Technology Assessment, Refinement and Transfer

Krishi Vigyan Kendra (KVK) is a major project of the Council for technology assessment, refinement and transfer. At present, there are 500 KVKs in State Agricultural Universities, ICAR Institutes, NGOs, State Governments and other institutions.

- KVKs conducted on-farm trials on 1,318 technologies to identify the location specificity under different farming systems.
- ZTSD on rice-wheat system not only increased yield but also lower the cost of land preparation.
- Puddling in paddy with soil pulverizing roller saved 90 cm of water per hectare with an increase in yield of 2.4% over conventional method of puddling.
- Adoption of IPM gave 32% increase in yield over control with an average yield of 2.05 tonnes/ha in pigeonpea.

The major activities of KVK are enumerated here.

On-farm Trials

A total of 1,318 technologies were taken up for on-farm trials by the KVKs in order to evaluate and assess their impact on location-specific basis in different farming systems including varietal/feed evaluation (562), nutrient feed management (293), cropping system (97), resource conservation (35), weed management (62) and insect/disease management (269).

Performance of zero-till seed-cum-fertilizer drill (ZTSD): Zero-tillage trials were conducted by 16 KVKs (7 of Haryana and 9 of Punjab) to make the farmers aware of the use of zero-till drill for sowing of wheat. The wheat sown by zero-tillage gave more yield by 6.7% in Haryana and 4.1% in Punjab than conventional method of sowing

Leaf Colour Chart (LCC) based nitrogen management in paddy in Haryana: In Faridabad district, paddy is transplanted with a basal dose of 20 kg urea/acre. On-farm trials were conducted on LCC based nitrogen management in paddy (cv HKR 126) during *kharif* 2005. The application of nitrogen based on LCC with recommended plant population gave the highest

Sowing of wheat by zero-tillage at KVK, Chitrakoot, Uttar Pradesh

On-farm trials by KVKs

Crops	Varietal/feed evaluation	Nutrient/feed management	Cropping system	Resource conservation*	Weed management	Insect/disease management	Total
Cereals	230	75	34	11	30	57	437
Oilseeds	62	32	20		4	29	147
Pulses	52	9	10	8	5	28	112
Commercial crops	28	16	8	1	0	33	86
Vegetables, fruits and flowers	135	85	25	15	13	102	375
Animal Science	55	76	0	0	10	20	161
Total	562	293	97	35	62	269	1,318

*Resource conservation technologies include zero-tillage, bed planting and LCC based nitrogen management

Zero-tillage in wheat in Haryana and Punjab

District/KVK	Year	No. of farmers	Area (ha)	Average yield (tonnes/ha)		% Increase over conventional tillage
				Zero-tillage	Con-ventional tillage	
HARYANA						
Kurukshetra	1998–05	271	132.6	4.78	4.44	7.7
Kaithal	1997–05	123	121.3	4.39	4.12	6.6
Panipat	1999–05	153	70.5	4.80	4.57	5.0
Faridabad	2001–05	92	132.0	4.28	4.01	6.7
Rohtak	2002–03	18	56.0	4.72	4.67	1.1
Sonipat	2002–04	16	22.0	4.67	4.51	3.5
Gurgaon	2004–05	5	2.0	4.77	4.68	1.9
Total/Average		678	536.4	4.56	4.31	5.8
PUNJAB						
Bathinda	2002–05	56	111.4	4.52	4.39	3.0
Faridkot	2002–05	55	87.0	4.53	4.35	4.1
Ferozepur	2000–03	41	108.4	4.54	4.51	0.7
Gurdaspur	2000–03	52	47.7	4.60	4.58	0.4
Kapurthala	1999–04	57	179.7	4.99	4.83	3.3
Nawanshahar	2001–03	38	59.6	4.58	4.45	2.9
Patiala	1999–05	92	299.8	4.61	4.56	1.1
Sangrur	2002–05	201	154.8	5.27	5.17	1.9
Hoshiarpur	2003–04	10	20.0	5.05	5.03	0.4
Total/Average		602	1,068.4	4.77	4.67	2.1

yield of 5.7 tonnes/ha with an improvement in yield of 2.2% over application of recommended dose of nitrogenous fertilizer. In Kaithal district, the application of nitrogen based on leaf colour chart basis with recommended plant population gave the highest yield of 6.35 tonnes/ha, with an improvement in yield of 2.1% over application of recommended dose of nitrogen fertilizer.

Performance of soil-pulverizing roller and conventional method of puddling on paddy: Puddling in paddy (cv PR 114) with soil pulverizing roller saved 90 cm of water per hectare with an increase in yield of 2.4% over conventional method of puddling in Patiala district of Punjab.

Effect of pruning and mulching on yield and quality in Santa Rosa plum: On-farm trial was conducted on yield and quality in Santa Rosa plum in Solan district of Himachal Pradesh. The highest fruit yield (21.68 tonnes/ha) and maximum fruit weight (47.50 g) were recorded with 25–30% thinning of shoots along with $^1/_3$—$^1/_2$ heading back of shoots. The treatment also recorded the highest Benefit : Cost ratio of 3.95.

