

Tribal Sub Plan

Village clusters in four districts of Uttarakhand viz., Pithoragarh, Bageshwar, Chamoli, and Dehradun were adopted by the institute under Tribal Sub Plan with the objective of socio-economic development of the tribal communities of Uttarakhand. During the reporting period a number of programmes were organized at the institute as well as at farmers' fields. A brief description of these programmes is as follows:

Farmer Trainings/Kisan Goshthis/ Farmers-Scientists Interaction Meet

A 5-days training programme on 'Improved Production Techniques of Hill Crops' was organized during 13-17 May, 2015 for farmers of Jaunsar tribal region of Dehradun district. A total of 33 farmers including 16 farmwomen participated in this programme. Two training



Exposure to institute technologies during training

programmes were also organized during 16-18 February, 2016 and 28-30 March, 2016 for the farmers of Dharchula and Munsyari blocks of Pithoragarh district, respectively in which 55 farmers including 41 farm women participated. In these programmes, the farmers were imparted training on cultivation of improved varieties, improved crop production and crop protection technologies, seed production,

fodder production, small tools and farm machinery, and mushroom production. A special session on post harvest technologies for value addition was organised in which the farm women were imparted hands-on training on soya milk and tofu preparation. The trainees were made aware on formation of farmer clubs and group investment in agriculture and were also sensitized on the ways to achieve higher work efficiency from lower labour input. During farm visits for practical demonstrations of improved technologies, the farmers were also sensitized on 'Swachha Bharat Abhiyaan'.

A one-day off-campus training programme on 'Improved Production Techniques for Crops of Higher Hills and Integrated Pest Management' was organized in Chamoli district on 30th July, 2015 for farmers of Niti Valley of Joshimath block. A total of 22 farmers including 7 farmwomen participated in this programme. During the programme, the farmers were provided information on management for major insects and diseases of important crops of higher hills, viz., rajmash, garden pea and potato, with emphasis on adoption of organic and environment-friendly management practices such as use of *Melia azadirach* L. (*batain/dainkan*) seed kernel for control of cutworm; use of Bt for controlling pod borer; and use of light trap and WGPSB-2 for controlling white grub. Information on improved crop production technologies and quality seed production for these crops was also disseminated.



Training programme on IPM at Bhimtala, Chmoli

A programme ‘*Makka Sheller ke Samavesh se Krishak Kathin Shram ka Nyunikaran*’ was organized at the adopted village cluster Dhanpau in Dehradun district on December 18, 2015 to sensitize the farmers on the long-term health-related ailments potentially resulting from uncomfortable postures used in traditional shelling of maize, and the importance of maize sheller in mitigating these ailments. The programme was attended by 50 farmers from 5 villages of Dhanpau cluster. During the programme, a practical demonstration of the maize sheller was given and farmers were explained about the method of its operation and the precautions required during its operation. Besides, the technique of *Tofu* making was also demonstrated and was much appreciated by the women folk.



Introduction of maize sheller at Dhanpau village

An off-campus Training-cum-Live demonstration on ‘Maize Hybrid Seed Production Technology’ was organized at village Yamuna Khadar in Vikasnagar block of Dehradun district on 12 February, 2016. The training programme was attended by 85 farmers (including 18 female farmers) from Dhanpau and Khadin clusters of Kalsi block and Quanu cluster of Chakrata block of the Jaunsar tribal area. In this programme, the farmers were trained on the technical aspects of maize hybrid seed production such as method of planting, ratio of male and female plants, detasseling and general crop management and were also given a live demonstration on the field. The programme was part of the Institute’s work plan to ensure availability of the hybrid seed of Institute’s maize varieties in the Jaunsar tribal area at local level through farmer participatory seed production.

Nine farmers-scientist interactions meet was organized in Niti valley of Chamoli district and Jaunsar area of Dehradun during the reporting period. The programmes were attended by 661 farmers belonging to the *Bhotia* and *Jaunsari* tribe. During the interactions, the farmers were briefed about the Tribal Sub-Plan Programme of Govt. of India. Besides, the problems of various villages were prioritized to prepare an action plan for the ensuing season. During discussion, the activities already carried out were also reviewed and action plan was chalked out. During an interaction with the 25 farmers of village Mirag of Joshimath block in Chamoli district, seed of late blight resistant varieties of potato was provided to selected farmers for undertaking potato seed production.



