Himachal Pradesh

Agro forestry is an integral component of

integrated farming system, but long maturity time and less income is an important concern. Hence KVK Chamba evaluated selected clones of willow (*Salix* spp) viz., UHF-S-5, UHF-S6 and UHF-S14 at four locations. All the clones performed well in moist condition and badly in dry condition. Clone UHF-S-6 recorded 98 number of nodes, average collar diameter of 48 cm and average height of 11 m and performed well at all the sites, hence its cultivation is suitable for multipurpose.

M. Food & Nutrition

61. Impact of nutrition education in diabetes management in Punjab

People with diabetes are at risk for long-term problems affecting the eyes, kidneys, heart, brain, feet, and nerves in Punjab. It is caused due to change in food habits (more use of fast food), life style and stress. The KVK Patiala conducted on farm trial on management of diabetes through nutrition education. Results of the trial revealed that nutrition education proves to be successful in changing the dietary pattern, life style along with medical treatment resulted in 40 mg/100g decrease in blood glucose level of diabetic patient.

N. Value Addition

62. Acceptability of value added pearl millet biscuits in Haryana

Pearl millet is largely grown for grain and fodder purpose under hot, dry conditions on infertile soils of low water holding capacity where other crops generally fail. Pearl millet or *bajra* is a highly nutritious and a gluten free grain. It is full of vitamins, minerals and amino acids. The grain is easily digestible and has the lowest probability of causing allergic reactions. This nutri-millet can provide health package to people by preventing them from micro-nutrient deficiency diseases. Value added products of pearl millet can also provide nutritional security and economic empowerment of rural women. Hence, on farm trial was conducted by KVK Delhi to assess the acceptability of bajra biscuits in different ratios. It was observed that bajra+ besan biscuit in 50% combination was liked very much by 65% respondents as compared to Bajra+ Atta which was liked by 60% of respondents followed by bajra+Maida which was only liked by 50% of the respondents. Majority of the population showing keen interest in *bajra* biscuits and it can be an effective tool in improving the nutritional status of the masses.

63. Assessment of profitability of value added products of tomato in Himachal Pradesh

Tomato is an important cash crop in Una district of Himachal Pradesh. It is the major cash crop during winter season and a source of livelihood for small and marginal farmers. It is cultivated in an area of about 850 ha. Sometimes, farmers do not get the optimum price of raw tomato due to very low market price. Hence, KVK Una conducted on farm trial to assess the profitability of value added products of surplus produce of tomato. During glut season, farmer only get Rs 45900/ha from the sale of fresh tomatoes in the open market because of low price however, value added products like puree and sauce out of the same produce enabled farmers to get Rs. 85330/- and 110740/- respectively. Of the two value added products, the profitability of sauce was higher than the puree followed by the sale of fresh produce.

64. Assessing the effect of different coagulants on the quality and production of soya paneer in Mandi district of Himachal Pradesh

Soybean is one of the oldest known food sources to human beings. It is nutritious, economical and eco-friendly crop. Use of 30 - 50 g of processed soybean in daily diet results into better health, happiness and longevity. Majority of Indian population is vegetarian and drives its protein from cereals & legumes. Soya protein is least expensive and quality wise at par with animal protein and has no negative health effects. In Himachal Pradesh, consumption of soybean in daily diet is very low as people are not aware about its nutritive value . Hence, on farm trial was conducted to assess the effect of different coagulants on the quality and production of soya paneer. Citric acid @2gm/l Soya milk, Calcium sulphate@5 gm/l Soya milk and Magnisum chloride @ 5 gm/ Soya milk were used as coagulants in the trial. Based on the evaluation on various parameters like taste, flavor, texture, weight, colour and overall acceptability, the results revealed that magnesium chloride was found best coagulant for making good quality soya paneer followed by calcium sulphate. Coagulation with magnesium chloride also resulted in more weight of Soya Paneer which also provided higher benefit cost ratio over other coagulants.

3.1.2 Frontline Demonstration

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 14751 demonstrations were conducted covering an area of 3543.77 ha and 910 units. Under crops, 12975 frontline demonstrations were conducted by the KVKs of Zone-I. Highest number of demonstrations were conducted in cereals & millets (5221) followed by oilseeds (2650), vegetables (2013), pulses (1191), fodder crops (1158), commercial crops (508), fruits (129) and flowers (105) in an area of 3455.77 ha. Further, the KVKs also conducted 910 FLDs related to livestock & fisheries and 866 other demonstrations (Table 13).

3.1.2.1 Cereals & Millets: A total of 5221 demonstrations were conducted in various cereal and millet crops covering an area of 1911.02 ha during the year by the KVKs of Zone-I. The state wise break up of FLDs on cereal & millet crops includes 1117 in Punjab, 1755 in Haryana, 67 in Delhi, 477 in Himachal Pradesh and 1805 in Jammu & Kashmir. The state wise details of results of FLDs are presented as under:

Punjab

A total of 1117 demonstrations on cereal crops were conducted by KVKs of Punjab covering an area of 558.80 ha in the farmers' field during the year under report (Table 14). During Kharif season, 152 in paddy, 85 in basmati, 76 in maize and during Rabi season, 804 demonstrations on wheat were conducted. The average yield of demonstrations on paddy and basmati was recorded 64.71 and 42.35 q/ha as compared to local check yield of 62.19 and 40.80 q/ha, which is an

Table 13: Overview of Frontline Demonstrations implemented

Crops Category	No. of demonstrations	Area (ha)	Units
Cereals & Millets	5221	1911.02	
Oilseeds	2650	813.43	
Pulses	1191	153.08	
Vegetable & spices	2013	143.82	
Fruit crop	129	20.22	
Flowers	105	18.10	
Fodder crops	1158	195.10	
Commercial Crops	508	201.00	
Total	**12975**	**3455.77**	
Livestock& fisheries			
Dairy	443		443
Sheep & Goat	66		66
Poultry	397		397
Fisheries	4		4
Total	**910**		**910**
Others			
Mushroom production	279		
Vermicompost	89		
Farm Implements	220	88.00	
Home Science	278		
Total	**866**		
Grand total	**14751**	**3543.77**	**910**

increase of 4.05 and 3.80 per cent, respectively. The BC ratio of paddy and basmati was also found to be higher in case of demonstration (3.19 & 3.53) in comparison to local check (2.88 & 2.76), respectively. The average yield of demonstration on maize was found to be 40.19 as compared to local check (34.20 q/ha), which is 17.50 per cent higher. In case of wheat, the demonstration yield was observed to be 53.84 q/ha as compared to local check (51.80q/ha), which is 3.92 per cent higher. The BC ratio of demonstration (2.91) was found higher as compared to local check (2.64). 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.

Haryana

A total of 1755 demonstrations on cereals & millets were conducted by KVKs of Haryana covering an area of 769.10 ha in the farmers' field during the year under report including 46 in paddy, 256 in basmati 1270 in wheat, 32 in barley and 151 in pearl millet (Table 15). The average yield of demonstrations on paddy and basmati was recorded 59.93 and 47.25 q/ha as compared to local check yield of 55.64 and 44.61 q/ha, which is an increase of 7.71 and 5.91 per cent, respectively. The BC ratio of paddy and basmati was also found to be higher in case of demonstration (3.16&2.32) in comparison to local check (2.76& 2.14), respectively. In case of wheat barley, the demonstration yield was observed to be 51.48 and 51.23 q/ha as compared to local check (48.36 and 47.60q/ha), which is 6.45 and 7.63 per cent higher, respectively. The BC ratio of wheat and barley was found 2.46 and 2.89 which is higher as compared to local check (2.30 and 2.63), respectively. The average yield of pearl millet was observed to 24.89 q/ha which is 21.17 per cent increase over local check. The BC ratio was observed higher in demonstrations (2.23) as compared to local check (2.01). Technologies such as water management, Integrated Disease Management,

Table 14: Frontline demonstrations on cereals conducted in Punjab

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Paddy	12	152	125.10	64.71	62.19	4.05	68690	3.19	63776	2.88
Basmati	6	85	34.30	42.35	40.80	3.80	93831	3.53	89277	2.76
Maize	4	76	45.40	40.19	34.20	17.50	22150	1.75	16425	1.60
Wheat	14	804	354.00	53.84	51.80	3.92	54790	2.91	50893	2.64
		1117	**558.80**							

Table 15: Frontline demonstrations on cereals and millets conducted in Haryana

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Paddy	3	46	18.4	59.93	55.64	7.71	70419	3.16	60906	2.76
Basmati	8	256	123.3	47.25	44.61	5.91	60430	2.32	53821	2.14
Wheat	15	1270	552.6	51.48	48.36	6.45	53075	2.46	47366	2.30
Barley	2	32	12.8	51.23	47.60	7.63	51902	2.89	45755	2.63
Pearl millet	4	151	62.0	24.89	20.54	21.17	18390	2.23	13823	2.01
		1755	**769.1**							

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.

Delhi

A total of 67 demonstrations on cereal crops were conducted by KVK Delhi covering an area of 26.8 ha in the famers' field during the period under report including 50 in paddy and 17 in wheat (Table 16). The average yield of demonstrations on paddy crop was found to be 51.08 q/ha as compared with 43.27 q/ha of local check, which is an increase of 18.07 per cent yield over local check. The BC ratio of demonstrations on paddy crop was observed higher (2.12) than the local check (1.83). The average yield of demonstrations on wheat crop was found to be 42.97 q/ha as compared with 39.70 q/ha of local check, which is an increase of 8.23 per cent higher yield over local check. The BC ratio of demonstrations on paddy crop was observed higher (1.74) than the local check (1.60). Technologies such as Integrated Disease Management, Integrated Pest Management, Integrated Weed Management, Integrated Nutrient Management, Resource Conservation, and improved varieties of paddy, and wheat have led to gain in yield as compared to farmers' practices.

Himachal Pradesh

A total of 477 demonstrations on cereal crops were conducted by KVKs of Himachal Pradesh covering an area of 121.37 ha in the farmers' field during the year under report including 199 in paddy, 69 in maize and 209 in wheat (Table 17). The average yield of demonstrations on paddy crop was recorded 33.46 q/ha as compared to local check yield of 26.84q/ha, which is an increase of 24.67per cent yield over local check. The BC ratio of demonstration was found to be higher (2.24) than the local check (2.05). The average yield of demonstrations on maize was found to be 34.80 q/ha as compared to local check (28.83 q/ha), which is an increase of 20.69 per cent yield over local check. The BC ratio of maize demonstrations was found to be higher (1.95) than the local check (1.76).In case of wheat, the demonstration yield was observed to be 35.10 q/ha as compared to local check (28.48 q/ha), which is an increase of 23.24 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,

Table 16: Frontline demonstrations on cereals conducted in Delhi

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Paddy	1	50	20.0	51.08	43.27	18.07	59015	2.12	43740	1.83
Wheat	1	17	6.8	42.97	39.70	8.23	29721	1.74	24312	1.60
		67	**26.8**							

Table 17: Frontline demonstrations on cereals conducted in Himachal Pradesh

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Paddy	6	199	38.80	33.46	26.84	24.67	34504	2.24	25695	2.05
Maize	3	69	15.50	34.80	28.83	20.69	26388	1.95	18315	1.76
Wheat	9	209	67.07	35.10	28.48	23.24	27320	2.20	18431	1.96
		477	**121.37**							

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.

Jammu & Kashmir

A total of 1805 demonstrations on cereal crops were conducted by KVKs of Jammu & Kashmir covering an area of 434.95 ha in the farmers' field during the year under report including 837 in paddy, 410 in maize, 539 in wheat and 19 in barley (Table 18). The average yield of demonstrations on paddy crop was recorded 54.19 q/ha as compared to local check yield of 47.24 q/ha, which is an increase of 17. 09 per cent yield over local check. The BC ratio of demonstration was found to be higher (2.10) than the local check (1.78). The average yield of demonstrations on maize was found to be 38.43 q/ha as compared to local check (27.27 q/ha), which is an increase of 40.94 per cent yield over local check. The BC ratio of maize demonstrations was found to be higher (2.12) than the local check (1.66). In case of wheat, the demonstration yield was observed to be 32.91 q/ha as compared to local check (25.86q/ha), which is an increase of 27.29 per cent over local check. The BC ratio of wheat demonstration (2.10) was found higher than the local check (1.69). The average yield of demonstrations on barley was found to be 13.50 q/ha as compared to local check (9.45 q/ha), which is an increase of 42.86 per cent yield over local check. The BC ratio of barley demonstrations was found to be higher (1.29) than the local check (0.88). 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.

3.1.2.2 Oilseeds: A total of 2650 demonstrations were conducted in various oilseeds crops covering an area of 813.43 ha during the year by the KVKs of Zone-I. The state wise break up of FLDs on oilseed crops includes 1048 in Punjab, 546 in Haryana, 10 in Delhi, 533 in Himachal Pradesh and 513 in Jammu & Kashmir. The state wise details of results of FLDs on oilseed crops are presented as under:

FLD on Gobhi Sarson

Punjab

A total of 1048 demonstrations on oilseed crops were conducted by KVKs of Punjab covering an area of 438.80 ha in the farmers' field during the year under report including 25 demonstrations in mustard, 36 in African sarson71 in canola sarson, 575 in gobhi sarson, 14 in raya, 51 in sesame, four in sunflower and 272 in soybean (Table 19). Technology demonstrated on various crops under oilseeds performed better over local check. The increase in demonstration yield over local check varies from 2.81 to 30.55 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

Table 18: Frontline demonstrations on cereals conducted in Jammu & Kashmir

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Paddy	11	837	218.96	54.19	47.24	17.09	57575	2.10	43867	1.78
Maize	12	410	114.96	38.43	27.27	40.94	43905	2.12	24991	1.66
Wheat	8	539	99.95	32.91	25.86	27.29	30493	2.10	20850	1.69
Barley	1	19	1.08	13.50	9.45	42.86	23300	1.29	9550	0.88
		1805	**434.95**							

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.

Haryana

A total of 546 demonstrations on oilseed crops were conducted by KVKs of Hayana covering an area of 199.20 ha in the farmers' field during the year under report including 211 demonstrations in mustard, 295 in raya, 80 in sunflower, and 10 in groundnut (Table 20). Technology demonstrated on various crops under oilseeds performed better over local check. The increase in demonstration yield over local check varies from 15.03 to 27.94 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.

Delhi

The KVK Delhi has conducted 10 demonstrations on mustard covering an area of four ha. The technology demonstrated performed better than the local check. An increase in yield of demonstrated technology was recorded 8.22 per cent over local check. The BC ratio was also found better than the local check (Table 21). Integrated Disease Management, led to gain in mustard yield as compared to farmers' practices.

Table 19: Frontline demonstrations on oilseeds conducted in Punjab

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of demos		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Mustard	1	25	12.00	21.38	19.29	10.83	65556	5.83	58428	5.51
African Sarson	3	36	12.60	20.50	17.82	15.06	45717	2.36	37662	2.31
Canola Sarson	1	71	20.00	17.85	14.71	21.35	58495	5.50	43935	3.90
Gobhi Sarson	13	575	220.00	18.89	15.07	25.29	38180	2.50	26444	1.95
Raya	1	14	3.20	14.50	11.50	26.09	13189	1.41	7050	1.24
Sesame	4	51	17.60	5.41	4.13	30.79	13568	1.77	10613	1.43
Sunflower	1	4	1.60	18.30	17.80	2.81	37045	2.17	32215	1.92
Soybean	6	272	151.8	15.71	12.03	30.55	32301	1.77	19282	1.26
		1048	**438.8**							

Table 20: Frontline demonstrations on oilseeds conducted in Haryana

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of demos		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Mustard	4	211	82.80	19.575	15.30	27.94	44427	2.85	37762	2.52
Raya	6	295	100.40	20.35	17.05	19.30	43362	2.70	33416	2.37
Sunflower	2	30	12.00	32.99	28.68	15.03	96194	4.80	79289	3.87
Groundnut	1	10	4.00	18.80	15.00	25.33	52480	4.40	41500	3.20
		546	**199.2**							

Himachal Pradesh

A total of 533 demonstrations on oilseed crops were conducted by KVKs of Himachal Pradesh covering an area of 99.22 ha in the farmers' field during the year under report including, 250 in gobhi sarson, 186 in toria, 27 in sesame and 70 in soybean (Table 22). Technology demonstrated on various crops under oilseeds performed better over local check. The increase in demonstration yield over local check varies from 29.06 to 37.16 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.

Jammu & Kashmir

A total of 513 demonstrations on oilseed crops were conducted by KVKs of Jammu & Kashmir covering an area of 72.21 ha in the farmers' field during the year under report including 355 in mustard, 120 in gobhi sarson, 21 in toria and 17 in soybean (Table 23). Technology demonstrated on various crops under oilseeds performed better over local check. The increase in demonstration yield over local check varies from 21.05 to 33.00 percent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated Nutrient

Table 21: Frontline demonstrations on oilseeds conducted in Delhi

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Mustard	1	10	04	24.78	22.90	8.22	71514	5.05	61140	4.51

Table 22: Frontline demonstrations on oilseeds conducted in Himachal Pradesh

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
GobhiSarson	5	250	42.20	9.08	6.62	37.16	23624	2.32	15154	1.89
Toria	3	186	43.00	9.46	7.33	29.06	14165	1.61	6258	1.30
Sesame	1	27	5.00	6.60	5.30	24.53	18140	1.84	8120	1.40
Soybean	3	70	9.02	13.88	10.37	33.86	25290	1.87	14610	1.45
		533	**99.22**							

Table 23: Frontline demonstrations on oilseeds conducted in Jammu & Kashmir

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Mustard	11	355	48.46	10.35	7.74	31.71	31713	1.96	17391	2.24
GobhiSarson	4	120	16.20	9.68	7.28	32.94	29614	3.17	17432	2.30
Toria	2	21	5.55	5.75	4.75	21.05	11225	1.86	6825	1.51
Soybean	1	17	2.00	12.00	9.00	33.00	44000	1.37	30000	1.15
		513	**72.21**							

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.

3.1.2.3 Pulses: A total of 1191 demonstrations were conducted in various pulse crops covering an area of 153.08 ha during the year by the KVKs of Zone-I. The state wise break up of FLDs on pulse crops includes 191 in Punjab, 90 in Haryana, 671 in Himachal Pradesh and 239 in Jammu & Kashmir. The state wise details of results of FLDs on oilseed crops are presented as under:

Punjab

A total of 191 demonstrations on pulse crops were conducted by KVKs of Punjab covering an area of 34.85 ha in the farmers' field during the year under report including nine in pigeon pea, four in blackgram and 820 in chickpea (Table 24). Technology demonstrated on various crops under pulse performed better over local check. The increase in demonstration yield over local check varies from 24.13 to 44.77 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 compared to farmers' practices.

Haryana

A total of 90 demonstrations on pulse crops were conducted by KVKs of Punjab covering an area of 36.40 ha in the farmers' field during the year under report including five in pigeon pea, 19 in guar and 66 in chickpea (Table 25). Technology demonstrated on various crops under pulse performed better over local check. The increase in demonstration yield over local check varies from 16.67 to 28.57 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 compared to farmers' practices.

Table 24: Frontline demonstrations on pulses conducted in Punjab

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Pigeon Pea	1	9	3.20	10.32	7.13	44.77	30676	2.02	17842	1.64
Blackgram	1	4	0.80	8.63	6.19	39.42	15202	1.50	6590	1.24
Chickpea	6	178	30.85	13.98	12.24	14.20	34383	2.87	15655	2.36
		191	**34.85**							

Table 25: Frontline demonstrations on pulses conducted in Haryana

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Pigeon Pea	1	5	2.00	18.9	14.7	28.57	11073	1.27	6344	1.15
Guar	1	19	8.00	10.5	9.00	16.67	11125	1.51	8400	1.43
Chickpea	2	66	26.40	18.63	15.17	22.86	54863	2.92	43250	2.33
		90	**36.40**							

Himachal Pradesh

A total of 671 demonstrations on pulse crops were conducted by KVKs of Punjab covering an area of 56.00 ha in the farmers' field during the year under report including 379 in blackgram, 15 in moong,16 in cow pea 75 in chickpea, 24 in lentil and 162 in rajma (Table 26). Technology demonstrated on various crops under pulse performed better over local check. The increase in demonstration yield over local check varies from 18.03 to 45.50 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 compared to farmers' practices.

FLD on Blackgram

Jammu & Kashmir

A total of 239 demonstrations on pulse crops were conducted by KVKs of Punjab covering an area of 25.83 ha in the farmers' field during the year under report including 50 in blackgram, 42 in moong, 20 in cowpea 35 in lentil, 15 in rajma and 77 in pea (Table 27). Technology demonstrated on various crops under pulse performed better over local check. The increase in

Table 26: Frontline demonstrations on pulses conducted in Himachal Pradesh

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Blackgram	4	379	37.8	7.91	5.96	32.60	35964	3.21	28143	2.98
Moong	1	15	2.00	7.28	5.00	45.50	48700	4.18	32700	3.48
Cowpea	1	16	2.00	10.70	7.40	44.59	56000	3.96	29300	3.34
Chickpea	2	75	5.3	10.18	8.30	22.59	37240	2.68	23499	2.11
Lentil	1	24	2.00	7.20	6.10	18.03	15000	1.71	11500	1.61
Rajma	3	162	6.9	10.84	7.67	41.35	79200	3.16	43433	2.21
		671	**56**							

Table 27: Frontline demonstrations on pulses conducted in Jammu & Kashmir

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Blackgram	1	50	10.00	4.11	3.18	29.25	23210	2.05	16480	1.84
Moong	2	42	5.00	6.40	4.90	30.61	23345	2.67	21285	2.51
Cowpea	1	20	1.35	9.50	7.00	36.00	99700	2.32	65000	1.62
Lentil	2	35	0.98	4.35	3.85	12.99	37375	1.81	20400	1.45
Rajma	1	15	3.00	4.98	2.83	75.97	73600	3.83	32300	2.33
Pea	4	77	5.50	11.93	9.18	29.97	50500	1.99	28262	1.48
		239	**25.83**							

FLD on Chickpea

demonstration yield over local check varies from 12.99 to 75.97 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 compared to farmers' practices.

3.1.2.4 Vegetable & spice crops: A total of 2013 demonstrations were conducted in various vegetable & spice crops covering an area of 143.82 ha during the year by the KVKs of Zone-I. The state wise break up of FLDs on pulse crops includes 141 in Punjab, 150 in Haryana, 723 in Himachal Pradesh and 999 in Jammu & Kashmir. The state wise details of results of FLDs on vegetable & spice crops are presented as under:

Punjab

A total of 141 demonstrations on vegetable crops were conducted by KVKs of Punjab covering an area of 24.72 ha in the farmers' field during the year under report including 30 in brinjal, 15 in bottle gourd, 15 in broccoli, 58 in pea, nine in onion and 14 in chili (Table 28). Technology demonstrated on various crops under vegetables performed better over local check. The increase in demonstration yield over local check varies from 6.25 to 35.80 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 compared to farmers' practices.

Haryana

A total of 150 demonstrations on vegetable crops were conducted by KVKs of Haryana covering an area of 55.1 ha in the farmers' field during the year under report including 32 in tomato, 20 in cauliflower, 10 in bottle gourd, 28 in carrot, 25 in pea, 25 in onion and 10 in muskmelon (Table 29). Technology demonstrated on various crops under vegetables performed better over local check. The increase in demonstration yield over local check varies from 5.67 to 50.13 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 vegetable crops have led to gain in yield as compared to farmers' practices.

Himachal Pradesh

A total of 723 demonstrations on vegetable crops were conducted by KVKs of Himachal Pradesh covering an area of 48.83 ha in the farmers' field during the year under report including 61 in tomato, 15 in

Table 28: Frontline demonstrations on vegetable& spice crops conducted in Punjab

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Brinjal	2	30	1.00	490.00	442.50	10.73	60000	3.10	50000	2.70
Bottle gourd	2	15	0.05	59.60	56.00	6.43	60000	1.30	43000	0.82
Broccoli	1	15	0.02	170.00	160.00	6.25	195000	4.25	132000	3.20
Pea	2	58	20.80	106.68	96.50	10.54	75700	3.51	59750	2.50
Onion	2	9	1.85	212.50	172.00	23.55	59404	1.71	48195	1.38
Chili	2	14	1.00	137.50	101.25	35.80	35794	1.76	26357	1.30
		141	**24.72**							

cauliflower, 16 in cabbage, six in broccoli, 55 in bottle gourd, 264 in cucumber, five in capsicum, 20 in colocasia, 41 in okra, 96 in pea, six in elephant foot yam, five in fenugreek, 35 in French bean, 30 in potato, 46 in onion, 13 in turmeric and 9 in ginger (Table 30). Technology demonstrated on various crops under vegetables performed better over local check. The increase in demonstration yield over local check varies from 13.95 to 50.00 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.

Jammu & Kashmir

A total of 999 demonstrations on vegetable crops were conducted by KVKs of Jammu & Kashmir covering an area of 15.17 ha in the farmers' field during

Table 29: Frontline demonstrations on vegetable& spice crops conducted in Haryana

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Tomato	4	32	12.80	269.00	249.25	50.13	64650	2.60	45257	1.91
Cauliflower	2	20	8.00	202.73	191.85	5.67	136220	3.86	125920	3.49
Bottle gourd	1	10	4.00	301.25	282.00	6.83	194375	12.78	180150	11.44
Carrot	2	28	3.30	246.50	164.19	50.13	80972	2.97	125725	4.46
Pea	1	25	20.00	83.10	75.00	10.80	116960	4.00	107500	3.90
Onion	2	25	3.00	300.00	275.00	9.09	210000	3.34	185000	3.05
Muskmelon	1	10	4.00	106.75	82.50	29.30	42225	2.29	20250	1.54
		150	**55.10**							

Table 30: Frontline demonstrations on vegetable crops conducted in Himachal Pradesh

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Tomato	7	61	4.66	396.52	311.01	27.50	331819	3.80	226976	2.92
Cauliflower	2	15	2.40	222.85	176.20	26.48	206850	4.63	130000	3.34
Cabbage	2	16	0.75	279.20	236.00	18.31	183258	3.28	147665	2.81
Broccoli	1	6	0.50	156.00	127.00	22.83	166160	3.45	125000	2.91
Bottle gourd	1	55	2.00	275.00	160.00	71.88	370000	4.60	190000	3.80
Cucumber	4	264	20.30	262.68	218.20	20.38	255403	5.11	207833	4.40
Capsicum	1	5	0.40	245.00	215.00	13.95	362000	2.44	297000	2.23
Colocasia	1	20	2.00	150.00	100.00	50.00	164000	4.10	88000	2.75
Okra	4	41	2.46	164.81	128.69	28.06	94558	2.61	66041	1.91
Pea	7	96	6.06	134.75	106.93	26.01	143739	3.77	100319	2.94
Elephant Foot Yam	1	6	0.24	410.00	348.60	17.61	336800	2.21	252900	1.94
Fenugreek	1	5	0.40	69.00	53.00	30.19	19300	1.67	10100	1.37
French bean	2	35	0.88	194.30	139.45	39.33	263525	3.59	169433	2.64
Potato	3	30	3.60	216.00	187.00	15.51	128290	2.38	109293	1.91
Onion	4	46	1.33	239.61	176.65	35.64	190135	5.18	128210	3.83
Turmeric	1	13	0.15	290.00	210.00	38.10	238000	3.16	154000	2.57
Ginger	1	9	0.70	187.00	156.00	19.87	68140	1.57	41000	1.36
		723	**48.83**							

FLD on Broccoli

FLD on Chilli

the year under report including 160 in brinjal, 5 in cabbage, 17 in Chinese cabbage, 30 in okra, 160 in bottle gourd, 36 in pea, 15 in French bean, 167 in menthi, 20 in onion, 4 in garlic, 162 in chili and 223 in coriander (Table 31). Technology demonstrated on various crops under vegetables performed better over local check. The increase in demonstration yield over local check varies from 10.97 to 170.27 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 compared to local check.

3.1.2.5 Fruits: A total of 129 demonstrations were conducted in various fruits crops covering an area of 20.22 ha during the year by the KVKs of Zone-I. Technology demonstrated on various fruit crops viz. guava, kinnow, apple, plum, apricot, pomegranate and mango, performed better over local check. The increase in demonstration yield over local check varies from 10.03 to 42.19 percent (Table 32). The BC ratio of all the demonstrated technologies was also observed higher than the local check. Technologies such as Integrated

Table 31: Frontline demonstrations on vegetable crops conducted in Jammu & Kashmir

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Brinjal	1	160	1.50	172.00	155.00	10.97	112000	1.86	99000	1.76
Cabbage	1	5	0.01	900.00	333.00	170.27	665000	2.89	19400	1.03
Chinese cabbage	1	17	0.01	482.91	222.23	117.30	1031780	3.47	285160	2.79
Okra	2	30	3.50	117.50	84.50	39.05	116702	3.80	81750	2.80
Bottle gourd	1	160	0.25	200.00	170.00	17.65	148000	2.84	132000	2.75
Pea	1	36	5.50	77.67	55.57	39.97	155333	3.26	109333	2.93
French bean	1	15	0.75	239.80	124.50	92.61	376635	2.69	132370	1.74
Menthi	1	167	0.70	150.00	134.00	11.94	140000	3.50	123800	3.35
Onion	1	20	1.00	384.50	227.50	69.01	656090	3.15	313705	2.23
Garlic	1	4	0.20	92.00	76.80	19.79	580800	4.74	480400	3.58
Chili	2	162	1.50	16.00	12.00	33.33	132000	2.20	112000	2.00
Coriander	1	223	0.25	50.00	41.00	21.95	145000	3.86	115100	3.54
		999	**15.17**							

Table 32: Frontline demonstrations on fruit crops conducted by KVKs

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Guava (Punjab)	2	10	4.80	325.63	278.88	16.76	133038	3.05	97860	2.52
Guava (Haryana)	1	10	4.00	205.75	187.00	10.03	112025	2.20	70950	1.82
Guava (HP)	1	5	0.18	88.04	71.39	23.32	170322	2.82	87902	2.60
Kinnow (Punjab)	1	8	4.80	166.13	123.68	34.32	37017	1.33	10762	1.11
Apple (HP)	8	70	5.19	132.88	92.20	42.19	400643	3.02	266065	2.48
Plum (HP)	1	10	0.25	132.77	98.00	35.48	219334	3.12	123409	2.77
Apricot (HP)	1	10	0.36	150.12	116.67	28.67	274723	3.80	166024	3.51
Pomegranate (HP)	1	2	0.40	192.00	156.00	23.08	518000	4.36	388000	3.45
Mango (HP)	1	4	0.24	33.72	24.02	40.38	31160	1.44	7060	1.11
		129	**20.22**							

Disease Management, Integrated Pest Management, Integrated Weed Management and improved varieties of various fruits crops have led to gain in yield as local check.

