Impact of Krishi Vigyan Kendra trainings in adoption of bio-fertilizers and bio-pesticides practices by pigeonpea growers

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ABSTRACT

Gulbarga region of the Karnataka is known as "Pulse bowl" of Karnataka. Since it is grown as a sole crop, is prone to the attack of several insect pests and diseases. Among which the pigeon pea pod borer, with this background to minimize the burden of chemical on environment and also the cost of cultivation, it is therefore, imperative that, alternative environment friendly methods of plant protection like integrated pest management (IPM) techniques including the use of bio-pesticides are the next best resources for agriculture. Trichoderma, Nucleo polyhedrosis virus (NPV), Neem products and *Bacillus thuringiensis* are popular. The study was taken up in Gulbarga district of Karnataka with four Talukss namely; Gulbarga, Chittapur, Aland and Sedam involving 160 farmers (80 trained and 80 untrained). Data were collected by personal interview method using structured interview schedule. It reveled that 47.50 per cent of trained and 12.50 per cent of untrained respondents belonged to medium adoption level category, Regarding adoption level of *Rhizobium* practices, 43.75 and 11.25 per cent of trained and untrained farmers were of high adoption category, Majority of 47.50 and 90.00 per cent of trained and untrained farmers were of low adoption category with respect to adoption level of phosphorus solubilizing bacteria practices, Regarding the adoption level of utility of NSKE practices, half of the trained (50.00%) respondents and only 15.00% of untrained respondent were of medium adoption category. In adoption level of utility of *Trichoderma* practices, 68.75 per cent and 10.00 per cent of trained and untrained respondents, respectively, belonged to medium adoption category and regarding adoption level of utility of bio-digester practices, 48.75 and 6.25 per cent of trained and untrained farmers were of medium adoption category.

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INTRODUCTION

Gulbarga region of the Karnataka state where pigeon pea is under cultivation since time immemorial is known as "Pulse bowl" of Karnataka. Since it is grown as a sole crop, is prone to the attack of several insect pests and diseases. Among which the pigeonpea pod borer, *Helicoverpa armigera* Hubner is the most devastating pest causing damage upto 90 to 100 per cent. To control this menace, farmer uses hazardous pesticides. This unilateral approach of pest management has caused several un-warranted repercussions. With this background to minimize the burden of chemical on environment and also the cost of cultivation, it is therefore, imperative that, alternative environment friendly methods of plant protection like integrated pest management (IPM) techniques including the use of bio-pesticides are the next best resources for agriculture.Bio-fertilizers are universally recognized to contain agriculturally important beneficial and viable microorganisms capable of mobilizing the nutrionally important elements from non-usable form through biotic process.The bio-pesticides are derived from animals, plants and microorganisms such as bacteria and viruses. Among bio-pesticides, *Trichoderma*, Nucleo polyhedrosis virus (NPV), Neem products and *Bacillus thuringiensis* are popular. In this context, appropriate training of practicing farmers, extension personnel and the agricultural teachers and trainers is very crucial in increasing agricultural production. The Indian Council of Agricultural Research (ICAR), during the fifth five-year plan, launched an innovative project for imparting training in agriculture and allied areas to the farmers, school dropouts and field level extension functionaries in the country by establishing Krishi Vigyan Kendras (KVKs).

Training is an important input which will help farmers to practice techniques scientifically. Krishi Vigyan Kendras conduct trainings on different aspects to transfer the technology. To bring sustainability in farm production through bio-fertilizers and bio-pesticides, Krishi Vigyan Kendra, Gulbarga, Karnataka is imparting training to the farmers in its jurisdiction. There were no empirical studies in this regard. Gulbarga district is known as "Pulse bowl" of Karnataka. Hence, the present study was designed with the objective, to study the personal, socio-economic and psychological profile of the trained and untrained respondents with respect to use of bio-fertilizers and bio-pesticides.

METHODOLOGY

Gulbarga district comprises ten Talukss namely, Gulbarga, Jewargi, Shahapur, Surapur, Yadgir, Chincholi, Chittapur, Aland, Afzalpur and Sedam. Out of these four Talukas namely, Gulbarga, Chittapur, Aland and Sedam were purposively selected, because they had maximum number of farmers trained under KVK on bio-fertilizers and bio-pesticides. From each Taluka, four selected villages were, Gulbarga, Savalagi (B), Garoor (B) and Faradabad from Gulbarga Taluka. Arankal, Naldar, Kalagi and Anakal from Chittapur taluka. Narona, B.Sangalagi, Gung Babalad and Rudravadi from Aland Taluka and Sedam, Betagera, Kodla and Goudanhalli from Sedam Taluka. Thus, totally sixteen villages were selected for the study.