Effect of pruning and mulching on yield and quality in Santa Rosa Plum

Treatments	Fruit size (mm)		Fruit weight (g)	Yield (kg/) tree	Yield (tonnes /ha)	TSS (%)	Acidity (%)	Increase in yield over FP (%)
	Length	Breadth						
FP	36.4	33.2	34.4	48.5	13.43	11.10	0.60	-
T_1	39.3	38.2	38.3	58.8	16.28	11.70	0.65	21.80
T_2	40.2	39.4	44.2	67.0	18.55	11.50	0.52	38.12
T_3	43.3	41.8	47.5	78.0	21.689	12.30	0.40	61.49

Sale Rate: Rs 8/kg

FP: No orchard management practices; T_1: 25–30% thinning of shoots; T_2: T_1 + $^1/_3$–½ heading back of shoots and T_3: T_2+ grass mulch

Performance of groundnut varieties: KVK in Kaimur district, Bihar conducted an on-farm trial with 5 varieties of groundnut. Among the varieties, TG 22 gave the highest average yield of 2.2 tonnes/ha followed by Birsa Bold (1.76 tonnes/ha). Among the short duration varieties (105 to 112 days duration), ICGS 1 gave higher yield of 1.48 tonnes/ha followed by 1.37 tonnes/ha and 1.14 tonnes/ha from ICGS 37 and BR 12 respectively.

Performance of turmeric varieties: The KVK in Bankura district of West Bengal conducted an on-farm trial for identification of suitable turmeric variety for red lateritic soil conditions. Out of 8 varieties, TCP 2 gave the highest yield of 92.5 tonnes/ha, followed by TCP 11 (87 tonnes/ha) and Kasturi (79.2 tonnes/ha).

Performance of turmeric varieties in West Bengal

Variety	Yield (tonnes/ha)
R.Sonia	50.2
Nagaland local	59.0
RH 5	55.0
Pct 13	59.0
TCP 11	87.0
Kasturi	79.2
TCP 2	92.5
TCP 1	72.0

Management of* Helicoverpa *and wilt in Chickpea: The KVK in Basti district, Uttar Pradesh conducted an on-farm trial to identify suitable control measures for *Helicoverpa* and wilt disease in chickpea through IPM. Application of IPM module (HYV PUSA 256 + Trichoderma 4g/kg seed + spraying of 5% neem kernel extract + NPV 250 L.E./ha) gave 42% increase in yield.

Management of *Helicoverpa* and wilt in chickpea in Uttar Pradesh

Treatments	Yield (tonnes/ha)	Increase in yield (%)
T_1– Use of variety Radhey	1.22	-
T_2– HYV Pusa 256 + Trichoderma 4 g/kg seed	1.48	21
T_3– T_2 + Spraying of 5% neem kernel extract	1.61	32
T_4– T_3 + NPV 250 L.E./ha	1.73	42

Management of population density and feed regulations in fishponds: To increase the fish production through polyculture, optimum density of fingerlings and supplementary feeding (rice bran + mustard cake 1 : 1 @5 kg/day for first 3 months, 8 kg/day for next 3 months and 12 kg/day for next 3 months/ha) was suggested. The KVK in Basti district conducted an on-farm trial with 3 treatments. Using proper ratio of Indian and exotic fingerlings alone could increase the fish yield by 28%. This treatment in combination with use of supplementary feed gave 52% increase in yield.

In treatment T_1 (farmers' practice), the net income was Rs 39,000/ha by investing Rs 24,000/ha. In T_2, with an initial investment of Rs 23,000/ha, the net income was Rs 57,000/ha. Similarly by investing Rs 29,000/ha in T_3, the net income was Rs 75,000/ha.

Increasing milk yield through mineral supplement for buffalo: The KVK in Etah, Uttar Pradesh, conducted a trial with 3 treatments. The use of mineral supplement (Ostovet 100 ml/day) gave an average milk yield of 9.2 litres/day, which is 15% more than without the supplement.

Feed management for buffaloes in Uttar Pradesh

Treatments	Milk production (litres/day)	Increase in yield (%)
T_1–Farmers' practice without mineral mixture	8.0	-
T_2–Mineral supplement (untimely 40g/day)	8.6	6.97
T_3–Mineral supplement (ostovet 100 ml/day)	9.2	15

Nutrient management in wheat: The KVK in Satara, Maharashtra, conducted an on-farm trial on nutrient management to improve the low yield of wheat due to poor tillering and grain filling. The application of 120 kg N, 60 kg P_2O_5 and 60 kg K_2O per ha along with spray grade of N,P and K at the time of tillering (19 : 19 : 19), flowering (0 : 52 : 34) and grain filling stage (0 : 50)

Nutrient management in wheat with spray grade fertilizer

Treatments	Yield (tonnes/ha)	Increase in yield (%)
T_1–Imbalance use of fertilizers	2.87	
T_2–Application of 120 kg N, 60 kg P_2O_5 and 60 kg K_2O/ha	3.24	12.94
T_3–Application of 120 kg N, 60 kg P_2O_5 and 60 kg K_2O/ha plus spray grade 19:19:19 at the time of tillering, 00:52:34 at the timeof flowering and 0:0:50 NPK at the time of grain filling stage	3.45	20.10

increased the yield by 20% over the farmers practice (2.87 tonnes/ha).

