

MITIGATION PRACTICES FOLLOWED BY COTTON GROWERS TO CONTROL PINK BOLLWORM

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ABSTRACT

The economic loss in the cotton through pest is serious concern. Amongst pest, pink bollworm is one of the most serious pests of cotton causing losses both yield and quality. After looking to the seriousness of pink bollworm, the mitigation practices were recommended to control pink bollworm. Considering this, present study was conducted by selecting 120 representative cotton growers to study the personal, socio-economical characteristics and the mitigation practices followed by cotton growers in Dhule, Shirpur and Sindkheda tehsils of Dhule District of Maharashtra State. The study shows that, majority of the respondents belong to the middle age group, literate one, had medium farming experience, possessed marginal land holding, medium area under cotton, medium annual income, medium level of source of information, had medium level of social participation, medium scientific orientation and had medium risk orientation. The majority had followed medium level of mitigation practices. In respect to mitigation practices summer deep ploughing was followed by all. Crop rotation was followed by only one third. Majority respondents had followed inter cropping and sown refugee plants. Every one preferred short duration varieties and majority sown cotton in the month of June. Inspection of the crop at squaring and flowering stage for the presence of pink bollworm larvae in the flower was followed by large majority. Majority sprayed neem seed kernel extract, very few installed trichocard, all most all used chemical insecticides and pesticides, majority harvested and remove cotton crop in December or January and avoid cotton ratoon. Therefore, it is suggested to organize awareness campaign, make available pheromone traps, trichocards, bio-pesticides on large scale at grass root level at reasonable cost. Also there is need to give wide publicity of recommended mitigation practices to control pink bollworm through print and electronic media.

Keywords : mitigation, pink bollworm, cotton growers

INTRODUCTION

Cotton (*Gossypium sp.*) plays a vital role in the national economy. Maharashtra rank second for cotton Production in India. But still the economic loss in the cotton through pest is serious concern. Due to excessive and indiscriminate use of pesticides to control certain pests results into disturbance of natural balance. During last few decades cotton is becoming more susceptible to different insect, pest especially bollworms. Amongst bollworms, pink bollworm is one of the most serious pests of cotton worldwide, causing losses both yield and quality of cotton. It has become economically the most destructive pest of cotton and has known to cause 2.8 to 61.9 per cent loss in seed cotton yield, 2.1 to 47.1 per cent loss in oil content and 10.7 to 59.2 per cent loss in normal opening of bolls (Patil, 2009).

Maharashtra state particular has faced the problem of control of pink bollworm in cotton as a more pronounced

during last year and the incidence has been identified from the middle of crop season seriously damaging the cotton in late pickings. In Mahatrasra incidence of pink bollworm on BG, BG-II and non BT cotton fields during 2017-18 was monitored in Dhule, Jalgaon, Nandurar, Wardha, Yavatmal, Washim, Hingoli, Nanded, Parbhani, Aurangabad, Buldhana, Akola, Amravati. In BT hybrids, the per cent infestation was more in and Gujarat. In Maharastra the districts with highest infestation were Hingoli, Nandurbar, Dhule, Yavatmal and Jalgaon (Naiket *et al.*, 2013).

To overcome the problem of pink bollworm, the mitigation practices were recommended by Mahatma Phule Krishi Vidyapeeth, Rahuri. The present study entitled, 'mitigation practices followed by cotton growers to control pink bollworm' was undertaken to understand personal and socio-economic characteristics and mitigation practices followed by cotton growers to control pink bollworm.

OBJECTIVES

- (1) To study the personal and socio-economic characteristics of cotton growers
- (2) To study the mitigation practices followed by cotton growers to control pink bollworm

METHODOLOGY

The present study was conducted in Dhule, Shirpur and Sindkheda tehsils of Dhule District of Maharashtra State. The list of villages was obtained from Taluka Agriculture Officer and 12 villages were selected from these three tehsils on the basis of highest area under cultivation of cotton crop. Then 10 farmers were selected from each village by

using simple random sampling methods. Accordingly, 120 respondents were selected for the present study. The data were collected through a specially designed interview schedule. The data were analyzed, tabulated and interpreted with suitable statistical instruments like frequency and percentage method.

RESULTS AND DISCUSSION**Personal and socio-economic characteristics of cotton growers**

The study of profile of cotton growers was made with reference to age, education, farming experience, land holding, area under cotton, annual income, source of information, social participation, scientific orientation and risk orientation.

