



## STEM SMEARING TECHNIQUE FOR MANAGEMENT OF SUCKING PESTS IN RAINFED COTTON

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**Abstract:** A new Stem Smearing Techniques with Methyl demeton 25 EC solution at 1:1 dilution ratio (i.e. one part each of insecticide and water) as recommended by the Department of Entomology, Dr. PDKV, Akola for stem smearing of young cotton seedlings for management of sucking pests on cotton was assessed during the On Farm Trial on farmer's field in Yavatmal district. It was compared with stem smearing with Monocrotophos 36 SL at 1:1 and farmer's practice (foliar application of insecticide mixture) for effectiveness under rainfed farming. Stem smearing with Monocrotophos 36 SL caused maximum reduction of aphids (62.79 %) as well as thrips (65.63 %) after 14 days of first application. After 14 days of second application the aphids and thrips were found suppressed to the extent of 82.81 and 80.76 per cent, respectively due to Monocrotophos 36 SL which proved best among the treatments. The survival and activity of the beneficial insects i.e. chrysopid and lady bird beetle populations were found more. As the amount of water required is meager in case of stem smearing techniques this can be best adopted under dryland farming situations.

**Key Words:** Stem smearing, Sucking pests, Rainfed cotton.

### Introduction:

Aphids (*Aphis gossypii*) and thrips (*Thrips tabaci*) are important sucking pests of cotton under rain fed farming situation in Vidarbha. The pests attack in early crop stage affecting growth and significantly declining the yield levels of rain fed cotton. Repeated foliar application of insecticides is a regular practice adopted by the farmers for suppression of these pests (Anonymus, 2009). However, increased frequency of foliar applications may lead to undesirable effects on beneficial insect fauna in addition to development of insecticide resistance and undue residue accumulation in ecosystem. The registered insecticides that provide adequate control of the pest have continued to decrease (Ramaprasad *et al.*, 1996). Considering the need to search for improved methods of pesticide application to prolong the effectiveness of available and effective insecticides in addition to conserve the natural enemies and minimizing the residues in the ecosystem a new Stem Smearing Techniques with Methyl demeton 25 EC solution (1:1) has been

recommended by the Department of Entomology, Dr. PDKV, Akola in the year 2006-07 (Anonymous, 2008) and subsequently assessed on farmer's field under on farm trial (OFT) in Yavatmal district to know its effectiveness under rainfed cotton farming situation. It was compared with stem smearing with Monocrotophos 36 SL solution at 1:1 ratio (i.e. one part each of insecticide and water) and farmer's practice of foliar application of insecticide mixture.

### Material and Methods

Seven farmers were selected from the KVK adopted villages having history of cotton cultivation under rainfed condition. *Bt* cotton varieties are adopted by the farmers in this district which are susceptible to the attack of sucking pests. The crop was sown by the farmers on receipt of sufficient monsoon rains. The treatments were consisted of application of insecticide - water mixture to the main shoot of young cotton seedling with a brush about 8-10 cm below the growing tip on the stem (2-3 cm patch). Monocrotophos 36 SL and Methyl Demeton 25 EC insecticides diluted in water at 1:1 ratio (i. e.

one part of insecticide and one part of water) were used as treatments. Farmer's practice (control) consisted of first foliar application of Dimethoate 30 EC at 20 days of crop growth followed by second application of mixture of Monocrotophos 36 SL +

Endosulfan 35 EC at 40 days of crop growth with recommended doses as usually undertaken by the farmers in this area. The treatment details is given below

Treatments
T <sub>1</sub> - Stem smearing with Monocrotophos 36 SL solution in water (1:1) at 20 and 40 days after emergence of crop
T <sub>2</sub> - Stem smearing with Methyl demeton 25EC solution in water (1:1) at 20 and 40 days after emergence of crop
T <sub>3</sub> - Spraying of Dimethoate 30 EC @ 10ml / 10lit of water at 20 days followed by second application of Endosulfan 35 EC(20ml) + Monocrotophos 36 SL (20ml) in 10 lit of water at 40 days after crop emergence

The treatments were executed twice *i.e.* 20 and 40 days after emergence of crop. The observations on populations of aphids and thrips were recorded at 3, 7 and 14 days after treatments. The per cent reductions in pest populations (table 1 and 2) were worked out based on pre-treatment observations taken on previous day of the treatment exposure. The observations on beneficial insects *viz.*, chrysopid and ladybird beetles populations were also recorded and depicted in table no. 3 and 4, respectively.

**Results and Discussion:**

The results (Table 1 and 2) revealed that stem smearing with Monocrotophos 36 SL at 1:1 dilution caused maximum reduction of aphids (62.79 %) as well as thrips (65.63 %) after 14 days of first application. After 14 days of second application the aphids and thrips were found suppressed to the extent of 82.81 and 80.76 per cent, respectively due to Monocrotophos 36 SL stem smearing which proved best among the treatments. It was followed by stem smearing with Methyl demeton 25 EC at 1:1 ratio of concentration which has given 80.30 and 81.25 per cent reduction in aphid and thrips population, respectively after 14 days of second application as against 35.90 and 45.83 per cent reduction in aphid and thrips population, respectively due to farmer's practice consisting of foliar application of insecticides. The survival and activity of the beneficial insects *i.e.* chrysopid (Table 3) and lady bird beetle (Table 4) populations were found more *i.e.* an average of 3.20 and 2.15 each per plant after second application in case of stem smearing

techniques as against only 1 each per plant in case of farmer's practice after 14 days of second application.

