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# Management of thrips, *Thrips tabaci* Lindeman (Thripidae: Thysanoptera) infesting cumin

**Elakkiyaa U, KD Shah, JR Talaviya and MK Ghelani**

**Abstract**
Investigations on insecticidal management of thrips, *Thrips tabaci* Lindeman infesting cumin were carried out under field condition during *Rabi*- 2019 at Department of Entomology, Junagadh Agricultural University, Junagadh. For the management of thrips, different combinations of seed treatments and foliar application of insecticides were evaluated against the pest. Results were found non-significant on third, fifth, seventh and tenth days after sowing, which means the effectiveness of the seed treatments were same as they are at par with each other. Among the different seed treatments, thiamethoxam 30 FS have reduced thrips population to a greater extent which is followed by clothianidin 50 WDG and imidacloprid 30.5 SC. Among foliar application of insecticides, spinosad 45 SC was found best insecticide than rest of the treatments *i.e.*, profenophos + cypermethrin 44 EC and flonicamid 50 WG.

**Keywords:** chemical spray, cumin, seed treatment, thrips, *Thrips tabaci* Lindeman

## Introduction
India is the leading producer of spices in the world and popularly known as the Land of Spices. With the varying conditions viz., sub-tropical to temperate, about 109 different spices are being cultivated in the country. Major seed spices to be grown in India are coriander, cumin, fenugreek, fennel, dill, kalazeera etc. In India, Rajasthan and Gujarat states have emerged as seed spices bowl and together contribute more than 80 percent of the total seed spices production in the country. Cumin (*Cuminum cyminum* L.) is commonly known as *Jeera* and belongs to Apiaceae family. It is one of the most popular condiments used all over the world. The dried fruit obtained from the annual herb is known for its distinct pungent flavor and aroma.

There are so many sucking insect pests attacking the cumin crop. Among them, thrips was a minor pest of this crop. Since two years, the farmers of Saurashtra regions are facing the infestation of thrips and causes the considerable damage to the crop. This emerging pest is attacking after 20 to 30 days of sowing of the crop. The pest suck the cell sap continuously from the cumin plant which leads to drying up of the compound leaves followed by branches and stem and thus it hinders the vegetative growth and development of the crop.

Several chemical pesticides have been used as a spray application for combating thrips. As the pupal stage of this pest is inside the soil, a soil application of newer insecticides is to be intensified. However, problems like residues in seeds and environmental contamination are the result of injudicious use of chemical pesticides. Such reliance on insecticides has created many problems such as frequent application of insecticides, excessive residues on marketable product that concerns general consumer health and the environment, pesticide resistance, trade implications, poisoning, hazards to non-target organisms and increased production costs etc. Among the several avenues to overcome the insecticidal resistance problem and as this pest is attacking more within first month of sowing, to check the effect of seed treatment along with replacement with new molecules of insecticides is one of the important considerations. Looking to the concern with several facts, a research on this aspect was studied.

## Materials and Methods
### Details of experiment
The experiment was laid out in a Split Plot Design with three replications during *Rabi*- 2019 at Instructional Farm, College of Agriculture, Junagadh Agricultural University, Junagadh. Cumin variety GC-4 was broadcasted in November, 2019. All agronomical practices were adopted as per the recommendation in the vogue.

**Application of insecticides**

The seed treatment of three different insecticides *viz.*, imidacloprid 30.5 SC @ 0.122%, clothianidin 50 WDG @ 0.25% and thiamethoxam 30 FS @ 0.12% were applied few hours before sowing (Table-1). According to the treatments, spraying of the three different insecticides *viz.*, profenophos + cypermethrin 44 EC @ 0.088 percent, spinosad 45 SC @ 0.023 percent, flonicamid 50 WG @ 0.015 percent (Table-1) were applied with the help of knapsack sprayer. As the population of thrips was heavy after 45 days of germination, the spray was carried out to check the population. To combat the pest, second spray was carried out at 10 days after the first spray.

