

Technology Assessment, Refinement and Transfer

The Council has created a vast network of Krishi Vigyan Kendras (KVK), aiming at assessment, refinement and demonstration of technologies/products. At present, there are 562 Krishi Vigyan Kendras which include 379 under Agricultural Universities, 41 under ICAR Institutes, 90 under NGOs, 33 under State Governments and 19 under other organizations.

KRISHI VIGYAN KENDRA

Technology assessment and refinement

During the year, 520 technologies were taken up for assessment and refinement in 2,044 locations with 20,002 on-farm trials. There were 389 technologies in 1,647 locations with 14,349 trials on improved cultural practices of various crops (4,560), varietal evaluation (2,502), application of bio-fertilizers and bio-control agents (911), crop diversification including cropping systems (755), plant protection (3,441), protected cultivation for production of seeds and planting material (230), farm machinery and equipment (507), resource conservation (708), and processing, value-addition and quality improvement (735).

Similarly, 32 technologies in 158 locations with 3,331 trials were taken up for assessment of technologies related to control of diseases; improved breeding; nutrition including feeds and fodder in cattle, pig and poultry; and production and management in fishery.

A total of 67 technologies in 170 locations with 1,031 trials were taken up for assessment and refinement related to improved cultural practices of various crops (529), application of bio-fertilizers and bio-control agents (58), plant protection (224), protected cultivation for seed production (16), farm machinery and implements (63), resource conservation (43), and processing,

value-addition and quality improvement (98).

Thirteen technologies were taken up in 18 locations with 258 trials for assessment and refinement related to health of cattle, sheep and goat (102), improved breeding of cattle (56), nutrition including feeds and fodder of cattle, sheep, goat and poultry (81), and production and management of sheep, goat and fishery (19).

Besides, 19 technologies related to entrepreneurship development and improving family health and nutritional status were also taken up with 1,033 trials in 51 locations.

Frontline demonstration

Frontline demonstrations were conducted to demonstrate the production potential of improved technologies on farmers' fields in different farming systems. A total of 75,825 frontline demonstrations were organized including oilseeds, pulses, cotton, farm implements and other crops including cereal, millet, fibre, fodder and commercial crops; vegetable, fruit, flower, plantation and medicinal crops, and spices and condiments, covering an area of 31,627 ha; including 3,791 demonstrations on hybrids of different crops. Besides 2,168 demonstrations on livestock and fishery, 109



Frontline demonstration on *safed musali*

demonstrations were conducted on various other enterprises.

Oilseeds: During the year, 18,949 demonstrations were conducted covering 6,379 ha on oilseed crops including castor, groundnut, linseed, mustard, niger, safflower, sesame, soybean, sunflower, *toria*, and *gobhi sarson*. The percentage increase in yield varied from 21.86 in *raya* to 52.70 in rapeseed, and on an average oilseed crops under demonstration gave 33.17% more yield than under local practice.

Pulses: There were 17,301 demonstrations were conducted covering 5,433 ha on pulse crops including blackgram, chickpea, cowpea, field pea, french bean, greengram, horse gram, lentil, mash, moth bean, pigeonpea and *rajmash*. The increase in yield varied from 34.88% in chickpea to 50.93% in horse gram, and on an average pulse crops under demonstration gave 41.14% more yield than under local practice.

Cotton: The frontline demonstrations on cotton were conducted in major cotton-growing areas of 11 states (Andhra Pradesh, Gujarat, Haryana, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu and West Bengal), in an area of 8,347 ha involving 11,613 farmers on production technology (4,211 in 1,754 ha), integrated pest management (1,774 in 1,420 ha) and farm implements (5,628 in 5,173 ha).

Production technology: The average yield of demonstration plots varied from 243 kg lint/ha in West Bengal to 745 kg lint/ha in Rajasthan, with the cost of production varying from Rs 5,000/ha in West Bengal to Rs 24,107/ha in Tamil Nadu. Due to variation in cost of production, yield levels and market price received for the cotton, the benefit: cost ratio also varied from 1.9 in Jharkhand and West Bengal to 4.5 in Haryana.

Performance of BT hybrids, non-BT hybrids and other varieties: Demonstrations on hybrids were conducted involving 2,991 farmers. Besides Bt hybrids, *desi* hybrids, *hirsutum* × *barbadense*

hybrids, *hirsutum* × *hirsutum* hybrids were also demonstrated in several locations along with *hirsutum*, *arboreum* and *herbaceum* varieties.

