

# Technology Assessment, Refinement and Transfer

At present, there are 569 Krishi Vigyan Kendras (KVKs) which include 383 under State Agricultural Universities, 44 under ICAR Institutes, 91 under NGOs, 33 under State Governments and the remaining 18 under other organizations. The KVKs aim at assessment, refinement and demonstration of technologies/products. The KVKs have facilitated the backstopping for mass dissemination of contingent plan for drought and flood situations and played a vital role in the mitigation of drought like situation in various districts of the country. To show the potentiality of technologies, KVKs have organized Technology Week across the country involving SAUs, line departments, private agencies, non-governmental and farmers' organizations.

## KRISHI VIGYAN KENDRA

### Technology assessment and refinement

During the year, KVKs have assessed 1,913 technologies in 6,574 locations by laying out 18,425 trials on 465 crops on the farmers' field under the thematic areas, viz. Varietal evaluation; Integrated nutrient management; Integrated disease management; Integrated pest management; Integrated crop management; Integrated weed management; Resource conservation; Crop diversification including cropping systems, improved tools and implements; Processing, value-addition and quality improvement; Soil-test-based fertilizer recommendation; Bio-fertilizers; Entrepreneurship development; and Protected cultivation including seedling production.

Similarly, 189 technologies in 877 locations involving 2,692 trials under the thematic areas, viz. animal health, improved breeds, nutrition including feeds and fodder, production and management related to livestock, poultry and fisheries have been taken up for assessment. With regard to refinement of technologies, KVKs have

refined 235 technologies in 803 locations by laying out 4,911 trials on the farmers' field.

KVKs have also assessed 99 technologies in 280 locations covering 1,025 women in the area of empowerment of rural women under the thematic areas of drudgery reduction, entrepreneurship development, and health and nutrition.

### Frontline demonstration

A total of 86,285 frontline demonstrations in 51,101 ha were conducted by KVKs. Under the frontline demonstrations conducted, 76,206 were on oilseeds, pulses, cotton and other important crops covering an area of 30,663 ha. Besides, 4,600 demonstrations covering an area of 4,212 ha on-farm implements and 5,479 demonstrations were conducted on 16,225 units of various enterprises including dairy, piggery, poultry, piggery, sheep and goat, fisheries, bee-keeping, mushroom, nutrition garden, sericulture, organic compost, Home science and bio-products.

**Oilseeds:** During the year, 12,360 demonstrations were conducted covering 4,392 ha on different oilseed crops including groundnut, sesame, soybean, sunflower, *toria*, linseed, mustard, castor, niger, and safflower. The percentage increase in yield varied from 6.25 in groundnut to 38.93 in *toria* and on an average oilseed crops under demonstration gave 31.02% more yield than farmers' practice.

**Pulses:** During the year, 12,352 demonstrations were conducted covering 3,632 ha on several pulse crops including blackgram, chickpea, cowpea, field pea, frenchbean, greengram, horsegram, lentil, mash, moth bean, pigeonpea and *rajmash*. The percentage increase in yield varied from 23.14 in lentil to 52.19 in horse gram and on an average pulse crops under demonstration gave 34.69% more yield than farmers' practice.

**Cotton:** The frontline demonstrations on cotton

particularly with regard to Production technologies, Integrated pest management and Farm implements were conducted in major cotton-growing areas of 11 states involving 12,786 farmers in 10,068 ha. In Production technology(4,966 demonstrations in 1,986 ha), Integrated pest management technologies (1,673 demonstrations in 1,350 ha) and farm implements 6,147 demonstrations in 6,732 ha) were conducted.

Performance of cotton hybrids and varieties: During the year, a large number of demonstrations involved *Bt* hybrids, wherein 4,827 farmers participated in demonstrations. Among them, *Bt* performed well as compared to others. In hybrids other than *Bt*, *desi* hybrids, *Gossypium hirsutum* × *G. barbadense* hybrids, *G. hirsutum* × *G. hirsutum* hybrids were demonstrated in 172, 150 and 300 locations, respectively. The *G. hirsutum*, *G. arboreum* and *G. herbaceum* varieties of cotton were demonstrated in 605 locations.