Farmer's-scientist interaction meet in Chamoli

Establishment of Farmer Participatory Hybrid Maize Seed Production System in Jaunsar Tribal Area

Since making seed of hybrid maize available to the farmers every year is a challenging task for the institute, therefore, as part of its work plan to ensure availability of maize hybrid seed to farmers locally every year, an initiative was undertaken to establish a farmer participatory

maize hybrid seed production system in the Jaunsar tribal area. The brief description of the planned system is as follows:

1. Survey of Jaunsar tribal area, need assessment and identification of technological interventions
2. Organizing demonstrations of institute's elite maize hybrid in selected village clusters
3. Part of the bumper crop harvest retained for household consumption, rest makes way to industry fetching higher returns.

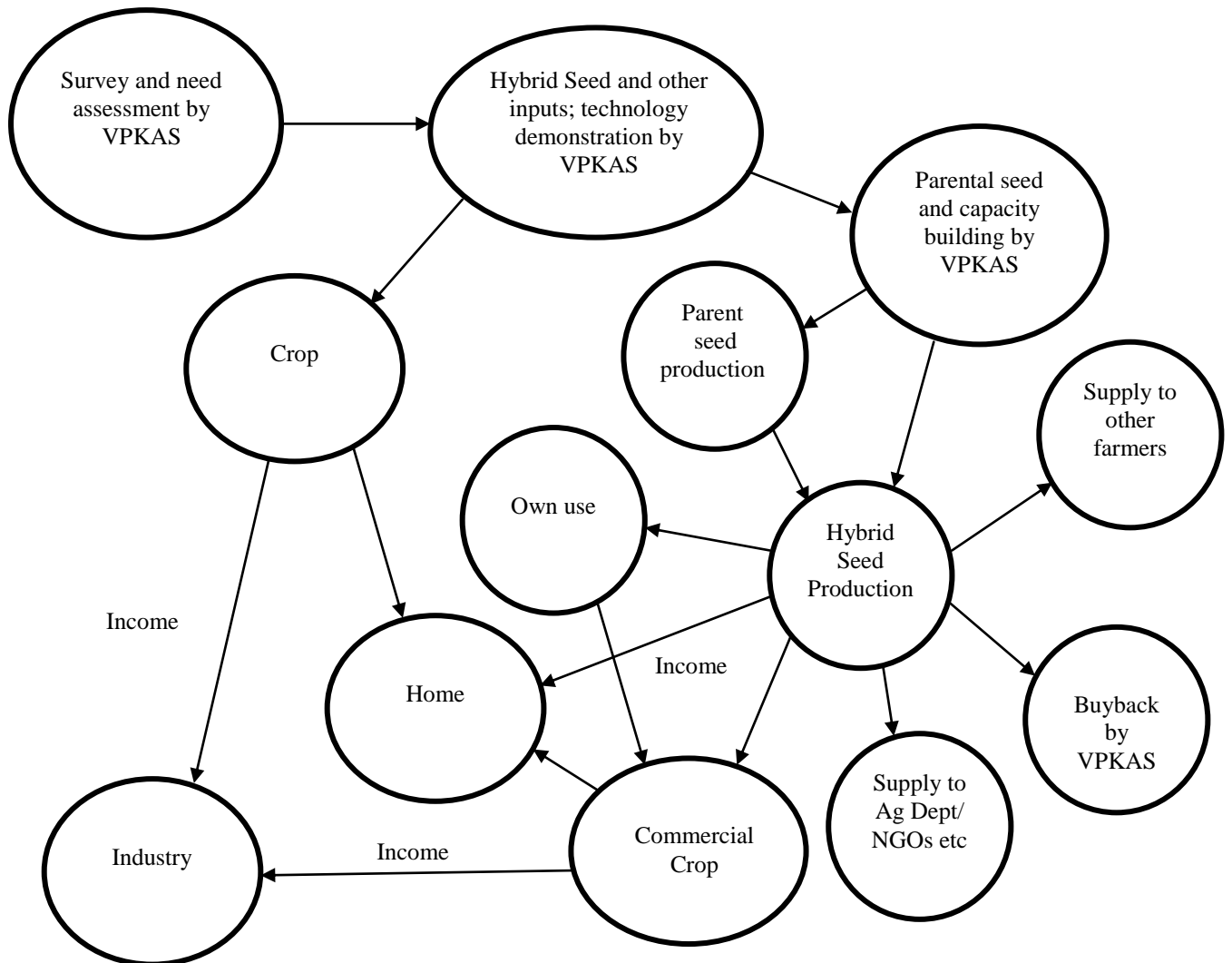


Figure: Schematic diagram of action plan of ICAR-VPKAS to establish a farmer participatory maize hybrid seed production system in the Jaunsar tribal area

4. Demand for hybrid maize seed necessitates establishment of a local and self-sustainable hybrid seed production system. The objective is achieved by capacity building of famers in maize hybrid seed production through on-campus and on-farm demonstrations and hands-on training programmes
5. In the initial years, part of the hybrid seed produced by the farmers is bought back by VPKAS. Rest is used by the farmers for raising commercial crop.
6. In the subsequent years, farmers supply surplus seed to/produce hybrid seed on demand for State Agricultural Department, NGOs and others.
7. Hybrid seed thus sold brings in additional income to the seed producing farmers

8. Sufficient availability of hybrid maize seed at affordable prices results in hybrid varieties covering most part of the region, thereby ensuring sustained supply of high volume of maize grain to the industry and regular higher income to the farmers.

Table 1. Farmer Trainings/Kisan Goshthis/ Farmers-Scientists Interaction Meet

Sl No.	Type of programme	Number	Venue	Subject	No. of beneficiary
1.	On-campus Training	3	Hawalbagh	Improved Production Techniques of Hill Crops	88
