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Bio-efficacy of Econeem® plus against thrips in rose under field conditions

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Abstract
A field experiment was conducted to evaluate the Bio-efficacy of foliar spray of Econeem® Plus (Azadirachtin 10,000 ppm) formulation against Thrips in Rose. The influence of two concentrations of Econeem® Plus *viz*. 2.5 ml and 3 ml/L were tested with and without addition of Ecospread TM at the rate of 0.5 ml/L. The bio-efficacy results revealed that Econeem® Plus is effective against rose thrips and addition of Ecospread at 0.5 ml/L further improves the efficacy. The percentage reduction of thrips after 10 days of first and second spray of Econeem® Plus (3ml/L) in combination with Ecospread TM (0.5 ml/L) indicated 72.3% and 91.1% reduction of thrips population respectively over untreated control. The phytotoxicity study also reveals that the product is safe for rose plants and effectively controls the target pest i.e., rose thrips.

Keywords: Rose, thrips, Econeem® Plus, Ecospread™, bio-efficacy

Introduction
Rose (Rosa spp.) is one of the most popular flowering shrubs in India as well as in other countries. Roses have been cultivated in gardens for centuries as vines, shrubs, specimen plants, ground-covers and container-plants. Commercial rose cultivation under open-field and protected structures is gaining importance with area under its cultivation increasing area day by day. There is a need to provide adequate protection against various insect pests to improve quality and yield of the flowers. A large number of insects attack different parts of the rose plant from the very early stages of growth. The most common pests are thrips, aphids, scales, chaffers, termites, whiteflies, leafhoppers, mites etc. Among these pests, thrips (*Scirtothrips dorsalis* Hood) is very important causing damage in the plants (Ananthakrishnan and Jagdish, 1968; Nair *et al*, 1991; Onkarappa and Mallik, 1998) [1, 5, 6].

The larvae and adults of thrips *S. dorsalis* cause damage at all the stages in flower development (Murugan, 2000) [4]. *Scirtothrips dorsalis* alone can cause 28-95% damage (Gahukar, 2003) [2]. Due to extensive cultivation of rose by humans, the crop now needs to be managed using less pollutant chemicals. Pest resurgence due to improper use of pesticides and lack of knowledge with farmers about ill effects of chemical pesticides on food, water and environment as well as carcinogenic effects on human beings urged the researcher to find out alternative eco-friendly management strategy, instead of using synthetic insecticides to control these devastating pests. The present investigation focuses on the environmental friendly approach using bio-pesticides/plant extract which are target specific and easily bio- degradable with lesser residual effect to combat thrips population in rose.

Materials and methods
The present field experiment was conducted at Nallur Village, Dist. Bangalore Rural, Karnataka during 2019-20 to evaluate the Bio-efficacy of Econeem® Plus against Thrips in Rose under field conditions.

Econeem® Plus is a neem based bio-pesticide with a blend of 10,000 ppm Azadirachtin (1%) and neem oil, providing all the liminoids for effective insecticidal action. Ecospread™ is silicon based non-ionic adjuvant specially designed for instant and uniform spreading of spray solution on plant surfaces and acts both an emulsifier and surfactant.

The experiment was laid out in randomized complete block design. There were five treatments including control and each treatment was replicated four times. A well-defined neem product formulation Econeem® Plus was used in this study. The treatments comprise of Econeem® Plus at different concentrations *viz*., 2.5 and 3ml/L; Econeem® Plus + Ecospread™ at 2.5 +0.5

ml/L and 3 +0.5 ml/L which were compared with an untreated control (water spray). All together there were 20 plots with plot size of 3.6 x 3 m each. Row to row and plant to plant distance was maintained at 90 cm by 60 cm respectively. All agronomic practices were followed as per the normal farmer practice.