3.1.2.6 Flowers: A total of 105 demonstrations were conducted on marigold flower covering an area of 18.10 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 12.41 to 29.41 percent (Table 33). 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 as compared to local check.

FLD on Marigold

Table 33: Frontline demonstrations on flowers conducted by KVKs

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Marigold (Punjab)	1	3	0.80	32.60	29.00	12.41	160000	2.90	80000	1.40
Marigold (Haryana)	1	10	4.00	27.11	23.00	17.87	155400	2.87	97500	2.30
Marigold (HP)	1	20	0.80	329.50	260.50	26.49	281125	1.46	113950	1.19
Marigold (J&K)	3	72	12.50	202.20	156.25	29.41	168219	3.91	34850	1.82
		105	**18.10**							

3.1.2.6 Fodder crop: A total of 1158 demonstrations were conducted in various fodder crops covering an area of 195.10 ha during the year by the KVKs of Zone-I. The state wise break up of FLDs on pulse crops includes 267 in Punjab, 81 in Haryana, 63 in Himachal Pradesh and 747 in Jammu & Kashmir. The state wise details of results of FLDs on vegetable & spice crops are presented as under:

Punjab

A total of 267 demonstrations on fodder crops were conducted by KVKs of Punjab covering an area of 58.39 ha in the farmers' field during the year under report including 116 in maize, 24 in pearl millet, 26 in oat, and 101 in berseem (Table 34). Technology demonstrated on various fodder crops performed better over local check. The increase in demonstration yield over local check varies from 14.72 to 20.95 percent. 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.

Haryana

A total of 81 demonstrations on fodder crops were conducted by KVKs of Haryana covering an area of 12.39 ha in the farmers' field during the year under report including 16 in maize, 15 in oat, 42 in berseem and 8 in cowpea (Table 35). Technology demonstrated on various fodder crops performed better over local check. The increase in demonstration yield over local check varies from 8.31 to 24.26 percent. 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.

Himachal Pradesh

A total of 63 demonstrations on fodder crops were conducted by KVKs of Himachal Pradesh covering an area of 6.60 ha in the farmers' field during the year under report including 10 in maize, 15 in napier bajara hybrid, 28 in oat, and 10 in guinea grass (Table 36). Technology demonstrated on various fodder crops performed better over local check. The increase in demonstration yield

Table 34: Frontline demonstrations on fodder crops conducted in Punjab

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Maize	6	116	28.90	381.97	324.87	17.58	50636	3.64	43687	3.34
Pearl millet	2	24	2.80	557.50	479.50	16.27	21417	2.75	17986	2.58
Oat	2	26	5.44	865.38	715.48	20.95	66612	4.14	44822	2.91
Berseem	3	101	21.25	200.93	175.15	14.72	92928	2.86	59359	2.29
		267	**58.39**							

Table 35: Frontline demonstrations on fodder crops conducted in Haryana

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Maize	1	16	4.75	457	395	16.00	39475	3.23	32638	2.95
Oat	2	15	1.25	548.85	506.75	8.31	21084	1.59	16743	1.48
Berseem	3	42	5.39	949.24	785.56	20.84	96635	3.732	73180	3.11
Cowpea	1	8	1	292	235	24.26	29478	3.05	22880	2.84
		81	**12.39**							

over local check varies from 27.93 to 142.13 percent. 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.

FLD on Fodder Crop Oat

Jammu & Kashmir

A total of 747 demonstrations on fodder crops were conducted by KVKs of Jammu & Kashmir covering an area of 117.75 ha in the farmers' field during the year under report including 77 in maize, 644 in oat, and 26 in sorghum (Table 37). Technology demonstrated on various fodder crops performed better over local check. The increase in demonstration yield over local check varies from 32.42 to 74.61 percent. 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.

3.1.2.7 Commercial crop: A total of 508 demonstrations were conducted on commercial crops covering an area of 201 ha during the year by the KVKs of Zone-I. Technology demonstrated on commercial

Table 36: Frontline demonstrations on fodder crops conducted in Himachal Pradesh

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Maize	1	10	1.00	330.00	202.00	63.37	22185	1.99	7270	1.36
Napier Bajra	1	15	1.00	862.00	356.00	142.13	162400	17.20	61000	7.12
Hybrid Oat	3	28	3.60	350.53	274.00	27.93	42643	2.59	30233	2.13
Guinea Grass	1	10	1.00	274.00	206.00	33.01	13400	1.79	8100	1.64
		63	**6.60**							

Table 37: Frontline demonstrations on fodder crops conducted in Jammu & Kashmir

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Maize	3	77	14.60	230.80	124.00	74.61	88325	2.14	36000	1.32
Oat	11	644	99.90	184.82	138.83	32.42	38969	2.14	24420	1.54
Sorghum	2	26	3.25	422.50	315.00	32.86	33500	1.82	20000	1.16
		747	**117.75**							

Table 38: Frontline demonstrations on commercial crops conducted by KVKs

Crop	No. of KVKs	No. of Demos	Area (ha)	Yield (q/ha)		% increase	Economics of Demo		Economics of check	
				Demo	Check		Net return (₹)	BCR	Net return (₹)	BCR
Cotton (Punjab)	3	237	92.60	20.51	17.16	19.74	54076	1.79	41693	1.57
Cotton (Hrayana)	6	255	104.00	19.46	16.77	16.08	42223	1.99	31891	1.77
Sugarcane (Punjab)	1	10	2.00	820.00	750.00	9.33	125125	2.10	92500	1.70
Sugarcane (Haryana)	1	6	2.40	725.00	645.00	12.40	139500	2.78	109500	2.30
		508	**201**							

crops such as cotton and sugarcane performed better over local check. The increase in demonstration yield over local check varies from 9.33 to 19.74 percent (Table 38). 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 cotton and sugarcane have led to gain in yield over local check.

3.1.2.8 Livestock and poultry: KVKs of Zone-I also conducted 910 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.

3.1.2.9 Other demonstrations: KVKs of Zone-I conducted 279 demonstrations on mushroom production and 89 demonstrations on vermicompost. KVKs also conducted 220 demonstrations on improved farm implements covering an area of 88.00 ha on *Direct Seeding of Rice* (DSR), wheat sowing by happy seeder and zero till drill, management of paddy straw by baler cum knotter and paired row trench method of sugarcane planting by trench digger. In case of home science aspect, 278 demonstrations were conducted on home science aspects. Improved technologies such as use of solar cookers, value addition, nutrition garden, etc. were demonstrated among the farmwomen in the states of Punjab, Haryana, Delhi, Himachal Pradesh and Jammu & Kashmir. These technologies have been found to be acceptable by the farm women and resulted in drudgery reduction to the farmwomen.

Demonstration on mineral mixture administration in sheep

3.1.3 Capacity Development

Under capacity development 7251 capacity building courses were organized by the KVKs in which approx. 1.95 lakh stakeholders got benefited. Out of 7251 courses, 2561 courses were organized by 18 KVKs of Haryana, 1978 courses by 22 KVKs of Punjab, 1540 courses by 20 KVKs of Jammu & Kashmir, 1089 courses by 13 KVKs of Himachal Pradesh and 83 courses by the KVK of Delhi. Eighty six per cent of these courses (6323) were organized to meet the needs of farmers/farmwomen/rural youth (young farmers) and extension functionaries. KVKs organized 615 vocational training courses benefitting 17645 participants, including mostly the rural youth, young women and school dropouts. Besides these need based courses, KVKs organized 313 sponsored courses for 14305 participants. The state-wise number of courses and the participants in these different categories of capacity building is given in Table 39.

Zone-I comprises of two types of topographical regions - hill and plain. In terms of participation, KVKs of plain region accounted for 63.74 per cent of participants whereas KVKs of hill region accounted for 36.26 per cent of participants.

3.1.3.1: Capacity building courses for farmers and farm women.

A total of 5003 capacity building courses were organized for farmers and farm women by the KVKs during the period under report, involving approx. 1.29 lakh participants (Table 40). The maximum of 1832 courses were organized in Haryana followed by 1274 courses in Punjab, 1116 courses in Jammu & Kashmir, 722 courses in Himachal Pradesh and 59 courses in

Table 39: 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. of Courses	No. of Participants	No. of Courses	No. of Participants	No. of Courses	No. of Participants	No. of Courses	No. of Participants
Punjab	22	1670	36217	63	2647	245	6355	1978	45219
Haryana	18	2300	66354	59	2114	202	7287	2561	75755
Delhi	1	72	1411	2	80	9	196	83	1687
H.P.	13	867	27561	135	6212	87	2355	1089	36128
J&K	20	1414	31766	54	3252	72	1452	1540	36470
Total	**74**	**6323**	**163309**	**313**	**14305**	**615**	**17645**	**7251**	**195259**

Table 40: State wise details of training courses organized for farmers/ farm women

State/ UT	No. of Courses	No. of Participants								
		General			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Punjab	1274	16976	4965	21941	2726	2433	5159	19702	7398	27100
Haryana	1832	33178	7959	41137	6234	4351	10585	39412	12310	51722
Delhi	59	687	285	972	181	51	232	868	336	1204
Himachal Pradesh	722	7744	7184	14928	4493	4414	8907	12237	11598	23835
Jammu & Kashmir	1116	15165	1723	16888	5179	3914	9093	20344	5637	25981
Total	**5003**	**73750**	**22116**	**95866**	**18813**	**15163**	**33976**	**92563**	**37279**	**129842**

Training on Value Addition for girls at KVK Patiala

Training on Bee Keeping for farmers

Delhi. These courses involved 92563 men and 37279 women as participants. The state-wise participation of SC/ST community and farmwomen reveals the fact that Haryana had better participation of SC/ST (10585 out of 33976 participants) and Himachal Pradesh had better participation of SC/ST women participants (4414 out of 15163 women participants).

Capacity building courses for farmers and farm women were organized in the 11 major areas related to agriculture and allied sectors, the details of which are given in Table 41. Most number of courses were organized on Crop Production (899) followed by Plant Protection (849), Horticulture (804), Home

Table 41: Details of thematic area wise courses organized for farmers/ farm women.

Thematic area	No. of Courses	No. of Participants								
		General			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop Production	899	15921	2779	18700	4073	1952	6025	19994	4731	24725
Horticulture	804	12115	2610	14725	3356	2431	5787	15471	5041	20512
Soil Health and Fertility Management	540	9556	796	10352	1761	815	2576	11317	1611	12928
Livestock Production and Management	383	5183	629	5812	1646	912	2558	6829	1541	8370
Home Science/Women empowerment	762	772	12325	13097	444	6395	6839	1216	18720	19936
Agril. Engineering	173	2342	285	2627	1213	303	1516	3555	588	4143
Plant Protection	849	16910	1299	18209	3677	1090	4767	20587	2389	22976
Fisheries	85	1136	138	1274	241	86	327	1377	224	1601
Production of Inputs at site	61	864	73	937	196	181	377	1060	254	1314
Capacity Building and Group Dynamics	291	5427	836	6263	1404	607	2011	6831	1443	8274
Agro-forestry	156	3524	346	3870	802	391	1193	4326	737	5063
Total	**5003**	**73750**	**22116**	**95866**	**18813**	**15163**	**33976**	**92563**	**37279**	**129842**

science/Women empowerment (762) and Soil health and fertility management (540). The maximum participation was also recorded in Crop Production (24725) followed by 22976 participants in Plant Protection. The maximum number of women farmers participated in Home Science/Women empowerment (18720) followed by Horticulture (5041) and Crop Production (4731).

3.1.3.2: Training courses for rural youth

KVKs trained 24226 rural youth by organizing a total of 880 training courses. The state wise distribution of these training courses reveal that 316 courses were organized in Haryana followed by 283 in Punjab, 170 in Jammu & Kashmir, 100 in Himachal Pradesh and 11 in Delhi. The number of rural youth who participated in the KVK training courses revealed that 10985 participants were recorded highest in Haryana followed by 6779 in Punjab, 3652 in Jammu & Kashmir, 2646 in Himachal Pradesh and 164 in Delhi. The details are given in table. Among 24226 rural youth trained, 8383 were SC/ST (33.49 per cent) and 8248 were women (34.04 per cent).

The thematic area wise categorization of courses related to rural youth revealed that most number of training courses were organized on value addition (112) followed by of mushroom production (94), with a participation of 2571 and 2439 rural youth respectively Table 42. Other major areas which, involved rural youth were bee-keeping (92 courses, 2461 participants), dairying (79 courses, 3951 participants). The maximum number of women in the rural youth category preferred training related to value addition (2152) followed by tailoring and stitching (1326).

3.1.3.3: Extension Functionaries

The state wise details of capacity building courses organized for extension functionaries by the KVKs and the participation level are given in Table 43. The data indicated that a total of 440 courses were organized with a participation of 9241 extension functionaries. Among the different states, 152 courses in Haryana followed by 128 courses in Jammu & Kashmir, 113 courses in Punjab, 2 courses in Delhi and 45 courses in Himachal Pradesh. In terms of participation, about 39.08 per cent of these participants were recorded in Haryana (3627 out of a total of 9241).The extent of SC/ST and women participation in different states indicates that Jammu & Kashmir recorded higher participation from SC/ST community (625 out of a total of 1707) and Haryana recorded highest women extension functionaries (926 out of a total of 1966) in Haryana.

Training on Compost preparation for rural youth

Table 42: State wise details of training courses organized for rural youth

State/ UT	No. of Courses	No. of Participants								
		General			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Punjab	283	3727	1278	5005	869	905	1774	4596	2183	6779
Haryana	316	5062	1374	6436	2012	2537	4549	7074	3911	10985
Delhi	11	77	57	134	17	13	30	94	70	164
Himachal Pradesh	100	917	797	1714	548	384	932	1465	1181	2646
Jammu & Kashmir	170	2237	317	2554	512	586	1098	2749	903	3652
Total	**880**	**12020**	**3823**	**15843**	**3958**	**4425**	**8383**	**15978**	**8248**	**24226**

Vocational Training on Electric Motor Rewinding

Integrated Pest Management (75 courses, 1519 participants) and Integrated Nutrient Management (54 courses, 1441 participants). The majority participation of women extension functionaries was in the area of women and child care (724 out of 836).

3.1.3.4: Sponsored Training Courses

A total of 313 sponsored training courses were organized by the KVKs during the reporting period Table 45. Himachal Pradesh organised maximum number of sponsored training courses 135 courses

Table 43: State wise details of training courses organized for extension functionaries

State/ UT	No. of Courses	No. of Participants								
		General			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Punjab	113	1768	351	2119	104	115	219	1872	466	2338
Haryana	152	2405	726	3131	316	200	516	2721	926	3647
Delhi	2	0	37	37	0	6	6	0	43	43
Himachal Pradesh	45	490	249	739	229	112	341	719	361	1080
Jammu & Kashmir	128	1459	49	1508	504	121	625	1963	170	2133
Total	**440**	**6122**	**1412**	**7534**	**1153**	**554**	**1707**	**7275**	**1966**	**9241**

The details of training courses organized for extension functionaries during the year are given in Table 44. The maximum participation was recorded in the area of productivity enhancement in field crops wherein 94 courses (out of 440) attracted 1975 extension functionaries (out of a total of 9241). Other areas of interest for extension functionaries were followed by Haryana 59 courses and Jammu & Kashmir 54 courses. But the extent of participants was highest in Himachal Pradesh with 6212 participants, followed by Jammu & Kashmir with 3252 participants, Punjab with 2647 participants and Haryana with 2114 participants. Out of 14305 participants, 5965 were from SC/ST community (41.69 per cent) and 2962 were women.

Table 44: Training area wise details of courses organized and participants under extension functionaries.

Thematic Area	No. of Courses	No. of Participants								
		General			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Productivity enhancement in field crops	94	1496	155	1651	263	61	324	1759	216	1975
Integrated Pest Management	75	1283	32	1315	182	22	204	1465	54	1519
Integrated Nutrient management	54	1242	22	1264	161	16	177	1403	38	1441
Rejuvenation of old orchards	19	262	18	280	52	10	62	314	28	342
Protected cultivation technology	24	243	8	251	93	22	115	336	30	366
Formation and Management of SHGs	6	58	24	82	0	16	16	58	40	98
Group Dynamics and farmers organization	19	404	3	407	63	3	66	467	6	473
Information networking among farmers	14	185	0	185	46	5	51	231	5	236
Capacity building for ICT application	14	104	134	238	23	37	60	127	171	298
Care and maintenance of farm machinery and implements	7	77	1	78	43	0	43	120	1	121
WTO and IPR issues	2	23	0	23	4	0	4	27	0	27
Management in farm animals	15	166	12	178	77	7	84	243	19	262
Livestock feed and fodder production	15	132	3	135	13	0	13	145	3	148
Household food security	12	55	91	146	42	37	79	97	128	225
Women and Child care	31	90	536	626	22	188	210	112	724	836
Low cost and nutrient efficient diet designing	17	0	339	339	0	69	69	0	408	408
Production and use of organic inputs	10	154	0	154	45	19	64	199	19	218
Gender mainstreaming through SHGs	12	148	34	182	24	42	66	172	76	248
TOTAL	**440**	**6122**	**1412**	**7534**	**1153**	**554**	**1707**	**7275**	**1966**	**9241**

Table 45: State wise details of sponsored training courses organized and distribution of participants

State/UT	No. of courses	No. of Participants								
		General			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Punjab	63	1144	441	1585	395	667	1062	1539	1108	2647
Haryana	59	815	54	869	537	708	1245	1352	762	2114
Himachal Pradesh	135	2483	1663	4146	1150	916	2066	3633	2579	6212
Jammu Kashmir	54	1509	153	1662	919	671	1590	2428	824	3252
Delhi	2	76	2	78	2	0	2	78	2	80
Total	**313**	**6027**	**2313**	**8340**	**3003**	**2962**	**5965**	**9030**	**5275**	**14305**

Under sponsored courses category, 157 courses were conducted in area of the Crop Production and Management followed by 54 in the area of Agriculture Extension and 49 courses in Home Science with a participation of 8024, 2610 and 1776 participants respectively. Details of sponsored training are described in Table 46.

Table 46: Thematic area wise details of sponsored training courses organized and distribution of participants

Thematic Area	No. of Courses	No. of Participants								
		General			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop production and management	157	4156	1371	5527	1547	950	2497	5703	2321	8024
Post harvest technology and value addition	8	0	83	83	3	169	172	3	252	255
Farm machinery	5	31	58	89	7	67	74	38	125	163
Livestock and fisheries	40	470	153	623	563	291	854	1033	444	1477
Home Science	49	79	369	448	115	1213	1328	194	1582	1776
Agricultural Extension	54	1291	279	1570	768	272	1040	2059	551	2610
Total	**313**	**6027**	**2313**	**8340**	**3003**	**2962**	**5965**	**9030**	**5275**	**14305**

3.1.3.5: Vocational Training Courses

During the reporting period, 615 vocational training courses were organized by KVKs with the participation of 17645 stakeholders. In Punjab, KVK organized 245 courses with a participation of 6355 participants. In Haryana, KVKs organized 202 courses with 7287 participants. The details of number of courses and participants in each State/UT of the Zone-I are given in table. The participation of women was encouraging in vocational training courses with a participation of 39.49 per cent (6890 out of 17645).

Vocational training courses were organized on 5 major thematic areas as provided details in Table 47. Most courses were conducted on income generation activities 278 (out of 615) courses for 7004 participants. Livestock and fisheries were the second most preferred area for vocational training with 130 courses and 3318 participants.

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

Table 47: State wise details of vocational training courses organized and distribution of participants

State/UT	No. of courses	No. of Participants		
		Male	Female	Total
Punjab	245	3840	2515	6355
Haryana	202	4891	2396	7287
Himachal Pradesh	87	1129	1226	2355
Jammu Kashmir	72	682	770	1452
Delhi	9	123	73	196
Total	**615**	**10665**	**6980**	**17645**

Table 48: Thematic area wise details of vocational training courses organized and distribution of participants

Thematic Area	No. of Courses	No. of Participants		
		Male	Female	Total
Crop production and management	82	1460	763	2223
Post harvest technology and value addition	130	429	2889	3318
Livestock and fisheries	122	4657	363	5020
Income generation activities	278	4073	2931	7004
Agricultural Extension	3	46	34	80
Total	**615**	**10665**	**6980**	**17645**

Training Programme on Cucumber Cultivation

Training on Poultry

3.1.4 Frontline Extension Programmes

A total of 54653 extension programmes were organized through different methods and means wherein technologies related to agriculture and allied sectors were appraised among 9.98 lakh farmers, and 0.18 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 49). Data further indicated that KVKs in Punjab organized maximum extension programmes (28323) followed by Jammu & Kashmir (16209), Himachal Pradesh (5493), Haryana (4112) and Delhi (516).

The state-wise details of extension programmes organized are furnished in Table 50. Data implies that KVKs' efforts through extension programmes covered a large number of farmers and created awareness about new technologies, activities and agri-enterprises. In respect of utilizing mass media KVKs popularized technologies through extension literature (1823), newspaper coverage (1549), popular articles (388), radio talks (318) and TV talks (319). State-wise details of extension programmes are presented in Table 51.

KVKs have organized a total of 54653 extension programmes and created awareness among 9.98 lakh farmers and 0.18 lakh extension personnel on various aspects like varietal performance, production technologies, resource conservation technologies, protected cultivation, diversification through Horticulture and Floriculture, Net house technologies, Integrated Pest and Disease Management, Animal Health and Nutrition, Production of Animal, Poultry, Crop, Human Nutrition etc.

Table 49: Activity wise extension programmes organized and distribution of participants

Name of State	No. of activities	Participants											
		Farmers (Others) (I)			SC/ST (Farmers) (II)			Extension Officials (III)			Grand Total (I+II+III)		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Advisory Services	29392	40545	12261	52806	14303	2493	16796	197	53	250	55045	14807	69852
Agricultural camp	6	499	0	499	0	0	0	10	5	15	509	5	514
Agri mobile clinic	114	2606	384	2990	572	133	705	1	0	1	3179	517	3696
Animal Health Camp	121	2773	667	3440	922	259	1181	52	17	69	3747	943	4690
Awareness camp	142	7222	1149	8371	1593	466	2059	1833	774	2607	10648	2389	13037
Diagnostic visits	3447	4648	1120	5768	1728	877	2605	79	24	103	6455	2021	8476
Exhibition	257	26444	9386	35830	9059	5453	14512	434	119	553	35937	14958	50895
Exposure visits	2041	14770	2735	17505	2829	2282	5111	246	90	336	17845	5107	22952
Extension Literature	38	9965	955	10920	1776	546	2322	54	5	59	11795	1506	13301
Ex-trainees Sammelan	45	976	309	1285	496	162	658	19	10	29	1491	481	1972
Farm Science Club Conveners meet	62	2126	65	2191	232	60	292	235	13	248	2593	138	2731
Farmer Scientist Interaction	11	197	19	216	47	16	63	55	4	59	299	39	338
Farmers Seminar	161	10071	1863	11934	1530	545	2075	245	60	305	11846	2468	14314
Farmers visit	0	44896	7406	52302	15637	4931	20568	187	55	242	60720	12392	73112
Field Day	409	13674	1889	15563	2987	957	3944	604	154	758	17265	3000	20265
Film Show	470	7108	2414	9522	3856	1600	5456	89	35	124	11053	4049	15102
Group Meetings	554	5341	946	6287	1289	664	1953	168	91	259	6798	1701	8499
Important Days of Celeberation	569	15033	4642	19675	3186	2301	5487	432	219	651	18651	7162	25813
Kisan Ghoshti	374	102672	13940	116612	64769	11308	76077	614	199	813	168055	25447	193502
Kisan Mela	213	62252	6508	68760	11563	5748	17311	1981	1230	3211	75796	13486	89282
Lectures delivered	5086	198423	23601	222024	53511	9982	63493	3218	2375	5593	255152	35958	291110
Mahila Mandals	17	186	293	479	42	78	120	5	4	9	233	375	608
Method Demonstrations	1949	24446	2252	26698	3520	1369	4889	259	181	440	28225	3802	32027
Scientific visit	8504	28884	3801	32685	7002	2141	9143	792	465	1257	36678	6407	43085
Self help group	98	262	903	1165	54	109	163	7	3	10	323	1015	1338
Soil health Camp	214	4245	917	5162	1219	571	1790	151	26	177	5615	1514	7129
Soil test campaigns	132	3336	441	3777	771	180	951	58	11	69	4165	632	4797
Workshops	227	1927	620	2547	790	370	1160	305	62	367	3022	1052	4074
Total	**54653**	**635527**	**101486**	**737013**	**205283**	**55601**	**260884**	**12330**	**6284**	**18614**	**853140**	**163371**	**1016511**

Table 50: State wise frontline extension programmes organized and distribution of participants

Name of State	No. of activities	Participants											
		Farmers (Others) (I)			SC/ST (Farmers) (II)			Extension Officials (III)			Grand Total (I+II+III)		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Punjab	28323	463122	51505	514627	146540	30889	177429	6764	4149	10913	616426	86543	702969
Haryana	4112	72723	10319	83042	20569	6872	27441	3031	1373	4404	96323	18564	114887
Delhi	516	4907	2196	7103	861	268	1129	142	65	207	5910	2529	8439
Himachal Pradesh	5493	47094	27021	74115	20930	14269	35199	1307	501	1808	69331	41791	111122
Jammu & Kashmir	16209	47681	10445	58126	16383	3303	19686	1086	196	1282	65150	13944	79094
Total	**54653**	**635527**	**101486**	**737013**	**205283**	**55601**	**260884**	**12330**	**6284**	**18614**	**853140**	**163371**	**1016511**

Table 51: State-wise extension programmes organized for mass contact

Activity	Punjab	Haryana	Delhi	H.P.	J&K	Total
Extension Literature	1532	164	3	50	74	1823
Newspaper Coverage	637	495	28	172	217	1549
Popular Articles	127	82	5	99	75	388
Radio talks	161	38	4	40	75	318
TV Talks	90	83	26	39	81	319

Lecture at block level farmer traning camp KVK Mandi

Invitation lecture at block level farmer training camp at KVK Hoshiarpur

Visits of Hon'ble Governor of Himachal Pradesh to the Exhibition installed by KVK Mandi

Field day at KVK Ropar

3.1.5 Technology Week

Technology week is being organized by KVKs to demonstrate and create awareness among the stakeholders about the latest technologies on various aspects of agriculture and allied sectors generated by NARS. Normally it is observed for a period of 4 to 6 days. A total of 26539 farmers have participated in technology week programmes organized by 37 KVKs. This programme enabled the KVKs to have strong linkages and collaboration with various line departments of the district, as evident by the involvement of technical programmes including 76 Kisan Ghosties, 330 lectures from eminent scientists and experienced officials, 66 exhibitions, 52 film shows, 15 fair, 227 visits to the KVK farm and 206 diagnostic practical's (Fig. 1).

In addition, 430 q of high yielding varieties/hybrid seeds, 1,27,232 planting materials and 3,293 literature related to latest technologies in agriculture were made available to more than 25,000 participating farmers, farm women, extension officials and other stakeholders.

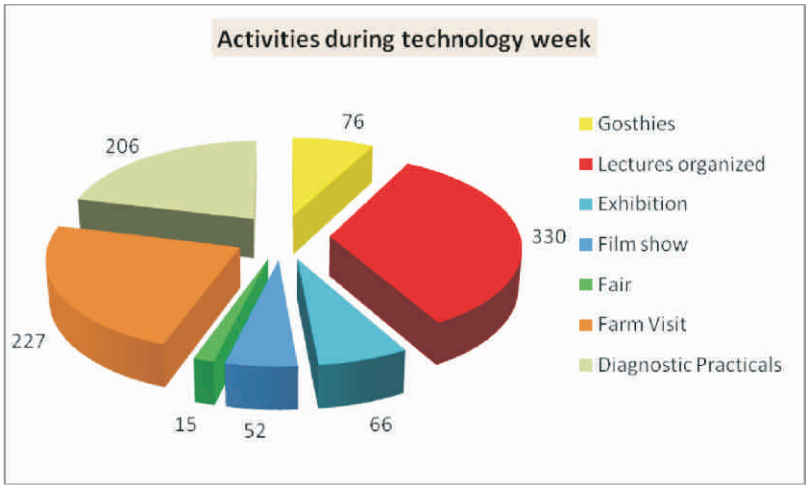

Fig. 1: Number of different activities conducted during the celebration of technology week by KVKs

3.1.6 Kisan Mobile Advisory

Kisan Mobile Advisory is one of the Information and Communication Technology (ICT) tools for dissemination of requisite and need based agricultural information to the farmers at the right time. KVKs are sending information via short message service to farmers advising them on the vital issues of agricultural importance. During the reporting period, 41 KVKs of Zone-I have advised farmers regularly on the areas of crops, livestock, weather, marketing and any other information related to awareness of latest agricultural technologies generated by State Agricultural Universities through the text messages depending on the expertise and facility available with KVKs. A total of 3092 text messages regarding agriculture and allied fields were delivered to 20,28,347 farmers of the Zone (Table 52). The messages were mainly based on crops (1565), awareness among the farmers about agricultural based technologies (398), livestock (592), other enterprises related to agriculture (176), weather (219) and marketing (63).

