# EVALUATION OF DIFFERENT INSECTICIDE FORMULATIONS AGAINST *APHIS GOSSYPII* IN OKRA CROP

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**Abstract:** Evaluation of insecticides against sucking pest like aphid in okra crop was conducted Department of Entomology, CoA, IGKV, Raipur during *Rabi*2013-14. During *first of spraying*, the lowest aphid population was recorded (4.91/plant) against treatment $T_6$and highest in $T_1$ (9.41/plant) within fifteen day of spraying. Whereas, the aphid population was also exhibited lowest (5.92/plant) in $T_6$and treatment $T_1$ observed highest (9.77/plant) during *second of spraying*. The mean of first and second of spraying theaphid population (5.42 aphid/ plant) was observed minimum in foliar application of treatment $T_6$ i.e. spinosad 45EC @75g a.i./ ha followed by treatment $T_4$ i.e.emamectin benzoate 5 SG@13 g a.i./ha(6.46aphid/ plant).The maximum 9.60 aphid/ plant was recorded in treatment $T_1$i.e. emamectin benzoate 5 SG@8 g a.i./ha. Thus, during this period spinosad 45EC was found to be best effective treatment and which minimized the aphid populationwhileemamectin benzoate 5 SG@8 g a.i./ha was noticed the least effective as compared to among all treatments.

**Keywords:** Evaluation of insecticides, Okra aphid, *Aphis gossypii*, Sucking pest of okra

## INTRODUCTION

Okra is ravaged by as many as 45 species of insect-pests throughout its growth period (Rawat and Sahu, 1973). Among these, the aphid, *Aphis gossypii* is a polyphagous sucking pest and also found damaging okra all over India. It also acts as vector of virus and transmits mosaic, leaf curl etc. (Butani and Verma, 1976). The indiscriminate use of pesticides has caused toxicity to non-target beneficial organisms resulting in development of pest resistance to the chemical pesticides and resurgence of pest due to pyrethroids (Basha *et al.,* 1982). A field experiment conducted at Bangalore (Karnataka) by Mohan and Mohan (1985) revealed that endosulfan (0.7 kg a.i. ha-1) was quite effective for the suppression of A. biguttula biguttula and *A. gossypii* population on okra crop. Rai (1985) revealed from field trials conducted at New Delhi on management of okra pests that decamethrin (0.0065%) gave maximum reduction in jassid population but was statistically at par with cypermethrin at both the doses (0.017%; 0.00325%), whereas, chlorpyriphos (0.048%) was the most effective against aphids but did not differ statistically from cypermethrin (0.034%) and decamethrin (0.0065%). Cypermethrin (100 g a.i. ha-1) gave good protection to okra against aphids and jassids at Bhubneshwar, Orissa compared to thiomethoxam and imidacloprid (both at 25g a. i. ha-1) which were less effective (Mishra, 2002). Patel *et al*. (1997b) conducted field experiments on okra at Anand (Gujarat) to test the efficacy of some conventional insecticides against *A. gossypii* and *A. biguttula biguttula*. They reported that among the different insecticidal sprays, endosulfan (0.035%) was most effective against both the pests. In West Bengal, higher mortality of aphids (66.19%) and jassids (49.52%) on okra crop was brought about by the application of malathion (Ghosh *et al*., 1999). Rao *et al.* (1991) reported from Bapatla (Andhra Pradesh) that 4 sprays of endosulfan (0.07%) or endosulfan (0.07%) alternated with carbaryl (0.15%) were quite effective against aphids and leafhoppers infesting okra crop.

## MATERIAL AND METHOD

Field experiment was undertaken for two spraying during *Rabi*, 2013 - 14 in a randomized block design with seventh treatments replicated three times at experimental field of Entomology, IGKV, Raipur. The insecticidal treatments included Emamectin benzoate 5 SG of four doses *viz.* 8.0, 10.0, 11.0 & 13.0 gm a.i.$ha^{-1}$, respectively and 50.0 gm a.i./ha of Cypermethrin 10EC and 75.0 gm a.i./ha of Spinosad 45 ECalong with an untreated control.Rice variety 'Swarna' was grown in plot of size 4m × $6m^2$ at spacing of 10cm × 15cm with recommended package of practices excluding plant protection. The insecticides were sprayed by high volume knapsack sprayer using 500 litres of spray fluid per hectare. Sprayer was calibrated for equal discharge of insecticidal solution in all the treatments. The control plots were sprayed with water only. Observations were taken on the number of aphid population/plant from ten randomly and diagonally taken plant of each plot leaving the border rows at one day before spraying and 1, 3, 5, 7, 10 and 15 days after sprayings. Data recorded before and after the sprayings are pooled, transformed, analyzed and presented in the Table- 1, 2&3 and Fig.-1&2.

