

Original Research Article

Efficacy of newer insecticides against the major sucking pests of groundnut (*Arachis hypogea* L.)

ABSTRACT

The field experiments on the efficacy of newer insecticides on sucking insect pests of groundnut was conducted at Regional Agricultural Research Station, Palem, of Nagarkurnool district, Telangana, India during rabi, 2021-22 in a randomized block design with eight treatments viz., Tolfenpyrad 15 %EC @ 1.5ml L⁻¹ and Tolfenpyrad 15% EC @ 2 ml L⁻¹, Tolfenpyrad 15% EC @ 2.5ml L⁻¹, Spinetoram 11.7% SC @ 0.5ml L⁻¹, Thiamethoxam 12.6+ Lambda-cyhalothrin 9.5% ZC @ 0.4ml L⁻¹, Clothianidin 50% WDG @ 0.3g L⁻¹, Afidopyropen 50g/IDC @ 2ml L⁻¹ and Sulfoxaflor 21.89% SC @ 0.5ml L⁻¹. Among all the tested insecticides tested clothianidin @ 0.3g L⁻¹ worked very effectively in reducing the population of leafhoppers and thrips. Further, the next best other effective treatments were afidopyropen @ 2ml L⁻¹ and tolfenpyrad @ 2.5ml L⁻¹. Followed by tolfenpyrad 15 %EC @ 2.5ml L⁻¹, tolfenpyrad @ 2.5ml L⁻¹, thiamethoxam+ lambda-cyhalothrin @ 0.4ml L⁻¹. The treatment spinetoram @ 0.5ml L⁻¹ was less effective on the sucking pest. The highest ICBR is recorded from the plots sprayed with clothianidin @ 0.3g L⁻¹ (1.4.83) followed by afidopyrofen @ 2ml L⁻¹ (1:3.94).

Comment [MB1]: PL expand

Key words: Bio-efficacy, Newer insecticides, Groundnut, Sucking pests, Leafhoppers, Thrips, Newer insecticides, Sucking pests etc.

1. INTRODUCTION

Groundnut (*Arachis hypogea*) L. is a member of the Fabaceae or Leguminosae family of legumes. It's also a popular oilseed crop in tropical and subtropical areas around the world (10) and among oilseeds, groundnut has first place in the country. It's referred to as the "King of Oil Seeds." It is native to South America. The major groundnut-producing countries are China, Nigeria, the USA, Taiwan, Indonesia, Ghana, Argentina, and Brazil. And in India it is mainly produced in states like Gujarat, Andhra Pradesh, Karnataka, Telangana Tamil Nadu, Rajasthan, and Maharashtra. China produces the most groundnuts (17.39 million hectares), followed by India (6.70 million tonnes). In India, over 4.76 lakh ha were planted in 2021, with Karnataka leading the way with 1.32 lakh ha, followed by Telangana (0.87 lakh ha). (2). There are several constraints for the low productivity of groundnut and the biggest threat is due to major insect pests. Among them 13 species of sucking insect s which would damage the crops are recorded (5). The major sucking insect pest complex of groundnut includes thrips, (*Scirtothrips dorsalis* Hood), (*Frankliniella schultzei* Trybom), (*Thrips palmi* Karny), (*Caliothrips indicus* Bagnall), leafhopper, (*Empoasca kerri* Pruthi); aphid, (*Aphis craccivora*. Koch). Aphids are vectors for groundnut rosette virus and peanut mottle virus, resulting in a 40% loss (7), and thrips acts as vectors for peanut bud necrosis. The indiscriminate use of chemicals for control causes the resistance, resurgence of the pests, and secondary pest outbreaks, and they are more persistent. There is a need to use the insecticides in a right time, and in right doses, and right direction. Therefore, a following study was taken up by using to evaluate the efficacy of the a few newer insecticides which are having multiple mode of action were evaluated and their efficacy is tested against sucking pests of groundnut.

