Imidacloprid smearing: A new technique to control early sucking insect pests of cotton

M. Bheemanna and B.V. Patil
Regional Agricultural Research Station, University of Agricultural Sciences, Raichur, Karnataka INDIA
Correspondence author bheemuent@rediffmail.com

ABSTRACT

An experiment was carried out at Regional Agricultural Research Station, Raichur, Karnataka - India, during 1999-2002, to evaluate the bioefficacy of imidacloprid 17.8 SL as both stem and top growing shoots smearing against early sucking insect pests of cotton under irrigated condition. Monocrotophos 36 SL and imidacloprid 17.8 SL at different dosages were evaluated as smearing on stem and growing shoots of the cotton plants. Three years results indicated that imidacloprid 17.8 SL + water (1 ml and 20 ml) treatment proved to be best in reducing the early sucking insect pests like leaf hoppers, thrips and aphids without affecting the natural predatory population like spiders, Chrysopa, coccinellids etc. The cost of the application was less than spraying. The role of this technique in integrated pest management is discussed.

Introduction

Cotton is one of the major commercial crops and is grown in Karnataka over an area of 5.29 lakhs hectares with a total production of 8 lakh bales and an average productivity of 257 kg lint/ha (Anonymous, 2000). The low productivity is due to many factors like the large cotton area under rainfed conditions, poor genotypes and insect pests and diseases. The major factor which contributes to low yield is the incidence of insect pests. Among them, sucking insect pests like leaf hoppers (*Amrosaca biguttela* (Ishrida)), thrips (*Thrips tabaci* (Linderman)), whitefly (*Bemisia tabaci* (Gennadius)) and aphids (*Aphis gossypii* (Glover)) are important ones. Due to continuous desapping the crop suffers heavily during early stage of the crop in particular by leaf hoppers and thrips.

The pesticides usage on cotton is both extensive and intensive. This is evident from the fact that 48 percent of the pesticides are used on cotton alone (Balakrishna 1992). A considerable amount of pesticides is applied for the control of cotton early sucking pests. Both spraying and application of systemic granular insecticides remain the traditional approach. However, both adversely affect the population of non-target insect pests (Sarath Babu and Gupta 1988), cause secondary outbreaks of pests, resistance to insecticides, pesticide residues, environmental pollution and health hazards to human beings and wildlife. To minimize the pesticide load in the cotton ecosystem, a number of alternative, safer and ecofriendly methods of insect control, involving minimum expenditure, are being developed for managing early sucking insect pests.

Material and Methods

A field experiment was conducted during the three cropping seasons from 1999-2002 at the Regional Agricultural Research Station, Raichur, Karnataka, India. Five treatments of imidacloprid 17.8 SL at different dilutions, including a control against leaf hopper and thrips were imposed to study the effectiveness of a smearing technique. The imidacloprid was smeared on the growing shoots with the help of small, narrow mouthed plastic bottles modified for smearing. Smearing was done twice, 20 and 30 days after sowing.

The seeds of cotton hybrid NHH-44 were sown in a plot of 20 square meters per treatment for each replication and replicated four times. The post treatment observations were recorded three days after application of treatments. Observations were made on five selected tagged plants per 20 m^2. A blanket application with insecticides was given to control bollworms.

Results and Discussion

Leaf hoppers

The data from Table 1 revealed that amongst dilutions tried, the imidacloprid 17.8 SL 1ml+ 20 ml water recorded lower population of leaf hopper (2/leaf) as compared to control (4.8/leaf) during 1999-2000. There was no significant difference between the two treatments of the smearing technique during 2000-2001 season. However, these two treatments recorded significantly lower populations (0.86 and 0.84 per leaf) over the control, which recorded 3.23/leaf. There was no significant difference amongst the different imidacloprid treatments during 2001-02 but recorded significantly lower population over control treatments. However, from all three seasons, it was clear that the smearing technique treatments recorded lower populations of leaf hoppers compared to control.

Thrips

The data from the table revealed that imidacloprid (1 + 20) treatment recorded significantly lower populations (10.2/leaf) compared to the control (34.5/leaf), but was inferior to the imidacloprid spray treatment @ 100 ml/ha, which recorded 2.6/leaf during 1999-2000. Although there was no significant difference between the smearing technique and the spraying treatment, these treatments were significantly superior for control during 2000-2001. The same trend was seen in the 2001-2002 season.

Yield

The imidacloprid smearing treatment (1+20) recorded 14.05 q/ha, which was significantly superior over the control (11.17 q/ha) during 1999-2000. However, imidacloprid spray treatment 100 ml/ha recorded the maximum yield of (19.34 q/ha). There was no significant difference in the yield amongst the smearing technique treatments during 2000-2001. However,

these treatments were significantly superior over the control, but inferior to spray treatments. The same trend was seen in year 2001-2002.

Conclusion

The shoot smearing technique is a new method evolved recently in cotton IPM. Based on three year results imidacloprid (1 ml + 20 ml) water would be very effective and economical. It would require only 22.5 ml imidacloprid per hectare with a total solution of 450 ml/ha. Compared to spraying, it is very cheap, economic and comparatively very safe to natural enemies under moderate pest load

References

- Anonymous, (2000). Cotton scenario in India and world. Project Co-ordinators Report, 1999-2000 CICR, Coimbatore, India. Pp. 5-7.
- Balakrishna, V. (1992). Pesticides industry. The challenges in the nineties, *In* Pest management and pesticides. Indian Scenario (ed. Vasantraj David, B., Namratha) Publications, Madaras, India pp. 251-255.
- Barkhede, U.P. and Nimbalkar, S.A. (2000). "Stem smearing technique" A new approach in pest management. *Pestology*, **24**: 10-12.
- Sarath Babu, B. and Gupta, G.P. (1988). Efficacy of systemic insecticides against cotton jassids (*Amarsca devastans*) and their effect on non-target organisms in Upland cotton (*Gossypium hirsutum*). *Indian Journal of Agriculture Sciences*, **58**: 496-499.

Table 1. *Control of cotton early sucking pests by a shoot smearing technique.*

Treatment	Dosage (ml)	Leafhoppers/leaf (3DAS)			Thrips/leaf (3DAS)			Yield (q/ha)		
		1999-00	2000-01	2001-02	1999-00	2000-01		1999-00	1999-00	2000-01
Imidacloprid (17.8 SL + water)	1 + 20	2.0	0.86	--	10.2	6.15	--	14.50	12.96	--
Imidacloprid (17.8 SL + water)	2 + 20	--	0.84	1.34	--	5.96	2.60	--	12.88	9.56
Imidacloprid (17.8 SL + spray)	4 + 20	--	0.71	0.75	--	5.92	1.93	--	12.65	10.0
Imidacloprid (17.8 SL spray)	100 ml/ha	0.4	0.12	0.32	2.6	0.47	2.00	19.34	14.70	10.60
Untreated control	--	4.8	3.23	5.85	34.5	12.53	6.44	11.17	11.47	8.13
SEm±			0.3	0.15	0.9	0.46	0.36	0.18	0.31	0.21
CD at 5 %			0.9	0.46	2.8	1.41	1.12	0.55	0.98	0.65