

Annual Report

2018-19



ICAR-Agricultural Technology Application Research Institute
Zone-1, PAU Campus, Ludhiana-141 004



वार्षिक प्रतिवेदन

Annual Report 2018-19



भा.कृ.अनु.प.-कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थान,
क्षेत्र-१, पं.कृ.वि. परिसर, लुधियाना-१४१ ००४ (पंजाब)

**ICAR-Agricultural Technology Application Research Institute,
Zone - I, PAU Campus, Ludhiana-141 004 (Punjab)**



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Dr. Rajbir Singh
Director

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ICAR-Agricultural Technology Application Research Institute,
Zone -1, PAU Campus, Ludhiana-141 004, Punjab

PREFACE

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

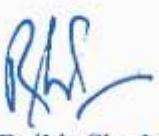
In addition to knowledge and understanding of the intricacies of technologies, the farmers also need skills in various complex agricultural operations for adoption on their farms. In this regards, many of the KVKs made liaisoning with National Horticulture Mission (NHM), Rasthriya Krishi Vikas Yojna (RKVY), Japan International Cooperation Agency (JICA) and Agricultural Skill Council of India etc. for organizing various trainings and awareness programme among farming community.

I extend my gratitude and sincere thanks to Dr. T Mohapatra, Secretary, DARE and Director General, ICAR; Dr. AK Singh, Deputy Director General (Agricultural Extension); Dr. VP Chahal and Dr. Randhir Singh, ADGs (Agricultural Extension) for their valuable advice and guidance as and when required. 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 painstaking efforts and sincere contribution during this period.

I duly acknowledge the sincere efforts of the dedicated team of editorial board and KVK scientists to bring this annual report in its shape. However, I look forward to the feedback from the readers for further improvement of this report in following years. I am quite confident that untiring efforts of KVKs and ICAR-ATARI Ludhiana for ensuring overall agricultural development in India will bear fruits.

Place: Ludhiana

Dated: 12 July 2019



(Rajbir Singh)



ਹਰ ਕਦਮ, ਹਰ ਲਗਾ
ਕਿਸਾਨੋਂ ਕਾ ਹਮਸ਼ਫਰ
ਭਾਰਤੀਯ ਕ੃ਧਿ ਅਨੁਸਂਧਾਨ ਪਰਿ਷ਦ

Agri-search with a Human touch

C o n t e n t s

Preface	iii
Acronyms	vii
कार्यकारी सांसारण	ix
Executive Summary	xii
1. About ICAR-ATARIs and KVks	1
1.1 Genesis of ICAR-ATARs	1
1.2 ICAR-ATARI, Zone-I, Ludhiana	2
1.3 Krishi Vigyan Kendras	2
1.4 Budget	4
2. Technology Assessment and Refinement	5
2.1 Technology Assessment	5
2.2 Technology Refinement	8
2.3 Location Specific Technologies	9
3. Frontline Demonstrations	26
3.1 Cereals & Millets	30
3.2 Oilseeds	32
3.3 Pulses	33
3.4 Vegetables & Spice crops	37
3.5 Fruits	38
3.6 Flower	38
3.7 Fodder Crops	40
3.8 Commercial crops	41
3.9 Livestock and poultry	41
3.10 Other demonstrations	41
4. Capacity Development	42
4.1 Training courses for farmers and farm women	42
4.2 Training courses for rural youth	43
4.3 Extension functionaries	44
4.4 Sponsored training courses	44
4.5 Vocational training courses	45
5. Other Projects and Plans	46
5.1 CFLDs on Oilseed	46
5.2 CFLDs on Pulses	49
5.3 NICRA	52
5.4 ARYA	57
5.5 Tribal Sub Plan	58
5.6 Awareness on PPV&FRA	59
5.7 Farmer FIRST Programme	61
5.8 District Agro Metrological Units (DAMU)	64
5.9 Krishi Kalyan Abhiyan	66
5.10 New Extension Methodologies and Approaches	68
5.11 Pre-Rabi sammelan	68
6. Other Extension Activities	70
6.1 Frontline Extension Programs	70



6.2	Convergence and Linkages	72
6.3	Kisan Mobile Advisory	72
6.4	Mera Gaon Mera Gaurav	74
6.5	Skill Development Programmes in Agriculture	75
6.6	Celebration of World Soil Day	77
7.	Support Services by KV	78
7.1	Technological inputs	78
7.2	Soil, Water and Plant Analysis	81
7.3	Rainwater Harvesting Units	82
8.	Technology Backstopping at Research Institutes	83
8.1	ATICS	83
8.2	Directorates of Extension	84
9.	Human Resource Development	87
10.	Prosperity of Farmers through Technological Interventions	89
10.1	Income enhancement with nursery production of new varieties of apple on rootstocks	89
10.2	An enterprising rural woman	90
10.3	Vegetable Nursery – A lucrative attempt towards diversification	91
10.4	Maximizing farm profitability through strawberry cultivation	92
10.5	A missionary of Crop Residue Management -Ranjit Singh Thind	93
10.6	Maximizing dairy farm profitability through silage making	94
10.7	Apricot Harvest Net in Cold Arid Ladakh Ensuring Economic Boom	95
11.	Important Activities, Initiatives and Celebrations	97
11.1	Crop Residue Management	97
11.2	Technology Week Celebration	99
11.3	BEE-UREDA initiative	99
11.4	District Kisan Melas	100
11.5	Sub Mission on Agriculture Mechanization	101
11.6	Orientation Training for Skill Development	101
11.7	International Women Day Celebration	103
11.8	Interface Meet of KVks and State Animal Husbandry Department	103
11.9	Review Workshop of Cluster FLDs on Pulses and Oilseeds	104
11.10	World Breastfeeding Week	105
11.11	National Nutrition Week	105
11.12	Swachh Bharat Abhiyan	105
11.13	MDP for newly recruited PCs of KVks	106
11.14	CHAK DE	106
11.15	Harvest Field Days Celebrated across Punjab	107
11.16	Religious Saints Lead Campaign against Stubble Burning	108
11.17	Training on “In-situ paddy residue management through machinery	109
11.18	Hindi Pakhwada	110
12.	Publications and Personnel	111
12.1	Publications	111
12.2	Personnel	115
13.	Annexures	116-126



Acronyms

AICRP	- All India Coordinated Research Project
ARYA	- Attracting and Retaining Youth in Agriculture
ATARI	- Agricultural Technology Application Research Institute
ATIC	- Agricultural Technology Information Center
ATMA	- Agricultural Technology Management Agency
CAZRI	- Central Arid Zone Research Institute, Jodhpur
CCSHAU	- Chaudary Charan Singh Haryana Agricultural University, Hisar
CIFA	- Central Institute of Freshwater Aquaculture, Bhubaneswar
CIPHET	- Central Institute of Post-Harvest Engineering & Technology, Ludhiana
CITH	- Central Institute of Temperate Horticulture, Srinagar
CPDO	- Central Poultry Development Organisation, Chandigarh
CPRI	- Central Potato Research Institute, Shimla
CRIDA	- Central Research Institute for Dryland Agriculture, Hyderabad
CSISA	- Cereal Systems Initiative for South Asia
CSKHPKV	- Chaudhary Sarwan Kumar Himachal Pradesh Agricultural University, Palampur
DMR	- Directorate of Mushroom Research, Solan
DSR	- Direct Seeded Rice
Farmer's FIRST	- Farmer's Farm, Innovations, Resource, Science and Technology
FLDs	- Frontline Demonstration
HRD	- Human Resource Development
IARI	- Indian Agricultural Research Institute, New Delhi
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 Horticultural Research, Bangalore
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



IVRI	- Indian Veterinary Research Institute, Izatnagar
IWM	- Integrated Weed Management
KKA	- Krishi Kalyan Abhiyan
KMA	- Kisan Mobile Advisory
KVK	- Krishi Vigyan Kendra
LCC	- Leaf Colour Chart
MANAGE	- National Institute of Agricultural Extension Management, Hyderabad
MGMG	- Mera Gaon Mera Gaurav
NABARD	- National Bank for Agriculture and Rural Development
NARS	- National Agricultural Research System
NDRI	- National Dairy Research Institute, Karnal
NEMA	- New Extension Methodologies and Approaches
NICRA	- National Innovations in Climate Resilient Agriculture
NILERD	- National Institute of Labour Economics Research and Development, New Delhi
NITI	- National Institute of Transforming India
NRM	- Natural Resource Management
NRRI	- National Rice Research Institute, Cuttack
OFT	- On Farm Testing
SHG	- Self Help Groups
SMS	- Short Message Service
SNF	- Solid Not Fat
UMMB	- Urea Molasses Mineral Blocks
ZT	- Zero Till

कार्यकारी सारांश

आई.सी.ए.आर संस्थानों, राज्य कृषि विश्विद्यालयों कृषि विभाग और गैर-सरकारी संगठनों की छतरी के तहत भारतीय कृषि अनुसंधान पिरष्ट (आई.सी.ए.आर) द्वारा कृषि विज्ञान केन्द्रों (के.वी.के) का एक नेटवर्क स्थापित किया गया है, जिसका उद्देश्य मूल्यांकन, परिष्करण और प्रदर्शन करना है। आई.सी.ए.आर-कृषि विस्तार प्रभाग, उप महानिदेशक (कृषि विस्तार) की अध्यक्षता में देश के विभिन्न हिस्सों में स्थित ग्यारह कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थान आई.सी.ए.आर-अटारी के माध्यम से कृषि विज्ञान केन्द्रों की प्रगति पर नजर रखता है और समीक्षा करता है। आईसीएआर-अटारी, क्षेत्र-1, लुधियाना, भारतीय कृषि अनुसंधान पिरष्ट के प्रौद्योगिकी प्रसार पिरयोजनाओं की योजना, निगरानी, समीक्षा और समर्थन अपने 69 कृषि विज्ञान केन्द्रों पंजाब (22), हिमाचल प्रदेश (13), उत्तराखण्ड (13) और जम्मू-कश्मीर (21) द्वारा करता है।

राज्य कृषि विश्विद्यालयों और आईसीएआर संस्थानों से तकनीकी बैकस्टॉपिंग और प्रणालीमों किसानों और अध्य हितधारकों के साथ साझेदारी के साथ कृषि विज्ञान केन्द्रों द्वारा प्रौद्योगिकयों का आकलन और परिष्करण किया जाता है। कृषि विज्ञान केन्द्र हितधारकों के लिए आवश्यकता आधारित क्षमता विकास कायर्क्रम आयोजित करते हैं और उपयुक्त अग्रपंक्ति प्रसार कायर्क्रमों के माध्यम से बेहतर कृषि प्रौद्योगिकयों के बारे में जागरूकता पैदा करते हैं। प्रौद्योगिकयों के प्रारंभिक प्रयास को सुविधाजनक बनाने के लिए गुणवत्ता वाले बीज, रोपण सामग्री, पशुधन नस्लों, पशु उत्पादों और दूध-उत्पादन का उत्पादन और आपूर्ति भी की जा रही है। इस प्रकार, कृषि विज्ञान केन्द्र, जिले की कृषि अर्थव्यवस्था के लिए ज्ञान और संसाधन केंद्र के रूप में कार्य कर रहे हैं। रिपोर्टिंग वर्ष के दौरान प्रमुख

उपलब्धियों को संक्षेप में सारांशित किया गया है:

प्रौद्योगिकी आकलन एवं परिष्करण

वर्ष 2018-19 के दौरान 2861 परीक्षणों के माध्यम से कुल 546 ओएफटी आयोजित किए गए। इनमें से रिपोर्टिंग अविध के दौरान, फसलों पर 433 ओएफटी, पशुधन एवं मध्य पालन पर 81 तथा अन्य पहलुओं पर 32 ओ.एफ.टी आयोजित किए गए थे। कृषि विज्ञान केन्द्रों द्वारा फसलों के तहत, कुल 393 प्रौद्योगिकयों का मूल्यांकन 1640 परीक्षण द्वारा किया गया, जिसमें कि विभिन्न किस्मों का मूल्यांकन (89), एकीकृत पोषक प्रबंधन (52), एकीकृत रोग प्रबंधन (53), एकीकृत कीट प्रबंधन (59), एकीकृत फसल प्रबंधन (56), एकीकृत खरपतवार प्रबंधन (24) विषयगत क्षेत्रों में किया गया। अन्य विषयगत क्षेत्रों में मूल्यांकन की गई प्रौद्योगिकयों इस प्रकार से हैं: तकनीकों प्रसंस्करण और मूध्यवर्धन (27), संसाधन संरक्षण प्रौद्योगिकी (18), कृषि मशीनरी (5), एकीकृत कृषि प्रणाली (7) एवं भंडारण तकनीक (1)।

अग्रिम पंक्ति प्रदर्शन

कुल 15064 प्रदर्शनी द्वारा जिसमें 6051 अनाज और बाजरा, 1762 तिलहनों, 1570 दालों, 3248 सब्जी और मसालों, 608 फल, 45 फूलों, 1369 चारा फसलों, 10 वाणिज्यिक फसलों, 695 पशुधन एवं मत्स्य पालन, 124 अन्य पहलुओं जैसे कि मशम उत्पादन (114), कृषि उपकरण (10) तथा गृह विज्ञान से संबंधित गतिविधियों (285) पर प्रदर्शन आयोजित किए गए, जो कि 2809.50 हेक्टेयर और 15718 इकाइयों के क्षेत्र को कवर करते थे।

क्षमता विकास

रिपोर्टिंग अविध के दौरान कृषि विज्ञान केन्द्रों ने 1.55 लाख प्रतिभागियों के लिए कुल 6058 क्षमता विकास कायर्क्रम आयोजित किए। जिसमें कि 6058



पाठ्यक्रम में से 5275 आवश्यक पाठ्यक्रम थे और शेष प्रायोजित एवं व्यावसायिक पाठ्यक्रम थे। कुल 4272 पाठ्यक्रम आयोजित किए गए जिनमें 68094 किसानों और 42812 खेतिहर मिहलाओं को प्रशिक्षित किया गया।

दालों पर सामूहिक अग्रिमपंक्ति प्रदर्शन

खरीफ, रबी और गर्मी के मौसम के दौरान चार राज्यों में 1340.77 हेक्टेयर क्षेत्र में कुल 6436 अग्रिम पंक्ति प्रदर्शन आयोजित किए गए। स्थानीय चेक किस्मों पर अग्रिम पंक्ति प्रदर्शन के तहत उपज 13.11% (उत्यान मटर, पंजाब) से 45.26% (काबुली चना, हिमाचल प्रदेश) के बीच बढ़ी।

तिलहन पर सामूहिक अग्रिमपंक्ति प्रदर्शन

खरीफ और रबी मौसम के दौरान चार राज्यों में 860 हेक्टेयर क्षेत्र में कुल 2150 अग्रिम पंक्ति प्रदर्शन आयोजित किए गए। पंजाब में इन अग्रिम पंक्ति प्रदर्शन के तहत औसत उपज 20.1 किंवंटल/हेक्टेयर थी जो चेक उपज से 27.1% अधिक थी। 8876 किसानों के लाभ के लिए, विचाराधीन अविधि के दौरान 284 विभिन्न विस्तार गितिविधयां आयोजित की गयी। इसके अलावा, इस परियोजना के तहत 1813 किसानों को लाभ पहुंचाने के लिए 60 प्रशिक्षण कायर्क्रम भी आयोजित किए गए।

जनजातीय उप योजना (टी.एस.पी)

जनजातीय उप योजना के तहत क्षेत्र-1 के कृषि विज्ञान केन्द्रों द्वारा 545 ओएफटी, 6246 एफएलडी, 143897 अन्य विस्तार पाठ्यक्रम (39534 प्रतिभागियों) का आयोजन किया गया और किसान मोबाइल एडवाइजरी सिवर्सेज के तहत 20838 विभिन्न मूल संदेश भेजे गए।

जलवायु अनूरूप कृषि पर राष्ट्रीय पहल (निकरा)

क्षेत्र-1 के जलवायु की द्रष्टि से सवार्धिक

संवेदनशील 13 जिलों में लागू की गई निकरा परियोजना में प्राकृतिक संसाधन प्रबंधन मॉड्यूल के तहत 1408 किसानों को लाभान्वित किया, जबकि यह संख्या क्रमशः 3628, 2448 एवं 5247 फसल उत्पादन, पशुधन एवं मत्स्यपालन तथा स्थानीय हस्तक्षेप मॉड्यूल के तहत रही। इस परियोजना के तहत 5266 किसानों को जलवायु अनूरूप कृषि के विभिन्न पहलुओं पर 225 पाठ्यक्रमों के माध्यम से प्रशिक्षित किया गया था। इस परियोजना ने 563 अन्य विस्तार गितिविधयों के माध्यम से 9314 किसानों को भी लाभान्वित किया।

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

वर्ष 2018-19 के दौरान 1581 के किसानों को लाभान्वित क्षेत्र-1 में पीपीवी और एफआरए पर 16 जागरूकता कायर्क्रम आयोजित किए गए थे।

आर्या

2018-19 के दौरान क्षेत्र-1 में 21 प्रशिक्षण पाठ्यक्रम आयोजित किए गए थे, जिसने इस परियोजना के तहत 508 ग्रामीण युवाओं को लाभान्वित किया था। इस परियोजना के तहत छह नए कृषि विज्ञान केन्द्रों का विस्तार किया गया, जिसमें सोलन (हि. प्र.), रियासी, कुलगाम एवं बारामुल्ला (जम्मू-कश्मीर), बरनाला (पंजाब) तथा नैनीताल (उत्तराखण्ड) थे।

फार्मर फ़स्ट कायर्क्रम

इस कायर्क्रम के तहत 2429 किसानों को लाभान्वित करने के लिए 71 प्रशिक्षण पाठ्यक्रम आयोजित किए गए। इसके अलावा, 40 जागरूकता शिविर और 71 एक्सपोजर विज़िट भी आयोजित की गई, जिसमें क्रमशः 1244 और 3169 किसानों को लाभान्वित किया गया।

अन्य प्रसार गितिविधयां

2018-19 के दौरान, क्षेत्र-1 के कृषि विज्ञान

केंद्रों ने 48108 अन्य प्रसार गतिविधियों का आयोजन किया, जिसमें 16.44 लाख किसानों को लाभ हुआ, जिनमें से 12.94 लाख पंजाब से थे, इसके बाद उराखंड से 1.43 लाख, जम्मू-कश्मीर से 1.30 लाख और हिमाचल प्रदेश से 0.75 लाख थे।

कृषि विज्ञान केंद्रों के अभिसरण एवं कार्यामक संबंध

क्षेत्र में कृषि के सम्पूर्ण विकास के लिए, कृषि विज्ञान केंद्रों ने अभिसरण एवं संपर्क गतिविधियों के अंतर्गत राष्ट्रीय बागवानी मिशन (एन एच एम), राष्ट्रीय कृषि विकास योजना (आर.के. वी. वाई.), जापान अंतरराष्ट्रीय सहयोग संसಥान (जे.ए.आई.सी.ए.), राष्ट्रीय मत्स्य विकास बोर्ड (एन.एफ.डी.बी), हैदराबाद, कृषि कौशल पिरष्ट (ए एस सी आई) के साथ कुशलतापूर्वक सहयोग किया है।

किसान मोबाइल सलाहकार

क्षेत्र-1 में, 9.08 लाख किसानों को 4513 लिपिक संदेशों के साथ किसान मोबाइल सलाहकारों के माध्यम से लाभान्वित किया गया। फसलों से संबंधित लगभग 68% टेक्स्ट संदेश, पशुधन के लिए 9%, जागरूकता पर 9%, मौसम की जानकारी पर 6%, 5% विविध और विपणन संबंधी जानकारी पर, 3% संदेश भेजे गए। तकनीकी अदानों का उत्पादन कृषि विज्ञान केंद्रों ने 18758 किसानों के लिए विभिन्न फसलों की 15383 विवंटल बीज सामग्री का उत्पादन और आपूर्ति करवाई। कृषि विज्ञान केंद्रों ने विभिन्न फसलों की 31.50 लाख पौधों की रोपण/रोपण सामग्री का उत्पादन किया तथा ₹ 76.78 का 0.23 लाख पशुधन, 691 किसानों को वित्तिरत किया गया। कृषि विज्ञान केंद्रों ने 109.03 विवंटल बायो-उर्वरको, 195.6 विवंटल खाद और 1119 बायो-एजस्ट का उत्पादन और आपूर्ति हितधारक किसानों के लिए की है।

मृदा, पानी और पौधे के नमूने

वर्ष के दौरान, इस क्षेत्र के कृषि विज्ञान केंद्रों ने कुल 18062 नमून का विश्लेषण किया है जिसमें 14808 मिट्टी के नमूने, 1812 पानी के नमूने और 1442 पौधे के नमूने शामिल हैं।

कृषि प्रौद्योगिकी सूचना केंद्र (एटिक)

वर्ष के दौरान आठ कृषि प्रौद्योगिकी सूचना केंद्रों के विभिन्न लाभान्वितों ने 21633 तकनीकी सलाह, जबिक 195884 किसानों ने मेजबान संस्थानों द्वारा विकिसत उत्पादों को प्राप्ति करने के लिए शैषिणक भ्रमण किया। एटिक में मृदा और जल परीक्षण सुविधाओं का इस्तेमाल 8441 किसानों द्वारा किया गया था। एटिक द्वारा अपने अंतिम उपयोगकर्ताओं को 54026 किताबों और 478 तकनीकी बुलेटिन प्रदान किए गए। बीज, रोपण सामग्री और अन्य उत्पादों और सेवाओं की बिक्री से उत्पन्न राजस्व ₹1.69 करोड़ रहा।

विस्तार शिक्षा निदेशालय

विभिन्न विश्वविद्यालयों के विस्तार शिक्षा निदेशालयों के अधिकारियों ने 62 वैज्ञानिक सलाहकार समिति की बैठकों में भाग लिया है। इसी प्रकार, विभिन्न कृषि विज्ञान केंद्रों द्वारा आयोजित कार्यक्रमों जैसे कि 105 खेत दिवसो, 61 कार्यशालायों/सेमिनार, 60 किसान वैज्ञानिक बातचीत, 38 प्रौद्योगिकी सप्ताह, 185 प्रशिक्षण कार्यक्रम, 203 कृषि परीक्षण (ओ एफ टी) और 635 अग्रिम पंक्ति प्रदर्शन (एफ एल डी) में भाग लिया।

फसल अवशेष प्रबंधन

2018-19 के दौरान कृषि विज्ञान केंद्रों द्वारा 357 मशीनें, जिसमें कि 115 हैप्पी सीडर, 65 रिवर्सेबल एम्म बी प्लो, 60 श्रब मास्टर/कटर सह स्प्रेडर, 69 मल्चर, धान काटने वाले चॉपर एवं जीरो टिल-ड्रिल फसल अवशेष प्रबंधन के अंतर्गत खरीदे गए। कुल 305 लाख से ज्यादा प्रतिभागी 6090 गतिविधियों के माध्यम से लाभान्वित हुए।



Executive Summary

Indian Council of Agricultural Research (ICAR) has established a network of Krishi Vigyan Kendras (KVKs) under the umbrella of ICAR-Agricultural Technology Application Research Institutes (ATARIs) with an aim to assess, refine and demonstrate technologies in agricultural and allied sectors. ICAR-Division of Agricultural Extension headed by the Deputy Director General (Agricultural Extension) monitors and reviews the progress of KVKs through its eleven Agricultural Technology Application of Research Institute (ICAR- ATARI) located in different parts of the country. ICAR- ATARI, Zone-I, Ludhiana plans, monitors, reviews and supports ICAR initiated technology dissemination projects mainly 69 KVKs of Punjab (22), Himachal Pradesh (13), Uttarakhand (13) and Jammu & Kashmir (21).

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

Technology Assessment and Refinement

During 2018-19 a total of 546 OFTs were conducted through 2861 trials by the KVKs of the zone-1. Out of these, 433 OFTs on crops, 81 on livestock & fisheries and 32 on others aspects were conducted during

the reporting period. Under crops, a total of 393 technologies assessed by KVKs by conducting 1640 trials in thematic areas such as varietal evaluation (89), integrated nutrient management (52), integrated disease management (53), integrated pest management (59), integrated crop management (56), and integrated weed management (24). Technologies assessed in other thematic areas are processing & value addition (27), resource conservation technology (18), farm machinery (5), integrated farming system (7) and storage techniques (1).

Frontline Demonstrations

Under FLDs a total of 15064 demonstrations including 6051 cereal & millets, 1762 on oilseeds, 1570 pulses, 3248 on vegetable & spices, 608 fruit crops, 45 on flowers, 1369 on fodder crops, 10 on commercial crops, 695 on livestock & fisheries, 124 on other aspects viz. mushroom production (114), and vermicompost (10) related activities (285) were conducted covering an area of 2809.50 ha and 15718 units.

Capacity Development

KVKs of Zone-1 have organized a total of 6058 capacity development programmes for 1.55 lakh participants during the reporting period. Out of 6058 courses, 5275 were the need based courses and the rest were sponsored and vocational courses. A total of 4272 courses were organized for farmers and farmwomen wherein 68094 men and 42812 women were trained.

Cluster Frontline Demonstration on Pulses

Under the CFLDs on Pulses a total of 6436 FLDs were conducted on an area of 1340.77 ha in four states during *kharif*, *rabi* and summer season. The FLD yield increased between 13.11 % (Field pea, Punjab) to 45.26 % (Chickpea, HP) over the local check varieties.

Cluster Frontline Demonstrations on Oilseeds

Similarly under CFLDs on Oilseeds a total of 2150 FLDs were conducted on an area of 860 ha in four states during *kharif* and *rabi* seasons. In Punjab the average yield under these FLDs was 20.1 q/ha which was 27.1 % higher than the check yield. For the benefit of 8876 farmers, 284 different extension activates were conducted during the period under consideration. Moreover, 60 training programmes were conducted to benefit 1813 farmers under this project.

Tribal Sub Plan

KVKs of Zone-1 conducted 545 OFTs, 6246 FLDs under TSP. A total number of 39534 farmers participated in various training programmes, 143897 in extension activities and 20838 in Kisan Mobile Advisory Services conducted under TSP.

NICRA

National Innovations in Climate Resilient Agriculture (NICRA) project implemented in 13 most vulnerable districts of Zone-1 benefitted 1408 farmers under Natural Resource Management module while this number was 3628, 2448 and 5247 under Crop Production Livestock and Fisheries and Institutional Interventions modules, respectively. Under this project 5266 farmers were trained through 225 courses on various aspects of climate resilient agriculture. The project also benefited 9314 farmers through 563 other extension activities.

PPV & FRA

Sixteen awareness programs on PPV&FRA were organised in Zone-1 benefiting 1581 farmers during the year 2018-19.

ARYA

Under ARYA project twenty one training

courses were conducted in Zone-1 during 2018-19 that benefited 508 rural youth. The ARYA project was extended to six new KVKs i.e. Solan in Himachal Pradesh; Reasi, Kullam and Baramulla in J&K; Barnala in Punjab; and Nainital in Uttarakhand.

Farmers FIRST Program

Under this program 71 training courses were conducted benefiting 2429 farmers. In addition, 40 awareness camps and 71 exposure visits were also conducted in which 1244 and 3169 farmers were benefited, respectively.

Other Extension Activities

KVKs of Zone-1 organised 48108 other extension activities during 2018-19 benefiting 16.44 lakh farmers out of which 12.94 lakh were from Punjab followed by 1.43 lakh from Uttarakhand, 1.30 lakh from J&K and 0.75 lakh from HP.

Convergence and Linkages of KVKs

KVKs efficiently collaborated with National Horticulture Mission (NHM), Rashtriya Krishi Vikas Yojna (RKVY), Japan International Cooperation Agency (JICA), Agriculture Skill Council of India (ASCI) for overall agricultural development in the zone.

Kisan Mobile Advisory

In Zone-1, 9.08 lakh farmers were benefited through Kisan Mobile Advisories with 4513 text messages. About 68% of text messages related to crops followed by 9% for livestock, 9% on awareness, 6% on weather information, 5% miscellaneous and 3% on marketing related information.

Production of technological inputs

KVKs have produced and supplied 15383 q of seed material of different crops to 18758 farmers. KVKs



produced 31.50 lakh plant-lets/ planting material of different crops and distributed 0.23 lakh livestock worth ₹ 76.78 which were supplied to 691 farmers. KVks have also produced and supplied 109.03 q of bio- fertilizers, 195.6 q of compost and 1119 bio-agents for supplying to stakeholder farmers.

Soil, Water and Plant Samples

During the year, KVks of this zone have analysed a total of 18062 samples including 14808 soil samples, 1812 water samples and 1442 plant samples.

Agricultural Technology Information Centres (ATIC)

In eight ATICs of this zone 21633 farmers visited for technical advice whereas, as much as 195884 visited to obtain products developed by the host institutes. Soil and water testing facilities at ATICs were used by 8441 farmers. As much as 54026 books and 478 technical bulletins were provided by the ATICs to its end users. The revenue generated by sale of seeds, planting

materials and other products and services by them were ₹ 1.69 crore.

Directorate of Extension Education

DEEs of various host universities conducted 152 human resource development (HRD) activities and their officials have participated in 62 Scientific Advisory Committee meeting. Similarly, they have attended 105 Field days, 61 workshops Seminars, 60 farmer scientist interactions, 38 technology weeks, 185 Trainings programs, 203 On Farm Testing (OFT) and 635 Front Line Demonstrations (FLD) programs organized by various KVks.

Crop Residue Management

KVks procured 357 machines, including 115 Happy Seeders, 65 reversible MB ploughs, 60 shrub masters/ cutting cum spreaders, 69 mulchers/ paddy straw choppers and 48 zero till drills for crop residue management during 2018-19. More than 3.05 lakh participants benefitted from about 6090 activities under IEC.





Chapter - 1

ABOUT ICAR-ATARIS AND KVKS

1.1 Genesis of ICAR-ATARs

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

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

Research Institutes (ICAR- ATARI) with added responsibilities and functions including research.

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

1.1.1 Mandate of ATARIs

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

- Coordination and monitoring of technology application and Frontline Extension Education Programs.

Table 1.1: Details of all ICAR-ATARIs in India

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



- Strengthening Agricultural Extension Research and Knowledge Management

1.1.2 Major Functions of ICAR-ATARI's

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

1.2 ICAR-ATARI, Zone-I, Ludhiana

Zonal Coordination Unit (ZCU) was established at Ludhiana in 1979 by the Agricultural Extension Division of the Indian Council of Agricultural Research, to monitor and coordinate transfer of technology projects/ activities. The states of Punjab, Haryana, New Delhi, Himachal Pradesh and Jammu & Kashmir came under the jurisdiction of Zone-1 at that time. These transfer of technology projects/ activities were merged

and implemented under KVK scheme in 1992 and onwards. The Zonal Coordination Unit, Ludhiana was upgraded as Zonal Project Directorate (ICAR-ZPD) in March, 2009 which was subsequently further upgraded as ICAR-Agricultural Technology Application Research Institute (ICAR-ATARI) in July, 2015. Presently (2018-19 onwards), the ICAR-ATARI for the Zone-I situated at Ludhiana is engaged in planning, monitoring, reviewing and facilitating ICAR initiated technology dissemination projects mainly *Krishi Vigyan Kendras* (KVKS) of Punjab, Himachal Pradesh, Jammu & Kashmir and Uttarakhand.

1.2.1 Staff

At ICAR-ATARI for Zone-1, total staff strength of 18 has been sanctioned and as on 31 March 2019 out of these sanctioned posts, 12 have been filled while 6 are laying vacant Annexure-V.

1.3 Krishi Vigyan Kendras

Krishi Vigyan Kendras (KVKS), also known as Agriculture Science Centres, are grass root level scheme that have been designed and nurtured by ICAR for the past four decades to address issues related to technology assessment and dissemination in agriculture. So far, ICAR has established 714 KVKS across the country under varied host organizations viz. SAUs, ICAR Institutes, Central institutes/ Deemed Universities, State Government, Public Sector Undertakings and NGOs.

1.3.1 Establishment of KVKS

The Education Commission, Government of India (1964-66), under the chairmanship of Dr. DS Kothari, recommended 'application of science to productive processes, including agriculture' and 'vocationalization of secondary and agricultural education'. These recommendations were subsequently reviewed by the Planning Commission of India and Inter-Ministerial Committee and were further recommended by a Committee set up by ICAR under the Chairmanship of Dr. Mohan Singh Mehta (1973) which ultimately found the ground of reality in 1974 with the establishment of India's first Krishi Vigyan Kendra



(Agriculture Science Centre) in Puducherry under the aegis of the ICAR, New Delhi through its Division of Agricultural Extension. Zone-I got its first KVK in the district of Karnal in 1976 under ICAR-National Dairy Research Institute, Karnal. On 31st March 2019, the ATARI Zone-1 has 69 KVKs functioning under their jurisdiction. The details of these KVKs, regarding their establishment and contact details, have been given in Annexure I.

1.3.2 Mandate of KVKs

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

- Conducting on-farm testing to identify the location specificity of agricultural technologies under various farming systems.
- Organizing frontline demonstrations to establish production potential of various crops and enterprises on the farmers' fields.
- 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.
- Creating awareness about improved technologies to larger masses through appropriate extension programmes.
- 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.

• Work as resource and knowledge centre of agricultural technology for supporting initiatives of public, private and voluntary sector for improving the agricultural economy of the district.

1.3.3 Manpower

Human resources play imperative role in realizing the vision and objectives of various institutions including the KVK system. Accordingly, staff strength of 16 has been sanctioned for each of the KVKs, which includes one Programme Coordinator, six Subject Matter Specialists, three Programme Assistants, two Administrative staff, two Drivers and two Supporting Staff. For the 69 KVKs of this zone, the total sanctioned strength is 1104, out of which, 802 are in position as on 31st March 2019. The category wise staff position of each KVK is detailed in Annexure-III.

1.3.4 Infrastructural Facilities

The basic infrastructural facilities are mandatory for any research and development organization including the KVKs to accomplish their mandated activities. ICAR have been proactive in providing these infrastructural facilities to their KVKs. In the Zone-1, 61 KVKs do possess their Administrative Building, 46 KVKs have Farmer's hostel, 43 KVKs have staff quarters, 25 KVKs have been provided with the rain water harvesting units, 27 KVKs have threshing floors and 60 KVKs of the zone have demonstration units with them at the end of year 2018-19. As on 31st March 2019, 61 KVKs had Jeep/ cars with them, while 52 KVKs had two-wheelers and 54 possessed tractors. The details of the infrastructural facilities available in the KVKs have been provided in Annexure IV.

1.3.5 Scientific Advisory Committee

As per the guidelines issued by the Council all KVKs have constituted their Scientific Advisory Committees (SAC) under the chairperson of the Head of



the host organization. Each KVK has to conduct SAC meeting once 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-VIII. Out of the 69 KVKs, 5 KVKs did not conduct SAC meeting during the year of 2018-19

1.3.6 Thrust Areas of KVKs

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

1.3.6.1 Plain State (Punjab)

- Soil & water conservation and improvement of soil health
- Crop diversification
- Hybrid seed production
- Integrated Nutrient/Pest/Weed Management in different crops
- Popularization of resource conservation technologies
- Improvement in the productivity of livestock
- Management of repeat breeding in dairy animals
- Clean milk production and processing of dairy products

- Drudgery reduction of farm-women
- Value addition in agricultural products
- Supplementary source of income for farm-women
- Selfemployment for rural youth
- Use of information and communication technologies

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

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

1.4 Budget

A total of ₹ 9449.86 lakh was sanctioned for the year 2018-19 and 100 per cent of the sanctioned budget was utilized. Head wise details of the budget are given in Annexure VII.



Chapter - 2

TECHNOLOGY ASSESSMENT AND REFINEMENT

Technologies developed by National Agricultural Research System are tested by the Krishi Vigyan Kendras for their location specificity involving farmers as partners through the Technology Assessment and Refinement process. On-farm testing (OFT) is the research conducted in participatory mode involving farming community, extension personnel and scientists. 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 problem, 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-I assessed 501 technologies (393 under crops, 74 related to livestock & fisheries and 32 related to others) by conducting 2679 trials. Furthermore, the KVKS refined 45 technologies, including 40 related to crops, 5 related to livestock & fisheries through 182 trials (Table 2.1).

Table 2.1: Technology assessment and refinement by the KVKS of Zone-1 during 2018-19

Particulars	Crops		Livestock & fisheries		Others		Total	
	No. of OFTs	No. of trials	No. of OFTs	No. of trials	No. of OFTs	No. of trials	No. of OFTs	No. of trials
Assessment	393	1640	76	512	32	527	501	2679
Refinement	40	156	5	26	0	0	45	182
Total	433	1796	81	538	32	527	546	2861

2.1 Technology Assessment

A total of 393 technologies assessed by KVKS under crops by conducting 1640 trials in thematic areas such as Varietal Evaluation (89), Integrated crop management (56), Integrated nutrient management (52), Integrated disease management (53), Integrated pest management (59), Integrated weed management (24), Resource conservation technology (18), Integrated farming system (7), Farm machinery (5), Processing & value addition (27), Storage techniques (1), Seed and plant production (2) as shown in the Table 2.2.

The figures depicted in Table 2.3 indicate that maximum number of crop related technologies (118) were assessed by KVKS of Jammu & Kashmir through

444 trials followed by Punjab (117). KVKS of Himachal Pradesh assessed 106 technologies by conducting 455 trials whereas KVKS of Uttarakhand assessed 52 technologies at 315 locations.

In case of livestock & fisheries, KVKS assessed 76 technologies assessed under six thematic areas by conducting 512 trials. There were 22 technologies assessed under Nutrition Management followed by Disease Management (14). Technologies assessed in other thematic areas are Evaluation of breeds (10), Composite fish culture (1), Production and management (9), Feed and fodder (10), Value addition (3), Integrated farming system (1), Dairy production (1), Small scale income generating enterprises (1) as shown in Table 2.4.

Table 2.2: Thematic area wise technologies assessed under crops

Thematic area	No. of KVks	No. of crops/enterprise	No. of OFTs	No. of Trials
Varietal evaluation	41	39	89	348
Integrated crop management	27	28	56	226
Integrated nutrient management	26	20	52	212
Integrated disease management	31	21	53	222
Integrated pest management	30	32	59	262
Integrated weed management	13	12	24	81
Resource conservation technology	15	9	18	68
Integrated farming system	5	7	7	38
Farm machinery	4	3	5	11
Processing & value addition	16	22	27	163
Storage techniques	1	1	1	3
Seed and plant production	2	2	2	6
Total			393	1640

Table 2.3: State wise technologies assessed under crops

Thematic areas	No. of crops	No. of technologies	No. of trials
Punjab	45	117	426
Himachal Pradesh	42	106	455
Jammu & Kashmir	49	118	444
Uttarakhand	31	52	315
Total		393	1640

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

Thematic areas	No. of type of animal	No. of OFTs	No. of trials	No. of KVks
Composite fish culture	1	1	4	1
Evaluation of breeds	2	10	74	10
Nutrition management	8	22	167	19
Disease management	5	14	70	13
Production and management	6	9	32	8
Feed and fodder	4	10	76	10
Value addition	2	3	18	2
Integrated farming system	1	1	1	1
Dairy production	4	5	32	4
Small scale income generating enterprises	1	1	38	1
Total		76	512	

State wise details of technologies assessed under livestock & fisheries are given in Table 2.5. KVKS of Punjab assessed 27 technologies through 78 trials and KVKS of Jammu & Kashmir assessed 32 technologies through 280 trials while 12 technologies were assessed by KVKS of Uttarakhand with 139 trials. Himachal

Pradesh assessed five technologies with 15 trials.

As depicted in Table 2.6, a total of 32 technologies assessed related to various enterprises by conducting 527 trials by KVKS of Punjab, Himachal Pradesh, Uttarakhand and Jammu and Kashmir.

