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# ENVIRONMENT FRIENDLY BIO-TECHNOLOGIES IN MANAGING CHILLI THRIPS, SCIRTOTHRIPS DORSALIS

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## Introduction

One of the important commercial spice-cum vegetable crop, Chilli [Capsicum annum] is cultivated over a substantial area in the southern districts of Tamil Nadu, where insect pests are a serious problem. Among them the sucking pests, namely, the Thrips, (Scirtothrips dorsalis), the aphids (Aphis gossypii and Myzus persicae) and the mite (Polyphagotrarsonemus latus) cause over 50 per cent reduction in yield. Earlier, more weightage had been given to insecticides both contact and systemic to manage these pests (Rajasri et al., 1991., Thakare et al., 1992, Misra 1992., Jaganath, 1993., Chendete and Desh-pande 1984, Jagan mohan et al., 1980., Kareem et al., 1977., Mote 1977 and Rao and Ahamed, 1986). On the other hand, other methods like hose plant resistance, cultural and botanical methods can pave the way for a viable and long term pest management strategy with least pollution to the environment. Evaluation of relative resistance in Chilli thrips, Scirothrips dorsalis to some insecticides was done by Srinivasa Rao (1994).

Hence to evolve a suitable environment friendly biotechnological approach to manage the Chilli thrips, Scirtothrips dorsalis, studies were carried out with the

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objectives of (i) Collection of potential Chilli geno types from various places and evaluating them for their reaction to Chilli thrips, Scirtothrips dorsalis. (ii) To assess the effect of different intercrops and mulching on the incidence of thrips and to evaluate the effect of naturally available materials against sucking pests in comparison with the conventional insecticides.

# Materials and Methods

Host plant resistance : The genotypes collected from different places were sown in the nursery and each accession was transplanted in the mainfield in a 5m row replicated three times. The incidence of thrips was assessed at different stage of growth to select the potential ones.

Confirmatory screening : The promising accessories were short listed and subjected to thrips infestation in macroplots (5m x 4m) to study the reaction to thrips (Scritothrips doralis)

# Influence of Cultural Methods

| | | |
|---|---|---|
| Design | : | Split plot design |
| Plot Size | : | 20m2 (5.4m) |
| Spacing | : | 45x30 cm |
| Main plots | : | 1. Direct sown Chilli |
| | | 2. Transplanted Chilli |
| Subplots | : | 1. Deep hoeing and earthing up |
| | | 2. Just weeding without deep hoeing and earthing |
| | | 3. Mulching with trashes. |

# Methodology

**Population size and damage assessment**

This was done each fortnight for all the three sucking pest.

**Thrips :**

(1) Thrips population was assessed by counting the total number of thrips (nymphs + adults) present on the terminal 3 leaves of each shoot. The average number of thrips per leaf was worked out from atleast 10 shoots in each accession or plot.

2) The injury was assessed by following a 9 grade score where, grade 1 indicates clear leaves, grade 3 one or two wrinkles, grade 5 too many wrinkles with slightly wavy margin, grade 7 too many wrinkles with margin folded and grade 9 disfigured leaf with reduced leaf size, folded and too many wrinkles.

# Results and Discussion

During the 1999 Kharif season he treatment namely mulching + methyl O-demeton 0.03% spray was more effective in the management of thrips population. The mean thrips population in the treatment was 1.24 thrips / leaf plant, while in untreated check plot it was 2.63 thrips / leaf / plant.

In the year 1999-2000 nineteen selected accessories were screened both under field and pot culture conditions with K2 Chilli variety as check. During winter 1999-2000. Population of thrips was very low in the following accessions.

**Table 1. Incidence of thrips on promising cultures**

| Accession | Population of thrips (No. of thrips / leaf /plant | |
|---|---|---|
| | Field condition | Pot condition |
| Ps 64 | 0.47 | 0.81 |
| Ps 69 | 0.79 | 1.28 |
| Ps 168 | 0.87 | 1.95 |
| CPM 1 | 0.91 | 1.91 |
| K2 (Check) | 1.11 | 1.53 |
| Ps 176 (Susceptible) | 1.26 | 2.57 |

The results revealed that population of thrips was high in pot culture conditions (0.81 to 2.67 thrips / leaf/plants) compared to field condition (0.47 to 1.3 thrips/ leaf/plant). Thrips damage grade in 1 to 9 grade scale was also recorded. The results are furnished in the following table 2.

**Table 2. Thrips damage grade in promising cultures (1 to 9 grade scale)**

| Accession Name | Field condition | Pot condition |
|---|---|---|
| Ps 64 | 1.42 | 2.62 |
| Ps 4 | 1.84 | 4.43 |
| Ps 69 | 1.9 | 2.81 |
| CPM 171 | 1.9 | 4.67 |
| Ps K2 | 2.81 | 3.67 |
| Ps 176 | 3.9 | 5.76 |

Regarding percentage of thrips affected plants to total number of plants three accessories namely Ps 64, Ps 69 and Ps 177 were very low percentage viz., 9.22%, 9.79 and 10.2% field of Chilli pods were also recorded, the accession namely Ps 177 registered high yield (2264 Kg/ha) compared to K2 (1650 Kg/ha) Accession Ps 168 and Ps 4 registered 2190 Kg/ha and 1928 Kg/ha.