3.1.7. 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 aspects of agriculture and rural development for sharing experiences and expertise. Such collaborations with line departments will help the KVKs in arranging resources for carrying out different extension activities and developing demonstration and training infrastructure. The organizations having linkage and collaboration with KVKs have been listed in Table 53. 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 52: Details of Kisan Mobile Advisory by KVKs of Zone-I

KVKs	No. of Farmers covered	No. of Messages (Text)	Crop	Livestock	Weather	Marketing	Awareness	Other enterprise	Any Other
Punjab	245159	1034	387	199	44	37	240	72	55
Haryana	1264323	439	294	39	7	1	64	30	4
Delhi	18449	17	14	2	0	0	1	0	0
HP	472144	327	212	31	3	7	21	33	20
J&K	28272	1275	658	321	165	18	72	41	0
Total	**2028347**	**3092**	**1565**	**592**	**219**	**63**	**398**	**176**	**79**

Table 53: List of organizations having linkage and collaboration with KVKs

Sl. 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; IIWBR, Karnal; NDRI, Karnal; DMR, Solan; IIMR, New Delhi; CSSRI, Karnal; CRIDA Hyderabad; CITH, Srinagar; IIHR, Bangalore; IARI, New Delhi; CAZRI, Jodhpur
4.	Central Government Departments and schemes Central Poultry Development Organization (CPDO), Central Wareho use 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), Punjab Agricultural Management & Extension Training Institute (PAMETI), Ludhiana
8.	Electronic and Print Media
9.	Private Firms: Mahindra & Mahindra, Dhannuka, India Potash Limited, Bioveta, Mother Dairy, Crystal, Chambal Fertilizers, Adani Agri Logistics Pvt. Ltd, Insurance Companies
10.	Agriculture Skill Council of India (ASCI), Hindustan Insecticide Limited (HIL), National Fishries Development Board (NFDB)
11.	International Agencies: Japan International Cooperation Agency

Three KVKs of GADVASU utilized about ₹5.51 lakhs under Rasthtriya Krishi Vikas Yojna (RKVY) for providing training on various aspects of livestock farming. Similarly, three more KVKs of the zone utilized ₹1.93 lakhs from National Fisheries Development Board (NFDB) for provided training and created awareness among farmers on fish rearing practices in Punjab and J&K. This year about 16 KVKs collaborated with Agriculture Skill Council of India (ASCI) for conducting various skill development trainings in different agricultural fields and utilized an amount of ₹46 lakhs. 11.5 lakh is also provided by Hindustan Insecticides Limited (HIL) under MIDH Scheme of GOI to four KVKs of this zone for creating awareness programme among farming community regarding safe and judicious use of different agro-chemicals in crops.

3.1.8. E-connectivity

The e-linkage has been provided to selected KVKs and 8 ICAR-ATARIs during XI Plan. In Zone-I, e-linkage facility was established in 27 KVKs along with ICAR-Agricultural Technology Application Research Institute, Zone-I, Ludhiana. State wise list of KVKs provided with this facility is depicted in Table 54. These KVKs have been connected electronically through VSAT to the KVK Hub established at Agricultural Extension Division, New Delhi. The communication between KVKs across the country was enabled though IP phones provided to each KVK.

3.1.9 Production of 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.

During the period under report, KVKs have produced 18645.32 q seed of crop varieties and 16175 kg bio-fertilizers and supplied to 799630 and 1988 farmers respectively. Further, KVKs produced 1660 number of bio-agents and supplied to 4810 farmers. KVKs produced 15.39 lakh number of planting materials and 0.10 lakh numbers of livestock worth ₹ 59.08 lakh and 14.26 lakh and supplied to 12729 and 716 farmers respectively (Table 55).

3.1.9.1 Seeds

KVKs in Punjab have produced the highest quantity (9800 q) of seeds followed by KVKs of Jammu & Kashmir, Haryana, Himachal Pradesh and Delhi (Table 56). Out of total quantity of seed produced, the highest quantity was on Cereals (10565 q) followed by fodder, vegetables, pulses, oilseeds, commercial crop, spices ans flowers (Table 57).

3.1.9.2 Planting material

KVKs in Himachal Pradesh have produced more planting materials of crops (10.51 lakh) followed by KVKs in Jammu & Kashmir, Punjab, Haryana and Delhi. Out of total 15.39 lakh planting material 12.27 lakh were vegetable seedlings and the rest were fruit crops, flower crops, fodder slips and forest species (Table 58).

Table 54: Details of KVKs with E-Connectivity facility

State	No. of KVKs	Name of KVK
Punjab	9	Bathinda, Faridkot, Ferozepur, Gurdaspur, Hoshiarpur, Kapurthala, Nawanshahar, Patiala, Sangrur
Haryana	9	Hisar, Faridabad, Yamunanagar, Rohtak, Sonipat, Panipat, Karnal, Rewari, Gurgaon
Himachal Pradesh	6	Shimla, Kangra, Hamirpur, Sirmour, Kullu, Mandi
Jammu & Kashmir	3	Leh, Pulwama, Jammu
Total	27	

Table 55: Production and supply of technological inputs

SI. No.	Category	Quantity	Value (₹ in lakh)	Farmers (No.)
1.	Seeds of crop varieties (q)	18645.32	332.65	799630.00
2.	Planting Material (in lakh)	15.39	59.08	12729.00
3.	Bio-fertilizer (No./Kg)	4480/16175	1.98	1988.00
4.	Bio-Agents (No./Kg)	1660/2852	3.48	4810.00
5.	Livestock and fisheries (in lakh)	0.10	14.26	716
	Total		**411.45**	**819873**

Table 56: State-wise production of seeds and planting materials by KVKs

State	Seeds			Planting Material		
	Quantity (q)	Value (₹ in lakh)	Farmers (No.)	Quantity (lakh)	Value (₹ in lakh)	Farmers (No.)
Punjab	9800.00	259.27	17991	1.14	4.70	2362.00
Haryana	1545.36	38.05	683719	0.48	3.14	527.00
Delhi	84.58	3.30	790	0.01	0.00	0.00
H.P.	383.14	23.99	356	10.51	34.44	5741.00
J&K	6832.24	8.05	96774	3.24	16.80	4099.00
Total	**18645.32**	**332.65**	**799630**	**15.39**	**59.08**	**12729.00**

Table 57: Crop category wise production of seeds

Crop category	Quantity (q)	Value (₹ in lakh)	Farmers (No.)
Cereals	10565.18	269.67	698736
Oilseeds	134.17	7.03	2221
Pulses	177.58	14.54	720
Vegetables	573.86	13.26	1297
Commercial crops	97.42	0.48	733
Fodder crop seeds	7073.86	25.41	95923
Flowers	7.03	1.33	0
Spices	16.22	0.94	0
Total	**18645.32**	**332.65**	**799630**

Table 58: Crop category wise production of planting materials

Crop category	Quantity (lakh)	Value (₹ in lakh)	Farmers (No.)
Vegetable seedlings	12.27	5.03	8434
Fruits	0.84	50.70	3266
Flowers	0.08	0.08	250
Fodder crop saplings	0.94	2.06	501
Forest species	1.26	1.22	150
Total	**15.39**	**59.08**	**12601**

3.1.9.3 Bio-Products

Bio-fertilizers produced by the KVKs constitute microbial inoculants and vermicompost. Thus, microbial inoculants are given in number of packets and vermicompost is given in kilogram. KVKs in Punjab have produced highest quantity of bio-fertilizers; whereas, KVKs in Jammu and Kashmir have produced highest quantity of vermicompost (Table 59 & 60).

Table 59: State wise production of bio-products

State	Quantity (No.)	Quantity (Kg)	Value (in lakh)	Farmers (No.)
Punjab	4170	163	1.07	1797
Haryana	450	6103	0.24	155
Delhi	0	2442	0.20	21
HP	1520	2849	3.33	4788
J&K	0	7470	0.63	37
Total Zone	**6140**	**19027**	**5.46**	**6798**

Table 60: Category wise production of bio-products

Category	Quantity		Value (in lakh)	Farmers (No.)
	(Nos)	(Kg)		
Bio Fertilizers	4480	16175	1.98	1988
Bio Agents	1660	2852	3.48	4810
Total	**6140**	**19027**	**5.46**	**6798**

3.1.9.4 Livestock and fisheries

KVKs in Punjab have produced more number of livestock (8879) followed by Jammu & Kashmir, Haryana and Himachal Pradesh. Out of the total production of livestock more quantity (9826) was under poultry followed by Piggery and Diary (Table 61 & 62) however no KVK produced fingerlings.

Table 61: State-wise production of livestock materials

State	Quantity (No.)	Value (in ₹)	Farmers (No.)
Punjab	8879	103196	585
Haryana	526	819980	42
Himachal Pradesh	20	404968	18
Jammu & Kashmir	573	98274	71
Total	**9998**	**1426418**	**716**

Table 62: Category wise production of livestock

Animal Category	No. of Animals	Value (₹ in lakh)	Farmers (No.)
Cows	14	5.02	14
Calf	9	0.01	7
Piggery	82	2.79	11
Goat	67	5.13	13
Poultry	9826	1.31	671
Total	**9998**	**14.26**	**716**

3.1.10. Soil, water and plant analysis

During the year, KVKs of this Zone have analysed a total of 28,236 samples including 20,489 soil samples, 4528 water samples, and 3,219 plant samples. There were 21,999 farmers from 6804 villages who have availed this facility and KVKs earned ₹2.19 lakh from this service (Table 63).

Data in Table 64 showed state-wise samples analysed by KVKs and Punjab has analysed 6950 soil samples followed by Haryana (4836), Himachal Pradesh (4341), Jammu & Kashmir (3999) and Delhi (363). The KVKs have also distributed 12,574 soil health cards to 9,301 farmers from 2880 villages (Table 65).

Table 63: Details of samples analysed during 2016-17

Particulars	No. of samples	No. of farmers	No. of villages	Amount realised (₹)
Soil	20489	16057	3809	164095
Water	4528	3011	1849	55317
Plant	3219	2931	750	0
Total	**28236**	**21999**	**6408**	**219412**

Table 64: State-wise samples analysed during 2016-17

State	Soil samples analysed				Watersamples analysed				Plant samples analysed			
	No.	Farmer	Village	Amount realised (₹)	No.	Farmer	Village	Amount realised (₹)	No.	Farmer	Village	Amount realised (₹)
Punjab	6950	4579	1741	101820	2372	1545	1040	40712	1140	1026	299	0
Haryana	4836	2804	735	28670	2070	1386	780	14605	1307	1304	417	0
Delhi	363	358	43	0	86	80	29	0	0	0	0	0
H.P.	4341	4409	756	22505	0	0	0	0	155	155	0	0
J&K	3999	3907	534	11100	0	0	0	0	617	446	34	0
Total	**20489**	**16057**	**3809**	**164095**	**4528**	**3011**	**1849**	**55317**	**3219**	**2931**	**750**	**0**

Table 65: State-wise soil Health Card distributed during 2016-17

S. No.	State	No. of Soil Health Card distributed	No. of farmers	No. of Villages
1.	Punjab	4934	3338	1204
2.	Haryana	2811	1771	1148
3.	Delhi	350	347	42
4.	Himachal Pradesh	2335	1712	277
5	Jammu & Kashmir	2144	2133	209
	Total	**12574**	**9301**	**2880**

3.1.11. Rain water harvesting units

Rainwater harvesting units with micro irrigation system were established in seven KVKs. A total of 12 training courses and 48 demonstrations were conducted and 223.22 q seed and 2,38,232 planting materials were produced utilizing this facility. Further, 4383 farmers and 206 officials visited these units and got acquainted with the rainwater harvesting technique.

3.1.12 Prosperity of farmers through technological interventions

Balraj Singh - An innovative onion seed producer

In Punjab, rice-wheat is the major crop rotation. This intensive rotation has led to many serious consequences in the form of depletion of natural resources as well as squeezed profit margins from farming due to consistent rise in input costs. Most of the farmers are not satisfied with this existing cropping pattern but they have no way out to move away from the traditional farming of paddy-wheat in the absence of proper policy support especially procurement and marketing of alternate crops. Farmers often discuss with agriculture scientists of KVK, Sangrur to suggest them more remunerative crop choices for making most efficient utilization of their land so that they may earn more income per unit of land. With this hope to find an alternative of paddy-wheat rotation, Mr. Balraj Singh a resident of village Arkwas came in contact with KVK, Sangrur. He showed keen interest in growing vegetables/adoption of some other enterprise to get more income from his 12 acres operational land.

KVK intervention: The KVK scientists interacted with him about his past experiences in agriculture and explored his urge to shift away from traditional practice. Finally, the experts suggested him that the seed production of vegetables especially onion and cowpea could be a good option to get higher income. Thereafter, he attended vocational training course on seed production of vegetables conducted by KVK, Sangrur. During the training, he got motivated to adopt seed production of onion and growing nursery of different vegetables for earning a better profit. He worked hard to learn details of good cultural practices for quality seed production, selection of quality bulbs and its storage techniques.Although seed production of onion is very difficult phenomenon as it is produced in two phases and takes long time to produce quality seed. But he was determined to achieve his goal.

Output: After acquiring training, he started growing bulb sets of onion variety PRO-6 in 2014. As it was a novel venture for him so he faced several difficulties in raising this crop but he never got discouraged. He maintained regular interaction with KVK during crop growth period. The scientists from KVK visited his field and helped him to solve the problems. Ultimately, he produced quality bulb sets and sorted it properly which were planted in the upcoming season i.e. in the month of November on 0.1acre to produce quality seed from bulb crop. With his sincere efforts and timely advice of KVK scientists, he earned a net profit of Rs. 18,000/- by producing 12 kg seed.

During next year, he followed seed to seed method of seed production alongwith bulb to seed method on an area of 0.3 acre and got Rs. 98,700 as net profit. In 2016, he started producing seed of onion variety Punjab Naroya as well as PRO-6 on 2.5 acres and cowpea on 3.0 acres and earned a net income of Rs.7,62,000/- from both crops. Simultaneously, he also started nursery production of onion, cucurbits and chili to further enhance his farm income.

Outcome: Diversification with seed production and nursery raising resulted in better economic returns to Mr. Balraj Singh as compared to the conventional crops. The inclusion of aforesaid vocations enhanced by his net income by 5.13 and 97.40 per cent (almost double) in 2015-16 and 2016-17 respectively over that of 2014-15.

Impact: Witnessing his success and economic benefits, 14 farmers from his own and neighbouring villages have replaced their traditional farming with vegetable cultivation on some part of their land. They also visited his farm for experiential learning and to seek his guidance. He has been recognized at State level Kisan Fair for his achievements in seed production.

Dairy Farming: A Profitable Venture

The problem of unemployment is alarming in India and Punjab is no exception. Almost, all farmers of Punjab are not satisfied with irregular income they incurred from agriculture and most of them have given their land on lease, as they think that, traditional crops rotation agricultural practices are no more a profitable venture. Youth are not showing interest towards farming and they are trying to seek alternative ways for their livelihood. The most liked alternative means of livelihood among youth is going abroad, but in reality, nobody wants to leave his home but the problem of non-remunerable agriculture coupled with problem of unemployment has compelled them. To address this problem dairy farming on scientific line can play important role. But dairy farming along with agriculture farming is very much old concept, however with the adoption of crossbreeding policy it resulted in rapid increase in milk production. However, it also led to increase in the prevalence of disease which are difficult

to manage if traditional practice of dairy farming is followed as a result, it led to closure of many small dairy farm dues to problem of disease like metabolic disease and reproductive problem anoestrus, repeat breeding etc disorder which ultimately leads to failure of these small dairy farmer entrepreneur.

The inadequate knowledge regarding scientific feeding and managements of high yielding dairy animals along with problem of disease and climatic stress inadequacy tolerance in these animals has promoted a sense of negative feeling among public regarding crossbred dairy cattle. But Mr. G. S. Sidhu has proved that dairy farming as enough potential to address these problem like unemployment, unproductive agriculture farming along with supplementing their family income provided with proper use of family member if it is carried out on scientific line and itcan very well integrated with agriculture farming as both enterprises complement each other. The manure produced from farm is use and promote the soil fertility.

KVK intervention: Mr. Gurjit Singh Sidhu is a resident of district Barnala and who has done diploma in business management from "Greenwich University of London" after completing his graduation from PTU, Jalandhar in 2013. Likewise, other youth, he was also very much interested in going abroad. After staying in UK for two years and seeing the hardship in acquiring permanent residentship at their, he came back to Punjab and started assisting his father in agriculture farming. After seeing the margin of profit is not much in agriculture, he started consulting various line department related to agriculture for starting a new enterprise along with agriculture.

As agriculture did not provide regular income and during lean period they have plenty of free time to run and manage small venture like dairy farming, poultry farming etc in addition to agriculture. He came in contact with KVK, Barnala after reading a news regarding concluded vocational training programme published in local daily. The scientist of KVK make him aware about all vocational training which are available for agriculture farming community. Thereafter, he developed keen interest in dairy farming but feel fear about the problem of reproductive disorder like anoestrus and repeat breeding in high yielding dairy animals. After convincing him by KVK scientist that Dairy farming is an profitable enterprise if carried out on scientific lines with maintenance of proper record and it can plays an important role in providing huge margin of profit, as all resources are available in plenty on the land of Punjab which are required for commercial dairy and thereafter got himself registered for scientific dairy farming. He has undergone a vocation training course on "scientific dairy farming" of 15 days duration at KVK, Barnala.

In July, 2015, he started his Dairy farm with an investment of four lakh and procured four animals out of which 2 were cow (Holstein Friesian) and 2 were female buffalo (Murrah) with average milk of yield of 20 litre per day. Slowly and slowly over two years, he has increase the strength of his farm from 4 to 37 animals through raising their own heifer and by purchasing some female calf of recorded high yielding dairy animal at economic price, out of which 25 are HF and 12 are buffalo (Murrah). He used milking machine in dairy cow and kept whole record on scientific line but practice hand milking in buffalo. All family membersassist him in this business. After getting significant profit in his venture, he wanted to further increase the strength and size of his farm.Scientist of KVK routinely visit his farm and advise him regarding the housing and managements of disease such as metabolic disease, mastitis, anoestrus and repeat breeding diarrhea through nutritional and therapeutically intervention and guided him to follow fodder cultivation schedule to avail green fodder throughout year for dairy animals as it make the cost of production economic and also provide all needed support him in preparing silage for the availability of green fodder during lean period and he make use of agriculture land during free time for growing green fodder without missing any crops which additionally adds profit to its family income.

Output: The daily milk production of his farm is 350 litres from 15 animals who are in lactation and sale his dairy farm milk to customer without involvement of any middle at the @ Rs 40 /ltr and @ of Rs 30/ltr in case of buffalo and cow milk respectively while other animals are heifer which are pregnant mostly. In 2015, his agriculture gross income from land holding of 12 acre was Rs 9,00,000/annum and with a net income return of Rs 4,80,000/annum but presently (2017) his income from same land holding with the adoption of scientific dairy farm has shown many fold increase in his income just over a period of two year. Presently his gross income after adopting scientific dairy farming is Rs36,00,000 with a net annual income Rs 12,80,000 from same land holding.

Mr. Gurjit Singh Sidhu feels that dairy farming is very much profitable venture provided it is carried out on scientific line with suitable concerned scientist advice and one must have full knowledge regarding various milch breed of dairy animal, their feeding practices, raising of their own replacement stock and managements of common disease through vaccination and proper intervention at an appropriate time to make it as a profitable venture.

Impact: A desirable change in the thinking among the among agriculture farmers of nearby villages are seen in favour of dairy farming on scientific line as there is significant increase in demand such courses received by KVK Barnala. He also motivated youth of nearby villages to start dairy farm on scientific line and also assist them in becoming self-reliant. A total of 15 farmer started their own dairy farm after seeing the successful venture of Mr.Gurjit Singh Sidhu and they are earning a good profit and they often came and visit him to seek advice from him.

Women empowerment of rural farm women through value addition

Value addition in fruits and vegetables is a highly remunerative enterprise. In Hamirpur District fruits grown are Mango, Amla, Guava, Litchi, Plum, Citrus, papaya and Vegetables are Okra, Cauliflower, Cucumber, Tomato, Onion, Peas, and potato. Almost 60-70% of the people of Hamirpur District belong to the category of small and marginal farmers and landless labourers.Women play a vital role in farm and household activities. Their direct and indirect contribution at the farm and household level alongwith other management operationhas not only help to save their assets but also led to increase the family income. Empowerment of women is essential to harness their potential in main stream of economic development. The major strategy of women empowerment includes social,economic and political empowerment and gender justice.For economic empowerment the concept of Self-help group (SHGs)based on group approachto rural development is indeed a boon to women who undertake viable economicactivities at their ownhas not only help to save their assets but also lead to their family income

There is a complete absence of on-farm employment for a considerable period of time during the year for rural farm women. Moreover,the lack of resources and knowledge about the Post-harvest management and value addition of fruits and vegetables kept the rural farm women dependent mainly on thetraditional cropsand livestock fortheir livelihood. In order to raise their family income, value addition of fruits and vegetables emerged to be an effective alternative source of income generation for women.

Value addition of fruits and vegetables is therefore offers a profit making technology to the rural farm women which holds the promise to rejuvenate their sinking economic condition. Rural farm women recognise the importance of value added products throughout the year as an additional income for higher returns in addition to their household work. A significant number of farm women approached Krishi Vigyan Kendra- Hamirpur at Bara for proper guidance. Earlier, apart from the routine agriculture farming, rearing of cattle and buffaloes farmwomen of the area used to prepare value added products in small quantity at domestic level which was a seasonal activity.

KVK intervention: Krishi Vigyan Kendra Hamirpur at Bara recognising the value of preparation of value added products in uplifting the economy of marginal, small and landless farm women, provided Post harvest management and value addition of agricultural crops a central place in its Annual Action Plans. The KVK has conducted number of activities such as trainings to the farm women/rural youth and skill development programmes on value addition to the larger dimensions. Demonstrations/On Farm Trials were also conducted at farm women's locations in order to provide hands on experience to them. KVK also organised various activities such as exposure visit to promote value addition activities and to motivate the youth/farm women for establishment of low cost processing units for large scale adoption. All theextension methods like on – campus, off-campus training programmes, demonstration, literature, film shows, exposure visits and OFTs have beenadopted by the Krishi Vigyan Kendra to provide ultimate benefit to the farm rural women of the District.

Output and Impact: The KVK played significant role in the income generation and women empowerment through Post harvest and value addition beside other enterprise.Farm women were Guided to do activities step by step from making SHG, procuring raw and packaging material for value addition, preparation ,Packaging, storing and marketing etc.

Smt. Reena, a house wife is now a small entrepreneur of the village Gagal,BlockNadaun,Distt. Hamirpur H.P. She came in contact with the KVK and attended trainings on PHT and value addition of agricultural & horticultural crops at KVK Hamirpur at Bara. After attended trainings under the guidance of KVK scientists she has adopted the innovative andsustainable Post harvest and value addition practices resulting into good returns.Now she started a Self Help Group named "AJIVIKA" under the guidance of KVK and started preparing different value added products viz. Pickles, Candy, Chutney and *peda*etc . Shestarted selling their products in local market and in local fairs. In 30 days she earned an amount of Rs. 17768/- with expenditure of Rs. 6167/- in initial stage.

Horizontal expansion of value addition: Value addition is being an indoor activity, labour intensive and profitable venture provides ample opportunities for rural farm women and unemployed youth.KVK Hamirpur is providing technical support to 10 Self Help Groups (SHGs) which are working on this aspect and earning a handsome amount by selling their products.Three Self Help Groups were also formed by the KVK viz. Ajivika SHG Nadaun, Shiv Shakti SHG Badain and Sarswati SHG Gahalian.These groups are working well and also spreading their skills and knowledge to the other villages also.SHG is preparing their products from locally available materials and selling these prepared materials in local market by contacting the local shopkeeper, door to door supply, local fairs andalso getting special orders from people for birthday, marriage,retirement and other functions.

Economic viability: Economic viability of the enterprise is very good as raw material is easily and locally available. There is no problem of labour because being a small entrepreneur group members are sufficient. SHG is also getting orders of different value added products for functions,marriages, birthday parties etc.especially of pede. SHG is earning Rs.18000-20000 per month with an expenditure of Rs.5000-6000.The earning is increase if there is any local fair or any order received by Group for functions.

Diversification through off-season vegetable production for livelihood of hill farmers

Kullu district of Himachal Pradesh, owing to its diverse agro-ecological situations, is endowed with comparative advantage for growing various off-season vegetables. The consumption of vegetables is ever increasing and to meet this increasing demand, more and more emphasis is required on off-season vegetable production for higher income and employment generation in the rural sector. Hence, vegetables play a significant role in quality food, nutritional security as well as poverty alleviation. The vegetables are rich source of vitamins, proteins, minerals, carbohydrates and fibers. In hills, where job opportunities in other sectors are very less, off-season vegetable growing can be an attractive proposition to engage more and more rural youth to adopt agriculture as vocation (means of self employment), halt rural migration to cities and achieve higher agriculture growth and pave the way for doubling income. Further, global warming has resulted in the shift of apple to higher altitudes, off-season vegetables is the suitable candidate remunerative alternative for livelihood. Keeping in view, Krishi Vigyan Kendra (KVK), Kullu initiated its endeavour for the diversification of agriculture through off-season vegetable cultivation.

Plan, implement and support: During early nineties, awareness campaigns were initiated by KVK, Kullu to popularize the off-season vegetable cultivation with the formation of 20 *Kisan* clubs. Simultaneously, about 100 rural youth were trained at KVK, Kullu in collaboration with the Department of Agriculture for meeting the input requirements of off-season vegetables. In present scenario, when there is strong network of various stake holders throughout the district through various Self Help Groups (SHGs) and farmers clubs etc., KVK has established itself as a knowledge hub to increase outreach to every nook and corner of the district. Therefore, KVK, Kullu conducted various extension activities in the district for promotion of off-season vegetable cultivation. Acknowledging KVK as knowledge hub, all the stake holders working for the enhancement of livelihood options to the farmers like State Government Departments for Agriculture, Horticulture, Animal husbandry, Mid-Himalayan Watershed Project (Forest), Great Himalayan National Park, District Youth Services and Sports, SHGs, NGOs, NYK etc. are seeking KVK's expertise for the diversification through off-season vegetable production.

Output: KVK has assessed and refined various technologies through 45 OFTs on off-season vegetable cultivation and also prepared technology modules based on recommendation domains for different agro-

ecological situations in the district. To popularize these technologies, off and on campus training programmes based on the principles of "Learning by Doing" and 150 FLDs based on "Seeing is Believing" were organized. Under the State Government's ambitious programme "*Pt. Deen Dyal Kisan Bagwan Samridhi Yojna*", now known as "*Y S Parmar Kisan Bagwan Swarojgar Yojna*", it has been made mandatory for polyhouse owners to get training from the KVK. Similarly, *Krishak Mitras* from every *panchayat* are also being trained at KVK, before extending their services in the farming community. Literature pertaining to these technologies was developed and distributed to the farmers and extension officers. *Kullu Krishi Patrika*, a quarterly magazine of the Krishi Vigyan Kendra, played a significant role in dissemination of aforesaid technologies. For the quality production of vegetables, availability of healthy nursery is kingpin. Therefore, KVK has developed large number of the farmers as entrepreneurs for nursery raising. Regular services are also provided to the farmers to solve their day to day problems and to monitor the progress and obtain feedback. Now, regular text messages (SMSs) are also being sent to nearly 45, 600 farmers of the district for timely information and alerts.

Outcome: KVK's efforts have resulted in considerable increase in area under vegetables in the district, which is otherwise very difficult in fragile eco-system of hills. The total area under off-season vegetables in the district has increased from 301 ha in 1995-96 to 6046 ha in 2015-16. The productivity (average) of the vegetables as a whole has also increased to 185.78q/ha in 2015-16. Various vegetable cultivation technologies popularized by KVK Kullu have also been spread to the adjoining district Mandi, where large numbers of farmers have now adopted vegetable cultivation as a vocation for self employment for their livelihood. With the adoption of vegetable cultivation, the net annual income of the farmers in the district ranges from Rs.1,50,000 to Rs. 2,00,000/- from one acre of land and subsequently their standard of living has improved.

Impact: The economic impact of the various vegetable cultivation technologies was studied from a random sample of about 200 farmers in the district. Based upon the economic analysis, the income earned by the vegetable growers ranged upto Rs.1.5-2.0 lakh/acre. Due to KVK interventions, the adoption rate of various vegetable cultivation technologies varies from 65-85 per cent.

Outcome: The field performance of HD-2967 under frontline demonstrations strongly narrate its superiority, in terms of higher net returns and B:C ratio (3.37) over local check wheat varieties (B:C ratio of 2.19).

Impact: This leads to the sharing of farm saved seed among the farmers which further leads to the speedy spread of HD-2967. On the recommendations of KVK Kathua, the State Department of Agriculture has also procured the seed for large scale distribution to the farmers of the district, which further enhances the area under improved variety of wheat in rice-wheat cropping system. The spread of HD-2967 in Kathua district over the last few years has been reached to 44584 ha during 2014-15.

Transforming the life of a Border Conflict Victim through Skill Development

As the title suggests, the story is about Mrs. Sushma Devi,resident of Suchetgarh, a small hamlet situated on international border in Tehsil RS Pura, Jammu district of J&K andwho belongs to an underprivileged social caste. Due to unprovoked firing across the border, the life of Mrs. Sushma and her family was quite miserable. It was not possible to meet two square meals for her family. The pathetic condition of her family compelled her to leave her studies in 9th standard only. Her parents finally solemnized her marriage at very early life with one Mr. Suresh Kumar R/o RS Pura, who is a daily rated worker in PHE department, where the salary was meager and that too never in time. Moreover, the couple had no adequate farm land for livelihood. So there was crisis in the family. She always thought that how she will be able to earn of her own? Will she ever be independent? But with such poor educational background, how can she do so? Though, Sushma was not highly educated, but had a quest to be independent in life and as a result she didn't succumb to the adversities. Finally, it was Krishi Vigyan Kendra (KVK, RS Pura) that became the turning point in her life.

KVK Intervention: A Ray of Hope and answer to all her questions was found when she heard of Krishi Vigyan Kendra which gives training to rural women on skill development. Mrs. Sushma Devi is an excellent example of how woman can effectively utilize their talents and leisure time for income generation. She

attended first training on food processing at KVK along with other ladies of same block. This was just the beginning after that she never looked back. She started coming to KVK at regular basis to enquire about other skill development programmes. Her persistent efforts attracted KVK scientists to identify her as one of the candidate for other training programmes as well. Decorative Cushion making training programme was one of those trainings that changed her life completely.

Input: Though she was a hardworking lady but she lacked opportunity and KVK provided her with that opportunity she was looking for. She realised that there are people who will help her to succeed.Meanwhile, she attended 7 days training programme on cushion making along with other members of SHG who were part of a local NGO. SMS Home- science of KVK motivated her to be part of self help groups. NGO representatives explained to her that how she can take loans from SHG to meet emergency situations which can be house repair, medical emergency or starting a business enterprise or advance agricultural farming etc.After successfully completing training she showed her interest towards the business and became a regular visitor to KVK, R.S.Pura for further guidance & help. Subject Matter Specialist,Home Science, KVK- Jammu arranged extra classes for her on cushion making and value addition of household articles with the assistance of Programme Assistant, Home Science. Finally,She became an active member of a local SHG and availed loan through the micro credit scheme and started her venture under the technical guidance of the KVK .

