Content list available at http://epubs.icar.org.in, www.kiran.nic.in; ISSN: 0970-6429

Indian Journal of Hill Farming

December 2017, Volume 30, Issue 2, Page 286-289

Performance of Front Line Demonstrations in Hill Region of Uttarakhand

Gaurav Papnai* . V K Sachan . Pankaj Nautiyal . Manisha

Krishi Vigyan Kendra (ICAR-VPKAS), Chinyalisaur, Uttarkashi, Uttarakhand

ARTICLE INFO

Article history:
Received 2 December 2016
Revision Received 24 June 2017
Accepted 16 August 2017

Key words:
Uttarakhand, Hills, Agriculture, Demonstrations, crops

ABSTRACT

Agriculture in hill regions of Uttarakhand is mainly dependent on rain. The scattered and uneven land of hills hinders production of high yield. Various oilseed, cereals, pulses and vegetable crops were demonstrated at farmer's field along with their farmers' owned varieties and practices. All the recommended cultivation practices were performed to grow the crops. Front Line Demonstrations of improved technologies of major hill crops along with farmers' practice were conducted during 2011-12 to 2013-14 at farmer's field in hill region of Uttarakhand. The respondents were selected through purposive random selection method as the data was to be collected from the adopted farmers for the demonstrations. Results revealed that the high yielding varieties of oilseed, cereals, pulses and vegetable crops have given more production as well as more economic benefit than the local varieties over the years. To gain more yield and benefit from the farming in hills and to cope up with such extreme conditions scientific methods can be adopted in these conditions.

1. Introduction

Krishi Vigyan Kendra (Farm Science Center) is an innovative centre that aims at imparting vocational training scientifically for farmers, farm women and rural youths. Other major activities like in-service training to field extension functionaries in the area of emerging agricultural technologies, on farm testing for assessment and refinement of technology with farmers' participation and front line demonstrations are also conducted to provide scientific feed back to the research functionaries for further modification as per the needs and requirements of the farmers. The main purpose of KVK is imparting learning through "Work Experience" to those who are engaged in farming. The KVKs are the grass-root institutions, designed for bridging the gap between technologies on one hand and their effective applications for increasing production on the other (Pant and Singh, 2005). For the overall growth and development of Uttarakhand hills, attention has to be focused on new agricultural technologies, scientific cropping patterns, alternative land use techniques, proper land and water management practices, livestock management and home and family resource management. The concept of "Front Line Demonstration"(FLD) may be applied to all farmers-categories for changing the attitude, skill and knowledge of improved/recommended practices of high yielding varieties, its adoption, spread and wider dissemination of the recommended practices to other members of farming community (Singh et al. 2005). Mukharjee (2003) has also opined that depending on identification and use of farming situation, specific interventions may have greater implications in enhancing system productivity. In Uttarakhand hills, about more than 80 per cent area is rain fed and traditional crops are *Mandua*, *Madira*, Wheat, Bean, *Gahat*, Paddy and Garden pea. Due to use of local genotypes, traditional broadcasting practices for seed sowing, poor soil fertility, lack of proper application of recommended fertilizer and manures, lack of seed treatment and plant protection measures in practices *etc*. the average productivity of these hill crops are very low. To enhance the productivity, KVK, Uttarkashi conducted several FLDs in selected villages on various oilseed, pulse, cereal and vegetable crops. The impact of improved production technology on the performance of crops was observed as compared to local practice usually followed by the farmers.

*Corresponding author: gauravpapnai@gmail.com

2. Methodology

As the whole district serves as the working area of the KVK, the present study was conducted in Uttarkashi district of Uttarakhand state. The data was collected from different adopted villages of Uttarkashi district for three years (Year 2011-12 to 2013-14). In total, 2031 demonstrations for 253 oilseeds, 752 pulses, 574 cereals, and 452 for vegetables in different villages were laid out in farmer's fields to show the potential of technologies. A number of 200 respondents were selected through purposive random selection method as the data was to be collected from the adopted farmers for the demonstrations. Full recommended package of practices were demonstrated along with the local check plots where existing farmers practices were followed. In demonstration plots, some inputs like seed of improved varieties, fertilizers, manure as well as the scientific cultural practices (insect-pest and weed management), *etc.* were provided. The data gathered by personal interview with the beneficiaries and analyzed using standard deviation, Benefit Cost ratio and 't' test.

3. Results and Discussion

The details of demonstrations conducted by Krishi Vigyan Kendra, Chinyalisaur, Uttarkashi are presented in the tables below. In each front line demonstration, the improved variety suitable for local condition was selected and the recommended package of practices was adopted. The observed technology gap was mainly attributed to rain fed conditions prevailing in the district. The other reasons include dissimilarity in soil fertility status, marginal land holdings and hilly terrain. Some of the major yield differences between the improved technologies adopted in front line demonstrations and farmers practices (local checks) adopted by farmers in different crops are summarized as below.

