Indian Journal of Extension Education
Vol. 56, No. 2, 2020 (164-169)

Impact of KVK on Adoption of Improved Bitter gourd Cultivation Technology in Gorakhpur district of Uttar Pradesh

R.K. Singh[1], R.P. Singh[2], A.K. Singh[3], Raksha Pal Singh[4] and Mukesh Singh[5]

ABSTRACT

Available agricultural technology does not serve its purpose till it reaches and adopted by its ultimate users, the farmers. The present study was conducted inGorakhpur district of Uttar Pradesh state to find out the adoption of improved technologies in bitter gourd cultivation. To conduct the study successfullya total number of fifty KVKbenefitted farmers and fifty KVK not-benefitted farmers were selected to make a sample size of one hundred. A schedule was developed to know the adoption level of improved bitter gourd cultivation practices and adoption level was ranked based on the adoption status. The study indicated that most of the KVK's non benefitted farmers have less knowledge about Integrated Pest Management (IPM), use of growth regulators, seed treatment and Integrated Disease Management practices due to which the adoption rate for the bitter gourd cultivation practices were very poor, against it the adoption rate among KVKbenefitted farmers found satisfactorily. The study also exposed that the Marketing facilities in the villages were very poor among KVK non-benefitted farmer whereas, KVK improves the marketing skills of benefitted farmers through various trainings and organizing them into various Self-Help Groups/ Farmers interest Groups. On the basis of that it may be concluded that the technology transformation tools like farmers field school, demonstration, training and exposure visit are most effective to enhance the production and productivity of crops bitter gourd.

Key Words: KVK, schedule, growth regulator, IPM, IDM, training, demonstration.

INTRODUCTION

Bitter gourd (Momordica charantiaL.), 2n=22, is an annual, climber vine and taxonomically a member of cucurbitaceae. It is monoecious and highly cross pollinated due to a high degree of heterozygosity (Singh *et al.,* 2013). Bitter gourd is an indigenous vegetable to tropical and subtropical regions of Asia, Africa, Middle East and America. Locally, bitter gourd is also known as Bitter melon (England), Balsam-pear, Margose (French), Nigeria URI (Japan), Kugua (China), Ampalaya (Philippines), Mara (Thailand), Balsambirneperia (Malaysia) and karella (India).

It used as a vegetable and reported to have medicinal properties (Behera *et al.,* 2008). Momordicin in the fruit is responsible for the bitter taste. It is low in calories (17%) and a source of vitamins (B1, B2 and B3), vitamin C (34%); ripe fruit are rich in Vitamin A. It contains 4.0 to 10.5 of carbohydrate, 1.5 to 2.0% protein, water (83-92%), Fat (0.2-1.0%), Minerals (0.5-1.0%) and 0.8 to 1.7 of fibers (Islam *et al.,* 2010). India occupies an area of vegetables about 10436 thousand ha with an annual production of 187474 thousand MT.

Uttar Pradesh occupies an area of vegetables about 1479.42 thousand ha with an annual production of 28621.67 thousand MT (NHB, 2019). In India, Bitter gourd is growing in an area of 99 thousand hectares with a total production of1198 thousand metric tons, having productivity of 12.10 MT/ha (Pocket Book of Agricultural Statistics, 2019). The most prominent states in bitter gourd production are Chhattisgarh, Telangana, Andhra Pradesh, Odisha, Madhya Pradesh,Maharashtra,

[1.] Subject Matter Specialist-Agril. Extension, [2.] Senior Scientist & Head, [3.] Subject Matter Specialist-Agronomy, Mahayogi Gorakhnath Krishi Vigyan Kendra, Chaukmafi (Peppeganj), Gorakhpur (U.P.), [4.] Professor & Head, SVBPUAT, Meerut (U.P.) and [5.] Division of Extension Education, IARI, New Delhi

Gujarat, Rajasthan, Punjab, Tamil Nadu, Kerala, Karnataka, West Bengal, Assam, Uttar Pradesh and Bihar.

Bitter gourd is one of the important vegetable crops cultivated in more than 50 hectares area of Jungle Kaudiya block of Gorakhpur district.Location specific and crop specific approach is being one of the important novel technique for horticultural crops. The objective is optimization of inputs use to facilitate optimal output resulting in saving of valuable resources like water, cost and energy. The study was undertaken to know the adoption level of improved production technologies in bitter gourd cultivation by thebenefitted farmersof Krishi Vigyan Kendra (KVK).

METHODOLOGY

The study was conducted in Gorakhpur district of Uttar Pradesh during 2019-20 (Table 1). Ex-post facto research design combined with exploratory type of research design used as the selected phenomena have already occurred and the researcher had no control over the same. Mahayogi Gorakhnath Krishi Vigyan Kendra, Chaukmafi, Gorakhpur along with its benefitted farmers under demonstration, training and exposure visit programme etc. in Jungle Kaudiya block was selected for the study.