Output: Meanwhile the NGO displayed her cushions to some of the local people who liked her product. The NGO representative contacted us and requested to put up an exhibition cum sale of her cushions at annual day of Holy Cross Convent School, R.S.Pura and at Main Church, Gandhinagar,Jammu. Thus,On 23rd 24th Dec.2016, An exhibition cum sale of around 300 decorative cushions was put up on each venue and these were sold on the same day itself. It was a tremendous morale booster for her. Not only this, she received an order of 105 cushions. Subsequently, KVK Home Scientist coordinated with the people from Red Cross Society, Jammu who organized Mela at Government College, Gandhi Nagar on 27-28 January 2017. She booked a stall there for herself at the cost of Rs.1000 and again her cushions were sold out within no time.

Impact: She has taken bulk orders from fancy stores, textiles and local markets. She has purchased the required raw materials in bulk and has involved other members of the SHG to work along with her. She does the basic designing,enrichment and finishing touches herself and the rest of the work is done by other group members working with her. She purchases the raw materials in bulk at a cheaper rate and the work place is her-own house. Therefore, the profit she gains has increased and now she plans to showcase her products on bigger forums such as Kala Kendra under the guidance of KVK scientists.

- She is selling one cushion at the rate Rs. 200 and earning profit of Rs. 75 to 100. Now, she is selling cushions and taking orders from her home itself. Her average income at present ranges from5000-7000 per month.

- With this innovative and very successful idea, Mrs. Sushma Devi has achieved a greater economic status in her family. She has a greater say in the decision-making process of the family. The micro-credit support and KVK has helped Mrs. Sushma Devi to live a life of dignity, respect and self-reliance.

A silent revolution through scientific livestock farming in Changthang cold deserts: A case study

Changthang is a high altitude plateau in south-eastern Ladakh with vast highland grazing ecosystem consists mainly of rangelands. All water bodies or wetlands of Changthang have extended marshes and surrounding grasslands inhabited by nomadic pastoralist population known as 'Changpa'. Agricultural farming in this arid region of Ladakh is practiced on a limited scale due to harsh climatic conditions, leaving most of these regions to be used as grazing rangeland. The local Changpas practiceslivestock rearing as a part of their subsistence. The livestock population mainly consists of *changhangi*goats (65%) followed by *changluk sheep* (27%), *tibetian*yak (*demo)* (5%), local horse (2%) and local cow*(dzo/dzomo)* (1%). Maintenance of such herds was possible only through a skilful organisation of the migration movements to avail pastures in certain niche or at certain times in the particular environment of the cold desert. The contribution that livestock production can make towards enhancing socio-economic status of these

farmers is well recognised in this Himalayan area, although modern agricultural technologies are out of reach for these resource poor farmers in the region. Likewise, most of the livestock population mainly depend on grazing land having a very poor nutrient value which is hardly enough for maintenance of proper livestock health. Traditional rearing practices coupled with poor growth rate of young lambs and kids, low production, reproductive complications, parasitic infestation and high incidence of endemic diseases makes livestock rearing more vulnerable.

KVK intervention: In October 2013, Krishi Vigyan Kendra, Nyoma came into existence for improving the livelihood opportunities among the tribal population of this high altitude region of Ladakhunder the aegis of Indian Council of Agricultural Research. Detailed survey was conducted by the scientists of KVKs for situational analysis. In order to address the various felt need of the livestock keepers, different OFTs and FLDs were carried out by the KVK. Sensing the benefit of scientific livestock rearing vis-a-vis solving the problem of diseases and parasitic infestation among the small ruminant, KVK scientists started motivating the farmers for scientific livestock rearing through a series of activities which includes trainings, demonstrations, providing technical know-how and distribution of inputs like medicines, feed (mash & pellet), mineral mixture etc. Regular field visits and follow-up programmes in the village were made.They were advised to supplement feed and mineral mixture in addition to normalgrazing of their herds.Their family members especially women were also encouraged for various skill development training programmes viz. spinning machine, knitting trainings, value addition in milk under the assistance of Tribal Sub-Plan.

Output: Among various beneficiaries, encouraging results was observed in the animals of a pastoral nomad namedShri Palgon Yangjor, representative of Mudh village. The farmer is 45 years old. He is primary pass person knowing some practical knowledge related to animal and agriculture sector. He is economically sound as per his tribal community is concerned. He is well interested in adopting the scientific approach towards animal rearing. Initially he owned 200 pashmina goats, 100 sheep and two yaks. The average production of these animals was 250 g/goat of raw pashmina per annum, 700g of raw wool per annum by the sheep and average milk production of 5 lit/day by the yaks. He was able to sell about 44 kg of raw pashmina at rate of 2500/kg and 65kg of wool at rate of 200/kg thus making his estimated annual income approximately Rs. 1,25000/- annually.

As Shri Yangjor was a pro-active farmer and keen to adopt all the technological interventions under the guidance of KVK, he further expanded his livestock population to 300 pashmina goat and 150 sheeps within one and half years of time. He was able to sold off pashmina fetching ₹167000/- and wool ₹15000/- by enhanced pashmina yield on average of 20g/animal. The total 3.5 kg of enhanced pashmina yield added ₹8750/- to his annual income. Besides this, there were also significant increased in birth weights of kids to 3.66 kg as a result of feed supplementation.With the revenue generated, he purchased three horses for transportation purpose and four cows for milk consumption. He learned the benefits of scientific livestock practices with respect to timely and proper doses of vaccination, deworming, dipping of sheep in liquid formulation of insecticides to protect them from ecto-parasitic infestation and supplementation of feed and fodder.

Outcome: Under the technical guidance of KVK, most of the herdmen have started purchasing feed (both pellet and mesh) and mineral mixture for their animals. They have learnt the art of scientific animal rearing and investing their money in procuring medicines as well for proper management of their animals. Shri Palgon Yangjor himself invested ₹30000/- for renovation of their animal shed for comfortable lambing and kidding during winter months and his house by ₹60000. He narrated that his estimates annual income crossed ₹2.0 lakhs and by end of 2016 crossed ₹3.0 lakhs and has a sustainable livelihood.

Impact: Shri Yangjor proved to be a role model in his area, being delighted by his success,altogether twelve other herdsmen came forward to adopt the technology package prescribed by KVK Nyoma. They have also started to focus on individual animal performance rather than that of the whole herd and thus intensified the use of scientific practices resulted into better utilization of resources. In this way technology exhibited potential for employment and income generation in the remote area of Changthang.

3.1.13 Tribal Sub-plan (TSP) Scheme

TSP is the programme which intends to ensure exclusive benefits to individuals or families belongs to Scheduled Tribes (ST) and outlay for area oriented schemes directly benefiting STs hamlets/villages having more than 40% STs population. The scheme attempts to develop agriculture and allied activities like irrigation, animal husbandry, dairy development, skill development etc. that provides a source of livelihood to the ST population under this project. In ICAR-ATARI, Zone-I, 9 KVKs were covered under TSP.

TSP scheme involves integrated development of the tribal areas and the communities. With the fast developing world, tribal people needed specific attention not only with monetary allocation but along with special interventions for their rapid socio-economic development. It required an integrated approach from all departments in an integrated approach.

In Himachal Pradesh, 3 KVKs (Lahual & Spiti, Kinnaur and Chamba) while 6 KVKs (Leh, Leh (Addl.), Poonch, Rajouri and Reasi) of Jammu & Kashmir were covered TSP scheme. During the 2016-17 year, KVKs under the TSP scheme organized 64 OFT and FLDs in 1036.7 ha area were organized. A total of 37385 stakeholders attended the extension programmes organized by the KVKs under TSP. A total of 12934 farmers and 679 extension personnel were trained during the reported period. KVKs under TSP produced 2.66 lakh number of good quality planting material and 108.18 tonnes of seed for distribution among farmers (Table 66 & 67).

Treatment of animal camp KVK Rajouri

Pea day celebration at Nesang

Table 66: Performance of KVKs under Tribal Sub-Plan

S.No.	KVK	On- farm trials conducted (No.)	Frontline Demonstration (No.)	Farmers trained (No.)	Extension Personnel trained (No.)	Participants in extension activities (No.)	Production of Seed (tonnes)	Planting Material (lakh)	KMA (Advisories & no. of farmers)	Soil, water & Plant samples
Himachal Pradesh(3)										
1.	Lahul & Spiti	7	14	695	-	3421	5.66	-	0	140
2.	Kinnaur	4	6	2060	-	172	-	2189	9(39796)	456
3.	Chamba	7	125	1662	-	8683	1.60	6475	0	60
	Total	**14**	**145**	**4417**	**-**	**12276**	**56.76**	**8664**	**9(39796)**	**656**
Jammu &Kashmir (6)										
4.	Kargil	7	405	1260	165	4435	3.98	22550		500
5.	Leh	6	8	1783	142	1934	-	206250	24(432)	476
6.	Leh (Addl.)	9	10	1977	85	6052	-	9873	19(4292)	442
7.	Poonch	5	53.5	1106	130	-	14.70	3200	13(1620)	0
8.	Rajouri	8	65.2	1013	38	12268	43.85	1000	48(2000)	145
9.	Reasi	11	350	1378	136	420	39.01	15000	-	74
	Total	**46**	**891.7**	**8517**	**696**	**25109**	**101.54**	**257873**	**104 (8344)**	**1637**
Grand Total		**64**	**1036.7**	**12934**	**696**	**37385**	**108.80**	**2.66**	**113 (48140)**	**2293**

Table 67: State wise performance of KVKs underTribal Sub-plan in Zone-I.

S.No.	Activities	H.P	J&K	Total
1.	On- farm trials conducted (No.)	18	46	**64**
2.	Frontline Demonstration (No.)	145	891.7	**1036.7**
3.	Farmers trained (No.)	4417	8517	**12934**
4.	Extension Personnel trained (No.)	-	697	**697**
5.	Participants in extension activities (No.)	12276	25109	**37385**
6.	Production of Seed (tonnes)	56.76	351.42	**408.18**
7.	Planting Material (lakh)	0.086	2.57	**2.66**
8.	Soil Samples	656	1492	**2148**
9.	Plant Samples	145	0	**145**
10.	Soil health cards issued	626	250	**876**
11.	Kisan Mobile Advisories sent	9	104	**113**
12.	No. of farmers covered under advisories	39796	8344	**48140**

3.2 Agricultural Technology Information Centres

Agricultural Technology Information Centre (ATIC) has been established under the National Agricultural Technology Project (NATP) of the ICAR. Farm worthy technologies have been developed in various institutions in the form of knowledge, technologies, seed, planting materials and publications.

ATIC is a single window delivery system for agricultural information as well as products and technologies developed by the Research Institute with a view to deliver quality services to the clientele.

The services provided through ATIC during 2016-17 and its beneficiaries are given in the Table 68.

Technological services: During the year from these eight ATICs the number of visits performed by the various beneficiaries includes 41,879 visits for technical advice whereas, as much as 2,63717 farmers's visited to obtain products developed by the host institutes. ATICs have provided trainings to 9860 beneficiaries which include farmers, students and technocrats. Soil and water testing facilities at ATICs were used by 7,955 farmers.

Inputs provided: As much as 1,44,782 books and 7,414 technical bulletins were provided by the ATICs to its end users Table 69. A total of 3,312 farmers were benefited with video shows organized by the ATICs. These eight ATICs also provided farm inputs such microbial inoculants, seeds and planting materials, mushroom cultures, bio-pesticides, farm implements, animal feeding materials, etc. The sale of publications such as books, bulletins and CDs have earned Rs. 1,12,24,286/- for the ATICs. Similarly, Rs. 5,38,95,854/- were earned by them with sale of seeds, planting materials and other products and services (Table 70).

Information provided: ATICs replied to 329 different letters and responded to as many as 22,874 phone calls from farmers asking for technical advices. They provided information using different means such as books, bulletins, pamphlets, CDs, video shows, phone calls, letters, etc. They also provide training on different aspects of agriculture which involve innovative ideas and techniques.

3.3 Technological Backstopping by Directorate of Extension

KVKs are being provided with enough technological backstopping in agriculture and its allied sectors through Directorate of Extension Education located in seven State Agricultural Universities viz., PAU, Ludhiana; GADVASU, Ludhiana; CCSHAU, Hisar; Dr. YSPUH&F, Solan; CSKHPKV, Palampur; SKUAST, Jammu and SKUAST, Srinagar.

The Directors of Extension 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 their farmer's requirements.

Table 71 reveals that Directorates of Extension Education of various universities and their officials have participated in 76 Scientific Advisory Committee meeting. Similarly, they have attended 68 Field days, 136 workshops/ Seminars and farmer scientist interactions, 45 technology weeks, 152 Trainings programmes, 106 On Farm Testing (OFT) and 244 Front Line Demonstrations (FLD) programmes organized by various KVKs.

Technological inputs:

These Directorates of Extension Education has published more than 240 different kind of literature

Table 68: Details of activities conducted by ATICs during 2016-17

S.No.	ATIC	Visits of farmers for Technical Advice	Visits of farmers for Technology Products	Phone calls from farmers	Soil & Water Testing Samples
1.	PAU, Ludhiana	9464	246536	536	6688
2.	CCSHAU, Hisar	5484	4000	5130	0
3.	IARI, New Delhi	10575	0	13175	0
4.	CPRI, Shimla	460	0	100	0
5.	NDRI, Karnal	114	1502	1404	0
6.	SKUAST-K, Srinagar	11801	2637	1470	213
7.	Dr. YSPUH&F, Solan	3677	3677	293	1054
8.	CSKHPKV, Palampur	304	5365	766	0
	Total	**41879**	**263717**	**22874**	**7955**

including various technology inventories at their universities. They have also provided the various technological inputs to KVKs such as 10,239 quintals of improved seeds of high yielding varieties, 600 quintals of planting materials and 13,000 packets of bio-fertilizers for demonstration at farmer's fields. More than 5,000 kg of mineral mixture, 180 packets of UMM blocks and 125 kg of bypass fat were also provided to the KVKs for demonstrating purpose in various livestock species. Along with this, more than two hundred numbers of services such as analysis of fecal matter, deworming, soil-water testing and other diagnostic services were facilitated by these directorates.

Tabl 69: Publications sold by ATICs

S. No.	Particulars	Number of sold copies	Revenue generated in ₹	Number of farmers benefited
1.	**Books**	144782	10593651	132616
2.	**Technical Bulletins**	7414	114025	6906
3.	**Technology Inventory**	666	9990	666
4.	**CDs**	50	2200	522
5.	**DVDs**	10	250	01
6.	**Others if any:**	4,82,835	5,04,170	57,830

Table 70: Technological Products & Service Sales provided by ATICs

S. No	Particulars	Quantity	Value in Rs.
1.	**Seeds** (qt.)	4686	30864693
2.	**Planting materials** (No.)	362076	21520836
3.	**Mineral mixture** (qt.)	463	1230849
4.	**Uromin Bricks** (No.)	1252	87640
5.	**Poultry birds** (Kg)	11.4	2474
6.	**Bio Products** No. (bottles)	1697	277002

Table 71: Details of activities conducted by Directorates of Extension Education of SAUs

Directorates of Extension Education	SAC Meetings Attended	Field Days	Workshops/ Seminars	Technology Weeks	Trainings Programmes	OFT Visited	FLD Visited	Publication
PAU, Ludhiana	17	33	39	17	90	15	20	114
GADVASU, Ludhiana	0	0	12	0	5	0	1	10
YSPUH&F, Solan	4	2	3	1	2	2	2	15
CSKHPKV, Palampur	8	0	2	0	2	24	30	5
CCSHAU, Hisar	28	7	42	11	19	41	163	67
SKAUST, Jammu	7	17	28	4	14	12	16	6
SKAUST, Srinagar	12	9	10	12	20	12	12	31
Total	**76**	**68**	**136**	**45**	**152**	**106**	**244**	**248**

3.4 National Innovations in Climate Resilient Agriculture (NICRA)

The world's climate is changing and will continue to change in the coming centuries at rates projected to be unprecedented in the recent human history. The impact of climate change is global, but countries like India are more vulnerable in view that huge population depends on agriculture for its livelihood. Climate change and agriculture are interrelated and both have significant bearing on each other. Climate change and its impact on agricultural production has become an important area of concern for Indian agriculture to ensure food and nutritional security for growing population. National Innovations in Climate Resilient Agriculture (NICRA) is a network project of the Indian Council of Agriculture Research (ICAR) launched in February, 2011. The project aims to enhance resilience of Indian agriculture to climate change and climate variability. NICRA is being implemented in the country with three major components namely, Strategic Research, Technology Demonstration, and Capacity building.

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 (drought/heat wave), Faridkot (high temperature), Fatehgarh Sahib(frost/cold wave), Ropar (frost/cold wave), Yamunanagar (frost in winter), Sirsa (drought/frost), Hamirpur (drought), Kinnaur (cold wave/drought), Kullu (cold wave), Chamba (drought/cold/frost), kathua (drought) and Pulwama (frost/heat wave) and KVK Bandipora (drought).

Research fellow, NICRA taking observations of temperature

Table 72: Details of NRM activities implemented under NICRA by KVKs of Zone-1

Intervention	Technology demonstrated	No. of farmers	Unit/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	338	298
Water harvesting and recycling for supplemental irrigation	Rain water harvesting structure and renovation of farm ponds	59	68
Water saving irrigation methods	Use of Tensiometer for irrigation scheduling in paddy	54	65
Green manuring for soil health improvement	Cultivation of green manuring crops	10	10
Vermi-composting	Use of vermi-compost for soil health improvement	20	5
Alternate energy source	Biogas Plant and Folding two step solar cooker	19	19
Any other-Efficient management of paddy stubbles-Baler-cum-knotter	Use of paddy stubbles for soil health/fertility	510	360
Conservation tillage	Conservation tillage	28	40
Total		**1038**	**865**

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:-

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, vermicomposting and green manuring for soil health improvement and fertility management, use of baler-cum-knotter were followed. Under these interventions, 1038 farmers were benefitted in selected NICRA villages (Table 72).

Wheat sown with Happy Seeder

Sowing wheat with Happy Seeder

Table 73: Crop production interventions

Cold and frost tolerant varieties: KBS-3, KS-101 (Brown Sarson); Sabzaar (Oat); SR-3 (Paddy); PTWG (Turnip); White Round (Radish); Early Nantes (Carrot); RH-0749 (Mustard)

Crop diversification: Him Mash-1, PU-31(Black Gram); DGS-1 (Gobhi Sarson); GHC-1 (Garlic)

Late varieties: Bajaura Makka, Girija (Maize)

Water saving paddy cultivation methods: Pusa Basmati-1121, PR-124, PR-116, NK-3325, PB-1

Drought tolerant varieties: C-15, African Tall, Double Dekalb (Maize); Raj-3765, WH-102, HPW-349, HPW-155, HPW-368 (Wheat); P-93, UG-218 (Black gram); UPC-9202 (Cowpea); HG 2-20 (Guar); Harit Soya (Soyabean); ONK - 1(Gobhi Sarson)

High yielding varieties: PBW-725, HD 2967 (Wheat)

In-situ moisture conservation: HD-2967 (Wheat)

Low water requiring crops: PBG-7 (Gram); GSC-7 (Gobhi Sarson); Polo Gold (Maize)

Protected Cultivation: Indira (Capsicum)

Short duration varieties: Shalimar Wheat-2 (Wheat); SML-668 (Summer Moong); HPN-3 (Gobhi Sarson); NDR-97, Pusa-1509 (Paddy); BH 393 (Barley)

Temperature tolerant varieties: HD-3086, HD-725 (Wheat); M.P.Cherry (Sorghum); Bhawani (Toria)

Mushroom Cultivation: *Agaricus bisporus* (Spawn)

Harvesting of Tomato

Demonstration on Cauliflower in Hamirpur

Module II: Crop Production

In this module, 2183 demonstration were conducted on an area of 984.28 ha and 750 mushroom bags were also produced. In Hamirpur, Brown sarson (KBS-3) was demonstrated on 2 ha area. Total 556 demonstration were conducted on 21.45 ha in Bandipura and Sirsa on cold and frost tolerant crop varieties i.e. Oats (Sabzaar), Paddy (SR-3), Brown Sarson (KS-101), Turnip (PTWG), Radish (White Round), Carrot (Early Nantes), Mustard (RH-0749). While demonstration on crop diversification were followed in Kathua on 12.5 ha on Black Gram (Him mash-1 and PU-31) and Gobhi Sarson (DGS-1) (Table 73).

Water saving paddy cultivation methods (SRI, aerobic, direct seeding) is one of the important technology, in which 61 farmers were benefitted in Bathinda, Fatehgarh Sahib, Yamunanagar and Faridkot districts on an area of 79.6 ha. Drought tolerant varieties of different crops were demonstrated in Bandipura [Maize (C-15), Cowpea (UPC-9202) and Fodder Maize (African Tall)], Kathua [Maize (Double Dekalb), Wheat (Raj-3765, WH-1021)], Sirsa [Guar (HG 2-20)], Kullu [Wheat (HPW-349, HPW-155, HPW-368), Black gram (P-93, UG-218), Soyabean (Harit soya)] were conducted. Likewise, 258 Nutrient Management demonstrations conducted in Faridkot and Ymunanagar on 464 ha. Diffrent short duration varieties of wheat, rice, summer moong, barley and gobhi sarson were conducted on 27.2 ha in NICRA villages. In Chamba and Fatehgarh Sahib 750 bags of mushroom were also produced.

Module III: Livestock and Fisheries

Different interventions like Animal health check up camp, Artificial Insemination, Breed up gradation, De-worming in livestock, improved shelters for reducing heat stress in livestock, Mitigation of mineral deficiencies in animals, Popularization of backyard poultry, Preventive vaccination, Management of fish ponds/tanks during water scarcity and excess water, Fodder Production and Hay Making were followed in NICRA villages of Zone-I. Under these activities, 1950 farmers were benefitted through 890 demonstrations (Table 74).

Module IV: Institutional Interventions

This module consists of interventions such as Fodder bank, Custom hiring centre, Mechanization through custom hiring for timely planting, Nutritional garden, Climate literacy through a village level weather station, Zero tillage, Community silage making and seed bank. Custom hiring centers in NICRA villages provided required farm implements to 332 farmers which were utilized for 402.1 ha area to carry out timely operations besides reducing the cost of cultivation (Table 75). Under these interventions, services were provided to 2329 farmers.

Demonstration on UMMB

Table 74: Details of livestock and fisheries activities implemented under NICRA by KVKs

Intervention	No. of demos	No. of farmers	Units
Animal health check up camp	19	214	394
Artificial Insemination (No. of animals)	1	21	29
Breed up gradation (No. of animals)	3	120	186
De-worming in livestock (No. of animals)	305	438	933
Improved shelters for reducing heat stress in livestock (Units)	4	33	69
Mitigation of mineral deficiencies in animals	508	414	1020
Popularizati on of backyard poultry (No. of birds)	30	49	1441
Preventive vaccination (No. of animals)	3	290	978
Management of fish ponds/ tanks during water stress (Units)	1	200	-
Fodder Production (ha)	15	124	136
Hay Making (Units)	1	47	91
Tota l	**890**	**1950**	**5289**

Table 75: Details of institutional interventions implemented under NICRA by KVKs

Interventions	No. of farmers	Units
Fodder bank (ha)	155	121
Custom hiring centre (ha)	332	402.1
Mechanization through custom hiring for timely planting (ha)	699	667.48
Nutritional garden (ha)	320	96.76
Climate literacy through a village level weather station	586	582
Zero tillage	4	1
Community silage making	33	-
Seed bank (ha)	200	400
Total	**2329**	**2270.34**

Capacity Building

During 2016-17, 242 different capacity building programs were conducted for 4693 farmers including 1154 farm women on various need based aspects i.e. Crop management, Enterprises for self employment, Farm implements and machineries, Fodder and feed management, Forest tree/ agro forestry plantation, Irrigation management, Live stock management, Management of horticultural crops, Natural resource management, NICRA awareness, Nutritional garden, Pest and disease management, Post harvest technology, Resource conservation technology, Seed production, Soil health management, Vegetable production, water saving, Awareness on abuse on social issues, Nursery raising, Nutrient management, Home Science and Crop Diversification (Table 76).

Exposure visit of NICRA farmers to RRS Ballowal Saunkhri on kisan mela.

Training Programme on Silage making in Drums at KVK Kullu

Table 76: Details of capacity building programmes carried out under NICRA by KVKs

Thematic area	No. of courses	No. of farmers		
		Male	Females	Total
Crop management	28	468	101	569
Enterprises for self employment	9	99	39	138
Farm implements a nd machineries	9	143	75	218
Fodder and feed management	21	327	153	480
Forest tree/ agro forestry plantation	3	35	10	45
Irrigation management	4	58	41	99
Live stock management	13	205	111	316
Management of horticultural crops	6	86	24	110
Natural resource management	47	505	60	565
NICRA awareness	9	150	99	249
Nutritional garden	8	86	56	142
Pest and disease management	30	470	39	509
Post harvest technology	5	-	77	77
Resource conservation technology	14	264	54	318
Seed production	3	41	19	60
Soil health management	12	228	55	283
Vegetable production	7	116	30	146
water saving	4	57	22	79
Awareness on abuse on social issues	4	43	47	90
Nursery raising	1	35	-	35
Nutrient management	3	70	-	70
Home Science	1	-	20	20
Crop Diversification	1	53	22	75
Total	**242**	**3539**	**1154**	**4693**

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 432 extension programmes were organized by the KVKs of the Zone-I in which 9783 farmers participated which included 2067 farmwomen. The detail of the extension activities are presented in the Table 77.

Table 77: Details of Extension Activities carried out under NICRA by KVKs

Name of the activities	Number of programmes	No. of beneficiaries		
		Male	Female	Total
Exposure visit of farmers	19	518	51	569
Strengthen - SHG	0	0	0	0
Strengthen - Kissan club	0	0	0	0
Integrated farming system	1	10	2	12
Field days	45	1009	341	1350
Method demonstrations	64	825	341	1166
Awareness Camps	48	1763	510	2273
Group dynamics	72	915	233	1148
Kissan Mela	8	1290	242	1532
Women awareness	20	86	156	242
Agro advisory services	109	1018	172	1190
soil health day	1	97	7	104
Field visit	45	185	12	197
Total	**432**	**7716**	**2067**	**9783**

Mass Awareness Campaign against Residue Burning

A *Kisan Sammelan* was organised on 16th October 2016 at KVK, Kaithal, to mark the beginning of "*Chetna maas*", in association with Agriculture department to sensitize farmers about bad effects of residue burning and making awareness about available technology options to manage residue.

Demonstration on Happy Seeder at Kaithal

The highlight of the programme was Farmers to Farmers Dialogue (F2FD) and live demonstrations on various machines like baler, chopper, spreaders etc. for residue management.

Dr. Gurbachan Singh, Chairman, ASRB & Chief Guest of the *Sammelan* initiated the '*Chetna Month'* and sensitized the audience about soil health improvement, reducing pollution, increasing productivity and increasing sustainability and resilience of the agriculture to adopt resource conservation technologies under the changing scenario of climate change. In his presence, all the participants took oath not to burn residue.

Demonstration on Baler during Awareness Campaign at Kaithal

Dr. K. P. Singh, VC, CCSHAU, Hisar urged the farmers to restrain from residue burning and use residues as mulching as a source of nutrient for the next crop. He also informed the importance of soil organic carbon (SOC) in sustainability and methodology for the farmers

to adopt resource conservation technologies under the changing scenario of climate change.

Dr. V. P. Chahal, ADG (Agri. Ext.) and Dr. Randhir Singh, ADG (Agri. Ext) urged the scientists to work in close association with the farmers for larger impact and all out efforts should be made to reach farmer to reduce the problem of residue burning.

Dr. Rajbir Singh, Director, ATARI, Ludhiana while explaining the purpose of the Sammelan narrated success stories of farmers who are not burning residue and how young farmers are minting money out of residue management.

Dr. P. C. Sharma, Director, CSSRI, Karnal and Dr. G. P. Singh, Director, IIWBR and Dr. S. S. Siwach, Director Extension Education, CCSHAU, Hisar were also present for the programme.

More than 1500 farmers and farm women participated in the Sammelan.

***Kisan Sammelan* organized to aware farmers about hazards of residue burning**

A Kisan Sammelan was organized by ICAR-ATARI, Zone-I, Ludhiana along with KVK Yamunanagar on November 11th, 2016 in village Radouri where Technology Demonstration Component of National Innovations in Climate Resilient Agriculture (NICRA) is being implemented. Dr. S.S. Siwach, Director Extension Education and Director Research, CCSHAU Hisar; Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana; Dr. M.L. Jat, CIMMYT; Dr. Dharamvir Yadav; Dr. Samar Singh, Director, RRS CCSHAU Uchani; Dr. B.R. Kamboj, PC, KVK Yamunangar and Sh. S.P. Singh, President, Kisan Club, Yamunanagar were the dignitaries present for the programme. Around five hundred farmers attended the programme.

The programme began with interactive lectures by experts from different fields regarding crop cultivation, soil health management, fertilizer management, soil testing, human health and nutrition management, etc.

At the outset, Dr. Kamboj formally welcomed the guests and farmers. Dr. Dharamvir mentioned about the need to move towards minimum rather zero tillage in coming future. Similarly, Sh. S.P. Singh, on behalf of farmers, assured the chief guest about residue burning free district.

Dr. Jat asked farmers to raise their voices and demand the government for necessary policy change for going residue burning free agriculture. He highlighted use of successfully tested technologies for better resource management at the farm level.

Dr. Rajbir Singh congratulated the Radouri village for achieving complete laser leveling, no residue burning and successful functioning of the Custom Hiring Centre. He mentioned about the efforts taken to provide necessary implements and other technical help in managing crop residue.

Dr. Siwach highlighted production of electricity and bio-gas for straw management. He emphasized on developing climate smart villages like Radouri in the rest of the Haryana. He also expressed need to work on participatory resource conservation technology development.