**Other crops, farm implements and tools, and crop hybrids:** A total of 33,522 demonstrations were conducted covering 10,924 ha on cereals, horticultural and other commercial crops. In farm mechanization, KVK have organized 4,600 demonstrations covering 4,212 ha with respect to tillage equipments and tools; Inter-tillage equipments and tools; Planting/sowing equipments; Plant protection equipments and tools; Harvesting equipments and tools; Threshers and post harvesting; and Processing equipments.

During the year 5,186 demonstrations on hybrids were conducted covering 1,646 ha on maize, paddy, pearl millet, sorghum, wheat, berseem, groundnut, linseed, sunflower, sesame, soybean, rapeseed/mustard, *toria*, castor, blackgram, greengram, lentil, *rajmash*, redgram; napier grass, sorghum, coconut, turmeric, bitter gourd, bottle gourd, brinjal, broccoli, cabbage, capsicum, cauliflower, chillies, cucumber, french bean, okra, onion, pea, potato, pumpkin, summer

squash, sweet pepper, tomato, papaya, watermelon and jute. The percentage increase in yield varied from 9.20 in sunflower hybrid RSFH 1 to 130.60% in papaya hybrid Surya.

**Livestock, poultry, fishery and other enterprises:** KVK have conducted 5,479 demonstrations on 16,225 units of various enterprises including dairy, poultry, piggery, sheep and goat, fisheries, bee-keeping, mushroom, nutrition garden, sericulture, organic compost making, home science and bio-products.

#### Training programmes

During the year, 56,819 training programmes were organized with the participation of 15.40 lakh farmers including rural youth and in-service extension personnel.

**Farmers:** A total of 39,912 training programmes were organized for the benefit of 11.27 lakh farmers and farm women on various technologies to update their knowledge and skill. The beneficiaries including farm women were 168,898 in increasing production and productivity of crops; 161,807 in plant protection; 103,650 in production of inputs at site; 5,802 in household nutritional security; 6,404 in animal production and management; 65,354 in soil health and fertility management; 49,339 in



Demonstration of chaff cutter usage

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
<i>Bt</i> hybrid	3,600	583.44	731	631	20.41	11,695	13,555	3.1
<i>Desi</i> Hybrid	172	27.9	733	688	6.64	6,125	7,652	3.2
<i>G. hirsutum</i> × <i>G. barbadense</i> hybrids	150	24.28	549	472	16.34	18,642	19,253	2.1
<i>G. hirsutum</i> × <i>G. hirsutum</i> hybrids	300	48.56	481	363	32.55	13,035	14,325	3.4
<i>G. herbaceum</i> variety	125	20.34	301	250	22.13	6,563	5,563	2.7
<i>G. hirsutum</i> variety	350	56.66	508	437	17.21	13,489	14,263	3.1
<i>G. arboreum</i> variety	130	20.64	426	335	28.18	8,621	6,821	2.4
Total	4,827	781.82	532	454	20.49	11,163	11,633	3.0

commercial production of vegetables; 67,508 in processing and value-addition; 40,950 in capacity building and group dynamics; 24,824 in integrated farming system; 29,596 in orchard management; 26,048 in entrepreneurial development; 48,269 in farm machinery, tools and implements; 37,087 in fruit crops; 31,189 in resource conservation technologies; 63,888 in animal nutrition; 55,479 in fisheries; 12,349 in water management; 36,993 in animal health; 4,083 in production and value-addition; 7,648 in ornamental plants; 5,049 in tuber crops; 7,675 in agro-forestry; 4,845 in plantation crops; 5,449 in spice crops; and 56,742 in economic empowerment of women.

**Rural youth:** The beneficiaries were 28,972 in increasing production and productivity of crops; 4,160 in orchard management; 46,112 in production and value-addition; 52,868 in livestock production and management; 38,704 in economic empowerment of women; 14,558 in farm machinery, tools and implements; 9,636 in fisheries; 53,146 in production of inputs at site; 4,308 in capacity building and group dynamics; 21,836 in entrepreneurial development; and 36,052 in commercial horticulture. There were 12,978 skill-oriented training programmes for 3.10 lakhs rural youth.

