Technology Assessment, Refinement and Transfer

The activities of Division of Agricultural Extension include technology assessment, refinement, and transfer, aiming to bridge the gap between the technology developed at research stations and its adoption at field level. Major projects of the Division are Krishi Vigyan Kendra (KVK), Trainers Training Centre (TTC), Technology Assessment and Refinement through Institution-Village Linkage Programme (IVLP), and Agricultural Technology Information Centre (ATIC). The council have established one National Research Centre for Women in Agriculture (NRCWA) at Bhubaneshwar (Orissa). At present, there are 329 KVKs including 53 Zonal Agricultural Research Stations (ZARSs) strengthened to take up the additional functions of KVKs, 10 TTCs, 70 IVLP Centres, and 44 ATICs in State Agricultural Universities, ICAR Institutes, NGOs and other institutions under frontline extension programmes of the council.

- KVKs organized 19,880 training courses for farmers, 6,073 vocational and skill-oriented training courses for rural youth, and 2,591 training programmes for in-service personnel; also organized 18,355 extension activities to accelerate dissemination of technologies
- Frontline demonstrations resulted in yield increase in oilseeds, pulses, cereals, horticultural and commercial crops
- KVKs identified 333 technologies for on-farm testing to evaluate and assess its impact on specific locations
- Zero-tillage sowing of wheat decreased the population density of *Phalaris minor*
- TTTs organized 216 training courses, benefiting 4,140 participants
- Under Mission Mode Project 3 publications, viz., *Inventory of ITK in Agriculture – Document 1*, *Inventory of ITK in Agriculture — Documents 2* and *Supplement 1 of Document 2*, brought out

Krishi Vigyan Kendras

The activities of KVK include skill training of farmers; on-farm testing; in-service training of extension

Training courses for in-service personnel

Area	No.of courses	No.of beneficiaries			SC/ST		
		Male	Female	Total	Male	Female	Total
Agricultural extension	274	5,311	1,527	6,838	630	205	835
Agricultural engineering	158	2,592	664	3,256	536	151	687
Agroforestry	82	1,389	151	1,540	246	35	281
Livestock production and management	216	3,523	638	4,161	753	274	1,027
Crop production	612	14,390	2,066	16,456	2,349	241	2,590
Fishery	50	869	123	992	115	85	200
Home science	320	1,578	5,713	7,291	481	1,410	1,891
Horticulture	346	5,727	759	6,486	1,479	255	1,734
Plant protection	312	6,471	812	7,283	937	135	1,072
Soil fertility	67	1,390	114	1,504	235	39	274
*Others	154	4,334	770	5,104	1,016	275	1,291
Total	2,591	47,574	13,337	60,911	8,777	3,105	11,882

*Rural crafts, soil and water conservation, and biotechnology, etc.

Extension activities

Activities	Number	Number of beneficiaries
Field days	1,273	1,28,442
Kisan melas	320	4,08,325
Kisan gosthies	1,882	97,839
Exhibitions	478	3,10,605
Ex-trainees sammelans	131	6,527
Advisory services	12,824	85,129
Film shows	421	23,861
Diagnostic services	592	1,18,689
Clinic centre	265	3,443
Farm science clubs	142	4053
Self-help groups (SHG)	27	296
Total	18,355	11,87,209

Newsletter

75 KVKs have started publication of quarterly newsletters in local languages as well as in English and Hindi for the benefit of the farming community. These newsletters contain information on agricultural operations for the coming three months, besides useful articles on crop production, vegetable cultivation, horticulture, animal sciences, home science, agricultural engineering, etc. The newsletters also carry the schedule of training programmes of the KVK in the ensuing three months. These newsletters are widely circulated to the farmers, gram panchayats and line departments.

Vocational Training for Rural Youths: The training courses for rural youths were organized in agricultural extension, agricultural engineering, agroforestry, animal science, apiculture, crop production, fishery, home science, horticulture, agri-business, mushroom production, plant protection, rural crafts and other income generating activities. As many as 6,073 vocational and skill oriented training courses were organized for 110,000 rural youths.

Frontline demonstrations on oilseeds

Crops	No.of farmers	Area (ha)	Demonstration yield (tonnes/ha)	Local yield (tonnes/ha)	Increase (%)
Castor	422	191.00	1.683	1.226	37.26
Groundnut (*kharif*)	1,519	673.34	1.442	1.090	32.31
Groundnut (*rabi*)	1,110	419.60	1.961	1.386	41.47
Niger	580	163.60	0.407	0.250	62.80
Sesamum	1,064	372.27	0.509	0.343	48.41
Soybean	1,225	516.50	1.515	0..117	29.10
Sunflower	648	303.66	1.565	1.200	30.48
Linseed	324	110.50	0.928	0.619	50.00
Mustard	2,052	691.26	1.444	1.070	34.96
Safflower	58	29.50	0.877	0.653	34.38
Toria	284	90.00	1.010	0.627	61.13
Total	9,286	3,561.23			

personnel; and organizing frontline demonstrations to establish production potentials on farmers' fields and provide feed back.

