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Production Technologies of Cotton (*Gossypium herbaceum* L.) Followed By Farmers in District Karimnagar, Telangana

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ABSTRACT

The paper was discussed on the knowledge and adoption levels of 90 selected farmers on cotton production technologies. Ex post facto research design was adopted for this study. High level of knowledge and extent of adoption were observed among the KVK adopted farmers whereas low level of knowledge and low extent of adoption were observed among the non adopted farmers.

Key Words: Adoption, Cotton, Farmers, Knowledge, Production, Technologies .

INTRODUCTION

Knowledge is the key in application of any technology. It reflects an array of information possessed by an individual. It plays a pivotal role in understanding the intricacies involved in any given phenomena. The Krishi Vigyan Kendras (KVKs) are rendering a great help to the farmers in increasing the knowledge base on various crops by conducting different programmes to enlighten the farmers on various crop production technologies. A farmer has to understand, analyze and get satisfied before implementation of any technology. Technology adoption is a graded process in which a farmer has to pass through different stages like awareness, interest, evaluation, training and adoption. The full scale application of technologies is considered as adoption. Adoption is a holistic process where in farmer has to understand the intrinsic as well as extrinsic factors. Cotton is one of the important crops of Karimnagar district. Farmers follow a number of different production technologies than the recommended by the research institutes. Therefore, present study was undertaken to delineate the knowledge and adoption level of various technologies adopted by farmers in Karimnagar district of Telangana state.

MATERIALS AND METHODS

An ex-post facto research design was used for the study**.** KVK, Jammikunta selected 15 adopted villages for the study. A sample of 60 cotton growing farmers who were adopting the KVK technologies and 30 cotton farmers not covered by KVK were selected from the adopted villages. A schedule was developed with 26 technologies to assess knowledge of the cotton growing farmers, measured on 2 point continuum *i.e.* yes or no, to adopted and non-adopted with the scores of 2 and 1, respectively. Accordingly the respondents were grouped on the basis of frequency and percentage**.** Similarly, another schedule was developed with 26 technologies to assess the adoption level among the cotton growers, which was measured on 3 point continuum i.e. fully adopted, partially adopted and non-adopted with the scores of 3, 2 and 1, respectively. Accordingly the respondents were grouped on the basis of frequency and percentage

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Table 1. Distribution of respondents according to their knowledge level in cotton crop.

Category	KVK adopted farmers (n=60)			KVK non adopted farmers (n=30)		
	Low (26- 34)	Medium (35 – 43)	High (44 -52)	Low (26- 34)	Medium (35 – 43)	High (44 -52)
Frequency	14	19	27	16	12	02
Percentage	23.33	31.67	45.00	53.33	40.00	6.67
Mean	51.25±1.0			33.36±2.35		
Z value	5.32*					

*Significant at 0.01 level of probability

RESULTS AND DISCUSSION

It was observed (Table1) that majority (45.0%) of the KVK adopted farmers had high level of knowledge followed by medium (31.67%) and low (23.33%) whereas, majority (40.0%) of the KVK non-adopted farmers had medium level of knowledge followed by low (53.33%) and high (6.67%). These findings were in line with the results of Prashanth (2011) and Rao *et al* (2012). It was evident (Table 1) that calculated Z Value (5.32) was greater than table Z value at 0.01 level of probability. So the null hypothesis was rejected and hence it could be concluded that there exists a significant difference between mean scores of KVK adopted and non-adopted farmers. Results were in tune with Anon (2002),

It was observed (Table 2) that majority (45.0%) of the KVK adopted cotton farmers had high extent of adoption followed by medium (31.67%) and low (23.33%) whereas, majority (66.67%) of the KVK non adopted cotton farmers had low extent of adoption followed by Medium (26.66%) and high (6.67%). These results were in conformity with the results of Prashanth (2011) and Rao *et al* (2012). It was evident from that calculated Z Value (3.53) was greater than table Z value at 0.01 level of probability. So the null hypothesis was rejected and hence it could be concluded that there exists a significant difference between mean scores of KVK adopted and non adopted farmers. These results were in conformity with Bhagwat and Gohad (2003) and Christain *et al* (2003).

The item analysis revealed that the technologies on which the respondents had high level of knowledge were closer spacing , stem application with monocrotophos to control sucking pests. Boll guard II tolerant for both *Helicoverpa* and *Spodoptera* ranked first followed by application of *Trichoderma viridi* culture to reduce wilt incidence, growing of second crop after Bt cotton under irrigated conditions, foliar spray with water soluble fertilizers under stress conditions, soil drenching with COC to reduce wilt incidence and Poison bait is effective for *Spodoptera* control (2^{nd}), soil sample collection, soil test based fertilizer application (3^{rd}), seed treatment, providing irrigation at critical stages (4^{th}), usage of recommended fertilizers, growing of trap crops, spraying of NSKE (5^{th}), sowing of refuge crop (6^{th}), respectively.