A sample of 50 vegetable growing KVK benefitted farmersunder various demonstration, training and exposure visit programme etc. who were adopting improved technologies and 50 vegetable farmers who did not adopt precision technologies were selected from the list of five KVK operational villages namely Chaukmafi, Rakhukhor, Ranadih, Sankhiand Panchagava. A total number of ten KVK benefitted and ten not-benefitted farmers were taken from each village to make a total sample size of 100 farmers.

A schedule was developed to know the adoption level of the bitter gourd production technologies by the farmers which were measured on 3point continuum *i.e.* fully benefitted, partially benefitted and non-benefitted with the scores of 2, 1, and 0, respectively and ranked from I to XI to express their adoption levels.

Accordingly, the respondents were grouped on the basis of percentage. The researcher himself interviewed all the selected participating and non-participating farmers. The purpose of the data collection was fully explained to every respondent before they were asked to answer. The collected data were scored, tabulated and subjected to suitable statistical analysis.

Table1: Sampling design for locale and respondent's selection

Unit	Particular	Design
District	Gorakhpur	Purposive
Total Block under KVK (09)	Jungle Kaudiya, Campierganj, Pali, Sahajanwa, Khorabar, Bhathat, Pipaich, Sargar Nagar and Chargawa	Purposive
Sample block (01)	Jungle Kaudiya	
Total Village (05)	05(village)	Purposively
Sample Village (05)	V1 V2 V3 V4 V5 BF NF BF NF BF NF BF NF BF NF 10 10 10 10 10 10 10 10 10 10 20 20 20 20 20	
Respondents	100	Randomly

RESULTS AND DISCUSSION

Practice wise technology adoption:

Field preparation: Field preparation is one of the most important practice in bitter gourd to get the higher returns. Inconsideration to the above point KVK scientist motivates the farmers through various teaching methods and aids to adopt various field preparation practices viz. deep ploughing in summer, ploughing with chisel, disc, rotavator and cultivator and leveling. The data in Table 2 indicates that 68 per cent farmers had fully adopted the Field preparation practices followed by 30 per cent partially adopted and 2 per cent not adopted among KVK benefitted farmers whereas, among the KVK not-benefitted farmers 54 per cent farmers did not adopt the Field preparation practices followed by 30 per cent partially adopted and 14 per cent fully adopted categories, respectively.

Seed rate: A perusal of the data in table 2 shows that maximum 70 per cent KVK benefitted farmers belongs to the category of fully adopted followed by 22 per cent and 8 per cent from partially adopted and not adopted for recommended dose of seed rate, whereas the maximum 72 per cent KVK not-benefitted farmers belongs to the category of not adopted followed by 20 per cent and 8 per cent from partially adopted and fully adopted categories, respectively. This finding is support to the findings of Kakkad *et al.* (2019) and Patel *et al.* (2019).

Seed treatment: To free the bitter gourd crop from disease and insects seed treatment practices is must. It is

depicted in table 2 indicates that most of the KVK benefitted farmers 40 per cent belongs to the category of fully adopted followed by 30 per cent and 30 per cent from partially adopted and not adopted for recommended seed treatment practices, whereas the maximum 52 per cent KVK not-benefitted farmers belongs to the category of not adopted followed by 28 per cent and 20 per cent from fully adopted and partially adopted categories, respectively. In support to the study the similar finding done by Chaudhary *et al.* (2018).

Spacing: Seed spacing is the distance between seeds in a given row and the distance between rows. If crop planted too close to one another, it may be hard for the farmer to walk about in the weeding, spraying pesticides or doing crop inspection. So, KVK benefitted farmers were advice regularly to maintain the plant population as per recommendation. Table 2 indicates that most of the KVK benefitted farmers 48 per cent belongs to the category of fully adopted followed by 28 per cent and 24 per cent from partially adopted and not adopted for recommended plant spacing, whereas the maximum 44 per cent KVK not-benefitted farmers belongs to the category of partially adopted followed by 40 per cent and 16 per cent from not adopted and fully adopted categories, respectively.

Fertilizer application: Table 2 represents that most of the KVK benefitted farmers 46 per cent belongs to the category of fully adopted followed by 40 per cent and 14 per cent from partially adopted and not adopted for recommended dose of fertilizer application, whereas the maximum 50 per cent KVK not-benefitted farmers belongs to the category of not adopted followed by 38 per cent and 12 per cent from and partially adopted and fully adopted categories, respectively. This finding is conformity to the findings of Kakkad *et al.* (2019) and Patel *et al.* (2019).