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**RESULT AND DISCUSSION**

The non-significant difference observed in different plots during the pretreatment observation. The post treatment, in first spraying, at one DAS, the minimum aphid population(3.22 aphid/ plant) was observed in foliar application of cypermethrin 10EC @ 50 g a.i./ hafollowed by treatment ($T_3$) Emamectin benzoate 5 SG@8 g a.i./ha(5.55aphid/ plant).The maximum 8.65aphid/ plant was recorded in treatment ($T_1$) Emamectin benzoate 5 SG@8 g a.i./ha. Whereas, in second spraying, the minimum aphid population(3.42 aphid/ plant) was noticed in cypermethrin 10EC @ 50 g a.i./ha followed by treatment ($T_4$) Emamectin benzoate 5SG@13 g a.i./ha(7.85aphid/ plant) and maximum aphid population (8.25aphid/ plant)was recorded in treatment ($T_1$) Emamectin benzoate SG@8 g a.i./ha. In three days after spraying of insecticides the minimum aphid population per plant was observed in foliar application of ($T_6$) Spinosad 45 EC@75g a.i./ha (4.32 aphid/ plant) and maximum in Emamectin benzoate 5SG@8 g a.i./ha(8.78 aphid/ plant) in after first spraying. Whereas, in after second spraying there was minimum aphid population was observed in of cypermethrin 10EC@50 g a.i./ ha,(3.89 aphid/ plant) and maximum in Emamectin benzoate 8 SG@11 g a.i./ha(8.56aphid/ plant). In five days, after application of insecticides, the treatment six ($T_6$) Spinosad 45 EC@75g a.i./ha recorded the least aphid population(4.32 and 4.22aphid/ plant). The treatment ($T_3$) Emamectin benzoate 5%SG@11 g a.i./ha, and treatment four ($T_4$) Emamectin benzoate 5%SG@13 g a.i./ha were found statistically at par. There was maximum aphid population observed in Emamectin benzoate 5%SG@8 g a.i./ha, i.e. treatment seven ($T_1$) 8.78 and 8.56 aphid per plant after first and second of spraying, respectively.Seven days after spraying of insecticides, the minimum aphid population was recorded in treatment six ($T_6$) spinosad 45EC@75g a.i./ha ( 4.19 and 4.34aphid/ plant).The treatment four ($T_4$) Emamectin benzoate 5%SG@8 g a.i./ha was found maximum (9.77 and 9.36 aphid/ plant) in after first and second of spraying. The entire treated plot had statistically highly significant lower population as compared to control.In tenth days after application of insecticides treatment six ($T_6$) Spinosad 45 EC@75g a.i./ha had minimum aphid population(5.45 and 5.41aphid/ plant). There was maximum aphid population observed in Emamectin benzoate 5%SG@8 g a.i./ha, i.e. treatment seven ($T_1$) 10.01and11.32 aphid per plant after first and second of spraying, respectively.In fifteenth days after application of insecticides, the treatment six ($T_6$) spinosad 45EC @75g a.i./ ha (7.05 and 7.31 aphid/ plant) showed the best effect and treatment $T_4$,$T_3$,$T_5$ were found statistically at par after first and second spraying, respectively.

During *first spraying* 2013-14, the lowest aphid population was recorded 4.91/plant against treatment $T_6$and highest in $T_1$ (9.41/plant) within fifteen day of spraying Whereas, the aphid population was also exhibited lowest 5.92 per plant in $T_6$and treatment $T_1$ observed highest (9.77/hill)during *second spraying* 2013-14was significantly low as compared to control.

Pooled mean of first and second spraying of insecticides was reduced the population of aphid in okra ranged from 5.42-9.60within 15 days after spraying. The differences between treatments in respect of aphid population were found significantly superior over the untreated control. The minimum aphid population(5.42 aphid/ plant) was observed in foliar application of treatment ($T_6$) spinosad 45EC @75g a.i./ ha followed by treatment ($T_4$) Emamectin benzoate 5 SG@13 g a.i./ha(6.46aphid/ plant).The maximum 9.60 aphid/ plant was recorded in treatment ($T_1$) Emamectin benzoate 5 SG@8 g a.i./ha. Thus, during this period spinosad 45EC was found to be the best effective treatment and minimized the aphid population, whereas Emamectin benzoate 5 SG when dose applied @8 g a.i./ha was recorded the least effective treatment.The effectiveness of *V.lecanii and C.zastrowisillemi* in controlling aphids has been reported by Khalil *et al.* (1983), Yokomi and Gottwald (1998), Ramarethinam*et al.* (2005) and Nirmala*et al.*,(2006) earlier and the present study also confirmedtheir findings.The efficacy of spinosad in reducing the aphid population has been documented by Stansly (2001) who observed that spinosad gave effective control of aphids in cotton ecosystem.