List of farmers from each of the sixteen selected villages was obtained. From each village, ten farmers were selected randomly. Again out of ten farmers, five trained farmers from the list who have undergone training organized by KVK and five untrained farmers from the village were randomly identified for making total sample of one hundred and sixty *(i.e.* 80 trained and 80 un trained farmers). Thus, 160 farmers formed the sample for study**.** Data were collected by personal interview method using structured interview schedule.

Adoption level:

Adoption was operationally defined as the extent to which the trainees adopted improved biofertilizers/ biopesticides utility techniques.

Based on the review of literature and in consultation with KVK Gulbarga subject matter specialists and experts, improved biofertilizers/biopesticides utility practices were identified namely, recommended dose, number of sprays, time of spray and quantity of spray solution required per unit area etc. The important practices, which were related to the biofertilizers/biopesticides utility and production, were selected to know the adoption pattern. Thus, total 20 practices were selected for the study. The scores for each of the individual practices adopted were arrived by viewing relative importance of the items in consultation with specialists. The following scores were given for full, partial and non-adoption of the recommended practices.

Adoption level	Score
Full adoption	1.00
Partial adoption	0.50
Non adoption	0.00

The partial adoption was arrived at taking into cognizance any deviation from the recommendation. The maximum score that respondents could obtain was 20 and the minimum was zero. Depending upon the total score obtained by each of the respondents, they were grouped into three categories with mean and standard deviation as a measure of check and expressed as below:

Category	Score
Low	(Mean – 0.425SD)
Medium	(Mean ± 0.425SD)
High	(Mean + 0.425SD)

RESULTS AND DISCUSSION

The findings of the present study as well as relevant discussion have been summarized under following heads:

Adoption level of trained and untrained farmers regarding bio-fertilizers and bio-pesticides:

The results of Table 1 revealed that 47.50 per cent of trained and 12.50 per cent of untrained respondents belonged to medium adoption level category, followed by 33.75 per cent and 5.00 per cent of trained and untrained farmers were belonged to high adoption category. While, 18.75 per cent and 82.50 per cent of respondents were in low adoption level category.

The possible reason for the above findings could be that, those practices which were easy to adopt and required less skill were fully adopted by the respondents. While those practices, which required more knowledge and skills were adopted by less number of respondents.

Adoption level of recommended practices of bio-fertilizers and bio-pesticides by the trained and untrained farmers:

Table 2 highlights the adoption level of the respondents regarding bio-fertilizers and bio-pesticides by

Table 1: Adoption level of the trained and untrained farmers with respect to bio-fertilizers and bio-pesticides practices (n=160)

Sr. No.	Categories	Trained (n=80)		Untrained (n=80)	
		F	%	F	%
1.	Low (Mean- 0.425SD)	15	18.75	66	82.50
2.	Medium (Mean ± 0.425SD)	38	47.50	10	12.50
3.	High (Mean + 0.425SD)	27	33.75	4	5.00
	Mean		43.78		16.22
	S.D.		19.5		7.28

F-Frequency

the respondents.

Regarding adoption level of *Rhizobium* practices, 43.75 and 11.25 per cent of trained and untrained farmers belonged to high adoption category. Here, *Rhizobium* was easily available for the farmers from KVK, RSK etc. and also trained respondents have more contact with the department of agriculture.

Majority of 47.50 per cent and 90.00 per cent of trained and untrained farmers were of low adoption category regarding phosphorus solubilizing bacteria practices. The probable reason is that respondents were less aware about the phosphorus solubilizing bacteria (PSB).

Regarding the adoption of NPV practices, 45.00 per cent and only 13.75 per cent of trained and untrained farmers were of medium adoption category with respect to the recommended practices of NPV, respectively The probable reason could be that trained farmers were aware of NPV practices and also NPV practices is a new emerging concept, but it was not possible for the untrained farmer to know and adopt the NPV practices and untrained farmers could not undergo any training on bio-fertilizers and bio-pesticides.

Half of the trained respondents (50.00%) and only 15.00 per cent of untrained respondents belonged to medium adoption category with respect to the recommended practices of NSKE. This is because the trained farmers knew the advantage of the NSKE and they have regular contact with the subject matter specialist, scientist of the KVK and other private agency also. The neem seeds were locally and easily available for them, but untrained farmers don't know the advantage of neem seeds and also they lack the proper contact with subject matter specialist, scientist and other private agency etc.

Regarding the adoption level of *Trichoderma* practices, 68.75 per cent and only 10.00 per cent of trained and untrained farmers were belonged to medium adoption category with respect to the recommended practice of the *Trichoderma*, respectively. This is because trained farmers were aware about the *Trichoderma* practices and they knew the mass multiplication of *Trichoderma* with the help of specialist of KVK, but untrained farmers were not aware of *Trichoderma* as they had less contact with the specialists and scientists of the KVK.