Table 1 Distribution of respondents according to personal and socio-economic characteristics

(n=120)

| Sr. No. | Details of personal and socio-economic characteristics | Frequency | Percent |
|----------|--|-----------|---------|
| A | Age | | |
| 1 | Young (Up to 35) | 15 | 12.50 |
| 2 | Middle (36 to 55) | 77 | 64.40 |
| 3 | Old (56 and above) | 28 | 23.10 |
| B | Education | | |
| 1 | Illiterate (No Education) | 03 | 02.50 |
| 2 | Primary (Up to 4 th std.) | 26 | 21.66 |
| 3 | Secondary (Up to 10 th std.) | 54 | 45.00 |
| 4 | Higher secondary (Up to 12 th std) | 24 | 20.00 |
| 5 | Graduation | 13 | 10.84 |
| C | Farming Experience (Yrs) | | |
| 1 | Low (Up to 14 years) | 26 | 21.66 |
| 2 | Medium (15 to 23) | 65 | 54.17 |
| 3 | High (24 and above) | 29 | 24.17 |
| D | Land holding (ha) | | |
| 1 | Marginal (Up to 1 ha) | 41 | 34.16 |
| 2 | Small (1.01 to 2 ha.) | 29 | 24.17 |
| 3 | Semi-medium (2.01 to 4 ha.) | 39 | 32.50 |
| 4 | Medium (4.01 to 10 ha.) | 11 | 9.17 |
| 5 | Large (10.01 ha. and above) | 0 | 0.00 |
| E | Area under cotton (in ha) | | |
| 1 | Low (up to 0.78) | 23 | 19.16 |
| 2 | Medium (0.79 to 3.75) | 66 | 55.00 |
| 3 | High (3.76 and above score) | 31 | 25.84 |
| F | Annual income (₹) | | |
| 1 | Low (Up to ₹ 58580) | 20 | 16.66 |
| 2 | Medium (₹ 58581 to 326197) | 68 | 56.67 |
| 3 | High (₹ 326198 and above) | 32 | 26.67 |
| G | Source of information (Score) | | |
| 1 | Low (up to 45 score) | 22 | 18.33 |
| 2 | Medium (46 to 57 score) | 81 | 67.51 |
| 3 | High (58 and above score) | 17 | 14.16 |

| Sr. No. | Details of personal and socio-economic characteristics | Frequency | Percent |
|----------|--|-----------|---------|
| H | Social participation(Score) | | |
| 1 | Low (up to 4 score) | 22 | 18.33 |
| 2 | Medium (5 to 9 score) | 78 | 66.67 |
| 3 | High (10 and above score) | 20 | 15.00 |
| I | Scientific orientation Category (score) | | |
| 1 | Low (Up to 14) | 26 | 21.66 |
| 2 | Medium (15 to 19) | 66 | 55.00 |
| 3 | High (20 and above) | 28 | 23.34 |
| J | Risk orientation(score) | | |
| 1 | Low (Up to 19) | 28 | 23.33 |
| 2 | Medium (20 to 23) | 56 | 46.67 |
| 3 | High (24 and above) | 36 | 30.00 |

(A) Age

The data presented in Table 1. revealed that majority (64.40 %) of the respondents belong to the middle age group *i.e.* age group of 36 to 55 years of age, followed by 23.10 per cent belong to old age and 12.50 per cent belonged to young age group. The findings are in line with Kumbhani *et al.* (2017) and Dobariya *et al.* (2017).

(B) Education

Table also revealed that large majority of respondents were literate while only 2.50 per cent of respondents were illiterate. Amongst all, 45.00 per cent respondents were educated up to secondary school, 21.66 per cent were educated up to primary school, 20.00per cent were educated up to higher secondary and 10.84 per cent of respondents were educated up to graduate level.Educated people have a broader view, more receptive and always in search for new information and technologies. Therefore, they easily accept and adopt new technology than other.The findings are in line with Patel (2016).

(C) Farming Experience

It was observed from Table 1 that majority (54.17 %) of the cotton growers had medium farming experience (15 to 23 years), followed by 24.17 per cent of the respondents had high experience (24 years and above) and 21.16 per cent of the respondents had low experience (up to 14 years). Similar findings were reported by Badhe (2012).