Table 2.5: State wise technologies assessed under livestock & fisheries

Thematic areas	No. of type of animal	No. of tech.	No. of trials
Punjab	11	27	78
Himachal Pradesh	3	5	15
Jammu & Kashmir	11	32	280
Uttarakhand	8	12	139
Total		76	512

Table 2.6: Details of technologies assessed in other areas

Thematic areas	No. Crops/ Enterprises	No. of OFTs	No. of trials	No. of KVKS
Punjab				
Home science	3	3	280	2
Small scale income generation enterprises	3	8	50	5
Nutrition management	1	1	4	1
Drudgery reduction	2	2	23	2
Women empowerment	1	5	5	1
Total (Punjab)		19	362	
Himachal Pradesh				
Mushroom Cultivation	2	2	25	2
Total (Himachal Pradesh)		2	25	
Jammu & Kashmir				
Small scale income generation enterprises	1	1	5	1
Others	1	1	5	1
Total (Jammu and Kashmir)		2	10	
Uttarakhand				
Drudgery reduction	4	5	60	4
Others	2	4	70	1
Total (Uttarakhand)		9	130	
Total		32	527	

2.2 Technology Refinement

Table 2.7 reveals that a total of 40 technologies refined through 156 trials under crops by KVKs on eleven thematic areas including Crop production (2), Varietal evaluation (2), Integrated crop management (13), Integrated nutrient management (6), Integrated disease management (4), Integrated pest management (6), Integrated weed management (2), Farm machinery (1), Resource conservation technology (1), Small scale income generation enterprises (1) and Seed and plant

production (1). State wise details of technologies refined are given in Table 2.8.

In case of livestock & fisheries, KVK refined five technologies on four thematic areas by conducting 26 trials. There were two technologies refined under Nutrition management, one each under Feed and fodder, Disease management and Small scale income generation enterprises as depicted in Table 2.9. State wise details of technologies refined under livestock and fisheries are given in Table 2.10.

Table 2.7: Thematic area wise technologies refined under crops

Thematic areas	No. of KVKs	No. crops/ Enterprises	No. of OFTs	No. of trials
Crop production	1	1	2	15
Varietal evaluation	2	2	2	8
Integrated crop management	10	9	13	42
Integrated nutrient management	5	6	6	21
Integrated disease management	3	4	4	33
Integrated pest management	5	5	6	17
Integrated weed management	2	2	2	7
Farm machinery	1	1	1	2
Resource conservation technology	2	2	2	5
Small scale income generation enterprises	1	1	1	4
Seed and plant production	1	1	1	2
Total			40	156

Table 2.8: State wise technologies refined under crops

Thematic areas	No. of crops	No. of tech.	No. of trials
Punjab	8	12	37
Himachal Pradesh	6	7	27
Jammu & Kashmir	11	17	75
Uttarakhand	3	4	17
Total		40	156

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

Thematic areas	No. of type of animal	No. of OFTs	No. of trials	No. of KVKs
Nutrition management	2	2	7	2
Feed and fodder	1	1	5	1
Disease management	1	1	9	1
Small scale income generation enterprises	1	1	5	1
Total		5	26	

Table 2.10: State wise technologies refined under livestock & fisheries

Thematic areas	No. of type of animal	No. of tech.	No. of trials
Jammu & Kashmir	4	5	26
Total		5	26

2.3 Location Specific Technologies

2.3.1 Technology Assessment

2.3.1.1 Integrated Nutrient Management

Problem definition: Zinc deficiency in salt affected soils

Technology assessed: Effect of soil and foliar application of zinc in transplanted rice Zinc (Zn) deficiency is most widely spread in rice cultivated light textured soils with low organic carbon content, high concentration of soluble salts, available-P and calcium carbonate content. The OFTs were conducted during 2018-19 to assess the effect of soil and foliar application of zinc sulphate heptahydrate ($ZnSO_4 \cdot 7H_2O$, 21% Zn) on yield and yield contributing attributes and economics of rice cultivation under rice-wheat cropping system. These OFTs were conducted at 3 different farmers' field locations in Mansa district during *kharif* 2018-19. Three different treatments viz. T_1 : 12.5 kg $ZnSO_4 \cdot 7H_2O$ ha^{-1} (farmer's practice, FP), T_2 : 25 kg $ZnSO_4 \cdot 7H_2O$ ha^{-1} (recommended practice, RP) and T_3 : 12.5 kg $ZnSO_4 \cdot 7H_2O$ ha^{-1} + Foliar application of Zn @ 0.5% (through $ZnSO_4 \cdot 7H_2O$) 30 DAT (Intervention) were compared at each location. Yield obtained with FP (T_1) was 72.0 q ha^{-1} while in intervention (T_3) yield obtained was 74.2 q ha^{-1} indicating an increase of ~6.1%. The results revealed that Zn application at recommended rate (T_2) resulted in considerably higher rice grain yield, compared with FP (T_1). Soil and foliar application of Zn resulted in a considerable increase in number of productive tillers, plant height (cm), number of grains per ear, 1000-grain weight, compared to FP (T_1). Average net returns were ₹ 82, 690/-, 87,918/- and 88,334/- per ha in three treatments, with highest benefit-cost (B-C ratio) of 3.1 in T_2 and T_3 compared with 2.8 in T_1 .

Problem definition: Magnesium deficiency in cotton

Technology assessed: Assessment of magnesium sulphate basal dose to mitigate magnesium deficiency in cotton

Cotton is major *kharif* crop of Sri Muktsar sahib district, but magnesium deficiency is one of the hindrances in optimizing potential yields. The use of underground brackish water has increased in the area which further enhanced the carbonate and bicarbonate in the soil. Now it is observed that when RSC is high the spraying of magnesium sulphate is not sufficient to remove the deficiency. It was also observed that during *Kharif* 2018 the basal dose of magnesium sulphate is required in cotton. Results of the trials revealed that basal dose of magnesium sulphate @ 62.5 kg/ha followed by foliar application of magnesium sulphate @ 1 % at flowering and 15 days after flowering found effective and gave higher yield *i.e.* 26.0 q/ha and 25.3 q/ha respectively compared to control plot (23.9 q/ha). By applying basal dose of magnesium sulphate the RSC will be reduced and cotton crop will respond positively.

Problem definition: Poor quality of cauliflower curd due to boron deficiency leading to low price

Technology assessed: Management of boron deficiency in cauliflower

Cole crops especially cauliflower is gaining importance in Lahaul valley due to highest returns among the off-season vegetables (seed potato, pea) grown in the tribal district of Lahaul and Spiti. KVK Lahaul and Spiti-1 conducted an on-farming trial to manage the deficiency of boron through soil application as well as foliar spray of soluble boron. The data of the OFT revealed that two sprays of borax @ 5% before flowering at 15 days interval increased the curd yield



(268.0 q/ha) of cauliflower by 23.9 percent compared to no spraying (216.3 q/ha), while soil application of borax @ 20 kg/ha increased the curd yield (244.3 q/ha) by only 12.9 percent. The benefit cost ratio (3.46) with two sprays with borax @ 5% before flowering at 15 days interval was also highest followed by soil application of boron (3.15) and no application of boron to cauliflower (2.80) by the farmers.

Problem definition: Non-recommended Nitrogen fertilization (post-harvest) in Litchi

Technology assessed: Post-harvest application of urea on fruiting and yield of litchi cv. Dehradun

District Pathankot is hub for litchi cultivation in the Punjab state. A wide gap exists between the recommended practice and actual practice of nitrogen application in litchi. In practice, the litchi growers of Pathankot have a tendency to apply 500 g urea after harvesting. Therefore, KVK, Pathankot conducted a study wherein the economical impact of post and pre-harvest application of urea (including the recommended and farmer practice) on litchi trees was assessed. The results revealed that application of 600 g urea/ plant during mid-April + 1000 g urea/ plant (after harvesting) gave the highest yield (83.75 kg/plant). This treatment also recorded maximum production (15075 kg/ha) and highest net return of ₹ 5,28,476 per hectare as compared to other treatments.

2.3.1.2 Integrated Pest Management

Problem definition: Low productivity of wheat due to aphid attack

Technology refined: Management of aphid population in wheat

In recent years, farmers of the Mohali district were experiencing wheat crop losses due to high incidence of aphid, KVK Mohali hence conducted on farm trials to assess the performance of two different doses of neem-based formulation (1500 ppm) @ 500 ml (T3) and 1000 ml (T4) per acre in comparison with

farmers practice (T1= irrational use of insecticides) and Punjab Agricultural University (PAU) recommendation (T2 = Thiamethoxam spray @ 20g /acre). Results revealed that crop production of farmers practice, PAU practice and two KVK interventions was (T1) 47.5 q/ha, (T2) 57q/ha, (T3) 54.5 q/ha and (T4) 55.25 q/ha. There is not much difference between BC ratio of T2 (2.95), T3 (2.85) and T4 (2.87). Moreover, neem-based insecticides are safer for human health and environment as well, therefore farmers can adopt these insecticides for management of wheat aphid.

Problem identification: Low productivity of rice due to high incidence of plant hopper

Technology Assessed: Assessment of different insecticides and non insecticides for the management of plant hopper in rice

Rice is grown under different agro climatic conditions in the Punjab State. The incidence of plant hopper in rice is a serious threat to realize the optimum returns in Barnala District. Therefore, KVK, Barnala conducted OFT to access the efficacy of different insecticides against plant hopper in rice. The results of on farm trial revealed that minimum plant hopper population of 2.53 per hill was observed following foliar application of buprofezin 25 SC @ 1.0l/250 litre of water and also the highest yield of rice (74.51 q/ha).

Likewise in district Ferozepur, KVK conducted on farm trial at three locations of the district for the management of plant hopper with neem based formulation *i.e.* azadirachtin 0.03 % @ 1000 ml/ha and the results revealed that azadirachtin 0.03 % @ 1000 ml/ha was effective in minimizing pest incidence and enhancing the yield of crop. This treatment resulted in minimum population of plant hopper per hill, maximum yield (78.3 q/ha) and highest BC ratio (2.4).

Problem definition: Injudicious use of non-recommended pesticides in cotton for management of whitefly

Technology assessed: Evaluation of cotton whitefly, *Bemisia tabaci* management modules in cotton



In India, cotton is cultivated over a large area and district Bathinda has the maximum area in Punjab under the crop. A serious attack of whitefly, *Bemisia tabaci* (Aleyrodidae: Hemiptera) during 2014-15 devastated cotton crop in *Malwa* region of Punjab. Keeping in view KVK Bathinda conducted an OFT at 5 locations consecutively for three years including use of neem based and university recommended insecticides against mixing of non-recommended pesticides which are generally used by farmers. Data on per cent reduction in mean population of whiteflies over untreated check and yield in different treatments revealed that university recommended practice (T1) resulted in maximum reduction (70.3%) in mean population of whitefly adults. Treatment (T2) comprised addition of surf in neem based spray solution remained on a par with T1 with 70 per cent reduction in mean population of whiteflies over untreated check. Farmers' practice of spraying unrecommended insecticide resulted in minimum reduction in whitefly population. A similar trend in yield was observed amongst the treatments, being maximum in T₁ and T₂. Whereas, minimum yield was observed in the treatment comprising unrecommended spray by farmers. As per as the number of spray applications are concerned, the maximum sprays (4) were done in T₃, comprising farmer's practice followed by T₂ and T₁.

Problem definition: Low yield of tomato due to high incidence of fruit borer in tomato

Technology assessed: Evaluation of different management modules on fruit borer incidence and yield



of tomato Tomato is an important cash crop in many parts of district Mandi, however incidence of fruit borer especially in Balh valley of the district is a serious threat to realize the optimum returns. In order to assess the efficacy of safer modules, KVK Mandi conducted on farm trial on integrated management of fruit borer at six locations in the district. Results of the trials revealed that installation of pheromone traps @ 10 traps/ ha followed by foliar application of lambda cyhalothrin 5EC @ 0.004 % & azadirachtin @ 0.03 % alternatively at 15 days interval found effective in minimizing pest incidence and enhancing the fruit yield. This treatment resulted in minimum larval count, minimum fruit infestation, highest marketable yield and BC ratio (3.56), closely followed by pheromone trap + flubendamide @ 0.12 % at flowering stage.

KVK Moga also conducted on farm trial to assess the effectiveness of different sequentially applied microbial insecticides viz., *Bacillus thuringiensis* var. *kurstaki* Berliner (Delfin® 25 WG @ 500g /ha) and Tracer (spinosad 45 SC @ 150 ml a.i./ha) along with pheromone traps with Helilure against *H. armigera* in comparison with application of synthetic insecticides viz. Chlorantraniliprole (Corazen @ 125 ml a.i./ha), Flubendamide (Fame @ 75 ml a.i./ha) and untreated control on tomato were conducted during 2018-19. Application of microbial and mass trapping proved less effective than treatments of chlorantraniliprole 18.5 SC (125 ml a.i./ha) and Flubendamide (Fame @ 75 ml a.i./ha). Minimum no of eggs (0.5) and larvae (0.45) per



10 plant basis seven days after spray were recorded incase of Corazen @ 125 ml a.i./ha. Relatively higher number of predators was recorded in biorational application applied plots compared to the chemical insecticides treated plots.

Problem definition: Low yield of tomato due to infestation of white fly under polyhouse.

Technology assessed: Validation of different management modules for the management of white fly in tomato.

Tomato is one of the most important vegetable crops grown in mid hill situations of district Champawat. In recent years the farmers of the district Champawat were experiencing severe losses due to infestation of white fly. For management of this pest farmers use various synthetic pesticides at frequent intervals, causing residue problems in tomato fruits, development of pesticides resistance, resurgence and secondary pest outbreaks. In order to assess the bioefficacy of safer modules, KVK Champawat conducted on farm trials on integrated management of white fly at 12 locations in the district. Results of the trial revealed that foliar spray of Imidacloprid 17.8 SL @ 0.04% followed by Thiamethoxam 25 WSG @ 0.04% at 10 days after first spray was effective in minimizing pest population and enhancing the fruit yield. The results revealed that this technology recorded minimum infestation (5-9%), highest fruit yield (312.16 q/ha) and BC ratio (3.36).

Problem definition: Low yield of tomato due to high incidence of tomato pin worm under protected conditions

Technology assessed: Integrated management of *Tuta absoluta* pest in tomato under protected condition

Tomato is an important cash crop in many parts of district Mandi and a source of livelihood of small and marginal farmers of the district. It is cultivated in an area of about 1500 hectares under open conditions apart from off season cultivation under protected conditions. The incidence of a new invasive pest tomato pin worm, *Tuta absoluta* especially under protected conditions in the district is a serious threat to its successful cultivation and damage ranging from 80-90 percent has been realized under protected tomato cultivation in some areas. Farmers are resorting to indiscriminate usage of synthetic pesticides resulting in serious ecological consequences environmental pollution and high residues in the marketable produce. In order to assess the efficacy of safer modules, KVK Mandi conducted on farm trial on Integrated management of tomato pin worm, *Tuta absoluta* in tomato under protected and open conditions at four locations involving pheromone traps and safer molecules. Result of the trials revealed that installation of pheromone traps @ 2 traps /500 m² + indoxacarb @ 1 ml/ 1 sprays at 15 days interval on appearance of pest not only reduced incidence of *Tuta absoluta* but also increased yield and profitability, followed closely by pheromone traps @ 2 traps /500 m² + flubendamide @ 0.12% and Azadirachtin @ 0.03 % alternatively at 15 days interval. These treatments resulted in minimum leaf mine blotch of 8.2 and 9.18 percent and fruit infestation of 7.10 and 7.89 percent respectively. The marketable fruit yield recorded was 12.58 and 12.16 q/100m² following these treatments with BC ratio of 5.64 and 5.38, respectively.

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

Technology assessed: Assessment of insecticides against sucking pests in capsicum under protected conditions

Capsicum is an important vegetable crop grown widely under protected conditions in district Hamirpur. The incidence of sucking pest like white fly, thrips and aphids has increased in recent years causing a serious threat to cultivation of capsicum under protected conditions. In this view, KVK Hamirpur conducted on farm trials on assessment of different insecticides against sucking pests in capsicum at three locations of the district. Results of the trials revealed that yellow sticky traps @1 trap/ 10 m² + spray of imidacloprid @ 0.5ml/l followed by spiromesifen @1ml/l at 15 days interval gave better yield (38 q/ 250 m²) and thus was effective in minimizing sucking pest incidence as compared to control (repeated spray of available insecticides) which recorded yield of 29 q/ m². This treatment also resulted in minimum infestation (8.0 %) and highest BC ratio (4.50) which was closely followed by treatment of yellow sticky traps @1 trap/ 10 m² + spray of lambda-cyhalothrin @ 0.8 ml/l followed by imidacloprid @ 0.5 ml/l and azadirachtin @ 0.03% at 15 days interval. Thus it may be concluded that yellow sticky traps @1 trap/ 10 m² + spray of imidacloprid @ 0.5ml/l and spiromesifen @1ml/l at 15 days interval is effective for the management of sucking pests in capsicum under protected conditions as against repeated sprays of available insecticides as practiced by farmers.

Problem definition: 15-20% yield losses due to incidence of aphid and lepidopterous larvae (cabbage butterfly and diamond back moth) in cauliflower

Technology assessed: Integrated insect-pests management in cauliflower

Cauliflower is one of the important off-season cash crops of Lahaul valley. In order to reduce the losses caused by insect-pests, KVK Lahaul & Spiti-1 at Kukumseri conducted on farm trial on integrated insect-pests management in cauliflower at five locations in the valley. Results of the trials revealed that one spray of Indoxacarb 14.5 SC @1 ml/l followed by one sprays of malathion 50 EC (0.05%) at 15 days intervals starting with pest appearance gave the highest yield and effective management of insect pests in cauliflower. This treatment

resulted in minimum larval count of 0.26 per plant, less incidence of aphid 11.13 per leaf and gave the highest yield (280.5 q/ha) along with the maximum BC ratio (3.57) as compared to the farmers' practice (220.8 q/ha).

Problem definition: Low yield due to high incidence of shoot and fruit borer in brinjal crop.

Technology assessed: Eco-friendly management of shoot and fruit borer in brinjal using Nimbicidine and Bt

Brinjal is an important off season vegetable cash crop of Chamoli district of Uttarakhand and is highly affected by shoot and fruit borer. In order to reduce environmental pollution and human health hazards from chemical insecticides, the use of safer insecticides (Nimbicidine and Bt) was tested in brinjal growing areas of Chamoli district. KVK, Chamoli (Gwadam) conducted on farm trial (OFT) on management of shoot and fruit borer in brinjal crop at four different locations (Jola, Nail, Malsi and Bagoli villages) of Chamoli district. The results revealed that two sprays of Nimbicidine (5 ml/l) followed by Bt @ 5 g./t. at 15 days interval resulted in minimum pest incidence and increased yield by 16.2 per cent over alone treatment of Nimbicidine. The treatment resulted in minimum fruit infestation (0.78/ plant), highest marketable yield (98.2 q/ha) and highest BC ratio (2.32), with net return of rupees 147300 per hectare. In another OFT conducted by KVK Ropar, pheromone trap and spray of Azadirachtin (1.0%) was found equally effective to pesticides against shoot and fruit borer in brinjal.

Problem definition: High incidence of onion maggot.

Technology assessed: Integrated management of onion maggot in trans Himalayan Leh.

To address the serious problem of maggot in onion, an OFT was conducted on integrated management of maggot in onion in the micro climatic conditions of the district. On-farm trials comprising four treatments *viz.* farmers practice (no spray), crop rotation with non-allium crops, dip onion seedlings in 0.2 % chloropyriphos @ before transplanting and application



of carbofuran 3G 1 kg a.i./ha were conducted by KVK Leh at 5 locations consecutively for three years during 2015-16 to 2017-18. The results revealed that treatment comprising application of carbofuran 3G 1 kg a.i./ha before transplanting was significantly superior over other treatments and farmers practice in terms of pest incidence and onion yield. This treatment resulted in maximum reduction in maggot incidence over control, respectively apart from increase in yield over control. This treatment provided a net return of ₹ 500000/ ha with BC ratio of 2.50 followed by other treatment and check.

Problem definition: Wilt and nematode problem in pigeon pea

Technology assessed: Integrated pest management for wilt and nematodes in pigeon pea (VL Arhar 1)

Short duration pigeon pea was successfully introduced in district Bageshwar. The area under this crop has occupied around 110 ha in the district. But with the advancement of time, problem of wilt and nematodes are becoming serious. Therefore, KVK Bageshwar performed on farm trials at three locations to mitigate this problem. The results showed that seed treatment (Thiram @ 2 g/kg seed) + soil drenching (carbendazim @ 1.0 g/l water and Nemagone @ 2.0 ml/l) yielded 9.25 q/ha while bioagent seed treatment (*Trichoderma harzianum* @ 5 g/kg seed) + soil application of *Trichoderma harzianum* @ 250 g/q FYM at the time of sowing + soil application of neem cake @ 5 q/ha yielded 7.5 q/ha in comparison to farmers practice (5.9 q/ha).

2.3.1.3 Integrated Disease Management

Problem definition: Reduction in yield of rice due to blast disease.

Technology assessed: Evaluation of different management modules on blast incidence and yield in yield in aromatic rice.

Haridwar district is known for its aromatic rice, but is severely affected by blast disease. Thus KVK Haridwar conducted on farm trials at five locations in the

district. Spray of carbendizim @ 2.0 g/l in the nursery followed by spray of hexaconazole 5% EC 1000 ml/ha on infection resulted in lowest infection level (8%) of blast compared to spray of tricyclazole 75% WP @ 400 g/ha at 15 days interval on appearance of symptoms (10%) and application of carbendazium @ 1.0 kg/ha after disease appearance (20%). The spray of carbendazim in nursery with hexaconazole on infection resulted in highest yield of paddy (52 q/ha) and BC ratio (3.42) as compared to spray of tricyclozole on appearance of symptoms (50 q/ha) and BC ratio 3.20. The application of carbendazim after appearance of disease resulted in lowest yield of 39 q/ha and BC ratio 2.60.

Problem definition: Pokka boeing disease in Sugarcane

Technology assessed: Assessment of fungicides for management of Pokka boeing disease in sugarcane

The weather of district Pathankot is very congenial for variety of pathogens due to high humidity and favourable temperature during *Kharif* season. Sugarcane is grown on large area after paddy and Pokka boeing disease occurs every year in the district. The disease is economically very important among the foliar disease of sugarcane. Therefore, on farm trial was conducted by KVK Pathankot at three locations during 2018-19. The trail comprised of three treatments viz. spray of Tilt 25 EC (propiconazole) @ 0.1%, carbendazim @ 0.1% and carbendazim 12 % in combination with Mancozeb 63% WP @ 0.1 %. The sprays were initiated after disease appearance and thereafter repeated at 10 days of interval. The results revealed that percent disease incidence was found less in treatment T₃ (4.63) followed by T₁ (8.68) and T₂ (11.83), respectively. The results also showed highest benefit cost ratio (2.15) and net return (₹ 188245) in treatment T₃ as compared to T₁ and T₂.

Problem Definition: Low yield of tomato due to high incidence of *Phytophthora* blight (late blight).

Technology Assessed: Management of late blight of tomato through different management modules.

Tomato is one of the important cash crops of district Sirmour and a source of livelihood of the farmers of Pachhad, Shillai and Sangrah blocks of the district. It is cultivated in an area of about 2000 ha. Late blight during *kharif* season is a serious threat and farmers use pesticides indiscriminately. KVK Sirmour conducted on farm trials on the management of late blight of tomato at four locations. Results of the trial revealed that spray of Moximate (0.25%) followed by mancozeb and ridomil (0.25%) or spray of azoxystrobin (0.1%) followed by mancozeb and ridomil (0.25%) at 15 days interval was effective in managing the disease. The percent disease incidence in these treatments were low (10 and 14 per cent, respectively) and BC ratio was 4.31 and 4.35, respectively.

Problem definition: Low yield of capsicum due to high disease incidence

Technology assessed: Wilt management in capsicum

In recent years, farmers of the Doda district of J & K were experiencing severe losses in the capsicum due to prevalent capsicum diseases especially wilt. Hence, KVK Doda conducted on farm trials to assess the technologies for wilt management in capsicum comprising three treatments viz. T1 (farmers practice), T2 (seed treatment + soil drenching with carbendazim 2 g/l of water followed by foliar application mancozab @ 3 g/l) and T3 (T2 + seedling root treatment with carbendazidum 50 % WP @ 0.1 %). Results revealed that treatment T3 recorded lowest mortality rate of 11 percent and consequently the highest net returns of ₹ 68920/ ha with BC ratio of 1.53 as compared to T1 and T2. T3 can be hence widely adopted for managing wilt in capsicum.

Problem definition: Low yield of cabbage due to bacterial rot.

Technology assessed: Management of bacterial rot in cabbage.

Cabbage is an important cash crop cultivated throughout the year in district Pithoragarh. Bacterial rot is a serious disease of the crop. Due to improper

management of bacterial rot in cabbage the yield and quality is adversely affected. To manage this problem, KVK Pithoragarh conducted on farm trial on management of bacterial rot in cabbage at 7 locations in the district. Results of the trial revealed that soil treatment with formalin (40%) @ 50ml (in 10 L of water)/ m² + 3 sprays of copper oxychloride (0.3%) + streptocyclin (0.02%) not only minimized disease incidence (8.2%) but also increased yield. The treatment gave the highest yield (176.8 q/ha) and BC ratio (2.68).

Problem definition: Low yield due to *Stemphylium* blight in onion during seed production.

Technology assessed: Management of *Stemphylium* blight in onion during seed production.

Onion is an important commercial crop of lower and mid hills of Uttarkashi district. This crop is affected by many diseases but the severe incidence of *Stemphylium* blight is major concern during seed production of onion. KVK Uttarkashi, hence conducted on farm trials to assess the management modules against *Stemphylium* blight in onion during seed production. The data of the OFT revealed that the foliar spray of mancozeb (0.3%) + monocrotophos (0.05%) was found more effective and decreased disease incidence up to 14.0 percent. However, yield increase was found 33.86 percent compared to control. This treatment resulted in additional net return of ₹ 190640 as compared to the farmers' practice with highest BC ratio (4.51).

Problem definition: Poor technical knowhow resulted in overall decline of citrus plants

Technology assessed: Effect of Integrated management of dieback disease in Malta

Malta is an important fruit crop in many parts of District-Rudraprayag, Uttarakhand. Incidence of dieback disease and improper nutrition management compounded with attack of thrips and mites is a severe problem in the Rudraprayag district. The farmers are ignorant in knowledge about the integrated disease



management practices and their effect on the productivity. In order to control the citrus decline in Malta, KVK Rudraprayag conducted on farm trial on integrated management of dieback disease in Malta at five locations in the district. Results of the trials revealed that spray of Pant Bio-agent 3 (Trichoderma + Pseudomonas) along with application of 30 kg FYM/ plant/ year with three spray of tracer (Spinosad) after fruit set at an interval of 15 days was found most effective in maximizing the fruit yield. This treatment was found superior and best because TSS increased from 5.5 to 9.5, the disease incidence decreased from 41 to 17 percent and per plant yield increased from 27 kg to 49 kg/ plant.

Problem definition: Low yield due to incidence of Marssonina blotch (*Marssonina coronaria*) in apple orchards

Technology assessed: Management of *Marssonina* blotch (*Marssonina coronaria*) in apple orchards.

A new problem of mid season defoliation in apple orchard appeared in epidemic proportion in many orchards in Uttarkashi district. KVK Uttarkashi conducted on farm trial on management of *Marssonina* blotch (*Marssonina coronaria*) at five locations in the district. Results of the trial revealed that foliar spray of Companion (mancozeb 63% + carbendazim 12% WP) was found more effective with decreased disease incidence to 22 percent and higher yield by about 40 percent compared to control. This treatment resulted in additional net return of ₹ 252400 as compared to the farmers' practice with highest BC ratio (5.14).

Problem definition: Incidence of collar rot in apple

Technology assessed: Verification of new molecules for the control of collar rot

It's been old age practice to irrigate the apple plant through flood irrigation which usually result in high incidence of collar rot in apple and emerged as a serious problem in the district. Keeping in view the importance of crop and damage caused by the disease, an

on farm trial was conducted by KVK Kinnar at farmer fields to keep the diseases under check. Drenching of ridomil MZ proved best control strategy against collar rot in apple as compared to the other treatments. Further maximum yield (28.32 q/ha) and BC ratio (2.23) was recorded following this treatment in comparison to farmer practice (12 q/ha) and assessed treatment (21.4 q/ha). It is therefore recommended that drenching of apple plant with ridomil MZ in the month of June - July kept the disease under control.

2.3.1.4 Weed Management

Problem definition: Low yield due to high incidence of weeds in wheat

Technology assessed: Assessment of performance of herbicides for weed management in wheat

Phalaris minor is a major threat to wheat productivity in north-western India, and as such needs to be addressed with integrated weed management approaches. So OFT was conducted by KVK Amritsar to help the farmers to choose the compatible herbicides in right dose for getting the best results. Three different treatments i.e. T1 (recommended): (clodinafop 400 g/ha), T2 (Intervention): (metribuzin 125 g + clodinafop 400 g /ha), T3 (farmer practice): (2 sprays of clodinafop at 35 and 55 DAS 400 g/ha) were assessed. It was observed that minimum weed population and highest grain yield (54.6 q/ha) was observed in T2 treatment (metribuzin 125 gm+ clodinafop 400 g/ha) which was followed by farmer practice (2 sprays of clodinafop at 35 and 55 DAS @ 400 g/ha) i.e. 53.7 q/ha and recommended practice (clodinafop 400 g/ha) i.e. 53.25 q/ha.

Problem definition: High infestation of weeds in black gram during *kharif* season

Technology assessed: Assessment of post emergence herbicide for weed management in black gram

Black gram (*Vigna mungo* L.) is one of the most preferred grain legumes, cultivated during summer as

well as *kharif* season. Infestation of weeds, especially during *kharif* season, poses a great threat to these crops mainly due to high rainfall and slow initial growth rate. Blackgram has poor smothering potential. Being a major pulse crop in district KVK Bilaspur conducted on farm trials during *kharif* 2018 on assessment of post emergence herbicide for weed management in black gram comprising three treatments viz. farmer practice (one hand weeding), recommended practice (pre emergence application of pendimethalin @ 1.5 kg a.i./ha) and assessed technology (post emergence application of quizolofop ethyl 5% EC @ 60g /ha). Results of the trial revealed that less number of weeds (88) was found in recommended practice i.e. pre emergence application of pendimethalin followed by 108 weeds in case of post-emergence application of quizolofop ethyl 5% EC @ 60 g/ha. Net Return (₹ 51249.75/ha) and BC ratio (2.52) was observed maximum in post emergence application of quizolofop ethyl followed by pre emergence application of pendimethalin and lowest being in farmers practice. In district Nawanshahar, results of on farm trial on weed management in black gram revealed that pre emergence application of pendimethalin @ 750 g a.i./ha followed by imazethapyr @ 62.5 g a.i./ha resulted in significant decrease in weed density, weed dry matter, highest WCE, weed control index, significantly higher number of pods/plant (29.18), seed yield (11.14 q/ha) and BC ratio (2.76) followed by hand weeding and pre emergence application of pendimethalin. Likewise in an OFT conducted by KVK Doda, imazethapyr @ 0.8 kg/ha (20-25 DAS) performed better in terms of weed management and yield than pre emergence application of pendimethalin @ 1 kg/ha and farmers practice of hand weeding.

Problem definition: Low yield due to weed infestation in rainy season okra

Technology assessed: Integrated management of weeds in rainy season okra

Okra is one of the major rainy season crops of Bilaspur district of Himachal Pradesh. But crop weed

competition was maximum during early stages of crop growth leading to decline in green pod yield. Keeping in view the above problem, an OFT with three treatments and it was found that recommended herbicide application i.e. spray of alachlor 1.5 kg a.i./ha within 48 hours after sowing followed by one hand weeding at 60 DAS is the best treatment with green pod yield and weed count of 165.8 q/ha and 174.5 number per m², respectively compared to farmer practice (142.0 q/ha and 1134 number per m²) and pre emergence application of alachlor (160.5 q/ha and 468.8 number per m²).

Problem definition: Prolific weed infestation due to frequent irrigation resulted in reduction of yield up to 40 – 70 % in onion.

Technology assessed: Integrated weed management in onion.

Onion is an important cash crop in many parts of Una district. Low productivity due to high weed infestation is a serious threat to realize the optimum returns and there is no recommendation of post emergence herbicide. KVK Una conducted On Farm Trial on integrated weed management in onion at two locations in the district. Results revealed that application of Oxyfluorfen (150 ml/ha) as post emergence herbicide + 1HW at 45 DAT effectively checked the weed problem resulting in highest yield (261 q/ha), with B:C ratio of 4.04. Farmers appreciated the effectiveness of Oxyfluorfen as post emergence herbicide for both nursery and field crop, as it controlled all grassy and broad leaved weeds not only on time but also reduce the cost of cultivation impose on drudgery.

2.3.1.5 Varietal Evaluation

Problem definition: Low yield potential of traditional basmati rice varieties

Technology assessed: Assessment of Pusa Basmati 1509 and Pant Basmati 1 rice cultivars under valley conditions of Dehradun



Dehradun is known for basmati rice but the area under this has been decreasing rapidly due to low productivity, lodging problem and high incidence of pests and diseases. In order to give alternate options to farmers, KVK Dehradun conducted OFTs to assess the performance of two promising basmati rice varieties viz. Pusa-1509 and Pant Basmati-1. A total of 10 demonstrations have been conducted in 10 ha area in different parts of Dehradun. Performance of these varieties has attracted the attention of farmers because of high productivity, dwarf nature, early maturity. Pusa-1509 and Pant Basmati-1 recorded high yield i.e. 42.6 and 42.2 q/ha, respectively which was about 17 per cent higher compared to traditional variety (Sharbati basmati) with 35.2 q/ha..

Problem definition: Low productivity of existing wheat varieties grown in hilly regions

Technology assessed: Assessment of new high yielding and disease resistant wheat varieties for higher productivity

Wheat is the most important cereal crop of *Rabi* season in north western plains and hills, but low productivity of existing wheat varieties is a matter of concern. In order to assess the performance of new high yielding and disease resistant wheat varieties, KVks Kathua and Sirmour conducted separate on farm trials in their districts. In district Kathua, HS-507 recorded highest yield (29.5 q/ha) followed by HS-490 (24.5 q/ha) with BC ratio of 3.0 and 2.6 respectively as compared to farmers practice HS-240. Likewise in district Sirmour DBW 88 and HPW 368 varieties have shown resistance to yellow rust and recorded yield of 37.5 q/ha (BC ratio 2.16) and 35.0 q/ha respectively compared to 33.75 q/ha in case of HD 2967.

Problem identification: Low yield of onion

Technology Assessed: Assessment of different onion varieties in *Rabi* season

Onion can be grown under wide range of climate conditions, but the best under mild climate without

extreme heat or cold or excessive rainfall as prevailing in district Barnala. An OFT was conducted by KVK, Barnala to assess the performance of three varieties of onion namely PRO-6, L-28 and Bhima Red at different locations. Average yield obtained during *Rabi* season onion from different varieties viz. PRO 6, L 28 and Bhima Red were 416.06 q/ha, 410.02q/ha and 434.54 q/ha respectively. In micro climatic condition of district Barnala, all the three varieties took 110-120 days to maturity. Owing to deep red bulb colour, PRO-6 was found more attractive with high market demand.

In district Faridkot, where it is an important cash crop of Kotkapura block and a source of livelihood of small and marginal farmers; the incidence of purple blotch is a serious bottleneck in expansion of area. Farmers are resorting to cultivation of NHRDF-Red (Line 28) and it has been under cultivation for past several years and is more prone to purple blotch, thereby, accounting for lower returns to the farmers. The assessment of three varieties viz. NHRDF-Red (Line 28), PRO 6 and local selection in OFT, revealed that PRO 6 recorded the highest yield (319.25 q/ha), BC ratio (2.63), followed by local selection which recorded yield of 304.50 q/ha with BC ratio of 2.48. The lowest yield of 275.00 q/ha was obtained in NHRDF-Red (Line 28), which is predominantly cultivated in district Faridkot. The highest incidence of purple blotch was observed in NHRDF-Red (Line 28) to the tune of 17.3 percent followed by local selection (14 %) and the lowest in PRO 6 (9.3 %).

Problem definition: Loose head formation in university recommended broccoli variety.

Technology assessed: Assessment of different varieties of broccoli in district.

Farmers cultivating broccoli are experiencing the problem of loose head formation deteriorating the quality of broccoli. KVK Fatehgarh Sahib hence assessed varieties of broccoli viz Palm Samridhi (university recommendation), Tahoe (new innovation), Fiesta (new innovation). Results showed that variety

Palam Samridhi though recorded good growth parameters but variety Fiesta exhibited superior harvest index values among all the varieties. Variety Tahoe had taken maximum days to 50 percent curd initiation and marketable maturity of curd whereas variety Fiesta had taken minimum days. In terms of head compactness, variety Fiesta showed compact head followed by Tahoe, whereas Palam Samridhi formed loose heads at an early stage. Overall, variety Fiesta out performed other varieties in terms of curd weight, compact head and curd initiation in minimum days.

Problem definition: Low income due to lack of alternate high value vegetable cash crop

Technology assessed: Assessment of exotic edible Snow pea for higher returns

Vegetables and fruits attain the prime position as cash crops and have played a pivotal role in the economy of Himachal Pradesh. The lucrative returns of few vegetable crops and apple cultivation in initial years have attracted majority of the farmers. However, the monoculture of these crops is resulting in diminishing production, productivity and returns as well. The problem is further aggravated due to related issues like nutritional imbalance in soil, replant problems and climate change. To combat these issues and to present alternate crops and cropping plan, KVK Shimla assessed the performance of high value exotic vegetable snow peas which is cultivated for its edible high value pods. The OFT was conducted at five locations comprising three treatment and one commercial check. The results of these trials revealed that pod yield was maximum (11.7 t/ha) in snow peas cv. *Mithi Phali* followed by commercial check (GS 10; 11.4 t/ha), Azad P-1 (10.9 t/ha) and Lincoln (10.3 t/ha). The snow pea fetches a price of ₹ 200-250 per kg in comparison to ₹ 70-80 per kg of garden pea during September-November enhancing returns by 1.93 to 2.21 times compared to commercial check can be achieved, if the production is synchronized with the best price window of the target market.



Problem definition: Low productivity & poor quality fruits due to lack of suitable parthenocarpic cucumber hybrids under protected condition

Technology assessed: Assessment of high yielding parthenocarpic cucumber hybrids under protected condition

Protected cultivation being the most efficient means to overcome climatic adversities, has the potential to fulfil the requirements of small and marginal farmers especially under hilly terrains to increase per unit returns. Cucumber is an important vegetable cash crop under protected conditions in district Mandi. Of late, protected cucumber growers have suffered a lot owing to non awareness and faulty selection of cucumber hybrids for protected cultivation resulting in low yields or crop failures. Thus, in order to assess the suitable hybrid under protected condition for summer cultivation (February to June), KVK Mandi conducted on farm trial to assess four high yielding parthenocarpic cucumber hybrids viz. Kian, Hilton, Kingstar and Multistar under protected condition at three locations in the district. Results of the trial revealed that Hilton recorded highest yield of 28.37 q/250 m² with BC ratio of 3.32, followed by Kian (farmers' practice) and Kingstar recording fruit yield of 22.83 and 17.89 q/250 m², respectively. Hybrid Hilton realized an additional yield of 5.54 q/250 m² which was 24.27 per cent higher than farmers practice with additional monetary benefits of about ₹ 13000 over



prevalent practice.

2.3.1.6 Integrated Crop Management

Problem definition: Yellowing of wheat at initial stage when sown in rice residue.