2.	Off-campus Training	2	Bhimtala, Chamoli Yamuna Khadar, Dehradun	Improved Production Techniques and Integrated Pest Management Maize Hybrid Seed Production Technology	22 85
3.	Sensitization programme	1	Dhanpau, Dehradun	<i>Makka Sheller ke Samavesh se Krishak Kathin Shram ka Nyunikaran</i>	50
4.	Farmers-scientist interaction meet	9	Niti valley of Chamoli and Jaunsar area of Dehradun	Review of ongoing programme and finalization of action plan for ensuing season	661



Laying out of trial at Gamshali village of Chamoli

On Farm Research

During the reporting period, scientists of the institute surveyed Malari, Kailashpur and Gamshali village of Joshimath block in Chamoli district. Integrated pest management and marketing of produce (potato and rajamash) were identified as the key issues to be addressed for agricultural development in Niti Valley (Higher hills of Joshimath Block, Chamoli

district). A trial was also laid out at Gamshali (3401 m amsl) to assess the suitability of various varieties/ crops, viz., wheat (VL *Gehun* 616, VL *Gehun* 738, VL *Gehun* 802, VL 804, VL *Gehun* 829, VL *Gehun* 832, VL *Gehun* 892 and VL *Gehun* 907), finger millet (VL *Mandua* 347 and VL *Mandua* 352), lentil (VL *Masoor* 126 and VL *Masoor* 507), buckwheat (VL *Ugal* 7), Onion (Arka Kalyan, Arka Kirtiman and Arka Lalima), Amaranth (VL *Chua* 44), vegetable pea (VL *Ageti Matar* 7), bean (VL Bean 2), horse gram (VL *Gahat* 19), and Soybean (VLS 47 and VL *Soya* 65).

Studies on Women Drudgery

A focused group discussion was held On December 19, 2015 with tribal farm women of Dhanpau village. Information pertaining to gender, division of labour, seasonal activities in maize cultivation and daily activity profile of farm women was collected. The farm women were asked to shell maize with the newly introduced maize sheller and their responses on perceived feasibility in terms of simplicity, triability, profitability, observability and cultural compatibility were recorded. Field performance of maize sheller was compared with the local practice and it was observed that the field capacity of the sheller was 125 q/ hour as

compared to hand shelling, which was 26 kg/ hour. The scores on body part discomfort and visual analogue scale for traditional practice were recorded for further analysis.