**Extension personnel:** A total of 3,929 training programmes were conducted covering 103,428 participants. These were organized for extension functionaries working in government and non-governmental organizations related directly or indirectly with the development of agriculture. The



Water harvesting tank: KVK, Shimla

trainings were imparted to upgrade their knowledge and skills in frontier areas of agriculture technologies. These beneficiaries were 37,755 in increasing production and productivity of crops; 4,607 in production of input at site; 14,214 in plant protection; 128 in resource conservation; 10,456 in soil health and fertility management; 195 in integrated farming system; 9,473 in livestock production and management; 1,928 in farm machinery tools and implements; 5,594 in economic empowerment of women; 7,444 in capacity building and group dynamics; 5,766 in capacity building for ICT applications; 151 in processing and value-addition; and 5,717 in house-hold nutritional security.

*Sponsored training programmes:* Out of a total 56,819 training programmes conducted by the

Extension Activities				
Activities	No. of programmes	No. of farmers	No. of extension personnel	Total no. of beneficiaries
Advisory services	79,503	372,279	5,423	377,702
Diagnostic visits	22,891	81,093	3,443	84,536
Field day	3,411	222,683	9,052	231,735
Group discussions	101,165	310,438	12,965	323,403
<i>Kisan ghosthi</i> /farmers meeting	4,519	324,667	11,086	335,753
Film shows	5,739	122,306	6,865	129,171
Self-help group conveners meetings	1,585	32,622	2,921	35,543
Kisan mela	899	5,207,510	35,412	5,242,922
Exhibitions	1,848	2,566,833	542,027	3,108,860
Scientists' visit to farmers' field	51,990	225,605	6,483	232,088
Plant/animal health camps	5,513	108,273	3,477	111,750
Farm science club	816	17,981	1,768	19,749
Ex-trainees <i>sammelan</i>	440	13,446	541	13,987
Farmers' seminar/workshop	3,703	121,617	60,54	127,671
Method demonstrations	5,876	119,100	9,419	128,519
Celebration of important day	602	62,143	4,782	66,925
Special day celebration	102	18,621	1,575	20,196
Exposure visit	13,633	89,309	5,639	94,948
Total	304,235	10,016,526	668,932	10,685,458

## SUCCESS STORY

### Mithun-microchip technology by KVK, Papumpare, Arunachal Pradesh

Mithuns are semi-domesticated animals in Arunachal Pradesh and traditionally, mithuns are identified based on their ear notching (done during the calf-hood), horn structures, body-coat colour pattern, sex or the body size. Due to the close similarity between the mithuns of different owners in the locality, often it creates conflicts for the mithun ownership among the owners. Taking the degree of social importance in view, staff of KVK, Papumpare has initiated the micro-chip implantation drive as a means of identification of true owners of mithun in the locality in collaboration with State Forest Department.

A total of 155 mithuns had been micro-chipped by the KVK, Papumpare, in collaboration with the State Forest Department for identification of disputed mithuns in the district. This initiative has helped the local community to a great extent as the doubt and conflict about the ownership of mithuns in the district was eliminated. The awareness and use of microchip technology as a fool-proof identification for mithun was created among the farmers. The application of the microchip technology is accepted by the government and it helped to extend the benefit to a larger population in other districts of Arunachal Pradesh and similarly in the North-eastern region.



Microchipping of mithun

KVKs for the farmers and farm women, rural youth, and extension personnel, 6,091 were conducted on sponsorship by various organizations covering 2.55 lakh participants.

**Vocational training programmes:** A total of 2,763 programmes were specifically conducted for 54,924 rural youth on orchard management, production of inputs at site, economic empowerment of women, livestock production and management, production and value-addition, entrepreneurial development, capacity building and group dynamics, fisheries, farm machinery, tools and implements.

**Extension activities:** The KVKs have organized 304,235 extension activities involving 106.85 lakh farmers and extension personnel for backstopping about improved agricultural technologies.