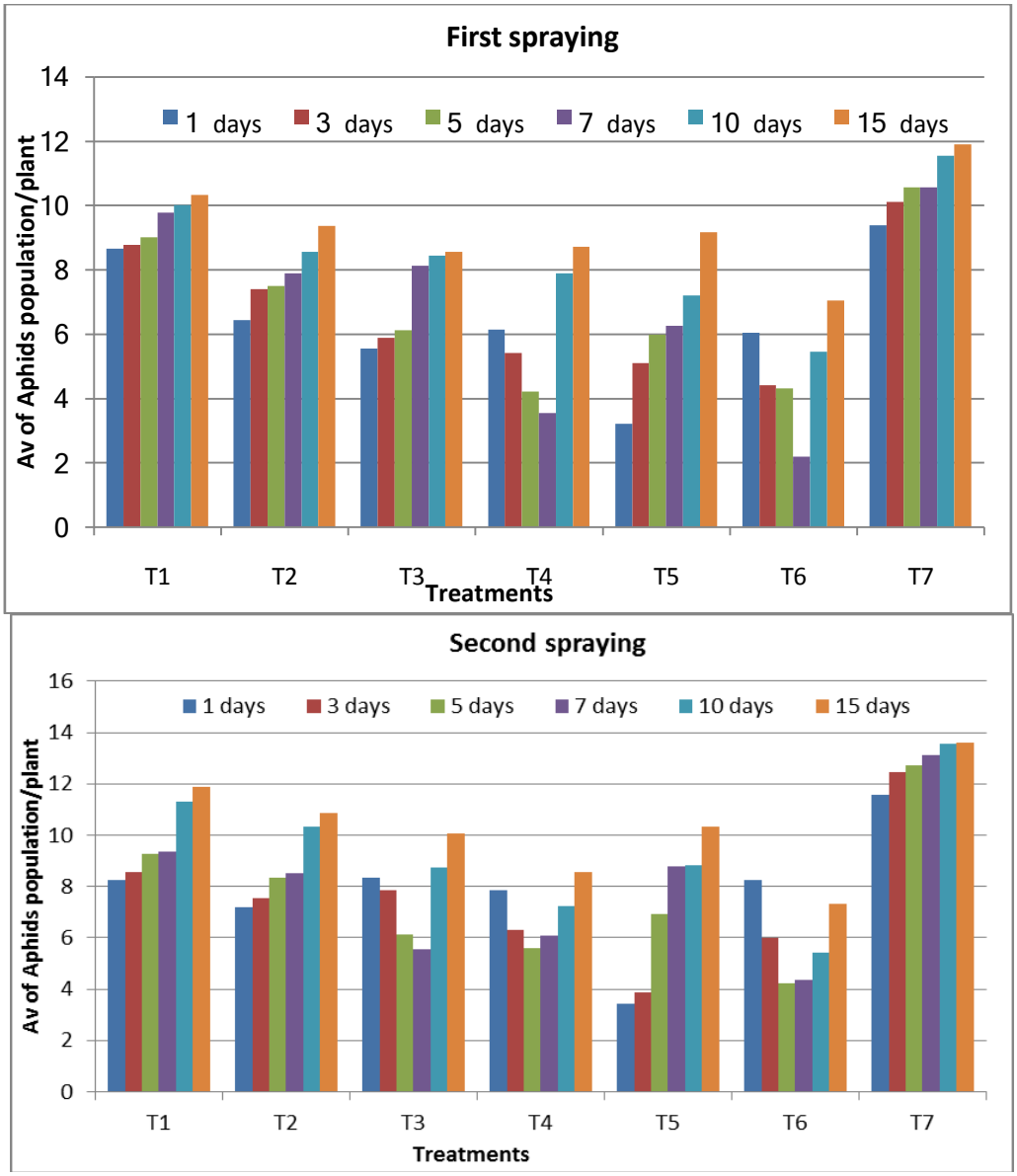


**Fig.-1:** Bioefficacy of different insecticides against aphid population / plant on okra crop after first and second sprayed during *Rabi* 2013-14