**Method of recording observation**

The observations on thrips were recorded visually from five randomly selected and tagged plants (by tapering the plant on white paper). Observations on thrips population were recorded at 3, 5, 7 and 10 days after each spray.

**Results and Discussions:**

To determine the efficacy of different seed treatments and insecticides against cumin thrips, three seed treatments *viz.*, $S_1$: imidacloprid @ 0.122%, $S_2$: clothianidin @ 0.25% & $S_3$: thiamethoxam @ 0.12% and three insecticidal aerial spraying *viz.*, $I_1$: profenophos + cypermethrin 0.088%, $I_2$: spinosad 0.023%, $I_3$: flonicamid 0.015% was tested. The combination of seed treatments and foliar application *viz.*, $S_1I_1$, $S_1I_2$, $S_1I_3$, $S_2I_1$, $S_2I_2$, $S_2I_3$, $S_3I_1$, $S_3I_2$ & $S_3I_3$ were made in such manner that overall effect can be worked out. During the experiment, seed treatments were given prior to the sowing of the crop while foliar applications were given twice with respective insecticides. The first spray was made after 45 days after sowing when pest reached considerable thrips population and second was carried out at ten after first spray. The results on thrips population are presented here under.

**Effect of different insecticides against thrips, *T. tabaci* during first spray**

In cumin, thrips population reached to considerable level after 6$^{th}$ week of sowing. The periodical data showing effect of seed treatments and insecticidal spray on infestation to cumin due to thrips on three, five, seven and ten days after spray (DAS). The bio-efficacy of various insecticides has been adjudged based on individual as well as pooled over period data.

**Seed treatments**

The data on mean thrips count after first application of insecticides presented in Table 2. On third, fifth, seventh and tenth DAS results were found non-significant, which means the effectiveness of the seed treatments were same as they are at par with each other. To know its effectiveness, a considerable amount of reduction of thrips population over control was worked out. In the interaction of seed treatment and foliar application of insecticides, percent reduction over control data showed some sort of reduction at different days after spray *i.e.*, three, five, seventh and tenth. Among the different seed treatments, thiamethoxam 30 FS have reduced thrips population to the extent of 68.49, 21.82, 16.03 and 18.54 percent at three, five, seventh and tenth days after first spray, respectively. While, clothianidin 50 WDG (65.83, 20.25, 15.33 and 14.22 percent, respectively) and imidacloprid 30.5 SC (64.50, 17.16, 14.73 and 7.37 percent, respectively) have reduced considerable thrips population at three, five, seventh and tenth days after first spray, respectively. In a nutshell, any of the tested seed treatments, which were given at time of sowing, can be applied for the management of thrips infesting cumin.

**Insecticidal spray**

The data on mean thrips population after first application of insecticides presented in Table 2 revealed that among sprayed insecticides, profenophos + cypermethrin 0.088% (11.42 mean thrips /plant) was found most effective insecticide as it was recorded lower thrips population at three days after spray. The next best treatments were spinosad 0.023% (21.16) and flonicamid 0.015% (21.71) which was found at par with each other at 3 DAS. After fifth days of spraying, spinosad 0.023% (70.05) was found to be effective insecticide as it was significantly superior to the other treatments. The next best treatment was profenophos + cypermethrin 0.088% (84.82) followed by flonicamid 0.015% (90.06).

Similar pattern was observed on seven days after spraying *i.e.*, spinosad 0.023% was considered as the best treatment with lowest thrips population (79.03 mean thrips /plant). The next best treatment was profenophos + cypermethrin 0.044% (117.93) followed by flonicamid 0.015% (119.02). On 10 DAS spinosad 0.023% showed lowest thrips population (88.82) and was considered to the superior to the other treatments whereas flonicamid 0.015% (135.09) and profenophos + cypermethrin 0.088% was least effective (137.63).

**Effect of different insecticides against thrips, *T. tabaci* during second spray**

After ten days of first spray the second spray was carried out. The periodical data showing effect of seed treatments and insecticidal spray on infestation to cumin due to thrips on three, five, seven and ten days after spray (DAS). The bio-efficacy of various insecticides has been adjudged based on period data.