Farmers' Training: A total of 19,880 training courses were organized benefiting 0.47 million farmers and farm women in various aspects of agricultural extension, agricultural engineering, agroforestry, livestock production and management, crop production, fisheries, home science, horticulture, plant protection, soil fertility and others.

Training Programmes for In-service Personnel: A total of 2,591 training programmes were conducted covering 60,911 participants. The training was imparted through participatory training methodologies, field visits and other interactive methods.

Extension Activities: The KVK organized 18,355 extension activities covering 1.18 million farmers and rural youths to accelerate the process of dissemination of technologies. These include field days, kisan melas, kisan gosthies, exhibitions, ex-trainees sammelans, advisory

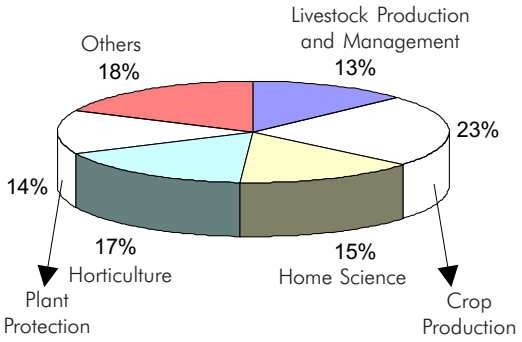
Frontline demonstrations on pulses

Crops	No.of farmers	Area (ha)	Demonstration yield (tonnes/ha)	Local yield (tonnes/ha)	Increase (%)
Blackgram	1,565	407.53	1.204	0.882	36.49
Greengram	833	356.92	1.015	0.726	39.80
Mothbean	39	22.50	0.481	0.338	42.27
Redgram (pigeonpea)	1,237	464.50	1.290	0.970	32.96
Chickpea (Bengalgram)	1,525	572.17	1.995	1.372	45.40
Lentil	778	236.10	1.683	1.113	51.18
Pea	455	106.67	1.669	1.035	61.26
Total	6,432	2,166.39			

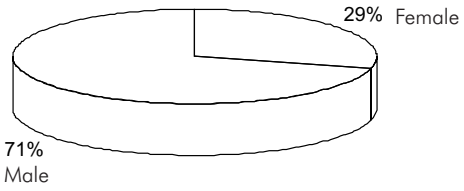
Frontline demonstrations on other crops

Crops	No.of farmers	Area (ha)	Demonstration yield (tonnes/ha)	Increase (%)	Local yield (tonnes/ha)
Jowar	115	50.80	2.333	1.420	64.26
Maize	605	222.68	3.917	.2.90	45.65
Paddy	1,381	470.85	4.707	3.535	33.15
Wheat	1,791	750.98	4.109	2.855	43.89
Pearl millet	202	76.70	1.513	1.144	32.27
Barley	109	38.40	3.432	3.044	12.77
Finger millet	15	4.00	1.162	0.801	45.07
Horticultural Crops					
Bitter gourd	10	1.00	23.500	20.300	15.76
Brinjal	110	15.79	21.093	16.886	24.91
Cabbage	79	11.36	26.695	16.267	64.11
Chillies	77	16.13	4.812	4.162	15.64
Cluster bean	41	7.75	6.619	5.102	29.72
Cucumber	56	4.50	18.944	14.311	32.38
Fennel	13	6.00	2.340	1.607	45.61
Okra	81	23.85	8.925	6.765	31.93
Onion	33	2.55	23.871	16.202	47.33
Pea	49	6.80	11.926	9.413	26.70
Potato	113	19.00	22.423	15.970	40.40
Tomato	139	15.68	32.294	23.053	40.08
Watermelon	14	4.75	31.436	23.168	35.68
Marigold	12	5.00	5.666	3.500	61.89
Turmeric	35	1.35	15.300	5.733	166.88
Commercial Crops					
Cotton	399	191.20	14.11	1.156	24.53
Sugarcane	11	4.40	45.600	39.000	16.92
Total	5,490	1,951.52			