4. Performance of Oilseeds

It is evident from the data presented in table 1 that yield recorded at demonstrational plot was significantly higher (21.86 q/ha) with 30 per cent yield increase over farmers practice. The 't' value was calculated 5.665 which indicated that the FLD had a positive impact over the existing practices in enhancing the productivity of the soybean crop. Kirar et al. (2005) also reported similar findings in their study. The results are further supported by the data in table 1 that the soybean gave gross returns of Rs. 56836/ ha, net return Rs. 34236/ha and B:C ratio of 2.51 as compared with the local check where farmers got gross returns, net returns and B:C ratio of Rs. 39780/ha, Rs. 20480/ha & 2.06 respectively.

5. Performance of Pulses

The data in table 2 show that the yield of pulse crops received by the farmers practice activities was 7.13, 9.65, 22.82 and 9.16q/ha for field pea, lentil, horse gram and pigeon pea respectively which enhanced to 9.7, 14.16, 7.67 and 14.14 in demonstrations adopted by farmers respectively. The increase in yield was found to be 26.49, 31.85, 22.82 and 35.22 per cent respectively over farmers practice. The t value was calculated 6.549, 5.279, 7.766 and 4.679 respectively which indicate that the farmers who have adopted the demonstrations got better yield performance and benefit over the existing practices in enhancing the productivity of the pulse crops. The results are in consonance with the opinion of Raj et al. (2013), indicated that the front line demonstrations have given a good impact over the farming community. The finding is also in corroboration with the findings of Poonia and Pithia (2010). It is evident from the table 2 that considerable benefits were obtained by the farmers in all the pulse crops. The economics of pulse crops in table 4 reveals that field pea recorded B: C ratio 1.91 as compared to the local check 1.51. Similarly B: C ratio of lentil was recorded 2.67 as compared to the local check 2.00. Horse gram recorded B: C ratio of 2.43 as compared to the local check 2.20. Pigeon pea was recorded benefits cost ratio of 4.20 as compared to the local check 3.05 It might be due to the application of scientific methods and intervention of improved varieties in the farmers field.

6. Performance of Cereals

The data in table 3 reveals that the yield of cereal crops received by the farmers practice activities was 23.9, 18.97 and 13.35 q/ha for Wheat, Maize and Barnyard millet respectively which enhanced to 31.94, 28.20 and 16.32 in demonstration fields respectively. The increase in yield was found to be 25.17, 32.73 and 18.20 per cent respectively over farmers practice. The t value was calculated 6.945, 5.111 and 9.990 respectively which indicate that the demonstration fields yield better than the farmers practice. These are in corroboration with the finding of Tomar (2010) and Mokidue et al. (2011). The yield improvement might be due to the combined effect of high yielding, moderate disease resistant varieties & adoption of improved Weed and Nutritional Management. The yield performance are further supported by the economics of cereal crops in table 3 in which wheat recorded net return Rs. 41380/ha as compared to the local check where farmers got net returns of Rs. 29500/ha. Similarly net return Rs. 42440/ha as compared to the local check where farmers got net returns of Rs. 24434/ha recorded for Maize. Barn Yard millet recorded of net return Rs. 11080/ha as compared to the local check \Rs. 7325/ha.

Table 1. Yield and economics of Oilseed crop under demonstration and local practices

Crop	No. of Farmers	Area (ha)	Average Yield (Q/ha.)		% increase over farmers practices	S D	t value	Economics of demonstration (Rs./ha)				Economics of check (Rs./ha)			
			Demo	Check				Gross Cost	Gross Return	Net Return	BCR (R/C)	Gross Cost	Gross Return	Net Return	BCR (R/C)
Soybean	253	8.0	21.86	15.3	30.00	4.638	5.665*	22600	56836	34236	2.51	19300	39780	20480	2.06

Note: * level of significance at 5%

Table 2. Yield and economics of Pulses crop under demonstration and local practices

Crop	No. of Farmers	Area (ha)	Average Yield (Q/ha.)		% increase over farmers practices	S D	t value	Economics of demonstration (Rs./ha)				Economics of check (Rs./ha)			
			Demo	Check				Gross Cost	Gross Return	Net Return	BCR (R/C)	Gross Cost	Gross Return	Net Return	BCR (R/C)
Field pea	115	4.0	09.70	07.13	26.49	1.817	6.549*	17800	33950	16150	1.91	16500	24955	8455	1.51
Lentil	239	9.0	14.16	09.65	31.85	3.189	5.279*	21200	56640	35440	2.67	19300	38600	19300	2.00
Horse gram	233	9.0	07.67	05.92	22.82	1.237	7.766*	19600	47554	27954	2.43	16700	36704	20004	2.20
Pigeon Pea	165	13.0	14.14	09.16	35.22	3.521	4.679*	18500	77770	59270	4.20	16500	50380	33880	3.05