2. MATERIALS AND METHODS

The experiment was conducted at Regional Agricultural Research Station, Palem, PJTSAU, Nagarkurnool district during the *rabi*, 2021-22. Groundnut variety K-6 was raised-grown with 22.5x10cm spacing in 3x3m² area of plots with 22.5x10cm spacing. All the standard agronomic practices were followed for raising the crop.

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The experiment was laid out with eight treatments and three replications in a randomized block design to investigate the efficacy of different insecticides like tolfenpyrad @ 1.5ml L⁻¹ and tolfenpyrad @ 2 ml L⁻¹, tolfenpyrad @ 2.5ml L⁻¹, spinetoram @ 0.5ml L⁻¹, thiamethoxam + lambda-cyhalothrin @ 0.4ml L⁻¹, clothianidin @ 0.3g L⁻¹, afidopyropen @ 2ml L⁻¹ and sulfoxaflor @ 0.5ml L⁻¹. Two sprays were given first spray was given after the pest reached ETL. The periodic observations were taken on leafhoppers (No. leafhoppers/3 leaves/plant) and thrips (No. thrips/plant). The observations on insect pests population was recorded on one day before the spray and 1, 3, 5 and 7 days after the spray.

Comment [MB3]: When was the 2nd spray applied?

Comment [MB4]: PI expand PI also mention the ETL parameter

The data was analyzed by using OPSTAT. The average square root transformed value of no. of sucking pests by using the Poisson formula $\sqrt{X+0.5}$ no. of defoliators and sucking pests were used for data analysis. square root transformed by using the Poisson formula $\sqrt{X+0.5}$.

Comment [MB5]: ?

The per cent reduction (PRC %) of insect pest population in treatments over control was estimated by using the formula given by Abbott (1).

$$\text{Population reduction} = \frac{\text{Population in the untreated plot} - \text{population in the treated plot}}{\text{Population in the untreated check}} \times 100$$

3. RESULTS AND DISCUSSION

3.1 Efficacy of different insecticidal treatments on leafhoppers, *Empoasca kerrikerri*

3.1.1 First spray

Data from the table suggests that the population of leafhoppers is uniformly distributed and found to be non significant among the treatments (Table 1). The pre count was ranging from 3.00 to 3.67 leafhoppers/3 leaves. The spray of clothianidin @ 0.3g L⁻¹ registered the least number of leafhoppers with 0.95 leafhoppers/3 leaves. Followed by afidopyropen @ 2ml L⁻¹ with 1.06 leafhoppers/3 leaves and tolfenpyrad @ 2.5ml L⁻¹ with 1.24 leafhoppers/3 leaves. Further, the best other effective treatments were tolfenpyrad @ 2 ml L⁻¹ (1.41 leafhoppers/3 leaves), tolfenpyrad @ 1.5 ml L⁻¹ (1.56 leafhoppers/3 leaves), sulfoxaflor @ 0.5ml L⁻¹ (1.69 leafhoppers/3 leaves), thiamethoxam+ lambda-cyhalothrin @ 0.4ml L⁻¹ (1.93 leafhoppers/3 leaves). There was more survival of leafhoppers in the plots sprayed with spinetoram @ 0.5g L⁻¹ with 2.09 leafhoppers/3 leaves according to the pooled mean observation on 1, 3, 5 and 7 days after the spray.

Comment [MB6]: PI write it as minimum population reduction

The per cent reduction over the control showed that clothianidin @ 0.3g L⁻¹ with 77.5% was found to be most effective on leafhoppers followed by afidopyropen @ 2ml L⁻¹ (74.6%), tolfenpyrad @ 2.5ml L⁻¹ (67.9%), tolfenpyrad @ 2 ml L⁻¹ (64.1%), tolfenpyrad @ 1.5 ml L⁻¹ (59.1%), sulfoxaflor @ 0.5ml L⁻¹ (57.1%), thiamethoxam+ lambda-cyhalothrin @ 0.4ml L⁻¹ (54.8%). Spinetoram @ 0.5g L⁻¹ (46.6%) found to be less effective in the controlling leafhoppers (Table 1).

Comment [MB7]: Please don't repeat all the data from the table in the text. Only the most effective and the least effective may be mentioned.