Nutrient management in wheat based on soil test results in Pune, Maharashtra: The KVK in Pune district of Maharashtra conducted an on-farm trial with 3 treatments. The highest yield of 3.77 tonnes/ha was obtained with the application of 120 : 60 : 60 NPK kg/ha as per soil testing, which was about 23% more than yield under the farmers' practice (2.79 tonnes/ha).

Nutrient management of wheat in Pune, Maharashtra

Treatments	Yield (tonnes/ha)	Increase in yield (%)
T_1–Farmers' Practice: Urea, SSP and MOP @10:26:26.	2.79	
T_2–Recommended dose of fertilizers 120:60:60 NPK Kg/ha as per soil test results	3.42	22.27
T_3–Recommended dose of fertilizers and use of spray grade multi-nutrient fertilizer @ 9% N, 9% P_2O_5 9% K_2O, 2% Fe, 2% Mn, 2% Zn—5 litres/acre at 60, 90 days after sowing	3.77	34.79

Nutrient management of niger in Orissa: An on-farm trial was conducted by the KVK in Keonjhar district, Orissa, to increase the yield of niger through proper nutrient management with 4 treatments. Application of recommended dose of fertilizer (40 : 40 : 0 kg NPK per ha) gave 133% more yield than farmers practice (no fertilizer). Application of 50% recommended dose of fertilizer along with application of *Azatobactor* and PSB also gave 113% more yield than farmers' practice.

Nutrient management of onion in Maharashtra: To improve the bulb formation and thereby the yield of onion through proper nutrient management, the KVK in Ahmedagar district, Maharashtra, conducted an on-farm trial with 3 treatments. It was found that application of 150 : 50 : 70 NPK kg/ha along with foliar application of P and K and vermiwash gave yield of 23.5 tonnes/ha which was 24% more than the yield under farmer's practice.

Nutrient management of pomegranate in Maharashtra: To reduce the flower drop for obtaining higher yield of pomegranate, the KVK in Pune, Maharashtra, conducted an on-farm trial with 3 treatments including Planofix spray and balanced fertilizer application. Application of 625 : 250 :250 g NPK per plant and 2 sprays of Planofix @ 20 ppm gave 18% more yield than farmers practice.

Management of white wooly aphid in sugarcane: The KVK in Ahmednagar, Maharashtra conducted a trial with 3 treatments to identify suitable control measures for white wooly aphids attack in sugarcane. The practice of collecting and burning infested leaves, seed treatment with Malathion, paired row planting, release of bioagents, application of verticilium @ 2 kg/acre followed by neem oil spray @ 2 litre/acre gave yield of 8.79 tonnes/ha compared to that of pesticide spray alone (9.89 tonnes/ha) with 50% reduction in cost of plant protection.

Integrated pest management for pod borer in pigeonpea:To test the efficacy of integrated pest management on control of pod borer in pigeonpea, on-farm trial was conducted by the KVK in Bhopal district, Madhya Pradesh, with 3 treatments including farmers practice. Adoption of IPM gave 32% increase in yield over control with an average yield of 2.05 tonnes/ha.

Management of white wooly aphid attack in sugarcane

Treatments	Yield (tonnes/ha)
T_1–Farmers practice: Spraying Methyl demeton @2ml/litre	9.89
T_2–Cutting and burning of infested leaves, seed treatment with Malathion, bio-agents-Conobathara/ Chrysoperla and need based Chemical sprays (Methyl demeton/dimethoate @2ml/litre)	9.49
T_3–Cutting and burning of infested leaves, seed treatment with Malathion, paired row planting, release of bio-agents Conobathara/Chrysoperla, application of Verticilium @2kg/acre followed by Neem oil spray @2 litre/acre	8.79

Integrated pest management for pod borer in pigeonpea

Treatments	Yield (tonnes/ha)	Increase in yield (%)
T_1– Farmers' practice (one and two spray of endosulfan)	1.55	
T_2– Polythin 40 + Chloropyriphos	1.88	21.3
T_3– IPM (SDP + Seed treatment + Nimbicidine + Pheromone trap +bird perches)	2.05	32.2

Integrated wilt management in chickpea

Treatments	Wilt incidence (%)	Yield (tonnes/ha)	Increase in yield (%)
T_1– Farmers' practice – use of seeds of available variety and no seed treatment	20.5	1.28	-
T_2– Use of farmers seeds + seed treatment with *Trichoderma viridae*	6.2	1.52	18.75
T_3– Use of seed of resistant variety of chickpea (JG 130) +seed treatment with *Trichoderma viridae*	3.6	1.91	49.2

Integrated wilt management in chickpea: The KVK in Bhopal, Madhya Pradesh, conducted an on-farm trial on chickpea with 3 treatments. Adoption of IPM including the use of resistant variety and seed treatment with *Trichoderma viridae* gave 49% more yield as compared to farmers practice and the wilt incidence was 20% in locally adopted variety (U 21).