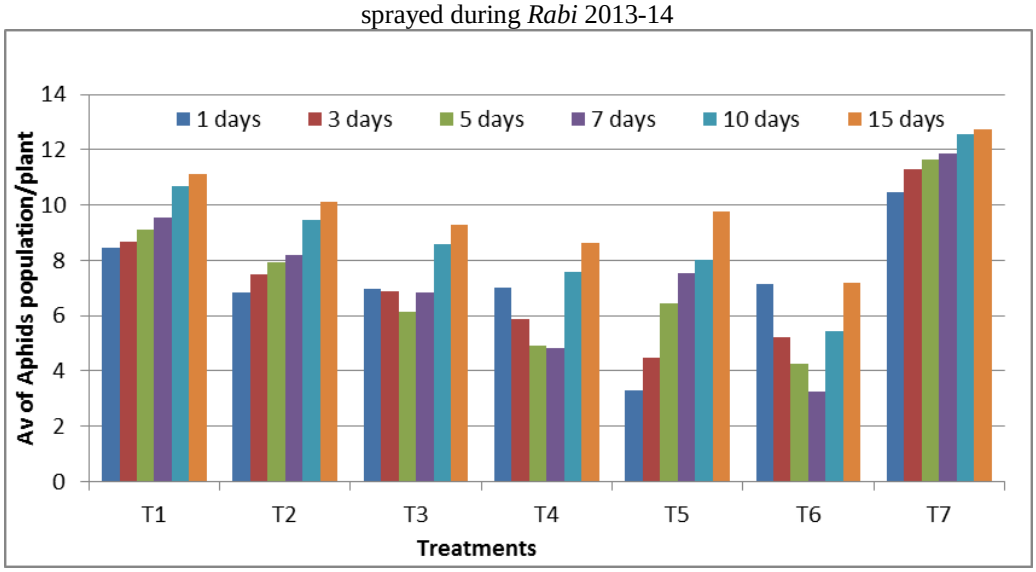


**Fig.-2:** Mean of aphid population / plant against after on okra crop first and second spraying of insecticidal treatments

**Table 1.** Bioefficacy of different insecticides against aphid population / plant on okra crop after first sprayduring *Rabi* 2013-14

| Treatment No. | Treatment name | Dose (gm a.i.ha$^{-1}$) | Pre-treatment population | Post –treatmentpopulation | | | | | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 day | 3 day | 5 day | 7 day | 10 Day | 15 day | |
| $T_1$ | Emamectin benzoate 5 SG | 8.0 0 | 10.40 (3.36) | 8.65 (3.09) | 8.78 (3.11) | 9.01 (3.15) | 9.77 (3.26) | 10.01 (3.31) | 10.33 (3.36) | **9.41** |
| $T_2$ | Emamectin benzoate 5 SG | 10.00 | 11.20 (3.49) | 6.45 (2.72) | 7.41 (2.89) | 7.50 (2.91) | 7.90 (2.98) | 8.57 (3.08) | 9.36 (3.21) | **7.87** |
| $T_3$ | Emamectin benzoate 5 SG | 11.00 | 9.55 (3.23) | 5.55 (2.53) | 5.89 (2.60) | 6.13 (2.65) | 8.12 (3.00) | 8.45 (3.06) | 8.56 (3.08) | **7.12** |
| $T_4$ | Emamectin benzoate 5 SG | 13.00 | 8.90 (3.14) | 6.14 (2.65) | 5.42 (2.52) | 4.22 (2.63) | 3.55 (2.12) | 7.90 (2.98) | 8.71 (3.11) | **5.99** |
| $T_5$ | Cypermethrin 10EC | 50.00 | 10.80 (3.43) | 3.22 (2.01) | 5.11 (2.47) | 5.98 (2.29) | 6.26 (2.67) | 7.21 (2.92) | 9.17 (3.18) | **6.16** |
| $T_6$ | Spinosad 45 EC | 75.00 | 9.22 (3.18) | 6.05 (2.65) | 4.42 (2.32) | 4.32 (3.38) | 4.19 (1.76) | 5.45 (2.51) | 7.05 (2.83) | **4.91** |
| $T_7$ | Control | Untreated | 9.36 (3.20) | 9.39 (3.21) | 10.11 (3.32) | 10.56 (3.38) | 10.57 (3.39) | 11.55 (3.84) | 11.89 (3.53) | **10.68** |
| **SE(m)+-** | | | **0.07** | **0.11** | **0.07** | **0.14** | **0.13** | **0.12** | **0.09** | |
| **CD at 5%** | | | **NS** | **0.34** | **0.23** | **0.45** | **0.40** | **0.36** | **0.30** | |

* Three times replicated on each treatment, * Figure is parenthesis in square root transformed values