Stem application of insecticides was reported to be effective for control of aphid, *Aphis gossypii* in cotton with reduced quantity of insecticide (Wang Kai Yun *et al.*, 1999). Rama Rao *et al.* (1998) reported that stem application with imidacloprid 200 SL at 1:20 dilution at 20, 40 and 60 DAS was highly effective in controlling aphids, leafhoppers and mealy bugs in cotton. Monocrotophos stem application @ 1:6 was reported to be effective against *Aphis gossypii* and *Amrasca biguttula biguttula* on okra (Kiranmai *et al.*, 2002). Thakare *et al.* (2009) reported that stem smearing of monocrotophos @ 1:4 and imidacloprid @ 1:20 dilutions proved effective and economical in *Bt* cotton against sucking pests. The results regarding assessment of the stem smearing technique in the present study are in confirmation with all these authors. The periodical decline in the beneficial insect populations in case of stem applied plots in the present study is a result of numerical response of the host population (*i.e.* aphids and thrips) generally evidenced under static environment in an agro-ecosystem. The natural enemy population in stem smeared plots, however, sustained at all stages of pest infestation and never found devastated as seen under farmer's practice. As the amount of water required is meager in case of stem smearing techniques this can be best adopted under dryland farming situations. However, there is a need to develop a suitable dispenser for stem smearing to make this technique of insecticide application more efficient and farmer friendly.

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**Table 1: Effects of treatments on average population of aphids on cotton**

Treatment	Per cent reduction in aphid population (%)					
	First application 20 days after crop emergence			Second application 40 days after crop emergence		
	3 DAA	7 DAA	14 DAA	3 DAA	7 DAA	14 DAA
T <sub>1</sub> - Stem application of Monocrotophos 36 SL solution in water (1:1)	30.23	48.84	62.79	45.45	53.13	82.81
T <sub>2</sub> - Stem application of Methyl demeton 25 EC solution in water (1:1)	17.33	41.33	49.33	27.27	51.52	80.30
T <sub>3</sub> – Farmer’s practice i.e .first spraying of Dimethoate 30 EC @ 10ml / 10lit followed by second application of Endosulfan 35 EC (20ml) + Monocrotophos 36 SL (20ml) in 10 lit of water (Check)	4.76	26.19	39.29	17.95	33.33	35.90

**DAA – Days after application**

**Table 2: Effects of treatments on average population of thrips on cotton**

Treatment	Per cent reduction in thrips population (%)					
	First application 20 days after crop emergence			Second application 40 days after crop emergence		
	3 DAA	7 DAA	14 DAA	3 DAA	7 DAA	14 DAA
T1- Stem application of Monocrotophos 36 SL solution in water (1:1)	18.75	50.00	65.63	17.31	57.69	80.76
T2 - Stem application of Methyl demeton 25 EC solution in water (1:1)	13.51	41.89	59.46	29.03	62.50	81.25
T <sub>3</sub> – Farmer’s practice i.e .first spraying of Dimethoate 30 EC @ 10ml / 10lit followed by second application of Endosulfan 35 EC(20ml) + Monocrotophos 36 SL (20ml) in 10 lit of water (Check)	8.33	33.33	41.67	4.29	17.14	45.83

**DAA – Days after application**

**Table 3: Effects of treatments on average population of Chrysopids on cotton**

Treatment	Average Chrysopid larvae population (No./plant)					
	First application 20 days after crop emergence			Second application 40 days after crop emergence		
	3 DAA	7 DAA	14 DAA	3 DAA	7 DAA	14 DAA
T <sub>1</sub> - Stem application of Monocrotophos 36 SL solution in water (1:1)	3.00	2.95	2.80	3.12	3.20	3.20
T <sub>2</sub> - Stem application of Methyl demeton 25 EC solution in water (1:1)	2.32	2.64	4.16	3.20	2.10	2.15
T <sub>3</sub> – Farmer's practice i.e .first spraying of Dimethoate 30 EC @ 10ml / 10lit followed by second application of Endosulfan 35 EC(20ml) + Monocrotophos 36 SL (20ml) in 10 lit of water (Check)	2.10	1.42	1.20	2.00	1.00	1.00

**DAA – Days after application**
**Table 4: Effects of treatments on average population of Ladybird beetles on cotton**

Treatment	Average Ladybird beetle larvae population (No./plant)					
	First application 20 days after crop emergence			Second application 40 days after crop emergence		
	3 DAA	7 DAA	14 DAA	3 DAA	7 DAA	14 DAA
T <sub>1</sub> - Stem application of Monocrotophos 36 SL solution in water (1:1)	4.20	4.10	3.28	3.24	2.12	2.08
T <sub>2</sub> - Stem application of Methyl demeton 25 EC solution in water (1:1)	4.28	4.36	4.48	4.42	4.42	4.80
T <sub>3</sub> – Farmer's practice i.e .first spraying of Dimethoate 30 EC @ 10ml / 10lit followed by second application of Endosulfan 35 EC(20ml) + Monocrotophos 36 SL (20ml) in 10 lit of water (Check)	2.20	2.12	2.00	2.10	2.00	1.20

**DAA – Days after application**