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Efficacy of Spinetoram 12% SC against Fruit Borer and Sucking Pests of Chilli

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An experiment was conducted to evaluate the bio-efficacy of Spinetoram 12% SC (doses viz., 42, 48, 56 and 60 g a.i./ha), with Spinosad 45% SC, Fipronil 5% SC and Novaluran 10% EC against fruit borer and sucking pests of chilli. The spray of Spinetoram at 60 g a.i./ha recorded lowest fruit borer and sucking pests followed by same chemical with dose of 56 g a.i./ha and Spinosad 45 SC at 73 g a.i./ha.

Introduction

Chilli (*Capsicum annum* L.) belonging to family solanaceae is one of the most versatile spices and vegetable grown in India. The main reason for low productivity of this crop is that it suffers heavy losses due to various insect pests. Major Indian chilli growing states are Andhra Pradesh (46%), Karnataka (15%), Maharashtra, Madhya Pradesh, Orissa, West Bengal, Rajasthan and Tamil Nadu. Indian chilli can be grown during the entire year at one or the other part of the country. India exports around 80000 –100000 tons of chillies a year. India exports chillies in the form of dried chillies, chilli powder, picked chillies and chilli oleoresin. Indian chilli is mainly exported to USA, Sri Lanka, Bangladesh, the Middle East and the Far East (Patel and Kumar, 2017). The major insect pest of chilli are thrips (*Scirtothrips dorsalis*, Hood), white fly (*Bemisiatabacis*, Genn) and fruit borer (*Helicoverpa armigera*, Hub), which causes losses ranged from 50-90 per cent (Reddy and Puttaswamy, 1983; Ahmed, 1987; Kandasamy, 1990; Patel and Kumar, 2017). Farmers rely on only the chemical insecticides for the management of pests which cause development of resistance in pest & leave residual toxicity in the fruits. The present study was under taken to evaluate the bio-efficacy of Spinetoram 12% SC & Spinosad 45% SC, derived from the *Saccharopolyspora spinosa* (actinomycetes) along with conventional insecticides against fruit borer and thrips.

Materials and Methods

The experiments were conducted during kharif 2008-09 and 2009-10 at Agricultural Research Station, Mandor, Jodhpur in a randomized block design with eight treatments and three replications. The seedlings of chilli variety Rch-1 were transplanted in 4.5 X 4.5 m plot size with 45 X 45 cm spacing. The treatments were Spinetoram 12 SC @ 42, 48, 56 and 60g a.i./ha, Spinosad 45% SC @ 56 g a.i./ha, Fipronil 5% SC @ 50g a.i./ha and Novaluran 10% EC @ 75 g a.i./ha with control. Need based sprays of the above mentioned insecticides were given at proper pest population build up stage. The observation were recorded one day before and 3 & 10 days after spray for fruit borer and 75 days & 120 days after transplanting for leaf curl incidence.

Results and Discussion

The fruit borer infestation and leaf curl incidence per cent under different treatments are presented in Table 1 & 2.

Table 1. Efficacy of Spinetoram 12 % SC against fruit borer & sucking pests of chilli (2009-10)