Regarding adoption level of bio-digester practices, 48.75 and only 6.25 per cent of trained and untrained farmers belonged to medium adoption category with respect to the bio-digester practices, respectively. The probable reason could be that trained farmers knew the advantage and utility of bio-digester solution and also the material required for preparation of bio-digester solution was locally available but untrained farmers did not know the utility and advantage of the bio-digester solution even though materials were locally available.

The above findings were based on impact of KVK, trainings. The KVK Gulbarga conducted regular trainings on bio-fertilizers and bio-pesticides leading to the adoption of the practices by the respondent

Adoption pattern of individual recommended practices of bio-fertilizers and bio-pesticides by trained and untrained respondents:

Table 3 highlight the adoption pattern of the trained and untrained respondents regarding individual bio-fertilizer and bio-pesticide practices.

Nearly 50 to 60 per cent of the trained farmers and only one to six per cent of the untrained farmers were partially adopted the recommended practices, like quantity of *Rhizobium* used for seed treatment, quantity of NPV, NSKE, *Trichoderma* and bio-digester used to control the pests and slightly more than 50 per cent of trained and only two to eleven per cent of untrained farmers were partially adopting the pesticides, respectively like time of NPV, NSKE and bio-digester spray followed (*i.e.* morning), proportion of biodiester solution with water (1:9) and number of biodiester and NSKE spray followed (3). Whereas 40 per cent of the trained farmers and more than ninety per cent of untrained farmers not adopted the recommended practices like, quantity of PSB used for seed treatment, quantity of *Rhizobium*, *Trichoderma* (liquid) and PSB used at the time of sowing and quantity

Table 2: Adoption level of trained and untrained farmers with respect to bio-fertilizers and bio-pesticides practices (n=160)

Sr. No.	Categories	Trained (n=80)		Untrained (n=80)	
		F	%	F	%
	Bio-fertilizers				
1.	***Rhizobium***				
	Low (Mean- 0.425SD)	13	16.25	60	75.00
	Medium (Mean ± 0.425SD)	32	40.00	11	13.75
	High (Mean + 0.425SD)	35	43.75	9	11.25
	Mean	2.25		0.906	
	S.D.	0.92		0.387	
2.	**Phosphorus solubilising bacteria (PSB)**				
	Low (Mean- 0.425SD)	38	47.50	72	90.00
	Medium (Mean ± 0.425SD)	25	31.25	8	10.00
	High (Mean + 0.425SD)	17	21.25	0	0.00
	Mean	1.13		0.44	
	S.D.	0.98		0.14	
	Bio-pesticides				
1.	**NPV**				
	Low (Mean- 0.425SD)	20	25.00	67	83.75
	Medium (Mean ± 0.425SD)	36	45.00	11	13.75
	High (Mean + 0.425SD)	24	30.00	2	2.50
	Mean	4.2		2.315	
	S.D.	3.82		0.785	
2.	**NSKE**				
	Low (Mean- 0.425SD)	9	11.25	62	77.50
	Medium (Mean ± 0.425SD)	40	50.00	12	15.00
	High (Mean + 0.425SD)	21	26.25	6	7.50
	Mean	5.3		2.42	
	S.D.	2.48		1.00	
3.	***Trichoderma***				
	Low (Mean- 0.425SD)	15	18.75	69	86.25
	Medium (Mean ± 0.425SD)	55	68.75	8	10.00
	High (Mean + 0.425SD)	10	12.50	3	3.75
	Mean	1.51		0.62	
	S.D.	1.03		0.2	
4.	**Bio-digester**				
	Low (Mean- 0.425SD)	23	28.75	73	91.25
	Medium (Mean ± 0.425SD)	39	48.75	5	6.25
	High (Mean + 0.425SD)	18	22.50	2	2.50
	Mean	3.53		1.41	
	S.D.	3.16		0.4	

of jaggery, blue powder and soap powder used with 250 LE NPV/ha.

The probable reason for the trained farmers partially adopting the quantity of NPV, NSKE practices like *Trichoderma* and bio-digester solution used to control the pest and time of spray of pesticides (*i.e.* morning) and also full adoption of the practices like quantity of *Rhizobium* used for seed treatment, proportion of biodiester solution with water and number of NSKE and biodigester spray followed, it was clearly observed that training given by the KVK has created a positive impact on the adoption of the trained farmers. Because, trained farmers had gained more knowledge and they easily adopted the technology and partially adopted the practices like quantity of *Rhizobium* used for seed treatment. Most of the trained farmers treated their seeds with *Rhizobium* but not a recommended quantity like 35 g/kg seeds, but they took one pocket of *Rhizobium* and treated seeds,

Table 3: Adoption pattern of individual recommended practices of bio-fertilizers and bio-pesticides by the farmers (n=160)