**Seed treatments**

The data on mean thrips count after second application of insecticides presented in Table 3. On third, fifth, seventh and tenth DAS results were found non-significant, which means the effectiveness of the seed treatments were same as they are at par with each other. To know its effectiveness, a considerable amount of reduction of thrips population over control was worked out. In the interaction of seed treatment and foliar application of insecticides, percent reduction over control data showed some sort of reduction at different days after spray *i.e.*, three, five, seventh and tenth. Among the different seed treatments, thiamethoxam 30 FS have reduced thrips population to the extent of 73.92, 33.91, 8.41 and 20.70 percent at three, five, seventh and tenth days after first spray, respectively. While, clothianidin 50 WDG (68.85, 38.89, 28.72 and 6.64 percent, respectively) and imidacloprid 30.5 SC (64.99, 40.39, 21.58 and 5.83 percent, respectively) have reduced considerable thrips population at three, five, seventh and tenth days after first spray, respectively. In a nutshell, any of the tested seed treatments, which were given at time of sowing, can be applied for the management of thrips infesting cumin.

**Insecticidal spray**

The data on mean thrips population after second application

of insecticides presented in Table 3 revealed that among sprayed insecticides, profenophos + cypermethrin 0.088% (15.28 mean thrips /plant) was found most effective as lowest thrips population was observed. The next best treatments were flonicamid 0.015% (35.88) and spinosad 0.023% (37.45) which was at par with each other at 3 DAS. While, spinosad 0.023% (58.52) was the best treatment with lower thrips population followed by profenophos + cypermethrin 0.088% (72.42) and flonicamid 0.015% (78.67) on fifth day after spraying. After seventh day of spraying, spinosad 0.023% (69.18) was found to be effective insecticide as it was significantly superior to the other treatments. The next best treatment was profenophos + cypermethrin 0.088% (115.47). The least effective insecticidal treatment was flonicamid 0.015% (121.69) with highest thrips population. On ten days after spraying, spinosad 0.023% was found most effective treatment (102.81) as lowest thrips population was observed. Flonicamid 0.015% and profenophos + cypermethrin 0.088% were at par with each other *i.e.*, 145.20 < 147.13.

**Effect of different insecticides against thrips, *T. tabaci* pooled over sprays**

The data on mean thrips count after seed treatments and two applications of insecticides pooled over spray presented in Table 4. The periodical data showing effect of seed treatments and insecticidal spray on infestation to cumin due to thrips on three, five, seven and ten days after spray (DAS). The bio-efficacy of various insecticides has been adjudged based on pooled over spray.

**Seed treatments**

The data on mean thrips count of pooled over spray presented in Table 4. On third, fifth, seventh and tenth DAS results were found non-significant, which means the effectiveness of the seed treatments were same as they are at par with each other. To know its effectiveness, percent reduction of thrips population over control was worked out. In the interaction of seed treatment and foliar application of insecticides, percent reduction over control data showed some sort of reduction at different days after spray *i.e.*, three, five, seventh and tenth.

Among the different seed treatments, thiamethoxam 30 FS have reduced thrips population to the extent of 71.65, 28.15, 11.46 and 24.46 percent at three, five, seventh and tenth days, respectively after first spray. While, clothianidin 50 WDG (67.56, 30.10, 22.13 and 10.20 percent, respectively) and imidacloprid 30.5 SC (64.77, 29.55, 18.16 and 6.56 percent, respectively) have reduced considerable thrips population at three, five, seventh and tenth days after first spray, respectively. In a nutshell, any of the tested seed treatments, which were given at time of sowing, can be applied for the management of thrips infesting cumin.

