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# EFFICACY OF CERTAIN INSECTICIDES AGAINST SUCKING PESTS AND PHYLLODY IN SESAMUM

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**ABSTRCT**

**A field experiment was conducted at the Agricultural college, Naira during rabi, 2020-21 on the control of major insect pests on sesamum viz., leafhopper *Hishimonus phycitis* (Distant) and whitefly *Bemisia tabaci* (Gennadius) and phyllody disease. The results revealed that *thiamethoxam* 25WG @ 0.25 g/ l was very effective against both the pests with 72.2 and 50.5% reduction in incidence, respectively. Thiamethoxam was also effective against phyllody (PDI of 5.72), and gave a maximum seed yield of 6.50 q/ ha and B:C ratio (1:4.7). Seed treatment with imidacloprid 17.5SL @ 5 ml/ kg seed stood as the next best with B:C ratio of 1:3.7.**

**Key words:** Sesamum, whitefly, leafhopper, phyllody, seed treatment, thiamethoxam, imidacloprid, yield, cost benefits

The sesamum *Sesamum indicum* L. is an oilseed crop and India ranks third in the world with 19.47 lakh ha with a productivity of 470 kg/ ha. (Directorate of Economics and Statistics, Government of India, 2019-2020). The crop is attacked by 38 insect pests (Rai, 1976), among which leafhopper *Hishimonus phycitis* (Distant) and whitefly *Bemisia tabaci* (Gennadius) are the major sucking pests. Both nymphs and adults of these suck the cell sap from leaves, flowers and pods. Due to this curling of leaf margins, stunted growth of the plants occur. Leafhopper is also responsible to transmit phyllody diseases in sesamum (Ahirwar et al., 2010). There is scope of utilizing the certain new insecticide molecules effective in small quantity against these. Keeping this in view, this study evaluates the efficacy of certain insecticides against these.

## MATERIALS AND METHODS

The field experiment was conducted at the Agricultural college, Naira (83.56$^0$E, 18.23$^0$N, 27 masl) in the north coastal zone of Andhra Pradesh during rabi, 2020-2021. The experiment was laid out in randomized block design with ten treatments including untreated check, and replicated thrice. Plot size was 20 m$^2$ with spacing of 30x 10 cm with the variety YLM- 66. The treatments include $T_1$: Seed treatment with imidacloprid 17.5 SL @ 5ml/ kg seed, $T_2$: thiamethoxam 25WG @ 0.25g/l, $T_3$: diafenthiuron 50WP @ 1.6g/l, $T_4$: pymetrozine 50WG @ 0.6g/ l, $T_5$: spinosad 45SC @ 0.33 g/ l, $T_6$: novaluron 10EC @ 1.0 ml/ l, $T_7$: chlorantraniliprole 18.5SC @ 0.3 ml/ l, $T_8$: chlorantraniliprole 9.3% + λ cyhalothrin 4.6% @ 0.5ml/ l, $T_9$: acephate 75 WP @ 1.5 g/ l, $T_{10}$: untreated check. When the pest reached its respective ETLs level, first spraying was done at 35 days after sowing. Precount of insect pests were recorded one day prior to the spraying, with post-treatment counts on 5$^{th}$, 10$^{th}$, 15 days after spraying. Counts on number of pests/ plant were recorded from randomly selected 10 plants from each treatment by excluding border rows. The data on PDI of phyllody was taken 10 days interval after spraying. The data on number of leafhoppers and whiteflies/ plant were subjected to ANOVA. The % reduction in incidence was calculated using modified Abbots formula (Flemming and Ratnakaran 1985,). These data were subjected to ANOVA with arc sine value transformation (Gomez and Gomez, 1984) using OPSTAT 2021 software, V 11.9.08. The PDI and benefit cost ratio were computed using standard methodology.

