



14. Technology Assessment, Refinement and Transfer

The Council has created a vast network of Krishi Vigyan Kendras (KVK) aiming at assessment, refinement and demonstration of technology/product. At present, there are 558 Krishi Vigyan Kendras (KVK) which include 376 under Agricultural Universities, 40 under ICAR Institutes, 90 under NGOs, 33 under State Governments and the remaining 19 under various other organizations.

KRISHI VIGYAN KENDRAS

Technology assessment

During the year, 893 technologies were taken up for assessment related to cereal, oilseed, pulse, commercial, vegetable, fruit, flower, plantation, tuber crops including varietal evaluation (193), nutrient management (200), cropping system (106), resource conservation (25), small-scale income generation enterprise (39), value-addition (15), integrated farming system (17), seed and plant production (16), weed management (33), insect/disease management (217), drudgery reduction (7), storage technique (4) and farm implement and tool (21).

Similarly, 122 technologies related to animal enterprises (cattle, poultry, piggery and goatery) and fishery were taken up for assessment in thematic areas of disease management (19), evaluation of breeds (15), feed and fodder management (22), nutrition (37) and production practices (29).

Technology refinement

A total of 143 technologies related to cereal, oilseed, pulse, commercial, vegetable, fruit, flower, plantation and tuber crops were taken up for refinement including nutrient management (71), pest management (34), disease management (31) and weed management (7); besides technologies related to cropping system/farming system (26),

resource-conservation technology (7) and drudgery reduction (3).

As far as livestock (cattle, poultry, piggery, goatery) and fishery is concerned, 22 technologies were taken up for refinement including disease management (4), evaluation of breeds/strains (2), feed and fodder management (6), nutrition (2) and production practices (8).

Frontline demonstration

Frontline demonstrations were conducted to demonstrate the production potential of newly released technologies on the farmers' fields in a given farming system, and organize training and extension activities for farmers and the extension workers for dissemination of technologies. A total of 71,640 frontline demonstrations were organized including oilseeds (18,306), pulses (13,042), cotton (6,206) and other important crops (31,248), covering an area of 25,000 ha. Besides, 2,838 demonstrations on various enterprises were also conducted.

Demonstrations on hybrids

Out of 71,640 demonstrations, 2,473 were conducted on hybrids of different crops including cereals, oilseeds, cotton, vegetables and fodder.

The hybrids of different crops showing maximum increase in their yields in demonstration plots over their local checks are: Hy 93330 pearl millet (80.43%), COSS sorghum (26.87%), COH (M) 5 maize (105.15%), RH 10 rice (105.95%), TMVCH 1 castor (94.13%), HNG 10 groundnut (15.79%), Mahyco mustard (47.06%), DSH 129 (19.46%), TCSH 2 sesame (21.80%), MFSH 8 sunflower (62.67%), AAH cotton (27.48%), NDBGH bottle gourd (21.88%), Pooja brinjal (179.38%), Megha cauliflower (16.67%), Sonali tomato (143.88%), Malini cucumber (135.88%), Hy 2/16 cashew (195.38%) and Taiwan papaya (42.86%).



Oilseeds: During the year, 18,306 demonstrations were conducted covering 6,283.98 ha on different oilseed crops including castor, groundnut, niger, sesame, soybean, sunflower, linseed, mustard, safflower and toria. The increase in yield varied from 28.2% in groundnut to 77.9% in niger and on an average, oilseed crops under demonstration gave 34.8% more yield than farmers' practice.

Pulses: A total of 13,042 demonstrations were



Frontline demonstration on foliar spray in greengram

conducted, covering 4,285.79 ha on various pulse crops including blackgram, greengram, Frenchbean, *rajmash*, mothbean, pigeonpea, gram, lentil and pea. The percentage increase in yield varied from 5.4 in lentil to 89.1 in Frenchbean and on an average, pulse crops under demonstration gave 37.6% more yield than farmers' practice.

Cotton: The frontline demonstrations on production technology of cotton were conducted in nine major cotton-growing states, viz. Andhra Pradesh, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan and Tamil Nadu, besides West Bengal. The number of districts covered were 7, 5, 5, 15, 5, 15, 5, 3, 9 and 2 and villages were 12, 17, 53, 17, 8, 25, 39, 27, 13 and 3, respectively, in these states.