| Treatments | Dose g ai/ha | Fruit borer infestation Larval count/ plant* | | | Leaf curl incidence (%) ** | | Fruit Damage (%) ** | Green fruit yield (q/ha) |
|--------------------|--------------|---|----------------|----------------|----------------------------|------------------|---------------------|--------------------------|
| | | IV spray (different intervals) | | | 75 DAT | 120 DAT | | |
| | | Pre treat. | 3 DAS | 10 DAS | | | | |
| Spinetoram 12 % SC | 42 | 1.26 (1.32) | 0.86 (1.17) | 0.56 (1.03) | 24.44 (29.55) | 28.88 (32.45) | 12.00 (20.22) | 44.61 |
| Spinetoram 12 % SC | 48 | 1.37 (1.36) | 0.83 (1.15) | 0.53 (1.01) | 21.11 (27.24) | 25.55 (30.28) | 8.66 (17.09) | 49.22 |
| Spinetoram 12 % SC | 56 | 1.23 (1.31) | 0.53 (1.01) | 0.26 (0.87) | 16.66 (23.90) | 19.99 (26.51) | 4.66 (12.42) | 65.84 |
| Spinetoram 12 % SC | 60 | 1.26 (1.33) | 0.36 (0.92) | 0.23 (0.85) | 13.33 (21.31) | 15.55 (23.13) | 3.33 (10.40) | 66.18 |
| Spinosad 45 % SC | 73 | 1.30 (1.34) | 0.60 (1.05) | 0.30 (0.89) | 17.77 (24.53) | 21.10 (27.25) | 5.33 (13.17) | 60.91 |
| Fipronil 5 % SC | 50 | 1.20 (1.29) | 0.93 (1.19) | 0.63 (1.06) | 22.21 (28.02) | 26.66 (30.97) | 10.00 (18.38) | 47.08 |
| Novaluron 10% EC | 75 | 1.33 (1.35) | 1.00 (1.22) | 0.66 (1.08) | 25.55 (30.32) | 31.11 (33.77) | 12.66 (20.76) | 44.28 |
| Untreated Check | -- | 1.20 (1.30) | 1.37 (1.36) | 1.43 (1.39) | 34.44 (35.90) | 41.12 (39.86) | 16.67 (23.97) | 40.33 |
| SEm± | -- | 0.07 | 0.06 | 0.05 | 1.92 | 1.99 | 1.26 | 4.44 |
| CD at 5% | -- | 0.21 | 0.20 | 0.15 | 5.83 | 6.05 | 3.82 | 13.46 |
| CV % | -- | 8.95 | 10.26 | 8.42 | 12.07 | 11.31 | 12.80 | 14.70 |

*Values in parentheses are $\sqrt{n+0.5}$ transformations. ** Figures in parentheses are angular values
Larva population is average of 10 plants

Table 2. Efficacy of Spinetoram 12 % SC against fruit borer & sucking pests of chilli (2008-09)

| Treatments | Dose g ai/ha | Fruit borer infestation Larval count/ plant* | | | Leaf curl incidence (%) ** | | Fruit Damage (%) ** | Green fruit yield (q/ha) |
|--------------------|--------------|---|----------------|----------------|----------------------------|------------------|---------------------|--------------------------|
| | | IV spray (different intervals) | | | 75 DAT | 120 DAT | | |
| | | Pre treat. | 3 DAS | 10 DAS | | | | |
| Spinetoram 12 % SC | 42 | 0.93 (1.19) | 0.76 (1.12) | 0.50 (0.99) | 22.21 (28.02) | 27.77 (31.68) | 10.00 (18.37) | 43.79 |
| Spinetoram 12 % SC | 48 | 1.00 (1.22) | 0.66 (1.08) | 0.43 (0.96) | 19.96 (26.51) | 23.33 (28.84) | 8.00 (16.35) | 47.57 |
| Spinetoram 12 % SC | 56 | 0.96 (1.21) | 0.53 (1.02) | 0.23 (0.85) | 15.55 (23.02) | 17.77 (24.84) | 5.33 (13.29) | 64.53 |
| Spinetoram 12 % SC | 60 | 0.87 (1.16) | 0.43 (0.96) | 0.16 (0.82) | 12.22 (20.42) | 14.44 (22.30) | 4.00 (11.28) | 67.49 |
| Spinosad 45 % SC | 73 | 1.00 (1.22) | 0.56 (1.03) | 0.26 (0.87) | 16.66 (23.80) | 18.89 (25.68) | 6.00 (14.05) | 59.26 |
| Fipronil 5 % SC | 50 | 0.90 (1.18) | 0.70 (1.09) | 0.56 (1.03) | 21.10 (27.24) | 24.44 (29.46) | 7.33 (15.67) | 48.40 |
| Novaluron 10% EC | 75 | 0.86 (1.16) | 0.80 (1.14) | 0.53 (1.01) | 23.33 (28.84) | 28.88 (32.41) | 11.33 (19.61) | 43.46 |
| Untreated Check | -- | 0.93 (1.19) | 1.10 (1.26) | 1.20 (1.30) | 21.11 (33.89) | 38.88 (38.56) | 14.66 (22.37) | 38.68 |
| SEm± | -- | -- | 0.037 | 0.044 | 1.57 | 2.03 | 1.39 | 43.43 |
| CD at 5% | -- | NS | 0.11 | 0.13 | 4.75 | 6.15 | 4.23 | 13.17 |
| CV % | -- | 8.26 | 5.97 | 7.85 | 10.25 | 12.04 | 14.76 | 14.56 |