3.1.2 Second spray

The results from the efficacy of insecticides on the leafhoppers after the second spray **resulted indicated** that there was no significant difference between the treatments one day before the spray. The treatment clothianidin @ 0.3g L⁻¹ was found significantly superior among all the treatments in the suppression of the leafhoppers population with 0.70 leafhoppers/3 leaves. The next effective treatments were afidopyropen @ 2ml L⁻¹ with 0.82 leafhoppers/3 leaves and tolfenpyrad @ 2.5ml L⁻¹ with 1.03 leafhoppers/3 leaves. Followed by the treatments tolfenpyrad @ 2 ml L⁻¹ (1.18 leafhoppers/3 leaves), tolfenpyrad @ 1.5 ml L⁻¹ (1.28 leafhoppers/3 leaves), sulfoxaflor @ 0.5ml L⁻¹ (1.47 leafhoppers/3 leaves), thiamethoxam+ lambda dacyhalothrin @ 0.4ml L⁻¹ (1.63 leafhoppers/3 leaves). The population was more with 1.67 leafhoppers/3 leaves in the treatment spinetoram @ 0.5 g L⁻¹ (Table 1).

The per cent reduction over the control revealed that clothianidin @ 0.3g L⁻¹ was more effective with 85% in controlling leafhoppers population. The next best treatments were afidopyropen @ 2ml L⁻¹ (82.5%) and tolfenpyrad @ 2.5ml L⁻¹ (77.5%) followed by tolfenpyrad @ 2 ml L⁻¹ (72.5%), tolfenpyrad @ 1.5 ml L⁻¹ (69.2%), sulfoxaflor @ 0.5g L⁻¹ (65%), thiamethoxam+ lambda dacyhalothrin @ 0.4ml L⁻¹ (63.5%). The effectiveness of spinetoram @ 0.5 g L⁻¹ was less on the leafhoppers with 58.2%. The results are in accordance with Kadam *et al.* (4) the spray of clothianidin @ 20 g a.i ha⁻¹ was found to be the most effective chemical on the suppression of sucking pests. Robert *et al.* (9) in **his-their** findings reported that the afidopyrofen was effective **in-against** sucking pests and it was found to be safer to the natural enemies. Pachundkar *et al.* (8) observed that the spray **of** clothianidin @ (0.025%) showed a maximum efficacy in the reduction of the leafhoppers population.

From both sprays it is evident that a similar trend was noticed **after- on** 1, 3, 5 and 7 days after the spray of clothianidin @ 0.3g L⁻¹ **and** was superior **when** compared to other treatments. Further**more**, the order of efficacy was afidopyropen @ 2ml L⁻¹ and tolfenpyrad @ 2 ml L⁻¹. Followed by tolfenpyrad @ 2 ml L⁻¹, tolfenpyrad @ 1.5 ml L⁻¹, sulfoxaflor @ 0.5ml L⁻¹, thiamethoxam+ lambda dacyhalothrin @ 0.4ml L⁻¹. While the efficacy was comparatively less by the spray of spinetoram @ 0.5 g L⁻¹ on the population of leafhoppers.

Comment [MB8]: On which host plant?

Table 1. Effect of different insecticides on the mean population of leafhoppers on groundnut