The demonstrations were given on production technology, integrated pest management and farm implements. There were 6,206 demonstrations covering an area of 4,281.3 ha. In production technology, 2,495 farmers were benefited directly covering an area of 1,012.3 ha. The demonstrations on integrated pest management were also conducted, including 1,261 farmers, covering an

Demonstrations on production technology in cotton

| State | No. of farmers | Area (ha) | Demo yield (q/ha) | Local yield (q/ha) | Increase (%) | Demo cost (Rs/ha) | Local cost (Rs/ha) | Demo benefit:cost ratio |
|----------------|----------------|-----------|-------------------|--------------------|--------------|-------------------|--------------------|-------------------------|
| Andhra Pradesh | 321 | 142.4 | 23.40 | 18.74 | 24.87 | 14,990 | 15,582 | 2.99 |
| Gujarat | 180 | 72.0 | 23.35 | 23.12 | 1.01 | 11,516 | 11,351 | 4.43 |
| Haryana | 190 | 76.0 | 20.38 | 17.49 | 16.51 | 10,325 | 9,607 | 3.78 |
| Karnataka | 457 | 176.8 | 15.04 | 12.32 | 22.00 | 12,047 | 12,100 | 3.06 |
| Madhya Pradesh | 180 | 72.0 | 17.59 | 12.24 | 43.64 | 11,786 | 10,592 | 3.43 |
| Maharashtra | 512 | 204.8 | 17.86 | 13.69 | 30.46 | 13,373 | 11,274 | 2.67 |
| Punjab | 147 | 68.8 | 23.66 | 25.15 | -5.92 | 15,505 | 15,875 | 3.09 |
| Rajasthan | 120 | 48.0 | 20.90 | 17.64 | 18.46 | 12,755 | 11,689 | 2.95 |
| Tamil Nadu | 320 | 128.5 | 18.26 | 11.59 | 57.55 | 12,411 | 11,458 | 3.64 |
| West Bengal | 68 | 23.0 | 11.20 | 10.07 | 11.23 | 8,738 | 8,981 | 2.31 |
| Total/average | 2,495 | 1,012.3 | 19.14 | 15.63 | 22.46 | 12,345 | 11,850 | 3.24 |

Performance of Bt hybrids, *desi* hybrids, non-Bt hybrids and other varieties in frontline demonstrations on cotton

| Type of hybrid/variety | No. of farmers | Area (ha) | Demo yield (q/ha) | Local yield (q/ha) | Increase (%) | Demo cost (Rs/ha) | Local cost (Rs/ha) | Demo benefit:cost ratio |
|----------------------------|----------------|-----------|-------------------|--------------------|--------------|-------------------|--------------------|-------------------------|
| Bt hybrids | 1,500 | 602.4 | 22.69 | 18.72 | 21.22 | 11,873 | 11,596 | 3.51 |
| <i>Desi</i> hybrids (A×A) | 60 | 24.0 | 20.29 | 16.64 | 21.97 | 9,692 | 9,322 | 3.78 |
| H×B hybrids | 152 | 68.0 | 13.50 | 10.43 | 29.53 | 9,791 | 10,236 | 3.02 |
| H×H hybrids | 155 | 62.0 | 13.21 | 10.98 | 20.31 | 13,140 | 12,284 | 2.13 |
| <i>herbaciun</i> varieties | 75 | 30.0 | 5.91 | 4.65 | 27.24 | 8,069 | 6,903 | 1.66 |
| <i>hirsutum</i> varieties | 409 | 153.9 | 13.76 | 10.84 | 26.90 | 8,210 | 7,705 | 2.56 |
| <i>arboreum</i> varieties | 144 | 72.0 | 14.25 | 11.05 | 29.02 | 8,858 | 8,616 | 2.92 |
| Total/average | 2,495 | 10,12.3 | 19.14 | 15.63 | 22.46 | 12,345 | 11,850 | 3.24 |



area of 925 ha, in 19 blocks spread over 6 states, majority of which were in Maharashtra and Karnataka. As far as the demonstrations on farm implements are concerned, 2,450 farmers were included, covering an area of 2,344 ha.

Production technology: Average seed-cotton yield in the demonstration plots varied from 11.20 q/ha to 23.66 q/ha, with the cost of production from Rs 8,738/ha to Rs 15,505/ha. Due to variation in cost of production, yield and market price, the benefit : cost ratio also varied from 2.31 to 4.43. There was negligible increase (1%) in yield in demonstration plots in Gujarat and negative increase (-5.92%) in Punjab because the local checks RCH 2 Bt and RCH 134 Bt hybrids, respectively, outyielded new hybrids (MRC 6301 and MRC 6304 in Punjab) and Vikram 5 in Gujarat.

Performance of hybrid: A number of demonstrations were conducted on Bt hybrids by involving 1,500 farmers. In hybrids other than Bt, demonstrations on H×H hybrids and H×B hybrids were conducted in 152 and 155 locations. The *desi* hybrids performed better than other non-Bt hybrids. Among varieties, *hirsutum* and *arboreum* varieties performed very well next to Bt and *desi* hybrids.