The KVK adopted farmers had lowest level of knowledge on installation of yellow sticky traps and pheromone traps. Whereas non-adopted KVK farmers had high level of knowledge on practices like boll guard II tolerant for both *Helicoverpa* and *Spodoptera* and mono cropping increases pest and disease incidence ranked 1^{st} followed by closer spacing, stem application with monocrotophos to reduce sucking pest complex, growing of second crop after Bt cotton under irrigated conditions (2^{nd}), providing irrigation at critical stages (3^{rd}), wilt management with *Trichoderma viridi*, usage of recommended fertilizers (4^{th}), seed treatment, sowing of refuge crop, fertigation, growing of trap crops, poison bait for *Spodoptera* control (5^{th}), soil

Table2. Distribution of respondents according to extent of adoption of cotton production technologies.

Category	KVK adopted cotton farmers (n=60)			KVK non adopted cotton farmers (n=30)		
	Low (33-55)	Medium (56-78)	High (79-100)	Low (33-55)	Medium (56-78)	High (79-100)
Frequency	14	19	27	20	08	02
Percentage	23.33	31.67	45.00	66.67	26.66	6.67
Mean	56.58±3.02			34.73±3.16		
Z value	3.53*					

*Significant at 0.01 level of probability

test based fertilizer application, spraying of post-emergence herbicides, installation of yellow sticky traps (6th) etc.

The item wise analysis indicates that adopted cotton farmers had high level of knowledge on closer spacing, stem application with monocrotophos for sucking pest management, cultivation of boll guard II hybrid, practicing the application of *Trichoderma viridi* culture against the wilt incidence, taking up of second crop after Bt cotton under irrigated conditions, taking of foliar spray with water soluble fertilizers under stress conditions, soil drenching with C.O.C. for wilt control, poison bait against *Spodoptera*, collecting the soil samples, soil test-based fertilizer application etc. The reasons could be the existing technologies have been assessed and tried to refine to fit to address the local problems and demonstrated and disseminated for best application by the farmers. This exercise has been evaluated by the KVK scientists for better adoption of the above technologies. Hence, the farmers had high knowledge on all these said technologies. Whereas the adopted farmers had lowest level of knowledge on usage of yellow sticky traps and pheromone traps due to non availability of these inputs in local market.

The non-adopted cotton farmers had high level of knowledge on cultivation of boll guard II hybrid, closer spacing, stem application against sucking pests, taking second crop under irrigated conditions, giving irrigation at critical stages, wilt management with *Trichoderma viridi* etc. The high level of knowledge of these non adopted farmers on the said technology could be these farmers were impressed with the performance of the technologies taken by the KVK adopted farmers. This inquisitiveness might have derived the non adopted cotton farmers to have more knowledge on the said technologies for their betterment.

The technologies on which the respondents had high adoption were closer spacing, stem application with monocrotophos for sucking pest management and boll guard II is tolerant for both *Helicoverpa* and *Spodoptera* are ranked 1st followed by soil drenching with COC for wilt management (2nd), growing of second crop after Bt cotton under irrigated conditions (3rd), application of DAP fertilizer as basal (4th), sowing of refugy crop, application of *Trichoderma viridi* for wilt management, foliar spraying of water soluble fertilizer for early recovery of crop (5th), soil sample collection and spraying of post emergence herbicides for effective weed control (6th) respectively, where as adopted farmers had lowest extent of adoption on installation of yellow sticky traps and pheromone traps. Most of the non adopted KVK farmers practices like boll guard II is tolerant for both *Helicoverpa* and *Spodoptera* were ranked 1st followed by growing of second crop after Bt cotton(2nd), application of pesticides based on ETL, spraying of water soluble fertilizers for early recovery of the crop (3rd), closer spacing, providing irrigation at critical stages (4th), drip irrigation reduces water usage (5th), use of micro nutrients, growing of trap crops (6th) etc.

Table 3. Knowledge level on cotton production technologies by KVK adopted farmers (n=60).