In addition, 64,643 extension programmes were organized by KVKs through electronic and print media to have wider coverage in the districts. It

## SUCCESS STORY

### KVK interventions in drought mitigation

During *kharif* 2009, the monsoon was erratic and deficient by 28% for the country as a whole. The ICAR took the initiative by establishing weather advisory services and its updating on daily basis. Consequently, with the backstopping from Zonal Project Directorates of the Council and Directors of Extension Education of SAUs, KVK have provided weather advisory services through electronic and print media, organization of technology demonstrations and trainings, technology weeks, camps, etc. Introduction of alternate crops/varieties was the major interventions. Demonstrations on sesame, soybean, groundnut, pigeonpea, blackgram, greengram, cowpea and *rajmash* were mainly conducted. In cereals, demonstrations on short duration paddy, maize, *jowar* and *bajra* were laid out. Cotton, French bean, niger, sweet orange, cashew and tapioca related technological demonstrations were also conducted out by the KVK. An area of 36,675 ha with the participation of 56,719 farmers was brought under demonstrations on resource conservation technologies in states facing drought.



include electronic media, extension literature, newsletter, newspaper coverage, technical articles, technical bulletins, technical reports, radio talks, TV talks, animals treated in animal health camps, popular articles, technical books, leaflets and folders, and lectures were delivered.

### Production of technology products

KVKs have produced technological products like seeds, planting materials, bio-products, livestock material poultry and fisheries to a tune of Rs 1,304.47 lakhs benefiting 4.22 lakh farmers.

**Seeds, planting material and bio-products:** During the year, the KVK produced 20,898 tonnes of seeds including cereals, oilseeds, pulses, commercial crops, vegetables, flowers, spices, fodder and fibre crops. These seed materials have

## SUCCESS STORY

### Management of white grubs in lower hills of Uttarakhand

In North-western Himalayas, cereals, millets, pulses, oilseeds and vegetables are cultivated in 1.32 million ha with an estimated production of 3.44 million tonnes under rainfed condition. An array of insect pests and diseases cause a severe crop damage leading to low crop production. Among these, white grubs are the most destructive insect pests of agricultural and horticultural crops of Uttarakhand hills. The damage caused by the grubs may vary on an average from 10 to 30% and sometimes leads to complete crop failure. The grubs are reported to damage almost all the crops such as upland rice, finger millet, barnyard millet, maize, horse gram, soybean, French bean, chilli, potato, tomato, brinjal, okra, cole crops, apple, pear, plum, peach, apricot, pomegranate and forest trees.

The newly developed "VL-whitegrub beetle trap-1" is more efficient in trapping the beetles and is about half the cost of the previous models. In addition, an attempt was made to isolate and characterize a bacterium which is found potent for the management of the grubs. Out of 48 local strains, isolated from diseased whitegrubs and tested against 2<sup>nd</sup> instar grubs of predominant species, *Anomala dimidiata*, the isolate WGPSB-2 was found highly toxic causing more than 90% mortality in the grub population. Based on various morphological, physiological, biochemical and molecular tests, the isolate WGPSB-2 was identified as *Bacillus cereus*. A dose of 10 kg/ ha was found most promising under field conditions for the management of the grubs.

Both the technologies were demonstrated in an integrated manner in the five adopted villages of low hills of Uttarakashi and Uttarakhand. Depending on topography and other aspects of the mountain, light traps were installed at strategic locations of the adopted villages. Altogether, 47 light traps were installed and beetle catches recorded from June to October of every year. Beetles catch of 1.25 lakh, 0.72 lakh and 0.31 lakh was recorded during 2006, 2007 and 2008 respectively, which have resulted in a significant reduction of grub population. Overall 41.92 and 75.28% reduction in beetle population was recorded during 2007 and 2008 over the previous year. Besides installations of light traps, talc formulation of *B. cereus* strain WGPSB-2 was applied in the compost pits of the farmers and subsequent applications were made at their fields. Crop-wise pit samplings were done every month of pest incidence to monitor the grub population. Significant reduction in grub population to the tune of 32.75, 74.45 and 80.30% was recorded.