Technology assessed: Evaluation of time of urea application in happy seeder sown wheat

Paddy- wheat is the main cropping system of Punjab. Paddy residue is mainly retained in-situ as mulch and wheat is sown with PAU-Happy seeder. A heavy load of paddy residue remains on soil surface and it acts as dry mulch. In heavy clay loam soils, when wheat is sown in these conditions, incidence of yellowing of crop starts at initial stages due to lesser supply of nitrogen to crop plants due to immobilization of nitrogen. So to access the dose of nitrogen required at the time of sowing, on farm trials were conducted by KVK, Moga, Punjab. Three technologies for application of urea were accessed i.e. 110 kg urea per ha before cutter cum spreader at sowing (intervention), 110 kg urea per ha before first irrigation (recommended practice), 110 kg urea per ha after first irrigation (farmer practice). The results revealed that highest yield (58.13 q/ha) was recorded when 110 kg urea per ha before cutter cum spreader at sowing followed by 110 kg urea per ha before first irrigation (54.38 q/ha) and 110 kg urea per ha after first irrigation (52.50 q/ha). The highest BC ratio of 2.50 was obtained using 110 kg urea per ha before cutter cum spreader at sowing followed by 110 kg urea per ha before first irrigation (2.24) and 110 kg urea per ha after first irrigation (2.10).

Problem definition: Low farm income due to intercropping with cereals and pulses

Technology assessed: Evaluation of off-season vegetable as an intercrop

The farmers of the Kinnaur district have been intercropping barley and rajmash in apple orchard resulting in low returns due to high incidence of diseases. Pea (*Pisum sativum* L.) is one of the most remunerative off-season vegetable crops of the district and source of

livelihood for the small and marginal orchardists. Hence, KVK Kinnaur conducted on farm trial on evaluation of off-season vegetable as an intercrop in the farmers field at five location of the district to uplift the farm income. Results of the experiments revealed that intercropping of apple with off-season vegetable pea recorded highest yield of 22.45 t/ha and BC ratio of 4.03 as compared to other two treatments (apple + barley and apple + rajmash). Similarly, KVK Sangrur conducted OFTs on realizing higher profit through intercropping of cucumber with bitter gourd. It was observed that intercropping of cucumber with staking of bitter gourd gave 62.5 percent higher net profit with BC ratio of 3.6 followed by bitter gourd as a sole crop with BC ratio 2.5 and cucumber as sole crop with BC ratio of 2.20.

Problem definition: Sub-optimum production of A grade (>70g) and B grade (50- 70 g) fruits, causing marketing difficulty.

Technology assessed: Assessment of plant growth regulators and pinching on yield and quality of kiwi fruit

Kiwi fruit is gaining importance among the farmers of district Bageshwar due to its nutritive value, long shelf life and market value. The sale price of kiwifruit is predominantly determined by fruit size. But the orchardist of district Bageshwar could not achieve optimum production of A and B grade fruits even from properly managed plants which is causing marketing losses. Considering the problem, KVK, Bageshwar laid out an OFT at two locations of district Bageshwar in 2018-19. The results showed that pinching of 20 percent shoot growth at petal fall stage that continued till harvest at one month interval was found most appropriate. This practice gave 24 kg A grade fruits (>70 gm) per vine, 17 kg B grade fruits (50-70 gm) per vine and 7 kg C grade fruits (<50 gm) per vine, while the farmer's practice (no pinching) resulted in 6 kg A grade fruits (>70 gm) per vine, 13 kg B grade fruits (50-70 gm) per vine and 21 kg C grade fruits (<50 gm) per vine. The total soluble solid content (TSS[°]B) of fruits from pinching treatment was also higher (16.10 [°]B) than the fruits from no pinching vines (14.95 [°]B). Use of GA-3 (50 ppm) and 2-4-D (20

ppm) as fruit dip method at 20 days after full bloom (20 DAFB) could not further increase the grade A and B fruit yield significantly over pinching alone.

2.3.1.7 Crop Residue Management

Problem definition: Burning of paddy straw

Technology assessed: Evaluation of different methods of wheat sowing

Paddy-wheat is major cropping system of Punjab state and also in Ludhiana district. Farmers opt to burn paddy straw and it poses serious health issues to human, deleterious effects on animals, soil health and loss of nutrients. Wheat sowing with happy seeder (recommended technology) was compared to conventional method (farmers' practice) and roto-seeder (Intervention). Data of OFT revealed that there was lesser operational cost i.e. ₹ 1504/ acre in Happy Seeder wheat sowing as compared to ₹ 5970/- in conventional and ₹ 7000/- per ha in intervention method of wheat sowing. There were lesser weeds in happy seeder plot i.e. 21.6 weeds/m² as compared to 52.2 and 53.3 weeds/m² in conventional and intervention method of wheat sowing. Further, there was saving of one irrigation in happy seeder as compared to other two treatments, respectively. Yield in Happy Seeder sown plot (49.7 q/ha) was comparable (50.3 q/ha) with incorporation and higher than conventional method (48.3 q/ha) of sowing. Happy seeder technology was proved to be a better resource conservation technology for wheat sowing as this technology results in cost, time and labour saving and also decreased weeds flora as compared to other two treatments.

Likewise in district Gurdaspur also, the net returns and BC ratio was higher in treatments comprising straw management system + PAU Happy seeder (RP) and SMS + Rotavator (Innovation) than farmers practice of partial burning + conventional (disc harrow-2, cultivator-2, planking-2, sowing). The use of stubble shaver or cutter-cum spreader helped in easy operation of happy seeder as well as saved labour also. The area under happy seeder increased in the district. Management of straw

with this technique as well as the use of SMS (Straw Management System) technology in combination with Happy seeder, helped in increasing area under happy seeder to the tune of about 25000 acres in Gurdaspur district during 2018-19.

2.3.1.8 Mushroom Cultivation

Problem definition: Monoculture of apple and lack of diversification.

Technology assessed: Introduction of oyster (*dhingri*) mushroom in hilly regions of Shimla District.

Rohru tehsil in Shimla district of Himachal Pradesh is well known for the production of good quality apples. The temperate climate of the area with average temperature of 1 to 28°C which favours the possibility of round the year cultivation of different species of Oyster mushroom (*Pleurotus* spp) which is locally known as *dhingri*. With the aim of introducing Oyster mushroom for crop diversification, KVK Shimla conducted OFT on introduction of Oyster (*dhingri*) mushroom. The OFT was conducted at 15 locations with 49 number of beneficiaries during 2018-19. Five different types of substrates viz. wheat straw, paddy straw, bajra straw, soybean straw, sugarcane bagasse were used for Oyster cultivation. The results of these trials revealed that maximum yield (799 g/kg of dry substrate) was obtained with wheat straw followed by paddy straw (716 g/kg), soybean straw (560 g/kg), sugarcane bagasse (541 g/kg) and bajra straw (479 g/kg).

2.3.1.9 Drudgery Reduction

Problem definition: Back pain and fatigue while transplanting vegetable seedlings by routine method.

Technology assessed: Assessment of vegetable seedling transplanter.

The transplanting operation is one of the most labour intensive in vegetable production system largely done by farm women. Working in this posture can cause work related musculoskeletal disorders. The hand-



operated seedling transplanter is designed to do the transplanting of vegetables in standing posture. In order to increase efficiency, reduce low back and feet-toe pain, save time, labour and for increase output, KVK Barnala conducted on farm trial on assessment of vegetable seedling transplanter. Results of the trial revealed that the time spent in transplanting with the transplanter was less as compared to the traditional method. A total 2469 number of cauliflower seedlings were transplanted in 500m² area in 4.35 hours with traditional method, whereas with transplanter it was done in 2.05 hrs. Use of vegetable seedling transplanter not only saved time, but also reduced pain in lower back feet, ankles and the plants were healthy and vigorous.

Problem definition: Frequent wear & tear in traditional wooden plough used by farmers

Technology assessed: Evaluation of animal drawn light weight iron plough for tillage

Farmers of the Uttarakhand hills were commonly using traditional wooden plough for tillage of their soil before sowing of crops. The heavy weight of the wooden plough decreased the efficiency of bullocks used for tilling the land. Keeping all this in mind, KVK Rudraprayag conducted on farm trial on evaluation of animal drawn light weight iron plough for tillage in district Rudraprayag at five locations. Results of the trials revealed that use of animal drawn light weight iron plough for tillage resulted in time saving of 7 hrs/ha as the ploughing time decreased from 48 hrs/ha to 41 hrs/ha. Soil pulverization was better as compared to wooden plough and as a result of that the wheat yield increased from 16.94 to 22.06 q/ha by replacement of the traditional plough alone.

2.3.1.10 Livestock Management and Fishery

Problem definition: Low milk yield due to mastitis in cross bred animals

Technology assessed: Assessment of different methods for the prevention of mastitis in dairy animals.

In OFT conducted by KVK Bageshwar, the effect of non- clinical treatments was assessed in prevention of mastitis in cows. The results revealed that use of 0.001 percent KMnO₄ as teat dip solution can reduce incidence of mastitis in cow by 50 percent while topical application of Mastilep ointment after use of KMnO₄ as teat dip solution can reduce upto 80 percent incidence of mastitis in cow. Likewise at KVK Patiala,teat dipping with glycerine & iodine solution and keep the animals standing for half an hour after milking. Teat dipping method / keep animal stand for half an hours after milking were equally effective in the prevention of mastitis in dairy animals. Higher milk yield per lactation per animal by 5-7 percent (150-190 liter milk) was obtained in treated animals. BC ratio was also highest (3.12) in this treatment, followed by teat dipping with glycerine & iodine solution (2.1) and herbal teat dipping (1.97), respectively.

Problem definition: Low milk production and repeat breeding

Technology assessed: Use of mineral bricks and micro minerals mixture to increase the milk yield and reproductive efficiency in dairy animals

On farm trials were conducted by KVK Dehradun on 30 cross bred dairy animals to increase the milk yield and reproduction performance by supplementing mineral bricks and micro nutrients rich in Selenium and Vitamin E rich micro nutrient along with dewormer. Recently calved (20 days of time) HF cross breed dairy animals was selected for experiment. The T1 group of animal (control) were fed with local concentrate, T2 group of animals supplemented with 30 gm micronutrients and T3 group of animals supplemented with mineral bricks for licking 10-15 minutes regularly for a period of 60 days continuously. The results revealed that milk yield was increased 9.27 per cent of T3 group, followed by 7.1 per cent in T2 group respectively. The reproduction performance was also indicated that T3 group of animals have positive sign of estrus as compared to T2 and T1 respectively. The additional cost of production were recorded ₹ 5.42 per

animal/day during study period of time which gain ₹ 12.87 per day per animal (T3) followed by ₹ 9.61 per day per animal (T2) net profit/ animal respectively.

Problem definition: Postpartum anoestrus in buffaloes due to poor nutrition management

Technology assessed: Effect of mineral supplementation along with endo-parasitic control on postpartum breeding interval in buffaloes

Dairy farming is the primary subsidiary occupation in Ferozepur district. Mineral deficiencies and worm infestation both lead to reproductive inefficiency in buffaloes due to prolonged postpartum breeding interval. Therefore, KVK Ferozepur conducted an OFT to assess the effect of mineral supplementation along with endo-parasitic control on postpartum breeding interval in buffaloes. The results revealed that supplementation of mineral mixture feeding @ 60 g/animal/day along with control of endoparasites through deworming yielded best results in terms of postpartum breeding interval of only 98 days thereby reducing problem of anoestrus. Longest postpartum breeding interval of 176 days was observed in the group where no supplementation was done. However this period was lesser (123 days) in group where only minerals were provided and no deworming was done. Hence, Deworming along with supplementation of mineral mixture resulted in shortest postpartum breeding interval due to early return to oestrus after calving thereby reducing calving interval in buffaloes.

Problem definition: Delayed puberty and poor conception rate

Technology assessed: Improvement of fertility nutrition and health management

The nutritional and health management of the animals of district Pithoragarh is very poor. They do not give mineral mixture/ vitamins, probiotic and dewormer to their cattle at right time resulting in delayed puberty and poor conception rate of the animal. To overcome this problem, KVK, Pithoragarh conducted an OFT on

improvement of fertility nutrition and health management of cattle. The treatment comprising dewormer + mineral mixture/vitamins+ probiotic not only increased the milk production per unit (from 5.2 L in control to 6.1 L per day), but also increased the conception rate by 60 per cent.

Problem Definition: To address the problem of low survival and less production of carp culture, stocking with only one or two species of Indian major carp fishes in Tarn Taran district.

Technology Assessed: Assessment of Composite carp culture - Introduction of Indian Major Carps [IMC] and exotic carps in earthen ponds.

Fisheries sector has been recognized as a powerful income and employment generator besides providing nutritional security to the growing population. A new technology introduced for proper utilization of total fish pond like surface, column and bottom layers of the pond can be utilized properly by stocking three different species of Indian Major Carps and exotic carps, composite carp culture developed by ICAR-CIFA, Bhubaneswar was assessed in 2 locations for consecutive 2 years during 2017-18 and 2018-19 by KVK Taran Taran. The results revealed that composite carp culture gave the highest average production(1350 kg/acre) and survival which was significantly superior over farmers practice (800 kg/acre). There is a plenty of scope for expansion and further intensification of composite carp culture in farmers' ponds in the district.

Problem definition: Suitability of breeds for backyard poultry farming

Technology assessed: Assessment of poultry breeds for backyard poultry

Backyard poultry, which is an age-old practice, can turn into a lucrative profession for rural population which is predominantly occupied by poor, marginal farmers and landless labourers. As it is the best alternative for small farmers to subsidize the income with negligible input. Therefore, KVK, Sangrur



conducted OFTs to evaluate different breeds of poultry viz., IBL 80 (meat purpose), RIR (dual purpose) and Kadaknath (dual purpose) on parameters like weight gain (kg) and egg laying (no.). The investigation revealed that the maximum egg laying and gain in body weight was observed in RIR breed (1.7 kg and 242 eggs) with the highest BC ratio of 5.69 followed by Kadakanth (1.6 kg and 105 eggs) with the BC ratio of 4.16 and IBL 80 (2.6 kg and no egg laying) with BC ratio of 1.30.

2.3.1.11 Value Addition

Problem definition: Low shelf life of Hill lemon

Technology assessed: Evaluation of various treatments on shelf life of Hill lemon

Hill lemon (*Citrus pseudolemon*) locally known *Galgalis* by default organically grown citrus fruit in low and mid hills of Himachal Pradesh. It is very good source of vitamin C, mineral and salts. It is found in abundance in some parts of Mandi district and used for making pickles and squashes. Its juice is preserved and being used as souring agent in many food preparations, pickles and chutneys. Farm women of district Mandi used to preserve its juice by simple method of extraction and filling in bottles resulting in low shelf life of about three months. In order to assess the shelf life of hill lemon juice, on farm trial (OFTs) were conducted by KVK, Mandi consecutively for three years. In these OFTs effect of various treatments on shelf life was evaluated. The study revealed that boiling of juice till the end of formation of foam/leather and adding (Salt @ 20gm/L of juice + top dressing of mustard oil @ 20ml/L of juice) was found best that not only enhanced the shelf life of the juice up to 10 months but retained its original flavour and colour. Under chemical preservatives, Potassium meta bisulphite @0.7 gm/L of juice and Sodium benzoate @ 0.5gm/L of juice, six and five months shelf life was observed respectively. Hence, it is suggested to use salt and mustard oil as the organic method for preserving the juice of this abundantly found citrus fruit which can be a better substitute of chemical preservatives in many food processing industries.

Problem definition: Nutrient deficiency especially vitamins and minerals among local people of Changthang region

Technology assessed: Value addition of dried cheese

Dried cheese is one of the important dairy products of Changthang region used in many local delicacies or eaten as such. The value added dried cheese products is rich in nutrients (vitamins and minerals) and antioxidants which will overcome the nutrient deficiency among the local populace. With the objective of improving functional properties of dried cheese, KVK Nyoma (Leh-II) initiated OFTs on value addition of cheese with spinach (5%) and apricot (5%). Results showed that the value added dried cheese products are nutritionally as well as economically beneficial and having maximum shelf life. Least microbial load of 4.1×10^3 cfu/g was recorded in dried cheese added with apricot powder and highest ascorbic acid of 19.73 percent was recorded in dried cheese added with spinach powder. Overall acceptability score of 7 of the product added with spinach powder was highest among the other treatments. Value addition of dried cheese is found to be beneficial in terms of nutritional stability as compared to the traditional dairy product.

Problem definition: Lack of knowledge in preservation of garlic pickle

Technology assessed: Evaluation of methods of preparation of Garlic Pickle

Spoilage of garlic pickle due to existing technique was problem being encountered at the household level by the farm women. KVK Fatehgarh Sahib assessed different methods of preparing garlic pickle. The recipe of garlic pickle prepared using Synthetic vinegar (PAU technology), garlic pickle prepared using sugarcane vinegar (technology under assessment) and garlic pickle prepared using *Galgal* juice (farm women practice) was assessed. Sample of the recipes were given to 20 farm women. Data on shelf life,

colour, taste, odor and overall acceptability was collected. The results indicated that the total average score of recipe prepared by using galgal juice was higher and found acceptable with total average score of 8.65 as compared to the other recipes. The scores were particularly higher in terms of taste and odour with net returns of ₹ 85 per kg and BC ratio of 1.87 closely followed by recipe using synthetic vinegar.

KVK Sangrur also conducted similar assessments on garlic pickle preparation and observed that the pickle prepared by using fruit vinegar and *galgal* juice were found highly acceptable on the basis of hedonic scale. Fruit vinegar and *galgal* juice treatments were found at par in terms of organoleptic properties based on total marks scored under 7 point hedonic scale for overall acceptability i.e. 26.0 whereas cost effectiveness made *galgal* juice stand out as compared to fruit vinegar.

2.3.1.12 Agro Forestry and Fodder Production

Problem definition: Low fodder yield of existing fodder varieties

Technology refined: Assessment of oats varieties to combat fodder scarcity

Fodder demand is very high in Changthang region due to high livestock population. Oat is widely cultivated for fodder purpose under irrigated conditions, however farmers have been using seed rate 3-4 times higher than normal seed rate. KVK Nyoma hence conducted OFTs to assess oats varieties using mechanized sowing (tractor/ power tiller operated seed drill). Shalimar oat-1 produced highest fresh straw yield as well as dry straw yield followed by SKO-96. Both the varieties were found superior to the farmer's practice (Kent). Shalimar oat-1 recorded straw yield and BC ratio to the tune of 146.33 q/ha and 2.29 followed by 127.97 q/ha and 2.01 in SKO-96 and 124-12 q/ha and 1.95 in farmers' practice, respectively.





Chapter - 3

FRONTLINE DEMONSTRATIONS

The demonstrations are the practical tools for the dissemination of the farm technologies and are based on the principles of “Seeing is believing and learning by doing”. These demonstrations play significant role in improving the skill of rural people to perform an activity by their involvement. Under this programme, the demonstrations are conducted under the close supervision of scientists/extension worker to demonstrate the worth of a technology at the farmer's situations to generate the production data and feedback information. The main purpose of conducting demonstration is to convince the farmers as well as extension personnel about the potentialities of the technologies for further adoption and diffusion on large scale for the benefit of farming community. The KVKs

are playing an important role and involved in conducting demonstrations on new technologies to enhance the skill of the farmers. FLD is systematic creation of local proof of both the applicability and profitability of the recommended technology with the cooperation and participation of the farmers and under the personal guidance of the scientists and/or extension personnel. Frontline demonstrations (FLDs) is one of the mandated activity of KVKs to demonstrate the production potential of newly released crop varieties and production technologies in crops, livestock and fisheries not only to showcase their worth but also 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

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

Crops category	No.	Area (ha)	Units
Cereals & millets	6051	1866.46	-
Oilseeds	1762	314.99	-
Pulses	1152	217.73	-
Vegetable & spices	3248	159.06	-
Fruit crop	608	32.72	-
Flowers	45	4.00	-
Fodder crops	1369	210.54	-
Commercial crops	10	4.00	-
Total	14245	2809.50	-
Livestock & fisheries			
Dairy	559	-	866
Sheep & Goat	19	-	471
Poultry	95	-	86
Fisheries	22	-	13600
Pig	-	-	-
Total	695	-	15023
Others			
Mushroom production	114	-	685
Vermicompost	10	-	10
Farm implements	-	-	-
Home science	-	-	-
Total	124	-	695
Grand total	15064	2809.50	15718

report, a total of 15064 demonstrations were conducted covering an area of 2809.50 ha and 15023 units. Under crops, 14245 FLDs were conducted by the KVks of Zone-I. Maximum demonstrations were conducted in cereal & millets (6051) followed by vegetables & spices (3248), oilseeds (1762), fodder crops (1369), pulse crops (1570), fruits (608), flowers (45) and Commercial crops (10) in an area of 2809.50 ha. Further, the KVks also conducted 695 FLDs related to livestock & fisheries and 124 other demonstrations (Table 3.1).

3.1 Cereals & Millets

During 2018-19, KVks of Zone-I conducted a total of 6051 demonstrations on various cereal and millet crops covering an area of 1866.46 ha. The state wise break up of FLDs on cereal & millet crops includes 2149 demonstrations in Punjab, 571 in Himachal Pradesh, 1784 in Jammu & Kashmir and 1621 in Uttarakhand. The state-wise details of results of FLDs is as under:

3.1.1. Punjab

During the year 2018-19 a total of 2149 demonstrations on cereal crops, covering an area of 1242.40 ha, were conducted by KVks of Punjab at farmers' (Table 3.2). During *Kharif* season, 1019 demonstrations of paddy, 67 of basmati paddy, 356 of maize, while in *Rabi* season, 707 demonstrations of wheat was conducted. The average yield of demonstrations on paddy and basmati was found to be 65.09 and 46.92 q/ha as compared to local check yield of 61.96 and 44.78 q/ha, depicting an increase of 5.04 and

4.78 per cent, respectively. The BC ratio of demonstration on paddy and basmati was also found to be higher (3.49 & 4.10) in comparison to local check (3.05 & 3.79) respectively. The average yield of demonstrations on maize was found to be 47.49 q/ha as compared to 40.74 q/ha of local check, which is 16.56 per cent higher. In case of wheat, the average yield of demonstrations was observed to be 50 q/ha as compared to 48.18 q/ha of local check, which is 3.77 per cent higher. The BC ratio of demonstration on maize was 1.63 compared to 1.45 in local check. Similarly, BC ratio of demonstration on wheat was also found higher as compared to local check. Technologies such as water management, Integrated Disease Management, Integrated Pest Management, Integrated Weed Management, Integrated Nutrient Management, Resource Conservation Technologies and improved varieties of paddy, basmati, maize and wheat have led to gain in yield as compared to farmers' practices.



Table 3.2: Frontline demonstrations on cereals conducted in Punjab

Crop	KVks (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Paddy	8	1019	494.40	65.09	61.96	5.04	91159	3.49	80579	3.05
Basmati	4	67	31.40	46.92	44.78	4.78	106949	4.10	99677	3.79
Maize	3	356	137.20	47.49	40.74	16.56	23083	1.63	15739	1.45
Wheat	10	707	579.40	50.00	48.18	3.77	62928	3.42	59978	3.28
Total	25	2149	1242.40							



3.1.2 Himachal Pradesh

In Himachal Pradesh a total of 571 demonstrations on cereal crops were conducted by the KVKS covering an area of 76.37 ha during the year under report including 100 demonstrations of paddy, 49 of maize and 322 of wheat (Table 3.3). The average yield of demonstrations on paddy was recorded 33.44 q/ha as compared to local check yield of 29.92 q/ha, recording an increase of 11.77 per cent yield over local check. The BC ratio of demonstration was higher (1.71) than the local check (1.64). The average yield of demonstrations on maize was found to be 34.85 q/ha as compared to 31.32

q/ha of local check, with an increase of 11.27 per cent yield over local check. The BC ratio of maize demonstrations was found to be higher (3.50) than the local check (2.87). In case of wheat, the demonstration yield was observed to be 31.88 q/ha as compared to 26.00 q/ha of local check, recording an increase of 22.62 per cent over local check. The BC ratio of wheat demonstration (1.91) was found higher than the local check (1.77). Technologies such as Integrated Disease Management, Integrated Pest Management, Integrated Weed Management, Integrated Nutrient Management and improved varieties of paddy, maize and wheat have led to gain in yield as compared to farmers' practices.

Table 3.3: Frontline demonstrations on cereals conducted in Himachal Pradesh

Crop	KVKS (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Paddy	11	624	178.27	58.65	46.58	25.92	91218	2.64	46601	1.72
Maize	14	736	165.91	44.81	32.27	38.88	47817	2.65	27851	1.93
Wheat	9	424	88.65	34.67	26.66	30.06	41655	2.77	28665	2.31
Total	34	1784	432.83							

3.1.3 Jammu & Kashmir

KVKS of Jammu & Kashmir conducted a total of 1784 demonstrations on cereal crops covering an area of 432.83 ha during the year under report including 624, 736, and 424 demonstrations of paddy, maize and wheat, respectively (Table 3.4). The average yield of demonstrations on paddy, maize and wheat crop was 58.65, 44.81 and 34.67 q/ha, which was 25.92, 38.88 and 38.94 per cent higher than the local check, respectively.

The BC ratio of the demonstrations in case of paddy, maize and wheat was also found to be higher (2.64, 2.65 and 2.95) than the local check (1.72, 1.93 and 2.29), respectively. Technologies such as Integrated Disease Management, Integrated Pest Management, Integrated Weed Management, Integrated Nutrient Management and improved varieties of paddy, maize, wheat and barley also led to gain in yield as compared to farmers' practices.

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

Crop	KVKS (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Paddy	3	100	18.00	33.44	29.92	11.77	20652	1.71	17172	1.64
Maize	2	49	6.09	34.85	31.32	11.27	56947	3.50	40910	2.87
Wheat	8	322	52.28	31.88	26.00	22.62	28054	1.91	21157	1.77
Total	13	571	76.37							



3.1.4 Uttarakhand

KVKs of Uttarakhand conducted a total of 1621 demonstrations on cereal crops covering an area of 113.86 ha during the year under report including 465, 31, 126, 814, 50 and 135 demonstrations of paddy, basmati paddy, maize, wheat, barley and finger millets respectively (Table 3.5). The average yield of demonstrations on paddy and basmati was 39.36 and 35.00 q/ha, which was 23.94 and 47.06 per cent higher than the farmers' practice, respectively. The BC ratio of paddy and basmati was also found to be higher in case of demonstration (2.28 & 2.19) in comparison to local check (1.85 & 2.07), respectively. The average yield of demonstrations of maize was recorded 33.47 q/ha, which was 17.22 per cent higher than the local check. The BC ratio of maize demonstrators was also found to be higher (3.09) in comparison to local check (1.82). In case of

wheat and barley, the average yield of demonstrations was observed to be 29.95 and 19.50 q/ha, which was 25.27 and 20.00 per cent higher than the check, respectively. The BC ratio of wheat and barley was found 2.17 and 1.15 which was higher than the local check (1.94 and 1.09), respectively. The average yield of finger millet and amaranths was observed to 14.57 and 14.10 q/ha, respectively; recording an increase of 34.46 and 39.60 per cent, respectively over local check. The BC ratio was also higher in case of demonstrations of finger millet and amaranths as compared to local check. Other technologies such as water management, Integrated Disease Management, Integrated Pest Management, Integrated Weed Management, Integrated Nutrient Management, Resource Conservation Technologies and improved varieties of paddy, basmati, wheat, barley and pearl millet have led to gain in yield as compared to farmers' practices.



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

Crop	KVKs (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Paddy	8	465	42.29	39.36	31.75	23.94	39877	2.28	25270	1.85
Basmati	2	31	3.30	35.00	23.80	47.06	37600	2.19	26650	2.07
Maize	3	126	7.00	33.47	28.55	17.22	50812	3.09	24623	1.82
Wheat	8	814	53.77	29.95	23.91	25.27	33094	2.17	23809	1.94
Barley	1	50	0.50	19.50	16.25	20.00	3755	1.15	1875	1.09
Finger millet	2	135	7.00	14.57	10.83	34.46	13390	2.15	6508	1.61
Amaranths	1	27	1.00	14.10	10.10	39.60	41950	3.90	29000	3.10
Total	25	1621	113.86							



3.2 Oilseeds

KVKs of Uttarakhand conducted a total of 1762 demonstrations were conducted in various oilseeds crops covering an area of 314.99 ha during the year by the KVKs of Zone-I. The state wise break up of FLDs conducted on oilseed crops includes 484 in Punjab, 218 in Himachal Pradesh, 305 in Jammu & Kashmir and 761 in Uttarakhand. The state wise details are as under:

3.2.1. Punjab

KVKs of Punjab conducted a total of 484 demonstrations on oilseed crops covering an area of 174.00 ha during the year under report including 338, 50, 90 and 6 demonstrations of mustard, sesame, ground nut and soybean, respectively (Table 3.6). Technology demonstrated on various crops under oilseeds performed better than the local check. The increase in demonstration yield over local check varied from 9.82 to 80.00 percent. The BC ratio of all the demonstrated technologies was also observed higher than the local check. Other technologies such as Integrated Crop Management, Integrated Nutrient Management, Integrated Disease Management, Integrated Pest Management, and

improved varieties of various oilseed crops have also led to gain in yield as compared to farmers' practices.

3.2.2 Himachal Pradesh

KVKs of Himachal Pradesh conducted a total of 218 demonstrations on oilseed crops covering an area of 27.60 ha during the year under report including 97, 40 and 81 demonstrations of rapeseed & mustard, sesame and soybean, respectively (Table 3.7). The technologies demonstrated on various crops under oilseeds performed better than the local check in terms of yield and other attributes. The increase in demonstration yield over local check varied from 6.78 to 33.96 percent. The BC ratio of all the demonstrated technologies was also observed higher than the local check.



Table 3.6: Frontline demonstrations on oilseeds conducted in Punjab

Crop	KVKs (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Rapeseed Mustard	7	338	130.60	18.56	16.68	11.28	40892	2.49	37298	2.58
Sesame	1	50	20.00	4.50	2.50	80.00	42814	2.71	13535	1.54
Groundnut	1	90	21.00	13.35	10.65	25.35	7105	1.14	3670	1.08
Soybean	1	6	2.40	12.30	11.20	9.82	4787	1.14	1759	1.06
Total	10	484	174.00							

Table 3.7: Frontline demonstrations on oilseeds conducted in Himachal Pradesh

Crop	KVKs (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Rapeseed & Mustard	2	97	15.00	9.60	7.95	20.75	10575	1.48	6745	1.34
Sesame	1	40	10.00	6.30	5.90	6.78	11950	1.49	4450	1.21
Soybean	2	81	2.60	9.59	7.16	33.96	13377	1.65	6989	1.38
Total	5	218	27.60							

3.2.3 Jammu & Kashmir

During 2018-19 a total of 305 demonstrations on oilseed crops were conducted by KVks of Jammu & Kashmir covering an area of 81.75 ha including 295 of rapeseed & mustard and 10 of sesame (Table 3.8).

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

Crop	KVks (No.)	FLDs (No.)	Area (ha)	Yield (q/ ha)		% increase	Economics of FLD (₹/ ha)		Economics of Check (₹/ ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Rapeseed & Mustard	10	295	79.75	11.98	8.46	41.67	30421	2.22	18089	1.86
Sesame	1	10	2.00	2.60	2.36	10.17	11800	2.31	7000	1.78
Total	11	305	81.75							

3.2.4 Uttarakhand

KVks of Uttarakhand conducted a total of 761 demonstrations on oilseed crops covering an area of 34.04 ha including 181 and 580 demonstrations on mustard and soybean, respectively (Table 3.9). Technologies demonstrated on various crops under oilseeds performed better in terms of yield and

Technology demonstrated on various crops under oilseeds performed better over local check in terms of yield and economics. The increase in demonstration yield over local check varied from 10.17 to 41.67 per cent.

economics over local check. The increase in demonstration yield over local check varied from 23.74 to 30.90 per cent. Other technologies demonstrated in oilseed crops such as Integrated Crop Management, Integrated Nutrient Management, Integrated Disease Management, Integrated Pest Management etc. also led to gain in yield as compared to farmers' practices.

Table 3.9: Frontline demonstrations on oilseeds conducted in Uttarakhand

Crop	KVks (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Rapeseed/ Mustard	5	181	13.66	10.48	8.47	23.74	21780	2.25	11696	1.54
Soybean	5	580	20.38	16.94	12.94	30.90	33923	2.21	22524	1.96
Total	10	761	34.04							

3.3 Pulses

Pulses productions being national a total of 1152 demonstrations were conducted on various pulse crops covering an area of 217.73 ha during 2018-19 by the KVks of Zone-I. The state wise break up of FLDs conducted on pulse crops included 346 in Punjab, 171 in Himachal Pradesh, 211 in Jammu & Kashmir and 388 in Uttarakhand. The state wise detail of results of FLDs on pulse crops is as under:

3.3.1 Punjab

KVks of Punjab conducted a total of 346 demonstrations on pulse crops covering an area of 136.00 ha during the year under report including 190, 56 and 100 demonstrations of moong, lentil and chickpea, respectively (Table 3.10). The technologies demonstrated on various crops under pulses performed better over local check in terms of

yield and other attributes. The increase in demonstration yield over local check varied from

16.13 to 26.62 per cent across the state.

Table 3.10: Frontline demonstrations on pulses conducted in Punjab

Crop	KVKs (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Summer moong	3	190	76.00	10.01	8.33	20.18	23325	2.21	16327	1.88
Lentil	1	56	20.0	9.00	7.75	16.13	17425	1.94	11875	1.62
Chickpea	2	100	40.0	16.97	13.40	26.62	47143	3.53	32158	2.62
Total	6	346	136.0							

3.3.2 Himachal Pradesh

To augment pulses production in the state a total of 171 demonstrations on pulse crops were conducted by KVKs of Himachal Pradesh covering an area of 12.69 ha during 2018-19 including 18, 113 and 40 demonstrations of black gram, rajmash and chickpea, respectively (Table 3.11). Technologies demonstrated on various pulse crops performed better over local check in terms of yield and economics. The increase in demonstration yield over local check varied from 18.33 to 29.0 per cent.



Table 3.11: Frontline demonstrations on pulses conducted in Himachal Pradesh

Crop	KVKs (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Black Gram	1	18	2.00	12.00	9.30	29.03	51100	3.44	38300	3.19
Rajmash	2	113	6.39	16.68	13.00	28.35	25462	1.34	15045	1.22
Pea	2	40	4.30	97.08	82.04	18.33	298733	3.60	217667	2.82
Total	5	171	12.69							

3.3.3 Jammu & Kashmir

A total of 211 demonstrations on pulse crops conducted by KVKs of J & K covering an area of 40.88 ha included 153 and 58 demonstrations of rajmash and

moong, respectively (Table 3.12). Various technologies demonstrated on these crops performed better over local check in terms of yield and economics. The increase in demonstration yield over local check varied from 29.82 to 31.97 per cent. The BC ratio of all the demonstrated

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

Crop	KVKs (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Rajmash	4	153	29.78	7.66	5.90	29.82	57010	2.30	36060	1.87
Moong	2	58	11.10	8.05	6.10	31.97	87900	3.75	57450	2.82
Total	6	211	40.88							

3.3.4 Uttarakhand

For augmenting supply of pulses a total of 388 demonstrations on pulse crops were conducted by KVKs of Uttarakhand covering an area 24.76 ha including 21, 114, 62 and 191 demonstrations of pigeon pea, horse

gram, black gram and lentil, respectively (Table 3.13). Technologies demonstrated on various pulses including improved varieties, INM, IDM, IPM IWM etc. performed better in terms of yield and economics over local check. The increase in demonstration yield over local check varied from 22.46 to 37.04 per cent.

Table 3.13: Frontline demonstrations on pulses conducted in Uttarakhand

Crop	KVKs (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Pigeon Pea	1	21	2.00	11.3	8.50	32.94	48907	4.83	35002	4.03
Horse gram	5	114	12.30	9.69	7.21	34.32	46893	3.32	34477	2.84
Blackgram	1	62	2.00	7.40	5.40	37.04	26492	3.35	17052	2.67
Lentil	2	191	8.46	8.13	6.64	22.46	23580	2.21	18420	2.06
Total	9	388	24.76							

3.4 Vegetables & Spice crops

To promote diversification and to increase farmers' income a total of 3248 demonstrations were conducted in various vegetable & spice crops covering an area of 159.06 ha during 2018-19 by the KVKs of Zone-I. The state wise breakup of FLDs on vegetable and spice crops included 243 demonstrations in Punjab, 689 in Himachal Pradesh, 846 in Jammu & Kashmir and 1445 in Uttarakhand. The state wise detail of results of FLDs on vegetable & spice crops is as under:

3.4.1 Punjab

KVKs of Punjab conducted a total of 243 demonstrations on vegetable & spice crops covering an area of 36.37 ha during the year under report including 10

demonstrations each of bitter Gourd & brinjal, 30 of carrot, 128 of celery, 8 of okra, 5 of onion, 1 of pea, 15 each of radish & summer squash, 5 of tomato and 15 of turnip (Table 3.14). Technologies demonstrated on various crops including improved varieties, INM, IDM, IPM IWM etc. under vegetables performed better over local check in terms of yield and economics. The



Table 3.14: Frontline demonstrations on vegetable crops conducted in Punjab

Crop	KVks (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Bitter Gourd	1	10	0.50	119.00	112.00	6.25	61600	2.35	55300	2.22
Brinjal	1	10	0.80	231.00	170.00	35.88	261500	4.08	170000	3.00
Carrot	1	30	0.80	182.50	152.50	19.67	122500	3.04	92500	2.54
Celery	1	128	30.0	8.75	6.88	27.18	28450	1.77	14525	1.39
Okra	1	8	0.40	133.00	113.00	17.70	93250	2.30	95000	2.19
Onion	1	5	0.40	135.00	100.00	35.00	142500	3.38	90000	2.50
Pea	1	1	2.40	125.00	117.50	6.38	119275	3.14	117955	3.53
Radish	1	15	.40	205.00	170.00	20.59	88500	2.61	64000	2.16
Summer squash	1	16	0.20	203.90	150.00	35.93	158980	2.86	67000	2.26
Tomato	1	5	0.40	185.00	150.00	23.33	207500	3.96	155000	3.21
Turnip	1	15	0.40	82.50	65.00	26.92	21250	2.06	12500	1.63
Total	11	243	36.7							

increase in demonstration yield over local check varied from 6.25 - 35.93 per cent.

3.4.2 Himachal Pradesh

In Himachal Pradesh, a total of 689 demonstrations on vegetable & spice crops were conducted by KVks covering an area of 44.67 ha during the year under report including 10, 79, 130, 14, 3, 30, 10, 67, 64, 34, 31, 175, 37, 3, 2 demonstrations of bitter gourd, tomato, bottle gourd, brinjal, capsicum, cauliflower, chilli, cucumber, french bean, okra, onion, pea, potato, turmeric and sponge gourd, respectively (Table 3.15). Technologies demonstrated on various crops including improved varieties, INM, IDM, IPM IWM etc. under vegetables performed better over local check in terms of yield and economics. The increase



in demonstration yield over local check varied from 15.71 to 86.67 per cent.

Table 3.15: Frontline demonstrations on vegetables conducted in Himachal Pradesh

Crop	KVks (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Bitter gourd	1	10	1.00	135.00	100.00	35.00	299500	5.61	208000	4.35
Bottle gourd	2	130	5.00	178.75	133.75	33.64	318000	6.09	194750	4.36
Brinjal	2	14	1.20	204.75	156.00	31.25	246055	5.13	183846	4.58
Capsicum	1	3	0.05	675.00	520.00	29.81	4800000	9.00	2720000	7.80
Cauliflower	2	30	1.20	278.35	212.35	31.08	312375	3.43	230370	2.88
Chilli	1	10	1.00	50.00	40.00	25.00	245000	5.45	190000	4.80
Cucumber	4	67	10.30	372.45	299.33	24.43	28626	6.14	477725	4.68
French bean	2	64	1.50	178.57	149.68	19.30	83000	2.15	67326	1.99
Okra	2	34	0.98	136.01	96.82	40.48	95605	2.92	58736	2.29
Onion	3	31	1.32	184.55	137.31	34.41	168107	5.77	103263	4.16
Pea	3	175	9.50	118.14	95.58	23.60	219627	4.32	15102	1.07
Potato	2	37	4.04	269.85	226.90	18.93	212139	2.43	157393	2.12
Tomato	5	79	7.00	362.28	302.57	19.74	287654	3.76	215623	3.13
Turmeric	1	3	0.50	246.00	227.00	8.37	145500	3.84	130300	3.54
Sponge Gourd	1	2	0.08	170.00	145.00	17.24	120000	3.40	95000	2.90
Total	32	689	44.67							

3.4.3 Jammu & Kashmir

KVks of Jammu & Kashmir conducted 846 demonstrations on vegetable & spice crops covering an area of 31.44 ha including 18, 122, 10, 28, 110, 24, 14, 20, 5, 71, 19, 14, 30, 162, 20, 41, 12, 117 and 9 demonstrations of bhindi, brinjal, broccoli, cabbage, chilli, coriander, cucumber, french bean, garlic, knoll khol, methi, okra onion, pea, potato, saag kale, swiss chard, tomato and turnip, respectively (Table 3.16). Technologies demonstrated on various crops including improved varieties, INM, IDM, IPM IWM etc. under vegetables performed better over local check in terms of yield and economics. The increase in demonstration yield over local check varied from 2.90 to 251.43 per cent.