## RESULTS AND DISCUSSSION

The data from Table 1 reveals that the *H. phycitis*

Table 1. Efficacy of insecticides against *H.phycitis* and *B. tabaci* in sesamum (rabi, 2020-21)

| S. No | Treatments | Dose (ml or g/l) | No. of leafhoppers/3 leaves/plant | | | | | No. of whitefly/3 leaves/plant | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 DBS | 5 DAS | 10 DAS | 15 DAS | Overall mean | Reduction Over Control (%) | 1 DBS | 5 DAS | 10 DAS | 15 DAS | Overall mean | Reduction over control (%) |
| 1 | Seed treatment with Imdiacloprid 17.5SL | 5ml / kg seed | 1.31 (1.13) | 0.98 (0.99)$^{bcd}$ | 1.53 (1.24)$^{bcdef}$ | 1.68 (1.25)$^{b}$ | 1.36 (1.16)$^{bd}$ | 52.7% | 10.10 (3.17) | 10.60 (3.25)$^{bcde}$ | 14.50 (3.81)$^{defg}$ | 11.33 (3.36)$^{b}$ | 13.24 (3.63)$^{bc}$ | 20.48% |
| 2 | Thiamethoxam 25WG | 0.25g/l | 1.67 (1.29) | 0.43 (0.65)$^{a}$ | 0.90 (0.95)$^{a}$ | 0.80 (0.89)$^{a}$ | 0.80 (0.89)$^{a}$ | 72.2% | 10.77 (3.28) | 5.70 (2.38)$^{a}$ | 7.03 (2.65)$^{a}$ | 5.80 (2.23)$^{a}$ | 8.23 (2.87)$^{a}$ | 50.5% |
| 3 | Diafenthiuron 50WP | 1.6g/l | 1.36 (1.16) | 1.00 (0.99)$^{bcde}$ | 1.26 (1.12)$^{abc}$ | 2.20 (1.48)$^{be}$ | 1.34 (1.15)$^{bc}$ | 53.4% | 10.57 (3.24) | 12.33 (3.50) $^{bcdefgh}$ | 14.47 (3.80)$^{def}$ | 14.00 (3.73)$^{bcde}$ | 11.60 (3.40)$^{b}$ | 30.3% |
| 4 | Pymetrozine 50WG | 0.6g/l | 1.47 (1.20) | 0.97 (0.98)$^{b}$ | 1.19 (1.06)$^{ab}$ | 1.90 (1.37)$^{bc}$ | 1.28 (1.13)$^{b}$ | 55.5% | 7.27 (2.44) | 11.30 (3.32)$^{bcde}$ | 12.30 (3.50)$^{bcde}$ | 12.93 (3.59)$^{bcd}$ | 14.67 (3.82)$^{bcdef}$ | 11.8% |
| 5 | Spinosad 45SC | 0.33g/l | 1.37 (1.16) | 1.13 (1.05)$^{bcdefg}$ | 1.45 (1.20)$^{bcd}$ | 1.97 (1.38)$^{bcd}$ | 1.51 (1.23)$^{bce}$ | 47.5% | 10.63 (3.26) | 9.43 (3.05)$^{bc}$ | 11.07 (3.30)$^{bcd}$ | 12.33 (3.51)$^{bc}$ | 15.67 (3.96)$^{cdefgh}$ | 6% |
| 6 | Novoluron 10EC | 1.0ml/l | 1.33 (1.15) | 1.37 (1.15)$^{bcdefg}$ | 1.60 (1.24)$^{bcdef}$ | 2.63 (1.61)$^{cdef}$ | 1.67 (1.29)$^{bcdefg}$ | 42.1% | 10.50 (3.24) | 11.67 (3.40)$^{bcdefg}$ | 11.47 (3.37)$^{bcd}$ | 15.67 (3.96)$^{bcdef}$ | 13.33 (3.64)$^{bcd}$ | 20% |
| 7 | Chlorantraniliprole 18.5SC | 0.3ml/l | 1.77 (1.33) | 1.17 (1.07) $^{bcdefgh}$ | 1.85 (1.34)$^{cdefh}$ | 2.27 (1.50)$^{bcdef}$ | 1.93 (1.39)$^{defghi}$ | 32.9% | 10.37 (3.22) | 11.37 (3.33)$^{bcdef}$ | 12.03 (3.25)$^{b}$ | 17.33 (4.16)$^{cdefghij}$ | 13.83 (3.72)$^{bcde}$ | 16.9% |
| 8 | Chlorantraniliprole 9.3% + λ Cyhalothrin 4.6% | 0.5ml /l | 1.36 (1.1.7) | 1.25 (1.17) $^{bcdefghi}$ | 1.70 (1.30)$^{bcdefg}$ | 2.87 (1.65)$^{cdefg}$ | 1.78 (1.34) $^{bcdefgh}$ | 38% | 11.03 (3.22) | 9.27 (3.02)$^{b}$ | 10.83 (3.27)$^{bc}$ | 16.23 (4.03)$^{bcdefgh}$ | 14.67 (3.83)$^{bcdefg}$ | 11.8% |
| 9 | Acephate 75 WP ( standard check ) | 1.5g/l | 1.39 (1.18) | 1.03 (1.01)$^{bcdef}$ | 1.87 (1.37)$^{defghi}$ | 3.07 (1.75)$^{efgh}$ | 1.59 (1.26)$^{bcdef}$ | 44.7% | 11.77 (3.42) | 13.67 (3.69)$^{defghi}$ | 11.37 (3.36)$^{bcd}$ | 16.00 (4.00)$^{bcdefg}$ | 14.33 (3.77)$^{bcdef}$ | 13.9% |
| 10 | Untreated check | | 1.72 (1.31) | 2.80 (1.67)$^{j}$ | 3.35 (1.83)$^{j}$ | 3.80 (1.95)$^{gh}$ | 2.88 (1.68)$^{j}$ | | 12.50 (3.54) | 14.37 (3.77)$^{defghij}$ | 15.63 (3.94)$^{efgh}$ | 17.07 (4.13)$^{cdefghi}$ | 16.65 (4.88)$^{i}$ | |
| | F test | | NS | Sig | Sig. | Sig. | Sig. | | NS | Sig | Sig | Sig | Sig | |
| | SEm± | | 0.05 | 0.08 | 0.08 | 0.11 | 0.07 | | 0.27 | 0.19 | 0.17 | 0.25 | 0.15 | |
| | CD (p= 0.05) | | - | 0.23 | 0.24 | 0.33 | 0.21 | | - | 0.57 | 0.51 | 0.75 | 0.44 | |
| | CV | | 7.52 | 12.42 | 11.09 | 12.77 | 9.17 | | 14.34 | 10.14 | 8.67 | 11.57 | 6.94 | |