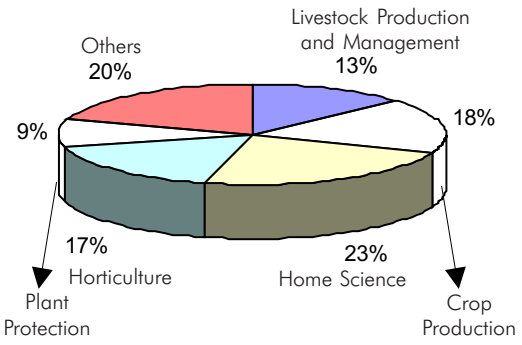
1. Distribution of training courses for farmers



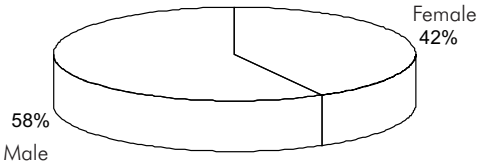
2. Participation of farmers and farm women in training programmes



3. Distribution of training courses for rural youth



4. Participation of male and female in rural youth training programmes



1. Distribution of training courses for farmers (others included are Agricultural Extension, Agricultural Engineering, Fisheries, Soil Fertility, Mushroom Production, Bee Keeping, Watershed, Rural Crafts, etc.)
2. Participation of farmers and farm women in training programmes
3. Distribution of training courses for rural youths (others included are Agricultural Extension, Agricultural Engineering, Fisheries, Apiculture, Mushroom Production, Vermi Compost, Hybrid Seed Production, Saffron Production, etc.)
4. Participation of female and male in training programmes

Summary of on-farm trials by KVKs

Crops	Varietal/feed evaluation	Nutrient/ feed management	Cropping systems	Zero tillage	Weed management	Insect/ disease management	Total
Cereals	53	44	16	8	18	10	149
Oilseeds	7	16	5	—	9	8	45
Pulses	6	10	5	1	4	9	35
Commercial crops	5	3	2	—		5	15
Vegetables, fruits and flowers	15	25	3	—	—	30	76
Animal science	4	8	—	—		4	16
Total	90	106	31	9	31	66	333

services, film shows, diagnostic services, clinic centres, farm science clubs and Self-help groups (SHG).

In addition the activities of KVKs were highlighted in 4,173 newspapers. The KVKs published 879 popular articles, 13,388 extension literature and delivered 1,792 radio and TV talks.

Frontline Demonstrations: The Frontline demonstrations (FLDs) were conducted to demonstrate the production potential of the newly released production technologies in a given farming system. The training and field days were organized for extension workers and farmers for dissemination of technologies.

FLD on greengram variety PM 9339 during *kharif* at KVK, Jalgaon, Maharashtra

A group of farmers purchasing technology products from sale counters of ATIC at BCKVV Nadia, West Bengal

Frontline demonstration on *kharif* groundnut (TAG 24) at KVK, Kolhapur, Maharashtra

Training of rural youth on cotton pest scouting at KVK, Jalna

Oilseeds: During the year, 9,286 demonstrations were conducted covering 35,61.23 ha on 10 oilseed crops including castor, groundnut (*kharif* and *rabi*) niger, sesamum, sunflower, linseed, mustard, safflower and *toria*. The percentage increase in yield varied from 29.10 in soybean to 62.80 in niger.

Pulses. During the year, 6,432 demonstrations were conducted covering 2,166.39 ha in 7 pulse crops including blackgram, greengram, mothbean, redgram, chickpea, lentil and pea. The percentage increase in yield varied from 32.96 in redgram to 61.26 in pea.

Other crops. During the year, 5,490 demonstrations were conducted covering 1,952 ha on different cereals, horticultural and commercial crops.

On-farm Trials: A total of 333 technologies were identified for on-farm testing by the KVKs to evaluate and assess its impact on location-specific basis in different farming systems including varietal/feed evaluation (111), nutrient/feed management (101), cropping systems (31), zero tillage (5), weed management(31) and insect/disease management(66).

Performance of zero-till-seed-cum-fertilizer drill (ZTD): For enhancing the productivity and sustainability of the rice-wheat system, zero tillage has been becoming popular among the farmers. The increasing cost of cultivation has made the farming business less profitable, the only way to increase profitability is by reducing the cost of cultivation. The land preparation after paddy for sowing of wheat involves substantial expenditure. In zero-tillage, wheat is directly sown without disturbing the soil, which increases yield and reduces the cost by saving fuel, water, herbicides and labour. Zero-tillage also helps in suppressing *Phalaris minor*.

Zero-tillage trials were conducted by 15 KVKs with the objective to make farmers aware of the use of zero-till-drill for sowing of wheat. The trials on zero-till-seed-cum-fertilizer drill for sowing of wheat were conducted at 1,064 farmers' fields covering an area of 1,108.0 ha during the last six years in different districts of Haryana and Punjab. The results indicated that the wheat sown by zero-tillage gave 3.5% more yield than conventional method of sowing.