3.4.4 Uttarakhand

A total of 1445 demonstrations on vegetable & spice crops were conducted by KVks of Uttarakhand covering an area of 45.25 ha during the year under report including 135 demonstrations of cabbage, 216 of capsicum, 10 of cauliflower, 25 of chilli, 60 of french bean, 20 of ginger, 87 of okra, 214 of onion, 386 of pea, 25 of potato, 70 of radish and 197 of tomato (Table 3.17). Technologies demonstrated on various crops including improved varieties, INM, IDM, IPM IWM etc. under vegetables performed better over local check in terms of yield and economics. The increase in demonstration yield over local check varied from 18.56 to 133.33 per cent.

**Table 3.16: Frontline demonstrations on vegetables conducted in Jammu & Kashmir**

Crop	KVks (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Bhindi	1	18	0.04	71.00	69.00	2.90	5000	0.93	3500	0.92
Brinjal	3	122	2.85	184.55	145.75	26.62	65000	4.17	52000	3.54
Broccoli	1	10	0.02	400.00	375.00	6.25	0	0	0	0
Cabbage	1	28	1.40	380.00	220.00	72.73	0	0	0	0
Chilli	2	110	2.19	64.54	49.95	29.20	6900	2.86	25300	0.32
Coriander	1	24	0.30	88.75	65.00	36.54	0	0	0	0
Cucumber	1	14	0.02	1230.00	350.00	251.43	3573440	3.65	63400	1.05
French bean	1	20	1.25	240.80	170.70	41.07	135800	2.29	80200	1.89
Garlic	1	5	0.10	89.50	80.00	11.88	421750	3.64	370000	3.47
Knol khol	2	71	2.55	202.33	177.67	13.88	91200	2.59	65350	2.16
Methi	1	19	0.05	93.95	70.00	34.21	0	0	0	0
Okra	1	14	2.00	134.00	84.00	59.52	111000	3.31	54400	2.16
Onion	1	30	1.00	348.00	245.00	42.04	262600	2.69	159000	2.18
Pea	5	162	15.47	78.64	56.01	40.41	148343	3.26	86877	2.39
Potato	1	20	0.50	328.00	280.00	17.14	208000	2.73	170000	2.55
Saag Kale	1	41	0.25	210.00	201.00	4.48	136000	3.72	129000	3.58
Swiss chard	1	12	0.00	400.00	180.00	122.22	631000	2.11	151000	1.27
Tomato	4	117	1.22	282.26	164.16	71.94	424125	4.64	205250	3.37
Turnip	1	9	0.23	200.00	120.00	66.67	0	0	0	0
Total	30	846	31.44							

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

Crop	KVks (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Cabbage	5	135	7.25	272.89	208.80	30.70	211133	3.75	53467	1.32
Capsicum	6	216	4.10	138.68	106.10	30.70	238658	2.99	155584	2.49
Cauliflower	1	10	0.25	238.00	185.00	28.65	264500	3.86	189300	3.15
Chilli	1	25	0.50	120.00	80.00	50.00	205000	3.16	132000	2.94
French Bean	2	60	2.00	108.05	91.13	18.56	99643	3.04	76677	2.66
Ginger	1	20	1.00	98.25	80.60	21.90	169065	2.25	136645	2.20
Okra	2	87	2.50	99.75	73.75	35.25	84075	2.75	55875	2.32
Onion	4	214	5.70	248.80	188.22	32.19	183283	2.97	116483	2.36
Pea	9	386	11.15	93.00	65.72	41.51	98681	2.51	76994	2.28
Potato	1	25	1.00	133.05	120.80	10.14	155100	3.47	121600	3.04
Radish	1	70	0.50	280.00	120.00	133.33	217000	4.44	57000	1.90
Tomato	4	197	9.30	275.46	208.12	32.36	384857	4.04	266554	3.63
Total	37	1445	45.25							

3.5 Fruits

A total of 608 demonstrations on various fruit crops were conducted covering an area of 32.72 ha during the year by the KVKs of Zone-I. Technologies

demonstrated on various fruit crops viz. Guava, kiwi, apple, plum, apricot, pomegranate, pear, strawberry, persimmon, watermelon and mango including improved varieties, INM, IDM, IPM IWM etc. performed better over local check in terms of yield and economics. The

Table 3.18: Frontline demonstrations on fruits conducted by KVKs

Name of Crop	KVKs (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Guava(Punjab)	2	12	4.60	291.67	263.67	10.62	197000	2.58	166000	2.17
Pear (Punjab)	1	3	1.20	472.50	461.00	2.49	942500	2.98	910800	2.93
Apple (HP)	7	156	19.27	67.00	55.70	20.29	290763	3.74	220023	3.04
Apricot (HP)	1	5	0.18	141.22	115.00	22.80	238480	3.08	154350	3.04
Kiwi (HP)	1	10	0.25	-	-	-	-	-	-	-
Mango (HP)	1	5	0.40	42.00	31.00	35.48	56000	1.8	33000	1.50
Pear (HP)	1	10	2.00	-	-	-	-	-	-	-
Persimmon (HP)	2	20	0.90	-	-	-	-	-	-	-
Plum (HP)	1	5	0.13	134.60	101.00	33.27	288972	3.04	166752	2.94
Pomegranate (HP)	3	18	1.44	216.00	186.50	15.82	367500	3.39	305000	2.97
Apple (J&K)	4	45	2.02	234.63	199.00	17.90	229667	4.41	110667	3.13
Apricot (J&K)	1	300	0.08	-	-	-	-	-	-	-
Strawberry(J&K)	1	3	-	38.73	34.20	13.25	456666	2.38	360840	2.09
Water Melon(J&K)	1	5	-	425.00	215.00	97.67	1515000	9.19	676000	4.67
Peach (UK)	1	11	0.25	-	-	-	-	-	-	-
Total	28	608	32.72							





increase in demonstration yield over local check varied from 2.49 to 97.67 per cent (Table 3.18).

3.6 Flower

Floriculture being a high profit venture a total of 45 demonstrations were conducted on marigold



flower covering an area of 4.00 ha during the year by the KVKS of Zone-I. Technologies demonstrated performed better over local check and an increase in demonstration yield over local check varied from 26.49 to 41.67 per cent (Table 3.19). The BC ratio of all the demonstrated technologies was also observed higher than the local check.



Table 3.19: Frontline demonstrations on flowers conducted KVKS

Crop	KVKS (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Marigold (HP)	1	10	0.4	329.5	260.5	26.49	211124	1.34	62200	1.1
Rose (HP)	1	5	0.4	2706000*	2032200*	33.16	4397030	1.48	1712318	1.2
Marigold (J&K)	3	20	3	141.67	108.77	30.25	249100	5.42	171750	4.18
Marigold (UK)	1	10	0.2	76.5	54	41.67	96000	2.85	61000	2.39
Total	6	45	4							

Note: *Yield of rose in number of cut flowers

3.7 Fodder Crops

KVKS of Zone-I conducted a total of 1369 demonstrations on various fodder crops covering an area of 210.54 ha during the year. The state wise break up of FLDs on fodder crops included 365, 96, 625 and 283 demonstrations in Punjab, Himachal Pradesh,

Jammu & Kashmir and Uttarakhand, respectively. The state wise details of results of FLDs on fodder crops are presented as under in Table 3.20 to 3.23.

3.7.1 Punjab

In Punjab, a total of 365 demonstrations on

fodder crops were conducted by KVKS covering an area of 78.52 ha including 134, 139, 82 and 10 demonstrations of maize, berseem, oats and bajra, respectively (Table 3.20). Technologies demonstrated on various fodder crops including

improved varieties, INM, ICM etc. performed better over local check in terms of yield and economics. The increase in demonstration yield over local check varied from 7.00 to 15.96 per cent.

Table 3.20: Frontline demonstrations on fodder crops conducted in Punjab

Crop	KVKS (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Berseem	4	139	20.70	870.16	811.04	7.29	32534	1.62	19469	1.34
Bajra	1	10	4.00	535.00	500.00	7.00	36300	2.30	31900	2.14
Maize	4	134	49.00	422.44	372.06	13.54	22813	1.67	35983	2.05
Oats	3	82	4.82	623.33	537.52	15.96	53793	4.01	30022	2.93
Total	12	365	78.52							

3.7.2 Himachal Pradesh

In Himachal Pradesh a total of 96 demonstrations on fodder crops were conducted by KVKS covering an area of 9.28 ha during the period under report including 59, 27 and 10 demonstrations of

oats, maize and red clover, respectively (Table 3.21). Technologies demonstrated on various fodder crops including improved varieties, INM, ICM etc. performed better over local check in terms of yield and economics. The increase in demonstration yield over local check varied from 19.63 to 50.00 per cent.

Table 3.21: Frontline demonstrations on fodders conducted in Himachal Pradesh

Crop	KVKS (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Oats	2	59	5.28	340.95	285.00	19.63	30312	2.21	22456	1.99
Maize	1	27	1.00	303.00	202.00	50.00	22185	1.99	7270	1.36
Red Clover	1	10	3.00	187.00	156.00	19.87	9933	1.27	7245	1.23
Total	4	96	9.28							

3.7.3 Jammu Kashmir

KVKS of Jammu & Kashmir conducted 625 demonstrations on fodder crops covering an area of 106.73 ha including 19, 15, 7, 40, 59 and 485 demonstrations of bajra, alfa alfa, berseem, maize,

napier grass and oat, respectively (Table 3.22). Technologies demonstrated on various fodder crops including improved varieties, INM, ICM etc. performed better over local check in terms of yield and economics. The increase in demonstration yield over local check varied from 7.87 to 85.29 per cent.

**Table 3.22: Frontline demonstrations on fodders conducted in Jammu & Kashmir**

Crop	KVKs (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Bajra	1	19	2.00	6.85	6.35	7.87	20600	2.72	18220	2.52
Alfa alfa	1	15	0.78	38.00	NA	NA	NA	NA	NA	NA
Barseem	1	7	1.50	434.00	287.00	51.22	75800	7.89	46900	5.47
Maize	1	40	3.00	441.00	238.00	85.29	151050	3.17	57500	1.93
Napier Grass	1	59	10.25	279.00	244.00	14.34	50000	3.53	42850	3.36
Oats	9	485	89.20	248.52	203.38	22.20	38330	2.27	29732	2.04
Total	14	625	106.73							

3.7.4 Uttarakhand

In Uttarakhand a total of 283 demonstrations on fodder crops were conducted by KVKs of covering an area of 16.01 ha including 37 demonstrations of sorghum, 39 of barseem, 65 of maize, 35 of napier grass

and 107 of oats (Table 3.23). Technologies demonstrated on various fodder crops including improved varieties, INM, ICM etc. performed better over local check in terms of yield and economics. The increase in demonstration yield over local check varied from 21.56 to 57.60 per cent.

Table 3.23: Frontline demonstrations on fodder crops conducted in Uttarakhand

Crop	KVKs (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Barseem	2	39	1.70	650.00	520.00	25.00	75120	2.88	29100	3.33
Maize	2	65	5.46	350.00	250.00	40.00	18750	1.85	9470	1.34
Napier	1	35	2.00	300.00	NA	NA	NA	NA	NA	NA
Oat	4	107	5.85	332.53	211.00	57.60	68972	2.78	35540	2.58
Sorghum	2	37	1.00	410.25	337.50	21.56	54910	2.20	42985	1.99
Total	11	283	16.01							

3.8 Commercial crops

KVKs conducted demonstration only on cotton under commercial crops. A total of 10 demonstrations on cotton were conducted covering an area of 4.00 ha

during the year. The average yield of demonstration was found to be 23.10 q/ha, which was 6.80 per cent higher as compared to local check (Table 3.24). The BC ratio of demonstration (3.77) was also higher than local check (3.51).

Table 3.24: Frontline demonstrations on commercial crops conducted by KVKs

Crop	KVK (No.)	FLDs (No.)	Area (ha)	Yield (q/ha)		% increase	Economics of FLD (₹/ha)		Economics of Check (₹/ha)	
				FLD	Check		Net return	BCR	Net return	BCR
Cotton (Punjab)	1	10	4.00	23.10	21.63	6.80	86535	3.77	78926	3.51

3.9 Livestock and poultry

KVKs of Zone-I also conducted 695 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 also resulted in increased milk yield of animals.

3.10 Other demonstrations

In addition, KVKs of Zone- I conducted 114 demonstrations on mushroom production and 10 demonstrations on vermi-composting technology which resulted in higher returns and income to the farmers.





Chapter - 4

CAPACITY DEVELOPMENT

Capacity development being an important mandate 6058 capacity building courses were organized by the KVKs in which about 1.55 lakh stakeholders were benefited. Out of 6058 courses, 2221 courses were organized by 22 KVKs of Punjab, 1657 courses by 19 KVKs of Jammu & Kashmir, 1185 courses by 13 KVKs of Uttarakhand and 995 courses by 13 KVKs of Himachal Pradesh. Eighty seven per cent of these courses (5275) were organized to meet the training needs of

farmers/farmwomen/rural youth and extension functionaries. KVKs organized 461 vocational training courses benefitting 11691 participants, including mostly the rural youth, young women and school dropouts. Moreover, KVKs organized 322 sponsored courses for 8932 participants. The state-wise number of courses and the participants in these different categories of capacity building programmes organized by the KVKs during the reported period is given in Table 4.1.

Table 4.1: Details of training courses organized by the KVKs (Number)

State/ UT	KVKs	Need Based Training Courses		Sponsored Training Courses		Vocational Training Courses		Total	
		No.	Participants	No.	Participants	No.	Participants	No.	Participants
Punjab	22	1901	40326	32	980	288	7154	2221	48460
Himachal Pradesh	13	845	30708	85	5872	65	1846	995	38426
Uttarakhand	13	1004	23904	156	775	25	433	1185	25112
Jammu & Kashmir	19	1525	39625	49	1305	83	2258	1657	43188
Total	67	5275	134563	322	8932	461	11691	6058	155186

4.1 Training courses for farmers and farm women

A total of 4272 capacity building courses were organized for farmers and farm women by the KVKs during the period under report, involving approx. 1.10

lakh participants (Table 4.2). The maximum of courses (1458) were organized in Punjab, followed by 1213 courses in Jammu and Kashmir, 908 courses in Uttarakhand and 693 courses in Himachal Pradesh. These courses involved 68094 men and 42812 women as participants.

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

State/UT	No. of Courses	Participants (No.)									
		Others			SC/ST			Grand Total			
		Male	Female	Total	Male	Female	Total	Male	Female	Total	
Punjab	1458	19701	5254	24926	2924	2502	5426	22625	7756	30381	
Himachal Pradesh	693	7856	7191	15047	5105	4807	9912	12961	11998	24959	
Uttarakhand	908	8346	8816	17162	2573	2493	5066	10919	11309	22228	
Jammu & Kashmir	1213	14990	3989	18979	6599	7760	14359	21589	11749	33338	
Total	4272	50893	25250	76114	17201	17562	34763	68094	42812	110906	



Farmer Scientist interactions at farmers field



Training programme on Azolla making

4.2 Training courses for rural youth

KVKs trained 17737 rural youth by organizing a total of 707 training courses. The state wise distribution of these training courses reveal that 327 courses were organized in Punjab, 187 in Jammu & Kashmir, 132 in Himachal Pradesh and 61 in Uttarakhand. The number of

rural youth who participated in the KVK training courses revealed that 7846 participants were recorded highest in Punjab, 5189 in Himachal Pradesh, 3621 in Jammu and Kashmir and 1081 in Uttrakhand. The details are given in Table 4.3. Among 17737 rural youth trained, 11335 were men and 6402 were women.

Table: 4.3 State wise details of training courses organized for rural youth

State/UT	No. of Courses	Participants (No.)									
		Others			SC/ST			Grand Total			
		Male	Female	Total	Male	Female	Total	Male	Female	Total	
Punjab	327	4615	1643	6258	780	808	1588	5395	2451	7846	
Himachal Pradesh	132	1705	1312	3017	1349	823	2172	3054	2135	5189	
Uttarakhand	61	398	478	876	118	87	205	516	565	1081	
Jammu & Kashmir	187	1798	614	2412	572	637	1209	2370	1251	3621	
Total	707	8516	4047	12563	2819	2355	5174	11335	6402	17737	



Students exposure visit nursery farm



Fingerling management in fish farming



4.3 Extension functionaries

The details of state wise capacity building courses organized for extension functionaries by the KVKS and the participation level are given in Table 4.4. The data indicated that a total of 296 courses were organized with a participation of 5920 extension functionaries. Among the different states, 125 courses in Jammu & Kashmir followed by 116 courses in Punjab, 35

courses in Uttrakhand and 20 courses in Himachal Pradesh. In terms of participation, about 35.45 per cent of these participants were recorded in Punjab (2099 out of a total of 5920). The extent of SC/ST and women participation in different states indicates that Jammu & Kashmir recorded higher participation from SC/ST community (926 out of a total of 1543) and Punjab recorded highest women extension functionaries (799 out of a total of 2074) in Punjab.

Table: 4.4 State wise details of training course organized for extension functionaries

State/UT	No. of Courses	Participants								
		Others			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Punjab	116	1225	592	1792	75	207	282	1300	799	2099
Himachal Pradesh	20	159	146	305	44	211	255	203	357	560
Uttrakhand	35	355	160	515	58	22	80	413	182	595
Jammu & Kashmir	125	1423	317	1740	507	419	926	1930	736	2666
Total	296	3162	1215	4377	684	859	1543	3846	2074	5920

4.4 Sponsored training courses

A total of 322 sponsored training courses were organized by the KVKS during the reporting period (Table 4.5). The state of Uttarakhand organized maximum number of sponsored training courses 156 courses followed by Himachal Pradesh 85 courses, Jammu and Kashmir 49 courses and Punjab 32 courses

during the reported period. But the extent of participation was highest in Himachal Pradesh with 5872 participants, followed by Jammu & Kashmir with 1305 participants, Punjab with 980 participants and Uttarakhand with 775 participants. Out of 8932 participants, 2381 were from SC/ST community (26.65 per cent) and 1148 were women.

Table: 4.5 State wise details of sponsored training courses organized by the KVKS

State/UT	No. of Courses	General			SC/ST			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Punjab	32	553	139	692	117	171	288	670	310	980
Himachal Pradesh	85	2693	2104	4797	572	503	1075	3265	2607	5872
Uttrakhand	156	317	237	554	158	63	221	475	300	775
Jammu & Kashmir	49	432	76	508	386	411	797	818	487	1305
Total	322	3995	2556	6551	1233	1148	2381	5228	3704	8932

4.5 Vocational training courses

During the reporting period, 461 vocational training courses were organized by KVKS with the participation of 11691 stakeholders. In Punjab, KVKS organized 288 courses with a participation of 7154

participants. In Jammu & Kashmir, KVKS organized 83 courses with 2258 participants. The details of number of courses and participants in each State/UT of the Zone-I are given in Table 4.6. The participation of women was encouraging in vocational training courses with a participation of 35.35 per cent (4133 out of 11691).

Table: 4.6 State wise details of vocational training courses organized by the KVKS

State	No. of Courses	Participants		
		Male	Female	Total
Punjab	288	4892	2262	7154
Himachal Pradesh	65	1089	757	1846
Uttrakhand	25	318	115	433
Jammu & Kashmir	83	1259	999	2258
Total	461	7558	4133	11691





Chapter - 5

OTHER PROJECTS AND PLANS

5.1 CFLDs on Oilseed

To boost the indigenous production of oilseed in India, "Cluster Frontline Demonstrations on Oilseed" project was initiated by the Department of Ministry of Agriculture cooperation and Farmer's Welfare (DAC & FW) with cooperation of Division of Extension Education, ICAR, New Delhi since the year 2015-16 till date. The main objective for conducting Cluster Frontline Demonstrations to show the production potential of notified oilseed varieties and package of practices and technologies generated in oilseed for higher production, better productivity and remunerative profitability for the farmers. The project was implemented by ICAR-ATARIs through *Krishi Vigyan Kendras* (KVKs) during 2015 to 2019 with the aim to

enhance the oilseed production in the country.

In ICAR-ATARI, Zone-I, the project was implemented through 45 KVKs of the states of, Punjab, Himachal Pradesh, Uttarakhand and Jammu and Kashmir during this year. The budget for each crop *i.e.* groundnut ₹ 12000/ha, rapeseed & mustard ₹ 6000/ha, soybean ₹ 7500/ha and sesame ₹ 5000/ha was provided to the respective KVKs for providing critical inputs like seed, biofertilizers *etc.* to the farmers for conducting cluster frontline demonstrations. During the year 2018-19, 860 ha area was allotted (Table 5.1), for CFLDs on oilseed however, only 145 ha during *Kharif* season (Table 5.2) and 621 ha area was demonstrated during in *Rabi* season (Table 5.3) and 64 ha area remained deficient during 2018-19.

Table 5.1: Details of state-wise and crop wise details of allotted, conducted and deficit CFLDs during 2018-19

State/Crop	Allotted		Conducted during <i>Kharif/Rabi/Summer</i>	
	Demo (No.)	Area (ha)	Demo (No.)	Area (ha)
Punjab				
Groundnut	75	30	62	26.00
Sesame	150	60	125	50.00
Rapeseed	1100	440	1050	440.00
Linseed	25	10		
Uttarakhand				
Sesame	25	10	25	10.00
Soybean	50	20	30	11.70
Rapeseed & Mustard	150	60	123	49.56
Himachal Pradesh				
Sesame	75	30	68	27.20
Soybean	25	10	25	10.00
Rapeseed & Mustard	200	80	172	70.00
Jammu & Kashmir				
Sesame	25	10	25	10.00
Rapeseed & Mustard	250	100	155	61.81
Total	2150	860	1860	766.27

During *kharif* season, total 359 CFLDs were laid on an area of 145 ha on groundnut, soybean and sesame crops. In Punjab, 17.25 per cent and 33.7 per cent higher yield was recorded from the demonstrations of sesame and groundnut respectively. In sesame, Punjab recorded highest yield increase of 33.7 per cent followed by



Monitoring of Groundnut crop at KVK Hoshiarpur

Himachal Pradesh, Jammu & Kashmir, and Uttarakhand with 27.3, 27.18 & 22.1 per cent in comparison with the local check. For soybean, Uttarakhand recorded highest yield increase of 46.8 per cent followed by Himachal Pradesh with 45 per cent increase in comparison with the local check.



Demonstration on Sesame crop at KVK Nawanshehar

Table 5.2: Summary of CFLDs conducted during *Kharif* season 2018-19

S. No	State	Crop	Allocated		Conducted		Yield (q/ha)		Increase in Yield (%)
			No of demo	Area (ha)	No of demo	Area (ha)	Demo	Local check	
1.	Punjab	Groundnut	75	30	62	26	18.35	16	17.25
2.	Punjab	Sesame	125	50	125	50	4.9	3.8	33.7
3.	Himachal Pradesh	Sesame	75	30	68	27.2	6.4	5.1	27.3
4.	Himachal Pradesh	Soybean	25	10	25	10	14.5	10	45
5.	Uttarakhand	Sesame	25	10	25	10	5.85	4.8	22.1
6.	Uttarakhand	Soybean	50	20	29	11.7	15.6	11	46.80
7.	Jammu & Kashmir	Sesame	25	10	25	10	4.96	3.9	27.18
Total (<i>Kharif</i>)			400	160	359	145	10.1	7.8	31.3



Demonstration on Sesame crop at KVK Ropar



Demonstration on Soybean crop at KVK Shimla



5.1.1 Rapeseed & Mustard

The cluster demonstrations were conducted on rapeseed & mustard by 43 KVKs of Punjab, Himachal Pradesh, Uttarakhand and Jammu & Kashmir. A total of 1500 CFLDs were conducted on rapeseed & mustard under an area of 621 ha. In Rapeseed & Mustard CFLDs, 27.1 per cent, 45.2 per cent, 46.70 per cent and 44.9 per cent higher yield was recorded as compared to local check in Punjab, Uttarakhand, Jammu & Kashmir and Himachal Pradesh. While conducting demonstrations, the technologies like improved varieties, seed treatment,

line sowing of crop, different intercropping systems, integrated pest management (IPM) etc. were demonstrated at the farmer's field. In varietal demonstrations, varieties like GSC 7, Giriraj & RH-749 were demonstrated in Punjab, Pant Pili sarsoo 1, TS67, Pusa Vijay, PR 20, PR 21, PPS-1 were demonstrated in Uttarkhand, DGS-1, RSPR-01, RSPR-69, KS 101, DGS-1, RLM-514 & CES-1, KS 101, SS 01, KBS 49 in Jammu & Kashmir and Neelam & ONK-1, GSC-7, Bhawani, RH-406, RH-749, PBR-357 in Himachal Pradesh.



Demonstration on Rapeseed & Mustard Crop at KVK Amritsar



Demonstration on Rapeseed & Mustard Crop at KVK Leh

Table 5.3: Summary of CFLDs conducted during Rabi season

S. No.	State	Allocated		Conducted		Yield (q/ha)		Increase in Yield (%)
		No of demo	Area (ha)	No of demo	Area (ha)	Demo	Local check	
1	Punjab	1100	440	1050	440.0	20.1	15.9	27.1
2	Uttarakhand	150	60	123	49.6	12.6	9.1	45.2
3	Jammu & Kashmir	250	100	155	61.8	10.3	7.0	46.7
4	Himachal Pradesh	175	70	172	70.0	9.2	6.6	44.9
Total (Rabi)		1675	670	1500	621	13.1	9.6	41.0

5.1.2 Extension activities to demonstrate improved technologies

Extension activities play an important role to disseminate the technologies and other related issues in CFLDs. During the year 2018-19, 287 extension activities were demonstrated across the states of Zone -1

in which as many as 8876 farmers actively participated. The extension activities included interaction of the farmers with the crop scientist, demonstrations on cultivation practices. In addition to this, awareness camps, field day, Canola day etc., was also conducted. KVKs organized 60 training programmes in which 1813 farmers actively participated (Table 5.5).



Field day on Rapeseed & Mustard crop at KVK Bilaspur



Farmer & scientist interaction on Rapeseed & Mustard crop at KVK Bathinda

Table 5.4: Extension activities conducted during 2018-19

Sr. No	Extension activities	No. of activities	No. of Farmers
1	Farmer scientist interaction	22	467
2	Field visit	125	2577
3	Field day	83	4301
4	Awareness camp	13	497
5	Kisan Goshti	20	663
6	Group discussion	8	212
7	Monitoring	13	159
Total		284	8876

Table 5.5: Training programmes conducted by KVKs during 2018-19

Sr. No	Training	No. of activities	No. of Farmers
1	Training on Sesame and Groundnut	15	526
2	Training on Rapeseed & Mustard	45	1287
	Total	60	1813

5.2 CFLDs on Pulses

Department of Agriculture, Cooperation & Farmers Welfare (DAC&FW), MoA&FW, Government of India approved the project "Cluster Frontline demonstrations (CFLDs) on Pulses 2018-19" with the aim increasing the area, productivity and production of pulse crops under National Food Security Mission (NFSM). Under the project, for conducting frontline demonstrations (FLDs) on pulses in the states of Punjab, Himachal Pradesh, Uttarakhand

and Jammu and Kashmir, a total budget of ₹ 160.16 lakh was sanctioned to ICAR-ATARI, Zone-1, Ludhiana. The project provided for ₹ 9000/ha for the KVKs conducting FLDs on pulses viz. black gram, green gram, rajmash, pigeon pea, chick pea, lentil, field pea. Moreover, the KVKs which conducted FLDs in at least 50 ha and more area either in *Kharif*, *Rabi* and Summer season were allowed to hire a Pulses Technology agent (PTA) for six months with the pay of ₹ 10,000/month to assist the execution of the project.

**Table 5.6: Crop-wise and state-wise area (ha) of demonstrations under CFLD Pulses 2018-19**

State/Crop	Kharif				Rabi			Summer		Total
	Black gram	Green gram	Rajmash	Pigeon pea	Chick pea	Lentil	Field pea	Black gram	Green gram	
Punjab	50.00	-	-	-	240.00	70.00	10.00	45.6	337.20	752.80
Himachal Pradesh	100.00	1.60	4.03	-	90.00	20.00	-	-	5.00	220.63
Uttarakhand	30.00	-	0.00	18.8	14.22	103.84	-	-	-	166.86
Jammu and Kashmir	50.00	18.00	36.00	-	48.00	0.50	47.98	-	-	200.48
Total	230.00	19.60	40.03	18.8	392.22	194.34	57.98	45.6	342.20	1340.77

5.2.1 Kharif Season

Frontline demonstrations on pulses viz. black gram, green gram, pigeon pea and rajmash were conducted to popularize improved cultivation practices. The highest percentage increment in black gram crop yield was recorded in Uttarakhand i.e. 50.00 per cent and lowest percentage increment in Punjab i.e. 24.97 per cent. Similarly, green gram demonstrations in Himachal Pradesh and Jammu and Kashmir recorded 56.25 and 40.91 per cent higher yield respectively was compared to the local check. Pigeon pea demonstrations in Uttarakhand recorded 69.18 per cent higher yield compared to that of the local check. Moreover, rajmash demonstrations in Himachal Pradesh and Jammu and Kashmir recorded 35.32 and 15.18 per cent respectively higher yield was recorded compared to the local check. This increase in yield can be attributed to the use of

**Method Demonstration on line sowing in Kinnaur**

improved varieties and following scientifically better practices compared to existing practices on the farmers' fields.

5.2.2 Rabi Season

Scientific cultivation and improved practices of chick pea, lentil and field pea crops were demonstrated in the states of the zone. The highest yield increased was recorded in chick pea crop in Jammu and Kashmir (46.82%) followed by Himachal Pradesh (45.26%), Uttarakhand (25.43%) and Punjab (24.48%). Similarly, the highest percentage increment in lentil crop yield was recorded in Himachal Pradesh i.e. 42.39 per cent and lowest percentage increment in Jammu and Kashmir i.e. 16.51 per cent. Moreover, field pea

**Field visit in Hamirpur**

Table 5.7: Details of Frontline demonstrations conducted during *Kharif* 2018-19

State	Crop	Variety	FLDs		Yield (q/ha)		Increase in yield (%)
			No.	Area (ha)	Demo	Check	
Punjab	Black gram	Mash 114	138	50.00	8.16	6.53	24.97
Himachal Pradesh	Black gram	UG 218, Him Mash 1, Palampur 93 and Mash 114	512	100.00	8.79	6.36	38.21
	Green gram	Suketi and IPM - 02-3	04	1.60	6.25	4.00	56.25
	Rajmash	Baspa and Jawala	37	4.03	16.78	12.4	35.32
Uttarakhand	Black gram	PU 31	221	30.00	6.87	4.58	50.00
	Pigeon pea	VL Arhar 1	371	18.80	14.38	8.50	69.18
Jammu and Kashmir	Black gram	PU 31	330	50.00	5.98	4.24	41.04
	Green gram	Shalimar moong 1 and KM 2241	66	18.00	7.75	5.50	40.91
	Rajmash	BR 104, Tripach Rajmash, Magav Rajmash and Shalimar Rajmash 1	161	36.00	10.47	9.09	15.18

demonstrations in Punjab and Jammu and Kashmir recorded 13.11 and 45.51 per cent respectively higher yield compared to that of local check.

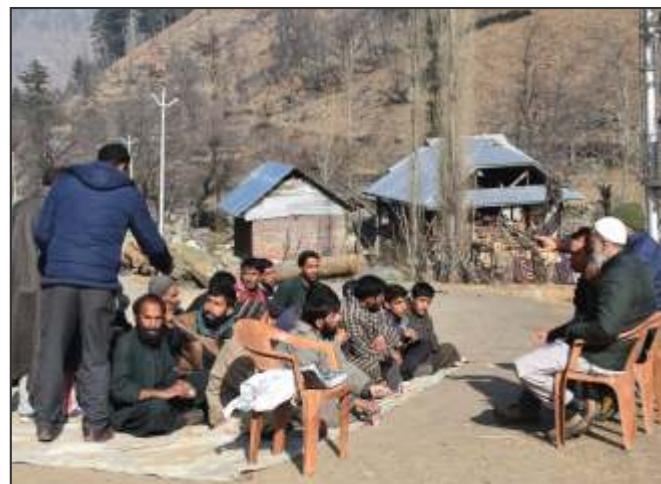
5.2.3 Summer Season

Demonstrations on black gram in Punjab



Diagnostic visit in Tehri Garhwal

recorded 26.68 per cent higher than that of the local check. Similarly, the average yield increase of 20.15 per cent was observed in demonstrations on green gram in Punjab as compared to local check; whereas, it was 19.28 per cent in Himachal Pradesh.



Training Programme on ICM in Pea in Bandipora

**Table 5.8: Details of Frontline demonstrations conducted during *Rabi* 2018-19**

State	Crop	Variety	FLDs		Yield (q/ha)		Increase in yield (%)
			No.	Area (ha)	Demo	Check	
Punjab	Chick pea	PBG 7, PBG 5, GNG 1581 and GNG 2144	694	240.00	18.10	14.54	24.48
	Lentil	LL 931 and LL 699	197	70.00	10.05	8.59	17.00
	Field pea	Punjab 89	26	10.00	15.10	13.35	13.11
Himachal Pradesh	Chick pea	Hmi chana 1, Him chana 2, GNG 1581, GNG 1958, GPF 2 and CSJ 515	429	90.00	11.04	7.60	45.26
	Lentil	Vipasha and Markanday	70	20.00	8.80	6.18	42.39
Uttarakhand	Chick pea	PG 4 and PG 186	117	14.22	21.95	17.5	25.43
	Lentil	PL 8 and VL Masoor 126	1511	103.84	10.97	8.16	34.44
Jammu and Kashmir	Chick pea	PBG 5, GNG 1581 and Shalimar chickpea 1	273	48.00	8.09	5.51	46.82
	Lentil	KGML	20	0.50	6.35	5.45	16.51
	Field pea	Rachna, Shalimar peal, Prakash, Punjab 89 and HFP 715	248	47.98	12.47	8.57	45.51

Table 5.9: Details of Frontline demonstrations conducted during *Summer* 2018-19

State	Crop	Variety	FLDs		Yield (q/ha)		Increase in yield (%)
			No.	Area (ha)	Demo	Check	
Punjab	Black gram	Mash 1008	123	45.60	10.16	8.02	26.68
	Green gram	SML 832	840	337.20	10.85	9.03	20.15
Himachal Pradesh	Green gram	SML 668	48	5.00	8.29	6.95	19.28

5.3 NICRA

National Innovations in Climate Resilient Agriculture (NICRA) is a network project of the Indian Council of Agriculture Research (ICAR) which aims to enhance resilience of Indian agriculture to climate

change and climate variability. The Technology Demonstration Component (TDC) of NICRA is being implemented through KVKS of 121 most climatically vulnerable districts across the country with an objective to demonstrate the existing technologies with National Agriculture Research system (NARS) to cope up with



Field Day on Summer Moong at Ferozpur

climate variability on farmers' fields and make the Indian agriculture climate resilient. In Zone-I, 13 most vulnerable districts which are covered under Technology Demonstration Component (TDC) of NICRA are namely, Bathinda, Faridkot, Fatehgarh Sahib, Ropar, Hamirpur, Kinnaur, Kullu, Chamba, Kathua, Pulwama, Bandipora, Tehri garhwal and Uttarkashi.

The interventions being implemented are categorized under four modules, i.e. natural resource management, crop production, livestock and fisheries, and institutional interventions. Besides, capacity building to participating farmers on the tools and new

technologies to be adopted to mitigate the climate related adversaries in crop production and animal husbandry is also being addressed. The achievements during the year are detailed as:-

5.3.1 Module I: Natural Resource Management (NRM)

Under NRM, different interventions like in-situ moisture conservation, water harvesting and recycling for supplemental irrigation, water saving irrigation methods, vermin-composting and green manuring for soil health improvement and fertility management, use of baler-cum-knotter were followed. Under these interventions, 1408 farmers were benefitted in selected NICRA villages (Table 5.10).

5.3.2 Module II: Crop Production

Under this module, different crop were grown in the farmers fields to demonstrate effectiveness of drought tolerant varieties, location specific intercropping systems with high sustainable yield index, nutrient management, pest and disease management, short duration varieties, water saving paddy cultivation methods etc. As many as 3628 farmers were involved to demonstrate these improved climate resilient

Table 5.10: Details of NRM activities implemented under NICRA by KVKS of Zone-1

Intervention	Technology demonstrated	Farmers (No.)	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	245	106.42
Water harvesting and recycling for supplemental irrigation	Rain water harvesting structure and renovation of farm ponds	248	49.65
Water saving irrigation methods	Use of Tensiometer for irrigation scheduling in paddy	134	346.02
Green manuring for soil health improvement	Cultivation of green manuring crops	30	20.00
Vermi-composting	Use of vermi-compost for soil health improvement	137	2.53
Alternate energy source	Biogas Plant and Folding two step solar cooker	1	0
Efficient management of paddy stubbles-Baler-cum-knotter	Use of paddy stubbles for soil health/fertility	84	969.00
Conservation tillage	Conservation tillage	529	330.50
Total		1408	1824.12

**Table 5.11: Details of Crop Production module implemented under NICRA by KVks of Zone-1**

Interventions	No. of Farmers	Area (ha)
Crop diversification	1167	80.88
Drought tolerant varieties	872	128.35
Location specific intercropping systems with high sustainable yield index	72	5.45
Low water requiring crops	83	18.00
Nutrient management	220	189.20
Pest and disease management	200	42.40
Short duration varieties	508	140.42
Varietal evaluation	124	49.20
Water saving paddy cultivation methods (SRI, aerobic, direct seeding)	98	96.00
Frost management in horticultural crops through fumigation	60	3.00
Nutritional Gardening	220	5.66
Temperature tolerant varieties	4	1.60
Total	3628	760.16

technologies and demonstrations were laid on 760.16 ha area (Table 5.11).

5.3.3 Module III: Livestock and Fisheries

Different interventions like animal health check up camp, breed up-gradation, de-worming in livestock, mitigation of mineral deficiencies in animals, preventive

vaccination etc. were followed in NICRA villages of Zone-I. Under these activities, 4495 farmers were benefitted through 1726 demonstrations (Table 5.12).

5.3.4 Module IV: Institutional Interventions

This module consists of interventions such as fodder bank, custom hiring centre, Mechanization

Table 5.12: Details of livestock and fisheries activities implemented under NICRA by KVks

Intervention	No. of demos	No. of farmers	Units
Animal health check up camp	5	202	370
Artificial Insemination (No. of animals)	1	19	28
Breed up gradation (No. of animals)	46	94	94
De-worming in livestock (No. of animals)	642	802	1064
Improved shelters for reducing heat stress in livestock (Units)	51	51	56
Mitigation of mineral deficiencies in animals	829	909	1361
Popularization of backyard poultry (No. of birds)	130	131	574
Preventive vaccination (No. of animals)	22	240	948
Total	1726	2448	4495

through custom hiring for timely planting etc. Custom hiring centers in NICRA villages provided required farm implements to 2226 farmers which were utilized for 1499.4 ha area to carry out timely operations besides

reducing the cost of cultivation. Under these interventions, services were provided to 5247 farmers (Table 5.13).