Frontline Demonstrations

During the year, 35,064 demonstrations were organized on various aspects of crop production and fishery covering an area of 11,938.8 ha.

Oilseeds: During the year, 15,787 demonstrations were conducted covering 5,918.4 ha on 13 oilseed crops. The increase

Frontline demonstrations on oilseeds

Crop	No. of farmers	Area (ha)	Yield (tonnes/ha)		Increase (%)
			Demonstration	Local	
Castor	678	325.5	1.47	1.13	39.9
Gobi Sarson	511	113.3	1.15	0.86	42.6
Groundnut (*kharif*)	2,887	1,039.6	1.82	1.31	43.0
Groundnut (*rabi*)	905	418.0	2.14	1.55	37.9
Linseed	453	134.6	0.94	0.65	48.5
Mustard	3,992	1,374.1	1.31	0.95	43.1
Niger	598	168.0	0.38	0.24	66.0
Raya	559	254.0	1.44	1.06	39.3
Safflower	231	106.6	0.92	0.74	24.4
Sesame	1,463	616.0	0.65	0.84	46.3
Soybean	1,572	617.3	1.60	1.18	39.0
Sunflower	963	466.6	1.45	1.13	31.9
Toria	975	284.9	0.95	0.67	52.0
Total/Wt.Average	15,787	5,918.4	1.38	1.05	31.4

Frontline demonstration on GCH 6 variety of castor at KVK, Jamnagar, Gujarat

Frontline demonstration on mustard variety Kaushal at KVK, Barmer, Rajasthan

Frontline demonstrations on pulses

Crop	No. of farmers	Area (ha)	Yield (tonnes/ha)		Increase (%)
			Demonstration	Local	
Bengalgram	1,911	643.8	1.36	0.97	42.9
Blackgram	1,263	378.3	0.82	0.60	40.6
Field Pea	429	81.8	2.09	1.65	32.8
Greengram	1,111	416.3	0.80	0.55	47.8
Lentil	629	159.9	1.19	0.85	42.9
Moth bean	69	31.2	0.77	0.52	50.3
Rajmash	244	41.2	1.06	0.91	21.9
Red gram	1,626	583.1	1.33	0.89	52.1
Total/Wt.Average	7,282	2,335.6	1.17	0.82	42.7

in yield varied from 24.4 in safflower to 66% in niger and on an average oilseed crops under demonstration gave 31.4% more yield than farmers practice.

Pulses: During the year, 7,282 demonstrations were conducted covering 2,335.6 ha. The increase in yield varied from 21.9 in rajmash to 52.1% in moth bean and on an average pulse crops under demonstration gave 42.7% more yield than farmers practice.

Cotton: During the year, 1,122 demonstrations covering an area of 618.9 ha were conducted. A total of 33 high yielding and pest-tolerant varieties and hybrids, INM and IPM technologies were demonstrated to show the production potentials on the farmer's fields. Training programmes (164) covering 5,544 farmers and 31 training programmes for 725 extension functionaries were organized besides 49 field days with 5,571 participants. In addition, 173 other extension activities (1,813 participants) were undertaken, besides, radio/TV talk and newspaper coverage.

- KVKs organized 35,064 demonstrations on various aspects of crop production and fishery covering an area of 11,938.8 ha.
- Yield increased in oilseeds, pulses, cotton, cereals, horticultural and commercial crops and different enterprises through frontline demonstrations. Number of livestock also increased.

Frontline demonstration on gladiolus at KVK, Muzaffarnagar, Uttar Pradesh

Frontline demonstrations on other crops and enterprises

Crop/Enterprise	No of demonstrations	Area (ha)
Cereals	6,657	2,559.9
Millets	20	10.0
Cash crops	884	444.6
Fodder crops	671	142.5
Fruit crops	76	16.9
Vegetable crops	1,764	316.5
Plantation crops	30	12.0
Spices and condiments	125	23.7
Flowers and ornamental crops	139	13.2
Medicinal and aromatic plants	83	30.6
Fishery	78	114.9
Total	10,527	3,684.8
		Units (No)
Dairy	15	20
Sheep and goat	58	370
Poultry	183	1,260
Piggery	10	6
Rabbi try	17	12
Apiculture	13	13
Mushroom units	50	210
Total	346	1,891
Grand Total	10,873	

Other crops: During the year, 10,873 demonstrations were conducted covering 3,684.8 ha on cereals, horticultural and commercial crops, and 1,891 different enterprises like dairy, sheep and goat, poultry, piggery, rabbitry, apiculture and mushroom production.