Weeding: The removal of weeds is useful becausethese unwanted pants compete with the crop for space, water and nutrients. The data in Table 2 shows that most of the KVK benefitted farmers 54 per cent belongs to the category of fully adopted followed by 28 per cent and 18 per cent from not adopted and partially adopted for weed management practices, whereas the maximum 40 per cent KVK not-benefitted farmers belongs to the category of partially adopted followed by 30 per cent from fully adopted and same for not adopted categories, respectively. Similar Findings were also recorded by Singh *et al.* (2019).

Stakes: Table 2 express that most of the KVK benefitted farmers 94 per cent belongs to the category of fully adopted followed by 4 per cent and 2 per cent from not adopted and partially adopted for staking the plants to reach the machan-2 meter, whereas the maximum 48 per cent KVK not-benefitted farmers belongs to the category of fully adopted followed by 26 per cent partially adopted and same for not adopted categories, respectively.

Growth regulators: Table 2 explicate that most of the KVK benefitted farmers 42 per cent belongs to the category of not adopted followed by 34 per cent and 24 per cent from fully adopted and not adopted for recommended use of growth regulators, whereas the maximum 80 per cent KVK not-benefitted farmers belongs to the category of not adopted followed by 14 per cent and 6 per cent from partially adopted and fully adopted categories, respectively.

Integrated Pest Management: Table 2 exposed that most of the KVK benefitted farmers 36 per cent belongs to the category of fully adopted and same 36 per cent from partially adopted followed by 28 per cent from not adopted category for Integrated Pest Management practices, whereas the maximum 78 per cent KVK not-benefitted farmers belongs to the category of not adopted followed by 18 per cent and 4 per cent from partially adopted and fully adopted categories, respectively.

Integrated Disease Management: Table 2 revealed that most of the KVK benefitted farmers 44 per cent belongs to the category of fully adopted followed by 30 per cent from partially adopted 26 per cent from not adopted category for Integrated Disease Management practices, whereas the maximum 66 per cent KVK not-benefitted farmers belongs to the category of not adopted followed by 24 per cent and 10 per cent from partially adopted and fully adopted categories, respectively.

Marketing: It is revealed from table 2 that most of the KVK benefitted farmers 40 per cent belongs to the category of not adopted followed by 34 per cent from fully adopted and 26 per cent from partially adopted category for Integrated Approach of marketing, whereas the maximum 78 per cent KVK not-benefitted farmers belongs to the category of not adopted followed by 12 per cent and 10 per cent from partially adopted and fully adopted categories, respectively.

Technology adoption level as rank order:

The ranks were assigned to all the technologies based on the total score obtained on each technology. The technologies on which the KVK benefitted farmers had high extent of adoption was Stakes for the plants to reach the machan-2 meter with mean score value of 1.90 was ranked 1st followed by Field preparation practices like deep ploughing in summer, Ploughing with chisel, disc,

rotator and cultivator and leveling etc. and seed rate (1.8 kg/ha) with mean score value of 1.66 and 1.62 were ranked IInd and IIIrd, respectively. Whereas,stakes for the plants to reach the machan-2 meter with mean score value of 1.22 was ranked 1stfollowed by weeding (hoe and weed thrice) with mean score value 1.00 and seed rate (1.8 kg/ha) with mean score value of 0.74 were ranked rankedIInd and IIIrd, respectively for the KVK's non benefitted farmers about bitter guard recommended technologies.

The study also exposed that most of the KVK not benefitted farmers have less knowledge about integrated pest management (IPM), use of growth regulators, seed treatment and integrated disease management (IDM) practices due to which the adoption rate for the same practices were very poor, against it the adoption rate among KVK's benefitted farmers found satisfactorily.

Table 2: Extent of adoption of bitter gourd cultivation practices in KVK benefittedand non-benefitted farmers