Sr. No.	Cotton technologies	Level of knowledge				Total score	Mean score	Rank
		Yes		No				
		F	%	F	%			
1	Closer spacing in Bt cotton increases the yield. Stem application with monocrotophos @ 1:4 with water at 20, 40 and 60 d effectively controls sucking pests and improves natural enemy population and boll guard II tolerant for both *Helicoverpa* and *Spodoptera.*	60	100.0	0	0.0	120	2.00	I
2	Application of *Trichoderma viridi* culture (2 kg *Trichoderma viridi* in 100 kg FYM) at the time of sowing under optimum moisture conditions will reduce wilt incidence, Bt cotton crop period is less. After Bt cotton cultivation of maize, sesame and other pulses increases the net returns. Foliar spray of urea @ 2%, 19:19:19 @ 1% and potassium nitrate @ 1% facilitates early recovery of plants under stress conditions, Soil drenching with COC @ 3 gm /lt of water or carbendazim @ 1 g/L of water reduces wilt incidence and Poison bait is effective for *Spodoptera* control.	58	96.7	2	3.3	118	1.96	II
3	Soil samples collected up to 15-20 cm depth in V shape for soil testing and Soil test based fertilizer application is economical.	57	95.0	3	5.0	117	1.95	III
4	Seed treatment with *Trichoderma viridi* @ 8 g/kg reduces wilt incidence and providing irrigation at critical stages is important.	54	90.0	6	10.0	114	1.90	IV
5	Recommended DAP fertilizer applied as basal to improve the yield in Bt cotton, Recommended dose of urea and potash fertilizers applied with equal dose at 20, 40, 60 and 80 DAS increases the yields, Spraying 2% potassium nitrate at flowering and boll formation stages increases the yields, Growing of trap crops is good for monitoring of pests and Spraying of 5% NSKE controls the hatching of insect eggs and 1st in star larva.	53	88.3	7	11.7	113	1.88	V
6	Sowing of refuge crop around the main crop is essential to sustain the Bt technology	52	86.7	8	13.3	112	1.86	VI

The item analysis of extent of adoption of cotton adopted farmers indicated that majority of them had high adoption on closer spacing because of the KVK scientists assessed this technology for 3 yr and refined the spacing based on the farming situations and also conducted several demonstrations. The adopted farmers also had high adoption on stem application with monocrotophos for the control of sucking pests due to KVK scientists assessed and refined this technology in farmer fields by designing suitable bottles with marking for easy application. Presently, KVK is also supplying these bottles to the cotton farmers of entire state. The extent of adoption was high on other technologies like usage

Table 4. Level of knowledge on cotton production technologies by KVK non-adopted farmers n=30

Sr. No.	Cotton technologies	Level of knowledge				Total score	Mean score	Rank
		Yes		No				
		F	%	F	%			
1	Boll guard II tolerant for both *Helicoverpa* and *Spodoptera.*	27	90.0	3	10.0	54	1.88	I
2	Closer spacing in Bt cotton increases the yields, Stem application with monocrotophos @1:4 with water at 20,40 and 60 d effectively controls sucking pests and improves natural enemy population.	25	83.3	5	16.7	55	1.83	II
3	Providing irrigation at critical stages is important for achieving higher yields.	24	80.0	6	20.0	54	1.80	III
4	Application of *Trichoderma viridi* culture (2 kg/100 kg FYM) at the time of sowing under optimum moisture conditions will reduce wilt incidence, Recommended dose of urea and potash fertilizers applied with equal doses at 20,40,60 and 80 DAS increases the yields, Foliar spraying of urea 2%, 19:19:19 1% and potassium nitrate 1% facilitates early recovery of plants under stress conditions	22	73.3	8	26.7	52	1.73	IV
5	Seed treatment with *Trichoderma viridi* @ 8 g/kg reduces wilt incidence, Sowing of refuge crop around the main crop is essential to sustain the Bt technology, Recommended DAP fertilizer applied as basal to improve the yields in Bt cotton,soil drenching with COC @ 3 g /L of water or carbendazim @ 1 g/Lof water reduces wilt incidence, Growing of trap crops is good for monitoring of pests.	20	66.6	10	33.3	50	1.66	V
6	Soil test based fertilizer application is economical, Spraying of quizalfop ethyl 400 ml and bispyribac sodium 250 ml in 200 L of water reduces all the weeds, Spraying 2% potassium nitrate at flowering and boll formation stages increases the yields, Installation of yellow sticky traps reduces the white fly incidence and Spraying of 5% NSKE controls the hatching of insect eggs and 1st star larva.	15	50.0	15	50.0	45	1.50	VI

of boll guard II hybrid, wilt management, growing of second crop after Bt cotton under irrigated conditions, application of complex fertilizer as basal, sowing of refugee crop, foliar spraying of water soluble fertilizers under stress conditions, usage of post emergence herbicides. The reasons could be the KVK scientists conducted farmer field schools on integrated crop management in cotton aspects in adopted villages. The adopted farmers were observed each and every operation of production technologies by practical involvement which facilitated for more adoption. The adopted farmers had lowest extent of adoption on installation of yellow sticky traps and pheromone traps due to non availability in the local market.