Training programmes for farmers and farmwomen

Areas of training	No. of courses	No. of participants		
		Male	Female	Total
Crop production	6,650	139,952	40,085	180,037
Horticulture	4,060	84,753	22,956	107,709
Group dynamics	1,097	23,420	7,839	31,259
Agricultural engineering	1,177	25,350	6,213	31,563
Home science	3,914	9,132	79,083	88,215
Livestock production/management	2,739	47,435	22,967	70,402
Plant protection	3,866	88,304	16,399	104,703
Fishery	410	7,994	1,614	9,608
Seed production	106	2,999	295	3,294
Apiculture	41	561	274	835
Mushroom production	130	1,303	1,997	3,300
Soil fertility management	1,062	22,509	7,050	29,559
Agroforestry	354	6,381	1,236	7,617
Others	363	8,201	3,913	12,114
Total	25,969	468,294	211,921	680,215

Training for rural youth

Areas of training	No. of courses	No. of participants		
		Male	Female	Total
Agricultural engineering	387	5,511	801	6,312
Agricultural extension	282	5,773	2,008	7,781
Agroforestry	212	1,501	359	1,860
Apiculture	77	1,559	462	2,021
Crop production	1,150	18,642	4,058	22,700
Fishery	172	2,847	879	3,726
Home science	1,587	2,898	29,518	32,416
Horticulture	1,350	19,396	7,003	26,399
Livestock production/management	1,076	13,605	5,796	19,401
Mushroom production	136	1,607	1,555	3,162
Plant protection	974	14,239	3,198	17,437
Seed production	35	618	17	635
Soil fertility management	195	3,588	1,232	4,820
Others	610	6,761	7,508	14,269
Total	8,243	98,545	64,394	162,939

- KVKs organized 25,969 training programmes for farmers, 8, 243 skill-oriented training programmes for rural youth and 3,751 training programmes for in-service personnel. Out of these 1,584 training programmes were sponsored by various organizations.

Training Programme

Farmers' training: A total of 25,969 training programmes were organized benefiting 0.68 million farmers and farmwomen in crop production, livestock production and management, group dynamics, use of improved tools and implements, agroforestry, fisheries, biotechnology, horticulture, plant protection, soil fertility management, home science and others.

Training course for farmers on proper use and maintenance of farm machinery at KVK, Bhatinda, Punjab

Training for in-service extension personnel

Areas of training	No. of courses	No. of participants		
		Male	Female	Total
Crop production	867	18,920	2,292	21,212
Horticulture	786	10,473	1,877	12,350
Agricultural extension	368	7,029	1,559	8,588
Agricultural engineering	202	3,857	896	4,753
Home science	345	1,720	7,698	9,418
Livestock production/management	269	5,258	1,144	6,402
Plant protection	538	11,624	1,760	13,384
Fishery	37	491	84	575
Seed production	17	620	77	697
Soil fertility management	147	3,424	449	3,873
Agroforestry	46	979	152	1,131
Others	129	1,810	732	2,542
Total	3,751	66,205	18,720	84,925

Sponsored training programmes

Areas of training	No. of courses	No. of participants		
		Male	Female	Total
Crop production	515	21,908	6,676	28,584
Horticulture	200	8,672	1,367	10,039
Livestock production/management	191	5,717	3,952	9,669
Home science	254	2,676	10,351	13,027
Agricultural engineering	24	785	66	851
Plant protection	138	5,689	1,949	7,638
Fisheries	10	625	225	850
Agricultural extension	100	4,423	1,591	6,014
Agroforestry	3	120	0	120
Soil fertility management	44	1,226	151	1,377
Rural crafts	26	545	50	595
Apiary	1	20	14	34
Sericulture	1	14	7	21
Vermicompost	1	15	0	15
Others	76	4,177	677	4,854
Total	1,584	56,612	27,076	83,688

Training for rural youth: The training programmes for the rural youth were organized on use of farm power and machinery, group mobilization, agroforestry, biotechnology, crop production, fishery, horticulture, hybrid seed production, livestock production and management, cultivation of medicinal plants, plant protection, post harvest technology, soil fertility management, home science and other income generating activities. A total of 8,243 skill-training programmes were organized for 0.16 million rural youth.

Training for in-service extension personnel: A total of 3,751 training programmes were conducted covering 84,925 participants.

Sponsored training programmes: Out of a total 37,963 training programmes (9.28 lakh participants) conducted by the KVKs for the farmers and farm women, rural youth and inservice

- KVKs organized 55,355 extension activities to accelerate dissemination of technologies.
- KVKs produced 53,22.5 tonnes of seeds of cereals, oilseeds, pulses and vegetables, in addition to 5.22 million sapling/ of fruits, vegetables, spices, medicinal plants, ornamental plants, plantation crops and forest species. KVKs also produced 23,321,176 livestock strains.
- KVKs (129) started publication of quarterly newsletters in local languages as well as in English and Hindi.

extension personnel, 1,584 training programmes were sponsored by various organizations covering 83,688 participants. The organizations which sponsored such training programmes include NABARD, DRDA, CAPART, ATMA, DBT, DST, State Department of Animal Husbandry, Agriculture, Women and Child welfare and Horticulture.

Extension Activities

The KVKs organized 55,355 extension activities covering 2.43 million farmers to accelerate dissemination of technologies. The activities included field days, kisan mela, kisan gosthies, exhibitions, ex-trainees sammelan, advisory service, film shows, diagnostic services, clinic centres, farm science clubs and formation of self-help groups (SHGs).