Irrigated: A total of 2,257 demonstrations were conducted in 10 states under irrigated situations in an area of 952.6 ha. Average yield of demonstration plots ranged from 319 kg lint/ha in Jharkhand to 836 kg lint/ha in Karnataka. An increase in yield of demonstration plots over local plots was the highest in Madhya Pradesh (32.42%), followed by Tamil Nadu (30.39%). Overall increase in yield was 9.86%. The difference of demonstration yield in Punjab was -0.72 because the demonstrated Bt hybrids MRC 6301, MRC 6304 and RCH 713 did not perform better than check hybrid RCH 134 Bt.

Rainfed: Under rainfed situations, 2,120 demonstrations were conducted in nine states covering 895 ha. Demonstration yields ranged from 243 kg lint/ha in West Bengal to 696 kg lint/ha in Madhya Pradesh and 812 kg lint/ha in Rajasthan under partial irrigated condition. The average increase in yield was 32.64%. Benefit : cost ratio was 3.10 in irrigated situation as compared to 2.2 in rainfed.

Integrated pest management: The integrated pest management (IPM) demonstrations were implemented in seven states, viz. Rajasthan, Andhra Pradesh, Maharashtra, Karnataka, Punjab, Haryana and Madhya Pradesh, in an area of 1,420 ha in 50 blocks (50 ha per block) with the involvement of 1,774 farmers including 331 women farmers. The maximum yield of 1,305 kg lint/ha was reported from Guntur (Andhra Pradesh), and the lowest (310 kg lint/ha) from Amaravathi (Maharashtra). The overall increase in yield from IPM plots was 18.63% higher than non-IPM plots.

Farm implements: Demonstrations of farm implements, viz. tillage (rotavator, furrow maker, harrow, plough, tiller, stalk uprooter and stalk shredder), sprayers, weeders, dibblers and planters, and ginning and delinting on cotton were conducted in an area of 5,173 ha involving 5,628 farmers.

Performance of cotton hybrids and other varieties in frontline demonstrations

Hybrid/variety	No. of farmers/ demo	Area (ha)	Demo yield (lint kg/ha)	Local yield (lint kg /ha)	Increase (%)	Demo cost (Rs/ha)	Local cost (Rs/ha)	Demo benefit: cost ratio
Bt hybrid	2,257	952.6	744	610	25.7	1,660	15,077	2.9
<i>Desi</i> Hybrid	120	74.0	683	622	11.3	5,790	5,244	3.6
H × B hybrids	355	125.2	528	447	17.5	18,496	16,153	1.9
H × H hybrids	259	108.4	651	529	23.1	12,808	12,060	3.1
<i>G. herbaceum</i> variety	97	38.8	210	181	15.9	5,467	4,925	2.5
<i>G. hirsutum</i> variety	446	180.8	487	414	23.2	10,654	10,212	3.2
<i>G. arboreum</i> variety	45	18.0	326	224	37.8	7,701	4,393	2.5

H, *hirsutum*; B, *barbadense*

Frontline demonstrations on other crops					
Category	No. of demonstrations	Area (ha)	Yield (tonnes/ha)		
			Demonstration	Local	Increase (%)
Cereals	11,655	3,847.77	4.18	3.37	24.18
Vegetables	4,074	874.16	16.58	12.71	30.37
Spices and condiments	2,352	473.51	14.56	11.61	25.44
Millets	1,167	414.70	2.07	1.56	32.80
Fodder crops	705	132.60	35.67	28.73	24.15
Tuber crops	538	65.08	23.15	16.86	37.29
Fruit crops	515	131.80	25.30	18.96	33.39
Fibre crops	509	120.00	1.43	0.98	44.74
Flower crops	335	95.85	13.02	9.63	35.26
Commercial crops	204	59.50	59.37	48.44	22.56
Plantation crops	129	35.90	5.74	3.82	50.26
Medicinal crops	57	27.00	1.14	0.71	23.01
Other crops	94	17.40	4.11	3.26	26.00
Total	22,334	6,295.27			