Economics of zero-tillage sowing of wheat at Patiala

Operation	No. of operations		Total amount (Rs)	
	ZTD	C	ZTD	C
Harrow @ Rs 375 each per ha	-	2	-	750
Cultivator @ Rs 375 each per ha	-	2	-	750
Suhaga @ Rs 100 each per ha	-	4	-	400
Wheat drilling @ Rs 625 per ha in ZTD and Rs 375 per ha in conventional method	1	1	625	375
Total	1	9	625	2,275

ZTD, zero-till-seed-cum-fertilizer drill; C, conventional method

Saving in land preparation and sowing operation Nawanshahar

Operation	No. of operations		Total amount (Rs)	
	ZTD	C	ZTD	C
Harrowing @ Rs. 525/ha	-	-	2	1050
Ploughing @ Rs 375/ha	-	-	2	750
Planking @ Rs 250/ha	-	-	2	500
Sowing @ Rs 375/ha	1	375	1	375
Total	1	375	7	2675

ZTD, zero-till-seed-cum-fertilizer drill; C, conventional method

Reduced weed population. *Phalaris minor* is an important weed of wheat crop. At 7 different locations, zero-tillage sowing of wheat resulted in 30% less population density of *Phalaris minor* than the conventional tillage.

Economics of zero-till-seed-cum-fertilizer drill sown wheat. The survey conducted by the KVKs at Hoshiarpur, Nawanshahar, Patiala, and Gurdaspur(Punjab), Kaithal, Sonipat and Panipat (Haryana) indicate that the reduction in cost by zero-tillage machine on tillage operations varied from Rs 1,650 to Rs 2,300/ha. The KVK at Patiala and Nawanshahar (Punjab) worked out the cost

Low-cost light traps in brinjal

of tillage operations. Under heavy soils, if the last irrigation to Basmati is applied about one week before its harvest during the month of early November, the wheat crop can be sown with zero-till drill even without applying pre-sowing irrigation, resulting in reduction of the cost of pre-sowing irrigation.

Integrated nutrient management (INM) in transplanted cotton: The trial was carried out in the Instructional Farm of Ramkrishna Ashram Krishi Vigyan Kendra, Nimpith, South-24 Parganas district of West Bengal under rainfed situations of Sundarbans during *rabi*-summer season of 2002 and 2003. The growth and yield of cotton significantly varied with the system of manuring. The plant height and yield attributes were significantly higher when 25% N was supplied through vermicompost along with 75% N from chemical fertilizer. The yield of seed cotton was 1.285 and 1.330 tonnes/ha in 2002 and 2003 respectively. The pooled increase in yield of seed cotton was 18.9% higher than that of 100% N as chemical fertilizer. Application of 50% N as Vermicompost + Azotobacter in combination with 50% N through chemical fertilizer produced the same yield (1.099 tonnes/ha) as for 100% N as chemical.

Net monetary return was maximum (Rs 8,670/ha) from 25% N through vermicompost along with 75% N through chemical fertilizer with the cost benefit ratio of 1: 1.49 followed by 25% N from FYM and 75% of nitrogen from chemical sources 1: 1.42.

Performance of raya: On-farm trials were conducted on three varieties of raya,viz. RH 30, Laxmi and RH 8701, in Sirsa district of Haryana during *rabi* 2002-03. Variety RH 30 performed better (1.56 tonnes/ha) than the other varieties. Laxmi and RH 8701 gave almost the equal yield (1.47 and 1.48 tonnes/ha) respectively.

Performance of gobhi sarson in Himachal Pradesh: On-farm trials were conducted on promising varieties of *gobhi sarson*, viz. GLS4 3A, ONK 1, JTC, Sheetal and Neelam, by KVK, Una during 2002-03. The results revealed that variety Sheetal and Neelam performed well in Una district over other varieties. The varieties GLS 4 3A, ONK 1 and JTC produced almost equal yield of about 0.80 tonnes/ha.