Pledge against residue burning

Happy seeder Sown wheat

3.5 Protection of Plant Varieties & Farmers' Right

In view of providing the way for establishment of an effective system for the protection of plant varieties and the rights of farmers and plant breeders and to encourage development of new varieties of plants Govt. of India enacted "The Protection of Plant Varieties and Farmers' Right (PPV& FR) Act, 2001" to recognize and to protect the rights of the farmers in conserving, improving and making new varieties. To implement the provisions of the Act, the Department of Agriculture and Cooperation and Farmers Welfare, Ministry of Agriculture, Govt. of India established Protection of Plants Varieties & Farmers' Right Authority (PPV & FRA) on 11th November, 2005. The PPV & FRA, in turn, took up large-scale awareness-cum-training programmes for the farmers through State Agriculture Universities, ICAR Institutes and other Research and Development Organizations. In extending helping hands to PPV&FRA, ICAR-ATARI, Zone-I provided its support to involve the existing network of KVKs to enable the PPV & FRA to achieve its set objectives. The details of total funds received under PPV & FRA are given in Table 78.

Training programme on PPV&FRA

Exhibition organised by KVK Reasi during PPV&FRA Program

Table 78: Details of total funds received under PPV & FRA

S.No	Name of KVK and Address	Amount released
1	KVK Bahowal, PO Mahalpur, Hoshiarpur-146105, Punjab	80000
2	KVK PAU research Station, Gurdaspur-143521, Punjab	80000
3	KVK Ropar-140001, Punjab	80000
4	KVK CSKHPKV, Bajaura, Kullu-175125, H.P.	80000
5	KVK CSKHPKV Research Sub Station, Berthin, Bilaspur, H.P	80000
6	KVK P.O. Kandaghat, Solan-173215, H.P	80000
7	KVK Tanmarg, District, Baramulla-193402 (J&K)	80000
8	KVK SKUAST(K), Kargil-194103, J&K	80000
9	KVK Kupwara-193222, J&K	80000
10	**ICAR-ATARI , Zone-I**	**40000**
	Total	**760000**
Revalidated funds		
1	Krishi Vigyan Kendra, Jammu	80000
2	Krishi Vigyan Kendra, Reasi	**80000**
3	Krishi Vigyan Kendra, Doda	**80000**
4	Krishi Vigyan Kendra, Poonch	**80000**
5	Krishi Vigyan Kendra, Kathua	**80000**
6	Krishi Vigyan Kendra, Rajouri	**80000**
Total Revalidated Funds		**480000**

Table 79: Details of training cum awareness programmes on PPV&FRA conducted by KVKs & ATARI Zone-I

Name of University	Name of KVK	Number of programmes	Venue	Number of Participants
PAU Ludhiana	Hoshiarpur	1	KVK, Hoshiarpur	103
	Gurdaspur	1	Vill. Phulra Pathankot	120
	Ropar	1	KVK, Ropar	100
CSKHPKV, Palampur	Kullu	1	Panjar	150
	Bilaspur	1	Vill. Kalol	135
	Hamirpur	3	Vill. Behrad	102
			Vill. Deot	120
			Vill. Siswan-Bari Mandir	105
	Kangra	3	Vill. Rait	450
YSPUH&F, Solan	Solan	2	KVK, Solan	48
				75
	Kinnaur	3	Vill. Hango, Chuling and Leo (Block Pooh,District Kinnaur)	165
SKUAST-J	Doda	1	KVK, Doda	100
	Jammu	1	KVK, Jammu	162
	Kathua	1	Vill. Bani	155
	Poonch	1	KVK, Poonch	124
	Rajouri	1	KVK Rajouri	144
	Reasi	1	KVK, Reasi	100
SKUAST-K	Kargil	1	KVK Kargil	89
	Bandipora	3	Vill. Bugliander Tulial	140
			Vill. Izmarg	140
			Vill. Boothu	220
	Budgam	1	Sheikhul Alam Conference Hall Budgam	200
	Baramulla	2	Vill. Chatoosa	300
			Vill. Braman	200
Total		**29**		**3747**
ICAR-ATARI, Zone -1		1	DEE office, CSKHPKV, Palampur	50

Nine KVKs from the state of Punjab, Himachal Pradesh and Jammu & Kashmir conducted the awareness programme for the farmers of the concerned districts. Besides this 6 KVKs from SKUAST Jammu received the revalidated funds from the Authority during this year. So over all 15 KVKs received funds for conducting training cum awareness programme for protection of extinct varieties by the farmers /farming community. A total of nineteen KVKs of this Zone conducted the training cum awareness programmes with the funds available and 3747 number of farmers participated in 29 programmes conducted by KVKs of Zone-I.

To give the programme a concrete shape as well be to evolve an effective plan of action, training-cum-awareness programme was organized for the subject matter specialists of KVKs of Himachal Pradesh on 27 February, 2017 at DEE office, CSKHPKV, Palampur; in which 50 subject matter specialists participated by ICAR-ATARI, Zone-I, Ludhiana during this year.

Plant Genome Savior Community Award

During this year a farming community of Village Sagam and Danwathpora, Dist-Anantnag, J & K, in Western Himalayan Agro-biodiversity hotspot area, who is involved of conservation and cultivation of Rice

varieties, especially Mushkbudgi and Kamad having high aroma, high cold tolerance, better cooking quality and great market value received a Plant Genome Savior Community Award for the year 2013-14. In addition to conservation of these rice varieties, this community is involved in post harvest processing and marketing.

Training on PPV&FRA at KVK Baramulla

Training on PPV& FRA at Kargil

3.6 Cluster Frontline Demonstrations on Pulses 2016-17

Division of Agriculture, Cooperation & Farmers Welfare (DAC&FW) approved the project "Cluster Frontline Demonstrations on Pulses 2016-17" with an aim to increase the area and production of pulse crops. Under the project, for conducting cluster frontline demonstrations (FLDs) on pulses in the states of Haryana, Punjab, Himachal Pradesh and Jammu and Kashmir, National Food Security Mission (NFSM) sponsored ₹1,23,60,000/- to ICAR-ATARI, Zone-I, Ludhiana during May 2016. For conducting FLDs, the KVKs were allocated with @ ₹7,500/ha for pulses viz. pigeon pea, rajmash, chickpea, lentil, field pea, black gram and green gram. A total of 4536 FLDs were conducted on an area of 1442.1 ha in four states during *kharif*, *rabi* and summer season (Table 80).

***Kharif* season**

In the states of Zone-I, during *kharif* season, FLDs on pulses were conducted on an area of 175.2 ha. In Haryana, FLDs on green gram were laid on 40ha area; whereas, in Punjab, FLDs on black gram and pigeon pea were laid on 20 ha area each. Similarly, on 56 ha area, FLDs on black gram were conducted in Himachal Pradesh; and, FLDs on were conducted on black gram on 30 ha area and rajmash on 9.2 ha area (Table 81).

Demonstrations on Mash 114 variety of black gram in Punjab resulted in 7.88 percent increase in yield compared to the local check due to line sowing of the crop instead of broadcasting. Similarly in Himachal Pradesh, demonstrations on UG 218, Palampur-93, Pant U-19 and Himachal Mash-1 varieties of black gram resulted in 33.17 percent increase in yield compared to local check

Method demonstration on seed treatment

Table 80: Crop-wise and State-wise area under CFLD Pulses conducted during 2016-17 (Area in ha)

State	Green gram	Black gram	Pigeon pea	Rajmash	Chickpea	Lentil	Summer Green gram	Summer Rajmash	Total
Punjab	0	20	20	0	204	20	443.6	0	**707.6**
Haryana	40	0	0	0	160	20	310	0	**530.0**
H.P.	0	56	0	0	58.3	0	10	10	**134.3**
J&K	0	30	0	9.2	27.5	0	3.5	0	**70.2**
Total	**40**	**106**	**20**	**9.2**	**449.8**	**40**	**767.1**	**10**	**1442.1**

Table 81: Details of Cluster Frontline Demonstrations conducted during *Kharif* 2016-17

State	Crop	Variety	FLDs (No.s)	Area (ha)	Local check yield (q/ha)	Demo. yield (q/ha)	% increase
Punjab	Black gram	Mash 114	50	20.00	7	8.29	7.88
	Pigeon pea	AL-201	50	20.00	4.5	7.5	66.67
Haryana	Green gram	MH 421	100	40	6.35	9.50	47.20
Himachal Pradesh	Black gram	UG 218, Palampur-93, Pant U-19, Himachal Mash-1	288	56	5.73	7.96	33.17
Jammu & Kashmir	Black gram	Mash PU-31, PU-19 and PU-31	232	30	4.22	6.79	51.56
	Rajmash	Wazej Rajmash	91	9.2	8.2	10.33	19.38
		Total	**811**	**175.2**			

due to application of Lambda cyhalothrin 5 % EC for pest management, seed treatment with Bavistin @ 2.5 g/kg seed for disease prevention and line sowing of crop. Moreover, weed management and plant protection measures were demonstrated in cultivating Mash PU-31, PU-19 and PU-31 varieties of black gram in Jammu and Kashmir, which resulted in 51.56 percent higher yield compared to local check.

Demonstrations on pigeon pea were conducted in Punjab on AL-201 variety along with pest management technologies which has resulted in 66.67 percent higher yield in comparison to local checks.

Rajmash was demonstrated in Jammu and Kashmir on 9.2 ha area on 91 farmers' fields. The variety Wazej Rajmash was demonstrated along with other package of practices of SKUAST- Srinagar. The demonstration fields were observed to have recorded 19.38 percent higher yield compared to that of local checks.

***Rabi* season**

During Rabi 2016-17, demonstrations of pulses in the zone were laid on 489.8 ha area, out of which 449.8 ha were under chickpea in the four states and rest 40 ha was under lentil in Punjab and Haryana (Table 82).

In Punjab, chickpea varieties PBG-2, PBG-5, PBG-7 and GPF-2 were demonstrated on 204 ha area. Along with varieties, different production technologies such seed treatment with micro-inoculant *Rhizobium*, seed treatment with Bavistin, pest management and other plant protection measures etc. were demonstrated. Application of these technologies has resulted into 22.77 percent higher yield in demonstrated fields compared to local check. Similarly, in Haryana, a total of 365 FLDs on

Land preparation for sowing Blackgram in Kharif

FLD on Chickpea in Nawanshahar

chickpea varieties i.e. HC-1, KC 1, CJS 515, GNG 1928 and GNG 1581 were conducted in different districts of Haryana on an area of 160 ha. Complete package of practices recommended by CCSHAU, Hisar were followed while conducting demonstrations on farmers' fields. As compared to the local check, 28.01 per cent higher yield was recorded from FLDs of chickpea. Similarly, in Himachal Pradesh, seed treatment with fungicide and with phosphorus solubilising bacteria (PSB) and *Rhizobium* were demonstrated on the farmer's field through a total of 359 FLDs on an area of 58.3 ha. Chickpea varieties, HC 1, HC 2, GPF 2, GNG 1581 and HC 5 were used for demonstrations which resulted in increase the yield by 28.66 per cent over the local check.

Moreover, in Jammu and Kashmir, 330 demonstrations were conducted on an area of 27.5 ha on chickpea variety GNG 1581. Complete package of practices recommended by SKUAST Jammu and Srinagar was followed to raise the crop. As a result, 27.07 per cent higher yield was recorded on demonstration plots over the local check.

Demonstrations on lentil, in Punjab, were laid on 20 ha area, where various improved technologies like improved variety (i.e. LL 931), seed with *Rhizobium* culture, Chloropyriphos and Bavistin, weed management and plant protection measures were demonstrated by the KVK scientists. These 69 demonstrations have resulted in

Table 82: Results of Rabi season FLDs

State	Crop	Variety	FLDs (no.)	Area (ha)	Demo yield (q/ha)	Local check yield (q/ha)	Increase in yield (%)
Punjab	Chickpea	PBG 5, PBG 7, GPF 2	719	204	15.87	12.86	22.77
	Lentil	LL 931	69	20	8.37	6.23	25.57
Haryana	Chickpea	GNG 1581, CJS 515, HC 1, GNG 1928, KC 1	365	160	16.74	13.07	28.01
	Lentil	LL 931	42	20	12.86	10.00	28.60
Himachal Pradesh	Chickpea	HC 1, HC 2, GPF 2 GNG 1581 and HC 5	359	58.3	7.20	5.50	28.66
Jammu and Kashmir	Chickpea	GNG 1581	330	27.5	5.93	4.67	27.07
		Total	**1884**	**489.8**			

25.57 percent higher yield as compared to the yield local check. Similarly, in Haryana, 42 FLDs on lentil variety LL 931 were conducted on 20 ha area and seed treatment with Chloropyriphos and *Rhizobium* culture and other package of practices recommended by CCSHAU, Hisar were demonstrated by the KVK experts on farmers' fields. In comparison to local check, 28.60 percent higher yield was recorded on demonstration fields.

Summer season

During the year, 1841 demonstration on summer green gram, summer black gram and rajmash were conducted in the season on an area of 777.1 ha in the states of Zone-I. In Punjab, summer green gram was demonstrated on 406 ha, while summer black gram covered 40 ha area. Similarly, demonstrations on summer green gram covered an area of 310 ha in Haryana. In Himachal Pradesh, summer green gram was demonstrated on 10 ha while rajmash covered 10 ha area under demonstrations. In Jammu and Kashmir, 3.5 ha were covered under demonstrations on summer green gram. The results were awaited during the financial year 2016-17.

Field Day on Summer Green gram in Moga

Field day on chickpea at Bishanpura, Sangrur

Field Day on Summer Green Gram

CFLD Pulses 2015-16 (Summer green gram)

During summer 2016, total 2027 frontline demonstrations (FLDs) were conducted on 818.15 ha by 30 Krishi Vigyan Kendras (KVKs) of Haryana, Punjab and Himachal Pradesh (Table 83).

In Punjab, summer green gram variety SML 668 was demonstrated along with improved practices like seed treatment with fungicides, microbial inoculation, line sowing, different intercropping systems, integrated pest management (IPM) etc. at the farmers' field. The effectiveness of demonstrations was observed as the yield recorded at demonstration plots was 21.64 percent higher as compared to that of local check. Similarly, in Haryana, summer green gram variety SML 668 and MH 421 along with seed treatment with biofertilizers and fungicides, plant protection measures and other recommended practices were demonstrated on 354.80 ha area. The demonstrated plots, when compared with local check, were found to have 26.50 percent higher yield. In Himachal Pradesh, SML 668 variety was demonstrated along with microbial inoculation technology at the farmer's field, which resulted in increase the yield by 64.69 per cent over the local control.

Mid-Term Review Meeting of CFLD Pulses

A Mid-term review meeting of Cluster Frontline Demonstrations on Pulses 2016-17 project was held on 12.07.2016 at KVK, Kaithal under the Chairmanship of Dr. Rajbir Singh, Director ICAR-ATARI, Ludhiana. The Programme Coordinators and scientists of the KVKs of Haryana and 19 progressive farmers of Kaithal district attended this meeting

Review meeting at KVK Kaithal

The Chairman, Dr. Rajbir Singh highlighted the importance of Pulses in the Indian economy. He told that there is a huge import of Pulses due to a large gap in production and consumption. It is utmost important increase acreage and productivity of pulses. KVKs have an important role to play increasing productivity through different extension activities viz. OFTs, FLDs, field days, campaigns, extension literature etc.

Program Coordinators/Scientists presented the progress of FLDs conducted under CFLD Pulses project of their respective KVK. At last, Dr. Rajbir Singh emphasized that the FLDs on pulses should be conducted in clusters by various KVKs. The literature on production technology of various crops should also be published. Field days should also be organized at the maturity of the crops, so that the results can be shown to the farmers of the area. He also stressed on the preparing the video clippings of the views of the farmers about various crops. Moreover, the success story of at least one farmer should also be prepared by each KVK.

Director ATARI addressing Zonal Workshop

Zonal Workshop on CFLDs on Pulses 2016-17

A review workshop on project Cluster Frontline

Zonal Workshop at Ludhiana

Table 83: Performance of CFLD Pulses during Summer green gram (2015-16)

State	Variety	FLDs (No.)	Area (ha)	Average yield (q/ha)		% increase
				Demo	Local check	
Punjab	SML 668	1082	443.35	10.01	8.23	21.64
Haryana	MH-421, SML 668	823	354.80	7.20	5.69	26.50
Himachal Pradesh	SML-668	122	20.00	11.94	7.25	64.69
	Total	**2027**	**818.15**			

Demonstrations on Pulses 2016-17 was organized by ICAR-ATARI, Zone-I, Ludhiana at the conference hall of Directorate of Extension Education, PAU, Ludhiana on January 24, 2017. Dr. A. K. Mehta, Former Consultant NFSM and former ADG (Extension) was the Chief Guest of the programme. Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana; Dr. R.S. Sidhu, Director Extension Education, PAU, Ludhiana; Dr. H.K. Verma, Director Extension Education, GADVASU, Ludhiana; Dr. D.S. Dillon, Director (Seeds), PAU, Ludhiana; Dr. Aulakh and Dr. G.S. Buttar, Additional DEE, PAU, Ludhiana and Dr. Suresh Kumar Yadav, Technical Officer, Directorate of Wheat Development, Gaziabad were the other dignitaries present during the workshop. Moreover, the workshop was attended by around eighty (80) Programme Coordinators and Scientists of Krishi Vigyan Kendras (KVKs) of Zone-I conducting demonstrations under the project and the Scientists from ICAR-ATARI, Ludhiana.

The Chief Guest of the programme, Dr. A. K. Mehta discussed about the production and import scenario of pulse crops in India and highlighted the broad objectives of the project. He shared his experiences with the project and provided practical solutions to the some of the problems and constraints faced by the KVK.

Dr. Rajbir Singh gave a brief remark about the project and highlighted the problems faced by the KVKs in implementing the project. He demanded more flexibility in allocating the FLDs to the KVKs. He also expressed his own vision of increasing the pulse production in the states of Punjab, Haryana, Himachal Pradesh and Jammu & Kashmir which would not only promote diversification but would also increase the profitability of farmers. He also stressed upon that the need for soil testing of each field under FLD.

Dr. Guriqbal Singh, Sr. Agronomist, Pulse section, PAU, Ludhiana has delivered a lecture on improved agronomic practices for rabi and summer pulses.

Programme Coordinators of KVKs presented the activities conducted under the project, budget utilization, problems faced and lessons learned. The workshop involved in-depth discussion on various issues in implementing the project and resulted in practical way out of the problems faced by the KVKs.

3.7 Cluster Frontline Demonstrations on Oilseeds 2016-17

"Cluster Frontline Demonstrations on Oilseeds 2016-17" under NMOOP had been sanctioned by the Department of Agriculture, Cooperation & Farmers' Welfare (DAC&FW) for boost the production, productivity and area covered under oilseeds in Zone-I. Under this project, National Mission on Oilseeds and Oil Palm (NMOOP) of DAC&FW sanctioned 33.99 lakh to ICAR-ATARI, Zone-I, Ludhiana during 2016-17 for conducting Cluster Frontline Demonstrations (CFLDs) were conducted by 39 Krishi Vigyan Kendras (KVKs) in five states namely Punjab, Haryana, Delhi, Himachal Pradesh and Jammu & Kashmir during Kharif, *Rabi* and Summer season of 2016-17. For conducting demonstrations the fund earmarked for each crop groundnut ₹7500/ha, R&M ₹3000/ha, sunflower ₹4000/ha and sesame ₹3000/ha. About of 2372 CFLDs were conducted in an area of 767.69 ha in five states. The allotted list of CFLDs allotted and conducted by KVKs state wise and crop wise during kharif, rabi and summer season of 2016-17 by the KVKs of Zone-I is presented in Table.

During 2016-17, 810 ha area was allotted, for CFLDs in oilseed however, 96.90 ha was demonstrated during Kharif season, 589.7 ha area was demonstrated in Rabi season and 81.09 ha area was demonstrated during summer season. Out of total area deficit area was 70.7 ha, the area was reallotted to conduct CFLDs of Rapeseed & Mustard in rabi season and deficient area 42.1 ha could not be covered during 2016-17 (Table 84).

Monitoring

The monitoring of Cluster Frontline Demonstration of Oilseed programme was carried out by the scientists of ICAR-ATARI along with Officers/Scientists of the Directorate of Extension of SAUs, Directorate of Oilseed Development, Ghaziabad, New Delhi. The details of monitoring visits done during 2016-17 are given in Table 85. About 12 monitoring and visits were done.

Kharif Season

CFLDs on groundnut were conducted by 2 KVKs in Punjab. The technologies demonstrated included management of cercospora leaf-spot disease & defoliators. The varieties used include SG 99 and TG-37A.

Table 84: Details of state-wise and crop wise of allotted, conducted and deficit CFLDs of oilseeds

State/Crop	Allotted		Conducted during Kharif/Rabi/summer/		Deficient area converted to Rapeseed &Mustard in lieu of deficient groundnut , sesame and sunflower	
	Demo. (No.)	Area (ha)	Demo. (No.)	Area (ha)	Demo. (No.)	Area (ha)
Punjab						
Groundnut	75	30	29	10	48	19
Sesame	25	10	25	10	-	-
Rapeseed & Mustard	500	200	685	219	-	-
Sunflower	150	60	150	60	-	-
Haryana						
Sesame	200	80	80	64	40	16
Rapeseed & Mustard	450	180	486	200	-	-
Sunflower	50	20	50	20	-	-
Delhi						
Rapeseed & Mustard	50	20	50	20	-	-
Himachal & Pradesh						
Sesame	75	30	60	8	29	11
Rapeseed & Mustard	75	30	269	41	-	-
Sunflower	25	10	-	-	-	10
Jammu &Kashmir						
Sesame	25	10	-	-	10	4
Rapeseed & Mustard	300	120	373	110	-	-
Sunflower	50	20	19	3	25	10
Grand total	**2025**	**810**	**2276**	**767**	**177**	**70**
Deficient area in 2016-17	**-**		**-**	**-**	**-**	**42**

Table 85: Detail of Monitoring of CFLDs of oilseed

Sr.No	KVK	Season	Crop	Date
Punjab	Bathinda	Kharif season	Groundnut, Sesame	13 Sept, 2016
	Hoshiarpur	Kharif season	Groundnut	20 Sept, 2016
Punjab	Nawanshahar	Rabi season	Rapeseed & Mustard	26 Dec, 2016
	Kapurthala	Rabi season	Rapeseed & Mustard	27 Dec, 2016
	Gurdaspur	Rabi season	Rapeseed & Mustard	28 Dec, 2016
	Amritsar	Rabi season	Rapeseed & Mustard	29 Dec, 2016
Haryana	Fatehabad	Rabi season	Rapeseed & Mustard	9 Jan, 2016
	Hisar	Rabi season	Rapeseed & Mustard	10 Dec, 2016
	Bhiwani	Rabi season	Rapeseed & Mustard	11 Dec, 2016
	Jhajjar	Rabi season	Rapeseed & Mustard	12 Dec, 2016
Punjab	Jalandhar	Summer season	Sunflower	1 June, 2017
	Patiala	Summer season	Sunflower	13 June, 2017

The results revealed that technologies demonstrated increased the yield of groundnut by 4.10 to 4.80 per cent.

The demonstrations on sesame were conducted by 9 KVKs in Punjab, Haryana and Himachal Pradesh. The technologies demonstrated include seed treatment, weed management, varietal and integrated pest management (IPM). The varieties used for demonstrations were HT-1 and Bajreshwari (LTK-4). The results revealed that technologies demonstrated increased the yield of sesame by 10.50 to 59.40 per cent when compared with local check (Table 86). The demonstrations on sunflower were allocated to 2 KVKs in Jammu & Kashmir. The CFLDs were conducted in 3.60 ha against the allocated area of 20 ha. The technologies demonstrated include line sowing; inter cropping, integrated weed management and integrated nutrient management. The variety Modern was demonstrated at farmer's field. The results revealed that technologies demonstrated increased the yield of sunflower by 11.10 to 37.50 per cent.

Rapeseed & Mustard

The cluster demonstrations were conducted on rapeseed & mustard by 31 KVKs of Punjab, Haryana, Delhi , Himachal Pradesh and Jammu & Kashmir. The technologies demonstrated included improved variety, balanced use of fertilizers, stem rot management, orobanche management, effect of gypsum application, intercropping, use of SSP, integrated nutrient management; integrated pest management and weed management. The varieties demonstrated in CFLDs were namely GSC-7, PC-6, TL-17,PBG-7,Raya (RLC 3) KBS-

Table 86 : Details of CFLDs conducted on *Kharif* season

Crop/State	Variety	FLDs (no.)	Area (ha)	Demo yield (q/ha)	Local check yield (q/ha)	Increase in yield (%)
Groundnut						
Punjab	SG 99, TG-37 A	29	10.80	15.60	14.90	4.70
Total(Groundnut)		**29**	**10.80**			
Sesame						
Punjab	HT-1	25	10.00	4.20	3.80	10.50
Haryana	HT-1,RT-351	150	64.0	4.6	3.4	34.2
Himachal Pradesh	LTK-4	61	8.5	4.4	2.9	53.7
Total(Sesame)		**236**	**82.5**			
Sunflower						
Jammu&Kashmir	Modern	19	3.60	7.50	6.00	25.90
Total(Sunflower)		**19**	**3.60**			
Total(Kharif)		**284**	**96.90**			

Field visit at KVK Hoshiarpur & Bathinda

3, Neelam , HPN-1, CS 56, RB 50, NRCDR-2 and Pusa Vijay were demonstrated.

The results revealed that technologies demonstrated increased the yield of rapeseed & mustard by 1.20 to 54.70 per cent when compared with local check (Table 87).

Summer season 2016-17

During summer season, 190 demonstrations were conducted on an area of 81.09 ha in Zone-I. Sunflower and Rapeseed & Mustard crop were used for conducting demonstrations. In Punjab, Sunflower was demonstrated on 60.00 ha area and 20 ha in Haryana. In Jammu & Kashmir 1.09 ha area was covered under rapeseed & mustard in Leh (Additional) Table 88.

Rapeseed & Mustard demo plot at KVK Gurdaspur & Bhiwani

Table 87: Details of FLDs conducted on rapeseed & mustard during *Rabi* season

KVK	Variety	FLDs (no.)	Area (ha)	Demo yield (q/ha)	Local check yield (q/ha)	Increase in yield (%)
Punjab						
Amritsar	GSC -7	63	20.00	22.20	14.35	**54.70**
Faridkot	GSC-7	84	20.00	19.80	14.10	**40.40**
Ferozpur	GSC-7,TL 17	80	20.00	18.75	15.00	**25.00**
Gurdaspur	GSC-7	50	20.00	20.26	18.05	**12.20**
Hoshiarpur	GSC-7 , RLC 3	41	19.20	15.82	12.50	**26.60**
Kapurthala	GSC-7	24	10.00	20.90	16.25	**28.60**
Muktsar	GSC-7	50	20.00	19.17	17.80	**7.70**
Nawanshahar	GSC-7	36	20.00	20.00	14.50	**37.90**
Ropar	GSC-7	50	20.00	19.40	15.10	**28.50**
Sangrur	GSC-7	85	20.00	20.50	20.17	**1.60**
Barnala	Pusa Vijay	97	20.00	22.23	17.71	**25.50**
TaranTaran	GSC-7	25	10.00	18.24	12.56	**45.20**
Total(Punjab)		**685**	**219.20**			
Haryana						
Bhiwani	RH 0749	75	30.00	23.10	15.61	**48.00**
Fatehabad	RH-0749	21	10.00	24.50	22.00	**11.40**
Hisar	RH 0749	50	20.00	20.50	18.05	**13.60**
Jhajjar	RH-0749	50	20.00	24.04	20.65	**16.40**
Mehandargarh	RH-0749	75	30.00	19.48	16.50	**18.10**

KVK	Variety	FLDs (no.)	Area (ha)	Demo yield (q/ha)	Local check yield (q/ha)	Increase in yield (%)
Sirsa	RH 0749	75	30.00	25.10	23.00	**9.10**
Gurgaon	RB-50	50	20.00	18.90	18.68	**1.20**
Rewari	NRCDR-601, RB 50, CS 54 , CS 56 &NRCDR-2	90	40.00	24.46	21.28	**14.90**
Total (Haryana)		**486**	**200.00**			
New Delhi	RH 0749, RH 406	50	20.00	24.48	22.90	**48.00**
Total (Delhi)		**50**	**20.00**			
Himachal Pradesh						
Bilaspur	GSC-7	25	10.00	10.50	7.40	41.9
Una	TL-17	75	10.00	6.00	4.30	39.5
Hamirpur	KBS-3	24	5.50	5.80	4.50	28.9
Kangra	KBS-3 , GSC 7 & Neelam	53	6.00	10.50	8.25	27.3
Chamba	HPN-1	117	10.00	5.85	3.80	53.9
Total (Himachal Pradesh)		**294**	**41.50**			
Jammu&Kashmir						
Kathua	DGS-1	40	14.00	10.78	7.00	**54.0**
Anantnag	KS-101	71	20.00	8.67	7.30	**18.8**
Baramulla	SS-01,KB-49	50	20.00	13.11	10.70	**22.5**
Gandarbal	KS-101	29	15.00	10.90	7.50	45.3
Kulgam	Shalimar brown sarson-1	115	20.00	12.70	9.30	**36.6**
Srinagar	KOS-1	48	20.00	14.25	10.48	**36.0**
Total (Jammu&Kashmir)		**353**	**109.00**			
Total (Rabi Season)		**1868**	**589.7**			

CFLD on Sunflower at KVK Patiala

Table 88: Details of CFLDs conducted during summer season

KVK	Variety	FLDs (no.)	Area (ha)	Demo yield (q/ha)	Local check yield (q/ha)	Increase in yield (%)
Punjab						
Jalandhar	PSH-1962	50	20.00	19.41	16.85	15.2
Kapurthala	PSH-1962	20	20.00	18.00	18.00	-
Patiala	PSH-1962	50	20.00	20.25	18.00	12.5
Total (Punjab)		**120**	**60.00**			
Haryana						
Ambala	PSH-1962	50	20	-	7.5	-
Total (Haryana)		**50**	**20**			
Jammu&Kashmir						
Leh (Addl.)	RLM-514	20	1.09	9.55	7.40	**29.1**
Total (Jammu&Kashmir)		**20**	**1.09**			
Total (Summer Season)		**190**	**81.09**			

Workshop on CFLDs on Oilseed 2016-17

A review workshop on Cluster Frontline Demonstrations on Oilseed 2016-17 was organized by

Workshop on CFLDs Oilseed 2016-17

ICAR-ATARI, Zone-I, Ludhiana PAU, Ludhiana on January 23, 2017. Dr. A. K. Mehta, Former Consultant NFSM and former ADG (Extension) and Dr. V.P. Chahal was the Chief Guest of the programme. Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana highlighted the problems faced by the KVKs in implementing the project. He demanded more flexibility in allocating the CFLDs to the KVKs. He also expressed his own vision of increasing the oilseed production in the states of Punjab, Haryana, Himachal Pradesh and Jammu & Kashmir which would not only promote diversification but would also increase the profitability of farmers.