Extension activities

Activities	Number	No. of beneficiaries
Advisory services	32,841	127,594
Diagnostic visits	4,654	30,962
Ex-trainee sammelan	112	7,109
Exhibitions	521	1,281,973
Field days	1,916	120,643
Film shows	1,022	57,293
Group discussions	546	12,346
Help line services	11,267	4,079
Kisan gosthies	1,457	124,058
Kisan melas	397	625,138
Seminars	195	14,879
Self-help group meeting	376	20,998
Workshops	51	3,298
Total	55,355	2,430,370

In addition 4,910 newspaper coverage, publication of 1,785 popular articles and 1,281 extension literatures, 63 bulletins and 3,030 radio and TV talks were taken up by the KVKs.

Production of seeds by the KVKs

Crop	Seed (tonnes)
Cereals	3,459.15
Oilseeds	643.91
Pulses	630.10
Vegetables	132.47
Spices	38.94
Flowers	9.55
Potato (Tubers)	9.09
Commercial crops	27.11
Fodder	31.52
Greenmanure	12.80
Medicinal	4.99
Other	322.84
Total	5,322.54

Publications

129 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 and are widely circulated to the farmers, Gram Panchayats and line departments.

Production of Seed/Planting Material

The KVKs produced 5,322.5 tonnes of seeds of cereals, oilseeds, pulses and vegetables. In addition, 5.22 million saplings/seedlings of fruits, vegetables, spices, medicinal plants, ornamental plants, plantation crops and forest species were produced. Besides, 23,321,176 livestock strains were also produced for availability to the farmers.

Monitoring Mechanism

During the year, Zonal Workshops (10) were organized with the participation of all the KVKs to review the work done during the year and formulation of action plan for the next year. Similarly, 42 State level workshops were organized in order to review the frontline demonstrations on oilseeds and pulses. Workshop (6) were organized under HRD programmes for KVKs staff.

Interface at District Level

To strengthen research-extension linkages the KVKs organized

Production of planting materials by the KVKs

Categories	Seedlings/saplings/livestock strains (No)
Cereals	282,000
Commercial crops	155,000
Vegetables	1,797,736
Fruits	780,532
Ornamentals	218,161
Spices	432,511
Fodder	112,527
Plantation	88,649
Forest tree	958,123
Medicinal	2,705
Biofuel	370,236
Others	26,702
Total	5,224,882
Livestock strain	25,231
Fishery (Fingerlings)	23,295,945
Total	23,321,176
Grand Total	2,846,058

222-interface meetings involving the scientist and development officials at district level.

Literature Developed/Published:The KVKs published 8,269 literatures.

Stem Application—A Cost Effective Technology in Cotton

In Andhra Pradesh, cotton is grown in an area of 0.8 million ha during *kharif*. Cotton accounts for more than 50% of the total amount of pesticides used in agriculture. The KVKs in Guntur and Khammam districts have demonstrated the effectiveness of stem application of pesticides in cotton. This reduces the pesticide usage in cotton to control sucking pests (ahpids, jassids, thrips and whitefly) especially during the initial stages. The technology has been adopted by 1,935 farmers in Guntur district alone, covering an area of 1,400 ha, resulting in overall saving of Rs 1.26 million to the farmers. It has also been adopted by 230 farmers in Pinapaka village in Khammam district of Andhra Pradesh with a saving of Rs 2,250/ha.

Demonstration of stem application technique in cotton at KVK, Khamman, Andhra Pradesh

- Stem application of pesticides in cotton reduced pesticide usage by controlling sucking pests.
- KVK, Ahmednagar provided the facilities for leaf/petiole analysis for the first time in the district for proper nutrient management, especially for cash crops. The fertigation and foliar nutrients management technology has diffused among the farming community with KVK's need based intervention.
- Kisan clubs (9) in different villages maintained a continuous interaction with the farmers.

Kisan Club

The KVK in Hoshiarpur district of Punjab formed 9 Kisan Clubs in different villages with 229 farmers to maintain a continuous interaction with the farmers. A yearly action plan is prepared in consultation with the Chief Volunteers of Kisan Clubs, Chief General Manager and Assistant General Manager of NABARD and Managers of the concerned banks. NABARD provided a financial assistance of Rs 3,000 per club per annum. Besides regular interaction with the club members and the KVK staff in bimonthly review meetings, the KVK also organized training programmes, demonstrations, seed replacement campaigns, educational tours and animal welfare camps, providing necessary literature to disseminate improved technologies.

Tissue Analysis Based on Nutrient Management

Nutrient management is an important aspect for quality production of grape and pomegranate at Ahmednagar district and its export. The KVK provided the facilities for leaf/petiole analysis for the first time in the district especially for cash crops. Tissue analysis along with foliar feeding and fertigation through drip has become a common practice and KVK became the focal point for commercial fruit growers. The soluble fertigation grades and the spray grades are made available to the farmers at the KVK. Annually about 1,000 to 1,200 farmers especially grape and pomegranate growers of about 500 ha from 7 tehsils of Ahmednagar district and 3 intensive grape growing tehsils of Nasik district are benefited. The farmers from these areas adopted the plant tissues based nutrients management package and produces the export quality fruits.

