



## EFFECT OF NEWER INSECTICIDES AGAINST THE MAJOR INSECT PESTS OF GROUNDNUT

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### ABSTRACT

Efficacy of some newer insecticides were tested against the groundnut leaf miner *Aproaerema modicella* (Deventer), tobacco caterpillar *Spodoptera litura* (F), gram pod borer *Helicoverpa armigera* (Hubner) and natural enemies (coccinellids) of groundnut. Tolfenpyrad @ 2.5ml/ l was significantly superior in controlling defoliator pests. The next best treatments were tolfenpyrad @ 2ml/ l, spinetoram @ 0.5ml/l, tolfenpyrad @ 1.5ml/ l, thiamethoxam+ lambdacyhalothrin @ 0.4ml/ l. The highest incremental cost benefit ratio (ICBR) was obtained in the treatments with tolfenpyrad @ 2.5ml/ l.

**Key words:** Efficacy, groundnut, *Aproraema modicella*, *Spodoptera litura*, *Helicoverpa armigera*, natural enemies, coccinellids, insecticides, defoliator pests, tolfenpyrad, spinetoram, incremental cost benefit ratio (ICBR)

*Arachis hypogaea* L., groundnut, is grown in tropical and subtropical regions all over the world, it is a widely grown oilseed crop in India. There are a number of factors limiting groundnut output, but insect pests provide the most risk. Among the different insect pests leaf miner *Aproaerema modicella* (Deventer), tobacco caterpillar *Spodoptera litura* (Fabricius), *Thrips palmi* (Karni), *Scirtothrips dorsalis* (Hood), jassids *Empoasca Kerri* (Pruthi), termite *Odontotermis obesus* (Rambur) causes most of the damage as reported by Atwal and Dhaliwal, 2008. Defoliators cause direct damage to foliage by voracious feeding on it, and they feed on chlorophyll content, which drastically reduces the yield. *H. armigera* and *S. litura* are reported to cause damage to more than 180 crops. Chemical management is mostly preferred by the farmers therefore, the present work was conducted to find out the effective chemical against the defoliator pests and safer to the natural enemies.

### MATERIALS AND METHODS

The field experiment was carried out at the Regional Agricultural Research Station, Palem. PJTSAU, Nagarkurnool district during the rabi, 2021-22. Groundnut variety K-6 was grown in 5×5 m<sup>2</sup> area of plots with 22.5×10 cm spacing. The experiment

was taken up with 8 treatments and 3 replications in a randomized block design (RBD) to investigate the efficacy of different insecticides like tolfenpyrad @ 1.5 ml/ l and tolfenpyrad @ 2 ml/ l, tolfenpyrad @ 2.5 ml/ l, spinetoram @ 0.5 ml/l, thiamethoxam + lambdacyhalothrin @ 0.4 ml/ l, clothianidin @ 0.3g/ l, afidopyropen @ 2 ml/ l and sulfoxaflor @ 0.5 ml/ l. Two sprays were taken, and the first spray was given after the pest reached ETL. The periodic observations on *A. modicella* (No. of webs/plant), *S. litura* (No. of larvae/plant), *H. armigera* (No. of larvae/plant) and coccinellids. The observations on insect pests population and coccinellids were recorded on 1 day before the spray and 1, 3, 5 and 7 days after the spray and pooled mean of two sprays were used. OPSTAT was used to analyze the data. Using the Poisson formula  $\sqrt{X+0.5}$ , the average number of defoliators was square root transformed.

Per cent reduction over control (PRC %) of insect pest population in treatments over control was estimated by using the formula of Abbott (1925).

### RESULTS AND DISCUSSION

The mean reduction over control after first and second spray against *A. modicella* revealed that among



all the treatments tested tolfeprad @ 2.5 ml/ l was most effective in the reduction of leaf miner population (85.6%). Further the order of superiority was tolfeprad @ 2.0 ml/ l (81.3%), spinetoram @ 0.5 ml/ l (80.1%). Sulfoxaflor @ 0.5 ml/ l with 47.7% PRC showed least effect on the leaf miner incidence (Table 1). The observations on the incidence of *S. litura* revealed that there was more reduction of the larvae by the spray of tolfeprad @ 2.5 ml/ l (83.5%), followed by tolfeprad @ 2.0 ml/ l (80%), spinetoram @ 0.5 ml/ l (77.6%), tolfeprad @ 1.5 ml/ l (74.0%). Maximum incidence of *S. litura* larvae was observed in the plots sprayed with sulfoxaflor @ 0.5 ml/ l (43.5%). The data of mean reduction over control from both the sprays revealed that tolfeprad @ 2.5 ml/ l (77.8%) PRC was found more effective than other chemicals on the incidence of *H. armigera*.