| Treatments | Dosage | Mean population of leafhoppers/3leaves/plant | | | | | | | | | | | | | |
|--|------------------------|--|-----------------------------|-----------------------------|------------------------------|-----------------------------|-------------|--------------|----------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------|---------|
| | | First spray | | | | | | Second spray | | | | | | | |
| | | Pre count | 1 DAS | 3 DAS | 5 DAS | 7 DAS | Pooled mean | PRC (%) | Pre count | 1 DAS | 3 DAS | 5 DAS | 7 DAS | Pooled mean | PRC (%) |
| Tolfenpyrad 15%EC | 1.5 ml L ⁻¹ | 3.00 (1.73) | 1.67 ^e (1.30) | 1.60 ^d (1.26) | 1.57 ^c (1.25) | 1.40 ^c (1.18) | 1.56 | 59.1 | 2.43 (1.56) | 1.33 ^d (1.15) | 1.30 ^d (1.14) | 1.27 ^d (1.17) | 1.23 ^d (1.11) | 1.28 | 69.2 |
| Tolfenpyrad 15%EC | 2 ml L ⁻¹ | 3.30 (1.81) | 1.50 ^d (1.22) | 1.47 ^c (1.21) | 1.43 ^b (1.19) | 1.23 ^c (1.11) | 1.41 | 64.1 | 2.31 (1.52) | 1.27 ^c (1.17) | 1.20 ^d (1.10) | 1.13 ^c (1.05) | 1.10 ^c (1.04) | 1.18 | 72.5 |
| Tolfenpyrad 15%EC | 2.5 ml L ⁻¹ | 3.03 (1.74) | 1.33 ^c (1.14) | 1.30 ^b (1.14) | 1.23 ^b (1.11) | 1.10 ^c (1.04) | 1.24 | 67.9 | 2.37 (1.54) | 1.13 ^{bc} (1.05) | 1.10 ^c (1.05) | 1.00 ^b (1.01) | 0.90 ^c (0.94) | 1.03 | 77.5 |
| Spinetoram 11.7%SC | 0.5 ml L ⁻¹ | 3.10 (1.76) | 2.40 ^g (1.54) | 2.13 ^f (1.46) | 2.00 ^e (1.41) | 1.83 ^e (1.35) | 2.09 | 46.6 | 2.53 (1.65) | 2.26 ^g (1.50) | 2.10 ^g (1.50) | 1.72 ^f (1.31) | 1.67 ^g (1.29) | 1.67 | 58.2 |
| Thiamethoxam 12.6+ Lambdacyhalothrin 9.5%ZC | 0.4 ml L ⁻¹ | 3.13 (1.76) | 2.20 ^f (1.48) | 2.06 ^e (1.43) | 1.89 ^d (1.37) | 1.55 ^d (1.24) | 1.93 | 54.8 | 2.35 (1.53) | 1.80 ^f (1.34) | 1.65 ^f (1.34) | 1.62 ^e (1.27) | 1.46 ^f (1.21) | 1.63 | 63.5 |
| Clothianidin 50% WDG | 0.3 g L ⁻¹ | 3.37 (1.83) | 1.10 ^a (1.04) | 1.07 ^a (1.03) | 0.87 ^a (0.93) | 0.77 ^a (0.87) | 0.95 | 77.5 | 2.43 (1.56) | 0.83 ^a (0.91) | 0.70 ^a (0.83) | 0.67 ^a (0.80) | 0.60 ^a (0.81) | 0.70 | 85.0 |
| Afidopyropen 50g/IDC | 2 ml L ⁻¹ | 3.67 (1.91) | 1.23 ^b (1.12) | 1.17 ^b (1.08) | 0.97 ^b (0.98) | 0.87 ^b (0.93) | 1.06 | 74.6 | 2.37 (1.54) | 0.97 ^b (0.99) | 0.83 ^b (0.91) | 0.77 ^b (0.87) | 0.70 ^b (0.83) | 0.82 | 82.5 |
| Sulfoxaflor 21.89% SC | 0.5 ml L ⁻¹ | 3.50 (1.87) | 1.83 ^f (1.35) | 1.80 ^d (1.34) | 1.67 ^{cd} (1.29) | 1.47 ^d (1.21) | 1.69 | 57.1 | 2.58 (1.65) | 1.55 ^e (1.23) | 1.50 ^e (1.23) | 1.43 ^d (1.20) | 1.40 ^e (1.18) | 1.47 | 65.0 |
| Control | | 3.07 (1.75) | 3.10 ^h (1.74) | 3.17 ^g (1.77) | 3.30 ^f (1.81) | 3.43 ^f (1.85) | 3.25 | - | 2.41 (1.55) | 2.57 ^h (1.60) | 2.73 ^h (1.64) | 2.87 ^g (1.68) | 4.00 ^h (2.03) | 3.04 | - |
| SEm± | | 0.4 | 0.03 | 0.02 | 0.02 | 0.04 | - | - | 0.9 | 0.04 | 0.02 | 0.03 | 0.02 | - | - |
| C.D. at 5% | | N/S | 0.11 | 0.10 | 0.10 | 0.15 | - | - | N/S | 0.15 | 0.10 | 0.11 | 0.10 | - | - |
| C.V. | | 8.54 | 3.39 | 3.30 | 4.75 | 6.06 | - | - | 4.51 | 3.72 | 3.46 | 3.60 | 4.37 | - | - |

