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# Influence of Organic Materials Against Leafhopper,*Amrasca devastans* Distant. (Cicadellidae : Homoptera) on Brinjal (*Solanum melongena* L.)

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**Abstract**

Field studies on organic and inorganic materials were evaluated against brinjal leafhopper, *Amrasca devastans* Distant. Plots applied with vermicompost (VC) + biofertilizer + insecticide, farm yard manure (FYM)+ biofertilizer + insecticide, VC + biofertilizer + neemcake and FYM + biofertilizer + neemcake recorded less population (4.00, 4.34, 4.57 and 4.98/3 leaves per plant, respectively). The corresponding overall per cent reduction in these treatments were 69.62, 67.04, 65.29 and 62.18 over NPK. The combination of organic and inorganic treatment, VC + biofertilizer + NPK and FYM + biofertilizer + NPK recorded the minimum per cent reduction 31.05 and 29.30 over inorganic NPK.
**Key words : *Bemisia tabaci,* Biofertilizer, Neemcake, Organic.**

The brinjal, *Solanum melongena* Linn. is infested by a number of insect pests. Vevai (1970) reported twenty-six insect pests to infest brinjal crop from the nursery stage to harvesting stage. Leaf hopper *Amrasca devastans* Distant. is one such major sucking pest, both nymphs and adults suck the cell sap from lower surface of leaves and inject their toxic saliva into the plant tissures. The attacked parts turn yellowish and start curling from margins inwardly. Gradually, the entire leaf becomes yellow resulting in bronzing and drying (Butani and Jotwani, 1984). in recent days, a pest management technology divertred towards eco-friendly approaches as IPM and information on all possible ways of pest management is essentially required to develop sound IPM system. In this context, information on effect of host nutrition was wanting and hence, the study conducted on brinjal leafhopper was presented here.

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## Methods

Field trial was conducted in vegetable revolving fund scheme at GKVK, Bangalore, Karnataka during *kharif* of 2006-07 using a brinjal variety Arka Shirish. The experiment was laid out in a randomized block design with 12 treatments, replicated thrice by adopting individual plot size of 15 sq m area and 60 × 60 cm spacing. Thirty days old seedlings were transplanted and the pest population was assessed from 15 days after transplanting (DAT) to 65 DAT at 15-day intervals by counting the total number of adults and nymphs present on three leaves representing top, middle and bottom. The population was expressed as mean per plant for five randomly selected plants. Insecticide endosulfan (0.07%) was sprayed at 30 and 60 DAT. The treatment means were compared by Duncan's multiple range test (DMRT) for their significance (Gomez and Gomez 1985). All the agronomic practices based on the recommended package of practice were adopted uniformly for all the treatments.

## Results and Discussion

On 15 DAT, significantly less hopper population was recorded in plots treated with VC + biofertilizer = neemcake (2.33/3 leaves per plant ) and FYM + biofertilizer + neemcake (2.80/3 leaves per plant ) compared to ) NPK as inorganic form (8.13). The corresponding per cent reduction over NPK was 71.34 and 65.55, respectively. The next treatment in descending

order of effectiveness were VC + biofertilizer + insecticide (3.60/3 leaves per plant) and FYM + biofertilizer + insecticide (3.86/3 leaves per plant) with the per cent reduction of 55.52 and 52.52 over NPK. The organic and inorganic treatment combinations viz., VC + biofertilizer + NPK and FYM + biofertilizer + NPK recorded less per cent reduction (33.57 and 32.84) over NPK, respectively (Table 1).

On 25 DAT, the high per cent reduction of leafhopper over NPK was observed in VC + biofertilizer + neemcake applied plots (70.14), followed by FYM + biofertilizer + neemcake (67.55). On 35 DAT, treatments combined with chemical spray, i.e. VC + biofertilizer and FYM + biofertilizer recorded 3.13 and 3.53 /3 leaves per plant and reduced the population 78.85 and 76.14%. The next effective treatments in descending order were VC + biofertilizer + neemcake (5.80 / 3 leaves per plant and FYM + biofertilizer + neemcake (6.2/3 leaves per plant). The combination of organic and inorganic treatment, VC + biofertilizer + NPK and FYM + biofertilizer + NPK reduced the population to 27.97 and 25.67, respectively as against NPK.