The light trap and the bio-pesticide are found very effective for the management of white grubs if used in a combined manner on entire village basis. Both the cost effective and environmentally safe technologies have now become popular in combating the devastating pest problem of the farmers of Uttarakhand hills. The integrated effect of the two novel technologies, the insect light trap and bio-pesticide has shown a reduction of 74.11–87.80% grub population in three years in the adopted villages. Considerable increase in yield of tomato, potato, chilli and French bean was recorded in adopted villages over non-adopted villages. Approximately 125 ha. area was covered and about 495 farm families were benefited through the white grub management programme.

### Technology week

Technology week was organized by 171 KVKs benefiting 1,20,831 participants which includes 76,701 men and 44,130 women. The technology week was organized under public-public and public-private partnership mode in which activities such as live demonstrations, exhibitions and scientists-extension personnel-farmer interactive sessions were included. During the technology week celebration, need-based technologies on crop improvement, crop production, crop protection, post-harvest processing, horticulture, livestock, farm implements and machineries, fisheries and allied sectors were demonstrated and explained to farmers, members of SHGs, extension officials and others. Seminars were conducted on thematic areas of local importance with a focus on agro-based enterprises and income generation activities. Agricultural exhibitions involving SAUs, ICAR Institutes, public sector organizations, etc. were organized by KVK to disseminate technologies. Besides, valuable technology products, viz. seeds, bio-fertilizers, bio-pesticides, improved implements, publications, etc. were provided to the farmers through sale counters.

been provided to 1.15 lakh farmers by earning Rs 777.76 lakhs. KVK produced 146.09 lakhs seedlings and saplings of commercial crops, vegetables, fruits, ornamental, medicinal and aromatic crops, plantation crops, spices, tuber crops, fodder and forest species. These planting materials have been provided to 1.59 lakh farmers by earning Rs 258.72 lakhs. The KVK produced bio-products and earned Rs 117.39 lakhs benefiting 48,471 farmers. The KVK provided poultry materials to 55,569 farmers and earned Rs 103.65 lakhs. The

### Technology backstopping and interface programmes

The Directorate of Extension of the State Agricultural Universities conducted 122 programmes for providing technological and methodological backstopping to 3,109 KVK staff. The Zonal Project Directorate conducted 59 programmes with the participation of 2,266 KVK staff. The KVKs organized 589 Interface programmes through the meetings of Scientific Advisory Committee, sponsorship of special programmes and developing functional linkages.

## SUCCESS STORY

### Farmers-scientists interaction

KVK conducted farmers-scientists interaction on livestock-rearing practices, fodder production, fish production, sensitization about health related problems, etc. A total of 399 interactions were held with the participation of 14,876 stakeholders. Animal health camps (298) were organized in which 49,731 animals were attended. Quality seeds of cereals, pulses, oilseed, vegetables, cotton, fodder crops were distributed to the farmers. A total of 639.08 tonnes seeds were distributed in 12 states by KVK.

KVK also provided fisheries materials to 42,203 farmers and earned Rs 9.21 lakhs.

**Livestock, poultry and fish fingerlings:** The KVK produced breeds (dairy animals, piglets,

rabbits, sheep and goats) of 2,085 livestock materials and earned a revenue of Rs 37.74 lakhs benefiting 1,212 farmers. The KVK produced various breeds/strains of poultry birds (chicken, duck, quail and turkey). Through the production of 1.22 lakh poultry birds, KVK have earned a revenue of Rs 103.69 lakhs benefiting 55,569 farmers. Through the production of 141.48 lakh fish fingerlings, KVKs earned a revenue of Rs 9.21 lakhs benefiting 42,203 farmers.

### Diagnostic facilitation

A total of 1.58 lakh samples including 1.42 lakhs soil samples, 1.23 lakhs water samples, 3,172 plant material, 479 manure samples and 84 other samples were analyzed benefiting 1.40 lakh farmers from 30,330 villages. This generated a revenue of Rs 83.02 lakhs.

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