Production Technology	Adoption extent of KVK'sBenefitted Farmer (N=50)						Mean score value	Rank order	Adoption extent of KVK's NonBenefitted Farmer (N=50)						Mean score value	Rank order
	FA (2)	%	PA (1)	%	NA (0)	%			FA (2)	%	PA (1)	%	NA (0)	%		
Field preparation (Deep ploughing in summer, Ploughing with chisel, disc, rotator and cultivator and leveling)	34	68.00	15	30.00	01	2.00	01.66	II	07	14.00	16	32.00	27	54.00	0.60	VI
Seed Rate (1.8 kg/ha)	35	70.00	11	22.00	04	08.00	01.62	III	14	28.00	10	20.00	26	52.00	0.74	III
Seed treatment (*Pseudomonas fluorescens* @ 10 gm or carbendazim @ 2 gm or Trichoderma @ 10 gm/kg)	20	40.00	15	30.00	15	30.00	01.10	VIII	04	08.00	10	20.00	36	72.00	0.36	VIII
Spacing (2 x 1.5 meter)	24	48.00	14	28.00	12	24.00	01.24	V	08	16	22	44	20	40.00	0.76	IV
Fertilizer application (Based on soil testing)	23	46.00	20	40.00	07	14.00	01.32	IV	06	12.00	19	38.00	25	50.00	0.62	V
Weeding (Hoe and weed thrice)	27	54.00	09	18.00	14	28.00	01.26	VI	15	30.00	20	40.00	15	30.00	1.00	II
Stakes (For the plants to reach the machan 2 meter)	47	94.00	01	02.00	02	04.00	01.90	I	24	48.00	13	26.00	13	26.00	1.22	I
Growth regulators (Ethrel 100 ppm: four times from 15th DAS)	17	34.00	12	24.00	21	42.00	0.92	XI	03	06.00	07	14.00	40	80.00	0.26	X
Integrated Pest Management	18	36.00	18	36.00	14	28.00	01.08	IX	02	04.00	09	18.00	39	78.00	0.26	X
Integrated Disease Management	22	44.00	15	30.00	13	26.00	01.18	VII	05	10.00	12	24.00	33	66.00	0.44	VII
Marketing (Integrated approach)	17	34.00	13	26.00	20	40.00	0.94	X	05	10.00	06	12.00	39	78.00	0.32	IX

FA= FULLY ADOPTED, PA= PARTIALLY ADOPTED, NA= NOT ADOPTED

Overall adoption level:

It is obvious from the Table-3 that majority of the KVK benefitted farmers (60.00 %) were observe in the medium level (10 to 17) of adoption category about precision technology of bitter gourd cultivation followed by 26.00 per cent and 14.00 per cent for high(18 and above)and Low(Less than 10). Against it most of the KVK not-benefitted farmers (80.00 %) were observe in the low level of adoption followed by 18.00 per cent and 2.00 per cent for medium and high level of adoption, respectively. The reasons for high extent of adoption among KVK's benefitted farmers on theabove technologies is KVK scientists envisagedthe bitter gourd farmers by conducting series oftraining, demonstrations by practically involvingin the operation area tofarmers. KVK scientists also conducted farmer–scientist interactions, fielddays and group discussions programmesand various advisory services which facilitate the high extent of adoption of the above technologies. Similar findings were also reported by Singh *et al.* (2018), Malabasari and Hiremath (2016), Sharma *et al.* (2014), Bahera *et al.* (2014), Meena and Gupta (2013), Dudi and Meena (2012), Sharma *et al.*(2011), Sahu *et al.* (2010), Singh (2010), Nagar *et al.*(2008) and Sharma (2002). KVK also published the many beneficial publication like farm magazine, newsletter, booklet, leaflet etc. which helped the farmers for high extent of adoption in staking, recommended dose of fertilizer on the basis soil testing, Field preparation and Application of seed with treatment. In the direction of KVK's Scientist farmers were mobilize in to groups/FIGs for getting the higher return from their produce. The study also revealed that the formal education, extension contact and innovativeness were influenced the rate of adoption among the farmers of bitter gourd cultivation (Dhanushkodi, *et. al.* 2018).

Table 3: Overall adoption extent of farmers about precision technology of Bitter gourd cultivation

Category	KVK Benefitted Farmer (N=50)		KVK not-Benefitted Farmer (N=50)	
	Number	Percentage	Number	Percentage
Low (Less than 10)	07	14.00	40	80.00
Medium (10 to 17)	30	60.00	09	18.00
High (18 and above)	13	26.00	01	02.00
Total	50	100	50	100

Low=Mean-S.D., Medium=Mean ± S.D., High= Mean + S.D (Mean=14.22, S.D.=4.45)

CONCLUSION

On the basis of the above findings, it can beconcluded that the Technology transformationplays a central role in gain in knowledge and skill of farmers. The investigationhas revealed that KVK intervention inconducting training, technology assessment and conduction of demonstration in the farmer's field, exposure visit related to seed helped them in overall knowledge of cropproduction practices. High extent of adoption of precision technology in bitter gourd cultivation have seen among the farmers benefitted by the KVK compared to the non-benefitted farmers. This could be due to the multiplicity of the transfer of technology mechanisms followed by the KVK scientists in the operational areas especially for the benefit off armers and adoption of such précised technologies in vegetable cultivation calls for the conduct of such awareness programmes under the transfer of technology by KVK. A deeper probe into the data analyzed that marketing facilities in the selected villages was very poor due to which farmers were unable to get appropriate price from their farm produce but after involvement of KVK farmers were mobilize into various groups/FIG which improve the marketing capacity of farmers and got satisfactorily price. So, it may be concluded that KVK have a big positive impact on bitter gourd growers in the Gorakhpur district of Uttar Pradesh.

Paper received on : February 12, 2019
Accepted on : December 16, 2019

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