Table 5.13: Details of institutional interventions implemented under NICRA by KVKs

Interventions	Farmers (No.)	Units
Fodder bank (ha)	74	38.0
Custom hiring centre (ha)	2226	1499.4
Climate literacy through a village level weather station	2897	13.0
Seed bank (ha)	50	28.5
Total	5247	1578.9

5.3.5 Capacity Building

During 2018-19, 225 different capacity building programs were conducted for 5266 farmers including 1385 farm women on various need based aspects like crop management, enterprises for self employment, live stock management, management of horticultural crops, nutritional garden etc (Table 5.14).

5.3.6 Extension Activities

For creating awareness about the impact of the climate resilient technologies, a number of extension activities were organized by KVKs under NICRA at the KVK farms as well as in the NICRA villages. Total 563 extension programmes were organized by the KVKs of the Zone-I in which 9314 farmers participated which

Table 5.14: Details of capacity building programmes carried out under NICRA by KVKs

Thematic area	No. of courses	No. of farmers		
		Male	Females	Total
Crop management	61	1182	261	1443
Enterprises for self employment	3	56	26	82
Farm implements and machineries	6	65	0	65
Fodder and feed management	15	255	60	315
Forest tree/ agro forestry plantation	8	114	46	160
Live stock management	20	425	80	505
Management of Horticultural crops	35	573	200	773
Natural resource management	29	610	129	739
NICRA awareness	3	116	86	202
Nutritional garden	10	90	96	186
Post Harvest and Value Addition	13	149	140	289
Seed production	3	60	4	64
Soil health management	7	115	24	139
Home Science	12	71	233	304
Total	225	3881	1385	5266

**Table 5.15: Details of Extension Activities carried out under NICRA by KVs**

Name of the activity	No. of programmes	No. of beneficiaries		
		Male	Female	Total
Exposure visit	27	691	135	826
Field days	31	1125	275	1400
Method demonstrations	160	1720	494	2214
Awareness Camps	61	1771	447	2218
Group dynamics	99	1022	231	1253
Women awareness	8	24	230	254
Agro advisory services	177	766	383	1149
Total	563	7119	2195	9314

Table 5.16: Establishment of enterprise units during 2018-19 under ARYA project in Zone-1

KVK (State)	Name of enterprise established	No. of Units established	No. of Youth benefitted
Bathinda (Punjab)	Post-harvest and Value Addition	15	30
	Poultry farming	25	50
	Mushroom Cultivation	11	30
	Bee Keeping	13	50
	Total	64	160
Hamirpur (HP)	Post-harvest and Value Addition	86	86
	Mushroom cultivation	27	27
	Protected Cultivation and Nursery Raising	23	23
	Total	81	81
Haridwar (UK)	Mushroom cultivation	4	20
	Broiler farming	3	30
	Bee keeping	5	15
	Total	12	65
Kathua (J&K)	Poultry Farming	12	12
	Commercial Floriculture	14	14
	Mushroom Cultivation	10	10
	Total	36	97
Barnala (Punjab)	Bee Keeping	7	15
	Total	7	15
Reasi (J&K)	Post-Harvest and Value Addition (Amla products)	3	12
	Backyard Poultry (Kadaknath)	4	48
	Vegetable production (Okra)	5	20
	Commercial floriculture (Marigold)	4	10
	Total	16	90
Grand Total		216	508

included 2195 farmwomen. The detail of the extension activities are presented in the Table 5.15.

5.4 ARYA

The ICAR project “Attracting and Retaining Youth in Agriculture (ARYA)” is aimed at entrepreneurial development of youth in rural areas to take up different agriculture, allied and services sector enterprises for sustainable income and gainful

employment. ARYA centres in selected KVKS, identified potential youth and trained them on entrepreneurship development skills by providing a basket of options to start agricultural ventures for self-employment. In Zone-I, four KVKS namely KVK Haridwar in Uttarakhand; KVK Bathinda in Punjab; KVK Hamirpur in Himachal Pradesh and KVK Kathua in Jammu and Kashmir have been implementing this project right from the year 2015-16 while this project was extended to six new KVKS viz.

Table: 5.17: Skill training and exposure visits organized for rural youth during 2018-19

Name of KVK	Name of training programme	No of youth benefitted
Bathinda (Punjab)	Bee Keeping	50
	Value addition & Processing	30
	Mushroom Cultivation	30
	Poultry Farming	50
	Total	160
Hamirpur (HP)	Mushroom Cultivation	65
	Protected Cultivation and Nursery Raising	69
	Post-Harvest and Value Addition	86
	Total	220
Haridwar (UK)	Mushroom Grover	15
	Vermi Compost Producer	20
	Total	35
Kathua (J&K)	Mushroom Production Technology	10
	Cultivation of oyster mushroom	20
	Compost making of button mushroom	10
	Poultry Farming	20
	Breeding programme of Backyard Poultry	11
	Vaccination schedule for commercial Poultry	10
	Management of Tagetus	16
	Total	97
Barnala (Punjab)	Bee Keeping	15
	Vegetable Nursery Production	20
	Total	35
Reasi (J&K)	Post-Harvest and Value Addition (Amla products)	12
	Backyard Poultry (Kadaknath)	10
	Vegetable production (Okra)	10
	Commercial floriculture (Marigold)	10
	Total	42
Grand Total		589



Training program on bee keeping under ARYA

Barnala in Punjab, Solan in Himachal Pradesh, Nainital in Uttarakhand and Reasi, Kulgam and Baranulla in J&K during 2018-19.

Division of Agricultural Extension, ICAR, New Delhi sanctioned ₹ 112.94 lakh (Revised Estimate) to the institute during 2018-19 for implementing the project in Zone-I. A total of 21 training programmes were organized by the ARYA centres during the year in which 508 rural youths got benefitted (Table 5.16). These trainings included theory-based lectures, method demonstrations, and hands-on-practice. Rural youth were trained on various agricultural & allied enterprises viz. bee keeping, value addition & processing, mushroom cultivation, poultry farming, protected cultivation and nursery raising of vegetables and commercial floriculture. In addition to these training programs exposure visits to the successful enterprises



Pickle making during training on Mushroom Cultivation

and skill trainings were also organised during 2018-19 in the benefit of selected farmers as young entrepreneurs. A total of 589 youths were benefitted through these exposure visits cum skill trainings (Table 5.17).

5.5 Tribal Sub Plan

Seventeen KVks of three states of ICAR-ATARI, Ludhiana were selected for this scheme during the year 2018-19. Four KVks of Himachal Pradesh, seven KVks from Jammu & Kashmir and six KVks from Uttarakhand are under the project of Tribal Sub Plan.

During the 2018-19 year, KVks under the TSP scheme conducted 545 OFTs and 6246 FLDs in farmers' fields. A total of 39534 farmers and 11807 extension personnel attended the training programmes organized



Method Demonstration on line sowing at Chamoli



Nursery Demonstration at KVK Kargil

Table 5.18: Mandated activities organized by the KVKs under TSP during 2018-19

S. No.	Name of Activity	Himachal Pradesh	Uttarakhand	Jammu & Kashmir	Zone-Total
1	On-farm trials (Number of farmers)	127	193	225	545
2	Frontline demonstrations (Number of farmers)	795	3711	1740	6246
3	Farmers training (Number of farmers)	12412	12355	14767	39534
4	Training of Extension Personnel (Number of Extension Personnel)	10592	254	961	11807
5	Participants in extension activities (Number of participants)	16086	87374	40437	143897
6	Production of seed (q)	5.57	176.04	109.15	290.76
7	Production of Planting material (Number in lakh)	1.82	5.50	1.97	9.28
8	Production of Live-stock strains and fingerlings (Number in lakh)	0.0018	0.0137	0	0.0155
9	Testing of Soil, water, plant, manures samples (Number)	1220	1322	880	3422
10	Mobile agro-advisory to farmers (Number of farmers)	0	4443	16395	20838

by seventeen KVKs of Zone-I. A total of 149010 stakeholders attended the extension activities organized by the KVKs under TSP. With the help of ICT 20838 farmers received the messages during the reported period. Further 3422 soil, water and plant samples were tested of farmer's fields by the KVKs during the reported period. (Table 5.18).

5.6 Awareness on PPV&FRA

During 2018-19, 12 KVKs (11 KVKs in Jammu & Kashmir and one in Himachal Pradesh) of Zone-I organized 16 awareness programmes for the 1581 farmers (Table 5.19). Sixty four extensional personal from state agricultural development departments also

Table 5.19: Details of awareness programmes conducted under PPV & FRA by KVKs of Zone-I

Sr. No.	Name of the KVK	Date	No. of farmers	No. of Extension Personnel
1	Doda	29-12-18	102	7
2	Rajouri	20-03-19	111	9
3	Jammu	17-01-19	103	4
4	Reasi	20-03-19	58	6
5	Kathua	11-01-19	87	9
6	Poonch	16-03-19	70	1
7	Kulgam	19-03-19	200	0
8	Leh	23-01-19, 05-02-19 & 10-02-19	294	3
9	Leh II	15-12-18 & 07-02-19	202	0
10	Kargil	13-02-19 & 15-03-19	135	0
11	Kupwara	10-12-18	150	20
12	Shimla	01-03-19	92	5
	Total	16	1581	64

**Table 5.20: Details of funds utilized during the year under PPV& FRA Programme**

Sr. No.	KVK	Amount revalidated	Funds Utilized
1	Doda	58566	56047
2	Rajouri	56583	18130
3	Jammu	34509	33187
4	Reasi	42057	15788
5	Kathua	35234	34989
6	Poonch	44310	13430
7	Kulgam	80000	80000
8	Leh	80000	79793
9.	Leh II	80000	79793
10	Kargil	80000	80000
11	Kupwara	80000	80000
12	Shimla	33326	33326
Total		704585	594361



Awareness programme at KVK Kargil



Awareness programme at KVK Jammu

participated in these awareness cum training programmes.

The dignitaries from Member of Legislative Assembly, Dr. A.K. Singh, Deputy Director General, Division of Extension Education, ICAR, Officers of PPV& FRA Authority, State Agriculture Universities and Panchayat Members also graced the occasion of these programmes. The major activities of these programmes included exhibition of farmers' on local varieties of

various crops, information from eminent scientists, group discussions among the farmers and scientists. The farmer varieties to be sent for the registration were procured from the farmers of the district and farmers were made aware about the award applications for the farmers under PPV& FRA and suitable recognition for the farmers whose local varieties has been listed by the Authority. Literature about awareness for Protection of farmers varieties developed by scientists of KVks was also distributed during the training programs.



5.7 Farmer FIRST Programme

The ICAR took initiative to uplift the production and productivity of agricultural outputs by enhancing farmers-scientists contact with multi stake holders-participation through Farmer FIRST Programme (FFP). The focus is on Farmer's Farm, Innovations, Resources Science and Technology (FIRST). There are seven Farmer FIRST Projects executed by ICAR institutes and State Agricultural Universities during the period under report to Zone-I, Ludhiana (Table 5.21).

Component-wise achievements under Farmer FIRST programme are elucidated herewith:

Component I: Enhancing Farmer-Scientist Interface

In different FFP centres of Zone-I, various programmes were organized to enhance farmer-scientist interface as presented in Table 5.22. A total of 262

different activities were organized on various relevant aspects by different FFP centres in which 8711 farmers benefited.

Component II: Technology Assemblage, Application and Feedback

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

5.7.1 GADVASU, Ludhiana

5.7.1.1 Crop based module

- ❖ For fodder purpose, 25 ha were covered under maize variety J1006 wherein 180 farmers were benefited. Over the local check, the average increment in yield of the demonstrations was 80 %.
- ❖ To curtail the fodder scarcity for animals, a total of 5 demonstrations laid on bag silage. The use of homemade bag silage reduced the

Table 5.21: List of Farmer's FIRST projects

S. No.	Name of Institute /University	Title of the project	Budget (₹) in Lakh
1	GADVASU, Ludhiana	Integrated approaches for livestock development: farmers context	24.00
2	CSK HPKV, Palampur	Transfer of improved farm production technologies for enhancement of rural livelihood security amongst the farm households of Kangra District of Himachal Pradesh	19.00
3	CIPHET, Ludhiana	Processing and value addition of agricultural produce for enhancing farmers income and employment in production catchment	33.50
4	PAU, Ludhiana	Technology Application and up -scaling for sustaining natural resources and augmenting farm income: farmers led market linked approach	28.00
5	SKAUST, Jammu	Exploring economic opportunities for farmers of kandi villages through application of proven rainfed technologies	27.00
6	ICAR-IISWC, Dehradun	Farmer Participatory Technology Application for Sustainable Resource Management and Livelihood Security in North-Western Himalaya	24.02
7	GBPUAT, Pantnagar	Enhancing livelihood opportunities of the farming community in the mid-hills of uttarakhand	28.80

**Table 5.22: Various extension activities conducted under Enhancing Farmer-Scientist Interface module**

S. No.	ICAR Institute/SAU	Camps		Kisan Goshthies		Trainings		Field day	
		No.	Farmers	No.	Farmers	No.	Farmers	No.	Farmers
1.	GADVASU, Ludhiana	21	270	1	182	37	1124	55	2027
2.	CSK HPKV, Palampur	5	192	11	489	11	502	2	455
3.	CIPHET, Ludhiana	0	0	0	0	1	14	0	0
4.	PAU, Ludhiana	5	100	24	730	5	100	1	151
5.	SKAUST-Jammu	2	54	6	112	13	584	2	204
6.	ICAR-IISWC, Dehradun	3	528	3	186	1	25	1	192
7.	GBPUA&T, Pantnagar	4	100	35	170	3	80	10	140
Total		40	1244	80	1869	71	2429	71	3169

expenditure by ₹ 3/kg over the commercial bag silage.

31.5 over the local check.

5.7.1.2 Livestock based module

- ❖ Under mineral mixture and uromin lick management, a total of 9 demonstrations were conducted wherein 500 animals treated. The average increase of milk production was 13.48 %.
- ❖ A total of 9 demonstrations were laid on bypass fat on 650 animals. The average increment in milk production was 4.86% and 0.42% in fat.
- ❖ A total of 8 demonstrations were conducted for balanced feed formulation. The average increase in milk production was 11.4 %. After getting good results, 150 farmers started making balanced feed.
- ❖ For yeast supplementation of feed, a total of 9 demonstrations were conducted wherein 300 animals treated. Total numbers of beneficiaries were 150.

❖ A total of 623 demonstrations were conducted on 74.04 ha area on paddy varieties Raja 369 and HPR 2143. As compared to the local check, average increment in yield was 22.6 per cent.

5.7.2 CSKHPKV, Palampur

5.7.2.1 Crop based module

- ❖ On maize variety K-25, a total of 108 demonstrations were conducted on an area of 26.5 ha. The average increment in the yield was

5.7.2.2 Horticulture based module

❖ For off season vegetable production (like French-bean, Chilli, Okra, Peas, Radish, Cauliflower, and Cucumber), a total of 3268 demonstrations were laid on an area of 56.06 ha.

❖ A total of 252 demonstrations were conducted on nutrition garden for getting nutritive vegetables like Brinjal, Chilli, Okra, French bean, Colocasia, Radish, Palak, Turnip all around the year.



Field visit of Farmers, CSKHPKV, Palampur

5.7.2.3 Livestock based module

- ❖ On mineral mixture, a total of 303 demonstrations were conducted for health care and nutritional aspects. The percentage increment in milk yield was 33.3 over the local unfed animal.
- ❖ From 303 demonstrations of milk ration, the average increment in milk was 40 per cent over local unfed. As compared to unfed animal (0.91), higher B:C was recorded under demonstrations (1.17).

5.7.3 ICAR-CIPHET, Ludhiana

- ❖ At Nurpur and Balachour (Nawanshahr) processing units, total 44 quintal of greengram, lentil, black lentil and chickpea processed into dal and husk as a by-product. The profit of ₹ 38,285 was recorded by selling the processed and packed dal into the market.
- ❖ Total 28 quintal of raw honey was processed at Mahalon (Nawanshahr) unit and sold directly to the consumers, dealers and through ICAR-CIPHET, Ludhiana.

5.7.4 PAU, Ludhiana

5.7.4.1 Crop based module

- ❖ For diversification in Rice-Wheat cropping system, a total of 100 demonstrations were conducted on summer moong (SML 668) on an area of 40 ha with average increment in yield 9.4 per cent.
- ❖ An area of 10 ha was covered under demonstrations of chickpea (*Var.* PBG 7) at 50 farmer's field. The average increment in yield was found to be 13.3 per cent over the local check.
- ❖ A total of 70 demonstrations, on Gobhi Sarson (*Var.* GSC 7) were conducted on an area of 14

ha. The average yield was 20 q/ha under demonstrations whereas 18 q/ha in local check.

5.7.4.2 Livestock based module

- ❖ A total of 50 demonstrations were laid on deworming and feeding of mineral mixture of the animals. Over the unfed animal the milk production was increased by 8 per cent in feeded animal.
- ❖ For prevention and control of mastitis in dairy animal, a total of 50 demonstrations were conducted. The average increment in milk was recorded by 10.4 per cent.



Zonal Review Workshop organized at
ICAR-ATARI, Ludhiana

5.7.4.3 NRM based module

- ❖ On short duration varieties of paddy, a total of 300 demonstrations were conducted on an area of 120 ha for efficient water management. The average yield of PR 126 and PR 121 varieties found to be 78.6 q/ha and 78.69 q/ha, respectively.
- ❖ A total of 50 demonstrations (*Var.* PR 126) on Direct Seeded Rice (DSR) were conducted (0.4 ha each). The average yield of demonstrations and local check was found almost similar. However, the B:C ratio of demonstrations (5.52) was found to be higher than farmers' practice (4.34).
- ❖ Demonstrations on Happy Seeder sown wheat (PBW 725) for *in-situ* paddy straw management



were conducted on 40 ha areas at 100 farmers' field. Average yield of demonstration plots was same as under local check (55 q/ha).

5.7.5 SKUAST, Jammu

5.7.5.1 Crop based module

- ❖ A total of 114 demonstrations of maize variety Double Dekalb and SJPC1 were conducted on 98.6 ha. Increase in average yield was found to be 32.3 % from demonstrations over the local check.
- ❖ Wheat variety WH-1080 was demonstrated on 98 ha. From 110 demonstrations, the recorded average yield was 20.8 q/ha in demonstration while and 13.3 q/ha in local check.

5.7.5.2 Horticulture based module

- ❖ A total of 7 demonstrations were laid on marigold Pusa Narangi/Basanti cultivar on an area of 1.00 ha. The increment in yield was 105.6 percent over the local check.
- ❖ On backyard nutritional kitchen garden, 120 demonstrations were conducted each in summer season vegetables and winter season vegetables.

5.7.5.3 Integrated farming system based module

- ❖ To raise and sustain the total farm productivity in terms of food, feed, fodder and fuel, a total of 10 IFS models were established at 10 farm family's fields. As compared to the obsolete farming system, ₹ 3,22,392 additional income generated under IFS.

5.7.6 ICAR-IISWC, Dehradun, Uttarakhand

5.7.6.1 Crop based module

- ❖ On wheat, a total of 301 demonstrations were conducted on an area of 34.6 ha. Over the local check, 38.1 percent higher yield was recorded under the demonstrations.
- ❖ Pigeon pea variety Pusa-992 was demonstrated on an area of 9.25 ha through 301

demonstrations.

5.7.6.2 Horticulture based module

- ❖ A total 1005 demonstrations (each 30 sq m) were conducted on backyard nutritional kitchen garden. The vegetable includes radish, turnip, spinach, pea etc. for household consumption.

5.7.7 GBPUAT, Pantnagar

5.7.7.1 Livestock based module

- ❖ A total of 50 demonstrations were conducted on mineral mixture on local breed of the cattle and 110 animals treated. Percentage increment in milk yield was 30 over the local unfed cattle.
- ❖ A total of 20 units of backyard poultry and net for construction of low cost housing system consisting of layer and broiler (Uttara Fowl) were established wherein 50 farm families benefited.

5.7.7.2 Enterprise based module

- ❖ A total of 50 farm families were benefited from beekeeping wherein 2000 bee boxes provided to the farmers. The average honey production was 10 kg/box.
- ❖ Under drudgery reduction kit comprising of revolving stool, dung collector and water bag, a total of 50 demonstrations were conducted. This helps to save 4 hours/day/person.

5.8 District Agro Metrological Units (DAMU)

During the year Indian Metrological Department (IMD) provided funds for establishment of District Agro Metrological Unit under Gramin Kirshi Mausam Sewa in 16 Krishi Vigyan Kendras of Zone-I (Table 5.23). With the advancement of observational network and forecasting technology, Agromet Advisory Service (AAS) network is being extended to sub-district /block level by setting up Agro-Met Units (DAMUs) in the premises of Krishi Vigyan Kendra (KVKs). Funds

were provided ₹ 4.80 lakh for each KVK for setting up the infrastructure and training of farmers and ₹ 3.20 lakh were provided to ATARI for implementation of the programme under DAMU in KVks.

During the year seven KVks of Zone-I conducted farmer awareness programme for the benefit

of farmers and farm women. Scientist's delivered the talks regarding rapid changing of climate and farmer scientist interactions were held regarding the problems and prospects to address the futuristic problems about weather vagaries. During the year 20 programs were organized in which 1328 farmers participated in these programs (Table 5.24).

Table 5.23: State wise list of KVks of Zone-I in which DAMU will be established

S. No.	Name of State	Name of KVK
1	Punjab	Ropar
2		Jalandhar
3		Ferozepur
4		Moga
5		Barnala
6	Himachal Pradesh	Chamba
7		Bilaspur
8		Mandi
9		Sirmaur
10	Jammu & Kashmir	Baramulla
11		Kathua
12		Kupwara
13		Reasi
14	Uttarakhand	Almora
15		Nainital
16		Pithouragarh

Table 5.24: Farmer Awareness Program conducted by KVks during the year

S. No.	Name of the KVK	Venue of FAP	No. of farmers
1.	Sirmaur	Ajouli, Thakurdwara	100
2.	Mandi	Palahuta, Dodhwan Pauda Kothi, Paunta, Dhamasan	427
3.	Ropar	KVK Ropar	150
4.	Jalandhar	KVK Jalandhar, Sarih, Bagga, Batura, Bhadma, Kara Ram Singh, KVK Jalandhar	304
5.	Ferozepur	Village Jhoke Hari Har, KVK Ferozepur	200
6.	Moga	KVK Moga	104
7.	Barnala	KVK Barnala	43
Total			1328



DAMU Awareness at Sirmaur



Literature for Climate Change

5.9 Krishi Kalyan Abhiyan

Krishi Kalyan Abhiyan-I (KKA-I) initiated from 1st June to 15th August 2018 started in the Aspirational Districts selected by NITI Aayog to motivate the farmers towards achieving the goals of Doubling Farmers' Income by 2022.

The main aim of the Abhiyan was to aid, assist and advise the farmers how to improve their farming techniques to get remunerative income from their farms.

During KKA, 25 villages from each of 112 Aspirational districts were selected. Under Zone-I and 7 districts (Moga, Ferozepur, Chamba, Kupwara, Baramulla, Haridwar and Udhampur) from four states namely Punjab, Himachal Pradesh, Jammu & Kashmir and Uttarakhand were covered under KKA to disseminate the latest information to the farmers to enhance their farm income.

Overall 1603 villages were covered by seven VKVs in seven districts under this Abhiyan-I during 2nd

Table 5.25: Activities carried out in Aspirational districts during Krishi Kalyan Abhiyan

S. No.	Activities	KKK – I		KKK - II	
		Villages (No.)	Achievements	Villages (No.)	Achievements
1	Soil Health Card	173	36271	161	42828
2	Mini Kits	155	6732	149	6818
3	Horticulture/ Agro Forestry/ Bamboo plant	174	27378	72	43220
4	NADEP Pits	106	2100	73	1504
5	Artificial Insemination	174	20580	450	16587
6	Agriculture Implements	159	2135	137	1420
7	Training Programs	170	35894	152	609
8	Micro Irrigation	54	1496	82	83
9	Integrated cropping	102	3177	103	129
10	Bovine Vaccine (FMD)	174	66611	164	112381
11	Sheep and goat for eradication of PPR	162	23969	169	47298
12	PMFBY	-	-	117	725
13	Grameen Haats	-	-	5	5
Total		1603	226343	1834	273607

June to 15th August 2018 (Table 5.25). These activities of the Abhiyan were implemented with the collaboration of State level agencies.

After the success of Krishi Kalyan Abhiyan I in these Aspirational districts Govt. of India launched another Krishi Kalyan Abhiyan II during 2nd October 2018 to 31st December 2018 to improve the development pace of these districts and have direct influence on the quality of life of the individuals residing in these districts.

In KKA-II, Overall thirteen activities were undertaken and specifically two more activities were included than KKA-I i.e. *Gramin Haats* and *Pradhan*

Mantri Fasal Bima Yojana (PMFBY). In KKA-II seven districts covered 1834 villages in this phase of Abhiyan. In Gramin Haats, marketing and supporting infrastructure was strengthened using MGNREGA and other Government Schemes for the benefit of the farmers. Five KVKS i.e. Moga, Ferozpur, Haridwar, Chamba, U.S. Nagar developed the Gramin haats for Gramin Agricultural Markets (GrAMs). In PMFBY program, 117 villages were covered and 725 farmers attended this crop insurance programme. During KKA-II, 231 more villages were benefitted by this Abhiyan as compared to KKA-I in these seven Aspirational Districts of Zone-I. Funds were provided to KVKS for construction of 300 NADEP pits @ ₹ 7000 per pit in 15



Artificial Insemination at Ferozpur



Vaccination against PPR



Distribution of soil health cards



Construction of NADEP Pit

Glimpses of the activities conducted during Krishi Kalyan Abhiyan



villages during KKA-I and during KKA-II funds were provided to organize skill development programmes @1.20 lakh per KVK and installation of micro-irrigation system @ ₹ 1.00 lakh per KVK for seven KVKs and three KVKs from ICAR were also provided funds for installation of micro-irrigation system.

5.10 New Extension Methodologies and Approaches

Division of Agricultural Extension of the ICAR initiated an ICAR-Network Project in Extension Education under the title New Extension Methodologies and Approaches during January 2019. In total, 19 ICAR institutions (Division of Agricultural Extension as Implementing Authority; seven technology generation or resource institutes including ICAR-IARI New Delhi as Lead Centre; and eleven ICAR-ATARIs) will be partners in this network project. A brainstorming

meeting of the project was held in the Division of Agricultural Extension, KAB-1 on 12 February 2019 under the chairmanship of Dr. AK Singh, DDG Extension Education of the ICAR.

5.11 Pre-Rabi sammelan

Thirty five KVKs of this Zone were selected for organizing Pre-Rabi Kisan Sammelan, Krishi Mela, Kisan Gosthie, Group meeting, Exhibition and Demonstrations of latest technologies during 2018-19 but only 34 KVKs were able to organize the Mela/World Soil day as KVK Haridwar could not utilize the funds for same. Each KVK was provided a sum of ₹ 80000/- per KVK for conducting the programme. The main aim of organizing these sammelan/days was to make aware about the improved package of practices of Kharif & Rabi crops and soil health through literature, film shows, exhibitions etc. generated by SAUs and ICAR Institutes and to solve the problems encountered by the farmers in

Table 5.26: Detail of Pre-Rabi sammelan/ World Soil Day conducted by KVKs during the year

Name of State	No. of KVKs	No. of programs organized	No. of farmers attended	Extension personnel
Punjab	2	6	562	55
Himachal Pradesh	10	22	3209	43
Jammu & Kashmir	14	15	1357	121
Uttarakhand	8	9	1465	122
Total	34	52	6593	341

Table 5.27: State wise funds released during the year for conducting Pre-Rabi Campaign

Name of States	Amount sanctioned (₹)	Expenditure (₹)
Punjab	160000	156542
Himachal Pradesh	800000	784901
Jammu & Kashmir	11200	790411
Uttarakhand	720000	434317
Total	2800000	2166171

the standing Kharif and Rabi season and to collaborate with the State Agricultural Departments for making this campaign a success. During the Pre-Rabi campaign and soil health day KVKs developed various exhibits in the form of posters, extension literature, display boards, soil health cards, models, sample trays etc. for displaying and distribution among the farmers.

KVKs conducted the sammelan coinciding with world soil day which falls on 5th December. Soil health cards were also distributed to the farmers on this day and

lectures about improving soil health were also delivered on this day. Thirty four KVKs in four states conducted 52 sammelan/day in which a total of 6593 farmers and 341 extension functionaries participated. (Table 5.26)

Funds were released to 35 KVKs of Zone-I for organizing the campaign. Out of total funds of ₹ 2800000 KVKs could utilize ₹ 2166171 amount for conducting 52 campaigns for farmers during the year. (Table 5.27)





Chapter - 6

OTHER EXTENSION ACTIVITIES

6.1 Frontline Extension Programs

KVKs made efforts to create awareness about recent developments in agriculture and allied sectors among farmers, extension personnel and other

stakeholders through different individual, group and mass contact methods. Further, KVKs are in the forefront of mass media utilization in disseminating timely and relevant technologies to the farming community without any time lag. Frontline extension

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

S. No.	Name of the Activity	No. of Activities	Other Farmers			SC/ST (Farmers)			Extension Officials			Grand Total			
			Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	
1	Advisory Services	15877	36821	8670	45491	14332	6039	20371	266	265	531	51419	14974	66393	
2	Agri Mobile Clinic	17	721	158	879	640	130	770	9	1	10	1370	289	1659	
3	Animal Health Camp	150	2919	490	3409	2218	530	2748	60	28	88	5197	1048	6245	
4	Awareness camps	451	25021	2080	27101	2668	1335	4003	351	92	443	28040	3507	31547	
5	Celebration of important days (specify)	1945	14984	12789	27735	3486	4937	8423	705	1198	1903	18998	18752	37664	
6	Diagnostic visits	5624	15661	5857	21518	5077	2406	7483	217	79	296	20955	8342	29297	
7	Exhibition	465	166117	23004	189121	27605	11981	39586	761	306	1067	194483	35291	229774	
8	Exposure visits	628	8519	2563	11082	2541	1332	3873	412	141	553	11472	4036	15508	
9	Ex-trainees Sammelan	58	426	279	705	109	139	248	27	21	48	562	439	1001	
10	Farm Science Club Conveners meet	19	81	34	115	0	12	12	10	3	13	91	49	140	
11	Farmers Scientists Interactions	73	1484	95	1579	766	792	1558	122	6	128	2372	893	3265	
12	Farmers Seminar	147	18928	655	19583	705	171	876	69	36	105	19702	862	20564	
13	Farmers visit to KVK	1436	50556	10081	60637	10217	5098	15315	268	125	393	61041	15304	76345	
14	Field Day	509	15947	2447	18394	3572	3187	6759	539	263	802	20058	5897	25955	
15	Film Show	657	13288	2725	16013	2395	1164	3559	272	71	343	15955	3960	19915	
16	Group meetings	356	1382	339	1721	520	130	650	76	36	112	1978	505	2483	
17	Kisan Gosthi	780	20124	7858	27982	3017	1976	4993	380	289	669	23521	10123	33644	
18	Kisan Mela	161	243645	67485	311130	343557	42679	386236	1772	820	2592	588974	110984	699958	
19	Lectures delivered as resource persons	4703	181157	21513	202670	24424	10235	34659	2211	728	2939	207792	32476	240268	
20	Mahila Mandals Conveners meetings	54	225	662	887	92	172	264	10	11	21	327	845	1172	
21	Method Demonstrations	2136	16170	4384	20554	4168	2847	7015	265	162	427	20603	7393	27996	
22	Scientific visit to farmers field	11384	36214	9885	46099	8535	3242	11777	251	290	541	45000	13417	58417	
23	Self Help Group Conveners meetings	95	281	530	811	154	172	326	14	21	35	449	723	1172	
24	Soil health day/Camp	143	4386	907	5293	1008	339	1347	200	71	271	5594	1317	6911	
25	Soil test campaigns	131	3857	430	4287	606	149	755	49	12	61	4512	591	5103	
26	Workshop	109	1233	253	1486	142	46	188	95	30	125	1470	329	1799	
	Total		48108	880147	186173	1066282	462554	101240	563794	9411	5105	14516	1351935	292346	1644195



Exhibition stall by Self Help Group

programmes undertaken by the KVKS helps to disseminate various agriculture related technologies among farmers on a large scale. In this process the coordination with development agriculture and animal husbandry departments and private agencies is crucial for successful executing of extension programmes. Various extension activities were carried out by KVKS in coordination and collaboration with other line departments/agencies working in the district during the year 2018-19 are briefly presented here under. The activity wise details of extension programmes organized are furnished in Table 6.1. Data implies that KVKS' efforts through extension programmes covered a large number of farmers and created awareness about new technologies, activities and agri-enterprises.

A total of 48108 extension programmes were organized through different methods and means wherein technologies related to agriculture and allied sectors



Mahila Kisan Diwas

were appraised among 16.30 lakh farmers and 0.15 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. The different participants participated in the various extension activities organized by different KVKS are presented in Table 6.2.

Data further indicated that KVKS in Punjab organized maximum extension programmes (30261) followed by Jammu & Kashmir (6807), Himachal Pradesh (5486) and Uttarakhand (5254). In respect of utilizing mass media KVKS popularized technologies through extension literature (306), newspaper coverage (930), popular articles (175), radio talks (147) and TV talks (72). State-wise details of extension programmes are presented in Table 6.3.

Table 6.2: State wise details of Frontline Extension programmes organized and distribution of participants (2018-19)

State	No. of Activities	Other Farmers			SC/ST (Farmers)			Extension Officials			Grand Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Punjab	30561	696955	122296	819251	399559	67333	466892	5649	2681	8330	1102163	192310	1294473
Jammu & Kashmir	6807	60894	12877	73771	39177	15542	54719	1347	489	1836	101330	28820	130106
Himachal Pradesh	5486	26854	18733	45549	16453	12880	29333	758	471	1229	43994	32018	75979
Uttarakhand	5254	95444	32267	127711	7365	5485	12850	1657	1464	3121	104448	39198	143637
Grand Total	48108	880147	186173	1066282	462554	101240	563794	9411	5105	14516	1351935	292346	1644195

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

Activity	Punjab	Himachal Pradesh	Jammu & Kashmir	Uttarakhand	Total
Extension literature	306	42	85	64	497
Newspaper coverage	930	116	357	267	1670
Popular articles	175	64	121	65	425
Radio talks	147	39	93	47	326
TV talks	72	9	125	15	221

6.2 Convergence and Linkages

KVKs work in collaboration with different line departments and organizations of the State and Central Government; well reputed NGOs working on different 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 6.4. KVKs are working in collaboration with other government development agencies. Under National Horticulture Mission (NHM), the KVKs of Gurdaspur and Bathinda 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.

KVKs of zone-1 utilized about ₹ 4.3 lakhs under Rasthriya Krishi Vikas Yojna (RKVY) for providing training on various aspects of livestock farming. Similarly, two KVKs of the GADVASU are funded with ₹ 2.15 lakh during the year from National Fisheries Development Board (NFDB), Hyderabad for provided training and created awareness among farmers on fish rearing practices in Punjab. This year about 38 KVKs collaborated with Agriculture Skill Council of India (ASCI) and a budget of ₹ 1,70,68,000 were sanctioned for conducting various skill development trainings

(SDT) in different agricultural fields. Four KVKs under the ICAR institutes also get collaborated with Department of Animal Husbandry, Dairying and Fisheries (DAD&F) and allocated ₹ 4.0 lakh during the year for promotion of their schemes. Along with this ICAR-ATARI collaborated with various Deemed Universities of ICAR and Other ICAR-Institutes under various research assignments. Many collaborative interface and workshops were also organized with international agencies such as Barlaug Institute for South Asia (BISA) and International Maize and Wheat Improvement Centre (CIMMYT).

6.3 Kisan Mobile Advisory

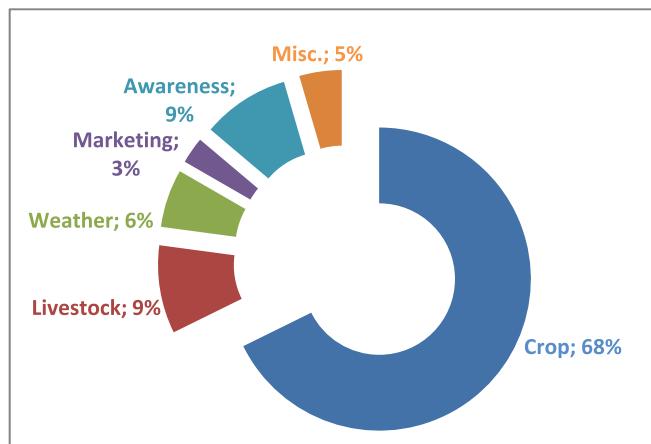
Kisan Mobile Advisory has proved to be very important tool of quick and cost-effective information dissemination. Nearly 9 lakh farmers of Zone-1 were supplied with 4513 text messages through mobile SMS service during 2018-19 by the KVKs of this zone. J&K was a leader among all Zone- 1 states in respect to the number of text messages (2334) prepared and sent through this service. The Himachal Pradesh reached 5.7 lakh farmers through mobile SMS service followed by Punjab (2.9 lakh), J&K (29488) and Uttarakhand with 7788 targeted farmers (Table 6.5). Out of the total text messages prepared for sending to farmers using Kisan Mobile Advisory Service about 68 per cent were related to crops followed by 09 per cent on livestock and 09 per cent related to awareness on various schemes and programmes, 06 per cent on weather related information, 05 per cent on miscellaneous topics and 03 per cent on various marketing aspects (Figure 6.1).

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

Sr. 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 Warehouse Corporation (CWC), Integrated Rural Development Programme (IRDP), Integrated Watershed Management Programme (IWMP), Kargil Development Project (KDP), Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), Rasthriya 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 Fisheries Development Board (NFDB)
11.	International Agencies: Japan International Cooperation Agency, CIMMYT, Barlaug Institute for South Asia (BISA) and (International Maize and Wheat Improvement Centre)

Table 6.5: Details of Kisan Mobile Advisory services in Zone-1 states (2018-19)

State	No. of farmers covered	No of advisories sent	Text Messages (No.)							
			Crop	Livestock	Weather	Marketing	Awareness	Other Enterprises	Any Other	Total
Jammu & Kashmir	29488	642	1943	251	62	58	19	1	0	2334
Himachal Pradesh	574715	298	189	10	0	9	18	26	22	274
Punjab	295775	1169	552	151	216	41	321	98	55	1434
Uttarakhand	7788	893	371	13	2	20	63	2	0	471
Total	907766	3002	3055	425	280	128	421	127	77	4513

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

6.4 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” (My village my pride) which will hasten the lab to land approach. Under “Mera Gaon Mera Gaurav”, scientists of ICAR institutes and Agricultural Universities of Zone-I have identified villages in the vicinity of the institutions for providing advisories and consultations to farmers for increasing farm productivity and production. At every institute and university a nodal officer for “Mera Gaon Mera Gaurav”

has been appointed, they are responsible for forming teams of scientists, selecting villages and organizing baseline surveys, interface meetings, demonstrations and trainings at selected villages. Teams of scientists of various ICAR Institutes and SAUs working in Zone-I have conducted 1,107 visits benefitting 15188 farmers in their respective adopted villages during 2018-2019. Scientists of this Zone also provided 3804 agro-advisory services by to farmers' mobile phones of adopted villages (Table 6.7). In order to motivate farmers to adopt new agricultural technology/practices and to show the superiority, applicability, economic advantages of new technologies; scientists have conducted demonstrations in an area of 1776 ha in 4,454 farmers' field on various crop and agricultural practices. Scientists of this zone also provided 3,804 agro-advisory services by sending 28,314 SMSs to farmers' mobile phones of adopted villages. Scientific literature developed by ICAR Institutes and SAUs on various aspects also provided to 24,674 farmers so that farmers can use it later. Under this scheme, scientists also created linkages with other departments and agencies for the benefit of farmers of their adopted villages. Awareness amongst 20423 farmers was created on various agricultural technologies, practices, schemes of different developments departments, crop insurance etc.