DBS – Day before spray DAS –Days after spraying; NS- Non significant Sig- Significant,*Values in parentheses square root transformed values; Values with same alphabet in each column do not vary significantly from each other.

Table 2. Efficacy of insecticides against sesamum phyllody and benefit cost ratio rabi, 2020-21

| S. No. | Treatments | Mean % Disease Index (PDI) | | Yield (q/ha) | Increase in yield over untreated check (q/ha) | Cost of insecticides (Rs/ha) | Total cost of cultivation (Rs/ha) | Gross returns (Rs/ha) | Net returns (Rs/ha) | B:C Ratio |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Pre spraying | 10 days after 1st spray | | | | | | | |
| 1 | Seed treatment with Imdiacloprid 17.5SL 5ml / kg seed | 15.07 (22.82) | 36.90 (37.4)$^{hi}$ | 4.80 | 1.30 | 350 | 7850 | 36000 | 28150 | 1:3.7 |
| 2 | Thiamethoxam 25WG 0.25g/ l | 20.73 (27.65) | 5.72 (13.82)$^{a}$ | 6.50 | 3.00 | 1010 | 8510 | 48750 | 40240 | 1:4.7 |
| 3 | Diafenthiuron 50WP 1.6g/ l | 18.67 (25.57) | 34.67 (36.04)$^{h}$ | 4.35 | 0.85 | 2500 | 10000 | 32625 | 22625 | 1:2.2 |
| 4 | Pymetrozine 50WG 0.6g/ l | 17.80 (24.90) | 10.60 (18.92)$^{b}$ | 5.50 | 2.00 | 1500 | 9000 | 41250 | 32250 | 1:3.5 |
| 5 | Spinosad 45SC 0.33g/ l | 16.50 (23.92) | 14.70 (22.47)$^{bcde}$ | 5.20 | 1.70 | 6500 | 14000 | 39000 | 25000 | 1:1.7 |
| 6 | Novoluron 10EC 1.0ml/ l | 16.60 (23.94) | 10.73 (19.07)$^{bcd}$ | 4.90 | 1.40 | 1100 | 8600 | 36750 | 28150 | 1:3.2 |
| 7 | Chlorantraniliprole 18.5SC 0.3ml/ l | 15.47 (23.00) | 11.60 (19.06)$^{bc}$ | 5.70 | 2.20 | 4500 | 12000 | 42750 | 30750 | 1:2.5 |
| 8 | Chlorantraniliprole 9.3%+λ Cyhalothrin 4.6% 0.5ml / l | 13.87 (21.77) | 19.63 (26.30)$^{efg}$ | 4.29 | 0.79 | 1940 | 9440 | 32175 | 22735 | 1:2.4 |
| 9 | Acephate 75 WP (standard check) 1.5g/ l | 15.80 (23.55) | 18.83 (25.33)$^{ef}$ | 4.18 | 0.68 | 600 | 8100 | 31350 | 23250 | 1:2.8 |
| 10 | Untreated check | 20.17 (26.55) | 44.23 (41.08)$^{i}$ | 3.50 | | - | 7000 | 26,250 | 19,250 | 1:3.0 |
| | F test | NS | Sig. | | | | | | | |
| | SEm± | 1.27 | 1.37 | | | | | | | |
| | CD (p= 0.05) | - | 4.10 | | | | | | | |
| | CV% | 9.07 | 9.06 | | | | | | | |