Postural analysis of 15 farmwomen manually performing maize shelling activity was carried out by Rapid Upper Lumbar Analysis (RULA) technique. For most of the respondents (80%), RULA score of 6 was observed indicating further investigation of the shelling activity and the need to change the same to eliminate the risk involved for the workers. It indicates that farm workers involved in maize shelling activities may become prone to work-related musculo-skeletal disorders due to prolonged squatting posture with a high amount of repetitiveness. It calls for dire need for replacing the activity.

Table 2: Subjective evaluation of maize shelling activity carried out by farmwomen manually and with maize sheller

Maize shelling	Traditional	Power operated Maize Sheller	Per cent reduction in exertion/discomfort
RPE (Borg scale)	6.33	2.61	58.77
ODR (Through VAS)	7.28	3.67	49.58

It is very well evident from Table 2 that the maize sheller intervention reduced the drudgery of farmwomen while shelling maize by power operated maize sheller to nearly half i.e. rated perceived exertion by 58.77 per cent and overall discomfort by 49.58 per cent.

Perceived feasibility of power operated maize sheller

A technology having high feasibility index can be easily adopted by the respondents. Hence, perceived feasibility of the introduced maize sheller was assessed through five attributes *viz.*, simplicity, profitability, compatibility, observability and triability. The responses of women belonging to a SHG (Durga Mahila Swayam Sahayata Samooh) in the village were collected on the feasibility.

Table 3: Feasibility of maize sheller as perceived by the respondents (N=30)

Attribute	Number	Per cent
Simplicity (S)		
Very easy to understand & use	4	13.33
Easy	21	70
Neither easy nor difficult	5	17
Difficult to understand & use	0	0
Very difficult	0	0
Profitability (P)		
Most Profitable	22	73.30
Profitable	7	26.7
Somewhat Profitable	1	0
Least	0	0
Not at all	0	0
Compatibility (C)		
Most compatible	21	70
Compatible	7	23.33
Somewhat compatible	2	6.67
Least compatible	0	0
Not at all	0	0
Observability (O)		
Most observable	24	80
Observable	6	20

Somewhat observable	0	0
Least observable	0	0
Not at all	0	0
Triability (T)		
Most triable	22	73.30
Triable	6	20
Somewhat triable	2	6.67
Least triable	0	0
Not at all	0	0

In order to find out the overall feasibility, a feasibility index of each respondent was calculated as given by Sadhna *et al*:

$$PFI = \frac{E(S+P+C+O+T)}{P(S+P+C+O+T)} * 100$$

Where, E= Extent to which innovation was rated feasible by the respondents

P= Maximum limit to which innovation can be rated feasible

Table 4: Overall feasibility of maize sheller (N=30)

Category (Scores)	Number	%
Most feasible (85-100)	23	76.67
Feasible (69-84)	7	23.33
Somewhat feasible (53-68)	0	0
Least feasible (37-52)	0	0
Not at all feasible (20-36)	0	0

Majority of the farmwomen (76.67%) perceived the power operated maize sheller as ‘most feasible’ technology followed by 23.33 per cent farmwomen who perceived the technology as ‘feasible’. None of the respondents considered the technology as ‘somewhat feasible’, ‘least feasible’ or ‘not feasible at all’. It can be concluded that power operated maize sheller can be easily adopted by the targeted beneficiaries (Table 4).

Farmer Fair/ Field Day/ Exposure Visit/ Seminar

During the Farmers Fair organized at Hawalbagh Experimental Farm of ICAR-VPKAS, Almora, two exposure visits of 125 tribal farmers including 74 farm women was conducted. The farmers were exposed to progressive agricultural technologies including crops/seed production, water conservation technology, post harvest processing technology, and other technologies developed at the institute. The farmers were also sensitized on the use of domestic waste for composting as an important component of Swachh Bharat Abhiyan.

A maize field day-cum-farmer fair was organized on October 2, 2015 at village Dhanpau of Kalsi block in Dehradun district for demonstrating the outstanding performance of maize hybrid variety Vivek Maize Hybrid 45 and improved technologies developed by the Institute. More than 200 farmers from adjoining villages participated in this programme.