*Values in parentheses are $\sqrt{n+0.5}$ transformations. ** Figures in parentheses are angular values
Larva population is average of 10 plants

Perusal of data revealed that third day after spray, the minimum larval population was recorded in Spinetoram 12 SC @ 60 g a.i./ha which was found to be most effective in reducing larval population (0.36 larva/plant). It was found at par with its dose 56 g a.i./ha and Spinosad 45% SC @ 73 g a.i./ha. The next best treatment in order of effectiveness were the Spinetoram 12 SC @ 48 and 42 g a.i./ha. All the insecticides were found significantly superior over control in reducing larval population of fruit borer.

Ten days after spray of insecticides, Spinetoram 12 SC @ 60 g a.i./ha (0.23 larva/plant) was at par with Spinetoram 56 g a.i./ha (0.26 larva/plant) and Spinosad 45% SC dose 73 g a.i./ha (0.30 larva/plant). The maximum population (1.43 larva/plant) was recorded in untreated control. The percent leaf curl incidence was recorded after 75 and 120 days after transplanting the chilli crop.

After 75 days after transplanting the per cent leaf curl incidence was ranged from 13.33 to 34.44. the minimum 13.33 per cent leaf curl incidence recorded in spinetoram 12 SC @ 60g a.i./ha; which was found at par with its dose 56g a.i. /ha and spinosad 45 SC dose 73g a.i. /ha. The highest per cent leaf curl incidence was recorded in untreated control which was 34.44 per cent.

After 120 days of transplanting, the per cent leaf curl incidence in untreated control was as high as 41.12. The minimum 15.55 per cent leaf curl incidence was recorded in Spinetoram 12 SC @ 60 g a.i./ha which was found at par with its dose 56 g a.i./ha and Spinosad 45 SC dose 73 g a.i./ha.

The per cent fruit damage ranged from 3.33 to 16.67. The minimum 3.33, 4.66 and 5.33 percent fruit damage were recorded in Spinetoram 12 SC @ 60 g a.i./ha, 56 g a.i./ha and spinosad 45 SC @ 73 g a.i. /ha, respectively. These treatments were found at par with each other. The highest 16.67 per cent damage was recorded in untreated control.

The highest 66.18 q/ha green fruit yield was recorded in Spinetoram 12 SC @ 60 g a.i./ha which was found at par with Spinetoram 12 SC @ 56 g a.i./ha and Spinosad 45 SC @ 73 g a.i./ha. The minimum green fruit yield was recorded in untreated control (40.33q/ha). Earlier Prasad and Ahmad (2009) reported the effectiveness of Spinosadin in reducing the population of *Scirtothrips dorsalis*. Later, Jadhao et al. (2015) also reported that Spinosad 45 SC @ 0.018% was most effective to reduce the thrips population (67.3%) and it gave highest marketable green chilli yield (9.98 t/ha).

Conclusion

The spray of Spinetoram 12 SC @ 60 g a.i./ha can be used to control fruit borer and sucking pests of chilli under Rajasthan conditions.

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