Integrated pest management: The IPM

Production of seed/planting material

During the year, the KVKs produced 111,164 q seeds of value Rs 84,852,506 including cereals, oilseeds, pulses, commercial crops, vegetables, flower crops, spices, fodder crops, fibre crops, forest species and others. In addition, production of planting material included, 91.29 lakh saplings/seedlings of fruits, vegetables, spices, medicinal plants, ornamental plants, plantation crops and forest species amounting to Rs 28,962,204, besides 8.94 lakh kg bio-products of value Rs 6,583,128, and 40.08 lakh fingerlings and other livestock/poultry strains were produced for availability to the farmers.

demonstrations were conducted in Amaravati, Jalna and Sriganganagar districts with 2 block demonstrations each (50 ha per block) and in other districts in one block each of 50 ha. In Vadodara district of Gujarat 91 demonstrations were conducted on IPM and the entire production was used for seed purpose. The maximum yield of 26.5 q/ha was reported from Dhule district of Maharashtra.

Farm implements: Demonstrations on farm implements were spread over 2,344 ha area in which 2,450 farmers participated. In addition, 36.2 q seeds were delinted by using improved delinting machine. Rotavator, harrows and cotton stalk uprooter were demonstrated in 890 ha area, sprayers in 787 ha, weeders in 449 ha, and planters/seed drills in 218 ha.

Demonstrations on IPM technology in cotton

| State | District | No. of farmers | Seed-cotton yield (q/ha) | | |
|----------------|------------------|----------------|--------------------------|---------|--------------|
| | | | IPM | Non-IPM | Increase (%) |
| Andhra Pradesh | Karimnagar | 50 | 17.40 | 16.00 | 8.75 |
| Gujarat | Vadodara | 91 | 10.10 | 8.38 | 20.53 |
| | Haryana Sirsa | 25 | 23.50 | 20.50 | 14.63 |
| Karnataka | Mysore | 125 | 13.72 | 11.54 | 18.89 |
| | Bellary | 50 | 24.90 | 21.60 | 15.28 |
| | Raichur | 50 | 24.80 | 19.58 | 26.66 |
| | Chitra- durga | 69 | 14.10 | 10.66 | 32.27 |
| | Belgaum | 149 | 22.16 | 20.40 | 8.63 |
| Maharashtra | Dhule | 50 | 26.50 | 22.80 | 16.23 |
| | Buldana | 70 | 16.37 | 13.05 | 25.44 |
| | Akola | 64 | 13.12 | 9.25 | 41.84 |
| | Amaravati | 81 | 11.75 | 8.85 | 32.77 |
| | Nanded | 125 | 24.95 | 14.45 | 72.66 |
| | Jalna | 132 | 26.14 | 20.90 | 25.07 |
| | Nandurbar | 30 | 13.56 | 11.50 | 17.91 |
| Rajasthan | Sriganganagar | 100 | 17.50 | 15.50 | 12.90 |
| Total/average | | 1,261 | 18.79 | 15.31 | 22.73 |



Direct sowing is being demonstrated using paddy drum seeder

In order to create awareness on improved practices, a number of extension programmes (consultancy, conventions, demonstrations, diagnostic surveys, exhibition, farmer study tours, farmers field school, field-days, field visits, *gram sabha*, group discussions, *kisan gosthi*, *kisan mela*, training for extension functionaries, training for farmers, video show, newspaper coverage, popular articles, publication, radio talks, TV programmes) were organized with the participation of 68,645 farmers.



Other crops: During the year, 31,248 demonstrations were conducted covering 10,149 ha on different cereals, horticultural and other commercial crops, besides 2,838 demonstrations on different enterprises like dairy, piggery, poultry, rabbitary, sheep and goat, mushroom, sericulture and vermicompost.

Training programme

During the year, 43,285 training programmes were organized with the participation of 1,174,136 farmers including rural youth, and in-service extension personnel.

Farmers' training: A total of 33,589 training programmes were organized for the benefit of 9.42 lakh farmers and farmwomen on various technologies. Total number of beneficiaries including male and female in different programmes were 210,382 in productivity enhancement of crops; 64,697 in commercial production of vegetables; 57,997 in orchard management; 34,034 in production and value-addition of ornamental, plantation, tuber, spice crops and medicinal and aromatic plants; 12,483 in agro-forestry plants; 137,801 in plant protection; 74,662 in soil health and fertility management; 101,163 in livestock production and management; 50,226 in household nutritional security; 62,963 in economic empowerment of women; 6,795 in drudgery reduction of women; 6,761 in methods of protective cultivation; 200,19 in farm machinery, tools and implements; 7,966 in processing and value-addition; 17,371 in fisheries; 41,287 in production of inputs at site; and 34,942 in capacity building and group dynamics.