The pooled mean from both the sprays revealed that the plots sprayed with tolfeprad @ 1.5 ml/ l had comparatively a greater number of coccinellids with 1.25 adults/plant followed by tolfeprad @ 2.0 ml/ l (1.11 adults/ plant), tolfeprad @ 2.5 ml/ l (1.01 adults/ plant), spinetoram @ 0.5 ml/ l (0.98 adults/plant). Whereas the treatments sulfoxaflor @ 0.5 ml/ l had less number of coccinellids incidence (0.58 adults/ plant). The data pertaining to incremental cost-benefit ratio (ICBR) of the different insecticides against defoliator pests of groundnut. From the different treatments the highest ICBR was obtained by the spraying tolfeprad @ 2.5 ml/ l (1:4.88), followed by tolfeprad @ 2.0 ml/ l (1: 4.60) and spinetoram @ 0.5 ml/ l (1:4.38) which were effective in controlling leaf miner, *S. litura* and *H. armigera*. While clothianidin @ 0.3g/l (1:4.83), and afidopyropen @ 2 ml/ l (1:3.94) the ICBR was comparatively high wherein these treatments were superior in controlling defoliator pests.

The present findings are in line with Raut et al. (2021) who found that spinetoram 11.7SC was effective in the reduction of leaf miner population and there was a minimum reduction of 9.78% by the spray of spinetoram. Hafsi et al. (2012) observed that spinetoram was effective in minimizing the population of leaf miner and it was found as effective chemical compared to others. Hanafy and Sayed (2013) revealed that spinetoram was proved to be highest efficacy in controlling the leaf miner incidence. Narendra et al. (2018) found that the spray of tolfeprad 15 % EC was proved to be effective against the tobacco caterpillar. Veeranna (2020) reported that spinetoram @ 0.5 ml/ l was superior in controlling defoliators of sunflower.

According to Navya et al. (2021) spinetoram @ 0.7 ml/ l and 0.5 ml/ l recorded lower incidence of *S. litura* with 0.17 and 0.25 larvae/ mrl. Spinetoram was found to be more effective in the reduction of *S. litura* larval population in soybean Bokan et al. (2021). The results are also in line with Jat et al. (2016) who revealed that the spraying of spinetoram resulted in the less incidence of the larvae of *H. armigera*. Aftab et al. (2020) found that the *H. armigera* was reduced by (82.28%) by the spray of spinetoram. Dharne and Bagde (2011) tested the efficacy of spinetoram against the *H. armigera* and reported that spinetoram @ 60g a.i / ha showed much effective on the larvae of *H. armigera*. Navya et al. (2021) revealed that spinetoram @ 0.7 ml/ l and 0.5 ml/ l presented a little effect on the natural enemy population. Vishnupriya and Mutukrishnan found that the plots sprayed with spinetoram @ 36 g a.i./ ha and 45 g a.i./ ha<sup>1</sup> had a greater number of coccinellids in comparison to other treatments. Mallick et al. (2016) tested different dosages of tolfeprad @ 125 and 150 g a.i./ ha and concluded that tolfeprad had a little effect on the natural enemies. Based on the results obtained the best treatment in controlling defoliators (*A. modicella*, *S. litura* and *H. armigera*) was tolfeprad @ 2.5 ml/ l followed by tolfeprad @ 2.0 ml/ l and spinetoram 0.5 g/ l. The % reduction of *A. modicella*, *S. litura* and *H. armigera* over the control was highest by spraying of tolfeprad @ 2.5 ml/ l, tolfeprad @ 2 ml/ l and spinetoram @ 0.5 ml/ l. The incremental cost-benefit ratio (ICBR) of the different insecticides against the major defoliator pests of groundnut revealed the among different treatments the highest ICBR was obtained by the spraying tolfeprad @ 2.5 ml/ l.

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#### AUTHOR CONTRIBUTION STATEMENT

PN conducted the experiment and wrote the manuscript. SO designed the research. DRV and AM provided the seed material for conducting the

experiment. R helped in statistical analysis of data. All the authors read and approved the manuscript.

### CONFLICT OF INTEREST

No conflict of interest.

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