Effect of INM on growth and yield of cotton during 2002-03

Treatments	Plant height (cm)	No of branches per plant	No of bolls per plant	Wt of seed cotton per boll (g)	Seed cotton yield (tonnes/ha)		
					2002	2003	Pooled
Control (without nitrogen)	73.4	13.3	6.41	2.50	0.526	0.610	0.568
100% N	85.5	19.7	9.26	3.37	1.034	1.165	1.099
75% N + 25% N (FYM)	83.9	18.5	8.96	3.32	0.824	1.267	1.045
75% N + 25% N (Vermicompost)	88.2	21.8	11.33	3.65	1.285	1.330	1.307
50% N + 25% (FYM) + 25% N (*Azotobacter*)	79.5	15.2	8.19	3.00	0.759	1.050	0.904
50% N + 25% N (Vermicompost) + 25% N (*Azotobacter*)	81.1	16.9	9.29	3.37	1.048	1.151	1.099

Effect of INM on economics of transplanted cotton during 2002 and 2003

Treatments	Seed cotton yield (tonnes/ha)	Stalk yield (tonnes/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Cost: Benefit ratio
Control (without nitrogen)	5.68	0.40	12,775	11,520	(-)1,255	1: 0.90
100% N	10.99	0,50	15,755	22,180	6,425	1: 1.40
75% N + 25% N (FYM)	10.45	0.55	15,960	21,120	5,160	1: 1.42
75% N + 25% N (Vermicompost)	13.07	0.60	17,710	26,380	8,670	1: 1.49
50% N + 25% N (FYM) + 25% N (*Azotobacter*)	9.04	0.45	15,465	18,260	2,795	1: 1.18
50% N + 25% N Vermicompost) + 25% N (*Azotobacter*)	10.99	0.48	16,965	22,172	5,207	1: 1.30

- KVKs produced 8,301.5 tonnes of seeds of cereals, oilseeds, pulses, vegetables and other crops, in addition to 2.071 millions of saplings/seedlings of fruits, vegetables, spices, forest species, ornamental, other plantation crops and medicinal plants. Besides, 5,775 livestock strains also produced for the farmers
- KVKs (75) started publications of quarterly newsletters in local languages as well as in English and Hindi
- ATICs provided 10,26.7 tonnes seeds of improved varieties, 0.70 million nursery plants of vegetables and fruits crops, 0.12 million packets of bio-fertilizers and bio-pesticides. Other activities included soil and water testing of 16,040 samples; diagnosis of 11,437 specimens of diseased crop plants, and treatment of 64, 120 animals

Performance of different varieties of *gobhi sarson* at Una district of Himachal Pradesh

Variety	Yield (tonnes/ha)
GLS4 3A	0.792
ONK 1	0.818
JTC	0.826
Sheetal	1.000
Neelam	0.908

Performance of barseem in Punjab: The trials were conducted during *rabi* season to evaluate the performance of two cultivars of berseem at Ferozepur and Bathinda districts of Punjab BL 42 berseem produced 5% more fodder yield than BL 10.

Varietal performance of barseem cultivars in Ferozepur and Bathinda district of Punjab

Variety	Fodder yield (tonnes/ha)		
	Ferozepur	Bathinda	Mean
BL -42	89.50	44.00	66.75
BL 10	88.20	38.40	63.30

Performance of rice varieties in sodic soils of Uttar Pradesh: Out of three improved varieties of rice (Narendra Usar 2, Sarju 52 and CSR 10), Narendra Usar 2 proved to be the best one in district Raibareli, as it recorded highest grain yield of 4.150 tonnes/ha and net return of (Rs 12,025/ha), followed by Sarju 52 (3.860 tonnes/ha) and CSR 10 (3.625 tonnes/ha), compared with the yield of conventional variety MTU 7029 (3.20 tonnes/ha).

The farmers opined that Narendra Usar 2 has better compatibility than Sarju 52 and CSR 10 and their own choice variety MTU 7029 in their existing rice-wheat cropping system.

Trimming of Basmati: A trial was conducted on trimming of Basmati rice (cv Basmati 386) with two levels, viz. trimming at 45 days after transplanting and control in Ferozepur district. The data indicate that the trimming of paddy at 45 days after transplanting gave 0.47 tonnes/ha more grain yield of rice than control (2.13 tonnes/ha).

Seed/Planting Material: The KVKs produced 8,301.5 tonnes of seeds of cereals, oilseeds, pulses, vegetables and others. In addition, 2.07 million saplings/seedlings of fruits, vegetables, spices, forest species, ornamental, other plantation crops and medicinal plants were produced. Besides, 5,775 livestock strains were also produced for availability to the farmers.

Monitoring Mechanism: The Project is monitored through 8 Zonal Co-ordinating Units, located at Ludhiana (Zone 1), Calcutta (Zone II), Shillong (Zone III), Kanpur (Zone IV), Hyderabad (Zone V), Jodhpur (Zone VI), Jabalpur (Zone VII), and Bangalore (Zone VIII). The Zonal Units monitor the frontline extension programmes by organizing Zonal-and State-level Workshop, Scientific Advisory Committee Meeting and Visits. During the year, 8 Zonal Workshops were organized with the participation of the Incharges of all the KVKs to review the work done during the year and formulation of action plan for the next year. Similarly, 16 State-level Workshops were organized in order to review the frontline demonstrations on oilseed and pulses. To upgrade the knowledge and skills of KVK staff, 14 workshops were organized under HRD programme.