Fund utilization

Out of total allotted funds Rs. 33, 99,000 from NMOOP during 2016-17, 77.94 per cent (₹2637676) funds were spent during the year for conducting CFLDs oilseeds by KVKs in implementing the project during the reported year.

3.8 Pre-*Rabi* Kisan Sammelan

The main aim of organizing these Sammelans was to make farmers aware about the improved package of practices of Kharif and Rabi crops generated by SAUs and ICAR Institutes and to solve the problems encountered by the farmers in the standing Kharif and Rabi season and to collaborate with the State Agricultural Departments for making this campaign a success. For this campaign 50 KVKs were identified from the Zone-I for conducting Pre-Rabi Campaign for the farmers during the reported period and 49 KVKs were advised to conduct the campaign on 5th December on World Soil Day so that more awareness can be disseminated among stakeholders about the improvement of health of soil.

KVKs were asked to invite the public representative of their respective districts to attend these

Kisan Sammelans, Kisan Meetings, Crop seminars, Farmers Interaction with Scientists and resource conservation campaigns so that these programmes get highlighted in every sphere of media and large number of farming community and extension functionaries get benefitted from these programmes. A total of 21311 farmers and 1134 extension functionaries participated in the programmes organized by 49 KVKs of Zone-I (Table 89 & 90).

Table 89: Details of Pre-Rabi Sammelans conducted by KVKs during the year

(Number)

Name of State	KVKs	Programs conducted	Village(s) covered	Farmers	Participants Extension Personnel
Punjab	19	94	215	10951	454
Haryana	17	20	48	7293	335
Delhi	1	1	1	150	4
Himachal Pradesh	7	15	38	1286	62
Jammu & Kashmir	5	10	46	1631	279
Total	**49**	**140**	**348**	**21311**	**1134**

Table 90: State wise funds released during the year for conducting Pre- Rabi Campaign

(Rupees)

Name of KVK	Amount Sanctioned	Expenditure
Punjab	1520000	1506127
HP	560000	560000
J & K	480000	306489
Delhi	80000	80000
Haryana	1360000	1019973
Grand Total	**4000000**	**3472589**

3.9 Empowerment of farm women for improved quality of life

ICAR-CIWA Bhubaneswar in collaboration with ICAR-ATARI started a project for a period of two years starting from 2015 till 2017. The project had an outlay of Rs.11.45 lakh for the zone for the period of two years. ICAR-ATARI, Zone-1 implemented this project with the assistance of Krishi Vigyan Kendra Patiala from PAU, Ludhiana Punjab for a period of two years started during 2015-17. The objectives of the project were

Objectives

- Assessment of nutritional status of farm families, nutritional challenges faced by them and suggestive interventions for the management of malnutrition.

Scientist-farmwomen interaction

- Assessment of available family resources with special emphasis on technology for household, agriculture and allied activities for appropriate intervention for their optional use and to reduce the drudgery of farmwomen.
- Need based technologies empowerment of farmwomen for income generation and livelihood security.
- KVK Patiala selected Nabha block for the study of the project. A cluster of 4 villages namely Bina Heri, Kot Khurd, Hiana Kalan and Hiana Khurd were selected for data collection from the farm families. Thirty farm families from each village were randomly selected and surveyed. A total of 120 farm families were selected for data collection from the four villages.

The farm women selected for the study under the project were found that 39.16 percent were in the age group of 26-33 years, 45.8 percent rural women were uneducated and only 23.33 percent women were educated up to primary level and 82.5 percent rural women got married only after attaining the age of 18 years but still at rural level girls are being married before the age of 18 years. Fifty five percent women were found to be of normal weight, 25 percent were underweight and 4 percent of women were found to be obese. The average body mass index was found to be 23.01 of rural women which were in the normal range for the women selected for the study. The women were involved in household as well in farm activities majority of rural women were involved in weeding, picking of potato, chillies, vegetables, flowers, harvesting of wheat

Training on hand embroidery

and paddy etc. in agricultural activities. The women respondents showed their keenness towards the skill development in various farm and nonfarm activities and fourteen skill development programmes were organized during 2016-17 by KVK Patiala on campus as well off-campus for the women selected under the project for improving income generation of the farm women. Drudgery reducing tools were distributed for the farm women like improved sickle, cotton gloves, maize sheller, revolving stool, vegetable harvestor and twin wheel hoe for improving the posture and drudgery during the farm and allied activities. The extension activities were also organized for the women to get to know their potential and involve them in the activities of their interest for generating income.

Six folders and one training manual were developed as literature distribution to the farm women during the capacity building programmes

3.10 Attracting and Retaining Youth in Agriculture (ARYA)

The ICAR has initiated a program on "Attracting and Retaining Youth in Agriculture (ARYA) in selected districts through KVKs, realizing the importance of rural youth in agricultural development especially from the point of view of food security of the country, with an objective for entrepreneurial development of Youth in Rural Areas to take up various Agriculture, allied and service sector enterprises for sustainable income and gainful employment. The identified youth are trained on entrepreneurship development skills by providing a basket of options to start agriculture ventures for self employment. The specific objectives of ARYA project are:

1. To attract and empower the youth in rural areas to take up various agriculture, allied and service sector enterprises for sustainable income and gainful employment in selected districts.
2. To enable the farm youth to establish net work groups to take up resource and capital intensive activities line processing, value addition and marketing.
3. To demonstrate functional linkage with different institutions and stakeholders for convergence of opportunities available under various schemes/programmes for sustainable development of youth.

In Zone-I, under ARYA project, four (4) KVKs namely KVK Gurgaon in Haryana; KVK Bathinda in Punjab; KVK Hamirpur in Himachal Pradesh and KVK Kathua in Jammu and Kashmir, were selected for providing specific skill based trainings and technical support to rural youth for establishing agriculture related enterprises. In one district, over the project period, rural youths are identified for their skill development in entrepreneurial activities and establishment of related micro-enterprise units in the area of Apiary, Mushroom, Seed Processing, Soil testing, Poultry, Dairy, Goatry, Carp-hatchery, Vermi-compost etc. At KVKs also one or two enterprise units are being established so that they serve as

Table 91 . Progress of Attracting and Retaining Youth in Agriculture during 2016-17

S. No.	KVK	Name of enterprise/ activity undertaken		Rural Youth benefitted
1	Bathinda, Punjab	Bee Keeping		50
		Value addition and Processing		30
		Mushroom Cultivation		40
		Poultry Farming		50
			Total	**170**
2.	Gurgaon, Haryana	Goat Farming		10
		Value Addition		34
		Mushroom Cultivation		14
		Protected Cultivation		16
			Total	**74**
3.	Hamirpur, Himachal Pradesh	Mushroom Cultivation		30
		Protected Cultivation and nursery raising of vegetables		22
		Post-harvest and value addition		30
			Total	**82**
4.	Kathua, Jammu and Kashmir	Mushroom cultivation		60
		Value addition		60
		Commercial Floriculture		40
		Poultry farming		40
			Total	**200**
		Grand Total		**526**

entrepreneurial training units for farmers (Table 91). The purpose is to establish economic models for youth in the villages so that youths get attracted in agriculture and overall rural situation is improved.

KVK Bathinda selected and trained 50 rural youth on Bee keeping, 30 on value addition and processing, 40 on mushroom cultivation and 50 on poultry farming. The trainings covered all the aspects of establishing an enterprise, like broiler production, egg production, backyard poultry along with processing and marketing of poultry and its products under poultry farming enterprise. On the completion of trainings, exposure visits were organized to farms of progressive mushroom growers, bee keepers etc. for providing practical exposure to the trainees. For an example, under bee keeping, trainees were taken to Tiwana Bee Farm, Ludhiana. Similarly, under poultry farming, visit to a broiler producer at Tungwali and visit to a layer bird farmer at Myserkhana were organized. Moreover, the selected and trained rural youth were given basic inputs to establish their own enterprises. Under mushroom cultivation, spawn and polythene were provided. Similarly, one kit of tools for the processing of fruits and vegetables was given under value addition and processing so that rural youth can start their venture at the household level. Similarly, under bee keeping and poultry, different basic inputs were provided as a support for the start of the business. KVK is also providing technical backstopping from time to time as and when it is required.

KVK Gurgaon has identified and trained 14 rural youth for mushroom cultivation, 16 for protected cultivation of vegetables and 34 for post harvest value addition and 10 for Goat farming. A workshop on agri-preneurship for all the trainees under ARYA project was also conducted at the KVK. An eight (8) days training program on mushroom production technology for the selected rural youth was followed by providing inputs like compost, spawn etc. and resultantly, trainees have already established mushroom cultivation shades at their respective locations. Similarly, a four (4) days program on protected cultivation following the principle of learning by doing and they were provided with seed/planting materials and polyethylene structure to start their business. Further, a six (6) days training program on value addition of aonla and soybean to prepare products like aonla candy, aonla powder, aonla juice, aonla pickle, soya products etc. was organized. Useful materials/machines like grinder, potato peeler and slicer, packaging and sealing machine utensils etc. were also given to the participating farm women. Two trainings were organized on goat rearing for rural youth and each were given six (6) goats of Sirohi breed of 10-12 months age, which are now in growing stage. Moreover, five (5) breeding bucks were also given for breeding the goats. All the goats have been given dewormed and vaccinated against Foot and Mouth disease. KVK is also providing regular technical support to these young entrepreneurs.

KVK Kathua has trained a group of 60 farmers in a 7 days training program on mushroom cultivation. The farmers were provided hands on training program on different aspects of mushroom cultivation at the Mushroom unit of the KVK. They were also provided with materials like spawn, polythene etc. after completion of training program to help them start their

Hands on Training on Food Processing

An ARYA Entrepreneur with her products

own units. The trainees are given technical support from time to time during the visits of the experts at their doorsteps. Similarly, a group of 60 farmers was trained on Poultry Farming in a 7 days training program conducted at the KVK. The trainees were given theoretical and practical training on the different aspects, like feeding, management etc., of the poultry farming. They were given hands on training at the Poultry unit of the KVK. The farmers were provided with poultry birds, feeders, drinkers, cages etc. after the completion of the training program to start their own enterprise. Forty (40) rural youth were trained on different aspects of commercial floriculture (Marigold, Gladiolus etc.) like nursery raising, seed treatment, cultivation techniques, pest-diseases management, seed production and economics of the commercial floriculture along with technical know-how of the marketing. Moreover, a group of 40 farmwomen and farmers was trained on the different aspects of value addition of mango, amla and other locally available fruits and vegetables. The trainees were particularly trained to make products like aampana, mango powder, jam, pickles, amla candy etc.

KVK Hamirpur selected a group of 30 farmers and trained them on mushroom cultivation through seven (7) day training program. Exposure visits have also been conducted to build confidence of the trainees. The materials like spawn, polythene etc. was also provided to the trainees after training program. Apart from this, a bamboo made structure is also being constructed at the individual trainee's house for them to begin with the business. They are being given technical support time to time. Similarly, a three days training program on protected cultivation was also organized in which 30 youths were trained in theoretical and practical aspects through learning by doing approach. After the training, the seed/planting materials were also provided to the trainees to start their own enterprise. Poly structures were also provided to the farmers to raise disease free nursery. One such training program for 30 farm women on post harvest value addition of seven (7) days was also organized, where more emphasis was given on practical demonstrations. This group was also exposed to various post harvest demonstration units within the district. Three Self Help Groups were also formed in the ARYA project viz., Ajivika, Shiv Shakti and Sarswati. In these groups, 10 farm women are ex-trainees of ARYA project activity and they trained 10 other farm women at their own level so as to make 20 persons per group. These SHGs have been earning a handsome amount for the fellow members.

Review Meeting on Attracting and Retaining Youth in Agriculture (ARYA)

A Review Meeting on Attracting and Retaining Youth in Agriculture (ARYA) project was organized on 11.01.2017 at the Conference hall of ICAR-ATARI, Zone-I, Ludhiana. Dr. H.S. Dhaliwal, Director, PAMETI, Ludhiana was the Chief Guest of the meeting and Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana was the Chairman. The meeting was also attended by all the scientists and AF&AO of ICAR-ATARI, Ludhiana and Program Coordinators and SMSs of KVKs implementing ARYA in the Zone.

Mushroom beds at an ARYA entrepreneur's house

Method demonstration during mushroom cultivation training

3.11 Farmer FIRST Programme

It is an ICAR initiative to move beyond the production and productivity and to privilege the complex, diverse & 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 (Table 92). 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.

Table 92: List of farmer's FIRST projects implemented

S. No.	Name of Institute/University	Sanctioned amount in (Rs in Lakh)	Title of project
1	ICAR-IARI, New Delhi	46.18	Participatory Technology Application and Multi - Stakeholder Convergence for Market led Agripreneurship and Sustainable Rural Livelihood
2	ICAR-NDRI, Karnal	33.62	Capacity Building of Resource poor Farmers in Paddy - Wheat cum Dairy Production Systems through Farmer FIRST (farm, innovation, resources, science and technology) Programme under Irrigated Agro -Eco. Region of Haryana
3	ICAR-CSSRI, Karnal	58.25	Empowering farmers through selective interventions in salt affected agro ecosystems of Ghaghar Plains
4	ICAR-CIRB, Hisar	17.20	Diversified Farming through Livestock and Agriculture
5	ICAR-CIPHET	8.41	Processing and value addition of agricultural produce for enhancing farmer income and employment in production catchment
6	ICAR-NIAP, New Delhi	42.80	Management and impact assessment of farmer FIRST programme
7	CSC HAU, Hisar	48.30	Enhancing farm productivity and profitability by technological interventions through farmers participatory approach in Hisar district
8	GADVASU, Ludhiana	41.88	Integrated approaches for livestock development: Farmer's context
9	PAU, Ludhiana	30.50	Technology application and up-scaling for sustaining natural resources and augmenting farm income: farmer-led market linked approach
10	CSK HPKV, Palampur	15.04	Transfer of improved farm production technologies for enhancement of rural livelihood security amongst the farm household of Kangra district of Himachal Pradesh
11	SKUAST, Jammu	16.77	Exploring economic opportunities for farmers of Kandi villages through application proven rainfed technologies

Training under farmer FIRST project

Exposure visit of farmers under Farmer FIRST project

The project is conceptualized to deal with focus on: i) Enabling involvement of researchers for continuous interaction with farm conditions, problem orientation, exchange of knowledge between farmers and other stakeholders, prioritization of problems and setting up 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-ecosystem 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.

The ICAR has sanctioned six farmer's FIRST projects to ICAR institutes and five to the State Agricultural Universities during the period under report to Zone-I. Thus, a total of 11 projects are being implemented in this zone and details are presented in Table .

3.12 Skill Development Training in Agriculture

Agriculture Skill Council of India (ASCI) has accredited 16 Krishi Vigyan Kendras (KVKs) of Zone-I (Punjab-6, Haryana-4, Himachal Pradesh-3, Jammu & Kashmir-2 and Delhi-1) to impart Skill Development Training (SDT) in agriculture of 200 hrs or more in different job roles for the youths so that they can get a job or can get self-employed. A total budget outlay of Rs 51,71,600 was sanctioned and released to 16 KVKs for conducting skill development training in agriculture or allied areas. A total of 33 skill development trainings were conducted by the KVKs in 11 different job roles to 659 rural youths during period under report (Table 93).

Table 93: Number of participants of skill development training in agriculture

S. No.	Job roles/QPs	No. of KVKs	No. of SDT conducted	No. of participants		
				Male	Female	Total
1.	Agriculture Extension Service Provider	2	2	32	8	40
2.	Artificial Insemination Technician	2	2	40	0	40
3.	Bee Keeper	4	4	81	0	81
4.	Dairy Farmer/Entrepreneur	5	5	99	1	100
5.	Floriculturist (Open cultivation)	1	1	18	2	20
6.	Floriculturist (Protected cultivation)	2	2	39	1	40
7.	Gardener	2	3	58	2	60
8.	Mushroom Grower (Small Entrepreneur)	7	7	123	15	138
9.	Quality Seed Grower	3	3	60	0	60
10	Small poultry farmer	2	2	39	1	40
11.	Vermi-compost producer	2	2	40	0	40
		Total	33	629	30	659

Skill training on Vermicompost producer

Skill training on beekeeper

3.13 Climate resilient Integrated Farming System Demonstration units

In order to promote integrated farming system (IFS) that is culturally and socially acceptable to the local community. The emphasis of IFS is on multi-cropping, rotational cropping, inter-cropping, mixed-cropping practices with allied activities like horticulture, livestock, fishery, agroforestry, apiculture, conservation/promotion of NTFPs etc. to enable farmers not only in maximizing the farm returns for sustaining livelihood, but also to mitigate the impacts of drought, flood or other extreme weather events. During the year, the ICAR has sanctioned an amount of ₹39.00 lakh to 13 KVKs (Punjab - 4, Haryana - 4, Himachal Pradesh -2, Jammu & Kashmir - 3) and ₹19.50 lakh was released for establishing climate resilient integrated farming system demonstration units at KVK.

3.14 Mera Gaon Mera Gaurav

To enhance the direct interface of scientists with the farmers, an innovative initiative has been launched as *"Mera Gaon-Mera Gaurav"* which will hasten 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 scientists selected villages and provided information to farmers on technical and other related aspects in a time frame through personal visits or through telecommunication. To be called "Mera Gaon-Mera Gaurav" (My Village-My Pride), the programme seeks to imbibe a sense of ownership among the agricultural scientists of the country. Zone-I consists of five states viz. Punjab, Haryana, Delhi, Himachal Pradesh, Jammu & Kashmir. A total of 18 ICAR institutes and eight State Agricultural Universities (SAUs) are working in this zone. All the ICAR institutes and SAUs has nodal officer for "*Mera Gaon Mera Gaurav*" and are responsible for forming teams of scientists, selecting villages and organizing baseline surveys, interface meetings, demonstrations and trainings in selected villages. Under this scheme, 369 teams of scientists have selected 1401 villages. The teams of scientists carried out various activities in their respective adopted villages and the details of the progress made during year 2016-17 are presented in Table 94.

Table 94: Summary of activities organized under MGMG by Institutes/SAUs

S. No.	Name of activity	No. of activities conducted	No. of farmers participated/ benefitted
1.	Visit to village by teams	2996	66215
2.	Interface meeting/ *Goshthies*	1161	37688
3.	Trainings conducted	916	25588
4.	Demonstrations conducted	3732	10435
5.	Mobile based advisories	3111	169209
6.	Literature support provided	701	54384
7.	Awareness created	978	62072
8	Linkages developed with other agencies	493	34907

3.15. Awards and recognitions

- **Pandit Deen Dayal Upadhyaya Antyodhyay Krishi Puruskar 2016**

Smt. Pooja Sharma, Gurgaon (Haryana) in recognition of her Self Help Groups 'Kshitiz" who had

adopted IARI technology for making soyabean products and started their marketing at national as well as state level and S. Jinder Singh, Rupnagar (Punjab) for growing and commercially selling nursery of vegetable crops produced in net/poly houses along with bee keeping bestowd with Pandit Deen Dayal Upadhyaya Antyodhyay Krishi Puruskar 2016 for zonal category on 25th September 2016 in Kisan Sammelan at KVK Samrala. The awards comprises of ₹50,000 each along with a citation and the certificate.

- **KVK Ujwa received best stall award at Krishi Unnati Mela**

During Krishi Unnati Mela-2017 at IARI, New Delhi KVK Ujwa received best stall award. The event was jointly organized by Ministry of Agriculture and farmer's welfare, ICAR and IARI. KVK, Ujwa, Delhi put the stall during the mela and showcased the various live demonstration technologies like improved structures for storage of onion, low cost mushroom production unit, improved varieties of onion and garlic, wheat and mustard. Various posters, depicting employment generation programs in activities like dairy farming, food processing, bee keeping & mushroom production.

- **Dr Gudev Singh Khush Team Award For Excellence in transfer of technology**

Krishi Vigyan Kendra, Jalandhar Scientist team has bestowed with G.S. Khush Team Award for Excellence in Transfer of Technology to the farmers for the year 2016. The much coveted award carrying a cash prize of twenty five thousand and a citation was presented to the KVK team. For the rapid transfer of PAU recommended technologies among the farming

community, this team established a Technology Park for demonstration of various advance technology in agriculture, conducted vocational training for generation of self employment among the rural youth and performing various field demonstration and on farm trial to identify area specific problem and their solution. Extension work of this team has put transcendental impact on farmer community.

- During Krishi Unnati Mela-2017, KVK Entrepreneur, Sh. Vipin Kumar, from Modi Nagar, awarded under innovative farmer category for his unique value added products of aonla. Another farmer Sh. Narender Kumar, from village Tatesar, Delhi, a handicap entrepreneur of KVK also awarded for his courageous involvement in setting up & selling of fruits & vegetables processing unit under the guidance of the KVK.

- The Krishi Vigyan Kendra (KVK), Bathinda, Punjab has adjusted as the Best KVK among the KVKs of Zone -1 for the year 2015-16, for its contribution in dissemination of technologies for overall agricultural development.

- KVK Ropar and KVK Patiala from Zone-1 are conferred with the award for completely cashless transactions by ICAR, New Delhi

- Award of Excellence was presented to KVK Bhiwani for Cluster FLDs on 18th February 2017, DDG (ICAR), Dr. A.K. Singh (Agri. Extension), Ministry of Agri.), Govt. of India and Vice Chancellor, Dr. R.K. Patil, Indira Gandhi Agricultural University, Raipur presented the award to KVK scientists during 2016-17.

- Dr. Preeti Mamagai, Sr. Scientist (FRM) was nominated for International Training Programme funded by Netwon Bhabha funds on *"Female leaders in Crop and Agricultural Sciences"* in Cambridge University, at United Kingdom from September 4-10, 2016.

- Dr. Pragya Bhadauria, Scientist (LPM) was bestowed with the International WPSA Young Scientist Award by World's Poultry Science Association, Netherland for attending World Poultry Congress at Beijing China w.e.f 05-09 Sep 2016.

- Dr. Preeti Mamagai, Sr. Scientist (FRM) and A.S Murai, Scientist (Agr. Ext.) received best poster award for the paper on "Empowering farming community to conserve traditional varieties" during *1st International Agro biodiversity Congress, Science, Technology, Policy & Partnership*, New Delhi, from 6-9th November 2016.

- ICAR-ATARI received consolation prize for Best Stall during Regional Agriculture Fair w.e.f 28-30 Nov 2016 at Muzaffarnagar.

Chapter 4

IMPORTANT EVENTS AND ACTIVITIES

4.1 Awareness Campaign on Pradhan mantri Fasal Bima Yojna (PMFBY)

In Zone-1, to create awareness and dissemination of the information regarding Pradhan Mantri Fasal Bima Yojana (PMFBY), ICAR-ATARI, Ludhiana initiated mass awareness campaign through their KVKs from 30th March 2016. During the year, about 62 programmes were conducted by KVKs of Zone-1 in total benefiting more than 37,000 farmers in Northern India. First time a huge campaign was initiated with the active participation of public representatives in collaboration with other supportive agencies like Department of Agriculture, Horticulture, Animal Husbandry, Banks, Insurance companies, Press and Media. In these programmes 04 Cabinet Ministers, 06 State Government Ministers, 18 Member of Parliaments (MP), 24 Members of Legislative Assembly (MLA) along with other important dignitaries showed their visible presence. During the campaign, technical knowledge was imparted to the farmers about PMFBY along with showcasing the latest agricultural technologies, distribution of soil health cards and telecasting video films on Pradhan Mantri Fasal Bima Yojana. The summary of these programmes is presented in the Table 95.

Smt. Harsimrat Kaur Badal, Union Cabinet Minister of Food Processing, (GOI) at Bathinda during PMFBY Programme

Dr. Jatinder Singh, Minister of State, (GOI) at KVK Reasi during PMFBY Programme

Table 95: Summary of awareness programmes on PMFBY in Zone-1

State	No. of awareness programme	No. of Union Ministers	No. of State Govt. Ministers	No. of Hon'ble MP	No. of MLAs	Other Dignitaries & Bank Officials	No. of Farmers
Punjab	20	1	3	5	5	22	12580
Haryana	18	1	1	5	11	25	13560
Himachal Pradesh	11	0	2	4	5	16	5008
Delhi	1	0	0	1	0	2	450
Jammu & Kashmir	12	2	0	3	3	15	6208
Total	62	4	6	18	24	80	37806

4.2. Management Development programme for newly recruited Programme Coordinators of KVKs

During the year ICAR-ATARI, organized 4th and 5th Management Development Programme (MDP) for newly recruited programme coordinators (PC) of KVKs of Zone-1. The 4th MDP was conducted from 23-27 May, 2016 with active participation of four Programme Coordinators of KVK Chamba, Yamunanagar, Kulgam

and Jammu. Similarly the 5th MDP was conducted from 13-17 Jan, 2017 with four of the PCs from KVK Sangrur, Fatehgarh Sahib, Rajouri and Lahual Spiti. During these programme participants were trained with various management skills for effective functioning of KVKs and exposure visit to CIPHET, Ludhiana was also conducted for trainees.

Participants during 5th MDP Training

Exposure visit of MDP trainees at ICAR-CIPHET, Ludhiana

4.3 Kisan Sammelan for Celebration of Pt. Deen Dayal Upadhyayay birth centenary

A *Kisan Sammelan* was organized by the ICAR-ATARI, Zone-I, Ludhiana at KVK, Samrala, Punjab on the eve of birth centenary of Pt. Deen Dayal Upadyay on 25th September, 2016. The programme was attended by Chief Guest Dr. B.S. Dhillon, Vice-chancellor, PAU, Ludhiana; Guests of Honour Dr. R.S. Poswal, ADG (Extn.), ICAR, New Delhi and Dr. R.K. Gupta, Director, ICAR-CIPHET, Ludhiana; Dr. Rajbir Singh, Director, ICAR-ATARI; Dr. R.S. Sidhu, DEE, PAU and Dr. G.S. Butter, ADE, PAU. The dignitaries urged farmers to work in tandem with the KVKs, Agricultural Universities and Research Institutes for realizing high profit sustainable farm business. During the technical session, KVK farm scientists delivered interactive talks on various agriculture related issues; moreover, ten progressive farmers shared their experiences of agri-businesses. On this occasion, two farmers from Zone-I were awarded with Pt. Deen Dayal Upadhyay Krishi Puruskar 2016. Mrs. Pooja Sharma from Gurgaon, Haryana was awarded for her successful endeavor named *Kshitij;* which is a Self Help Group (SHG) of resource deprived women who produce and sell Soya-products. Whereas, Mr. Jinder Singh from Ropar, Punjab was awarded for his triumphant venture of polyhouse vegetable nursery. Scientists and staff of KVKs and 800 farmers from the states of Punjab, Haryana, Himachal Pradesh and Jammu & Kashmir also participated in the programme.

Award ceremony of Pt. Deen Dayal Upadyay Krishi Puruskar 2016.

4.4 Orientation workshop-cum-training of trainers for conducting skill development programmes

ICAR-Agricultural Technology Application Research Institute (ATARI), Ludhiana successfully organized three-day "orientation workshop-cum-training of trainers for conducting skill development programmes" during October 26-28, 2016 in

Orientation workshop on skill development at ICAR-ATARI, Ludhiana

collaboration of Agriculture Skill Council of India (ASCI). Programme Coordinators, SMSs and Programme Assistants (computer) of 18 Krishi Vigyan Kendra of Punjab, Haryana, Himachal Pradesh, Jammu & Kashmir, Uttar Pradesh and Uttarakhand were participated in this workshop. Dr. V.P Chahal, ADGs (Agri. Ext) and Chief Guest of the programme, informed that 100 KVKs were selected for organizing skill based training programmes on pilot basis and plan of extension of the project to other KVKs in near future. He briefed about the initiative of skill development plans for various states by ICAR and ASCI. Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana, emphasized on the need of skill development among rural youth especially school and college dropouts for bringing them into the mainstream. While highlighting the importance of skill development. Sh Sodhi, Director, ASCI, briefed audience about Skill India initiative and role and responsibilities of ASCI. He emphasized that agricultural skill database and urged the scientists of KVKs for their full cooperation in making Skill India Initiative a grand success. Participants were also trained on National Skill Qualification Framework (NSQF) compliance, Qualification Packs (QPs), Job Roles, Data Management System, etc during first two days of the workshop. On third day, all the participants were assessed on domain skill (technical aspects) in their respective job roles. The assessments on job roles were included written as well as oral examination. In total, 52 specialists from 18 KVKs got trained and assessed for conducting skill development programmes for different job roles.

4.5 Annual Zonal Workshop of Krishi Vigyan Kendras of Zone-1

A three-days (12-14 December 2016), Annual Zonal Workshop of Krishi Vigyan Kendras of Zone-I was organised by ICAR-Agricultural Technology Application Research Institute, Ludhiana at CSK HPKV, Palampur (HP). The workshop was aimed at reviewing the work done by 70 KVKs and 8 ATICs of Punjab, Haryana, Delhi, Himachal Pradesh, Jammu & Kashmir. Dr Gurbachan Singh, Chairman, ASRB, New Delhi was the Chief Guest. In his inaugural address he said that KVKs can become harbingers of second green revolution and emphasized that problems of agriculture are becoming complex and farm scientists need to work in a problem solving mode for each specific region and district. Dr. A.K. Singh, Deputy Director General (Agril. Ext.) ICAR, in his presidential remarks, said that the Government of India has launched large number of initiatives to strengthen this vital organ of frontline extension system. He said that knowledge management, focus on oilseeds and pulses, doubling farmer's income, scientific management of crop straw and animal residues, attracting and retaining youth in agriculture, protected cultivation, etc. are some of the important areas where KVKs need to give top priority. Dr. P.K. Sharma, VC, SKUAST, Jammu; Prof A.K. Sarial, VC, CSK HPKV, Palampur and Dr Balraj Singh, VC, Agriculture University, Jodhpur also addressed the delegates and lauded the role played by KVKs in the development of agriculture. Dr. Rajbir Singh, Director, ICAR-ATARI, presented an overview of activities of KVKs in the region and told that KVKs have been able to propel farm growth. Dr. P.K. Mehta, Director (Ext), CSK HPKV, Palampur expressed his views about ways to increase the farm income by honey production, mushroom production, protected cultivation, etc. About 200 delegates includes Directors of ICAR Institutes, Directors (Ext) of SAUs, Programme Coordinators of KVKs, ATIC managers, Scientists of KVKs and farmers participated in the three day deliberation.More than a dozen farm publications and DVDs were also released during inaugural session.