Note: * level of significance at 5%

Table 3. Yield and economics of Cereals crop under demonstration and local practices

Crop	No. of Farmers	Area (ha)	Average Yield (Q/ha.)		% increase over farmers practices	S D	t value	Economics of demonstration (Rs./ha)				Economics of check (Rs./ha)			
			Demo	Check				Gross Cost	Gross Return	Net Return	BCR (R/C)	Gross Cost	Gross Return	Net Return	BCR (R/C)
Wheat	299	17	31.94	23.90	25.17	5.685	6.945*	22500	63880	41380	2.84	18300	47800	29500	2.61
Maize	209	9	28.20	18.97	32.73	6.526	5.111*	19600	62040	42440	3.17	17300	41734	24434	2.41
Barnyard millet	66	4	16.32	13.35	18.20	2.100	9.990*	13400	24480	11080	1.83	12700	20025	7325	1.58

Note: * level of significance at 5%

Table 4. Yield and economics of vegetables crop under demonstration and local practices

Crop	No. of Farmers	Area (ha)	Average Yield (Q/ha.)		% increase over farmers practices	S D	t value	Economics of demonstration (Rs./ha)				Economics of check (Rs./ha)			
			Demo	Check				Gross Cost	Gross Return	Net Return	BCR (R/C)	Gross Cost	Gross Return	Net Return	BCR (R/C)
French bean	81	3.06	92.63	64.17	30.72	20.124	5.509*	36800	148208	111408	4.03	32600	102672	70072	3.15
Vegetable pea	188	6.0	98.87	73.33	25.83	18.059	6.742*	31200	148305	117105	4.75	28400	109995	81595	3.87
Okra	183	6.02	102.63	67.73	34.01	24.678	4.881*	37600	164208	126608	4.37	29800	108368	78568	3.64

Note: * level of significance at 5%

7. Performance of Vegetables

The data presented in table 4 state that the vegetables yield grown through farmers own methods was 64.17, 73.33 and 67.73 q/ha for French Bean, Vegetable pea and Okra respectively which enhanced to 92.63, 98.87 and 102.63 in demonstration fields respectively. The increase in yield was found to be 30.72, 25.83 and 34.01 per cent respectively over farmers practice. The t value was calculated 5.509, 6.742 and 4.881 respectively which point out that the yield of demonstration fields was better than the farmers practice. Similar yield enhancement in different crops in front line demonstration has amply been documented by Haque (2000), Tiwari *et al.* (2003), Mishra *et al.* (2009) and Kumar *et al.* (2010). Yield of the front line demonstration trials and potential yield of the crop was compared to estimate the yield gaps which were further categorized into technology and extension gaps (Hiremath and Nagaraju 2009). The economics of vegetable crops are presented in table 4 in which French bean recorded gross returns of Rs. 148208/ ha, net return Rs. 111408/ha and B: C ratio of 4.03 as compared to the local check where farmers got gross returns, net returns and B: C ratio of Rs. 102672/ha, Rs. 70072/ha & 3.15 respectively. Similarly gross returns of Rs. 148305/ ha, net return Rs. 117105/ha and B: C ratio of 4.75 as compared to the local check where farmers got gross returns, net returns and B: C ratio of Rs. 109995/ha, Rs. 81595/ha & 3.87 respectively recorded for Vegetable pea. Okra recorded gross returns of Rs. 164208/ ha, net return Rs. 126608/ha and B: C ratio of 4.37 as compared to the local check where farmers got gross returns, net returns and B: C ratio of Rs. 108368/ha, Rs. 78568/ha & 3.64 respectively.

Conclusion

Thus, the cultivation of different crops with improved technologies including suitable varieties, weed management, nutrients and pest management has been found more productive and crop yield in oilseed, pulses, cereal as well as in vegetable crops. Technological and extension gaps existed which can be bridged by popularizing package of practices with emphasis on the seed of improved vegetable hybrid varieties, use of proper seed rate, balanced nutrient application and proper use of plant protection measures. Replacement of local varieties with the released hybrid varieties of okra, onion and brinjal would increase the production and net income of these vegetable crops.

Acknowledgement

The first author is thankful to Director, ICAR-VPKAS, Almora for providing necessary financial, field support and encouragement to conduct the study.

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