Sr. No	Statements	Trained farmers ((n=80))						Untrained farmers ((n=80))					
		Full adoption		Partial adoption		No adoption		Full adoption		Partial adoption		No adoption	
		F	%	F	%	F	%	F	%	F	%	F	%
	Bio-fertilizer (*Rhizobium*)												
1.	Quantity of *Rhizobium* used for seed treatment (35 g/ kg seed)	45	56.25	30	37.50	5	6.25	0	0.00	5	6.25	75	93.75
2.	Quantity of *Rhizobium* used at the time of sowing (2 kg *Rhizobium* + 20 kg FYM / ha)	7	8.75	33	41.25	40	50.00	0	0.00	0	0	80	100
	Phosphorus solubilizing bacteria (PSB)												
3.	Quantity of PSB used for seed treatment (25 g/ kg seeds)	11	13.75	14	17.50	55	68.75	0	0.00	2	2.50	78	97.50
4.	Quantity of PSB used at the time of sowing (2.5 kg PSB + 100 kg FYM / ha)	7	8.75	29	36.25	44	55.00	0	0.00	0	0	80	100
	Bio-pesticides. NPV (Nucleo Polyhedrosis Virus)												
5.	Quantity of NPV used to control pod borer (250 LE/ ha or 0.75ml/litre)	6	7.50	45	56.25	29	36.25	0	0.00	4	5.00	76	95.00
6.	Number of sprays followed (2)	43	53.75	28	35.00	9	11.25	0	0.00	3	3.75	77	96.25
7.	Time of sprays followed (Morning or Evening)	38	47.50	12	15.00	30	37.50	2	2.50	2	2.50	76	95.00
8.	Quantity of jaggery used with 250 LE NPV / ha (1250 g/ha)	33	41.25	10	12.50	37	46.25	2	2.50	2	2.50	76	95.00
9.	Quantity of Soap Powder used with 250 LE NPV/ha (250 g/ha)	0	0.00	5	6.25	75	93.75	2	2.50	2	2.50	76	95.00
10.	Quantity of Blue powder used with 250 LE NPV/ha (250 g/ha)	30	37.50	15	18.75	35	43.75	1	1.25	3	3.75	76	95.00
	5% NSKE solution (Neem Seed Kernel Extract)												
11.	Quantity of NSKE used to control pod borer (625 l/ha or 25 kg Neem seed/ha)	16	20.00	51	63.75	13	16.25	5	6.25	6	7.50	69	86.25
12.	Number of sprays followed (at Flowering, seed formation and seed development)	7	8.75	59	73.75	14	17.50	2	2.50	9	11.25	69	86.25
13.	Time of sprays followed (Morning or Evening)	42	52.50	18	22.50	10	12.50	8	10.00	3	3.75	69	86.25
14.	Quantity of soap powder used with NSKE (250 g/ ha)	44	55.00	22	27.50	14	17.50	0	0.00	8	10.00	72	90.00
	Trichoderma												
15.	Quantity of *Trichoderma* used for seed treatment (4-6 g/ kg seed)	11	13.75	47	58.75	22	27.50	3	3.75	7	8.75	70	87.50
16.	Quantity of *Trichoderma* (liquid) used at the time of sowing (1 litre liquid *Trichoderma* + 100 kg FYM)	4	5.00	10	12.50	66	82.50	0	0	2	2.50	78	97.50
	Bio-digester solution												
17.	Quantity of bio digester used to control pest (312.5 liters/ ha)	5	6.25	42	52.50	33	41.25	0	0.00	4	5.00	76	95.00
18.	Proportion of bio digester solution with water (1:9)	38	47.50	28	35.00	14	17.50	0	0.00	2	2.50	78	97.50
19.	Number of sprays followed (at flowering, seed formation and seed development)	5	6.25	40	50.00	35	43.75	0	0.00	2	2.50	78	97.50
20.	Time of sprays followed (Morning or Evening)	39	48.75	11	13.75	30	37.50	1	1.25	1	1.25	78	97.50

farmers sprayed the solution at one time but recommendations is at three time *i.e.* at flowering, seed formation and seed development stages with respect to bio-digester and NSKE spray. Almost sixty per cent of the trained farmers knew the advantage of spraying in early morning or evening, but compared to above findings, trained farmer's adoption was better than untrained farmers as more than ninety per cent of the untrained farmers, not adopted the recommended practices as compared to trained farmers. This is because they could not undergo any training on recommended practices. Veeraiah *et al.* (1998) and Kanavi (2000) have made some studies in the past regarding adoption level of farmers after going training through Krishi Vigyan Kendra.

Conclusion:

It can be concluded from this investigation that there is significant role of KVK in promotion of bio-fertilizers and bio-pesticides practices with ensuring their adoption. It also could be ascertained that there is substantial impact of training over the existing knowledge and adoption of the trained farmers than untrained farmers.

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