The treatments were imposed when the population of thrips reached the economic threshold level. The Economic threshold level for sucking insect pests were considered as 8-10 thrips per leaf. Spray applications were made with hand operated knapsack sprayer. Observations on number of thrips were made on the day of treatment (Pre-count) and at 3, 5, 7 and 10 days after treatment. Thrips (nymphs and adults) counts were recorded in five randomly-selected plants in each replication, on every date of observation. On each plant, three partially-opened flowers (one each from top, middle and bottom of the canopy), three young shoots (one each from top, middle and bottom of the canopy) and three young leaves (one each from top, middle and bottom of the canopy) were selected (Jayalaxmi *et al*, 2011) [3].

The flowers, shoots and leaves were shaken against a white card-board sheet (0.3×0.3m) separately, and the thrips that fell onto the sheet were counted separately for each part, and averaged per plant. Observations were repeated for five plants, and numbers of thrips were averaged. The data was subjected to ANOVA after square root transformation.

Phytotoxicity observations

At ten days interval two foliar applications were made on healthy plants. The phytotoxic effects such as chlorosis, tip burning, necrosis and epinasty were recorded on 0-10 scale for all the treatments.

Results and Discussion

Bio-efficacy of Econeem® Plus against Thrips

Whitefly control after 1st spray

At pre-count the mean population of Thrips ranged between 18.35 to 19.15 per three partially-opened flowers (one each from top, middle and bottom of the canopy), three young shoots (one each from top, middle and bottom of the canopy) and three young leaves (one each from top, middle and bottom of the canopy). Thrips population decreased with time after application in all the treatment except in control Treatment (Treatment 5) where there was an increase in population with time. All the treatments with Econeem® Plus were effective in reducing thrips population. At 10 day after first spray Econeem® Plus @ 3 ml/ ltr + Ecospread @ 0.5 ml/ltr resulted in maximum reduction of thrips population (Table 1).

Table 1: Evaluation of Econeem® Plus against Thrips (First spray)

Tr. No	Treatment Details	Mean number of Thrips population per organ (Bud/ Shoot/ Leaf)				
		Pre count	3 DAS	5 DAS	7 DAS	10 DAS
T1	Econeem® Plus	18.80 (4.37)	11.80 (3.49)	9.60 (3.17)	7.90 (2.87)	8.64 (2.99)
T2	Econeem® Plus	18.35 (4.34)	11.90 (3.52)	8.65 (3.01)	7.23 (2.77)	9.25 (3.12)
T3	Econeem® Plus + Ecospread	18.60 (4.36)	10.70 (3.33)	9.25 (3.12)	7.50 (2.80)	8.70 (3.03)
T4	Econeem® Plus + Ecospread	19.05 (4.42)	11.20 (3.42)	8.35 (2.96)	7.35 (2.79)	7.25 (2.78)
T5	Untreated Control	19.15 (4.42)	20.40 (4.56)	22.15 (4.74)	24.95 (5.07)	26.15 (5.16)
SEm		NS	0.18	0.19	0.20	0.14
CD @ 5%			0.57	0.59	0.60	0.43
CV (%)			8.88	9.92	10.64	7.28

*DAS- Days after spray

Figures in the parentheses are √(x+0.5) transformed values

Thrips control after Second spray

Data on thrips population ten days after second spray shows that, all the treatments with Econeem® Plus resulted in significant control compared to control. Econeem® Plus @ 3ml/ ltr + Ecospread @ 0.5 ml/ltr resulted in maximum control of thrips (Table 2).