Women farmers are being trained for using *bhendi* plucker

Training for rural youth: As many as 6,323 skill-oriented training programmes were organized for 1.52 lakh rural youth. The beneficiaries (male and female) in different areas were 15,119 in productivity enhancement of crops; 3,197 in orchard management; 9,190 in fruit plants; 22,290 in livestock production and management; 13,233



On-campus training for rural youth for raising nursery

in economic empowerment of women; 3,209 in methods of protective cultivation; 5,354 in farm machinery, tools and implements; 18,480 in processing and value-addition; 3,638 in fisheries; 33,402 in production of inputs at site; and 25,019 in capacity building and group dynamics.

Training programmes for extension personnel:

A total of 3,373 training programmes were conducted benefiting 80,416 participants. These training programmes were organized for extension

Training programmes for extension personnel

| Thematic area | No. of courses | No. of participants | | |
|--------------------------------------|----------------|---------------------|---------------|---------------|
| | | Male | Female | Total |
| Productivity enhancement of crops | 1,391 | 29,207 | 5,303 | 34,510 |
| Plant protection | 525 | 10,890 | 1,139 | 12,029 |
| Soil health and fertility management | 263 | 5,775 | 574 | 6,349 |
| Livestock production and management | 293 | 5,443 | 1,403 | 6,846 |
| Farm machinery, tools and implements | 78 | 1,342 | 123 | 1,465 |
| Economic empowerment of women | 217 | 2,373 | 1,816 | 4,189 |
| Capacity building and group dynamics | 275 | 5,690 | 868 | 6,558 |
| Household nutrition security | 331 | 1,427 | 7,043 | 8,470 |
| Total | 3,373 | 62,147 | 18,269 | 80,416 |

Diagnostic support

A total of 111,303 samples including 94,647 samples of soil, 15,916 samples of water, 721 samples of plant material and 19 samples of manure were analyzed, generating a revenue of Rs 53.73 lakh, benefiting 96,207 farmers from 14,971 villages during the reporting period.



| Extension activities | | |
|------------------------------------|-------------------|---------------|
| Activities | No. of programmes | Beneficiaries |
| Advisory services | 75,393 | 139,188 |
| Diagnostic visits | 16,727 | 63,849 |
| Field-days | 3,038 | 168,201 |
| Group discussions | 12,712 | 353,027 |
| <i>Kisan ghothi</i> | 2,731 | 164,907 |
| Film show | 4,609 | 151,540 |
| Self-help groups | 1,860 | 28,648 |
| <i>Kisan mela</i> | 835 | 1,477,838 |
| Exhibition | 1,277 | 1,539,773 |
| Scientists' visit to farmers field | 18,1175 | 491,606 |
| Plant/animal health camps | 6,838 | 36,045 |
| Farm science clubs | 797 | 41,414 |
| Ex-trainees <i>sammelan</i> | 842 | 10,855 |
| Farmers' seminar/workshop | 1,143 | 90,833 |
| Method demonstrations | 5,171 | 96,036 |
| Celebration of important days | 275 | 20,747 |
| Special day celebration | 877 | 55,872 |
| Exposure visits | 2,025 | 32,923 |
| Total | 318,325 | 4,963,302 |

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): Out of a total 43,285 training programmes (11.74 lakh participants) conducted by the KVKs for the farmers and farm women, rural youth, and in-service extension personnel; 5,265 training programmes were conducted on sponsorship by various organizations covering 1.52 lakh participants. The participants were from various government and non-governmental organizations associated directly or indirectly with the development of agriculture. The training was

imparted to upgrade their knowledge and skills including productivity enhancement of crops; commercial production of vegetables; production and value-addition of fruit plants, ornamental plants and spices crops; soil health and fertility management; processing and value-addition; methods of protective cultivation; production of inputs at site; farm machinery; tools and implements; livestock production and management; fisheries; household nutritional security; economic empowerment of women; drudgery reduction of women; and capacity building and group dynamics.

Training programmes (vocational): Out of 6,323 training programmes conducted for rural youth, 1,886 programmes were specifically conducted for 44,847 persons, on various vocations including agricultural para-workers and para-veterinary training; capacity building and group dynamics; commercial floriculture; commercial fruit production; commercial vegetable production; composite fish culture; dairy farming; income generation activities; integrated crop management; mushroom cultivation; nursery; grafting etc.; organic farming; piggery; poultry farming; production of bio-agents; bio-pesticides; bio-fertilizers etc.; repair and maintenance of farm machinery and implements; rural crafts; seed production; sericulture; sheep and goat rearing; value-addition; vermi-composting; and tailoring; stitching; embroidery; dyeing etc.

Extension activities

The KVK organized 318,325 extension programmes, benefiting 49.63 lakh farmers and others to create awareness about improved agricultural technologies. The activities include field-days, *kisan mela*, *kisan ghothi*, exhibitions, ex-trainees *sammelan*, advisory services, film shows, diagnostic services, organizing farm science club, and formation of self-help groups (SHG).

In addition 13,074 newspaper coverages, publication of 2,685 extension literatures, 5,037 radio and TV talks etc., were taken up by the KVK.

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