**Insecticidal spray**

The data on mean thrips count of pooled over spray presented in Table 4 revealed that among sprayed insecticides, profenophos + cypermethrin 0.088% (13.26 mean thrips /plant) was found with lowest thrips count followed by flonicamid 0.015% (28.38) and spinosad 0.023% (28.70) which was at par which each other on third DAS. While on fifth days after spraying spinosad 0.023% (64.20) was found to be effective insecticide as it was significantly superior to the other treatments. The next best treatment was profenophos + cypermethrin 0.088% (78.58) followed by flonicamid 0.015% (84.34). After seven days of spraying spinosad 0.023% (74.73) was considered as effective insecticide with less thrips population. The next best insecticidal treatment was profenophos + cypermethrin 0.088% (84.34) followed by flonicamid 0.015% (120.37). Among all sprayed insecticides, spinosad 0.023% (94.22) recorded lowest thrips population and was considered effective as compared to other treatments followed by flonicamid 0.015% (137.24) and profenophos + cypermethrin 0.088% (139.47) on tenth day after spray.

In nutshell, *T. tabaci* can be effectively managed by foliar sprays of spinosad 0.023% followed by profenophos + cypermethrin in cumin crop and in thiamethoxam the percentage reduction over control was comparatively less.

The obtained result from insecticidal application were in close conformity with the earlier workers as thiamethoxam 70% WS at 4.2 gm /kg seed was found to be the most promising seed treatment for south Saurashtra region against cumin thrips (Anon., 2008) [1]. Pokharkar *et al.* (2011) [3] found spinosad 45 SC @ 0.0025 percent as effective insecticide against thrips. In onion, spinosad 45 SC @ 0.0135% was found best insecticide against thrips (Patil *et al.*, 2009) [2]. According to Tripathy *et al.* (2013) [4], Profenophos followed by spinosad was the best treatment against onion thrips.

**Table 1:** Details of insecticides used as seed treatment and foliar applications for their efficacy against cumin thrips

| Sr. No. | Technical name | Concentration (%) | Dose | Trade name | Manufacture name |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| | | | | | |
| **S: Seed Treatment (g or ml /kg seed)** | | | | | |
| $S_1$ | Imidacloprid 30.5 SC | 0.122% | 4 ml | Imida Gold + | United Phosphorus Ltd. |
| $S_2$ | Clothianidin 50 WDG | 0.25% | 4 g | Dantotsu | Sumitomo Chemical India Pvt. Ltd. |
| $S_3$ | Thiamethoxam 30 FS | 0.12% | 4 ml | Actara | Syngenta India Ltd. |
| **I: Foliar Spray (g or ml /10 lit. water)** | | | | | |
| $I_1$ | Profenophos 40% + Cypermethrin 4% 44 EC | 0.088% | 10 ml | Polytrin-C | Syngenta India Ltd. |
| $I_2$ | Spinosad 45 SC | 0.023% | 5 ml | Tracer | Dow Agro Science. |
| $I_3$ | Flonicamid 50 WG | 0.015% | 3 g | Ulala | United Phosphorus Ltd. |

**Table 2:** Effect of seed treatments along with foliar application of insecticides against thrips after first spray

| Treatments | | 3 DAS | 5 DAS | 7 DAS | 10 DAS |
|---|---|---|---|---|---|
| 1 | | 2 | 3 | 4 | 5 |
| **Seed treatments (S)** | | | | | |
| $S_1$ | Imidacloprid 30.5 SC @ 0.122% | 4.32 (18.66) [64.50] | 9.17 (84.08) [17.16] | 10.29 (105.88) [14.73] | 11.30 (127.69) [7.37] |
| $S_2$ | Clothianidin 50 WDG @ 0.25% | 4.24 (17.97) [65.83] | 9.00 (81.00) [20.25] | 10.25 (105.06) [15.33] | 10.90 (118.81) [14.22] |
| $S_3$ | Thiamethoxam 30 FS @ 0.12% | 4.07 (16.56) [68.49] | 8.90 (79.21) [21.82] | 10.21 (104.24) [16.03] | 10.59 (112.34) [18.54] |
| S.Em.± | | 0.11 | 0.16 | 0.122 | 0.34 |
| C.D. @ 5% | | NS | NS | NS | NS |
| **Insecticides (I)** | | | | | |
| $I_1$ | Profenophos 40% + Cypermethrin 4% 44 EC @ 0.088% | 3.38 (11.42) [78.32] | 9.21 (84.82) [16.35] | 10.86 (117.93) [5.00] | 11.73 (137.63) [0.21] |
| $I_2$ | Spinosad 45 SC @ 0.023% | 4.60 (21.16) [ 59.84] | 8.37 (70.05) [30.98] | 8.89 (79.03) [35.06] | 9.42 (88.82) [35.59] |
| $I_3$ | Flonicamid 50 WG @ 0.015% | 4.66 (21.71) [ 58.75] | 9.49 (90.06) [11.21] | 10.91 (119.02) [4.07] | 11.62 (135.09) [2.05] |
| S.Em.± | | 0.05 | 0.10 | 0.16 | 0.19 |
| C.D. @ 5% | | 0.11 | 0.22 | 0.34 | 0.43 |
| S X I | | NS | NS | NS | NS |
| C.V. % | | 7.65 | 7.27 | 9.71 | 11.50 |
| **Control** | | | | | |
| Control (No Spray) | | 7.25 (52.65) | 10.07 (101.43) | 11.14 (124.17) | 11.74 (137.92) |