(D) Land holding

From Table 1 it is observed that 34.16 per cent of the respondents possessed marginal land holding (up to 1.00 ha), 24.17 per cent of the respondents possessed small land holding (1.01 to 2.00 ha) whereas, 32.50 per cent of the respondents possessed semi medium land holding (2.01 to 4.00 ha) and 9.17 per cent of the respondents possessed

medium land holding (4.01 to 10.00 ha). It can be concluded that a majority (56.67 per cent) of the cotton growers possessed small to semi-medium size of land holding.

(E) Area under cotton

It was observed from Table 1 that 55.00 per cent of the cotton growers had mediumarea under cotton (0.79 to 3.75ha.), followed high area under cotton (25.84 %) and low area under cotton (19.16 %).

(F) Annual income

The Table 1 revealed that the majority (56.67 %) respondents had medium annual income, followed by high level annual income (26.67 %) and low level annual income (16.66 %). Better financial condition of an individual provides him a chance to take risks and in trying out use of mitigation practices. Thefinding are in line with the findings of Patel (2016).

(G) Source of information

From Table 1 it is observed that majority (67.51 %) of respondents had medium level of source of information, whereas 18.33 per cent of the respondents had low and 14.16 per cent of the respondents had high level of source of information.The findings are in line with the findings of Gulkari (2014).

(H) Social Participation

From Table1 it is concluded that majority (66.67 %) of respondents had medium level of social participation, while,18.33 per cent of respondents had low social participation and 15.00per cent had high level social participation. From the above table it is inferred that most of respondents had medium level of social participation which helps the respondents to be in touch with the various ongoingprogram and projects of government and allied departments.

(I) Scientific orientation

The data presented in Table 1 indicate that majority (55.00 %) of the cotton growers had medium scientific orientation, followed by high (23.34 %) and low scientific orientation (21.66%). It can be thus inferred that a vast majority 78.34 per cent of the cotton growers had medium to high scientific orientation. This might be due to good social participation, extension contact, utilization of information sources and literacy level.

(J) Risk orientation

From Table 1 it is observed that nearly half of the respondents (46.67 %) were found to have medium risk orientation, followed by high risk orientation (30.00 %) and low risk orientation (23.33 %). The findings are in line with the findings of Patel (2016).

Mitigation practices followed by cotton growers to control pink bollworm

The use of recommended mitigation practices by the cotton growers is of prime importance. The recommended mitigation practices needs to be spread among the cotton growers to accelerate level by efficient pink bollworm management.

A. Level of mitigation practices followed by the respondents.

The recommended practices for mitigation of pink bollworm includes the cultural, mechanical, and biological and need based chemical practices. The schedule was developed and used for assessing the overall mitigation practices followed by cotton growers.

Table 2 : Level of mitigation practices followed by the respondents (n=120)

| Sr. No. | Level of mitigation (score) | Frequency | Percent |
|---------|-----------------------------|-----------|---------|
| 1 | Low (Up to 10) | 22 | 18.33 |
| 2 | Medium (11 to 14) | 66 | 55.00 |
| 3 | High (15 and above) | 32 | 26.67 |

It is observed from Table 2 that most of the respondents (55.00%) had followed medium level of mitigation practices. While, 26.67 per cent and 18.33 per cent of the respondents followed mitigation practices to high and low level for control of pink bollworm in cotton. The possible reason might be medium level of innovativeness, achievement motivation, decision making ability, risk orientation and economic motivation. The results are in conformity with findings of Humbal (2012).

Mitigation practices followed by the respondents to control pink bollworm of cotton

Practice-wise recommended mitigation practices followed by the cotton growers to control Pink bollworm are depicted in Table 3.

Table 3 : Distribution of respondents according to use of mitigation practices to control pink bollworm (n=120)

| Sr. No. | Recommended mitigation practices to control pink bollworm on cotton | Mitigation practices followed | | Mitigation practices not followed | |
|---------|---|-------------------------------|---------|-----------------------------------|---------|
| | | No. | Percent | No. | Percent |
| 1 | Summer deep ploughing | 120 | 100 | 00 | 00 |
| 2 | Crop rotation followed to break life cycle of pink bollworm in Kharif and Rabbi | 35 | 29.16 | 85 | 70.84 |
| 3 | Inter crop sown along with cotton (Red gram and green gram) | 66 | 55.00 | 54 | 45.00 |
| 4 | Refugee plants sown along with Bt cotton, if provided in separate pocket | 57 | 47.50 | 63 | 52.50 |
| 5 | Short duration (150 days) variety sown | 120 | 100 | 00 | 00 |
| 6 | Sowing time : June | 101 | 84.16 | 19 | 15.84 |
| 7 | Inspected the crop at squaring and flowering stage for the presence of pink bollworm larvae in the flower | 113 | 94.16 | 07 | 05.84 |
| 8 | Installed pheromone trap for mass trapping of adult moths | 67 | 55.83 | 53 | 44.17 |
| 9 | Installed light trap for mass trapping of adult moths. | 10 | 8.33 | 110 | 91.67 |