DAS- Days After Spraying

PRC- Per cent Reduction over Control

* Figures in parenthesis are square root transformed

3.2 Efficacy of different insecticidal treatments on thrips, *Scirtothrips dorsalis*

3.2.1 First spray

The results regarding the first spray is presented in (Table 2). The observation on the pre count of thrips population was in the range of 5.11 to 5.24 thrips/plant, and found to be non significant among the treatments (Table 2). The pooled mean estimated results after 1, 3, 5, and 7 days of the spray revealed that there was a higher reduction in the population of thrips by the due to spray of clothianidin @ 0.3g L⁻¹ with 1.08 thrips/plant. Followed by afidopyropen @ 2ml L⁻¹ with 1.19 thrips/plant and tolfenpyrad @ 2.5ml L⁻¹ with 1.30 thrips/plant were found to be further effective treatments. Followed by tolfenpyrad @ 2 ml L⁻¹ (1.41 thrips/plant), tolfenpyrad @ 1.5 ml L⁻¹ (1.51 thrips/plant), sulfoxaflor @ 0.5ml L⁻¹ (1.87 thrips/plant), thiamethoxam+ lamdacyhalothrin @ 0.4ml L⁻¹ (2.58 thrips/plant) and spinetoram 0.5 g L⁻¹ (3.06 thrips/plant).

The maximum per cent reduction (85%) of thrips over the control was observed resulted that in the plots the spraysprayed of with clothianidin @ 0.3g L⁻¹ was and found superior among to all the other treatments, in reducing the population of thrips with 85%. Followed by afidopyropen @ 2ml L⁻¹ (83.3%), tolfenpyrad @ 2.5ml L⁻¹ (81.5%), tolfenpyrad @ 2ml L⁻¹ (79.5%), tolfenpyrad @ 1.5 ml L⁻¹ (78.3%), sulfoxaflor @ 0.5ml L⁻¹ (74.1%), thiamethoxam+ lamdacyhalothrin @ 0.4ml L⁻¹ (62.1%) and spinetoram 0.5 g L⁻¹ (52.8%).

3.2.2 Second spray

The efficacy of different insecticides on the thrips during the second spray resulted indicated that there was at the population ranged between 4.21 to 5.25 thrips/plant during the pre count and treatments had no significant difference between among them. The population of thrips was less in the plots sprayed with clothianidin 0.3g L⁻¹ (1.01 thrips/plant)- the next effective treatments were afidopyropen @ 2ml L⁻¹ (1.28 thrips/plant) and tolfenpyrad @ 2.5ml L⁻¹ (1.45 thrips/plant), tolfenpyrad @ 2 ml L⁻¹ (1.58 thrips/plant). Followed by tolfenpyrad @ 1.5 ml L⁻¹ (1.74 thrips/plant), sulfoxaflor @ 0.5ml L⁻¹ (1.91 thrips/plant) thiamethoxam+ lamdacyhalothrin @ 0.4ml L⁻¹ (2.59 thrips/plant). Whereas spinetoram 0.5 g L⁻¹ (2.94 thrips/plant) proved to be the least effective in the suppression of thrips population (Table 2).