Annual Zonal Workshop of KVKs of Zone-I at CSKHPKV, Palampur, HP

4.6 Training programmes on Safe and Judicious Use of Agro Chemicals in Crops in collaboration with HIL

During the year, a total four one day training programmes on *'Safe and Judicious Use of Agro. Chemicals in Crops'* were organized by the ICAR-ATARI, Zone-I, Ludhiana in collaboration with

Hindustan Insecticide Limited (HIL) under MIDH Scheme of GOI in four states of zone-1. Benefiting the huge polyhouse grower farmer's of NCR region, a farmer-scientist interface was organised at Village Manoli in District Sonipat on 02.02.2017. The programme was inaugurated by the Chief Guest Dr. K.P Singh, Vice-chancellor, CCSHAU Hisar, Haryana; Guests of Honour, Dr. S.K. Malhotra, Agriculture Commissioner, Department of Agriculture, Cooperation & Farmers Welfare, New Delhi, Dr. S.P Mohanty, CMD, Hindustan Insecticides Limited (HIL), Sain Dass, Former Director, ICAR-Indian Institute of Maize Research (IIMR), New Delhi; Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana and Dr. D.B Ahuja, Director, ICAR-NCIPM, New Delhi. Addressing the massive gathering of farmers, the chief guest and other dignitaries' emphasised that the state has enormous potential to be a vegetable hub across the India but simultaneous taking care of the judicious use of pesticides in their crops. The event was attended by near about 600 farmers, farm women and other stakeholders from Haryana.

HIL training programme at Sonipat

In an another training programme at Krishi Vigyan Kendra, Bathinda on 21.02.2017, Dr. Baldev Singh Dhillon, graced the occasion as chief guest and suggested the farming community regarding right use of pesticide with right concentration and dose at the time of application. Dr. Rajbir Singh, Director ATARI- ICAR, expressed his concern regarding misuse of pesticides in crops. More than 350 farmers have attended the training programme.

HIL training programme at Bathinda

With the aim for benefiting the farmers of Himalayan region, a one day training programme on *safe and judicious use of pesticides in crops* with special emphasis on horticultural crops was held at Krishi Vigyan Kendra Jammu on 25.03.2017. Dr. Gagan Bhagat, honourable, MLA, R.S. Pura constituency was the chief guest on the occasion. In his address Dr. he expressed his concern over growing usage of pesticides and agro-chemicals in agriculture. He said that since he belonged to R.S. Pura which is famous for Basmati Rice every care must be taken to avoid use of any hazardous chemicals and we must make every farmer aware of ill effect of these chemicals. The programme was attended by more than three hundred farmers from five districts under Jammu province namely Jammu, Kathua, Samba,

HIL training programme at Jammu

Reasi and Rajouri. Officers from line departments from these districts along with heads of the departments and other stakeholders attended the awareness camp which aimed at sensitizing the rural folks about safe use of agro-chemicals which have gained popularity in recent years. Dr. Rajbir Singh, Director, ICAR-ATARI, assured that ICAR will bring all latest technology to doorsteps of Jammu farmers. He said that the ultimate goal of increasing farm income can only be achieved if we increase our productivity and reduce the cost of cultivation. Sh. A. K. Malhotra, Director Agriculture, Jammu gave a detailed presentation of common preventive measures that are to be taken for preventing any mishappening while spraying these chemicals.

Manager HIL showed a documentary on safe use of pesticide and farmers took keen interest in the film. He stressed that safe chemicals must be promoted and guided farmers about banned chemicals.

In a similar training programme at village Kuthiari in Una district on 31.03.2017. More than 275 farmers from adjoining villages of Kuthiari namely Nandpur, Thathal, Bijapur, Talwal, Katohar Kalan and Badaun actively participated and were benefitted. At the very outset, Deputy General Manager (Marketing) of HIL, Sh. Anil Yadav outlined the detailed activities and role of Hindustan Insecticide Limited in catering to the needs of the farming community of India. Thereafter, the farmers were appraised about the harmful effects non-judicious use of agro-chemicals by Dr Khan, Programme coordinator, KVK Una and Dr. Pragya, Scientist, ICAR-ATARI. The farmers were educated upon to use pesticides to only after correct diagnose of the existing problem and advised to lay greater emphasis on use of non-chemical methods like pheromone traps and microbial Pesticides.

HIL training programme at Una

4.7 Fisheries Development in North Zone in Collaboration with NFDB, Hyderabad

Looking towards the vast potential of fisheries in carp and trout fish farming among the plain area of Punjab & Haryana and in the hilly area of Himachal Pradesh & J&K respectively. ICAR-ATARI initiated his maiden venture with NFDB through the participation of Director, ATARI in the National Workshop on the *'Role of ATARIs in the Development of Fisheries'* held on 6th April 2016 at National Fisheries Development Board, Hyderabad. During the workshop, Sri. K.N. Kumar, IAS, Chief Executive, NFDB in his opening remarks opined that the KVKs are at the forefront in taking the schemes to the field level. Dr. A.K. Singh, Deputy Director General (AE), ICAR expressed that there are

National workshop of fisheries at NFDB, Hyderabad

100 fishery SMSs in KVKS to take up the HRD activity under the ATARIs.

Many collaborative efforts of ATARI and NFDB were made during 2016-17. Subject Matter Specialists (SMS) of fisheries from zone-1 actively participated in *'National Orientation Workshop for the Fisheries SMS'* at Hyderabad during 16-17 June 2016 and *Refresher Training Programme for Middle Level Extension Functionaries on New Dimension in Extension Management* during 27 June to 2 July at MANAGE, Hyderabad for development of fisheries human recourses in their respective areas. During the *Workshop of Fisheries Scientist from Zone-1 & Zone-IV on Project Proposal related to Fishery* in collaboration with ATARI, Kanpur and NFDB, Hyderabad at ICAR-NBFGR Lucknow on 07.10.2016, various projects proposal on fisheries under capacity development programme were screened and ATARI zone-1 has received a financial assistance of Rs. 1.93 lakhs from NFDB for carrying out HRD activities in fisheries in the state of Punjab and J&K. Under this KVK Tarn Taran organized two five days Vocational Training Programme on "Freshwater Carp Culture: Innovative Approach" w.e.f 12-18 Jan 2017 and "Ornamental Fish Breeding, Culture, Trade and Aquarium Services" w.e.f

Fisheries workshop for Zone-I and Zone IV at NBFGR, Lucknow

19-25 Jan 2017, KVK Barnala has also organized two five days on campus vocational trainings on "Integrated

Fish Farming" from 19-23 Dec 2016 and "Ornamental fish breeding, culture, trade and aquarium services" from 06-10 Feb 2017 and KVK-Doda of SKUAST-J also conducted five days training programme on "Integrated Fish Farming" during 30th January to 3rd February, 2017 under the supervision of ATARI, Ludhiana.

4.8 Celebration of International Yoga Day

On the occasion of the International Yoga Day, all the scientific, administrative and temporary staff of ICAR-ATARI, Zone-1, Ludhiana together performed various *Pranamayas* and *Asanas* in the Institute premises.

Yoga Day celebration at ICAR-ATARI, Ludhiana

4.9 Celebration of Hindi Pakhwada

In the ICAR-Agricultural Technology Application Research Institute, Ludhiana, Hindi fortnight was organized from 14th to 28th September 2016. The Hindi fortnight was inaugurated on 14 September 2016 by Dr. Arvind Kumar, Principal Scientist who detailed about Hindi Day and its importance. Since the institute is committed to propagate the Hindi language, various competitions such as debate, essay, poetry and Hindi vocabulary were organized during the Hindi fortnight to fulfill the purpose. In all these competitions, all the officers and employees of the institute actively took part and concluded the program by giving cash prizes of Rs.1200, Rs.800, Rs.5500 and Rs.200 by Dr Preeti, senior scientist to the winners. During the entire period, all the staff members of the institute have done their signature and their maximum work in Hindi. The entire programme was co-ordinated by Dr Pragya Bhadauria, Officer Incharge, official language and her team, under the patronage of Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana.

Celebration of Hindi Pakhwada at ICAR-ATARI, Ludhiana

4.10 Celebration of Swachata Pakhwada

Swach Bharat Abhiyan was organised at ICAR-ATARI, Zone-1 on 2nd October, 2016. Director and Staff members of ICAR-ATARI actively participated in this programme. During this programmes all the members made the institute campus as well as the surrounding areas of the campus filth free on this day.

Celebration of Swachata Pakhwada at ICAR-ATARI, Ludhiana

4.11 Celebration of World Soil Day

World Soil Day was celebrated by 50 KVKs of this zone on December 05, 2016 in which 11,272 farmers participated. During this programme, a total of 6695 Soil Health Cards were distributed to the farmers including 1608 in Punjab, 3667 in Haryana, 520 in Delhi, 770 in Himachal Pradesh and 130 in Jammu & Kashmir (Table 96). 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,

Celebration of World Soil day at ICAR-ATARI, Ludhiana

Table 96: 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	18	2519	1608
2.	Haryana	17	5863	3667
3.	Delhi	1	300	520
4.	Himachal Pradesh	10	2027	770
5	Jammu & Kashmir	4	563	130
	Total	**50**	**11272**	**6695**

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.

4.12 Visits of dignitaries

Additional Secretary DARE Shri C. Roul visited ICAR-ATARI, Ludhiana

Sh. C. Roul, IAS, Additional Secretary DARE and Secretary ICAR visited ICAR-ATARI, Zone-I, Ludhiana on 9th November, 2016. Sh. Roul planted a sapling of Araucaria at ICAR-ATARI, Ludhiana campus. ICAR-ATARI, Ludhiana organized a meeting of Sh. C. Roul with programme coordinators of Krishi Vigyan Kendras of Punjab at Vice-chancellors' committee hall in Punjab Agricultural University. Dr. B.S. Dhillon, VC, PAU Ludhiana; Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana; Dr. S.K. Gupta, Director, ICAR-CIPHET, Ludhiana; Dr. Vinay Mahajan, Director, ICAR-IIMR, Ludhiana and Director and Additional Director Extension Education, PAU, Ludhiana were the other dignitaries present for the meeting. Moreover, about twenty Programme Coordinators of KVKs of Punjab attended the meeting. Sh. Roul appreciated the KVKs for their close association with the farmers of the state and discussed contemporary issues like crop residue burning, white-fly menace, etc. with the KVK staff and experts of PAU, Ludhiana. He also suggested the KVKs to work out the economic viability and commercial feasibility of the improved technologies for their wider adoption. Dr. Dhillon explained the management strategy for controlling crop residue burning and highlighted research in progress. Dr. Rajbir Singh proposed formal vote of thanks.

Dr. Gurbachan Singh, Chairman, Agricultural Scientists Recruitment Board (ASRB) visited KVK Nag Kalan, Amritsar

Dr. Gurbachan Singh, Chairman, Agricultural Scientists Recruitment Board (ASRB) visited KVK Nag Kalan, Amritsar and interacted with the scientists of the KVK. Dr. Singh planted a sapling during his visit. He took keen interest in various crop demonstrations displayed in the technology park of KVK. He also guided the farmers to adopt Integrated Farming system

Visit of Add. Secretary DARE at ICAR-ATARI, Ludhiana

Visit of Dr. Gurbachan Singh, Chairman, (ASRB), at KVK Nag Kalan, Amritsar

approach to earn daily income. He also suggested that the farmers could enhance their profitability through starting auxiliary occupations such as Bee-keeping, Poultry, Dairy, Nursery production, Mushroom growing, etc as components of mixed farming. He visited the orchard of progressive farmer Major Manmohan Singh at village Firvariyan. He also visited Organic farm managed by Pingalwara Amritsar at village Deerekot, Jandiala Guru where he interacted with Master Rajbir Singh regarding various practices adopted for organic farming.

4.13 Foundation stone of new Krishi Vigyan Kendras

Krishi Vigyan Kendra, Samba

Dr. Jatinder Singh, Hon'ble MOS for Prime Minister's Office; Personnel, Public Grievances & Pension, unveiled the foundation stone of Krishi Vigyan Kendra in Samba district of Jammu & Kashmir at 4th December, 2016.

Dr. Jatinder Singh, Union Minister of State (GOI) inaugurated KVK, Samba

Krishi Vigyan Kendra, Abohar

Shri Vijay Sampla, Union Minister of State for Social Justice and Empowerment, inaugurated the building of Krishi Vigyan Kendra at CIPHET, Abohar (District Fazilka) on 25th December 2016.Shri Sampla highlighted importance of agriculture sector and mentioned that with the establishment of KVK, the farmers of the district will get exposure to new agricultural technologies. Shri Surjeet Jyani, Health Minister, Government of Punjab briefed about the importance of pro-farmer schemes introduced by the Government of India. Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana briefed that the KVK can be a specialized institution in the field of processing and

Sh. Vijay Sampla, Union Minister of State inaugurated KVK, Abohar

value addition and can show the path of prosperity. Dr. R K. Gupta, Director, ICAR-CIPHET, Ludhiana in his welcome address briefed the technologies developed by CIPHET and importance of processing and value addition in improving the income of farmers.

Krishi Vigyan Kendra, Pathankot

Sh. Dinesh Singh, Deputy Speaker, Punjab unveiled the foundation stone of Krishi Vigyan Kendra in Pathankot district of Punjab on 4th Jan 2016. In his inaugural address, Sh. Dinesh Singh, greeted the gathering and said that the prime objective of KVK's is two-way interaction between the agricultural scientists and the farmers. This KVK will play a great role for the farmers of district Pathankot and uplift the livelihood of the farmers. Dr Baldev Singh Dhillon, VC, PAU, Ludhiana articulated the role of KVK for imparting technical knowledge which is the need of the time for the overall development of farmers of district Pathankot.

Sh. Dinesh Singh, Deputy Speaker, Punjab inaugurated KVK, Pathankot

4.14 Mass Awareness Campaign against Residue Burning

Residue burning is one of the major issues of concern across not only for agriculture but for the society as a whole. Punjab and Haryana are burning almost 30 million tons of crop residues annually. This cannot be dealt and address in isolation and technologies alone are not sufficient to address this challenge until there is awareness among the whole social system. In the view of National Green Tribunal's serious view on burning of agricultural waste particularly in the states of Punjab and Haryana, Department of Agriculture, Cooperation and Farmer Welfare, Ministry of Agriculture has brought out a policy on residue burning of which capacity building and awareness creation are important components.

April-May 2016: The ICAR-ATARI, Zone-1 through KVKs of Haryana and Punjab, organized Pakhwara on Mass Awareness on Residue Burning from 16th April to 1st May 2016 (Table 97). The objective of this campaign was to create awareness about the ill effects of residue burning and available technologies/ interventions for management of residue. The theme of the campaign is 'Khet Ke Avsesh, Khet Main' (खेत के अवशेष, खेत में) and 'Earn, not burn'. During the pakhwara, various mass awareness activities were conducted by the KVKs to make farmers and other stakeholders aware about harmful effects of the burning of crop residues leading to smoke, release of green house gases in addition to the loss of plant nutrients and severe effect on human health. Further, the farmers were advised about various uses of crop residues which can be used for soil health improvement, reducing pollution,

Begining of Mass Campaign against Residue Burning at KVK Kaithal

Students in a rally

Table 97: Extension Activities organized during Residue Burning Campaigns

Name of Activities	No. of participants	
	April-May 2016	Oct-Nov 2016
Awareness Campaign	3458	5669
Slogan and Essay Writing Competition	238	434
Exposure visit	29	35
Lectures delivered	5432	4557
Field visits	259	436
Group Meeting	241	395
Kisan Goshti	836	892
Village *Sandhya Pheri*	211	465
Demonstrations	96	57
SMS / Mobile advisory	74582	75869
Literature distributed	19644	17450

increasing productivity and increasing sustainability and resilience of agriculture. The advisories were issued to the farmers to adopt resource conservation technologies under the changing scenario of climate change. Famers can also sow summer green gram which can be sown by zero seed drill and happy seeder and farmers can save one-third of the required nitrogen in the coming rice crop beside good crop of green gram. Scientists of KVK educated the farmers about alternative sources of straw management. This included making good quality paper and cardboard. Wheat straw can be used to make compost for mushroom cultivation, to feed the animals in straw farm, as a fuel for brick kiln industry. Many farmers of districts of Punjab and

Poster Competition on Residue Burning

Haryana on this occasion also took an oath not to burn wheat stalk and to adopt alternative management techniques and promised to stop this menace.

October-November 2016: All the KVKs of Haryana and Punjab observed a '*Chetna Maas'* from October 16th to November 11th 2016 for sensitizing all the stakeholders about effects of residue burning. The theme of the campaign was "*Khet Ke Avsesh, Khet Main"* (खेत के अवशेष, खेत में) and 'Earn, not burn'. A *Kisan Sammelan* was organised on 16th October 2016 at KVK, Kaithal, to mark the beginning of "*Chetna maas*", in which more than 1500 farmers and farm women participated. The major highlight of the programme was Farmers to Farmers Dialogue (F2FD) and live demonstrations on various machines like baler, chopper, spreaders etc. for residue management. Dr. Gurbachan Singh, Chairman, ASRB was the Chief Guest of the *Sammelan* and other dignitaries present for the *sammelan* were Dr. K. P. Singh, VC, CCSHAU, Hisar; Dr. V. P. Chahal, ADG (Agri. Ext.) and Dr. Randhir Singh, ADG (Agri. Ext), ICAR, New Delhi; Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana; Dr. P. C. Sharma, Director, ICAR-CSSRI, Karnal; Dr. G. P. Singh, Director, ICAR-IIWBR and Dr. S. S. Siwach, Director Extension Education, CCSHAU, Hisar. Similarly, a *Kisan Sammelan* was organized by ICAR-ATARI, Zone-I, Ludhiana along with KVK Yamunanagar on November 11th, 2016 in village Radouri to conclude the '*Chetna Maas*". Dr. S.S. Siwach, Director Extension Education and Director Research, CCSHAU Hisar; Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana; Dr. M.L. Jat, CIMMYT; Dr. Dharamvir Yadav; Dr. Samar Singh, Director, RRS CCSHAU Uchani; Dr. B.R. Kamboj, PC, KVK

Resource Conservation Technology - Happy Seeder for sowing wheat

Yamunangar and Sh. S.P. Singh, President, Kisan Club, Yamunanagar were the dignitaries present for the programme. Around five hundred farmers attended the programme.

The campaign focused awaking societal consciousness about the ill effects of residue burning and demonstrating technologies/ interventions for effective residue management. Under this campaign many activities were organized like slogan and essay writing competitions, exposure visits, lectures, training camps, field visits, group meetings, *Kisan gostis*, village *sandhya pheris*, seminars, demonstrations, etc. Similarly, farmers were also contacted through Kisan Mobile Advisories regarding climate friendly residue management. KVKs also developed and distributed literatures such as folders, handouts, leaflets, pamphlets, etc. these programs were organized in close association with ATMA, District Agricultural Department, ICAR institutes of the two states.

Chapter 5

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 other staff members to undertake higher training, participate in seminars, conferences, symposia, trainings etc. 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. The details are presented in Table 98, 99 and 100 .

Table 98: Details of HRD programme attended by KVK personnel

S. No.	Title of the Training programme	Duration of the Programme	No. of Participants	No. of KVKs Involved
1.	National Workshop on 'Community Radio for Agricultural Development' at MANAGE, Hyderabad	17-18 March, 2016	4	4
2.	Quality Seed Production, IIWBR, Karnal	26-28 May 2016	9	8
3.	Urban Agriculture and Food & Nutritional Security at MANAGE, Hyderabad.	20-25 June 2016	2	2
4.	National Orientation Workshop for the Fisheries SMS, NFDB, Hyderabad	16-17 June 2016	6	5
5.	Refresher Training Programme for Middle Level Extension Functionaries on New Dimension in Extension Management at MANAGE, Hyderabad	27 June to 02 July 2016	1	1
7.	Sensitization Workshop-Cum-Training on Recent Agricultural Engineering Technologies, CIAE, Bhopal	02-06 Aug 2016	3	3
8.	Workshop on Skill Development I Organic Farming, EEI, Nilokheri	30 Aug -02 Sep, 2016	2	2
9	Workshop on Climate Change, EEI, Nilokheri	14-17 Sep 2016	1	1
10.	Training Programme on Soybean Processing, CIAE, Bhopal	15-19 Nov 2016	8	8
11.	Training Programme on Soybean Processing, CIAE, Bhopal	26-30 Sept 2016	7	7
12.	Workshop on Motivational Skills for Organic Farming, EEI, Nilokheri	19-22 Sep 2016	2	2
13.	Workshop on Capacity Building Programme for Extension Personnel of ATMA Model, EEI, Nilokheri	26-30 Sep 2016	2	2
15.	Workshop on ICT for Linking Farmers to Market, EEI, Nilokheri	25-28 Oct 2016	2	2
16.	Workshop on Extension Management Skills, EEI, Nilokheri	02-05 Nov 2016	1	1
17.	Workshop on Skill Development in Horticultural Crops, EEI, Nilokheri	16-19 Nov 2016	1	1
18.	Model Training Course on Post Harvest Supply Chain/Cold Chain Management of Vegetables, CIPHET, Ludhiana	12-19 Dec 2016	6	6

Table 99: Details of HRD programme attended by ICAR-ATARI staff

S.No	Name of employee	Designation	Name of training	Duration	Organising Institution
1.	Dr. Preeti Mamgai	Sr. Scientist (CPIO)	Right to Information Act for how to file RTI online	21 Oct 2016	NASC Complex, New Delhi
2.	Dr. Pragya Bhadauria	Scientist	Summer School on ICT Use in Agriculture	05-25 July 2016	Department of Extension Education, PAU, Ludhiana
3.	Dr. Pragya Bhadauria	Scientist	National Workshop on Co-operative learning for producing high quality dairy professionals at College of Dairy Science & Technology,	17 March 2017	GADVASU, Ludhiana
4.	Dr. Ashish S. Murai	Scientist (I/C AAO)	Implementation of NIC's e-Procurement Solution through CCP Portal	16-17 June 2016	ICAR-IARI New Delhi
5.	Mr. D.C Sati	AF&AO	Training module of public Financial management system (PMFS)	05 March 2017	Institute of Government Accounts & Finance, New Delhi at Jaipur
6.	Ms Indu Bagal	Assistant (Finance)	Implementation of NIC's e-Procurement Solution through CCP Portal	16-17 June 2016	ICAR-IARI New Delhi
7.	Sh. Deepak Sharma	LDC	Payroll/HR Modules	18-19 April 2016	IASRI New Delhi

Table 100: Details of trainings/workshops/meetings organized by ICAR-ATARI

S. No	Name of the programme organised	Duration	No. of participants	No. of KVKs involved	Venue
1.	State Level Workshop for KVKs of Haryana and Delhi	02-03 May 2016	70	19	CCSHAU, Hisar
2.	Workshop of Cluster Demonstration of Oilseeds	03 May 2016	25	06	CCSHAU, Hisar
3.	4th MDP programme for newly recruited PCs of KVKs of Zone-1	23-27 May 2016	04	04	ICAR-ATARI, Ludhiana
4.	Orientation Workshop on Skilled Development in Agriculture	26-28 Oct 20 16	60	16	PAMETI, Ludhiana
5.	Annual Zonal workshop of KVKs of Zone-1	12-15 Dec 2016	150	70	CSKHPKV, Palampur
6.	Review meeting of ARYA	11 Jan 2017	15	04	ICAR-ATARI, Ludhiana
7.	5th MDP programme for newly recruited PCs of KVKs of Zone-I	13-17th Jan 2017	15	04	ICAR-ATARI, Ludhiana
8.	Workshop cum Training Program on Cluster FLDs on Oilseeds	23 Jan 2017	90	39	ICAR-ATARI, Ludhiana
9.	Workshop cum Training Program on Cluster FLDs on Pulses	24 Jan 2017	80	42	ICAR-ATARI, Ludhiana

Chapter 6

PUBLICATIONS

Publications by Staff of ICAR-ATARI, Ludhiana

Research Articles

- A.S. Shinde Tamboli, Akshat Goel, Manish Mehra, J.J. Rokade, Pragya Bhadauria, A.S. Yadav, S. Majumdar and S.K. Bhanja. 2017. Delayed post-hatch feeding affects the performance and immunocompetence differently in male and female broiler chickens. *Journal of Applied Animal Research*. DOI: 10.1080/09712119.2017.1299739
- Y.S. Jadoun, S.K. Jha, Pragya Bhadauria, Rajiv Baliram Kale. 2017. Analysis of Constraints Faced by Beneficiaries of Integrated Murrah Development Scheme (IMDS) in Haryana. *Buffalo Bulletin*. 36(1):208-213.

Popular Articles

- Preeti Mamgai, Ashish Murai and Pragya Bhadauria. 2016. Saviours of Agro-Biodiversity: Farmers. *Agrobios*. Vol XV (5):56-57.
- Preeti Mamgai, Ajaib Singh, Ashish Murai and Pragya Bhadauria. 2016. Farmers to farmer Extension, *Agriculture Today*. Vol: XIX, Issue: 8, Pg 40-41.
- Pragya Bhadauria, Arvind Kumar, Preeti Mamgai and Y.S Jadoun. 2016. Nutritional Management of Dairy Animals during Transition Period for Prevention of Lameness. *Livestock Technology*. 6(7):14-16.
- प्रीति ममगई. 2016. स्वयं सहायता समूह-ग्रामीण महिलाओं के लिए एक आशा की किरण, कृषि ज्ञान गंगा, Vol. (1) Pg: 127-128.
- प्रीति ममगई. 2016. मूल्य संवर्धन से आत्मनिर्भरता की ओर प्रसंस्करण प्रगति-राजभाषा पत्रिका।

Technical Bulletin/ Books

- Chahal, V.P., Singh R and Mamgai, P. 2016. Technological interventions through Cluster Frontline demonstrations in Rabi Oilseed.
- Pragya Bhadauria, Arvind Kumar and Preeti Mamgai. Highlights of Pradhan Mantri Fasal Bima Yojna in zone-1.
- Preeti Mamgai Ashish Murai and Pragya Bhadauria. Project Report 2015-16: Cluster Frontline Demonstrations on Rabi Oil Seed.
- Preeti Mamgai and Ashish Murai *et al*. Project report 2015-16: Cluster Frontline Demonstrations on Rabi Pulses.
- Preeti Mamgai, G Kaur and Akku Bala. 2016. *Pendu Aurta De Jeevan Padhar Nu Upar Chukan Laye Sikhlaye*. Training Manual (In punjabi).
- प्रज्ञा भदौरिया एवं अरविन्द कुमार. 2017. सब्जियों की फसलों में कृषि रसायनों का सुरक्षित एवं विवेकपूर्ण उपयोग, भा.कृ.अनु.प.-कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थान, क्षेत्र-1, पं.कृ.वि. परिसर, लुधियाना।

Folders/ Pamphlets

- P. Mamgai and G. Kaur. 2016. Empowerment of farm women for improved quality of life.
- P. Mamgai and G. Kaur and Akku Bala. 2016. "*Aurata de Kam Nu Shukala Karan Vale Sandh"* (In punjabi).
- P. Mamgai and G. Kaur and Akku Bala. 2016. "*Ma da Dudh: Bacche laye Sampuran Khurak"* (In punjabi)
- P. Mamgai and G. Kaur and Akku Bala. 2016. *"Ghelo Padhar the Urja Pradhan"* (In punjabi)
- P. Mamgai and G. Kaur and Akku Bala. 2016. *"Sehatmand jeevan da aadhar: Santulit Bhojan"* (In punjabi).
- Pragya Bhadauria, Y.S Jadoun, S.K Kansal and Harish Verma. 2017. "*Pashuan wich garmi da prabhav"* FFP Folder -9, GADVASU, Ludhiana (In punjabi).
- Pragya Bhadauria, Y.S Jadoun, S.K Kansal and Harish Verma. 2017. "*Katruan-vachruan di dekhbha"*. FFP-6, GADVASU, Ludhiana (In punjabi).
- प्रज्ञा भदौरिया, वाई.एस. जादौन, एस.के. कंसल एव हरीश वर्मा, 2017. पशुओं की प्रमुख स्वास्थ्य-समस्याएं एवं उनका समाधान FFP-6, GADVASU, Ludhiana.

Reports

- Mamgai, P. Arvind Kumar, Pragya Bhadauria and Ashish Murai. 2016. Annual Progress Report 2015-16 of ICAR-ATARI, Zone-I, Ludhiana.
- Arvind Kumar, Pragya Bhadauria, Preeti Mamgai and Ashish Murai. Annual Report of MGMG 2015-16.
- Ashish Murai, Pragya Bhadauria, Arvind Kumar and Preeti Mamgai. Annual report of NICRA 2015-16.
- Arvind Kumar, Pragya bhaduria, Preeti Mamgai, Ashish Santhosh Murai. Proceedings of Annual Zonal Workshop of Krishi Vigyan Kendra (Dec 12-14, 2016).

- DARE Report (2016-17) in respect of KVKs of ICAR-ATARI, Zone-I, Ludhiana.