| Sr. No. | Recommended mitigation practices to control pink bollworm on cotton | Mitigation practices followed | | Mitigation practices not followed | |
|---------|--|-------------------------------|---------|-----------------------------------|---------|
| | | No. | Percent | No. | Percent |
| 10 | Collection of fallen squares, flowers and bolls by burning or buried in field | 30 | 25.00 | 90 | 75.00 |
| 11 | Collected fallen squares, flowers and bolls and makeheap of infected portion on bund | 46 | 38.34 | 74 | 61.66 |
| 12 | Spraying of neem seed kernel extract 5% or neem oil @ 5 ml/ lit. | 90 | 75.00 | 30 | 25.00 |
| | A) 1 time spray | 38 | 31.67 | 82 | 68.33 |
| | B) 2 time spray | 27 | 22.50 | 93 | 77.50 |
| | C) 3 time spray | 25 | 20.84 | 95 | 79.16 |
| 13 | Installed trichocard | 06 | 05.00 | 114 | 95.00 |
| 14 | Insecticides spraying | 120 | 100.00 | 0 | 0 |
| | A) Quinolphos / Thiodicarb | 65 | 54.16 | 55 | 45.84 |
| | B)Chloropyriphos | 42 | 35.00 | 78 | 65.00 |
| | C) Cypermethrin / Fenevelerate | 13 | 10.83 | 107 | 89.17 |
| 15 | Remove cotton crop by December- Mid January | 118 | 98.34 | 02 | 01.66 |
| 16 | Clean and infested cotton picking separately | 90 | 75.00 | 30 | 25.00 |
| 17 | Cotton ratoon should be avoided | 118 | 98.34 | 02 | 01.66 |
| 18 | Grazing of Sheep and goat immediately after last harvesting of cotton | 108 | 90.00 | 12 | 10.00 |
| 19 | Use cotton stalk for Burning and Compost making | 113 | 94.16 | 07 | 05.84 |
| 20 | Arranging heap of cotton stalk near field should be avoided | 99 | 82.50 | 21 | 17.50 |
| 21 | Infected cotton do not store in house | 105 | 87.50 | 15 | 12.50 |

Mitigation practices followed by the respondents to control pink bollworm of cotton

The Table 3 revealed that, summer deep ploughing was followed by 100 per cent respondent. Crop rotation was followed by only 29.16 per cent respondents so as to break the life cycle of pink bollworm. Majority of the respondents (55.00 %) had followed inter cropping of red gram and green gram in cotton. As regards to refugee plants, 47.50 per cent cotton growers sown refugee plants along with the Bt cotton. Every respondent preferred short duration varieties. Large majority (84.16 %) of the respondent's sown cotton in the month of June. While some (15.84%) sown cotton in the month of May as a summer irrigated cotton.

Inspection of the crop at squaring and flowering stage for the presence of pink bollworm larvae in the flower was a recommended practice in cotton and it was followed by 94.16 per cent of respondents. More than half (55.83%) of respondent had installed pheromone trap for mass trapping of adult moths. From the study, it is found that few farmers (8.33 per cent) had installed light trap for the mass trapping of adult moths. Collecting and destroying of the fallen squares,

flowers and bolls from the field was a recommended practice and was followed by 25.00 per cent of farmer. These farmers either buried or burned the fallen squares, flowers, bolls and other debris of cotton plant. While 38.34 per cent of the farmers simply collected the fallen squares, flowers and bolls and make the heaps of infected portion on the bund which is not recommended one.