Frontline demonstrations on hybrids of crops						
Crop	hybrid	No. of farmers	Area (ha)	Yield (kg/ha)		
				Demonstration	Local	Increase (%)
Brinjal	PKM 1	20	4.00	3,025	2,820	7.27
Cabbage	Quisto	25	0.20	3,403	2,500	36.12
Castor	DCH 32, GCH 4, TMVCH 1	89	23.50	1,817	980	85.51
Chilli	HCH 9646	11	0.44	3,120	1,810	72.38
Cucumber	Century Hyb 1	4	0.04	4,600	3,800	21.05
Maize	Co MH 5, KH 9451, Shaktiman 3, Shaktiman 4	150	46.20	5,763	3,160	82.42
Rice	Co RH 3, KRH 2, Ranjit	48	23.10	6,539	5,169	26.51
Soybean	JS 335	63	21.00	1,280	870	47.13
Sunflower	KBSH 41, MSFH 17, MSFH 8, PAC 36	380	172.80	1,743	1,296	34.48
Tomato	TCS 212	10	4.00	30,100	18,400	63.59
Grand total		800	295.28			

Besides, a total of 70,111 cotton farmers were benefited from various extension activities including training of 13,759 farmers and 1,214 extension personnel to facilitate dissemination of technology among them. In addition, newspaper coverage (33), publication of extension literature (67) and radio/TV talk (66) were also organized.

Other crops: During the year, 22,334 such demonstrations were conducted covering 6,295

ha on cereals, vegetables, spices and condiments, millets, fodder crops, tuber crops, flower, commercial crops, plantation crops, medicinal and other crops. The increase in demonstration yield over local plots ranged from 22.56% in commercial crops to 50.26% in plantation crops.

Crop hybrids in cereals, oilseeds and vegetables: During the year, 800 demonstrations on hybrids were conducted, covering 295 ha on maize, rice, soybean, sunflower, castor, brinjal, cabbage, chilli, cucumber and tomato.

Farm implements: During the year, 2,258 demonstrations were organized on various tools and implements related to tillage operation, planting, inter-culture operation, plant protection, harvest, post-harvest and drip irrigation on several crops covering an area of 1,914 ha.

Livestock and fishery: During the year, 1,739 demonstrations comprising 6,362 units on health, nutrition and other production practices of dairy, poultry, piggery, sheep and goat were conducted. Besides, 429 demonstrations comprising 181 units were conducted on carp culture, composite fish



Dapog method of nursery raising of rice

culture, integrated fish farming, prawn culture, and fish seed production.

Other enterprises: A total of 109 demonstrations on various other enterprises, namely bee keeping, mushroom, nutrition, garden, sericulture and vermicompost were conducted.

Training programmes

During the year, 51,774 training programmes were organized with the participation of 12.42 lakh farmers including rural youth, and in-service extension personnel.

Farmers: A total of 35,533 training programmes were organized for the benefit of 966,142 farmers and farmwomen on various technologies to update their knowledge and skill. Total number of beneficiaries including women farmers were 159,008 in production and productivity enhancement of crops; 132,495 in plant protection; 107,537 in production of inputs at site; 58,935 in household nutritional security; 53,926 in animal production and management; 53,067 in soil health and fertility management; 46,142 in commercial production of vegetables; 40,419 in processing and value-addition of produce; 45,523 in capacity building and group dynamics; 30,731 in integrated

farming system; 28,844 in orchard management; 28,220 in entrepreneurial development; 22,360 in farm machinery, tools and implements; 27,536 in management of fruit crops; 29,576 in resource-conservation technologies; 21,071 in animal nutrition; 18,811 in fisheries; 20,656 in water management; 16,520 in animal health; 9,428 in grading and packaging; 6,283 in ornamental plants; 2,446 in tuber crops; 1,888 in agro-forestry; 1,119 in plantation crops; 1,095 in spices; and 506 in economic empowerment of women.

Rural youth: As many as 12,754 skill-oriented training programmes were organized for 187,304 rural youth. The beneficiaries in different areas were 12,657 on increasing production and productivity of crops; 1,212 in orchard management; 26,157 in production and value-addition; 25,226 in livestock production and management; 29,420 in economic empowerment of women; 4,983 in farm machinery, tools and implements; 6,571 in fisheries; 42,875 in production of inputs at site; 2,018 in capacity building and group dynamics; 23,743 in entrepreneurial development; and 12,442 in commercial horticulture.

Training programmes (vocational): Out of 12,754 training programmes conducted for rural youth, 6,073 were conducted for 49,176 rural youths on various vocations including orchard management; production of inputs at site; economic empowerment of women; livestock production and management; value-addition; entrepreneurial development; commercial horticulture; capacity building and group dynamics; fisheries; and farm machinery, tools and implements.