The per cent reduction over control after the seventh day resulted indicated that clothianidin 0.3g L⁻¹ found to be was most effective over other among all the treatments with a reduction of 88.6%. Followed by afidopyropen @ 2ml L⁻¹ (82.1%), tolfenpyrad @ 2.5ml L⁻¹ (80.7%), tolfenpyrad @ 2 ml L⁻¹ (77.8%). Followed by tolfenpyrad @ 1.5 ml L⁻¹ (76.3%), sulfoxaflor @ 0.5ml L⁻¹ (72.9%) thiamethoxam+ lamdacyhalothrin @ 0.4ml L⁻¹ (67.5%). Spinetoram 0.5 g L⁻¹ found less effective with 58.9%. The findings are in line with Duraimurugan and Aivelu (3) who reported that the spray of clothianidin 50 WDG reduced the population of thrips on the castor crop. Sreenivas *et al.* (11) reported that clothianidin @ 60 g a.i. ha⁻¹ found to be more effective on the suppression of thrips. Vijayaraghavan and Kavitha (12) reported that spraying of clothianidin 50 WDG was effective in treating sucking pests on the black gram. Kalyan *et al.* (6) reported that tolfenpyrad 15% EC at 125 and 150g a.i. ha⁻¹ found superior promising in the controlling of sucking pests of cotton.

The overall effect of first and second spray spray resulted that the spray of clothianidin 0.3g L⁻¹ was most effective in controlling of thrips. Further, the The next best effective treatments were afidopyropen @ 2ml L⁻¹, tolfenpyrad @ 2.5ml L⁻¹, tolfenpyrad @ 2 ml L⁻¹. Followed by tolfenpyrad @ 1.5 ml L⁻¹, sulfoxaflor @ 0.5ml L⁻¹, thiamethoxam+ lamdacyhalothrin @ 0.4ml L⁻¹. However, the population of thrips was more in the plots sprayed with spinetoram 0.5 g L⁻¹.

Comment [MB9]: Except the best treatment all the details of pest population under other insecticide treatments may not be repeated in text from the tables. Both the tables 1 & 2

Table 2. Effect of different insecticides on the mean population of thrips on groundnut