During 2000-2001 winter season management trial was laid out in the field under factorial design with two levels of cropping system viz., pure crop of Chilli and Chilli with agathi as bund crop and four levels of nutrients viz. (i) blanket fertilizer recommendation (75N: 35 P25 : 35 K20 Kg/ha) (ii) 50% blanket recommendation (iii) Soil test recommendation and (iv) control. The results indicated inter-cropping agathi was not found to was not found to influence the thrips population.

The fertilizers at the blanket dose (100%) and based on soil test supported significantly fewer thrips. (1.41 to 1.5 thrips / leaf) than those plants in the plots which received either of the level of fertilizer (Blanket dose 50%) or without any fertilizer (control). (1.77 to 1.92 thrips/leaf). The interactions between cropping system and fertilizer levels was not significant.

The level of injury due to thrips infestation was very significant among the treatments both main and subplots. Overall damage was lower in Chilli + Agathi plots (grade 3.16). The damage was minimal on the plants in the plots where the fertilizer was added based on soil test. It was followed by the plants in Blanket recommendation plots (both 100% and 50%) and control. The interaction effects between the plots was also significant.

The percentage of thrips infestation (table 3) was very significant in Chilli + Agathi plot (14.23%). The subplots differ significantly in the percentage of thrips infestation. The plants in both the plots which received the fertilizers at the blanket dose and based soil test supported lower fertilizers at the blanket dose and based on soil test supported comes infestation (12.24% + 14.93%) than those plants in the plots which received either 50% level of fertilizer (Blanket dose 50%) or without any fertilizer (control), 18.82 to 25.67%. There was no significant effect in the interaction between the main plot treatments and sub plot treatments.

**Table – 3 Influence of Cultural Practices on Thrips Infestation**

| Main Plot Treatments | Sub plot Treatment | | | | |
|---|---|---|---|---|---|
| | $S_1$ Blanket | $S_2$ 50% | $S_3$ Soil test | $S_4$ Control | Mean |
| $M_1$ Chilli | 19.24 (25.96) | 23.12 (28.69) | 13.85 (21.84) | 30.18 (33.3) | 21.6 (27.34) |
| M2 Chilli + Agathi | 10.62 (18.99) | 14.49 (22.37) | 10.63 (19.02) | 21.12 (27.38) | 14.23 (21.85) |
| Mean | 14.93 (22.4) | 18.8 (25.48) | 12.24 (20.3) | 25.67 (30.19) | 17.91 (24.69) |

| | SEd | CD (0.05) |
|---|---|---|
| M | 0.725 | 1.556 |
| S | 1.026 | 2.201 |
| M x S | 1.451 | 3.112 |

A screening trail of Chilli accessions (53 Nos) for their reactions against thrips was done. The accession namely Acc 42, Acc 24, Acc 36 recorded lowest thrips populations viz 0.12, 0.37 and 0.5 thrips/leaf/plant respectively.

Studies by Srinivasa Rao (1994) indicated that the Chilli thrips Scirtothrips dorsalis populations from two different locations namely GNT and WGL showed resistance to synthetic pyrethroids viz. fenvalerate, cypermethrin and alphamethrin respectively was 3.75, 4.55 and 4.10, in GNT population and 2.17, 2.64 and 2.0 fold in WGL population. This study was reported from Andrapradesh.

Hence various attempts were being done by testing different components of integrated pest management in the management of Chilli thrips Scirtothrips dorsalis. One such attempt was usage of neem formulations. Kandasamy et al., (1990) reported that the neem formulation Achook reduced the thrips infestation to an appreciable level. But James Keisa and Varadharajan (1995) declined that unlike chemical inseticides the neem are not so effective in reducing the density of thrips. When compared the neem formulations namely Achook and Nimin coated urea the former seemed to be better for thrips control because it is applied as liquid spray. However the alternate spray of Achook and monocrotophos appeared to be more suitable among the treatments tested.

Vos et al. (1995) found that the thrips severity or incidence in their trials were significantly lower in the plastic mulched plots compared to the bare soil treatment. Rice straw mulching had a small but significant effect in reduction of thrips severing in their trail. Thrips incidence in plots with silvery much was less than in non-mulchad plots.

Efforts by Patnaik and Mohapatra (1997) to study the effect of fertilizers on the incidence of thrips and leafcurl in Chilli under protected and unprotected conditions under field conditions confirmed that the leaf curl incidence was found to be inversely related with the levels of N. Slansky and Rodriquez (1987) stated that the levels of soluble N compounds, amino acids in plants, resulting in a significant increase in a digestibility for the concerned insects.

Patnaik and Mohapatra (1997) further concluded that the application of nitrogen at 120 kg/ha and potassium at 70 kg/ha with recommended dose of phosphorus (75 kg/ha) not only improved the productivity of Chilli but also helped the plants to tolerate the damage caused by thrips Scirothrips dorsalis.

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