Extension personnel: A total of 3,487 training programmes were conducted covering 90,398 participants. These were organized for extension functionaries working in government and non-governmental organizations related directly or indirectly with the development of agriculture. The training was imparted to upgrade their knowledge and skills in frontier areas of agriculture technologies.

Training programmes (sponsored): Of the 51,774 training programmes (12.44 lakh participants) conducted by the KVKs, 6,099 were

Training programmes for in-service extension personnel				
Thematic area	No. of courses	Male	Female	Total
Production, productivity and value-addition of crops	1,113	27,337	4,026	31,363
Production of input at site	214	3,859	1,375	5,234
Plant protection	433	9,523	638	10,161
Resource conservation, soil health and fertility management	287	6,251	504	6,755
Integrated farming system	47	1,360	363	1,723
Livestock production and management	354	6,025	1,551	7,576
Farm machinery tools and implements	73	1,449	209	1,658
Economic empowerment of women	153	1,742	2,410	4,152
Capacity building and group dynamics	177	3,855	785	4,640
Capacity building for ICT applications	296	6,643	1,673	8,316
Household nutrition security	340	1,961	6,859	8,820
Total	3,487	70,005	20,393	90,398

Seeds and planting material

During the year 201,675 q seeds including cereal, oilseed, pulse, commercial, vegetable, flower, spice, fodder and fibre crops were produced and made available to 1.39 lakh farmers. In addition, KVKs produced 133.20 lakh seedlings and saplings of vegetables, fruits, ornamental, medicinal and aromatic plants, plantation crops, spices, tuber crops, fodder and forest species and provided to 1.89 lakh farmers.

Demonstration on rain-water harvesting with micro-irrigation system

The demonstration units on rainwater harvesting with micro-irrigation system have been established in 100 KVKs. These KVKs conducted 240 training programmes and 128 crop demonstrations, benefiting 21,392 farmers and 1,384 extension personnel. The KVKs have also utilized such facility for production of 2.71 lakh planting material.

conducted on sponsorship by various organizations covering 232,951 participants.

Extension activities

The KVKs organized 264,485 extension programmes involving 8,069,061 farmers and extension personnel to create awareness about improved agricultural technologies. The activities include advisory services, diagnostic visits, field days, group discussions, *kisan ghosthi*, film show, self-help group conveners meetings, *kisan mela*, exhibition, scientists' visit to farmers' field, plant/animal health camps, farm science clubs, ex-trainees *sammelan*, farmers' seminar/workshop, method demonstrations, special day celebration, and exposure visits.

Other important extension programmes organized by the KVKs include publication of 28,224 extension literature, 11,224 newspaper coverage, 4,847 radio and TV talks, 1,409 popular articles and 8,220 lectures were delivered.

Production of technology products

The KVKs produced various technological products like seeds, planting materials, bio-products, livestock strains and fingerlings to a tune of Rs 2,194.62 lakh, benefiting 4.15 lakh farmers.

Bio-products: The KVKs produced various bio-

products and made available to 74,846 farmers. These include 11.97 lakh kg biofertilizer including *Azolla*, *Azospirillum*, *Azotobactor*, compost and vermicompost, phosphobacteria and rhizobium and 1,857 litres vermi-wash; besides bio-pesticides including botanicals, NPV, various pest repellants and pheromone traps; bio-fungicides including *Pacelomyces* and *Verticillium*; and bio-agents including beetles, decomposing fungus, earthworms and parasitoid (*Trichogramma chilonis*).

Livestock, poultry and fingerlings : The KVKs produced 5,102 improved livestock strains of dairy animals, piglets, sheep and goat, and rabbit benefiting 916 farmers; 72,255 improved chicks of poultry, turkey, quail and duck benefiting 10,963 farmers and 60.47 lakh fingerlings benefiting 630 farmers.

Diagnostic services

A total of 1.52 lakh samples including 1.30 lakh soil samples, 19,714 water samples, 2,256 plant samples, and 504 other samples were analysed, benefiting 10,963 farmers from 18,893 villages.

Technological backstopping to KVKs

The Directorate of Extension of the State Agricultural Universities conducted 99 programmes for providing technological and methodological backstopping to 2,827 KVK staff. The Zonal Coordinating Units conducted 52 programmes with the participation of 2,060 KVK staff.

District-level interface programmes

The KVKs organized 480 Interface programmes through the meetings of Scientific Advisory Committee, sponsorship of special programmes and developing functional linkages.