| Treatments | Dosage | Mean population of thrips/plant | | | | | | | | | | | | | |
|---|------------------------|---------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------|--------------|----------------|-----------------------------|-----------------------------|------------------------------|------------------------------|-------------|---------|
| | | First spray | | | | | | Second spray | | | | | | Pooled mean | PRC (%) |
| | | Pre count | 1 DAS | 3 DAS | 5 DAS | 7 DAS | Pre count | 1 DAS | 3 DAS | 5 DAS | 7 DAS | | | | |
| Tolfenpyrad 15%EC | 1.5 ml L ⁻¹ | 5.24 (2.29) | 1.70 ^d (1.30) | 1.55 ^c (1.24) | 1.50 ^e (1.21) | 1.30 ^d (1.14) | 1.51 | 78.3 | 4.23 (2.05) | 1.83 ^c (1.35) | 1.80 ^c (1.34) | 1.73 ^c (1.31) | 1.60 ^c (1.30) | 1.74 | 76.3 |
| Tolfenpyrad 15%EC | 2 ml L ⁻¹ | 5.11 (2.25) | 1.53 ^c (1.23) | 1.47 ^c (1.21) | 1.40 ^d (1.18) | 1.23 ^d (1.33) | 1.41 | 79.5 | 4.31 (2.07) | 1.67 ^c (1.29) | 1.60 ^c (1.26) | 1.55 ^c (1.23) | 1.50 ^c (1.22) | 1.58 | 77.8 |
| Tolfenpyrad 15%EC | 2.5 ml L ⁻¹ | 5.20 (2.27) | 1.40 ^c (1.18) | 1.37 ^c (1.17) | 1.33 ^c (1.15) | 1.11 ^c (1.05) | 1.30 | 81.5 | 4.21 (2.15) | 1.60 ^b (1.26) | 1.45 ^c (1.20) | 1.43 ^{bc} (1.19) | 1.30 ^c (1.14) | 1.45 | 80.7 |
| Spinetoram 11.7%SC | 0.5 ml L ⁻¹ | 5.10 (2.24) | 3.26 ^g (1.80) | 3.17 ^e (1.78) | 2.97 ^g (1.72) | 2.83 ^f (1.68) | 3.06 | 52.8 | 5.25 (2.06) | 3.17 ^e (1.78) | 3.03 ^f (1.74) | 2.78 ^f (1.66) | 2.78 ^e (1.66) | 2.94 | 58.9 |
| Thiamethoxam 12.6+ Lambdacyhalotrin 9.5%ZC | 0.4 ml L ⁻¹ | 5.15 (2.27) | 2.80 ^f (1.61) | 2.70 ^d (1.64) | 2.54 ^f (1.59) | 2.27 ^e (1.50) | 2.58 | 62.1 | 4.32 (2.19) | 2.80 ^d (1.61) | 2.77 ^e (1.66) | 2.60 ^{ef} (1.61) | 2.20 ^{de} (1.48) | 2.59 | 67.5 |
| Clothianidin 50% WDG | 0.3 g L ⁻¹ | 5.22 (2.28) | 1.20 ^a (1.10) | 1.13 ^a (1.12) | 1.10 ^a (1.04) | 0.90 ^a (0.94) | 1.08 | 85.0 | 4.37 (2.09) | 1.17 ^a (1.09) | 1.10 ^a (1.04) | 1.00 ^a (1.04) | 0.77 ^a (0.87) | 1.01 | 88.6 |
| Afidopyropen 50g/IDC | 2 ml L ⁻¹ | 5.24 (2.29) | 1.30 ^b (1.14) | 1.25 ^b (1.14) | 1.20 ^b (1.10) | 1.00 ^b (1.01) | 1.19 | 83.3 | 4.37 (2.05) | 1.33 ^b (1.15) | 1.30 ^b (1.14) | 1.27 ^b (1.15) | 1.21 ^b (1.11) | 1.28 | 82.1 |
| Sulfoxaflor 21.89% SC | 0.5 ml L ⁻¹ | 5.20 (2.27) | 2.10 ^e (1.43) | 2.00 ^d (1.41) | 1.83 ^e (1.35) | 1.55 ^e (1.24) | 1.87 | 74.1 | 4.83 (2.08) | 2.20 ^d (1.48) | 2.13 ^d (1.46) | 1.97 ^{cd} (1.41) | 1.82 ^d (1.35) | 1.91 | 73.1 |
| Control | | 5.19 (2.27) | 5.50 ^g (2.34) | 5.70 ^f (2.38) | 5.80 ^h (2.40) | 6.00 ^g (2.44) | 5.75 | - | 4.33 (2.23) | 5.03 ^f (2.24) | 6.33 ^g (2.60) | 6.60 ^g (2.66) | 6.77 ^f (2.70) | 6.18 | - |
| SEm± | | 0.18 | 0.10 | 0.11 | 0.8 | 0.7 | - | - | 0.12 | 0.07 | 0.05 | 0.12 | 0.08 | - | - |
| C.D. at 5% | | N/S | 0.25 | 0.28 | 0.16 | 0.15 | - | - | N/S | 0.23 | 0.18 | 0.37 | 0.27 | - | - |
| C.V. | | 4.21 | 8.02 | 6.43 | 3.73 | 4.03 | - | - | 2.05 | 5.39 | 4.44 | 8.91 | 6.95 | - | - |

DAS- Days After Spraying

PRC- Per cent Reduction over Control

* Figures in parenthesis are square root transformed

4. CONCLUSION

From the present study, it is concluded that the best treatment in controlling sucking pests (leafhoppers and thrips) of groundnut was clothianidin @ 0.3g L⁻¹ followed by afidopyropen @ 2ml L⁻¹, tolfenpyrad @ 2.5ml L⁻¹ when compared to other insecticides. ~~While the per cent reduction of leafhoppers and thrips over control after the seventh day of treatment also resulted indicated~~ that clothianidin 0.3g L⁻¹ ~~found to be~~ was the most effective insecticide over other among the treatments undertaken in the study, followed by afidopyropen @ 2ml L⁻¹, tolfenpyrad @ 2.5ml L⁻¹.

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