**Notes:**
1. NS: Non significant
2. Figures in parentheses ( ) are retransformed values; those outside are $\sqrt{x}$ transformed value and those in [ ] are percent reduction over control values

**Table 3:** Effect of seed treatments along with foliar application of insecticides against thrips after second spray

| Treatments | | 3 DAS | 5 DAS | 7 DAS | 10 DAS |
|---|---|---|---|---|---|
| 1 | | 2 | 3 | 4 | 5 |
| **Seed treatments (S)** | | | | | |
| S1 | Imidacloprid 30.5 SC @ 0.122% | 5.71 (32.60) [64.99] | 8.17 (66.74) [40.39] | 9.92 (98.38) [21.58] | 11.78 (138.76) [5.83] |
| S2 | Clothianidin 50 WDG @ 0.25% | 5.38 (28.94) [68.85] | 8.27 (68.39) [38.89] | 9.46 (89.43) [28.72] | 11.73 (137.59) [6.64] |
| S3 | Thiamethoxam 30 FS @ 0.12% | 4.93 (24.30) [73.92] | 8.60 (73.96) [33.91] | 10.72 (114.91) [8.41] | 10.81 (116.85) [20.70] |
| S.Em.± | | 0.09 | 0.14 | 0.14 | 0.11 |
| C.D. @ 5% | | NS | NS | NS | NS |
| **Insecticides (I)** | | | | | |
| I1 | Profenophos 40% + Cypermethrin 4% 44 EC @ 0.088% | 3.91 (15.28) [83.60] | 8.51 (72.42) [35.25] | 10.74 (115.47) [7.69] | 12.13 (147.13) [0.09] |
| I2 | Spinosad 45 SC @ 0.023% | 6.12 (37.45) [59.79] | 7.65 (58.52) [47.66] | 8.31 (69.18) [44.85] | 10.14 (102.81) [30.23] |
| I3 | Flonicamid 50 WG @ 0.015% | 5.99 (35.88) [61.39] | 8.87 (78.67) [29.68] | 11.03 (121.696) [3.00] | 12.05 (145.20) [1.53] |
| S.Em.± | | 0.08 | 0.10 | 0.19 | 0.18 |
| C.D. @ 5% | | 0.18 | 0.22 | 0.41 | 0.39 |
| S X I | | NS | NS | NS | NS |
| C.V. % | | 9.80 | 7.55 | 11.98 | 9.98 |
| **Control** | | | | | |
| Control (No Spray) | | 9.65 (93.08) | 10.59 (112.08) | 11.20 (125.46) | 12.14(147.40) |

**Notes:**
1. NS: Non significant
2. Figures in parentheses ( ) are retransformed values; those outside are $\sqrt{x}$ transformed value and those in [ ] are percent reduction over control values