Table 6.6: Summary of Zone-I under MGMG during 2018-19

No. of Team of Scientists	No. of Scientists	No. of Villages	No. of Blocks	No. of Districts	Bench Mark Survey conducted (No. of villages)
139	458	363	99	61	303

Table 6.7: Summary of activities organized under MGMSG by institutes/SAUs

S. No.	Activity	Activities conducted (No.)	Farmers beneficiary (No.)
1.	Visit to village by teams	1107	15188
2.	Interface meeting/ Goshthies	403	10772
3.	Training organized	251	5200
4.	Demonstrations conducted (in ha)	1776	4454
5.	Mobile based advisories (No.)	3804	28314
6.	Literature support provided	190	24674
7.	Awareness created	198	20423
8.	Input support provided (q)	1040	3586



6.5 Skill Development Programmes in Agriculture

In Zone-I, 38 Krishi Vigyan Kendras (Punjab-12, Himachal Pardesh-8, Jammu & Kashmir-12 and Uttrakhand-6), seven SAUs and two ICAR Institutes conducted 90 Skill Development Programmes (SDP) in 20 different job roles/QPs of 200 hrs duration or more during 2018-19 for the youths so that they can start their

own enterprise or get self-employed. A total budget outlay of ₹ 170.68 lakhs was sanctioned and released to the training centres for conducting these skill development courses in agriculture or allied areas. A total of 1794 rural youths successfully completed these skill development courses. Out of total 90 skill development programmes, 71 courses were conducted by 38 KVKS, 15 courses by 7 SAUs and 4 by ICAR Institutes of this Zone.



Skill development training on bee keeping



Skill development training on Mushroom growing

**Table 6.8: Number of participants of skill development training in agriculture**

Name of State	Name of Job Role/QPs	No. of training centre (KVKs/ SAUs/ ICAR Institutes)	No. of Skill Development Courses Conducted	No. of youths skilled		
				Male	Female	Total
Punjab	Agricultural Extension Service Provider	2	2	36	4	40
	Aquaculture worker	1	1	20	0	20
	Artificial Insemination Technician	1	1	20	0	20
	Assistant Gardener	1	1	20	0	20
	Beekeeper	7	7	130	10	140
	Dairy Farmer - Entrepreneur	5	5	91	9	100
	Floriculturist - Open cultivation	1	1	20	0	20
	Harvesting Machine Operator	1	1	20	0	20
	Mushroom Grower	5	5	87	13	100
	Nursery Worker	1	1	18	2	20
	Small Poultry Farmer	1	1	19	1	20
	Tractor operator	1	1	20	0	20
Total	12	14	27	501	39	540
HP	Agricultural Extension Service Provider	1	1	15	5	20
	Assistant Gardener	1	1	20	0	20
	Beekeeper	2	2	34	4	38
	Dairy Farmer - Entrepreneur	1	1	17	3	20
	Gardener	1	1	18	2	20
	Medicinal Plants Cultivator	3	3	52	8	60
	Mushroom Grower	4	4	59	21	80
	Nursery Worker	1	1	15	5	20
	Organic Grower	2	2	29	11	40
	Quality seed Grower	1	1	19	1	20
	Small Poultry Farmer	2	2	38	2	40
Total	11	10	19	316	62	378
J & K	Agricultural Extension Service Provider	1	1	18	2	20
	Artificial Insemination Technician	1	1	24	0	24
	Assistant Gardener	1	1	18	2	20
	Beekeeper	2	2	40	0	40
	Floriculturist - Open cultivation	1	1	18	1	19
	Floriculturist - Protected cultivation	1	1	15	5	20
	Forest Nursery Raiser	1	1	20	0	20
	Medicinal Plants Cultivator	1	1	9	11	20
	Mushroom Grower	4	4	45	35	80
	Nursery Worker	2	2	6	34	40
	Organic Grower	1	1	11	9	20
	Quality Seed Grower	1	1	20	0	20
	Small Poultry Farmer	3	3	54	3	57
	Tractor operator	1	1	20	0	20
	Vermicompost Producer	6	6	90	26	116
Total	15	14	27	408	128	536
UK	Agricultural Extension Service Provider	1	1	14	6	20
	Aquaculture worker	3	3	60	0	60
	Assistant Gardener	1	1	15	5	20
	Dairy Farmer - Entrepreneur	1	1	20	0	20
	Micro Irrigation Technician	1	1	11	9	20
	Mushroom Grower	5	5	77	23	100
	Nursery Worker	1	1	20	0	20
	Small Poultry Farmer	1	1	20	0	20
	Vermicompost Producer	3	3	29	31	60
Total	9	9	17	266	74	340
Grand Total	20	47	90	1491	303	1794

Training centres of Punjab organised 27 skill development courses on 12 different Job-roles whereas Jammu & Kashmir also organised 27 skill training programmes but on 15 different job-roles. Further, Himachal Pradesh organised 19 skill development courses on 11 different job-roles and 17 courses were conducted on 9 different job-roles by Uttarakhand as depicted in Table 6.8.

6.6 Celebration of World Soil Day

World Soil Day was celebrated by 66 KVKs of Zone-I on December 05, 2018 in which 6249 farmers participated. During this programme, a total of 3249 Soil health Cards were distributed among the farmers. In case of Punjab, 21 KVKs celebrated world soil day in which 2179 farmers participated and 1201 soil health cards distributed. Further, in Himachal Pradesh, 21 KVKs organised various programmes on this occasion in which

1066 farmers participated and 497 soil health cards distributed to farmers. Similarly, 20 KVKs of Jammu & Kashmir and 13 KVKs of Uttarakhand also celebrated world soil day in which 1819 and 1185 farmers participated and 811 and 740 soil health cards distributed amongst farmers, respectively as depicted in Table 6.9. On this Occasion, KVKs also created awareness about soil testing, interpreting soil health cards, ill effects of excessive application of chemical based fertilizers, Integrated Nutrition Management (INM) in different field and horticulture crops, Integrated Pest Management (IPM), etc. Similarly, many KVKs organized exhibitions for the farmers on soil health, soil sampling, soil testing techniques, good agricultural practices and soil and environment friendly technologies. Moreover, appropriate methods of soil sample collection were also demonstrated to the farmers.

Table 6.9: State-wise details of World Soil Day celebrated by KVKs during 2018-19

S. No.	State	No. of KVKs participated	No. of farmers Participated	No. of Soil Health Cards distributed
1.	Punjab	21	2179	1201
2.	Himachal Pradesh	12	1066	497
3.	Jammu & Kashmir	20	1819	811
4.	Uttarakhand	13	1185	740
Total		66	6249	3249



Recipients showing soil health cards



World Soil Day Celebration

Chapter - 7

SUPPORT SERVICES BY KVKS

7.1 Technological inputs

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

7.1.1 Seed production

Krishi Vigyan Kendras have produced 9938.16 q seed of cereals, 192.22 q seed of oilseeds, 1419.62 q

seed of pulses and distributed to farmers. Moreover, seeds of commercial crops like sugarcane, potato were also produced by the KVKS. In total, KVKS produced nearly 15383.35 q seed, made that available to 18758 farmers and earned a total of ₹ 435.19 lakhs (Table 7.1).

Among different states of the Zone, the highest total amount of seeds was produced by the KVKS of Punjab (10505.3q), followed by the KVKS of Uttarakhand (3711.77q); whereas, 667.45 q seed was produced in the state of Jammu & Kashmir and 498.878 q seed produced by the KVKS of Himachal Pradesh (Table 7.2).

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

Crop	Quantity (q)	Value (₹)	Farmers (No.)
Cereals	9938.16	33817282	13530
Oilseeds	192.23	1202365	577
Pulses	1419.62	2142028	1092
Commercial Crops	2903.38	1372399	13
Vegetables	588.43	1904421	1927
Spices	33.31	134550	82
Fodder Crops	192.48	2913535	1480
Fruits	4.00	10000	0
Others	111.74	22252	57
Total	15383.35	43518832	18758

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

Crop	Punjab	Himachal Pradesh	Uttarakhand	Jammu & Kashmir	Total
Cereal	8412.42	145.12	733.42	647.20	9938.16
Oilseed	50.44	43.47	95.82	2.50	192.23
Pulse	1287.33	58.45	67.14	6.70	1419.62
Commercial Crop	121.41	0.00	2781.97	0.00	2903.38
Vegetable	315.76	243.84	28.58	0.25	588.43
Spices	20.27	8.00	4.84	0.20	33.31
Fodder Crop	183.48	0.00	0.00	9.00	192.48
Fruits	4.00	0.00	0.00	0.00	4.00
Others	110.14	0.00	0.00	1.60	111.74
Total	10505.25	498.88	3711.77	667.45	15383.35

7.1.2 Planting material

During the year, KVKS of Zone-I produced 3150021 planting materials worth ₹ 84,96,212 and distributed to 23099 farmers (Table 7.3). KVKS of

Uttarakhand produced the highest numbers of plating material followed by Punjab, Himachal Pradesh and Jammu & Kashmir (Table 7.4).

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

Crops	Number	Value (₹)	Distributed to No. of farmers
Vegetable seedling	2375497	2280454	18610
Fruits	100744	5883858	3342
Ornamental plants	84700	187300	420
Forest species	2420	75200	460
Fodder crop	586200	55150	170
Others	50	150	0
Forest species	410	14100	97
TOTAL	3150021	8496212	23099

Table 7.4: State-wise details of planting material production during 2018-19

Crops	Punjab	Himachal Pradesh	Uttarakhand	Jammu & Kashmir	Total
Vegetable seedling	1112416	349271	913810	0	2375497
Fruits	540	63699	34705	1800	100744
Ornamental plants	1000	13000	70700	0	84700
Forest species	380	0	0	2040	2420
Fodder crop	5200	0	581000	0	586200
Others	50	0	0	0	50
Forest species	60	200	0	150	410
TOTAL	1119646	426170	1600215	3990	3150021

7.1.3 Livestock Production

During the year, KVKS of Zone-I produced as many as 22555 livestock including goats, cattle, carps and poultry worth ₹ 7,67,824 and distributed to 691

farmers (Table 7.5). KVKS of the state of Punjab produced highest numbers (21854) of animals followed by KVKS of Uttarakhand and Jammu & Kashmir (Table 7.6).

Table 7.5: Production of Livestock by the KVKS of Zone-I

Livestock	Number	Value (₹)	No. of farmers
Cow	16	390674	0
Calves	2	460	1
Goats	19	68000	11
Poultry	22503	307730	679
Fishery (Indian carp)	15	960	0
Total	22555	767824	691

**Table 7.6: State-wise production of Livestock during 2018-19**

Livestock	Punjab	Himachal Pradesh	Uttarakhand	Jammu & Kashmir	Total
Cow	0	10	6	0	16
Calves	2	0	0	0	2
Goats	19	0	0	0	19
Poultry	21818	0	600	85	22503
Fishery (Indian carp)	15	0	0	0	15
Total	21854	10	606	85	22555

7.1.4 Bio-products

Different bio-products are produced by the KVKs to provide input support to the farmers. KVKs of Zone-I, during 2018-19, produced 10903.5 kg bio-fertilizers namely Azotobacter, Azospirillum, and Rhizobium worth ₹ 1,43,355 and provided to 3772

farmers. Similarly, 19560 kg of different composts were produced, which were worth ₹ 3,16,600. Moreover, 1119 fruit fly traps (Palam trap) worth ₹ 1,10,280 were produced and provided to 25-farmers (Table 7.7). Jammu & Kashmir followed by Punjab was the leading state in this regards (Table 7.8).

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

Bio Product	Quantity (Kg)	Value (₹)	Number of farmers
Bio-fertilizer			
Azotobacter	10474.0	114545	2732
Azospirillum	165.0	13200	30
Rhizobium	264.5	15610	1010
Total	10903.5	143355	3772
Compost			
Vermi-compost	9260	305100	177
Compost	10000	10000	0
NADEP compost	300	1500	0
Total	19560	316600	177
Bio-agent			
Mushroom spawn	0.8	8000	19
Pheromone trap (No.)	1119	110280	25
Total		467955	3968

Table 7.8: State-wise details of production of Bio-products during 2018-19

State	Quantity (No.)	Quantity (Kg.)	Value (₹)	Number of farmers
Punjab	0	11203.5	144855	3804
Himachal Pradesh	1119	400.0	80000	100
Uttarakhand	0	11660.0	65600	64
Jammu & Kashmir	0	7200.8	177500	0
Total			467955	3968

7.2 Soil, Water and Plant Analysis

During the period, KVKs of this zone have analysed a total of 18062 samples including 14808 soil samples, 1812 water samples and 1442 plant samples. There were 14686 farmers from 3609 villages who have availed this facility and KVKs earned ₹ 1.71 lakh from this service (Table 7.9). Data in the Table 7.10 showed

state-wise samples analysed by KVKs and Punjab has analysed 11621 soil samples followed by Uttarakhand (1311), Himachal Pradesh (1103) and Jammu & Kashmir (773). The KVKs have also distributed 13300 soil health cards to 10073 farmers from 1885 villages. Details of soil health cards (SHC) distributed by the KVKs during 2017-18 have been given in Table 7.11.

Table 7.9 Details of samples analysed during 2018-19

Particulars	No. of samples	No. of farmers	No. of villages	Charges (₹)
Soil	14808	12220	2545	150295
Water	1812	1070	755	21000
Plant	1442	1396	309	0
Total	18062	14686	3609	171295

Table 7.10: State-wise samples analysed during 2018-19

State	Soil Samples analysed				Water Samples analysed				Plant Samples analysed			
	No.	Farmer	Village	Charges (₹)	No.	Farmer	Village	Charges (₹)	No.	Farmer	Village	Charges (₹)
Punjab	11621	7224	2040	130120	1754	1045	735	21000	1265	1234	264	0
Uttarakhand	1311	2460	155	6000	11	11	9	0	0	0	0	0
Himachal Pradesh	1103	1735	254	0	47	14	11	0	70	55	25	0
Jammu & Kashmir	773	801	96	14175	0	0	0	0	107	107	20	0
Grand Total	14808	12220	2545	150295	1812	1070	755	21000	1442	1396	309	0

**Table 7.11: State-wise details of Soil Health Cards distributed by KVKS during 2018-19**

S.No.	State	SHC distributed (No.)	Farmers (No.)	Villages (No.)	Charges
1	Punjab	8592	5759	1546	53680
2	Uttarakhand	2848	2494	152	0
3	Himachal Pradesh	1214	1207	112	0
4	Jammu & Kashmir	646	613	75	14175
	Total	13300	10073	1885	67855

7.2.1 Soil Samples Analysed through Mini Soil Testing Kit

KVKS of this Zone analysed a total of 7197 Soil samples using Mini Soil Testing Kits (MSTK). There were 9078 farmers from 1125 villages who have availed this facility and earned an amount of ₹ 27080 by KVKS from this

service (Table 7.12). The KVKS of Punjab has analysed 2346 soil sample whereas KVKS of Himachal Pradesh tested 1352 soil samples. Similarly, KVKS of Jammu & Kashmir and Uttarakhand analysed 2371 and 1128 soil samples, respectively. The KVKS have also distributed 7671 soil health cards to 7257 farmers from 828 villages during 2018-19.

Table: 7.12 State-wise samples analysed by MSTK during 2018-19

State	Soil samples analysed				Soil Health Cards distributed		
	No.	Farmer	Village	Amount realised (₹)	No.	Farmer	Villages
Punjab	2346	1914	422	26580	1894	1588	344
Himachal Pradesh	1352	1976	274	0	1837	1826	210
Jammu & Kashmir	2371	2575	256	0	1107	1107	100
Uttarakhand	1128	2613	173	500	2833	2736	174
Total	7197	9078	1125	27080	7671	7257	828

7.3 Rainwater Harvesting Units

Rainwater Harvesting Unit with micro irrigation has been established in many KVKS of Zone-I but only 9 training programmes has been conducted and 6 demonstrations were laid for creating awareness

among farmers. KVKS utilized this facility and produced 29.15 q of quality seed and 2 lakh improved quality planting material for distribution among farmers (Table 7.13). Further 4987 farmers and 316 officials visited the units and acquired the knowledge about this demo unit.

Table 7.13: State-wise details of Rainwater Harvesting Demonstration Unit

State	No. of Training programmes under Rain water Harvesting	No. of Demonstrations	Seed produced (q)	No. of plant materials produced	Visit by farmers (No.)	Visit by officials (No.)	No. of KVKS involved
Punjab	5	3	0	0	2398	32	5
Uttarakhand	4	1	3.15	134309	2485	265	3
Jammu & Kashmir	0	0	0	0	0	0	0
Himachal Pradesh	0	2	26.00	105783	104	19	2
Total	9	6	29.15	240092	4987	316	10

Chapter - 8

TECHNOLOGY BACKSTOPPING AT RESEARCH INSTITUTES

8.1 ATICS

Agricultural Technology Information Centres (ATICs) provide single window delivery system for technology information as well as products such as seed, planting material, technical knowhow, and publications etc. available to farmers. Various, services provided by the ATICs of ATARI Zone-1 during 2018-19 have been presented in the Table 8.1.

Table: 8.1: Details of activities conducted by ATICs during 2018-19

Sr. No.	Name of ATIC	Farmer's units		Phone calls from famers (No.)	Soil & water samples tested (No.)
		Technical advice (No.)	Technology products (No.)		
1	PAU, Ludhiana	7672	183702	5408	7665
2	CPRI, Shimla	650	0	150	20
3	SKUAST-K, Srinagar	7115	3740	4132	196
4	Dr. YSPUH&F, Solan	1826	2917	187	560
5	CSKHPKV, Palampur	1942	4812	809	0
6	GBPUA&T Pantnagar	2428	713	1931	0
Total		21633	195884	12617	8441

8.1.2 Delivering publications

ATICs have not been just a source of making farm inputs available to the farmers but they have also been acting as an important platform for selling or delivering publications to the intended clientele i.e. farmers. During 2018-19 ATICs of the Zone-1 sold/

delivered 457928 number of copies of publications to the farmers earning ₹ 1.69 crore and benefitting nearly 1 Lakh farmers. About 52% of the revenue generated through sale of sale of books and 48% from other publications (Table 8.2).

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

Sr. No.	Particulars	Copies (No.)	Revenue (₹)	Farmers benefited (No.)
1	Books	54026	8863880	48697
2	Technical bulletins	478	21970	1453
3	Technology Inventory	0	0	0
4	CDs	43	6400	40
5	Video films	15	0	2000
6	App's developed	0	0	0
7	Others	403366	8071671	56400
Total		457928	16963921	108590



8.1.3 Technological products

Sale of technology products like seed, planting material, livestock and processed products etc. has been highly popular activity at ATICs. During 2018-19 ATICs of this zone sold 90112 quintal quality of seeds and 8 Lakh plants/ planting material of different crops. Sale of approx. 14,000

litre livestock product (milk) by the ATICs was another significant contribution by this system. All six ATICs of Zone-1 collectively generated a revenue of 12.6 crore by selling technology products only out of which sale of seeds contributed 72% followed by 26 % by the sale of planting material and 1 % by the sales of animal products (milk) etc. (Table 8.3).

Table 8.3: Technological Products and Service Sales provided by ATICs

S. No .	Particulars	Quantity	Value (₹)
1	Seeds (q)	90112	91417061
2	Planting materials (Nos.)	810955	33291021
3	Livestock (Litres)	14126	565060
5	Bio Products (q)	0.19	6270
6	Processed Products (Bottles)	46	22775
7	Others pl. specify (q)	46075	921500
8	Mineral mixture (q)	4420	314362
9	Uromin Bricks (Nos.)	3874	271180
Total			126809229

8.2 Directorates of Extension

Directorates of Extension Education located in eight State Agricultural Universities *viz.*, PAU Ludhiana, GADVASU Ludhiana, Dr. YSPUH&F Solan, CSKHPK Palampur, GBPUA & T Pantnagar, VCSGUUH&F Bharsar, SKUAST Jammu and SKUAST Kashmir provide adequate technological backstopping in agriculture and its allied sectors to their KVKs. The Directors of Extension Education and their officials coordinate and monitor the mandated activities of all the KVKs under their jurisdiction through Scientific Advisory Committee meetings, workshops, review meetings, field visits and organize human resource development programmes for KVK staff on frontier areas of technologies. Further, they

also provide technological products like improved seeds, planting materials, livestock, poultry breeds and fingerlings to various KVKs as per the requirements of their stakeholder farmers. Table 8.4 reveals that Directorates of Extension Education of various universities conducted 152 human resource development (HRD) activities and their officials have participated in 62 Scientific Advisory Committee meeting. Similarly, they have attended 105 Field Days, 61 workshops/Seminars and 60 farmer scientist interactions, 38 technology weeks, 185 Trainings programmes, 203 On Farm Testing (OFT) and 635 Front Line Demonstrations (FLD) programmes organized by various KVKs. Moreover, 231 publications were also published and updated by these Directorates of Extension Education.

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

Activity	PAU Ludhiana	GADVASU, Ludhiana	Dr. YSPUH & F Solan	CSK HPKV, Palampur	GBPUA&T, Pantnagar	UH&F, Pauri Garhwal	SKUAST, Jammu	SKUAST, Srinagar	Total
HRD Activities organized	59	29	6	4	3	1	4	46	152
SAC meetings Attended	18	3	8	8	9	0	3	13	62
Field Days	46	4	5	0	27	0	12	11	105
Workshop/ Seminars Attended	18	2	4	0	0	0	14	23	61
Technology Weeks	18	0	1	0	11	1	2	5	38
Trainings Programmes attended	135	6	3	7	0	4	15	15	185
Farmer Scientist Interaction attended	18	6	1	1	18	4	0	12	60
Special Days organized	40	0	0	2	0	0	1	0	43
OFT	134	0	8	16	20	2	10	13	203
FLDs	450	3	10	24	100	10	22	16	635
Publication/ Technology Inventory/ Updated	18	18	2	3	0	6	2	88	137
Other Literature /Updated	9	52	29	0	3	0	1	0	94

Table 8.5: Details of Technological Products provided to KVKS

Technological product	PAU Ludhiana	GADVASU, Ludhiana	Dr. YSPUH & F, Solan	CSK HPKV, Palampur	GBPUA&T, Pantnagar	UH&F, Pauri Garhwal	SKUAST, Jammu	SKUAST, Srinagar	Total
Seed (Qtls.)	19968	61.12	7.67	0.38	40	14.84	242.57	310.51	20645.7
Planting materials (Nos.)	333160	350	511	0	0	32000	8668	2400	377089
Bio-Products (Nos.)	32981	65	4015	0	0	0	0	0	37,061
Livestock Products	Mineral Mix. (Kg)	3960	9050	400	1310	0	22.15	0	14742.2
	Bypaas Fat (Kg.)	0	204	0	0	0	0	0	204
	UMMB (No.)	0	378	0	250	0	1000	0	1628
Poultry Breed (Nos.)	0	55	40	1000	0	0	0	15786	16881
Soil/ water/ leaf testing Manure (Nos.)	10840	0	0	0	0	1701	0	0	12541
Fish Seed (Kg.)	0	40000	0	0	0	0	0	0	40000
Leaf color charts (Nos.)	483	0	0	0	0	0	0	0	483
Processed Products (Kg.)	4596	0	0	0	0	0	0	0	4596
Biopesticides (Kg.)	415	0	0	0	0	0	0	0	415
Farm Implements (Nos.)	321	0	0	0	0	0	0	0	321
Literature (Nos.)	0	0	2010	0	0	0	0	0	2010
Mushroom Span (Nos.)	0	0	0	0	0	0	0	540	540
Bio Agent (Nos.)	0	0	0	0	2	0	0	0	2

SWLT = Soil/water/leaf testing



8.2.1 Technological inputs

They have also provided the various technological inputs to KVKs such as 20645 quintals of improved seeds of high yielding varieties, 377089 number of planting materials and 37061 packets of bio-fertilizers, more than 14742 kg of mineral mixture, 1628

packets of UMM blocks and 204 kg of bypass fat were also provided to the KVKs for demonstrations at farmers' fields (Table 8.5). In addition to this, 12541 services such of soil-water testing and availability of 16881 poultry birds and 40000 fish seed and other important inputs were also facilitated for their farmers by these directorates.

Chapter - 9

HUMAN RESOURCE DEVELOPMENT

The institute HRD cell is effectively implementing various Human Resource Development (HRD) programmes to make Institute as well as KVK staff abreast with the latest technological development, acquiring specific technical knowledge and skill and update in their subject matter so as to make them efficient to carry out their assignments in the organization as well as for their career development. Human Resource Development activity in the Institute is carried out by encouraging the scientists as well as 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 Tables 9.1 and 9.2.

Table 9.1: Details of HRD programmes attended by ICAR-ATARI Staff during 2018-19

Sr. No.	Name of Employee	Designation	Date	Name of Training Programme Attended
1.	Dr. Preeti Mamgai	Sr. Scientist	30 May to 04 June 2018	Strategic Planning and Project Management at Mussorie, Uttarakhand
2.	Dr. Preeti Mamgai	Sr. Scientist	22-25 May 2018	Training Management Skills at PAMETI, Ludhiana
3.	Dr. Ashish S Murai	Scientist	22-25 May 2018	Training Management Skills at PAMETI, Ludhiana
4.	D.C Sati	AF&AO	05-11 July 2018	Refresher Course on Admin & Finance Management for SOD/AF&AOs/AAOs/JAOs/Assistants at Goa
5.	Indu Bagal	Assistant	10 Sept.-09 Nov 2018	168 th Cash Accounts Course at ISTM, New Delhi

Table 9.2: Details of trainings/workshops/meetings organized by ICAR-ATARI during 2018-19

Sr. No.	Name of the programme organised	Date of Organisation	No. of participants	No. of Institute/ Organisations	Venue
1.	State Level Action Plan Workshop of KVKs of Jammu & Kashmir	17 April 2018	45	21	SKUAST-KVK, Jammu
2.	Action Plan Workshop of Farmer FIRST Programme (FFP)	20 April 2018	15	7	PAMETI, Ludhiana
3.	State Level Action Plan Workshop of KVKs of Uttarakhand	18 May 2018	25	13	GB PUAT, Pantnagar
4.	Action Plan Meeting of Cluster FLDs on Pulses and Oilseeds	21 May 2018	50	22	ICAR-ATARI, Ludhiana
5.	Organisation of Interaction of Hon'ble Prime Minister with Farmers	20 June 2018	60	-	ICAR-ATARI, Ludhiana
6.	Organisation of Group Meeting on <i>In-situ</i> crop residue management	06 July 2018	120	60	NASC Complex, New Delhi



Sr. No.	Name of the programme organised	Date of Organisation	No. of participants	No. of Institute/ Organisations	Venue
7.	Zonal Review-cum-Action Plan Workshop of NICRA project	30 July 2018	40	13	ATARI
8.	Training on <i>In-situ</i> paddy residue management through machinery for the scientists of KVKs of Haryana and Delhi	6-7 August 2018	30	15	PAU, Ludhiana
9.	Training on <i>In-situ</i> paddy residue management through machinery for the scientists of KVKs of Uttar Pradesh	9-10 August 2018	46	23	PAU, Ludhiana
10.	ICAR-TCS Workshop for Program Assistants as Master Trainers for application of KVK Sandesh App	10 August 2018	10	10	SEEET, PAU Ludhiana
11.	Training on <i>In-situ</i> paddy residue management through machinery for the scientists of KVKs of Punjab	13-14 August 2018	44	22	PAU, Ludhiana
12.	Training of Trainers for conducting Skill Development Programmes in Agriculture of 200 hrs or more duration	30 August 2018 to 01 st October 2018	90	43	PAU, Ludhiana
13.	Organisation of Stakeholders' Meet Under <i>In-Situ</i> Crop Residue Management Project	08 October 2018	150	40	ICAR-ATARI, Ludhiana
14.	6 th Management Development Programme for Newly Appointed Programme Coordinators	04-08 January 2019	03	03	ICAR-ATARI, Ludhiana
15.	Workshop for Scientifically Conducting Socio-Economic Survey on Impact of Crops Residue Management in Punjab	21 January 2019	20	15	ICAR-ATARI Ludhiana
16.	Review cum Orientation Workshop of ARYA project	09 February 2019	22	10	ICAR-ATARI Ludhiana
17.	Organisation of Zonal Review Workshop of Farmer FIRST Programme (FFP)	09 February 2019	15	7	ICAR-ATARI, Ludhiana
18.	Review Workshop of Cluster FLDs on Pulses and Oilseeds projects	9-10 February 2019	50	22	ICAR-ATARI, Ludhiana
19.	Workshop organized on International Women's day "Empowering Rural Women for Addressing the Agricultural Air Pollution and One Health".	08 March 2019	110	25	ICAR-ATARI, Ludhiana
20.	Interface Meet of KVKs and State Animal Husbandry Department of Punjab on "Livestock Entrepreneurship for Doubling Farmer's Income"	09 March 2019	90	25	ICAR-ATARI, Ludhiana

Chapter - 10

PROSPERITY OF FARMERS THROUGH TECHNOLOGICAL INTERVENTIONS

The technological interventions through KVKs have resulted in raising socio-economic status of targeted farmers. However, due to lack of documentation of such expenses the efforts of KVKs in this duration of unnoticed and unrecognized. This chapter undertakes documentation of some selected technological interventions which raised income of farmers significantly in Zone-1.

10.1 Income enhancement with nursery production of new varieties of apple on rootstocks

10.1.1 Introduction

Apple is the main cash crop of farmers of Shimla district which contributes around 83 per cent of the area and 97 per cent of total fruit production. The area under apple has increased significantly during last five decades and there is further scope of expansion due to introduction of high yielding spur type, colour strains and low chill varieties, which can be grown in areas which have become marginal for apple cultivation of traditional high chill cultivars due to climate change. Besides this, increasing pressure on land and reduction in average land holdings, there is a shift from low-density planting systems to high-density planting (HDP) systems which need clonal rootstocks. Therefore, the demand for clonal rootstocks and nursery plants of apple is increasing consistently.

10.1.2 KVK intervention

In 2013, Lokinder Singh participated as a trainee on skill development organized by KVK Shimla on orchard management in temperate fruit crops. Subsequently, he established a high-density apple orchard with new varieties viz. Red Kan, Super Chief,

Scarlet Spur, Jeromine, Red Velox, Chalanger, Ace Spur, Gloster, Hapkey, Evasni, Redlum Gala, Gala bell, Decarli Gala. Scientists of KVK visited his field and assessed the possibility of HDP in this flat and highly fertile land having irrigation facilities. As the area was suitable for HDP in apple the KVK provided quality planting material of new varieties to the farmer and guided him for the establishment of the HDP apple orchard. Drip irrigation and solar fencing facility were also arranged to the orchard from the department of horticulture on 80 per cent subsidy. Scientists of KVK Shimla regularly provided technical support to Mr Singh.

Further, Mr Singh was given training on clonal rootstock propagation with mound layering, trench layering and cuttings. Orchardist started establishing mother orchard of different varieties and clonal rootstocks under the guidance of KVK Shimla. He planted 400 rootstocks of MM111 and M793 as mother stock for multiplication. Next year, he planted four thousands clonal rootstocks of M9, M26, M7 and MM111 as mother stock. According to Mr Singh, in the first year, he was able to get 3-4 rootstocks in mound layering and 6-7 rootstocks in trench layering. This gave him motivation and in 2017, he again planted four thousand rootstocks of M9 and M793. Later, orchardist started taking mother stocks from his own nursery and planted rootstocks and nursery in 40 bighas approximately.

10.1.3 Outcome

From 2017 onward, Mr. Singh started selling clonal rootstocks. The detail of nursery plants sold by the farmer is given below in Table 10.1. Mr. Singh became role model for the farmers of the area and a lot of farmers are visiting his orchard and nursery area.

**Table 10.1: Detail of nursery plants sold by the farmer**

Sr. No.	Year	Number of rootstocks	Price (₹ per plant)	Income (₹)
1.	2018	30,000	100	30,00,000
2.	2019	80,000	80	64,00,000
3.	2020	2,50,000 (expected)	-	-

10.1.4 Impact

Quality planting material has been experienced as serious constraint for attainment of desirable yield in otherwise majority of senile orchards in the state. Huge demand for clonal rootstocks and nursery plants of latest varieties creates a strong business opportunity. This orchardist not only seized this lucrative opportunity but also shown the path for other youth to remain in agriculture and have attractive income also.

more technical input to improve the scale of her business.



Entrepreneur showing different processed products

10.2 An enterprising rural woman

10.2.1 Introduction

Smt. Sukhdev Kaur of village Boor Majra, Block Chamkaur Sahib of district Ropar is a role model in terms of the upliftment of rural women. In the year 2018, she started the Self Help group named "Mata Sahib Kaur Self Help Group" with 12 women of the village and she was nominated as President of the group. Sukhdev Kaur studied up to 10+2 and came to Krishi Vigyan Kendra, (KVK) Ropar in the year 2018 with the dream of achieving something bigger in life and betterment of her family. She wanted to give a secure future to her children as her family. She had a very small land holding of only 3 acres. This was the time, when wanted to raise her family income by adopting income generating enterprises with the help of KVK, Ropar.

10.2.2 KVK Intervention

After coming in contact with KVK, Ropar she received vocational trainings on income generating enterprises related to candle making, making of decorative articles, garment stitching and enrichment. Initially, she started making of decorative articles like wall hangings, decorative pots, sceneries etc. but later on she switched over to quilted bags, garments for women & children and candle making. These products have found good market in her own village and adjoining villages. Excited Sukhdev Kaur approached KVK for

10.2.3 Output

With the motivation of KVK scientists, she organized her 12 fellow rural girls & women in to a Self Help Group namely 'Mata Sahib Kaur Self Help Group' in May 2018. She, along with her fellow rural girls & women started many income generating enterprises like stitching, crocheting, decorative articles etc. With the initiatives of KVK Ropar, she was selected as master trainer by the cooperative societies under the Mai Bhago Shakti karan scheme. She has trained approximately 1000 rural girls and women in stitching, crocheting, decorative articles and quilt work during the last one year in the different villages of district Ropar like Boor Majra, Salapur, Shantpur, Balsanda, Dhauri, Goslan, Kyenor, Kakrali, Samroli, Ban majra, Saheri, Kiri Afgana, Bassigujran etc.



Entrepreneur interacting with visitors in an exhibition

10.2.4 Outcome

Smt. Sukhdev Kaur puts up her exhibition-cum-sale stall at events such as Kisan Melas at Punjab Agricultural University, Ludhiana and Farmers' training camp organized by different line departments of district Ropar.

10.2.5 Impact

She attributes her success to her family as well as KVK Ropar for their continuous support. When she started before one year, she was the lone beneficiary of KVK but now around fifteen women of adjoining villages are also connected with the KVK and economically empowered. At present, she is earning about ₹ 10,000/- per month and is also generating employment for other girls and women. Now she is determined to expand this enterprise on a large scale. She has indeed become a role model for the rural women. We wish her dreams to be fulfilled so that she can earn more and more for her family and can serve rural girls & women efficiently.

10.3 Vegetable Nursery – A lucrative attempt towards diversification

10.3.1 Introduction

Diversification is the re-allocation of some of a farm's productive resources, mostly land, for farming or non farming activities other than regular crops. It is fundamental to agricultural growth. Shri Amritpal Singh is a young farmer of village Hamza, block Majitha, Amritsar. He is the owner of 2.5 acres land in the village and cultivating 7-8 acres on lease every year and had been growing traditional crops in this land but was always interested in trying something different and was on the lookout for a better way to manage his land and increase the revenue from the same.

10.3.2 KVK Intervention

Horticulture experts at KVK, Amritsar provided training to the farmer and handholding as well as subsidy to start Vegetable Nursery. He received training on

Protected Cultivation and Nursery raising. With the guidance of KVK, he purchased various instruments like rotavator, nursery bed maker etc. The nursery beds on his farm are raised 15 to 20 cm from the ground level and seeds of cauliflower, cabbage, tomato, brinjal, chilli, onion and capsicum are raised in lines after adopting package of practices by PAU, Ludhiana. The nursery of these vegetables is irrigated with sprinkler system thus resulting in a significant saving of water resources. He uses a Laser land leveler in his field every year which improves water use efficiency in his horticulture crops. Training on all these techniques is provided to him by KVK experts. He got a Pack-house constructed at his farm under NHM where the vegetables are properly sorted, graded and packed before dispatch to various outlets and *mandis*.



Healthy and robust harvest of brinjal

10.3.3 Output

The farmer adopted vegetable cultivation specially tomato and pea on his farm and received good results. Marketing of tomato is done in Amritsar market as well as supplied to a food processing factory at Khadoor Sahib while the nursery raised on his farm is in great demand and is sold locally only by word of mouth. He has established a well maintained vegetable nutrition garden for fulfilling the vegetable needs of his family, in which very limited use of pesticides is done.



10.3.4 Outcome

The farmer has managed more than two fold increase in income from his farm by his consistent efforts in comparison to traditional cropping pattern which he was following earlier. The coordination with KVK Team has helped in increasing his confidence to take calculated risks and better decisions for betterment of his crop. Various awards received by him are a testimonial to his continuous hard work along with proper guidance.

10.3.5 Impact

He has been a motivation for several farmers of the adjoining villages who took up tomato cultivation as their main occupation and have been getting lucrative results. The district needs more farmers like him who have the zeal to diversify and improve their cropping practices for more lucrative results.

10.4 Raising farm profitability through strawberry cultivation

10.4.1 Introduction

Strawberry is an important fruit crop of India and it is commercially grown in temperate and sub-tropical areas of the country. The fruits are delicious with rich source of vitamins, minerals and various other bioactive compounds. In Himachal Pradesh strawberries are mostly grown under open field condition.

10.4.2 KVK Interventions

Sandeep s/o Sh. Bhim Singh VPO Puruwala Kanshipur, Tehsil Paonta Sahib, District Sirmaur HP is a

progressive farmer. His total land holding is about one hectare but he has also leased-in one ha land from his close relative. Agriculture was his only source of income but he soon realized that his farming is non-remunerative due to dominance of traditional crops. KVK Sirmaur advised him to shift from cereal based rice – wheat cropping system to paddy/ maize- strawberry cropping system. The KVK ensured capacity building, technology introduction, technical guidance and facilitation for formation of self help group.

The farmer started his journey from 0.08 ha and at present he is cultivating strawberry in 0.84 ha of land. After procuring the planting materials from Haryana and Maharashtra in initial face, now he multiplies planting material in higher hills of the district during summer which reduces cost of transportation and planting material and also providing an opportunity to hill farmers to earn more. After KVK interventions he is using mulching and drip irrigation for weed management and judicious use of water. For better price he developed market linkages in nearby cities.

10.4.3 Output

He is currently cultivating strawberry in 0.84 ha and earning an annual net income of ₹ 7 lakh which was earlier ₹ 0.8 lakhs only. Annual additional income from sale of surplus planting material was between 2 to 3 lakh. Direct retailing of produce in nearby cities has removed role of middlemen in marketing of his produce. The economics of the strawberry crop is given in Table 10.2.

10.4.4 Outcome

With the active support of the KVK Sirmaur he has emerged as progressive farmer in Poanta valley.

Table 10.2: Economic analysis of strawberry crop (₹/ ha)

Cost of Labour	1650 mandays @ ₹ 300/-	4,95,000
Cost of Inputs (planting material, plant protection, mulching sheet, fertilizer etc.)	-	3,50,000
Yield (average)	15000 kg	
Gross Income	15000 kg x Rs 120/- kg	18,00,000
Net Income		9,55,000
Income from prevalent cropping system i.e. wheat- rice		80,000

Adoption of latest technologies has led to improvement in productivity and income of his family several folds further making him a role model for the farmers of the area.

10.4.5 Impact

Now, 10 to 12 nearby villages are covering an approximate area of 20 ha of strawberry cultivation. Successful adoption of strawberry cultivation by other farmers increasing farmers' strawberry production and farm income tremendously is a true reflection of the impact of this KVK intervention. Now farmers are getting planting material 20 to 30% cheaper.