**Table 2.** Bioefficacy of different insecticides against aphid population / plantokra crop after second sprayduring *Rabi* 2013-14

| Treatment No. | Treatment name | Dose (gm a.i.ha$^{-1}$) | Pre-treatment population | Post –treatmentpopulation | | | | | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 day | 3 day | 5 day | 7 day | 10 Day | 15 day | |
| $T_1$ | Emamectin benzoate 5 SG | 8.0 0 | 12.11 (3.61) | 8.25 (3.02) | 8.56 (3.08) | 9.25 (3.17) | 9.36 (3.20) | 11.32 (3.50) | 11.87 (3.58) | **9.77** |
| $T_2$ | Emamectin benzoate 5 SG | 10.00 | 11.30 (3.50) | 7.21 (2.98) | 7.54 (2.90) | 8.36 (3.05) | 8.52 (3.07) | 10.32 (3.35) | 10.85 (3.44) | **8.80** |
| $T_3$ | Emamectin benzoate 5 SG | 11.00 | 10.60 (3.39) | 8.36 (3.04) | 7.85 (2.96) | 6.12 (2.66) | 5.56 (2.54) | 8.74 (3.09) | 10.05 (3.31) | **7.78** |
| $T_4$ | Emamectin benzoate 5 SG | 13.00 | 12.03 (3.60) | 7.85 (2.96) | 6.32 (2.68) | 5.58 (2.56) | 6.08 (2.61) | 7.23 (2.86) | 8.56 (3.08) | **6.94** |
| $T_5$ | Cypermethrin 10EC | 50.00 | 10.54 (3.39) | 3.42 (2.09) | 3.89 (2.17) | 6.94 (2.81) | 8.78 (3.11) | 8.84 (3.12) | 10.32 (3.36) | **7.03** |
| $T_6$ | Spinosad 45 EC | 75.00 | 12.36 (3.65) | 8.25 (3.03) | 6.01 (2.64) | 4.22 (2.27) | 4.34 (2.30) | 5.41 (2.53) | 7.31 (3.04) | **5.92** |
| $T_7$ | Control | Untreated | 11.51 | 11.56 | 12.45 | 12.74 | 13.12 | 13.54 | 13.62 | **12.84** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | (3.52) | (3.49) | (3.66) | (3.70) | (3.74) | (3.81) | (3.02) | |
| **SE(m)+-** | | | **0.02** | **0.04** | **0.08** | **0.13** | **0.14** | **0.12** | **0.11** | |
| **CD at 5%** | | | **NS** | **0.13** | **0.26** | **0.43** | **0.44** | **0.39** | **0.36** | |

* Three times replicated on each treatment, * Figure is parenthesis in square root transformed values

**Table 3.** Mean of aphid population / plant on okra crop against after first and second sprayed of insecticidal treatments

| Treatment No. | Treatment name | Aphid population / plant | | | | | | Pooled Mean |
|---|---|---|---|---|---|---|---|---|
| | | 1 day | 3 day | 5 day | 7 day | 10 Day | 15 day | |
| $T_1$ | Emamectin benzoate 5 SG | 8.45 | 8.67 | 9.13 | 9.57 | 10.67 | 11.10 | **9.60** |
| $T_2$ | Emamectin benzoate 5 SG | 6.83 | 7.48 | 7.93 | 8.21 | 9.45 | 10.11 | **8.33** |
| $T_3$ | Emamectin benzoate 5 SG | 6.96 | 6.87 | 6.13 | 6.84 | 8.60 | 9.31 | **7.45** |
| $T_4$ | Emamectin benzoate 5 SG | 7.00 | 5.87 | 4.90 | 4.82 | 7.57 | 8.64 | **6.46** |
| $T_5$ | Cypermethrin 10EC | 3.32 | 4.50 | 6.46 | 7.52 | 8.03 | 9.75 | **6.60** |
| $T_6$ | Spinosad 45 EC | 7.15 | 5.22 | 4.27 | 3.27 | 5.43 | 7.18 | **5.42** |
| $T_7$ | Control | 10.48 | 11.28 | 11.65 | 11.85 | 12.55 | 12.76 | **11.76** |

## CONCLUSION

The minimum aphid population(5.42 aphid/ plant) was observed in foliar application of treatment ($T_6$) spinosad 45EC @75g a.i./ ha followed by treatment ($T_4$) Emamectin benzoate 5 SG@13 g a.i./ha(6.46aphid/ plant).The maximum 9.60 aphid/ plant was recorded in treatment ($T_1$) Emamectin benzoate 5 SG@8 g a.i./ha.Thus, treatmentspinosad 45EC was found to be the best effective treatment and minimized the aphid population

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