**Table 4:** Effect of seed treatments along with foliar application of insecticides against thrips (pooled over sprays)

| Treatments | | 3 DAS | 5 DAS | 7 DAS | 10 DAS |
|---|---|---|---|---|---|
| 1 | | 2 | 3 | 4 | 5 |
| | | | | | |
| **Seed treatments (S)** | | | | | |
| S1 | Imidacloprid 30.5 SC @ 0.122% | 5.01 (25.15) [64.77] | 8.66 (75.16) [29.55] | 10.10 (102.10) [18.16] | 11.54 (133.20) [6.56] |
| S2 | Clothianidin 50 WDG @ 0.25% | 4.81 (23.16) [67.56] | 8.63 (74.58) [30.10] | 9.85 (97.15) [22.13] | 11.31 (128.01) [10.20] |
| S3 | Thiamethoxam 30 FS @ 0.12% | 4.49 (20.24) [71.65] | 8.75 (76.66) [28.15] | 10.51 (110.46) [11.46] | 10.37 (107.68) [24.46] |
| S.Em.± | | 0.122 | 0.10 | 0.14 | 0.29 |
| C.D. @ 5% | | NS | NS | NS | NS |
| **Insecticides (I)** | | | | | |
| I1 | Profenophos 40% + Cypermethrin 4% 44 EC @ 0.088% | 3.64 (13.26) [81.42] | 8.86 (78.58) [26.35] | 10.80 (116.64) [6.50] | 11.81 (139.47) [2.16] |
| I2 | Spinosad 45 SC @ 0.023% | 5.35 (28.70) [59.80] | 8.01 (64.20) [39.83] | 8.64 (74.73) [40.10] | 9.70 (94.22) [33.96] |
| I3 | Flonicamid 50 WG @ 0.015% | 5.32 (28.38) [60.25] | 9.18 (84.34) [20.95] | 10.97 (120.37) [3.51] | 11.71 (137.24) [3.73] |
| S.Em.± | | 0.05 | 0.122 | 0.11 | 0.14 |
| C.D. @ 5% | | 0.122 | 0.27 | 0.25 | 0.31 |
| S X I | | NS | NS | NS | NS |
| C.V. % | | 7.56 | 9.31 | 7.30 | 8.30 |
| **Control** | | | | | |
| Control (No spray) | | 8.45 (71.40) | 10.33 (106.70) | 11.17 (124.76) | 11.94 (142.56) |

**Notes:**
1. NS: Non significant
2. Figures in parentheses ( ) are retransformed values; those outside are $\sqrt{x}$ transformed value and those in [ ] are percent reduction over control values

## Conclusion

In the trial on bio-efficacy of different insecticides against thrips infesting cumin, the results were found on third, fifth, seventh and tenth days after spray (DAS) was found non-significant, which means the effectiveness of the seed treatments were same as they are at par with each other. Among the different seed treatments, thiamethoxam 30 FS have reduced thrips population to a greater extent which is followed by clothianidin 50 WDG and imidacloprid 30.5 SC. In a nutshell, any of the tested seed treatments, which were given at time of sowing, can be applied for the management of thrips infesting cumin. Based on both the sprays on thrips, *T. tabaci* can be effectively managed by foliar sprays of spinosad (0.023%) followed by profenophos + cypermethrin (0.088%).

## References


1. Anonymous. In Research recommendations for farmers community. Department of Entomology, Junagadh Agricultural University, Junagadh, 2008. Available at http://www.jau.in/attachments/book/Research_Booklet/Booklet_2008.pdf accessed 25 July, 2019.
2. Patil SD, Chandele AG, Wayal CB, Game BC. Efficacy of different newer chemicals and bio-insecticides against onion thrips in *kharif* season. International Journal of Plant Protection 2009;2(2):227-230.
3. Pokharkar DS, Kale IK, Pawar DB. Management of onion thrips, *Thrips tabaci* (Lindeman) through varietal screening and newer insecticides. Journal of Maharashtra Agriculture University 2011;36(2):237-240.
4. Tripathy P, Das SK, Priyadarsini A, Sahoo BB, Dash DK, Rath LK. Field efficacy of some botanicals against onion thrips under Odisha condition. Indian Journal of Plant Protection 2013;41(2):82-183.