Presentation in conference/ symposia/ seminars/ other fora

- Murai A.S, Vijayragavan K. and Singh P. 2017. Developing an e-learning module. *National Symposium on Advances in Agriculture through Sustainable Technologies and Holistic Approaches,* 15-17 February 2017 at the International Centre Dona Paula, Goa.
- Burman R, Sharma J.P, Padaria R.N, Gills R, Paul S, Murai A.S, Tiwari G and Sharma S. 2016. Socio-economic impact of IARI improved paddy and wheat varieties in Punjab. *International Conference on Climate change adaptation and biodiversity: Ecological sustainability and resource management for livelihood security* (ASA: ICCR-2016), 8-10 December 2016. pp.193.
- Mamgai P, Murai A.S, Akkubala and Singh N. 2017. Joining hands with farmers to improve oilseed production through cluster demonstrations. *International Seminar on Oilseed Brassica*, February 23-27, 2017.pp.191.
- Mamgai P., Murai A.S, Akkubala and Singh N. 2017. Joining hands with farmers to improve oilseed production through cluster demonstrations. International Seminar on Oilseed Brassica, February 23-27, 2017.
- Mamgai P, Murai A.S. 2016. Empowering farming community to conserve traditional varieties. *First International Agro biodiversity Congress, Science, Technology, Policy & Partnership,* New Delhi, November 6-9, 2016.
- Mamgai P. 2016. Enhancement of livelihood of farmers through Agro processing. *National Conference on Innovative Food Processing Technologies for Food and Nutritional Security* held at CIPHET Ludhiana during 29-30th September 2016.
- Mamgai, P. and Murai A.S. 2016. Empowering farming community to conserve traditional varieties" presented the poster in *1st International Agro biodiversity Congress, Science, Technology, Policy & Partnership*, New Delhi, from 6-9th November 2016.
- Mamgai, P. and Sharma, N. on "Empowering farm women through Micro Finance" in International Conference on He for she- A solidarity movement on Gender equality in Punjabi University Patiala on 16-17th November 2016.
- Pragya Bhadauria, S.K Bhanja, S. Majumdar and G. Kolluri. 2016. Behavioural inventory and welfare status of young layers under different managemental conditions during winter season in the proceedings of *XXV World's Poultry Congress*, 5-9 Sep 2016, Beijing China.
- Singh U., Singh P., and Mamgai, P. 2016. Ice Less Refrigerator: Low Cost and Non-Electric Technique for Food Storage" Oral presentation in National Conference on Innovative Food Processing Technologies for Food and Nutritional Security held at CIPHET Ludhiana during 29-30th September 2016.
- Tanwar P.S, Jadoun Y.S and Bhadauria P. 2016. Meat consumer's survey in Barnala district of Punjab in the proceedings of *International Symposium & 7th Conference of Indian Meat Science Association,* 10-12 Nov, 2016, GADVASU, Ludhiana.

Details of Training/Refresher Course/ summer/ Winter Institutes/ Seminars/ Conferences Symposia/ Workshops attended within India and on deputation abroad

1. Brainstorming Workshop on Role of ATARIs in Development of Fisheries w.e.f 6 April, 2016 at National Fisheries Development Board, Hyderabad.
2. Programme of launching of e-NAM on 14 April, 2016 at Vigyan Bhawan, New Delhi
3. National Workshop on "Pulses and Oilseeds-Technology Evaluation and Demonstration" on 16-17 May 2016 at ICAR-NASC, New Delhi.
4. Training programme on Implementation of NIC's e-procurement solutions through CCP portal during 16-17 June 2016 at ICAR-IASRI, New Delhi
5. Hindi training programme organized by सहायक निर्देशक (राजभाषा) एवं सदस्य सचिव नगर राजभाषा कार्यान्वय समिति लुधियाना on 22 June, 2016 at Ludhiana.
6. 21 day Summer School on ICT use in Agriculture w.e.f 5-25 July 2016 at PAU Ludhiana
7. Second Review Meeting on NFSM Pulses on 09 August, 2016 at Director General's Conference Hall, ICAR, Krishi Bhawan, New Delhi
8. Divisional Meeting of Director ATARIs at Division of Extension Education, KAB-I, Pusa, New Delhi on 09 August, 2016.
9. XXV World's Poultry Congress, 05-09 Sep 2016 Beijing, China
10. Attended the National Conference on Innovative Food Processing Technologies for Food and Nutritional Security held at CIPHET Ludhiana during 29-30th September 2016.

11. Third Interactive meet of AS&FA, DARE/ICAR with the Administrative Officers and finance heads of ICAR institutes of North Zone at ICAR-IISR, Lucknow on 30 September, 2016.
12. Workshop of Fisheries Scientist from Zone-I & Zone-IV on Project Proposal related to Fishery in collaboration with ATARI, Kanpur and NFDB, Hyderabad on 07 October, 2016 at ICAR-NBFGR Lucknow.
13. Brainstorming Workshop on *"Policy Framing for Up-scaling Farm machinery Custom Hiring Centers"* on 17 October, 2016 at ICAR-CRIDA, Hyderabad.
14. Training programme on web portal *"RTI Online"* for receiving and processing RTI applications/appeals online w.e.f 21 October, 2016 at NASC, New Delhi.
15. Orientation Workshop-cum-Training of trainers for conducting Skill Development Programmes on 26-28th October at PAU, Campus Ludhiana.
16. 1st International Agro biodiversity Congress, Science, Technology, Policy & Partnership, organized by the Indian Society of Plant Genetic Resources & Biodiversity International from 6-9th November 2016 at New Delhi.
17. International Conference on He for she- A solidarity movement on Gender equality in Punjabi University Patiala organized by Women Study Centre of Punjabi University Patiala on 16-17th November 2016 at Patiala.
18. Closing ceremony of International Year of Pulses 2016 at Hotel ITC Mughal, on 22 December, 2016 at Agra.
19. Review Workshop on ARYA project on 17-18 January 2017 at ICAR-NASC Complex, New Delhi.
20. Second Workshop of Nodal Officers of KRISHI during 24-25 Jan, 2017at IASRI, New Delhi
21. National Review workshop under the project CFLDs on Oilseed 2016-17 from17- 18 Feb 2017 at IGKV, Raipur.
22. Brain Storming Session (BSS) on Climate Change Research in Agriculture: Prioritizing Themes for the Next Phase of NICRA Delhi on 23 February, 2017at ICAR-NASC Complex, New Delhi.
23. Action Plan Meeting of KVKs of Punjab on 14 February, 2017 at Directorate of Extension Education, Ludhiana
24. National Symposium on Advances in Agriculture through Sustainable Technologies and Holistic Approaches during 15-17 February 2017 at the International Centre Dona Paula, Goa.
25. हिन्दी की विभिन्न गतिविधियों की समीक्षा एवं राजभाषा विभाग द्वारा जारी आदेशों पर चर्चाः राजभाषा नगर राजभाषा करायान्वयन समिति, लुधियाना की 71 बैठक में दि. 23 फरवरी, 2017
26. Workshop on KVK Portal on 09March, 2017at ICAR-IASRI, New Delhi
27. National Workshop on Co-operative learning for producing high quality dairy professionals. On 17 March, 2017 at College of Dairy Science & Technology at GADVASU, Ludhiana.

Chapter 7

PERSONNEL

Existing staff position of the ICAR-Agricultural Technology Application Research Institute, Zone 1, Ludhiana as on March 31, 2017 :

8.1 Staff in Position

Category	Name	Designation
Research Management	Dr. Rajbir Singh	Director
Scientific	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
	Mr. Rajinder Raheja	UDC
	Ms. Indu Bagal	Assistant
	Sh. Raj Kumar	LDC
	Sh. Deepak Sharma	LDC
Technical	Sh. Harbhajan Singh	Sr. Tech. (Driver)

8.2 Superannuation / Joining / Promotion/ Transfer

- Dr. Keshava, Principal Scientist (Agril. Ext.) transferred to Division of Agriculture Extension at New Delhi on 10.06.2016.

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

Annexure-I

State/ District	Year of Sanction	Address	Telephone Number; email
Punjab			
Amritsar	2004	Usman-143001	09855556672; kvkasr@gmail.com; kvkasr@pau.edu
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 Malwa Qadim– 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
Ludhiana	2004	PAU Farm, Samrala-141114	09417241604; kvksamrala@gmail.com; kvk-ludhiana@pau.edu
Moga	2005	Village Budh Singhwala, Charik Road-140001	08146100796; kvk-moga@pau.edu
Muktsar	2004	Goneana-152026	09855620914; kvkmuktsar@pau.edu
Nawanshahar	1995	VPO Langroya, Distt.-144516	09815547607; kvk_langroya@yahoo.co.in; kvknsr@pau.edu
Patiala	1991-92	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
Sangrur	1995	Kheri, Sangrur–148001	09988111757; kvksangrur@gmail.com
Mansa	2006	Village Khokhar Khurd, P.O Khokhar Kalan, Mansa–151505	09417626843; kvkmansa@gmail.com; kvk-mansa@pau.edu
Barnala	2012	Village & P.O Handiaya, Barnala - 148107	09023532377; 081960-80643; ddkvkbrnlgadvasu2013@rediffmail.com
Mohali	2011	Village Majra, P.O Sayabe Majri, Sahibzada Ajit Singh Nagar-140103	09815700810; kvkmohali@gmail.com
Tarantaran	2011	Booh, P.O Harike-143412	09872974326; ddtkvktarntaran@gmail.com
Abohar	2016	ICAR-CIPHET, Malout, Hanumangarh Byepass-152116	09463975155; vinod.saharan@icar.gov.in
Pathankot	2016	Village Gho, Shahpur Kandi Jugial Road Near Focal Point-145023	08146400233; kvkpathankot@gmail.com
Haryana & Delhi			
Ambala	1995	Vill. Tepla, P.O Saha -133104	09416173081; 08295406560; kvkambala@gmail.com
Bhiwani	2004	Near Bhim Stadium-127021	09416767703; sckvkbhiwani@gmail.com
Faridabad	1992	Vill. Bhopani, P.O Bhaskola, Jasana Road-121002	09711715735; kvkfaridabad@gmail.com
Fatehabad	2004	Govt. Seed Farm-125050	09896136154; kvkfatehabadsc@gmail.com

Annexure-I contd.

State/ District	Year of Sanction	Address	Telephone Number; email
Gurgaon	1983	ICAR-IARI, Shikohpur-122001	09810833722; head_kvkggn@iari.res.in
Hisar	1989	Mandi Adampur, Vill.Sadalpur - 125052	09416259544; kvkhisar@gmail.com
Jhajjar	2004	Beed Sunarwala, 5Km-Stone, Jajjar-Badli Road-124103	09813894880; sckvkjhajjar@gmail.com
Jind	1992	Pandu Pindara-126102	09255971663; sckvkjind@gmail.com
Kaithal	1993	New Peoda Road-136027	09416408008; sckvkkaithal@gmail.com
Karnal	1976	NDRI-132001	09215757800; kvkkarnal@yahoo.com
Kurukshetra	1992	430/13, Urban Estate, Near Railway Station-136118	09896560123; sckvkkurukshetra@gmail.com
Mahendergarh	2002	Mahendergarh-123029	09650234449; sckvkmgarh@gmail.com
Panipat	1994	Ujha,P.O Risalu-132104	09416572469; sckvkpanipat@gmail.com
Rewari	1983	Shri B.B. Ashram,Rampura-123401	09416475793; bbakvkrr@gmail.com
Rohtak	2002	Near Jat College-124001	09896291515; kvkrohtaksc@gmail.com
Sirsa	2002	Tehsil Road-125055	09416403221; sckvksirsa@gmail.com
Sonipat	1992	Village Jagdishpur, Narela Road - 132001	09416811264; sckvksonipat@gmail.com
Yamunanagar	1992	Damla-135001	09416497231; 09050009920; sckvkynagar@gmail.com
Delhi	1995	Ujwai-110073	08888867619; kvkujwa@yahoo.com; kvkujwa@gmail.com
H.P.			
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	2004	CSKHPKV Regional Research Station, Kukumseri-175142	09418193270; pckvkls@gmail.com
Mandi	1994	Sundernagar–174402	09418222532; kvkmandihp@rediffmail.com
Shimla	1995	Near Petrol Pump, Rohru-171207	09459802063; 09418151577; kvkshimla@gmail.com

Annexure-I contd.

State/ District	Year of Sanction	Address	Telephone Number; email
Sirmaur	1983	Regional Research Station, Dhaulakuan-173001	09418741695; kvksirmour@gmail.com
Solan	2004	YSPUH&F, P.O & Teh. Kandaghat - 173215	09418488190; kvkkghat@rediffmail.com
Una	1994	Rampur-174303	09418462867; pckvkuna@hotmail.com; pckvkuna@gmail.com
Lahaul & Spiti-II	2016	V.P.O Tabo, Sub Division Kaza - 172113	094182-00677; 09418127451; bhupindert@gmail.com
J&K			
Bandipora	2005	Potushai, Bandipora, Baramulla-193502	09419449748; pckvkbandipora@gmail.com
Srinagar	2002	Srinagar, SKUAST -K, Old Airport, P.B. No. 823, GPO -191111	09419079152; kvksrinagar@hotmail.com
Doda	2002	SKUAST, Gwari, Bhaderwah–182221	09796423952; 08803674762; kvkdoda@gmail.com
Jammu	1992	SKUAST, R.S. Pura-181102	09419155273; kvkjammu@gmail.com
Kargil	2004	SKUAST-K-194103	09419219404; kvkkargil@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
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
Gandarbal	2002	Gandarbal, Shuhama, P.B. No. 1277, GPO-190001	09419553703; 09419095742; pckvk_gbal@skuastkashmir.ac.in; kvkganderbal@gmail.com
Anantnag	2012	Tehsil Dooru-192211	09419050073; 09906616078; zargarkvkang@gmail.com
Shopian	2012	Balpora, Tehsil Shopian-192303	09622820981; pckvkshopian@gmail.com
Budgam	2013	Hamchipora-Khag-193411	09419017278; pckvkbudgam@gmail.com
Baramulla	2013	Tangmarg-193402	07891210511; kvkbaramulla@gmail.com
Leh Additional	2013	Leh (Add.)-194404	09418457408; kvknyoma@rediffmail.com; kvknyoma@gmail.com
Samba	2016	Pulse Research Sub Station, Village Arazi-181141	09419139407; 09697180004; kvksamba@gmail.com

KVK-WISE DETAILS OF VEHICLES

Annexure-II

S. No	Name of KVK	Tractor	Jeep
Punjab			
1	Amritsar	1	1
2	Bathinda	1	1
3	Faridkot	2	1
4	Fatehgarh Sahib	1	1
5	Ferozepur	1	NA
6	Gurdaspur	1	1
7	Hoshiarpur	1	1
8	Jalandhar	1	1
9	Kapurthala	NA	1
10	Mansa	1	1
11	Moga	1	1
12	Muktsar	1	NA
13	Nawanshahar	NA	1
14	Patiala	1	1
15	Ropar	1	1
16	Samrala	NA	1
17	Sangrur	1	NA
18	Pathankot	-	-
19	Barnala	1	1
20	Mohali	NA	1
21	Taran taran	1	1
22	Abohar	-	-
TOTAL		**17**	**17**
Haryana			
1	Bhiwani	1	NA
2	Faridabad	NA	NA
3	Fatehabad		
4	Hisar	NA	1
5	Jhajjar	1	1
6	Jind	2	1
7	Kaithal	2	1
8	Kurukshetra	1	1
9	Mahendergarh	1	1
10	Panipat	2	1
11	Rohtak	1	1
12	Sirsa	1	1
13	Sonipat	1	1
14	Yamuna Nagar	1	1
15	Ambala	1	1
16	Rewari	NA	1
17	Gurgaon	1	NA
18	Karnal	2	1
TOTAL		**18**	**14**
1	Delhi	2	2
TOTAL		**2**	**2**

S. No	Name of KVK	Tractor	Jeep
Himachal Pradesh			
1	Bilaspur	1	1
2	Hamirpur	1	1
3	Kangra	1	NA
4	Kullu	1	1
5	Lahual & Spiti	1	1
6	Mandi	1	1
7	Sirmaur	2	NA
8	Una	2	1
9	Chamba	NA	1
10	Kinnaur	NA	1
11	Shimla	NA	1
12	Solan	NA	1
13	Lahual & Spiti II(Tabo)	-	-
TOTAL		**10**	**10**
Jammu & Kashmir			
1	Doda	NA	NA
2	Jammu	1	1
3	Kathua	NA	NA
4	Poonch	2	1
5	Rajouri	NA	1
6	Reasi		1
7	Samba		-
8	Budgam	NA	1
9	Bandipora	1	1
10	Srinagar	NA	1
11	Kargil	NA	1
12	Kulgam	1	1
13	Kupwara	1	NA
14	Leh	1	1
15	Leh (Additional KVK)	NA	2
16	Pulwama	NA	1
17	Gandarbal	1	1
18	Anantnag	1	1
19	Shopian	NA	1
20	Baramulla	-	-
TOTAL		**10**	**16**
GRAND TOTAL		**57**	**59**

Annexure-III

STAFF POSITION IN KVKs AS ON 31.03.2017

S.No.	Zone	Name of KVK	PC			SMS			Farm Manager			Programme Asistant			Computer Programmer			Assistant(Accountant)			Steno. Grade-3			Driver			Skilled supporing staff			TOTAL			Total Of
	Report		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	F+V
		PUNJAB																															**320**
1		Amritsar	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	16
2		Bathinda	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	16
3		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	16
4		Fatehgarh Sahib	1	1	0	6	6	0	1	0	1	1	1	0	1	1	0	1	0	1	1	1	0	2	2	0	2	2	0	16	14	2	16
5		Ferozepur	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	2	2	0	2	2	0	16	14	2	16
6		Gurdaspur	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	16
7		Hoshiarpur	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	16
8		Jalandhar	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	16
9		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	16
10		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	16
11		Moga	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	16
12		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	16
13		Nawanshahar	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	16
14		Patiala	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	16
15		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	16
16		Sangrur	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	16
17		Mansa	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	16
18		Tarntaran	1	1	0	6	6	0	1	0	1	1	1	0	1	0	1	1	1	0	1	0	1	2	2	0	2	2	0	16	13	3	16
19		Mohali	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	16
20		Barnala	1	1	0	6	6	0	1	1	0	1	0	1	1	1	0	1	1	0	1	0	1	2	1	1	2	2	0	16	13	3	16
		HARYANA																															**272**
21		Bhiwani	1	1	0	6	3	3	1	1	0	1	0	1	1	1	0	1	1	0	1	0	1	2	2	0	2	1	1	16	10	6	16
22		Faridabad	1	1	0	6	4	2	1	1	0	1	0	1	1	0	1	1	1	0	1	1	0	2	2	0	2	1	1	16	11	5	16
23		Hisar	1	1	0	6	3	3	1	1	0	1	0	1	1	1	0	1	0	1	1	0	1	2	2	0	2	1	1	16	9	7	16
24		Jhajjar	1	1	0	6	3	3	1	1	0	1	0	1	1	1	0	1	1	0	1	1	0	2	1	1	2	1	1	16	10	6	16
25		Jind	1	1	0	6	3	3	1	1	0	1	0	1	1	1	0	1	1	0	1	0	1	2	2	0	2	1	1	16	10	6	16
26		Kaithal	1	1	0	6	1	5	1	0	1	1	0	1	1	1	0	1	1	0	1	0	1	2	2	0	2	0	2	16	6	10	16
27		Kurukshetra	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	1	1	16	11	5	16
28		Mahendergarh	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	1	1	16	11	5	16
29		Panipat	1	1	0	6	1	5	1	0	1	1	1	0	1	1	0	1	1	0	1	0	1	2	2	0	2	2	0	16	9	7	16
30		Rohtak	1	1	0	6	3	3	1	0	1	1	0	1	1	1	0	1	0	1	1	0	1	2	1	1	2	0	2	16	6	10	16
31		Sirsa	1	1	0	6	4	2	1	1	0	1	1	0	1	1	0	1	0	1	1	1	0	2	2	0	2	1	1	16	12	4	16
32		Sonepat	1	1	0	6	6	0	1	0	1	1	0	1	1	0	1	1	1	0	1	0	1	2	2	0	2	0	2	16	10	6	16
33		Yamunanagar	1	1	0	6	2	4	1	0	1	1	0	1	1	1	0	1	1	0	1	0	1	2	2	0	2	2	0	16	9	7	16
34		Gurgaon	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	16
35		Karnal	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	16
36		Ambala	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	16
37		Rewari	1	1	0	6	5	1	1	0	1	1	1	0	1	1	0	1	1	0	1	1	0	2	1	1	2	2	0	16	13	3	16
38		Fatehabad	1	1	0	6	2	4	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	12	4	16
39		Delhi	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	1	1	16	11	5	16
		HIMACHAL PARDESH																															**192**
40		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	16
41		Hamirpur	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	1	1	16	13	3	16
42		Kangra	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	16
43		Kullu	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	16
44		Lahual & Spiti	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	2	0	16	9	7	16
45		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	2	0	16	14	2	16
46		Sirmour	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	16
47		Una	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	1	1	16	12	4	16
48		Chamba	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	16
49		Kinnaur	1	1	0	6	5	1	1	1	0	1	1	0	1	0	1	1	1	0	1	1	0	2	2	0	2	2	0	16	14	2	16
50		Shimla	1	1	0	6	6	0	1	1	0	1	0	1	1	0	1	1	1	0	1	1	0	2	2	0	2	2	0	16	14	2	16
51		Solan	1	1	0	6	5	1	1	0	1	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	14	2	16
		J & K																															**304**
52		Doda	1	0	1	6	5	1	1	0	1	1	1	0	1	1	0	1	0	1	1	1	0	2	1	1	2	2	0	16	11	5	16
53		Jammu	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	16
54		Kathua	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	16
55		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	16
56		Rajouri	1	0	1	6	5	1	1	0	1	1	1	0	1	1	0	1	0	1	1	1	0	2	2	0	2	2	0	16	12	4	16
57		Reasi	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	1	1	16	13	3	16
58		Bandipora	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	14	2	16
59		Srinagar	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	16
60		Kargil	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	2	2	0	2	2	0	16	14	2	16
61		Kulgam	1	0	1	6	5	1	1	0	1	1	1	0	1	0	1	1	1	0	1	0	1	2	2	0	2	2	0	16	11	5	16
62		Kupwara	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	13	3	16
63		Leh	1	1	0	6	2	4	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	12	4	16
64		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	2	0	16	15	1	16
65		Gandarbal	1	0	1	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	2	2	0	2	2	0	16	13	3	16
66		Leh II	1	1	0	6	2	4	1	1	0	1	1	0	1	0	1	1	0	1	1	0	1	2	2	0	2	2	0	16	9	7	16
67		Shopian	1	0	1	6	5	1	1	0	1	1	1	0	1	1	0	1	1	0	1	0	1	2	1	1	2	0	2	16	9	7	16
68		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	16
69		Budgam	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	0	2	16	11	5	16
70		Baramulla	1	1	0	6	0	6	1	0	1	1	0	1	1	0	1	1	1	0	1	0	1	2	0	2	2	1	1	16	3	13	16
70		**GRAND TOTAL**																												**1120**	**879**	**241**	1888

Annexure-IV

DETAILS OF REVOLVING FUNDS AS PROVIDED TO THE KVKS (₹ IN LAKHS)

Revolving Fund is given to the newly established KVKs and revenue is generated by the KVKs and is accumulated year by year. During the year 2016-17, revolving funds is in operation at 70 KVKs of Zone-I. The KVKs are utilizing revolving fund for production of technological products and the net balance was Rs.2696.06 lakh on March 31, 2017. During the reporting year, 7 KVKs reported a net balance of more than Rs.100.00lakh, 5 KVKs reported a net balance between Rs.75.00 to Rs.100.00 Lakh, 8 KVKs reported a net balance between Rs.50.00 to Rs.75.00 Lakh, 10 KVKs reported a net balance between Rs.25.00 to Rs.50.00 Lakh, 12 KVKs reported a net balance between Rs.10.00 to Rs.25.00 Lakh, 12 KVKs reported a net balance between Rs.5.00 to Rs.10.00 Lakh and 16 KVKs reported a net balance between Rs.0.00 to Rs.5.00 Lakh.

Name of KVK	Opening balance as on 1st April 2016	Income during the year	Expenditure during the year	Net Balance as on 31.3.2017 including STDR
Ferozepur	99.43	19.32	9.00	109.76
Nawanshahar	163.67	0.00	113.91	49.76
Kapurthala	64.35	16.29	8.80	71.84
Hoshiarpur	45.76	14.47	7.94	52.29
Patiala	127.42	18.15	12.00	133.57
Gurdaspur	104.17	16.75	9.90	111.02
Bathinda	69.59	8.87	3.20	75.26
Sangrur	90.10	27.13	19.50	97.73
Faridkot	111.76	28.85	13.93	126.68
Ropar	15.06	24.37	1.75	37.69
Muktsar	69.93	33.48	28.50	74.91
Amritsar	184.65	37.05	15.90	205.81
Ludhiana	90.24	17.06	18.18	89.12
Fatehgarh Sahib	38.32	11.62	7.99	41.95
Moga	57.95	16.28	8.13	66.10
Jallandhar	35.59	17.62	13.95	39.22
Mansa	6.06	6.97	3.70	9.33
Mohali	2.38	0.26	0.23	2.41
Tarn Taran	2.54	2.52	1.49	3.57
Barnala	2.03	0.85	0.30	2.58
Yamunanagar	58.13	27.21	4.42	80.91
Kurukshetra	81.12	30.61	18.33	93.40
Panipat	129.54	24.52	10.81	143.25
Jind	1.25	2.52	3.34	0.43
Kaithal	136.86	45.59	13.43	169.02
Sonepat	34.02	10.99	11.82	33.18
Faridabad	4.93	4.79	0.00	9.72
Hisar	16.22	4.98	3.07	18.13
Rohtak	70.95	5.67	3.79	72.83
Sirsa	53.94	13.64	12.72	54.86
Mahindergarh	11.00	8.71	5.69	14.02

Annexure-IV contd.

Name of KVK	Opening balance as on 1st April 2016	Income during the year	Expenditure during the year	Net Balance as on 31.3.2017 including STDR
Jhajjar	16.20	7.45	4.08	19.57
Bhiwani	18.35	9.28	2.18	25.45
Fatehabad	4.93	4.79	0.00	9.72
Rewari	39.98	2.32	0.61	41.68
Ambala	40.80	24.99	19.26	46.54
Gurgaon	16.88	8.54	4.91	20.51
Karnal	40.44	18.58	14.82	44.21
Baramulla	0.00	1.07	0.00	1.07
Kullu	8.17	15.37	12.82	10.72
Mandi	15.53	31.28	6.57	40.24
Hamirpur	17.56	15.40	9.63	23.33
Kangra	13.61	13.38	9.48	17.51
Una	7.68	11.63	8.48	10.83
Sirmaur	5.45	10.68	10.71	5.42
Lahul & Spiti	6.25	2.74	0.94	8.05
Bilaspur	3.91	5.08	2.17	6.82
Chamba	1.36	4.00	1.40	3.96
Shimla	4.81	1.48	0.64	5.65
Kinnaur	1.44	1.56	1.00	2.00
Solan	11.64	16.24	3.85	24.03
Jammu	49.30	4.55	1.00	52.84
Rajouri	15.09	3.40	0.48	18.01
Doda	1.84	0.66	0.00	2.50
Reasi	6.23	1.30	0.06	7.47
Poonch	4.65	2.01	0.42	6.24
Kathua	10.87	5.40	7.43	8.85
Leh	12.82	3.59	0.00	16.41
Phulwama	15.58	3.44	0.62	18.40
Gandarbal (Old Srinagar	4.27	0.00	0.00	4.27
Srinagar (Old Budgam	6.77	0.61	1.41	5.96
Kargil	7.49	2.58	2.34	7.73
Bandipora	1.72	0.10	0.28	1.54
Kupwara	1.66	0.10	0.17	1.59
Kulgam	1.02	4.94	1.66	4.30
Sophian	2.16	1.00	0.00	3.16
Anantnag	1.66	0.50	0.00	2.16
Budgam	1.00	0.04	0.00	1.04
Leh II	1.29	0.60	0.00	1.89
Ujwa	68.63	6.72	1.28	74.07
Total	**2467.96**	**744.56**	**516.43**	**2696.06**

Table 101: List of approved ongoing programmes at ICAR-ATARI

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)	Dr. Ashish S. Murai Dr. Pragya Bhadauria
2.	An Integrated Approach for Livestock Development: Farmer's context (with GADVASU)	Dr. Pragya Bhadauria
3.	Empowerment of farm women for improved quality of life (with ICAR-CIWA Bhubaneswar)	Dr. Preeti Mamgai
4.	Attracting and Retaining Youth in Agriculture (ARYA)	Dr. Ashish S. Murai
5.	Pradhan Mantri Fasal Bima Yojana (PMFBY)	Dr. Pragya Bhadauria Dr. Preeti Mamgai
6.	Cluster Frontline Demonstration on Rabi Pulses (CFLD)	Dr. Ashish S. Murai
7.	Cluster Frontline Demonstration on Oilseeds (CFLD)	Dr. Preeti Mamgai
8.	Farmer FIRST	Dr. Arvind Kumar Dr. Pragya Bhadauria
9.	Pradhan Mantri Fasal Bima Yojana (PMFBY)	Dr. Pragya Bhadauria Dr. Preeti Mamgai
10.	Collaborative projects with HIL, New Delhi and NFDB, Hyderabad	Dr. Pragya Bhadauria
11.	Protection of Plant Varieties & Farmers' Right (PPV&FRA)	Dr. Preeti Mamgai Dr. Pragya Bhadauria
12.	Tribal Sub Plan (TSP)	Dr. Preeti Mamgai
13.	Projects under District Agro meteorological Unit (DAMU)	Dr. Pragya Bhadauria
14.	Skill Development Programme in Agriculture	Dr. Arvind Kumar
16.	Mera Goan Mera Gaurav (MGMG)	Dr. Arvind Kumar Dr. Pragya Bhadauria
17.	Swach Baharat Abhiyan	Dr. Arvind Kumar
18.	Climate resilient integrated farming system demonistration unit	Dr. Arvind Kumar
Institutes projects/programmes		
1.	Application of resource conservation technologies and their impact	Dr. Arvind Kumar
2.	Study of interventions of Krishi Vigyan Kendras on Human Nutrition	Dr. Preeti Mamgai Dr. Pragya Bhadauria
3.	Development of Livestock Technology Inventory and Upscaling of suitable technologies for Profitable Livestock Production in Punjab	Dr. Pragya Bhadauria Dr. Preeti Mamgai
4.	Technology Application Behaviour of Basmati Rice Growers	Dr. Ashish S. Murai
5.	KVK Portal	Dr. Ashish S. Murai
6.	ICAR-Krishi	Dr. Pragya Bhadauria

NOTES

NOTES

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