Tissue analysis in the laboratory at KVK, Ahmednagar, Maharashtra

Farmers' clubs played a key role in spreading the technology among the grape and pomegranate farmers. Initially soluble and spray grades were available with the KVK only but with the increase in their demand, most of the agro-service centres are providing these inputs.

About 70–75% grape and pomegranate growers of Ahmednagar and adjoining districts now follow the soil and tissue analysis based nutrient management to get higher yield and better quality. Tissue analysis based nutrient management is also being adopted in other crops like vegetables and sugarcane.

Women Self-help Group

A number of KVKs have tried the concept of disseminating

appropriate need based technologies through Self-help groups (SHGs). KVKs (4) in Andhra Pradesh (Chittoor, Karimnagar, East Godawari and Srikakulam), 7 in Maharashtra (Ahemdnagar, Amaravathi (Durgapura), Jalna, Satara, Solapur, Thane and Pune) and 2 KVKs in Assam (Sonitpur and Golaghat) formed a total number of 1,584 self-help groups with a membership of 16,826 covering 409 villages.

The activities of most of the SHGs include establishment of various rural enterprises like dairy, backyard poultry, goatry, production and sale of vermicompost, tailoring, rural crafts, food processing and production and sale of vegetables. Among all the enterprises dairying was found to be highly promising. The average annual earning of a SHG beneficiary from dairying was found to be Rs 23,000 (Srikakulam, Karimnagar and Pune) to Rs 30,000 (Chittoor and Ahmennagar). Landless women belonging to SHGs of KVK, Chittoor derived maximum income i.e., 73% income from dairy. There was 70% increase in participation of landless women in dairying due to formation of such groups by KVK, Pune. Small scale food processing and value addition was also found to be one of the major activities of the SHGs. Food preservation and processing generated income of Rs 17,000/year to most of the women belonging to SHGs of Jammikunta and nearby villages in Karimnagar district of Andhra Pradesh. The average annual income from tailoring and garment making enterprise was Rs 13,000 (Ahemdnagar and Karimnagar)

With the technical assistance of the KVK, SHGs have established various rural enterprises like dairy (15 groups), backyard poultry (56 groups), goatry (49 groups), vermicompost unit (32 groups), tailoring and fabric designing (15 groups), and food processing and value addition (8 groups).

The KVK has been focusing on the problems of health and malnutrition of women and children of 2 drought prone villages (Kadegaon and Warudi) of Jalna, Maharashtra. The KVK has conducted 33 training programmes on various technologies, viz. post harvest value addition (anola, mango, sapota, grapes, tomato, soybean and fingermillet), kitchen gardening, seed treatment, IPM, INM, vermicomposting, watershed management, grading of fruits and vegetables, backyard poultry, dairy and hand embroidery. Some of the packed items such as fruit candy (anola and sapota), powdered sapota, raisin grapes, tomato ketchup, jams and jellies, anola supari, cereal and pulse based papads and soybean products made out of village surplus are in great demand in local markets of Jalna and nearby areas.

The tribal women belonging to Dhanu and nearby villages of Thane district of Maharashtra formed 10 SHGs and established 10 vermicompost units under the guidance of KVK, Thane and with financial assistance of ITDP, Dhanu. There was substantial cost reduction due to usage of forest-based raw material for running the units. The average bimonthly income of each unit was found to be Rs 8,500.

Leader Driven Transfer of Technology

KVK, Gadag (Karnataka) identified representatives of selected self-help groups and progressive farmers who were closely associated with different programmes of KVK. Farmers/farmwomen (50) were selected and special trainings were imparted to them in their area of expertise and in technology leader concept. These leaders serve as resource persons for the KVK training programmes as well as for their self-help groups and fellow farmers of the village. The advisory services and material provided by these technology leaders resulted in establishment of 474 units in 72 villages, with an annual production of 3,700 tonnes of vermicompost. Because of vermi compost application in 9,000 ha the farmers could save Rs 800–1,400/ha on fertilizer. The floriculture leaders influenced 10 farmers in 3 villages to cultivate improved varieties and adopt scientific methods of post harvest handling and marketing. Now the area under floriculture has increased to 13 ha in four villages, providing an additional income of Rs 10,000–15,000/ha.

***'aAqua'*—A Dynamic and Interactive IT Portal**

KVK in Pune district of Maharashtra and IIT, Mumbai, developed a web based interactive portal called *'aAqua'* (almost all questions answered) for the benefit of the farmers, which can be accessed and viewed on http://aaqua.persistent.co.in/aaqua/forum/index. The main features are bi-lingual (both English and Marathi),

- With the assistance of the KVK, SHGs have established various rural enterprises like dairy (15 groups), backyard poultry (56 groups), goatry (49 groups), vermicompost unit (32 groups), training and fabric designing (15 groups), and food processing an value addition (8 groups).
- A web based interactive portal called 'aAqua' was developed by KVK in Pune district of Maharashtra and IIT, Mumbai
- KVK, Pune, Maharashtra in collaboration with Vidya Partisthan Institute of Information Technology at Baramati started FM community radio dedicated to agriculture.