10.5 A missionary of Crop Residue Management-Ranjit Singh Thind

10.5.1 Introduction

Straw management is a biggest challenge faced by the farming community these days. Strict laws imposed by Supreme Court and National Green Tribunal added their worries. Though these bans may prove fruitful for the farmers themselves in long run, but at present they think it as punishment. A number of solutions for paddy straw management are suggested by agricultural universities and state departments; but the farmers feeling these as time consuming and uneconomical. However, there are some self motivated and socially responsible farmers in the society and Ranjit Singh Thind is one of them.

10.5.2 KVK Intervention

Ranjit Singh Thind VPO Mahijitpur is a marginal farmer of Sultanpur block of Kapurthala district who is one of the ambassadors of the KVK. He has taken a lead by adopting different straw management techniques at his farm for sowing different crops. Eight years back he has taken pledge of not to burn any kind of straw at his farm. He tried to incorporate straw in soil in a number ways and means. During this period, he has to face many problems. Sometimes his friends demotivated him and suggested to do cultivation by burning paddy straw & prepare the fields with no additional cost.

However, being motivated by the KVK Kapurthala tried to find out the remedies for it.



Farmer showing paddy straw shredder

KVK helped him buying a Happy Seeder and sowing wheat in standing paddy stubbles. In the second year, his fellow farmers observed that wheat sown with rotavator yielded less on account of lodging near maturity stage and they also started following him. Next challenge ahead him was to prepare the land for vegetables without burning the straw as Sultanpur block is an important vegetables growing area, especially potato, for which well-prepared fields is the basic requirement. Though the residue incorporation operations, added to the cost of cultivation, yet this solution resulted in higher yield and quality of the output.

10.5.3 Outcome

The farmer experienced considerable favourable developments on account of paddy straw management (PSM). With PSM the first irrigation was given after 35 days instead of usual 20 days to wheat crop. Same observations are noticed in potato and carrot crops. The loose paddy straw mulch in the field after the wheat is sown with Happy Seeder, suppresses emergence of weeds in wheat crop hence there is no need to apply weedicides. Farmers, who opted paddy straw incorporation in the soil, had 8-10% higher yield of potato and 10-12% increase in carrot yield. Similarly, farmer experienced that incorporation of straw improved



Healthy potato crop in residue incorporated field

the quality of output as the size of potato became larger while the length and girth of carrot increased. The colour of the potato tubers was much better while the nail in the carrot crop was thinner.

10.5.4 Impact

The successful crop residue management experience of Mr Thind made him role model of his fellow farmers. Inspired from him 55 farmers of the surrounding area followed him and are successfully incorporating the straw with this technique in more than 1000 acres. In addition to this from the last year onwards, the fellow farmers also incorporated maize straw and Dhancha in the soil, which increases the fertility of soil.

10.6 Enhancing dairy farm profit ability through silage making

10.6.1 Introduction

Regular supply of quality fodder is essential for ensuring attractive economic returns from the dairy farming. Contribution of forage in animal feed is more than 75% and is considered a cheap source of nutrients. Supply of green fodder throughout the year is limited due to extreme seasonal severity especially during May to June and November to December. Inadequate supply of quality fodder has been identified as one of the reasons for reduced livestock productivity. Less fodder supply issues in some months of the year can be resolved by converting fresh fodder in to silage when fodder production is at higher level.



Silage making process



Feeding silage to animals

10.6.2 Interventions

Harchand Singh S/o Joginder Singh is resident of village Mari Kamboke situated at Indo-Pak border. He is having dairy farm of 50 HF crossbred dairy animals. Earlier he was using conventional practices of feeding animals however; KVK Tarn Taran selected this farmer for his capacity building, introduction of recommended corn cultivars for silage making, scientific silage making in pakka silo pits and ensuring comprehensive technical support. He shifted major portion of his land to corn cultivation during spring season by adopting crop rotation of Paddy-Toria- Spring maize and started making silage.

10.6.3 Output

Milk production ($\text{Kg animal}^{-1} \text{day}^{-1}$) of HF crossbred dairy cows pre and post maize silage feeding (Table 10.3).

Table 10.3: Milk production (Kg animal⁻¹day⁻¹) of HF crossbred dairy cows

Size of silo pits (m ³)	Fodder Stored (tonnes)	No. of animals	No. of animals in early lactation	Silage fed (Kg animal ⁻¹ day ⁻¹)	Average milk yield before silage feeding (Kg animal ⁻¹ day ⁻¹)	Average milk yield after silage feeding (Kg animal ⁻¹ day ⁻¹)	Increase in milk production (%)
600	300	50	12	30.0	20.5	22.8	11.2

10.6.4 Outcome

With the active support of the KVK he has emerged as progressive dairy farmer in Tarn Taran. Adoption of latest technologies has led to improvement in productivity and income of his farm. The area which was earlier kept for cultivation of fodder crops become available for cultivation of paddy and toria which results in increased income of farm.

10.6.5 Impact

The success story of Mr Harchand Singh has encouraged many farmers to diversify into dairy farming in about 50 villages situated on Indo Pak Border by solving the problem of assured fodder to milch animals round the year and earning higher income.

10.7 Apricot Harvest Net in Cold Arid Ladakh Ensuring Economic upliftment

10.7.1 Introduction

Apricot (*Prunus armeniaca* L.) locally known as 'Chuli' is one of the most nutritive delicious and commercially important fruit crops of Ladakh. The fruits are perishable due to which extra care must be taken during harvesting. Harvesting is usually carried out by shaking or beating of branches. When ripe fruits fall from heights on the hard ground surface; the fruits split and bruise along with soil, grit and grasses that stick with the fruits when they touch the ground. These fruits when dried are low in quality and consumer acceptability. Almost 90 % of the fresh produce goes waste due to poor harvesting practices and therefore its market value stands abysmal.

10.7.2 KVK intervention

To address the problems related to quality and economic yield in apricot, KVK-Leh extensively started promoting use of low cost Apricot harvest net developed by SKUAST-K, Leh in all the major belts for harvesting of high quality bruise free clean fruits. KVK Leh has 1255 nos. of demos at farmer's field in various apricot growing villages so as to aware and adoption of this technology. The farmers have a good response towards the technology demonstrated and they are enthusiastic in adoption of this technology.



Apricot collection using safe harvesting net

10.7.3 Output

Through wide promotion and demonstration of this technology at farmer's field, the harvested fresh fruits are of good quality (bruise free). The Harvest net prevents direct contact of fresh fruits with the ground and helps in collection of almost 95% undamaged fruits for further drying and processing. Among various beneficiaries, encouraging results were observed in the orchard of Smt. Ishey Lamo, a resident of Saspol village. She has around 100 apricot trees and majority of his produce were unmarketable due to his traditional



harvesting practices. The average income from her orchard was only about ₹ 1500/plant. As Smt. Ishey Lamo was an active enthusiastic farmer willing to adopt Apricot Harvest Net technology and guided by KVK-Leh, her average income jumped to an astonishing amount of ₹ 3500/plant which was unexpected of, without this technological intervention by KVK-Leh. Smt Lamo herself now claims that her average annual income from the orchard has crossed to ₹ 2, 34,500 by the end of 2018 and enjoys a sustainable and prosperous livelihood.

10.7.4 Impact

Due to the intervention of Apricot Harvest Net in lower belt of Ladakh, all the farmers having apricot orchards have adopted this technology for harvesting their produce. The farmers are selling their harvested fruits either in dried form or fresh. The dried forms are mostly sold in the market with greater consumer acceptability earning them handsome income. This technology no doubt has helped raise the living standards of many farming families in the region but has also motivated the younger generations in entrepreneurship development (Table 10.4).

Table 10.4: Technology demonstration in apricot crop by KVK

Crop	Technology	Parameter with unit	Demo	Check
Apricot	Apricot Harvesting Net	Economic Returns and Quality (Firmness, Undamaged fruits)	₹ 3500/plant 90-95% undamaged, quality fruit harvested safely	₹ 2000/plant





Chapter - 11

IMPORTANT ACTIVITIES, INITIATIVES AND CELEBRATIONS

11.1 Crop Residue Management

11.1.1 In-situ Crop Residue Management in Punjab

Paddy is a major crop of Punjab and being cultivated in an area of about 3.0 million ha. Farmers generally burn paddy residue prior to wheat sowing as the cheap and easy option for residue management due to short time available for sowing ensuing crop. But burning leads to losses of soil organic matter and nutrients. Burning crop residue also causes pollution and releases 3 kg PM, 60 kg CO, 1460 kg CO₂, 199 kg Ash, and 2 kg SO₂ from one tonne of paddy straw. To address the problem of crop residue burning, Ministry of Agriculture & Farmer Welfare, Government of India initiated the Central Sector Scheme on "Promotion of agricultural mechanization for *In-situ* management of crop residue in the state of Punjab, Haryana, Uttar Pradesh and NCT of Delhi amounting ₹ 1152 crores for 2018-19 and 2019-20. The DAC&FW sanctioned ₹ 21.29 crores for 2018-19 to ICAR under this scheme for the year 2018-19 for the implementation of Information, Education and Communication (IEC) component. This project is being implemented by ICAR through 60 KVKs of Punjab (22), Haryana (14), Delhi (1), UttarPradesh (23). The ICAR-ATARI, Ludhiana acted as nodal ATARI for implementation of this project.

11.1.2 Training of trainers on *in Situ* Crop Residue Management

The ICAR-ATARI Ludhiana organized three training programmes on *In-situ* paddy residue management through machinery of two days each in collaboration with Department of Farm Machinery and Power Engineering, PAU, Ludhiana for building the capacity of the trainers. First training was organised for 30 KVK Heads & Scientists of 15 KVKs of Haryana &

Delhi at PAU, Ludhiana during 6-7 August 2018. Second for 46 KVK Heads & Scientists of 23 KVKs of Uttar Pradesh at PAU, Ludhiana during 9-10 August 2018 and third training was organised for 44 KVK Heads & Scientists of 22 KVKs of Punjab during 13-14 August 2018.

For the implementation of this project in Punjab, a total of 357 farm machines were procured by 22 KVKs of Punjab including 115 Happy seeders, 65 Reversible M.B. Ploughs, 60 Shrub masters/ Cutter cum Spreaders, 69 Mulchers & Paddy Straw Choppers and 48 Zero Till Drills as depicted in Table 11.1.

Table 11.1: Procurement of crop residue machinery

S. No.	Machines Procured	Number
1	Happy Seeder	115
2	Reversible M.B. Plough	65
3	Shrub Master /Cutter cum Spreader	60
4	Mulcher/ Paddy Straw Chopper	69
6	Zero Till Drill	48
TOTAL		357

The KVKs of Punjab implemented different IEC activities under this project during 2018-19. A total of 440 awareness camps were organized at district level, block level & Village level in which 48325 farmers participated. For capacity building of farmers, tractor & machine operators, custom hiring centre owners, 157 training programmes were conducted in which 4555 stakeholders participated. KVKs of Punjab also organised 34 Kisan Melas on crop residue management theme and more than two lakh farmers were mobilised. Students of 131 schools and colleges were also involved in creating the awareness about *in-situ* crop residue management. More than 25000 students mobilized through essay completion, painting, debate etc. Demonstrations on *In-situ* crop residue management were conducted at strategic locations on more than 5000 ha area and 11217 farmers participated in these



demonstrations. KVks also organized 104 exposure visits, 100 filed days and 39 harvest days in which more than 4000, 6000 and 1500 farmers participated as depicted in Table 11.2.

There were several other IEC activities carried out by KVk for creating awareness about in-situ crop residue management. A total of 349 advertisements appeared in print media and 281 articles and columns written by KVk scientist and published in newspapers and magazines. Almost 800 hoardings were fixed at

mandis, roadside, schools, markets, petrol stations and panchayats in villages across the state. Banners and Posters (6020) were also placed at different places and on vehicles to make people aware. A large number publicity material (303229 in number) such as pamphlets and leaflets etc were distributed. Jingles, scroll messages and audio- visual clip on TV & Radio were played twice a week. KVk expersts also participated in 50 TV programmes and panel discussion, which were telecasted on Doordarshan, DD-Kisan as given in Table 11.3.

Table 11.2: IEC activities conducted by KVks of Punjab

S. No.	IEC activities	No. of activities	No. of Participants
1	Awareness camps conducted	440	48325
2	Training Programme (5 days)	157	4555
3	Kisan Mela	34	203858
4	Mobilisation of students of schools and colleges	131	25107
5	Demonstrations (ha)	5085	11217
6	Exposure visits conducted	104	4071
7	Field days organized	100	6449
8	Harvest days organized	39	1678

Table 11.3: Other IEC activities conducted by KVks of Punjab

S. No.	Activity	No. of activities
1	Advertisement in print media	349
2	Column / Articles in newspaper and magazines etc.	281
3	Hording fixed (at Mandi/Road side/Market/Schools/Petrol pump/Panchayat etc.)	791
4	Poster/banner placed at different location/buses etc.	6020
5	Publicity material such as leaflets/ pamphlets etc. distributed	303229
6	TV programmes / panel discussions Doordarshan/ DD-Kisan and other private channels	50
7	Awareness through TV & Radio, Jingles on radio/TV, Scroll message on TV, Audio -Visual clips on TV	Twice a week

11.2 Technology Week Celebration

Technology Week Celebration is an important activity at the KVKs to demonstrate and provide awareness, on latest technologies related to various aspects of agriculture, to the farmers. During 2018-19 KVKs of the Zone-1 organized Technology Week benefitting 48257 farmers through 137418 activities (Table 11.4). This programme enabled the KVKs to strengthen linkages and collaboration with various line departments at the district level, as evident from the

involvement of personnel from various departments in Kisan Goshties, lectures, fairs and farmers' visits. In addition, exhibitions, film shows, fairs and farm visits were organized. In these programmes 5991 activities of publications were distributed among 10453 farmers. During these programmes 162 q of quality seed (812 farmers), 127815 numbers of planting material (1579 farmers), 410 q biofertilizer (320 farmers) and 4 activities related to livestock distribution activities (200 farmers) for the upliftment of agriculture in Zone-1 states were undertaken during this period.

Table 11.4: Various activities organized during Technology Week (2018-19) by the KVKs

Types of Activities	No. of Activities	Number of Participants	No. of KVKs
Gosthies	168	8227	24
Lectures organised	425	5786	24
Exhibition	52	6438	21
Film show	61	3194	18
Fair	11	4150	8
Farm Visit	130	4093	22
Diagnostic Practicals/visits	117	1455	15
Distribution of Literature (No. of copies)	5991	10453	15
Distribution of Seed (q)	162	1664	4
Distribution of Planting materials (No.of seedling/plants)	127815	1579	17
Bio Product distribution (Kg)	1947	200	3
Bio Fertilizers (q)	410	812	4
Distribution of fingerlings	125	6	1
Distribution of Livestock specimen	4	200	2
Total	137418	48257	

11.3 BEE-UREDA initiative

In order to create awareness among the farmers and extension personnel for energy efficient pump sets, tractors and other energy efficient farm machinery Bureau of Energy Efficiency (BEE) with collaboration with Uttarakhand Renewable Energy Development Agency (UREDA) provided ₹ 75000 to five KVKs of Uttarakhand during the year.

Three KVKs i.e. Bageshwar, Haridwar and Dehradun successfully organized the awareness programmed about appropriate use of energy in farm activities. About 284 farmers participated in these awareness programmes funded by BEE and 10 lectures were delivered to the farmers (Table 11.5).

**Table 11.5: Details of BEE-URED A initiative**

Sr. No.	Name of KVK	Date	Event under Farmer Awareness Program	Venue	No of participants	No. of Officers and Scientists	No. of Lectures
1	Almora	Nil	Nil	Nil	Nil	Nil	Nil
2	Dehradun	13.05.19	Energy Efficiency and Energy Conservation	KVK, Dehradun	105	-	3
3	Haridwar	15.06.19	Energy and Water Conservation	KVK Haridwar	60	5	3
4	US Nagar	Nil	Nil	Nil	Nil	Nil	Nil
5	Bageshwar	28.05.19	Energy and Water Conservation	KVK Bageshwar	119	9	4
Total					284	14	10

11.4 District Kisan Melas

District Kisan Mela was organised by three KVKS of Zone-I. KVKS who successfully conducted the Mela were Hoshiarpur, Bathinda from Punjab and Haridwar from Uttrakhand. District Kisan Melas were organized during the month of February 2019. These Melas were organized to create awareness among farmers and extension personnel of various schemes/programmes under Rashtriya Krishi Vikas Yojana (RKVY). The fund of ₹4.00 lakh for each district for conducting the Melas was provided by Department of Agriculture Cooperation & Farmers Welfare (DAC&FW). In KVK Bathinda Smt. Harsimrat Kaur Badal Union Minister of Food Processing Industries, Govt. of India attended the programme and addressed

the farmers of the region and about the various new schemes launched by the ministry for the welfare of the farmers. In KVK Hoshiarpur Sh. Vijay Sampla, Union Minister of State for Social Justice & Empowerment, Govt. of India was the chief guest and Smt. Isha Kalia, I.A.S., Deputy Commissioner, Hoshiarpur presided over the function and discussed the problems of farmers. Exhibition stalls by various SHGs and innovative farmers/groups/societies/ farm machinery/banks & companies related to agriculture.

In KVK Haridwar Sh. Ramesh Pokhriyal 'Nishank' Union Minister of Human Resource Development Govt. of India attended the mela and motivated the farmers for diversification and use of high yielding varieties.



Kisan Mela at KVK Bhatinda



Kisan Mela at KVK Hoshiapur

Table 11.6: Details of Kisan Mela conducted by KVKS of Zone-I during the year

Sr. No.	KVK	Date of Mela	Farmers (No.)	Extension personnel (No.)	Sale of seed /planting material
1	Hoshiarpur	22-02-2019	1015	45	Seed of <i>kharif</i> & summer crops, fodder crops, vegetable seed kits, mineral mixture, fruit & forest plants
2	Bathinda	18.02.2019	400	6	200 vegetable kits sold of ₹ 20,000. Sale of seed: 40 Kg PR-122 and 30 q Basmati 1121 Planting material sold of ₹ 1000
3	Haridwar	16.02.2019	860	35	
	Total	3	2275	86	



Exhibition during Kisan Mela at KVK Haridwar

11.5 Sub Mission on Agriculture Mechanization

The Ministry of Agriculture, Cooperation and farmers Welfare has sanctioned an amount of ₹40.00 lakh under its scheme on Sub-Mission on Agriculture Mechanization (SMAM) for the purchase of Farm machinery and Implements to seven different KVKS. Under this scheme, farm machinery and implement such as Tractor, 50-55 HP, small Tractor with small trolley and cultivator, Cultivator/ Disc Horrow, Rotavator, Power tiller with common attachment, Power tiller with common attachment, Self Propelled Rice transplanter (4-row), Power Weeder, Tractor drawn seed cum fertilizer drill, Self propelled reaper cum binder, Multi-

crop planter, pneumatic Planter, Disc Plough, Happy Seeder, Tractor operated Electrostatic sprayer, Tractor operated/ Powered sprayer, Ridge former,, Shrub Master/ Cutter-cum-Spreader, Tractor operated Boom sprayer, Straw chopper/ shredder, Mulcher, Shrub Master, Tractor operated Post hole digger, Laser Land leveller, Potato planter, Potato Digger, Raised bed planter, Reversible M B Plough, Sugar Cane Planter, Solar Based Pump set, Solar operated hand sprayer, Multi crop thresher, Mini Dal Mill, Bund former were procured by five KVKS and one ICAR institute for demonstration purpose to the farmers for mechanization in order to save time during unavailability of labour.

11.6 Orientation Training for Skill Development

A three day capacity development programme on orientation training of trainers for skill development in agriculture was organized by ICAR-ATARI, Ludhiana in collaboration with Agriculture Skill Council of India (ASCI) during August 29-September 01, 2018. In his inaugural address Dr. J. S. Mahal, Director (Extension), PAU, Ludhiana highlighted the importance of skill development and its role in entrepreneurship development amongst youths. He has also emphasized the identification of right people for training and



Table 11.7: Detail of amount sanction to different KVKS under Sub-Mission on Agriculture Mechanization (SMAM) schemes during 2018-19

S. No	Name of the State	Name of the KVKS/ICAR	Name of host organization	Release (₹ In Lakhs)
1	Uttarakhand	Uttarakashi	ICAR-VPKAS , Almora, Uttarakhand	40
2	Uttarakhand	Bageshwar	ICAR-VPKAS , Almora, Uttarakhand	40
3	Jammu & Kashmir	Baramulla	ICAR- CITH , Srinagar , Jammu & Kashmir	40
4	Punjab	Fazilka	ICAR- CIPHET, Ludhiana	40
5	Uttarakhand	Haridwar	GBP University of A&T, Pantnagar	40
6	Uttarakhand	ICAR VPKAS, Almora	GBP University of A&T, Pantnagar	40
Grand Total				240

certification of the trainers as well. Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana gave glimpses of existing huge manpower in agriculture and emphasized the need of skill development among rural youth especially school and college dropouts for bringing them into the mainstream of growth. He has also informed that 91 skill development trainings in agriculture on different job roles of 200 hrs or more were sanctioned to Krishi Vigyan Kendras (KVKSs), State Agricultural Universities

(SAUs), ICAR-Institutes of Punjab, Jammu & Kashmir, Himachal Pradesh and Uttarakhand state. Dr. Keshava, Principal Scientist, ICAR, New Delhi informed that 820 skill development training courses to be conducted during 2018-19 by the KVKSs, SAUs, and ICAR Institutes throughout the country. More than 90 scientists/faculty members of KVKSs, SAUs and ICAR Institutes of Punjab, Jammu & Kashmir, Himachal Pradesh and Uttarakhand participated in this programme.



11.7 International Women Day Celebration

A workshop entitled “*Empowering Rural Women for Addressing Agricultural Air Pollution and One Health*” was organized in collaboration with International Maize and Wheat Improvement Centre (CIMMYT) & International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) on 8th March 2019. The Chief Guest, Dr. G.S. Khush, World Food Laureate applauded the farm women for participating and exhibiting their ventures in the workshop. Dr. Khush also emphasized the balanced nutrition's role for good



health. Dr. Arbinda K. Padee, IAS, Director Country Relation and Business Affairs, ICRISAT, New Delhi discussed about two products namely “Healthy Snack” and “Smart Breakfast” based on sorghum and millets developed by ICRISAT which are beneficial for the family's health. Earlier, Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana underlined the various activities that are being carried out by the Krishi Vigyan Kendras of Zone-I for the empowering the farm women. The celebrations marked the participation by more than 100 innovative and progressive farm women from Punjab, Haryana, Jammu, Himachal Pradesh and Uttarakhand.



11.8 Interface Meet of KVks and State Animal Husbandry Department

ICAR-Agricultural Technology Application Research Institute (ICAR-ATARI), Ludhiana organized an Interface Meet of KVks and State Animal Husbandry Department of Punjab on the theme “*Livestock Entrepreneurship for Doubling Farmer's Income*” on 09th March, 2019 at ICAR-ATARI, PAU Campus, Ludhiana. Dr. Shiv Prasad Kimothi, ADG (Coordination) ICAR, New Delhi was the chief guest of the programme and Dr. Inderjeet, Director, Animal Husbandry, Govt. of Punjab was the guest of honour during the event. More than 85 delegates from NBAGR, Karnal, GADVASU, Ludhiana, Deputy Directors (AH), Veterinary Officers of Animal Husbandry Department

and Subject Matter Specialist of Krishi Vigyan Kendra interacted to develop strategies to work in convergence mode for enhancing the farmer's income. The chief guest, Dr. Kimothi in his presidential address speaks that the desired goals will be fulfilled only by integrating various farming systems. Dr. Inderjeet, Director, Animal Husbandry Department of Punjab appreciated the efforts of ICAR-ATARI, Ludhiana for this interface meet and assured full support of department to the KVks in all the extension activities. Dr. Rajbir Singh, Director, ICAR-ATARI, Zone-I, Ludhiana. emphasized the gathering to work in synergic mode to develop climate resilient and nutri-smart villages through “*Tandrust Punjab*”. A technical bulletin “*Pig Farming- Promising Agri-Business of Punjab*” was also released during this occasion.



11.9 Review Workshop of Cluster FLDs on Pulses and Oilseeds

The ICAR-Agricultural Technology Application Research Institute, Ludhiana organized a “Review Workshop of CFLD Pulses and Oilseeds projects” for the Krishi Vigyan Kendras (KVKs) of Punjab at Ludhiana today. The Chief Guest, Dr. W.S. Dhillon, ADG (Horticulture Sciences) applauded the works being done by the KVK's and appreciated the recognition of KVKs' importance at the grass root level. He sensitized the participants about the seed exchange's importance among the farmers for the sustainable pulses production. Dr. Dhillon also urged the KVKs for conducting the FLDs in specific need areas and also to document the success stories. Earlier,

Dr. Rajbir Singh, Director, ATARI, Ludhiana welcomed the participants. He appreciated the successful conduction of demonstrations under the project by the KVKs. Dr. Singh stressed on the selection of appropriate locations to conduct the demonstrations in order to ensure the speedy adoption of improved pulses cultivation technologies. The achievements of the Kharif season - 2018-2019 under the CFLD Pulses and Oilseeds Projects, the ongoing activities in Rabi and the Action Plan for the summer season were also presented by the scientists on the occasion. The workshop marked a total participation by more than 80 participants including Programme Coordinators and Scientists of KVK and Scientists from ATARI, Ludhiana.



11.10 World Breastfeeding Week

Krishi Vigyan Kendras of ICAR-ATARI, Zone-I, celebrated World Breast Feeding Week (WBW) in the states of Punjab, Himachal, Uttrakhand and Jammu & Kashmir during 1st to 7th August, 2018 at different adopted villages in their respective districts. A total 823 extension activities were conducted where, 8000 farmwoman and school girls were participated and 2117 message was sent through KMAS to farmers and farm women during the Week. The programme highlighted the importance of breastfeeding to the mothers for their babies. Various activities including mobile advisories, method demonstrations for nutritious weaning foods, radio talks, distribution of literature were also organized during the week.



11.11 National Nutrition Week

National Nutrition Week was celebrated by Krishi Vigyan Kendra's of ICAR-ATARI, Ludhiana from 1st to 7th Sept. 2018. Method Demonstrations of nutritional diet for different age groups, integrated nutrition garden, low cost nutritious recipes, discussions and awareness on new WHO growth standards were organized as per the need of the farm women. Along with this, mini exhibitions, nutritious quiz competitions, nutrition rally, poster competition, slogan making competition, recipes competition, puppet shows/street play etc were also conducted. During the year, about 755 extension activities were organized by the KVks in which 9984 farmwoman and school girls participated.



11.12 Swachh Bharat Abhiyan

ICAR-ATARI, Ludhiana and all the KVks of Zone-I has been organising Swachata Pakwada during 15th Sept to 2nd Oct 2018 and 16 Dec to 31st Dec 2018 according to the instructions of Govt. of India. During Swachata Pakwada, Swachhta Pledge was administered to all officials and organized various activities such as cleaning and beautification of surrounding areas of premises, weeding out unwanted files, eradication of parthenium, vermicomposting/composting of biodegradable waste management, etc with the active participation of famers, farm women, youths and school children. During the campaign in Sep-Oct, total 644 number of activities were carried out by the KVks by involving 9214 number of participants, while in Dec there were 6543 number of participants taken part in the campaign.





11.13 MDP for newly recruited PCs of KVKS

During the year ICAR-ATARI, organized 5th Management Development Programme (MDP) for newly recruited programme coordinators (PCs) of KVKS of zone-1. The 5th MDP was conducted from January, 2019 with active participation of three Programme Coordinators of KVK Sopian, KVK Gandarbal and KVK Lahual Spiti-II. Various technical and financial lectures were delivered during the five days training programme. Besides this exposure visits to PAU, GADVASU, PAMETI and KVKS were organized for the trainees.



11.14 CHAK DE

A Convergence Meet on crop residue management titled “Converging Harbingers of Agriculture, Allied department & KVKS for Demonstrating Excellence in residue management (CHAK DE)” was organized on October 8, 2018, in which various issues related to crop residue management were discussed. Dr. T. Mohapatra, Secretary (DARE) & DG (ICAR) was the Chief Guest of the meet which was organized by ICAR-ATARI, Ludhiana. Dr. T. Mohapatra, in his inaugural address, thanked farmers of Punjab and Haryana for feeding the entire nation and urged them to lead the way against crop residue burning as well. He said that managing 20 million tons of paddy straw in Punjab in three weeks is a

herculean task but in-situ management has many advantages over other options. He mentioned that as the paddy harvesting has started, the campaign against residue burning has entered in final and decisive phase. Efforts must be aimed to seek positive action from all the stakeholders in a single voice. He emphasized the significance of collaborative efforts of all the stakeholders of agriculture for realizing effective residue management. Considering the necessity of united action to transform the way crop residue is handled, he urged the organizations, institutions, government bodies, farm machine manufacturers, finance institutions and farmers to converge their efforts in a systematic and holistic way to reap desired outcomes. Dr. B. S. Dhillon, Vice-chancellor, PAU, Ludhiana expressed his happiness to see the

convergence among different organizations and institutes and urged every participant to contribute while accomplishing common objective of stubble management. He further emphasized that any action which creates confusion among stakeholders at this stage will desist us from this mission. He assured farmers of all the support in dealing with residue management and asked them to do what is best for themselves and their generations to come. Dr. A. S. Nanda, Vice-chancellor, GADVASU, Ludhiana emphasized that the efforts towards crop residue management are not just about implementing a government scheme but a crucial step towards transforming the way agriculture is done. Earlier, Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana briefed the purpose of the Meet and elaborated the activities being undertaken by the KVks and achievements in terms of given targets under in-situ management of crop residue. He appreciated the vital and unique role played



11.15 Harvest Field Days Celebrated across Punjab

Residue management has emerged as a challenge to the sustainability of the contemporary agriculture in the northern states. Convincing farmers through result demonstrations and farmer-to-farmer cross-learning is an effective pathway towards mass scale adoption of residue management technologies. Moreover, Dr. T. Mohapatra, Secretary DARE & DG, ICAR has also urged, during the stakeholders' workshop

by different stakeholders and every actor, public or private, in fighting the menace of residue burning while paving the way for sustainable agriculture in the region. He stressed upon the missionary zeal that is necessary to cope the challenges posed by modern agriculture and need of convergence of all the stakeholders. More than 150 delegates participated representing State Departments of Agriculture of Punjab and Haryana, farm machinery manufacturers, state agricultural universities, ICAR institutes, *Krishi Vigyan Kendras* of Punjab & Haryana, financial institutions, cooperative societies, custom hiring centres, farmers etc. In the end, *Nukkad nataks* and skits were performed by the students of PAU, GADVASU and GNCC, Doraha depicting clear message against burning stubbles. The program concluded with a positive note when all the participants assured their all possible efforts to curb paddy residue burning.



on crop residue management, to expose farmers to the demonstration sites for confidence building on the technology. Thus, *Krishi Vigyan Kendras* (KVks) of Punjab organized Harvest Field Day at the demonstration sites of wheat sown with Happy Seeder to educate and convince farmers about the multi-benefits of combo technology of Super Straw Management System (Super-SMS) and Happy Seeder. Team of scientists of KVks along with farmers travelled across villages to allow farmers to see the results of sowing wheat with happy seeder and discuss among them what they



learned. Results of demonstrations and open minded sharing of experiences have built confidence among farmers to adopt the recommended technologies. Participants discussed various issues of in-situ residue management and shared experiences with use of Super-SMS and Happy Seeder. Literature on residue management was also distributed to the participants. Farmers were also motivated to utilize ICT platforms to keep in touch with the KVKs and agricultural university for latest farming technologies. All the KVKs of Punjab organized Harvest Field Days in different villages as a part of Campaign against crop residue burning to mobilize as many farmers as possible to adopt the combo technology. More than 10,000 farmers were mobilized through Harvest Field Day and such activities across the state.

11.16 Religious Saints Lead Campaign against Stubble Burning

The KVKs organized special Farmers' Fairs to exhibit the technologies for residue management besides selling the latest seeds of Rabi crops. During these Melas, special efforts were made to involve various stakeholders for environmental building against residue burning. Efforts were being made to involve noted personalities in the campaign. Religious saints, gurus and noted environmentalists participated in these programmes and urged farming community to shun stubble burning. Noted environmentalist and

Padam Shri Recipient Baba Sewa Singh of Dera Kar Sewa, Khadoor Saheb was the Chief Guest of Kisan Mela organised by KVK, Kapurthala. In his inaugural address, the saint exhorted the farmers to shun the practice of burning of paddy residue and follow the teaching of Guru Nanak. Reciting the famous couplet – “Pawan Guru, Pani Pita, Mata Dharat Mahat” and urged farmers to adopt the methods suggested by scientists in managing paddy residue and make mother earth a better place for all living beings. Saint Gurmeet Singh, Khosa Kotla Wale of district Moga is renowned social worker and environmentalist was the Chief Guest during the Kisan Mela organized by KVK, Moga. During his address he emphasized that we should make collective efforts at community level for the safe guard of the environment. Collective efforts are needed to provide pollution free air, water and soil for the coming generations. He shared his experience in making his own village burning free and appreciated the role of KVK, Moga in achieving this mile stone. He urged the rural youth to start custom hiring centres of machinery for which Government is giving full support. He also cited the example of rural youth of his village who developed a custom hiring centre “Udami Kisan Self-help Group” and are determined to make cluster of villages “residue burning free”. He appealed all the farmers and farm women present during the Kisan Mela to make constant contract with the KVK scientists and adopt recommended technologies for the management of paddy residues and say no to burning.



Padama Shree Saint Balbir Singh Seechwal, a noted environmentalist, 'Time' magazine declared him 'Environmental Hero' was the Chief Guest of Kisan Mela organised by KVK, Nurmalah, Jalandhar. While addressing the farmers, Saint Seechwal expressed his pleasure to meet various stakeholders and interacted with them. He appreciated the role of KVK in making a movement against residue burning. Saint urged all the stakeholders to come on single platform and work together in convergence mode to fight this social problem. He visualized that with the use of machines, the problem of residue can be sorted out but we have to educate the farmers. He urged that missionary approach will motivate farmers to adopt latest technological interventions in managing residue particularly paddy straw. Thousands of farmers, farm women and youth thronged these melas in which live demonstrations of machines were arranged for the benefits of farmers.

11.17 Training on “*In-situ* paddy residue management through machinery

Three training courses on “*In-situ* paddy residue management through machinery” have been successfully organized by ICAR-Agricultural Technology Application Research Institute (ICAR-ATARI), Ludhiana in collaboration with Department of Farm Machinery and Power Engineering (FMPE), PAU, Ludhiana. The training was designed for

successful implementation of centrally sponsored scheme “Promotion of Agricultural Mechanization for *In-situ* Management of Crop Residue in the States of Punjab, Haryana, Uttar Pradesh and NCT of Delhi” by empowering experts of 60 Krishi Vigyan Kendras (KVKs) with the technical know-how of the effective technologies for residue management. The first training was conducted during August 6-7, 2018 for the KVKs of Haryana and Delhi. The second training was organized during August 9-10, 2018 for the KVKs of Uttar Pradesh and the third one was for the KVKs of Punjab during August 13-14, 2018. Dr. Jaskaran Singh Mahal, Director, Extension, PAU, Ludhiana, while explaining the significance of *in-situ* residue management, mentioned about the problem of residue burning and urgency shown by the central government in curbing it. He also gave a brief review of the efforts of research system in developing effective technologies and their regular improvement. He urged KVK scientists to clear all their doubts during the training about use of machines and provisions in the project and share their learning from the field with fellow participants. Dr. Rajbir Singh, Director, ICAR-ATARI, Ludhiana said “KVK scientists have been working relentlessly to aware farmers and other stakeholders about the ill-effects of residue burning. Now, the support from central government for the cause will give huge boost to the movement started by the KVKs and would yield better results.” In these three training courses, 135 heads and SMSs of 60



KVKs from Haryana, Delhi, Punjab and UP participated and got the opportunity for hand on exercises and exposure visit at manufacturers of various machinery of crop residue management. During the training, literature on In-situ management of rice residue was also shared for further dissemination.

11.18 Hindi Pakhwada

ICAR-ATARI, Zone-1, Ludhiana organized Hindi Pakhwara during 14 September to 27 September 2018. Under this celebration, eight competitions were organized in which 68 participants took part. All employees of the ICAR-ATARI participated in the concluding session of this Hindi Pakhwara and took pledge to work in Hindi to the maximum possible extent.





Chapter - 12

PUBLICATIONS AND PERSONNEL

12.1 Publications

12.1.1 Research Articles (National/International)

Balakrishnan R, Singh P, Varghese E and Murai AS (2018). Agricultural Teachers' Attitude towards Teaching Profession. *Indian Journal of Extension Education*. 54(1): 89-92.

Bhaduria P, Bhanja SK, Kalluri G, Saran S and Majumdar S (2018). Performance and Welfare of White Leghorn chicks under different housing systems. *Indian Journal of Poultry Science*. 54(1):89.

Bhanja SK and Bhaduria P (2018). Behaviour and welfare concepts in laying hens and their association with housing systems. *Indian Journal of Poultry Science*. 53(1): 1-10.

Dhiraj K Singh, Pandey NK, Kharmanud P and Rana RK (2018). Adoption Pattern and Economic Impact of Potato Variety Kufri Khyati in Uttar Pradesh. *Journal of Agri search* 5(3): 2011-2014.

Murai AS, Vijayaragavan K, Singh P and Balakrishnan R (2018). Farmers' Preferences of E-learning Courses: Implications for Extension Professionals. *Journal of Community Mobilization and Sustainable Development*. 13(3): 589-594.

Rana Rajesh K and Anwer Ezaj (2018). Potato production scenario and analysis of its total factor productivity in India. *Indian Journal of Agricultural Sciences* 88(9): 1354-1361.

Shirur Mahantesh, Shivalinge Gowda NS, Chandre Gowda MJ and Rana RK (2018). Performance Analysis of South-Indian mushroom units: Imperative Policy Implications for their Preparedness for Global Competitiveness. *Current Science* 115(11): 2141-2146 (10 DECEMBER 2018); doi: 10.18520/cs/v115/i11/2141-2146.

12.1.2 Technical/ Popular Articles:

Balakrishnan R, Murai AS, Kalnar Y and Kumar V (2018). Techniques for Impact Assessment of Technologies. In (ed.) ICAR- Summer School on Advancements in Post-Harvest Management of Legumes for Minimizing Losses and Sustainable Protein Availability, July 5-25, 2018, ICAR-CIPHET, Ludhiana. 252-259 p.

Balakrishnan R, Murai AS, Kalnar Y, Bembem K and Kumar V (2018). Project Profile Preparation for Start-Up's in Agriculture. In (ed.) ICAR Summer School on Emerging Post-Harvest Engineering and Technological Interventions for Enhancing Farmer's Income, September 4-24, 2018, ICAR-CIPHET, Ludhiana. 96-100 p.

Balakrishnan R, Murai AS, Mann S, Kalnar, Y and Bembem K (2018). Promoting Producer Organization among Farmers. In (ed.) ICAR Summer School on Emerging Post-Harvest Engineering and Technological Interventions for Enhancing Farmer's Income, September 4-24, 2018, ICAR-CIPHET, Ludhiana. 44-51 p.

Mamgai P and Kaur G (2018). "Promoting nutrition literacy among farm families" Lead paper published in concept papers on Nutrition sensitive agriculture and nutritional literacy Pg 132-136.

Rana Rajesh K and Singh R (2018). Establishment of Cottage Industry Level Potato Processing Units. In, Recent Engineering Interventions in Food and By-Product Processing for Sustainable Growth and Profitability. Devi Mridula, Goswami Deepika and Saha Dhritiman (editors). ICAR-Central Institute of Post-Harvest

Engineering & Technology Ludhiana-141004 (Punjab): xvi+256 p.

Gupta R, Singh K, Bhaduria P and Upadhyay V (2018). Chemiomedicinal Significance of Goat Milk. Livestock Technology. 8(7): 42-43.

Kumar M and Bhaduria P (2018). Dudharoo Pashuyo Ke Liye Buniyadi Awashyaktaye. (In Punjabi). Vigyanak Pashu Palan. 11(9)11-12.