Table 2: Evaluation of Econeem® Plus against Thrips (Second spray)

Tr. No	Treatment Details	Mean number of Thrips population per organ (Bud/ Shoot/ Leaf)			
		Second spray			
		3DAS	5 DAS	7 DAS	10 DAS
T1	Econeem® Plus	6.55 (2.64)	6.30 (2.60)	4.40 (2.20)	4.35 (2.20)
T2	Econeem® Plus	6.20 (2.57)	5.50 (2.44)	4.80 (2.29)	4.33 (2.19)
T3	Econeem® Plus + Ecospread	6.35 (2.61)	5.60 (1.47)	4.80 (1.30)	2.45 (1.71)
T4	Econeem® Plus + Ecospread	6.10 (2.56)	5.35 (2.39)	4.40 (2.21)	2.13 (1.61)
T5	Untreated Control	26.70 (5.20)	26.70 (5.20)	27.45 (5.28)	29.05 (5.42)
SEm		0.19	0.18	0.08	0.16
CD @ 5%		0.60	0.57	0.25	0.50
CV (%)		11.00	10.86	5.04	10.96

The percent reduction of Thrips at 10 days after first and second spray shows that, Econeem® Plus @ 3ml/ ltr + Ecospread @ 0.5 ml/ltr resulted in 72.3% and 91.1% reduction over control (Table 3).

Table 3: Percent Reduction of Thrips at 10 days after first and second spray

Sl. No	Treatments	Dosage	Percent Reduction of Thrips population at 10 days after spray	
			First Spray	Second Spray
1	Econeem® Plus	2.5 ml/ Ltr	67.0	83.6
2	Econeem® Plus	3.0 ml/ Ltr	64.6	83.7
3	Econeem® Plus + Ecospread	2.5 ml/ Ltr+ 0.5 ml/ Ltr	66.7	90.0
4	Econeem® Plus + Ecospread	3 ml/ Ltr + 0.5 ml/ Ltr	72.3	91.1
5	Untreated Control	--	--	--

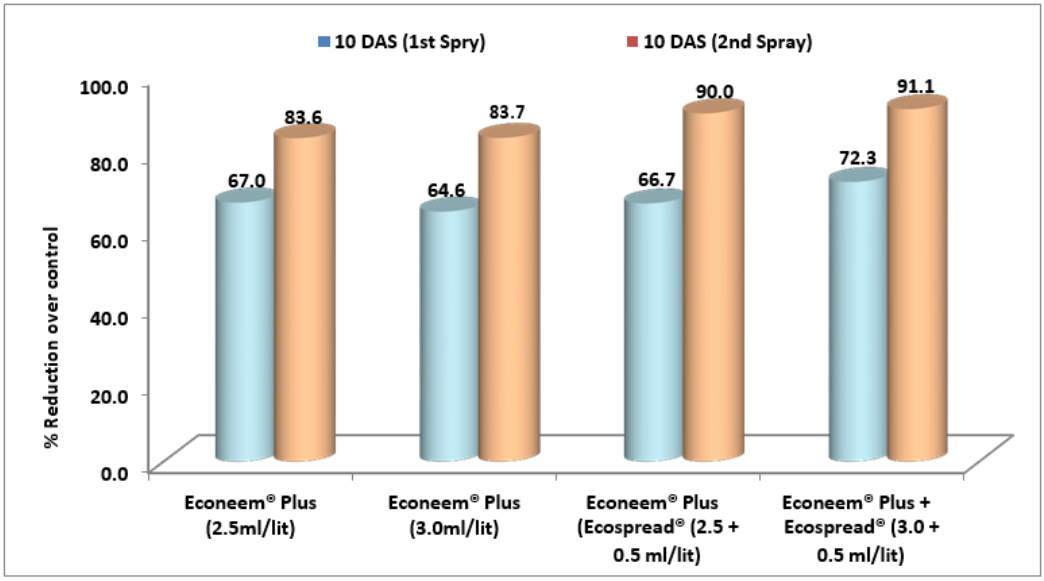

Fig 1: Percent reduction of thrips population at 10 days after first and second spray

Phytotoxicity

The treatments did not resulted in any phytotoxic symptoms on young stem, leaves or flower after two successive sprays even 10 days after second treatment.

Conclusions

Based on field study results it can be concluded that, Econeem® Plus is effective against rose thrips at the dosage of 2.5 to 3 ml/ ltr. Addition of Ecospread @ 0.5 ml increases the efficacy of Econeem® plus further resulting in effective control of thrips.

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