Vermicomposting

It is emerging as an important source in supplementing chemical fertilizers in agriculture. In 2002, KVK in Bharuch district (Gujarat) provided worms to 13 farmers to start their vermicompost units. There was a constant follow up by the KVK for proper adoption of the technology by the farmers. It was observed that by 2004 all the farmers in village Chikolta started vermicompost production by 2004. The efforts of KVK Kangra (Himachal Pradesh) to promote vermicomposting resulted in establishment of 4 units with improved race of Red American worms in 2003 and the technology was extended to 115 FIGs and WIGs (Farmer interest and Woman interest groups).

- KVK, Ahmednagar, Maharashtra standardized the technology for production of commercial products of Spirulina like Vaseline and face pack.
- KVK, Mandubar, developed audio-visual material (CD) in tribal dialect.
- Farmers' field school are being conducted since 1994–95 or paddy, groundnut and cotton.

question and answer archives, and decision support by plant pathologist to identify crop diseases and crop-wise recommendations by State Agricultural Universities of Maharashtra. So far, the portal has answered 2,737 queries covering 1,145 topics and at present there are 714 registered users. It has received Gold award of Digital Foundation Empowerment, New Delhi for best e-content development for the year 2005.

FM Community Radio Dedicated to Agriculture

The KVK, Pune in collaboration with Vidya Pratishthan Institute of Information Technology at Baramati, started FM (Frequency Modulation) community radio dedicated to agriculture on 29 March, 2005. The major aspects are market information, day-to-day field operation of important crops and major enterprises, information on daily weather, daily serial reading of a book on agriculture, answering farmers questions by subject-matter specialists, farmers school on radio, i.e. a serial on a crop or enterprise, disease forecasting, interviewing a progressive farmer, a slot for subject matter specialist of State Agricultural University or other research institute. KVK is shouldering the responsibility of content generation, while Vidya Pratishthan's Institute of Information Technology is responsible for the transmission.

'Own Your Seed'—An Intervention by KVK, Guntur

The KVK, Guntur, initiated seed production activity including the latest and high yielding varieties of major crops like rice, blackgram, greengram and groundnut in its instructional farm since 1992–93. KVK promoted the concept of 'Own your Seed' and 'Farmer to Farmer' net work by conducting 15 training programmes and 35 demonstrations which has benefited 612 farmers since 1993–94. Due to sustained efforts by KVK, the total seed production at KVK farm was 865 tonnes, which include rice (687.10), blackgram (116.9), greengram (39.4), groundnut (13.6), and other crops. The intense activity of KVK also resulted in a total production of 298 tonnes of quality seed of rice (196.97), blackgram (40.8) and groundnut (60.6) by 150 farmers. KVK has established a seed-processing unit at its campus with financial assistance of ICAR for the benefit of the farmers in Guntur district.

Spirulina for Balance Diet and Employment Generation

Spirulina, blue green algae, is a good protein supplement with medicinal value. It took 3 years for KVK, Ahmednagar, Maharashtra to standardize its production technology. It has also standardized the procedure for production of commercial products of spirulina like spirulina vaseline (used for wound healing, cuts, sore feet and dry lips) and spirulina face pack (used for smooth skin, to remove black spots and for anti aging property). After successful development of technology, KVK started a demonstration unit for rural/family based spirulina production unit and commercial raceway tank. The benefits of spirulina were publicised through newspaper, magazine, television, etc. which helped in creating its awareness among both the rural and urban population. Mass media also helped in developing market linkages. Based on the encouraging feedback KVK is now planning to enrich different food items and health drinks with spirulina besides helping to establish more spirulina units.

Farmers' Field School (FFS)

The schools are being conducted by the Department of Agriculture, Government of Pondicherry, since 1994–95 for paddy, groundnut and cotton. During 1994–95 to 2003–04, 158 Farmers Field Schools were conducted on various crops for 4,740 farmers of Pondicherry region.

As a result of FFSs, 3,420 paddy farmers used 3,725 cc of *T.Japonicum* against paddy stem borer, 11,528 cc of *T.chilonis* to control paddy leaf folder and 13,285 kg of *P.flourescens* against paddy blast, sheath blight, sheath rot and bacterial leaf blight. Continuous use of biocontrol agents and biopesticides helped not only to protect the crop from the targeted pests but also to conserve the natural enemies of these pests, which led to reduced occurrence of pests and diseases (sheath rot and bacterial blight incidence reduced from 25% in 1998 to only 5% in 2003). With the adoption of IPM, paddy farmers are now able to earn a net income of Rs 16,875/ha, which is Rs 5,688 more than their income before they adopted the IPM package. Pesticides consumption in Pondicherry has come down significantly from 135 tonnes in 1994–95 to 46.95 tonnes in 2003–04, accounting for more than 65% reduction. The reduced demand for pesticides, led to closure of about 30% of pesticide outlets in the district (209 in 1996–97 to 130 in 2003–04).

Educational Material in Tribal Dialect

To enhance the control of the hairy caterpillar in groundnut by the tribal farmers, the KVK developed audio-visual educational material (CD) in tribal dialect, which evoked good response from both farmers and the agricultural department personnel.

Spirulina production for employment generation (rectangular family based production) at KVK, Ahmednagar, Maharashtra