प्रज्ञा भदौरिया, रोहित गुप्ता एवं वार्ड.एस जादौन (2018). पिछवाड़ा (बैकयार्ड) मुर्गीपालन द्वारा महिला सशक्तिकरण प्रसंकरण प्रगति. अर्ध वार्षिक पत्रिका. अंक 1:77-80.

प्रज्ञा भदौरिया, रोहित गुप्ता एवं वार्ड.एस जादौन (2018). स्वच्छ दूध उत्पादन की अवधारणाएँ. प्रसंकरण प्रगति. अर्ध वार्षिक पत्रिका. अंक 2:71-75.

मुराई, आ. सं. (2019). मोबाइल एप्स से कृषि की बदलती तस्वीर. राजभाषा रशिम. नगर राजभाषा कार्यान्वयन समिति, लुधियाना. अंक-20. 10-11.

12.1.3 Technical bulletins/ Books:

Bhaduria P, Sharma A, Verma HK, Singh I and Singh R (2019). Pig Farming: Promising Agri-Business in Punjab, ICAR-ATARI, Ludhiana, Punjab, India. P 1-80.

Kumar A, Bhaduria P, Mamgai P and Murai AS (2018). Annual Report 2016-17 Mera Gaon Mera Gaurav. ICAR-Agricultural Technology Application Research Institute, Zone-1, Ludhiana.

Kumar A, Bhaduria P, Rana RK, Mamgai P and Murai AS (2019). Annual Report 2017-19 Mera Gaon Mera Gaurav. ICAR-Agricultural Technology Application Research Institute, Zone-1, Ludhiana.

Mamgai P, Murai AS, Bala A, Singh N, Singh A and Singh R (2018). Improving Oilseed Production through Cluster Frontline Demonstrations in North India. ICAR-ATARI, Zone-I, Ludhiana, Punjab. 50p.

Mamgai P, Rana Rajesh K, Kumar A, Kaur H and Singh R (2018). Krishi Kalyan Abhiyan. ICAR-ATARI, Zone-I, Ludhiana, Punjab: 92p.

Murai AS, Mamgai P, Singh N, Kaur D and Singh N (2019). Demonstrating Yield Potential of summer on Pulses in North-West India. ICAR-ATARI, Zone-I, Ludhiana, Punjab: 48p.

Murai AS, Mamgai P, Singh N, Kaur D, Devgan S and Singh N (2019). Frontline demonstrations on Pulses in North-West India. ICAR-ATARI, Zone-I, Ludhiana, Punjab: 78p.

Singh J, Grover J, Singh A, Kumar R, Marwaha B, Chandel R, Chhina R S, Sharma K, Sharma K, Kumar A, Murai A S, Lohan S K, Singh M, Narang M, Manes G S, Singh M, (2018). Manual on Happy Seeder (Technology for in-situ management of paddy residue) ICAR-ATARI, Zone-1, PAU Campus, Ludhiana, Punjab: 20p.

Singh R, Bhaduria P and Kumar A (2018). Glimpses of Sankalap se Siddhi in zone-1. ICAR-Agricultural Technology Application Research Institute, Zone-1, Ludhiana. Pp:73.



Singh R, Mahal JS, Rana Rajesh K, Kumar A, Murai AS and Sadawarti K (2019). Environment Building against Residue Burning. ICAR-ATARI, Ludhiana, Punjab, India. P 1-54.

Singh R, Mahal JS, Rana Rajesh K, Kumar A, Murai AS and Sadawarti K (2019). Stimulating Young Minds- Shunning Stubble Burning. ICAR-ATARI, Ludhiana, Punjab, India. P 1-26.

Singh R, Mahal J S, Rana Rajesh K, Kumar A, Murai AS, Sadawarti K and Dhaliwal PS (2019). Capacity Building: Hands-on training on machines. ICAR-ATARI, Ludhiana, Punjab, India. P 1-40.

Singh R, Mahal JS, Rana Rajesh K, Kumar A and Murai AS (2018). Converging Harbingers of Agriculture, Allied Departments and KVKS for Demonstrating Excellence in Residue Management. Reflections and Recommendations. P 1-16. ICAR-ATARI, Ludhiana, Punjab, India, October 08, 2018.

Singh R, Murai AS and Kumar A (2018). KVKS celebrate Harvest Field Day on Wheat Sown with Happy Seeder. ICAR-ATARI, Ludhiana, Punjab, India. Pp 1-16.

Singh R, Murai AS and Kumar A (2018). Stakeholders' Voice against Residue Burning: Recommendations and Action Points. ICAR-ATARI, Ludhiana, Punjab, India.

Singh R, Murai AS and Sadawarti K (2018). Igniting Young Minds: Combating Residue Burning. ICAR-Agricultural Technology Application Research Institute, Ludhiana, Punjab. Pp 1-8.

Singh R, Murai AS, Mahal, JS and Sidhu, RS (2018). Inspiring 25 Villages of Punjab- Journey towards Zero Residue Burning. ICAR-ATARI, Ludhiana, Punjab. 50 p.

Singh R, Rana Rajesh K, Mahal JS, Chahal VP and Singh AK (2018). Happy Seeder Malik-Punjab Vich Kheti Badhi De Sadeevin Badlav De Nayik (In Punjabi). ICAR-ATARI-1, Ludhiana, Punjab: 143p

Singh R, Rana Rajesh K, Mahal JS, Chahal VP and Singh AK (2018). Harbingers of Sustaining Farming Through Zero Stubble Burning in Punjab. ICAR-ATARI-1, Ludhiana, Punjab: 78 p.

Singh R, Rana Rajesh K, Mahal JS, Chahal VP and Singh AK (2018). Parali Na Saad Ke Punjab Di Khetibadi Nu Sadeevin Karan Wale Soorme (In Punjabi). ICAR-ATARI-1, Ludhiana, Punjab: 97p.

Singh R, Rana Rajesh K, Mahal JS, Chahal VP, Singh AK (2018). Happy Seeder Owner – The Change Leaders for Sustainable Agriculture in Punjab. ICAR-ATARI-1, Ludhiana, Punjab: 143p.

Singh R, Singh J, Singh K, Brar A, Mahal JS, Murai AS and Sadawarti K (2018). Religious Saints Lead Campaign against Residue Burning. ICAR-ATARI, Ludhiana, Punjab, India.

Singh R. Mahal JS, Jat ML, Sidhu HS and Murai AS (2018). Stakeholder Dialogue on Sustainable and Scalable Solutions for Rice Residue Management. Proceedings and Recommendations. ICAR-ATARI, Ludhiana, Punjab, India, March 15, 2018.

ਜੁਗਾਰਾਜ ਸਿੰਹ, ਜਗਦੀਸ਼ ਗਰੋਵਰ, ਅੰਜੈਬ ਸਿੰਹ, ਰਾਕੇਸ਼ ਕੁਮਾਰ, ਬਿਨਦੂ ਮਰਵਾਹਾ, ਰੁਧਿੰਦਰ ਚੰਦੇਲ, ਰਵਿੰਦਰ ਸਿੰਹ ਸ਼ਿੰਨਾ, ਕਰੁਣ ਸ਼ਰਮਾ, ਅੰਕਿਤ ਸ਼ਰਮਾ, ਅਰਵਿੰਦ ਕੁਮਾਰ, ਆਸ਼ਿ਷ ਸਾਂਤੋ਷ ਮੁਰਾਈ, ਸ਼ਿਵ ਕੁਮਾਰ ਲੋਹਾਨ, ਮਨਜੀਤ ਸਿੰਹ, ਮਹੇਸ਼ ਨਾਰੰਗ, ਗੁਰਸਾਹਿਬ ਸਿੰਹ ਮਨੇਸ ਏਂ ਮਨਜੀਤ ਸਿੰਹ (2018) ਹੈਪੀ ਸੀਡਰ ਮੈਨੂਅਲ (ਧਾਨ ਕੇ ਅਵਸ਼ੇ਷ਾਂ ਕੋ ਖੇਤ ਮੋਂ ਜਲਾਯੇ ਬਿਨਾ ਗੇਹੂ ਕੀ ਸੀਧੀ ਬੁਵਾਈ ਕੀ ਪ੍ਰਭਾਵੀ ਤਕਨੀਕ) ਮਾ. ਕੁ. ਅਨੁ. ਪ.-ਕ੍ਰਿ. ਪ੍ਰੋਫੈਲੀਗਿਕੀ ਅਨੁਪ੍ਰਯੋਗ ਅਨੁਸਾਰਾਨ ਸੰਥਾਨ, ਕਿੱਤੇ-1, ਪੀ. ਏ. ਯੂ. ਲੁਧਿਆਨਾ, ਪੰਜਾਬ। ਪ੃ਤ੍ਰ 20.

ਜੁਗਾਰਾਜ ਸਿੰਘ, ਜਗਦੀਸ਼ ਗਰੋਵਰ, ਅੰਜੈਬ ਸਿੰਘ, ਰਾਕੇਸ਼ ਕੁਮਾਰ, ਬਿਨਦੂ ਮਰਵਾਹਾ, ਰੁਧਿੰਦਰ ਚੰਦੇਲ, ਰਵਿੰਦਰ ਸਿੰਘ ਛਿੰਨਾ, ਕਰੁਣ

ਸ਼ਰਮਾ, ਅਰਵਿੰਦ ਕਮਾਰ, ਅਸਿਸਟੇਂਟ ਮਰਾਈ, ਸ਼ਿਵ ਕਮਾਰ ਲੋਹਾਨ, ਪ੍ਰੀਤ ਸਿੰਘ, ਮਨਜੀਤ ਸਿੰਘ, ਮਹੇਸ਼ ਨਾਰੰਗ, ਗੁਰਸਾਹਿਬ ਸਿੰਘ ਮਨੇਸ ਅਤੇ ਮਨਜੀਤ ਸਿੰਘ (2018) ਹੈਪੀ ਸੀਡਰ ਮੈਨੂਅਲ ਧਾਨ ਕੇ ਅਵਸੋਸੇ ਕੋ ਖੇਤ ਮੇਂ ਜਲਾਏ ਬਿਨਾ ਗੇਂਦ ਕਿ ਸਿਧੀ ਬੁਵਾਂਝੀ 'ਕਿ ਪ੍ਰਭਾਈ ਤਕਨੀਕ, ਡਾ. ਕ੍ਰਿ. ਅਨੁ. ਪ. ਕਿਸ਼ਾਨੀ ਪ੍ਰੋਫੋਰੇਗਿਕੀ ਅਨੁਸੰਧਾਨ ਸੰਸਥਾਨ ਜ਼ੋਨ-1, ਪੀ.ਏ.ਇ. ਕੰਪਨੀ, ਲੁਧਿਆਣਾ, ਪੰਜਾਬ। ਪੰਨੇ 20.

12.1.4 Book Edited:

Singh R, Kumar A, Sidhu RS and Mahal JS (2018). Upscaling Happy Seeder Technology: Scientific Evidences from Demonstrations. ICAR-ATARI, Ludhiana, Punjab pp: 120.

Singh R, Rana Rajesh K, Chahal VP and Singh AK (2018). Agri-Innovators: The Torch Bearers of Brighter Agriculture. ICAR-ATARI Zone-1, Ludhiana, Punjab: 140p.

12.1.5 Book Chapter:

Bhadauria P and Singh R (2019). Women Empowerment through Livestock Based Enterprises during National Conference on Women Empowerment through Agro-Entrepreneurship for Livelihood Security w.e.f 07-08th February, 2019, SKUAST-Jammu. pp: 127-135.

Bhadauria P, Singh R and Jadoun YS (2019). Technology-led Revolution through KVKS for Empowering Livestock Farmers during National Conference of Society for Veterinary & Animal Husbandry Extension (SVAHE) on Livestock Development for Societal Needs: Extension and Allied Sectors Initiatives w.e.f 03-05 April, 2019 at GBPUAT, Pantnagar pp: 208-211.

Jadoun YS, Bhadauria P and Bharti (2019). Organic Livestock Farming: Concept & Practices. In compendium of Model Training Course on “Empowering Farm Women with Dairy Preneurship” w.e.f 3rd -10th January, 2019. pp-16-25.

Singh R and Kumar A (2018). Performance of Happy Seeder Sown Wheat Crop in Punjab. In Singh R, Kumar A, Sidhu RS and Mahal, JS (ed.) Up scaling Happy Seeder Technology: Scientific Evidences from Demonstrations. ICAR-ATARI, Ludhiana, Punjab pp: 5-12.

Singh R, Murai AS and Mamgai P (2019). ICAR-ATARI, Ludhiana, In Singh AK, Chahal VP, Singh A, Dubey SK and Yemul SN. Realising higher productivity and profitability from Pulses. Division of Agricultural Extension, ICAR, New Delhi. pp: 4-7.

12.1.6 Presentations in conferences/ Symposia/ Seminars/ other fora

Bhadauria P, Singh R and Mamgai P (2019). Livestock Diversification through pig husbandry in Punjab. Abstract book National conference on Women Empowerment through Agro-Entrepreneurship for Livelihood Security 07-08th February, 2019, SKUAST-Jammu. pp: 14

Mamgai P and Kaur G (2018). Oral presentation on “Promoting nutritional literacy among farm women to tackle malnutrition” in International Workshop on Nutrition-Sensitive Agriculture and Nutrition Literacy” organized from 14-16 May 2018 at Amer Greens, Bhopal.

Mamgai P, Bhadauria P and Singh R (2019). Development of Nutrition Garden for Diet Diversification and Safe Nutrition. Abstract book National conference on Women Empowerment through Agro-Entrepreneurship for



Livelihood Security 07-08th Februray, 2019, SKUAST-Jammu. pp 140.

Rana Rajesh K and Singh R (2019). An Insight into Government Policies and Initiatives to Enhance Income of Agripreneurs. In, Model Training Course on Processing, value addition and entrepreneurship development in post-harvest sector (14-21 January 2018) at ICAR-CIPHET Ludhiana-141004 (Punjab) on 15 January 2018.

Rana Rajesh K and Singh R (2018). Establishment of Cottage Industry Level Potato Processing Units. In, Winter School on Recent Engineering Interventions in Food and By-Product Processing for Sustainable Growth and Profitability at ICAR-CIPHET Ludhiana-141004 (Punjab) on 25 October 2018.

Singh R, Rana Rajesh K, Mamgai P and Chaudhary M (2018). Efforts of KVKs in improving Nutritional Literacy at grass root level in Northern States. In, International Workshop on Nutrition-Sensitive Agriculture and Nutrition Literacy; 14-16 May 2018; Bhopal, MP.

12.2.1 Staff in Position at ICAR ATARI

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

12.2 Personnel

Existing staff position of the ICAR-Agricultural Technology Application Research Institute, Zone-1, Ludhiana as on March 31, 2019:

12.2.2 Superannuation / Joining / Promotion/ Transfer

- ❖ Dr. (Mrs.) Preeti Mamgai, was promoted to the post of Principal Scientist (Home Science) on 22nd November 2018 w.e.f 22nd November 2016.
- ❖ Mrs Manjit Kaur was promoted from Assistant to Assistant Administrative Officer on 31st March 2018.
- ❖ Sh. Raj Kumar was promoted to Upper Division Clerk from Lower Division Clerk on 26th November 2018.



ANNEXURES

CONTACT DETAIL OF KVKS UNDER ICAR-ATARI, ZONE-1

State/District	Year of Sanction	Address	Telephone Number	E-mail
Punjab				
Abohar	2016	ICAR-CIPHET, Malout, Hanumangarh Byepass-152116	09463975155	rk_jangra@rediffmail.com
Amritsar	2004	Usman-143001	9855556672	kvkasr@gmail.com
Barnala	2012	Village & P.O Handiaya, Barnala - 148107	08196080643	ddkvkbrnlgadvasu2013@rediffmail.com prahalad_tanwar@rediffmail.com
Bathinda	1992	Dabwali Road, Near Kheti Bhawan-151001	9417732932	kvkbtd@pau.edu
Faridkot	1995	PAU Regional Research Station - 151203	9855321902	kvkfdk@yahoo.com
Fatehgarh Sahib	2004	Shamsher Nagar, Sirhind-140406	8146570699	kvkfgs@pau.edu
Ferozepur	1990	VPO Malwa Qadim – 152001	9501800488	kvkfzr@pau.edu
Gurdaspur	1982	PAU Regional Research Station – 143521	9464070131	kvkgurdaspur@gmail.com
Hoshiarpur	1990	VPO Bahowal, P.O Mahilpur – 146105	9815751900	kvk-hsp@pau.edu msbons-hsp@pau.edu
Jalandhar	2006	Opposite-DIPS School, Nakodar Road, Nurmahal-144039	9888900329	kvk-jalandhar@pau.edu
Kapurthala	1990	J.J. Farm, Near New Grain Market, PO: Sheikhupur – 144620	9815547607	kvkkapurthala@gmail.com
Mansa	2006	Village Khokhar Khurd, P.O Khokhar Kalan, Mansa-151505	9417626843	kvkmansa@gmail.com kvk-mansa@pau.edu
Moga	2005	Village. Budh Singh Wala, Charik Road-140001	8146500942	kvk-moga@pau.edu
Mohali	2011	Village Majra, P.O Sayabe Majri, Sahibzada Ajit Singh Nagar-140103	9815700810	ysinghvet@gmail.com kvkmohali@gmail.com
Muktsar	2004	Goneana-152026	9855620914	nirmaljittdhaliwal@yahoo.com
Nawanshahar	1995	VPO Langroya, Distt.-144516	9592022280	drmanojsh1@gmail.com
Pathankot	2016	Village Gho, Shahpur Kandi Jugial Road Near Focal Point-145023	9872354170	kvk-pathankot@pau.edu
Patiala	1991-92	Post Box No. 22, Patiala – 147 001	9417360460 9464210460	kvk-patiala@pau.edu
Ropar	2004	PAU Regional Research Station, Haveli Kalan, Ropar-140001	9417241604	kvk-ropar@pau.edu
Samrala	2004	PAU Farm, Samrala, Ldh-141114	9417241604	kvksamrala@gmail.com
Sangrur	1995	Kheri, Sangrur-148001	9988111757	kvksangrur@gmail.com
Tarantarn	2011	Booh, P.O Harike -143412	9872974326	dr.balwinderkumar@rediffmail.com ddtkvktarntaran@gmail.com
Uttarakhand				
Almora	2004	Chaubatia, GBPUAT Ranikhet, Distt. Almora-263651 (Uttarakhand)	9761969696	kvkalmora@gmail.com
Bageshwar	2007	VPKAS (ICAR) Sinduri-Baskhola (Kafligair), Distt. Bageshwar-263628 (Uttarakhand)	9412950911	kvkbageshwar@gmail.com

State/District	Year of Sanction	Address	Telephone Number	E-mail
Chamoli	2004	Gwaldam Distt. Chamoli-246441 (Uttarakhand)	9837458381	kvkchamoli@rediffmail.com
Champawat	1994	PO Gulchora, Lohaghat, Champawat-262524 (Uttarakhand)	9412162673	officerinchargekvklohaghat@gmail.com, pc_kvklohaghat@rediffmail.com
Dehradun	2004	Dhakrani, GBPUAT, PO. Herbertpur, Distt. Dehradun-248 001 (Uttarakhand)	8475002277	kvkdehradun@gmail.com
Haridwar	2004	Dhanauri, Distt. Haridwar-249404	8475002233	kvkhariidwar@gmail.com, Puru968@gmail.com
Nainital	Not Available	Jeolikote Distt. Nainital-263135 (Uttarakhand)	7500241504 9412966838	kvknainital@rediffmail.com, vijaydoharey@gmail.com
Pauri-Garhwal	Not Available	VCSGCH, Bharsar, Via Chipalghat, Distt. Pauri Garhwal- 246123 (Uttarakhand)	9795842175	kvkpaurigarhwal@gmail.com
Pithouragarh	Not Available	P.O. Gaina Aincholi, Distt. Pithouragarh-262501 (Uttarakhand)	9412044788 9068725769	kvkpithoragarh@yahoo.com
Rudraprayag	2004	Jakhdhar, via Guptakashi Distt. Rudraprayag-246439 (Uttarakhand)	7351255604	kvkjakh@rediffmail.com
Tehri Garhwal	Not Available	GBPUAT, Hill Campus, Ranichauri, Distt. Tehri Garhwal-249199 (Uttarakhand)	7302230101	kvkranichauri@gmail.com
Udham Singh Nagar	2004	Bajpur Rd, Kashipur, Distt. Udham Singh Nagar-244713 (Uttarakhand)	7500241505 9412655395	kvkkashipur@gmail.com
Uttarkashi	2004	Chinalisaur, Distt. Uttarkashi-249196 (Uttarakhand)	9412394661 9012366559	kvkchinalisaur@gmail.com
Himachal Pradesh				
Bilaspur	2004	CSKHPKV, Research Sub Station, Berthin- 174029	9418030491	kvkbilaspurhp@gmail.com
Chamba	1991	P.O Saru -176310	9418409504	kvkchamba@yahoo.in
Hamirpur	1988	CSKHPKV, Bara -177044	9418128122	kvkhmr@gmail.com
Kangra	2000	Kangra-176001	9459083612	kvkkangra@yahoo.in kvkkangra@gmail.com
Kinnaur	1995	Kinnaur at Reckong Peo, Kinnaur – 172107	9419274758 8544712538	kvkkinnaur1995@gmail.com
Kullu	1985	CSKHPKV, Bajaura -175125	9418118557	kvkkullu@gmail.com keycsharma@yahoo.com
Lahaul & Spiti-I	2004	CSKHPKV Regional Research Station, Kukumseri-175142	9418193270	pckvkls@gmail.com skthpkv@yahoo.com
Tabo (Lahaul & Spiti-II)	2016	V.P.O Tabo, Sub Division Kaza - 172113	9418082177	kvktabo@yspuniversity.ac.in sudhir.verma@outlook.com sudhirverma.hp@gmail.com
Mandi	1994	Sundernagar-174402	9418222532	kvkmandihp@rediffmail.com pankajplp@rediffmail.com
Shimla	1995	Near Petrol Pump, Rohru-171207	8219645337 945980206	kvkshimla@gmail.com,
Sirmaur	1983	Regional Research Station, Dhaulakuan-173001	9418124767	kvksirmour@gmail.com
Solan	2004	P.O. & Teh. Kandaghat -173215	9418464081	kvkkghat@rediffmail.com



Annexure-I Contd...

State/District	Year of Sanction	Address	Telephone Number	E-mail
Una	1994	Rampur-174303	9418468203	pckvkuna@hotmail.com, pckvkuna@gmail.com
Jammu & Kashmir				
Anantnag	2012	Tehsil Dooru-192211	7006853560 9906530596	zargarkvkang@gmail.com
Bandipora	2005	Potushai, Bandipora, Baramulla-193502	9797037698	pckvkbandipora@gmail.com
Baramulla	2013	Tangmarg-193402	7891210511	kvkbaramulla@gmail.com
Budgam	2013	Hamchipora-Khag-193411	9419017278	pckvkbudgam@gmail.com
Doda	2002	SKUAST, Gwari, Bhaderwah-182221	9469225162 7006449810	kvkdoda@gmail.com
Gandarbal	2002	Gandarbal, Shuhama, P.B. No. 1277, GPO-190001	9419007400	kvkganderbal@gmail.com
Jammu	1992	SKUAST, R.S. Pura-181102	9419145253	kvkjammu@gmail.com
Kargil	2004	SKUAST-K-194103	9419219404	mehdiakhon@rediffmail.com kvkkargil@gmail.com
Zanskar (Kargil-II)	2017	Zanskar, District Kargil (J&K)	9419480062	kvkkargil2zanaskar@gmail.com
Kathua	2008	Rajhani-184101	9419150840	kathuavk@gmail.com
Kulgam	2005	Pombay-192101	9797138441	kvkkulgam@gmail.com drtasneem.mubarak@gmail.com
Kupwara	2005	Kupwara-193222	9906916443 8825062677	pc.kvk.kupwara@gmail.com
Leh	1994	SKUAST-K, P.B. No. 146, Choglam Road, Housing Colony-194101	8492086095	namgyalsangto@rediffmail.com kvkleh@yahoo.co.in
Nyoma (Leh Add.)	2013	Leh (Add.) Nyoma-194404	9418457408	kvknyoma@rediffmail.com kvknyoma@gmail.com
Poonch	2007	Qazi Morha-185101	9469170031	kvkpoonch@gmail.com mahajan.ajay@gmail.com
Pulwama	1983	Malangpura, P.B. No. 1228, Distt. Pulwama, GPO-190001	9419011205	kvkpulwama@yahoo.co.in pcpulwama@gmail.com
Rajouri	2002	SKUAST, Regional Research Station, VPO. Tandwal-185131	9419172382	kvkrajouri@gmail.com
Reasi	2005	Vill Tanda, Dera Baba Bahadur Singh, Teh. Reasi-182301	7889875590	kvkreasi@gmail.com drbanarsi2000@gmail.com
Samba	2016	Pulse Research Sub Station, Village Arazi-181141	9419139407 9697180004	kvksamba@gmail.com gupta.ng1@gmail.com
Shopian	2012	Balpora, Tehsil Shopian-192303	9906683864	pckvkshopian@gmail.com
Srinagar	2002	Srinagar, SKUAST-K, Old Airport, P.B. No. 823, GPO-191111	9419078638	kvksrinagar@hotmail.com

Annexure-II

KVK-WISE DETAILS OF VEHICLES

S. No.	Name of the KVK	Tractor	Four Wheeler
Punjab			
1	Amritsar	1	1
2	Barnala	1	1
3	Bathinda	1	1
4	Faridkot	1	1
5	Fatehgarh Sahib	1	1
6	Ferozepur	1	1
7	Gurdaspur	1	1
8	Hoshiarpur	1	1
9	Jalandhar	1	1
10	Kapurthala	1	1
11	Ludhiana	1	1
12	Mansa	1	1
13	Moga	1	1
14	Muktsar	1	1
15	Nawanshahar	1	1
16	Patiala	1	1
17	Roopnagar	1	1
18	Sangrur	1	0
19	Mohali	1	1
20	Tarn Taran	1	1
21	Fazilka	1	0
22	Pathankot	1	1
Total		22	20
Himachal Pradesh			
1	Bilaspur	1	1
2	Hamirpur	1	1
3	Kangra	1	1
4	Kullu	1	1
5	Lahaul & Spiti	1	1
6	Mandi	1	1
7	Sirmaur	1	1
8	Una	1	1
9	Chamba	0	1
10	Kinnaur	1	1
11	Shimla	0	1
12	Solan	0	1
13	Lahaul & Spiti II	0	1
Total		9	13

S. No.	Name of the KVK	Tractor	Four Wheeler
Jammu & Kashmir			
1	Anantnag	1	1
2	Bandipora	1	1
3	Gandarbal	1	1
4	Kargil	1	1
5	Kulgam	1	1
6	Kupwara	1	1
7	Leh	1	1
8	Pulwama	0	1
9	Shopian	0	1
10	Srinagar	1	1
11	Doda	0	0
12	Jammu	1	1
13	Kathua	1	1
14	Poonch	1	1
15	Rajouri	0	1
16	Reasi	1	1
17	Budgam	0	1
18	Leh additional	0	1
19	Baramulla	0	0
20	Kargil Add. (Zanskar)	0	1
21	Samba	1	1
Total		13	19
Uttarakhand			
1	Champawat	1	1
2	Almora	0	1
3	Chamoli	0	1
4	Haridwar	1	1
5	Rudraprayga	1	1
6	Nanital	1	1
7	Pithoragarh	1	1
8	Dehradun	1	1
9	Kashipur	1	1
10	Tehri Garhwal	0	0
11	Pauri Garhwal	0	1
12	Uttrakashi	1	0
13	Bageshwar	1	1
Total		9	11
Grand Total		53	63



STAFF POSITION IN KVKS AS ON 31.03.2019

S. No.	Name of KVK	PC			SMS			Farm Manager			Programme Asistant			Computer Programmer			Assistant (Accountant)			Steno. Grade-3			Driver			Skilled supporing staff			TOTAL					
		S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V			
		Himachal Pradesh																																
1	Bilaspur	1	1	0	6	3	3	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	2	1	1	2	2	0	16	11	5
2	Chamba	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
3	Hamirpur	1	0	1	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	1	1	1	16	14	2		
4	Kangra	1	1	0	6	6	0	1	0	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
5	Kinnaur	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	2	16	15	1		
6	Kullu	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	2	1	1	2	2	0	16	14	2
7	Lahual & Spiti I	1	1	0	6	2	4	1	1	0	1	1	0	1	0	1	1	1	0	1	0	1	1	0	1	2	1	1	2	0	2	16	7	9
8	Lahual & Spiti II	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	2	16	16	0		
9	Mandi	1	1	0	6	4	2	1	0	1	1	1	0	1	1	0	1	1	0	1	0	1	2	1	1	2	0	2	16	9	7			
10	Sirmour	1	1	0	6	4	2	1	0	1	1	1	0	1	1	0	1	1	0	1	1	0	2	0	2	2	1	1	1	16	10	6		
11	Shimla	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	2	16	15	1		
12	Solan	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	2	16	16	0		
13	Una	1	1	0	6	4	2	1	1	0	1	1	0	1	0	1	1	1	0	1	0	1	2	1	1	2	0	2	16	9	7			
		Jammu & Kashmir																																
14	Anantnag	1	1	0	6	5	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	1	1	2	2	0	16	9	7			
15	Bandipora	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	1	0	1	2	2	0	2	2	0	16	14	2
16	Baramulla	1	1	0	6	0	6	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	2	2	0	16	1	15	
17	Budgam	1	1	0	6	6	0	1	1	0	1	1	0	1	0	1	1	0	1	1	0	1	1	0	1	2	2	0	2	11	5			
18	Doda	1	0	1	6	4	2	1	0	1	1	1	0	1	1	0	1	0	1	1	0	1	1	0	1	2	2	0	2	2	0	16	11	5
19	Gandarbal	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	1	1	2	1	1	1	16	14	2		
20	Jammu	1	0	1	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	1	1	1	16	13	3		
21	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	2	16	16	0		
22	Kargil	1	1	0	6	6	0	1	0	1	1	1	0	1	1	0	1	1	0	1	1	0	1	2	1	1	2	2	0	16	13	3		
23	Kulgam	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			
24	Kupwara	1	1	0	6	4	2	1	1	0	1	0	1	1	1	0	1	0	1	1	0	1	2	2	0	2	1	1	1	16	10	6		
25	Leh	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	2	16	16	0		
26	Nyoma (Leh II)	1	1	0	6	4	2	1	1	0	1	1	0	1	0	1	1	0	1	1	0	1	1	0	1	2	2	0	2	2	0	16	11	5
27	Poonch	1	0	1	6	3	3	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	2	2	0	2	1	1	16	10	6
28	Pulwama	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	2	2	0	2	1	1	16	13	3
29	Rajouri	1	0	1	6	5	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	11	5		
30	Reasi	1	1	0	6	4	2	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	1	0	2	2	0	2	1	1	16	12	4	
31	Samba	1	0	1	6	4	2	1	0	1	1	1	0	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	0	2	16	8	8	
32	Shopian	1	1	0	6	4	2	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	2	0	2	2	0	16	5	11		
33	Srinagar	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	2	16	16	0		
34	Zanskar (Kargil-II)	1	0	1	6	2	4	1	1	0	1	0	1	1	0	1	1	1	0	1	0	1	2	0	2	2	1	1	1	16	5	11		
		Punjab																																
35	Abohar (Fazilka)	1	1	0	6	0	6	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	2	2	0	2	16	1	15			
36	Amritsar	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0			
37	Barnala	1	1	0	6	6	0	1	1	0	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	15	1	
38	Bathinda	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0			
39	Faridkot	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			
40	Fatehgarh Sahib	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			
41	Ferozepur	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	1	0	2	2	0	2	2	0	16	14	2	
42	Gurdaspur	1	0	1	6	5	1	1	1	0	1	1	0	1	0	1	1	1	0	1	1	0	2	2	0	2	1	1	16	12	4			
43	Hoshiarpur	1	1	0	6	6	0	1	0	1	1	1	0	1	1	0	1	1	0	1	1	0	2	1	1	2	2	0	16	14	2			
44	Jalandhar	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	1	0	2	2	0	2	1	1	16	14	2	
45	Kapurthala	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0			
46																																		

Annexure-III Contd....

S. No.	Name of KVK	PC			SMS			Farm Manager			Programme Asistant			Computer Programmer			Assistant (Accountant)			Steno. Grade-3			Driver			Skilled supporing staff			TOTAL		
		S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V
49	Mohali	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
50	Muktsar	1	1	0	6	5	1	1	0	1	1	0	1	1	1	0	1	1	0	1	1	0	2	2	0	2	1	1	16	12	4
51	Nawanshahar	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
52	Pathankot	1	1	0	6	6	0	1	1	0	1	0	1	1	0	1	1	1	0	1	0	1	2	1	1	2	0	2	16	10	6
53	Patiala	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	0	1	1	0	2	2	0	2	2	0	16	15	1	
54	Ropar	1	0	1	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	14	2
55	Sangrur	1	1	0	6	5	1	1	1	0	1	0	1	1	0	1	1	0	1	1	0	2	1	1	2	2	0	16	13	3	
56	Tarntaran	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
Uttarakhand																															
57	Almora	1	1	0	6	3	3	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	2	0	2	2	0	2	16	8	8
58	Bageshwar	1	0	1	6	3	3	1	1	0	1	1	0	1	0	1	1	0	1	1	0	1	2	2	0	2	2	0	16	9	7
59	Chamoli	1	0	1	6	4	2	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	13	3
60	Champawat	1	0	1	6	2	4	1	0	1	1	1	0	1	1	0	1	1	0	1	0	1	2	0	2	2	0	2	16	5	11
61	Dehradun	1	1	0	6	4	2	1	0	1	1	1	0	1	1	0	1	1	0	1	0	1	2	0	2	2	1	1	16	9	7
62	Haridwar	1	1	0	6	4	2	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	0	2	2	0	2	16	10	6
63	Nainital	1	1	0	6	4	2	1	0	1	1	1	0	1	1	0	1	1	0	1	1	0	2	0	2	2	0	2	16	9	7
64	Pauri Garhwal	1	0	1	6	3	3	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	2	2	0	2	16	3	13
65	Pithouragarh	1	0	1	6	3	3	1	0	1	1	1	0	1	1	0	1	1	0	1	0	1	2	0	2	2	1	1	16	7	9
66	Rudraprayag	1	0	1	6	3	3	1	1	0	1	0	1	1	0	1	1	1	0	1	0	1	2	0	2	2	0	2	16	5	11
67	Tehri Garhwal	1	0	1	6	4	2	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	1	1	2	2	0	16	7	9
68	U.S. Nagar	1	1	0	6	2	4	1	0	1	1	1	0	1	1	0	1	1	0	1	0	1	2	0	2	2	0	2	16	6	10
69	Uttarkashi	1	0	1	6	3	3	1	1	0	1	1	0	1	1	0	1	0	1	0	1	1	0	1	1	2	2	0	16	9	7

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





Annexure-IV

STATE WISE SUMMARY OF INFRASTRUCTURE IN KVKS

Infrastructure	Punjab	Himachal Pradesh	Jammu & Kashmir	Uttarakhand	Total
Administrative Building	21	10	17	13	61
Staff Quarters	16	9	8	10	43
Farmers Hostel	14	11	8	13	46
Demo Units	20	12	16	12	60
Soil and Water Testing Lab	20	11	16	10	57
Rain Water Harvesting	9	7	2	7	25
E-Connectivity	16	6	4	6	32
Minimal Processing	1	0	3	4	8
Integrated Farming System	6	7	6	4	23
Tractor	22	9	14	9	54
Jeep	20	13	17	11	61
Two Wheeler	15	11	14	12	52
Solar Panel	10	0	4	3	17

Annexure-V

STAFF POSITION OF ICAR-ATARI, ZONE-I, LUDHIANA AS ON 31.03.2019

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

*Annexure-VI***LIST OF ONGOING PROJECTS AND SCHEMES AT ICAR-ATARI ZONE-1 DURING 2018-19**

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



BUDGET OF THE INSTITUTE FOR THE YEAR 2018-2019

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

Name of the Zone	Budget Head	Other Than SCSP, TSP and NEH	TSP	SCSP	Total
ICAR ATARI Zone-I	Grant in Aid-Capital	10.51	0.00	0.00	10.51
	Grant in Aid-Salary	191.36	0.00	0.00	191.36
	Grant in Aid-General	74.55	0.00	0.00	74.55
	Total	276.42	0.00	0.00	276.42
KVK+ DEE	Grant in Aid-Capital	420.00	157.12	90.00	667.12
	Grant in Aid-Salary	7704.64	0.00	0.00	7704.64
	Grant in Aid-General	515.45	102.23	184.00	801.68
	Total	8640.09	259.35	274.00	9173.44
Total	Grant in Aid-Capital	430.51	157.12	90.00	677.63
	Grant in Aid-Salary	7896.00	0.00	0.00	7896.00
	Grant in Aid-General	590.00	102.23	184.00	876.23
	Grand Total	8916.51	259.35	274.00	9449.86



Annexure-VIII

DETAILS OF SAC MEETING CONDUCTED BY KVKS DURING 2018-19

Name of KVK	Date of SAC meeting	Number of Participants
Punjab		
Amritsar	12.12.18	24
Barnala	07.03.19	16
Bathinda	20.12.18	29
Fatehgarh Sahib	19.12.18	24
Faridkot	12.11.18	34
Fazilka	20.02.18	18
Ferozepur	20.11.18	42
Gurdaspur	27.11.18	34
Hoshiarpur	03.12.18	39
Jalandhar	07.12.18	33
Kapurthala	15.01.19	29
Ludhiana	14.12.18	39
Mansa	18.12.18	33
Moga	24.01.19	39
Mohali	22.05.18	23
Muktsar	21.12.18	19
Nawanshahar	08.02.19	33
Pathankot	12.02.19	37
Patiala	29.01.19	34
Ropar	31.01.19	34
Sangrur	05.02.19	34
Tarntaran	08.01.19	29
Total		676
Uttarakhand		
Almora	26.03.19	35
Bageshwar	08.05.19	28
Chamoli	27.03.19	30
Champawat	12.03.19	26
Dehradun	27.02.19	30
Haridwar	28.02.19	30
Nainital	17.12.18	58
Pauri Garhwal	Not Conducted	0
Pithoragarh	13.03.19	22
Rudraprayag	28.03.19	22
Tehri Garhwal	Not Conducted	0
US Nagar	11.12.18	29
Uttarkashi	06.10.18	39
Total		349



Name of KVK	Date of SAC meeting	Number of Participants
Himachal Pradesh		
Bilaspur	07.03.19	35
Chamba	06.12.18	36
Hamirpur	06.03.19	29
Kangra	29.03.18	21
Kinnaur	22.09.18	24
Kullu	26.03.19	18
Lahual & Spiti I	18.09.18	20
Lahual & Spiti II	20.09.18	19
Mandi	25.03.19	17
Shimla	07.08.18	27
Sirmour	12.03.19	22
Solan	25.04.18	18
Una	07.02.18	50
Total		336
Jammu & Kashmir		
Anantnag	25.03.19	90
Bandipora	1.04.19	84
Baramulla	Not Conducted	0
Budgam	02.05.19	36
Doda	10.03.18	23
Gandarbal	21.04.18	66
Jammu	26.03.19	30
Kargil	Not Conducted	0
Kargil II	Not Conducted	0
Kathua	25.03.19	33
Kulgam	14.05.18	38
Kupwara	29.04.19	77
Leh	09.05.18	29
Leh II	09.05.18	70
Poonch	24.03.18	12
Pulwama	4.07.18	35
Rajouri	12.03.18	17
Reasi	09.03.18	13
Samba	26.03.18	16
Shopian	14.05.19	13
Srinagar	24.04.18	31
Total		713
Grand Total		2074



ਹਰ ਕਦਮ, ਹਰ ਤਗਰ
ਕਿਸਾਨਾਂ ਕਾ ਫ਼ਮਸਫਰ
ਆਰਤੀਯ ਕ੃ਤਿ ਅਨੁਸਂਧਾਨ ਪਰਿ਷ਦ

*Agri*search with a *human touch***



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