Majority (75.00%) of respondents sprayed neem seed kernel extract, Out of which 31.67 per cent of respondents sprayed NSKE one time followed by twice (22.50%) and remaining in thrice (20.84%). Installation of the tricho-card was a recommended practice to control pink bollworm. It was found that very few number of farmer (5%) installed trichocard. It was observed that, all most all (100.00 %) of the respondent used chemical insecticides and pesticides to control pink bollworm. Amongst these, majority (54.16%) of respondent sprayed Quinolphosor Thiodicarb insecticide to control pink bollworm, followed by Chloropyriphos (35.00%) and Cypermithrin or Fenvelerate (10.83%).

Majority (98.34%) of respondents Harvested and remove cotton crop in December and January. Clean and

infested cotton picking separately was a recommended practice, it was found that majority of the respondents (75.00 %) followed this practice and (25.00%) of farmer followed combine picking. Majority of farmers (98.34%) avoided cotton ratoon and only 1.66 per cent of farmer took cotton ratoon up to February. Grazing by sheep and goat immediately after last harvesting of cotton was a recommended practice; it was found that 90.00 per cent of respondents followed it. Majority (94.16 %) of respondents used cotton stalk for burning purpose and for compost making. From the table it was found that 82.50 per cent were not arranged heap of cotton stalk near field. From the study, it was observed that 87.50 per cent of farmers were not store infected cotton in house.

CONCLUSION

From the study it is concluded that majority of the respondents were in middle age group, educated up to primary and secondary education level, had medium area under cotton crop, medium level of annual income, medium level of farming experience, had marginal and semi medium land holding, use source of information to medium level, medium level of social participation, medium level of scientific orientation and medium level of risk orientation. Majority of the respondents use mitigation practices up to medium level, followed by high level and low level.

Most of the respondents did not use the recommended quantity and use of trichocard and light traps and didn't follow recommended crop rotation. Therefore, it is suggested to organize awareness campaign by SAU and Department of Agriculture. Also all bio-agents for pest control, pheromone traps, trichocards, bio-pesticides and fertilizers should be made available on large scale at reasonable cost by Department of Agriculture at grass root level. Also there is need to give wide publicity of recommended mitigation practices to control pink bollworm through print and electronic media.

REFERENCES

Badhe, D. K. 2012. Farmers perception regarding environmental risk in use of pesticides in Anand district of Gujarat state. Ph. D. Thesis (Unpublished), A.A.U., Anand.

Dobariya, J. B.; Thesiya, N.M. and Desai, V. K. 2017. Impact of KVK activities in adopted villages of KVK-Dang. *Guj. J. Ext. Edu.*, 28(1): 28-32.

Gulkari, K. D. 2014. Risk management practices adopted by the farmers in drip irrigated banana cultivation. Ph. D. Thesis (Unpublished), A.A.U., Anand. 1-1513.

Humbal, U. N. 2012. Knowledge and adoption of castor as intercrop with groundnut in south Saurashtra agro climatic zone of Gujarat. M.Sc. (Agri.) Thesis (Unpublished), Junagadh Agricultural University, Junagadh.

Kumbhani, S.R.; Kavad, S. D. and Patel, G. R. 2017. Adoption of improved Indian bean production technology. *Guj. J. Ext. Edu.*, 28(1): 20-27.

Naik, V., Prasad N. V. V. S. D. and Rama Chandra Rao (2013)- Incidence of Pink bollworm on Bt and non Bt hybrids - *Ann. Pl. Protec. Sci.*, 21(2):61-67

Patel, J. V. 2016. Development of attitude scale and ascertaining the techno-economic changes of cotton growers in respect of drip irrigation system in Saurashtra region. M.Sc. (Agri.) Thesis (Unpublished), J.A.U., Junagadh.

Patil, S. B.; Udikeri, S. S.; Hirecurubar, R. B.; Guruprasad, G. S. and Abhilash, C. C. (2009). Thiodicarb and Profenophos: Promising Insecticides For Management of Pink Bollworm, *Pectinophora Gossypiella* (Saunders) in Cotton. *Indian J. Ent.*, 71(2): 183-185.

Undhad, S. V., Sharma, P. S. and Prajapati, V. S. (2018) Impact of frontline demonstrations on integrated approaches against the management of pink bollworm in Bt. Cotton. *Guj. J. Ext. Edu.* 29(2): 184-186.

Vinaya Kumar, H. M., Chauhan, N. B., Patel, D. D. and Patel, J. B. (2019). Predictive factors to avoid farming as a livelihood, *Economic Structures* 8(10):1-19. Springer doi.org/10.1186/s40008-019-0141-7.

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