Trainers" training centres

There are ten Trainers' Training Centres established by

Yield performance of rice varieties in sodic soil of Raibareli district of Uttar Pradesh

Practices	Yield (tonnes/ha)	Increase in yield (%)	Net return (Rs/ha)	Cost.: Benefit Ratio
Farmer Practice MTU-7029	3.200	—	7,710	1: 1.0
Narendra Usar-2	4.150	29.70	12,025	1: 1.65
Sarju-52	3.860	20.62	10,275	1: 1.50
CSR-10	3.625	13.28	9,325	1: 1.30

Production of seeds by the KVKs during 2003

Crops	Quantity (tonnes)
Cereals	6697.458
Oilseeds	298.194
Pulses	264.271
Vegetables	78.627
Others	962.993
Total	8301.543

Production of planting materials by the KVKs during 2003

Categories	Saplings and seedlings
Fruits	3,64,262
Fodder crops	2,785
Vegetables	7,72,526
Spices	7,02,258
Forest species	1,52,813
Ornamental	31,045
Plantation crops	37,518
Medicinal plants	7,400
Total	20,70,607

Nursery plants for sale at ATIC-TANUVAS

On-farm trial on efficacy of improved sickle for paddy harvesting at CTCRI, Trivandrum, Kerala

the Council in frontier areas of technology for providing in-service training to the KVK scientists, extension officers of line departments, university teachers and entrepreneurs. During the year, 216 training courses were organized benefiting 4,140 participants.

Mission mode project under NATP

Collection, Documentation and Validation of Indigenous Technical Knowledge (ITK): The mission of the project was to collect, document and validate indigenous knowledge-based practices in agriculture and

Zone-wise varieties/hybrids demonstrated

Zone/State	Varieties	Hybrids
Punjab, Haryana,	LD 327,LD 694, F 1378,LH 556,LH 1861,HS 6, HD 123	PH 54, Dhawal 2, White Gold, Ankur 651, LHH 144
West Bengal	LRA 5156	—
Meghalya	Comilla Cotton	—
Uttar Pradesh	RG 8, F 846	—
Andhra Pradesh, Maharashtra	Turab, AKA 7, CNH 120	PK HY 4, PK HY 5, PHH 316, NH 545, Banni 145, Ankur 651, Narsima, NHH 44
Gujarat, Rajasthan	RS 810, RS 2013, F 846, LH 1556, RS 875, BN	H-10, HY 8
Madhya Pradesh, Orissa	Sarvotham, JK 4, Tapti	HY 8, DCH 32, Banni, Savitha
Tamil Nadu, Karnataka	DLSA 17, Sahna	DHH 11, NHH 44, DHH 543, BT, DCH 32, DHB 105, RACH 1049, RAHS 14, Surbhi

Integrated Piggery Development

Under the centrally sponsored scheme on Assistance to States for Integrated Piggery Development, the programme has been undertaken in 10 KVKs with the financial support of Department of Animal Husbandry and Dairying. All the 10 KVKs have completed their construction work and created other infrastructure facilities. The KVK at Ambala and Rewari districts of Haryana have been imparting 15 days training programme in pig farming production and management. The KVKs also provided technical support to the ex-trainees. The KVK in Bankura district of West Bengal has selected 14 beneficiaries from scheduled tribe with an aim to upgrade the local stock of pig population. Training programmes (9) were conducted by the KVK, Allahabad covering 164 farmers, and 21 farmers have started their piggery units. All the KVKs are providing technical information to the farmers for economic management of the pig alongwith clinical and vaccination services.

allied activities in different agro-climate zones of India. The objectives of the projects were to catalogue and characterize the information for developing database, level of use of various ITKs by the farmers in the management of their systems, validate ITKs through quick-screening and by formal experimentation method, wherever needed, and to evolve a mechanism to protect peoples property rights and facilitate the process of sharing of benefit of the farming community. The expected outcome of the project was to develop methodology for collection of information on ITK, information on ITK in agriculture and land-based activities in publications, accessible computer-based classified information, quantified efficacy of selected ITK-based practices, and deliberate the issues related to intellectual property rights.

From the inception of the project 4,033 ITKs have been documented and three publications have been brought out in the form of *Inventory of ITK in Agriculture – Document 1*(1,473), *Inventory of ITK in Agriculture – Document 2* (1,998), and *Inventory of ITK in Agriculture – Supplement 1 of Document 2* (562). The theme-wise number of ITKs documented are indicated.