Table 5. Extent of adoption of cotton production technologies by KVK adopted farmers (n=60)

Sr. No.	Cotton production technologies	Extent of adoption						Total score	Mean score	Rank
		Fully adopted		Partially adopted		Not adopted				
		F	%	F	%	**F**	**%**			
1	Closer spacing in Bt cotton increases the yields, Stem application with monocrotophos @ 1:4 with water at 20,40 and 60 d effectively controls sucking pests and improves natural enemy population and Boll guard II tolerant for both *Helicoverpa* and *Spodoptera.*	60	100.0	0	0.0	0	0.0	180	3.00	I
2	Soil drenching with COC @ 3 g/lt of water or carbendazim @ 1 g/L of water reduces wilt incidence	52	86.7	8	13.3	0	0.0	172	2.86	II
3	Bt cotton crop period is less. After Bt cotton cultivation of maize, sesame and other pulses increases the net returns	50	83.3	10	16.7	0	0.0	170	2.83	III
4	Recommended DAP fertilizer applied as basal to improve the yields in Bt cotton	46	76.6	10	10.7	4	6.7	162	2.70	IV
5	Sowing of refuge crop around the main crop is essential to sustain the Bt technology, Application of *Trichoderma viridi* culture (2 kg/100kg FYM) at the time of sowing under optimum moisture conditions will reduce wilt incidence and Foliar spray of urea 2%, 19:19:19 1% and potassium nitrate 1% facilitates early recovery of plants under stress conditions	53	88.3	7	11.7	0	0.0	159	2.65	V
6	Spraying of quizalfop ethyl 400 ml and bispyribac sodium 250 ml in 200 L of water reduces all the weeds and Soil samples collected up to 15-20cm depth in V shape for soil testing	42	70.0	13	21.6	5	8.4	157	2.61	VI

Most of the non adopted farmers had high extent of adoption on usage of boll guard II hybrid due to easily availability in the local market. The non adopted farmers also had high extent of adoption on growing of second crop after Bt cotton under irrigated conditions, spraying of water soluble fertiliser, closer spacing, providing irrigation at critical stages, drip irrigation etc. The reasons for high adoption are seeing is believing. The non adopted farmers have seen the performance of technologies in the fields of adopted farmers. Electronic and print media also helps in educating the non adopted farmers for adoption of the above technologies.

CONCLUSION

Higher levels of knowledge and adoption of cotton production technologies were seen among the farmers adopted by the KVK Jammikunta

Table 6. Extent of adoption of cotton production technologies by KVK non adopted farmers (n=30)

Sr. No.	Cotton production technologies	Extent of adoption						Total score	Mean score	Rank
		Fully adopted		Partially adopted		Not adopted				
		F	%	F	%	F	%			
1	Boll guard II tolerant for both *Helicoverpa* and *Spodoptera*	30	100.0	0	0.0	0	0.0	90	3.00	I
2	Bt cotton crop period is less. After Bt cotton cultivation of maize, sesamum and other pulses increases the net returns	18	60.0	10	33.3	2	6.7	76	2.53	II
3	Application of pesticides based on ETL levels was more economical and Foliar spraying of urea 2%, 19:19:19 1% and potassium nitrate 1% facilitates early recovery of plants under stress conditions	15	50.0	15	50.0	0	0.0	75	2.50	III
4	Closer spacing in Bt cotton increases the yields	20	66.6	0	0.0	10	33.4	70	2.33	IV
5	Drip Irrigation reduces the water usage and facilitates good crop growth and higher yields	13	43.3	13	43.3	4	13.4	69	2.30	V
6	Use of micronutrients is as much important as the use of NPK, Soil drenching with COC @ 3 g/L of water or carbendazim @ 1 g/L of water reduces wilt incidence.	10	33.3	12	40.0	8	26.7	62	2.06	VI

compared to the non adopted farmers. This could be due to the multiplicity of the transfer of technology mechanisms followed by the KVK scientists. Before adoption of these technologies by the farmers, the KVK scientists were disseminating these technologies by scrupulous assessment careful refinement and showing the value or skill involved in these technologies by conducting well planned method and result demonstrations.

REFERENCES

Anonymous (2002). Comparison of cost and returns per hectare moong, gram, maize, wheat, mustard and cotton. *Agril Situation in India* **24**(2) : 73-78.

Bhagwat M R and Gohad V V (2003). Adoption of Dryland Cotton cultivation technology by the farmers. *Maharashtra J Ext Edu* **22**(2): 108-110.

Christain B M, Vyas H U and Patel K F(2003). Adoption of IPM strategy by Cotton growers. *Agric Ext Rev* **15**(2): 10-11.

Prashanth P(2011). A Study on adoption of organic farming in cotton in Karimnagar district of Andhra Pradesh. *M.Sc. (Ag.) Thesis*, Acharya N. G. Ranga Agricultural University, Hyderabad.

Rao N V, Ratnakar R and Jain P K (2012). Impact of farmer field schools in KVK adopted villages on improved practices of cotton. *J Communic Stud* ***30*** (1) : 11-17.

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