Gosthi during Kisan Mela at Dhannau village

An agricultural exhibition was organised on November 06, 2015 during *Swatantrata Senani Sri Hari Singh Krishi, Kutir Udyog evam Grameen Paryatan Pradarshani* at Malla Dummar, Munsyari block in Pithoragarh district. ICAR-VPKAS technologies were showcased on this occasion. A total of 24 farm women from 12 villages of Malla Johar (migration villages of Munsyari block) were selected in consultation with Dr. R.S.Tolia (Ex-Chief Secretary, Govt. of Uttarakhand) for imparting exposure and training on improved farming practices at ICAR-VPKAS, Almora.

Table 5 Farmer Fair/ Field Day/ Exposure Visit

SI No.	Type of programme	No.	Venue	Subject	No. of beneficiary
1.	On-campus exposure visit	2	Hawalbagh	Improved Production Techniques of Hill Crops	125
2.	Maize field day-cum-farmer fair	1	Dhanpau, Dehradun	Motivating the farmers for adoption of improved maize varieties and other modern technologies	200
3.	Agricultural exhibition	1	Malla Dummar, Munsyari	Improved Production Techniques of Hill Crops -	~200

Distribution of Agri-inputs

Seed of improved varieties, small hand tools, VL *Syahi Hal* and *Krishi* Calendars were distributed to all the farmers of Pithoragarh, Dehradun and Chamoli districts participated during trainings, exposure visits, *gosthis* and farmer fairs. In addition, *Vivek* Millet thresher-1 and maize sheller were provided to *Durga Mahila Swayam Sahayata Samooh* of Lakhwad cluster in Jaunsar area of Dehradun for community use. The farmers of Niti



Distribution of farm implements to tribal farmers

valley were also provided suitable pesticides.

Frontline Demonstrations

Demonstrations of maize hybrid (*Vivek* Maize Hybrid 45) were conducted in 8 ha area at Dhanpau, Lakhwad, Sawada and Jakhanau-Bhistau villages of Dehradun during *Kharif* 2015. The yield of *Vivek* Maize Hybrid 45 was recorded 1.5-2 times higher than the local cultivar despite the crop had experienced less than normal rainfall during the season. The damage due to high speed winds was also observed less in the hybrid. The 'stay-green' trait of the hybrid was particularly appreciated by the farmers.



Demonstration of *Vivek* maize hybrid 45 at Sawada village of Dehradun district

In order to ensure sustained supply of required quantity of seed of the hybrid variety over a longer term, the Institute has initiated steps towards establishing a maize hybrid seed production system at the village cluster level, through promoting local entrepreneurship in the process. Demonstrations of rice (*Vivek Dhan 62*) in 01 ha, soybean (VLS 47 and VL *Bhat 65*) in 02 ha, pea (Arkel) in 01 ha area are also successfully conducted in Bageshwar and Chamoli districts. Demonstrations of wheat, barley and vegetable pea are being conducted in various villages of Pithoragarh, Bageshwar and Dehradun during *rabi* 2015-16. The crop stages were monitored by the scientists regularly. Somewhere the crop stand was found good but some cases the crop was badly affected by drought and wild animals.



Demonstration of wheat (VL Gehun 829) at Patet village of Pithoragarh district

Collection of Local Germplasm from Tribal Areas

A total of 20 accessions including barley (4), amaranth (1), rajmash (8), field pea (1), kala zeera (1), wheat (1), buckwheat (2), proso millet (1) and coriander (1) from tribal areas of Chamoli districts were collected and submitted to the Institute Gene Bank. Nine local germplasms of finger millet were collected from Patet, Ghatgarh, Bala, Nanasem, Sarmoli, Shankhdhura and Talla Ghorpatta villages of Pithoragarh District and these were submitted to the concerned scientist of the Institute.

Inter-Institutional Collaboration

An interaction between the trainee farmers of Jaunsar area and officials of Uttarakhand State Seed and Tarai Development Corporation was also organized on May 16, 2015 and the information and views on USS&TDC's ongoing seed production programme at Dhanpau and Lakhwad were shared by both sides.