During the investigation, the issues related to intellectual property rights of the ITKs have been addressed. The practices based on indigenous knowledge have been documented and printed as books. The books are being placed in public domain (Libraries of SAUs, ICAR institutes and International institutes). Geographical indicators of the trees/plants which are in use in ITKs have been documented in the publications. The location of use of the ITKs have been mentioned in the documents and the names and addresses of the disclosers have been given in the documents.

Validation and Promotion of IPM Technology in Selected Crops in Different Agro-ecological Regions: Groundnut. At KVK Dausa, Gujarat, the adoption of the Integrated Pest Management (IPM) modules on groundnut resulted in increase of pod yield and net return per hectare compared with non-IPM village. In the IPM village, Mohanpura, the net return per hectare varied from Rs 8,229 to 8,617 compared with Rs 6,111 in non-IPM village of Jeetpura. Out of total 1,980 whitegrub host trees, one host tree with a radius of 15 m was selected and thus a total of 415 trees were selected. Nearly 80% of beetles were attracted and killed on pheromone loaded white grub host trees. The beetle control greatly reduced the grub population in IPM area. One deep ploughing of the fallow fields in the month of August reduced the grub by 20% in IPM village. To facilitate the process of transfer of technology 400 farmers were trained and 119 participated in field day.

Chickpea. The IPM demonstration on chickpea was taken up by the KVK, Kota, Rajasthan. The average number of nodules, root length and shoot length increased by 60.93, 54.74 and 20.16%, respectively, over non-IPM farmers. The per cent of abundance of bird species were recorded. The per cent increase in number of pods and per cent decrease in damaged pod were 17.99 and 6.45 respectively. The reduction of *Heliothes armigera* by application of biopesticides was 21.32% (NSKE-5%), 18.62% (Ha-NPV 250LE) and 76.22% (Qunailphos). The overall increase in yield of chickpea was 68.91% over non-IPM farmers.

Cotton. At KVK Bhatinda, Punjab, the IPM farmers applied on an average 9.11 sprays (8-12) in comparison to 14.34 (13-17) sprays applied by non-IPM farmers in cotton. The IPM farmers spent Rs 4,710/ha on sprays as compared to Rs 7,393/ha by the non-IPM farmers. The IPM farmers obtained on an average 1.609 tonnes/ha seed cotton compared with 0.985 tonnes/ha by non-IPM farmers. The net return of IPM farmers was Rs 29,079/ha compared with Rs 13,292/ha by non-IPM farmers.

At KVK, Nanded, Maharashtra 60 farmers having an area of 50.8 ha were given demonstration on IPM on Cotton. The average seed cotton yield of IPM plots was 0.947 tonne/ha compared with 0.381 tonne/ha from non-IPM plots. Training programmes (12) were organized with the participation of 1,207 farmers. Various extension activities were performed, i.e. kisan mela, field days, farmers' meeting and film shows benefiting 623 farmers.

Setting up of Renewable Energy Parks

The Ministry of Non-Conventional Energy Sources (MNES) under Special Area Demonstration Programme has provided financial support for setting up of Renewable Energy Parks at 10 KVKs. Various solar devices were provided under the project including Improved chulha, PV street light, PV domestic light, PV lanterns, water heating system, cookers, solar still, family size bio-gas plant, radio, colour TV, PV pump, wind pump, crop drier, biomass gastifier, educational kit and sprayers. KVK, Satna demonstrated about the utility and use of solar energy devices to 246 farmers, 110 farm women and 65 rural youths.

Other activities included, radio/TV talks, publication of popular articles and newspaper coverages and publication of extension literatures undertaken.

Seed treatment for prevention of white wooly sugarcane aphids at KVK, Kolhapur

Frontline demonstration on soybean (PK 1029) at KVK

Redgram. In Gulbarga district of Karnataka, the demonstration of IPM was taken by the KVK. The pod borer incidence in IPM fields of 54.5 ha showed 0.61 eggs, 0.43 larvae and 5.76% damaged pods compared with 0.88, 0.66 and 8.11% damaged pods in non-IPM fields in Sannur village. Similar results were obtained in Farhatabad, Tad – Tognoor and Kota villages. Various extension activities were taken up which include training of 646 farmers, and 28 other extension activities with the participation of 5729 farmers.

Tomato. In Ranchi district of Jharkhand IPM demonstrations were taken up on tomato. The mean insect population/plant in IPM field was 0.30, 0.45, 0.75 and 0.30 for *Heliothis armigera*, *Spodoptera litura*, leaf minor and semi-looper, respectively, compared against 0.89, 1.12, 3.25 and 0.88 in non-IPM fields. The average yield of tomato from IPM plots was 24 tonnes/ha compared with 19.5 tonnes/ha from non-IPM plots. The farmers from the neighbouring villages attended the five days training programmes on IPM.