NS- Non-significant, Figures in parentheses are angular or arc-sine transformed values; Means followed by same letter do not differ significantly following DMRT
Minimum Support Prize (MSP) for Sesamum @ 75/ kg.

incidence ranged from 1.31 to 1.72/ plant before treatment and the difference between treatments were non-significant. After the first spray all the treatments were significantly superior over untreated check, of which thiamethoxam 25WG @ 0.25g/ l resulted in significantly less incidence (0.80/ plant) with 72.2% reduction. Pymetrozine 50WG @ 0.6ml/ l, diafenthiuron 50WP @ 1.6 g/l and seed treatment with imidacloprid 17.5SL @ 5ml/ kg seed were the next best and on par with each other. With *B. tabaci* incidence before treatment counts ranged from 10.10 to 12.50/ plant with insignificant variations. But with *thiamethoxam* 25WG @ 0.25 g/ l the incidence reduced to 8.23/ plant, with 50.5% reduction followed by diafenthiuron 50WP @ 1.6 g/ l (11.60/ plant) with 30.3% reduction. The next best treatments were seed treatment with imidacloprid 17.5SL @ 5ml/ kg seed, novaluron 10EC @ 1.0ml/ l, chlorantraniliprole 18.5 SC @ 0.3 ml/ l. These observations on the efficacy of insecticides against *H. phycitis* corroborates with those of Saradava (2004) on sucking pests infesting groundnut under dry farming conditions. Imidacloprid 0.005% and thiamethoxam 0.05 % were the most effective against sucking pests like leafhoppers, aphids and whiteflies of okra. Sharma and Lal (2002) observed that thiamethoxam @ 25 g a.i./ ha is effective against whiteflies in brinjal. Mhaske and Mote (2005) also found imidacloprid 22.5 g/ ha and thiamethoxam 50 g/ ha as effective against whiteflies in brinjal. Naik et al. (2009) also found that thiamethoxam @ 0.005% was the most effective and significantly superior in brinjal. As regards phyllody incidence, it ranged from 15.07 to 20.17 before treatment, and the mean PDI values at 10 days after 1st spray was from 5.72 to 44.23; thiamethoxam 25WG @ 0.25 g/ l (5.72) resulted in 87% reduction in PDI, and pymetrozine 50WG @ 0.6 ml/ l and novaluron 10EC @ 1.0ml/ l were the next best (Table 2). Maximum B:C ratio of 1: 4.7 was obtained with thiamethoxam 25WG @ 0.25 g/ l with maximum net returns of Rs 40240/ ha (Table 2). Seed treatment with imidacloprid 17.5SL @ 5ml/ kg seed, pymetrozine 50WG @ 0.6ml/l and novaluron 10EC @ 1.0ml/l were the next best.

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**AUTHOR CONTRIBUTION STATEMENT**

Divya conducted the original experiment and wrote the original manuscript and done the data analysis. Chalm and Govindarao contributed the editing, conceptualization, visualization and supervision during the writing of manuscript.

**CONFLICT OF INTEREST**

No conflict of interest.

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