Apple. The demonstration on IPM technology for control of wooly aphid/root rot in apple was taken up in 293 farmers' fields by the KVK, Rohru, Himachal Pradesh.

FLD on mungari cotton at KVK Yagantipalle, Kurnool, Andhra Pradesh

Training programmes (6) were conducted benefiting 344 farmers.

- Twenty ATICs developed their own web-sites. Information about package of technologies for various crops and other related enterprises, weather information, markets and commodity prices and frequently asked question (FAQ) have been put for the benefit of farmers. Ten centres started telephone help-lines service during the year
- Undertaken technological interventions (1,671) under IVLP in different disciplines like crops (923), livestock (247), horticulture (306), forestry (12), fisheries (37), gender issues (53) and other related areas (93)
- Demonstrations (988) were conducted on 53 high-yielding and pest-tolerant varieties/ hybrids of cotton. 220 Training programmes for farmers (5,359) and 35 for extension functionaries (985) were organized besides 143 field days for participants (9,676). In addition, 142 other extension activities were undertaken

Agricultural technology information centres

Agricultural Technology Information Centres (ATICs) are functioning to provide as a single window support system for the availability of technological products, diagnostic services and technology information to the farmers and other end users. Out of total 44 centres, 28 are under State Agricultural Universities and 16 under ICAR Institutes. During the period, the following activities were undertaken by the ATICs.

- A two day National Workshop was organized to review the progress of activities of these centres.
- As many as 1,53,000 farmers and other stakeholders have visited these centres, out of which 80,240 farmers were provided with diagnostic services.
- The centres have provided 10,267 tonnes seeds of improved varieties of different crops, 0.70 million of nursery plants of vegetables and fruits crops, and 0.12 million packets of biofertilizers and biopesticides to the farmers.

Agro-ecosystem wise technological interventions implemented under IVLP

Agro-eco systems	No. of villages	No. of farmers	Number of interventions							
			Crops	Live-stock	Horti-culture	Forestry	Fish-eries	Gender issues	Others	Total
Irrigated	66	8,696	239	64	44	–	4	6	20	377
Rainfed	76	17,331	425	109	154	10	6	41	37	782
Coastal	33	7,042	87	42	75	1	26	3	26	260
Hill and Mountain	106	3,962	152	21	32	–	1	2	10	218
Arid	14	403	20	11	1	1		1	–	34
Total	295	37,434	923	247	306	12	37	53	93	1671

Demonstration of low-cost polyhouse technology for vegetable nursery raising for marginal farmers

Training of rural youth on mushroom recipes preparation at ZARS-KVK, Vambane

Frontline demonstration on turmeric at KVK, Kolhapur, Maharashtra

Training of rural youth on making of bamboo handicrafts of KVK, Calicut

- The diagnostic services provided by these centres included 16,040 samples for soil and water testing, 11,437 specimens of crop plants infested by diseases/ insects and 64,120 animals were diagnosed and treated by the veterinary clinics.
- 0.69 million copies of information material including leaflets/pamphlets/bulletins were produced and 0.54 million information materials were supplied to the farmers and other stakeholders.
- 20 centres have developed their own web-sites. Information about the package of technologies for various crops and other related enterprises, weather

information, regulated markets and commodity prices and Frequently Asked Questions (FAQ) have been put for the benefit of farmers. Ten centres have also started telephone help- line service during the last one year.

- The ATICs have generated a gross income of Rs 3.48 crores during the year for providing technology products and services.

Institution-Village Linkage Programme

Technology Assessment and Refinement through Institution — Village Linkage Programme (IVLP) was taken up at 70 centres under NATP, ensuring greater scientists and farmers linkage in a bottom-up approach. The programme was implemented in 295 villages, covering 37,434 farmers and farmwomen. A large number of technological interventions (1,671) were undertaken in different disciplines like crops (923), livestock (247), horticulture (306), forestry (12), fisheries (37), gender issues (53) and other related areas (93).

Frontline demonstration on Cotton

A total of 988 demonstrations covering an area of 464.8 ha were conducted. A total of 53 high yielding and pest tolerant varieties and hybrids were demonstrated under the programmes to show the production potentials on the farmers fields.

A total 220 training programmes covering 5,359 farmers and 35 training programes for 985 extension functionaries were organized besides 143 field days with 9,676 participatnts. In addition 142 other extension activities were undertaken viz., radio/TV talk, newspaper coverage, exhibitions, discussion, etc.

Interface at district level

To strengthen research – extension linkages, KVKs organized 344 interface meetings involving the scientists and development officials at district level.

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