On 45 DAT, the maximum leafhopper population was recorded among different treatments and it ranged form 5.06 to 17.60 / 3 leaves per plant. Treatment combinations, VC + biofertilizer + insecticide and FYM + biofertilizer + insecticide were found to be effective in reducing the leafhopper population (5.06 and 5.66 / 3 leaves per plant) compared to 17.60 and 14.26 in NPK as inorganic form and untreated control, respectively.

On 55 DAT, organic treatments VC + biofertilizer + neemcake and FYM + biofertilizer + neem cake recorded less population (4.60 and 5.0/3 leaves per plant

**Table 1.** Effect of organic sources of nutrients on leafhopper population on brinjal. * Mean of three replications; five plants/ replicate; figures within parentheses are square root (x + 0.5) transformed values; In a column means followed by same letter (s) are not significantly different at *P*=0.05 as per DMRT; FYM–farmyard manure (20 t/ha); VC—Vermicompost (5 t/ha); BF—biofertilizer (silica solubalising bacteria, *Azatobactor* and VAM—Vasicular Arbuscular Mycoriza (each 2 kg/ha); NC—Neem cake (1,000 kg/ha); INS–insecticide (endosulfan 0.07%). NPK—125 : 100 : 50 kg/ha.

| | | Insect mean numbers—Days after transplanting (DAT) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 15 | | 25 | | 35 | | 45 | |
| | Treatments | Leaf hopper no / 3 leaves* | Reduction over NPK (%) | Leaf hopper no / 3 leaves* | Reduction over NPK (%) | Leaf hopper no / 3 leaves* | Reduction over NPK (%) | Leaf hopper no / 3 leaves* | Reduction over NPK (%) |
| 1 | FYM | 4.60 (2.25) $^{bcd}$ | 43.41 | 7.53 (2.82) $^{bcd}$ | 40.84 | 9.93 (3.17) $^{bcd}$ | 32.90 | 10.60 (3.32)$^{cde}$ | 39.77 |
| 2 | VC | 4.20 (2.15)$^{abc}$ | 48.33 | 6.73 (2.68)$^{bcd}$ | 47.13 | 9.13 (3.09)$^{bcd}$ | 38.31 | 9.33 (3.10)$^{bcd}$ | 46.98 |
| 3 | FYM + BF | 3.86 (2.07)$^{abc}$ | 52.52 | 4.80 (2.28)$^{abc}$ | 62.29 | 6.80 (2.69)$^{abc}$ | 54.05 | 7.53 (2.82)$^{abc}$ | 57.21 |
| 4 | VC + BF | 3.73 (2.65)$^{abc}$ | 54.12 | 4.40 (2.21)$^{ab}$ | 65.43 | 6.40 (2.62)$^{abc}$ | 56.75 | 7.40 (2.80)$^{abc}$ | 57.95 |
| 5 | FYM + BF +NC | 2.80 (1.80)$^{ab}$ | 65.55 | 4.13 (2.15)$^{ab}$ | 67.55 | 6.20 (2.58)$^{abc}$ | 58.10 | 7.06 (2.74) $^{ab}$ | 59.88 |
| 6 | VC + BF +NC | 2.33 (1.68)$^{a}$ | 71.34 | 3.80 (2.07)$^{a}$ | 70.14 | 5.80 (2.40)$^{ab}$ | 60.81 | 6.60 (2.66)$^{ab}$ | 62.50 |
| 7 | FYM + BF +INS | 3.86 (2.08)$^{abc}$ | 52.52 | 4.93 (2.31)$^{abc}$ | 61.27 | 3.53 (2.00)$^{a}$ | 76.14 | 5.66 (2.48)$^{a}$ | 67.84 |
| 8 | VC +BF +INS | 3.60 (2.02)$^{abc}$ | 55.52 | 4.40 (2.21)$^{ab}$ | 65.43 | 3.13 (1.89)$^{a}$ | 78.85 | 5.06 (2.34)$^{a}$ | 71.25 |
| 9 | FYM + BF +NPK | 5.46 (2.34)$^{e}$ | 32.84 | 8.53 (3.00)$^{bcd}$ | 32.99 | 11.00 (3.37)$^{bcd}$ | 25.67 | 11.86 (3.51)$^{de}$ | 32.61 |
| 10 | VC + BF +NPK | 5.46 (2.44)$^{cd}$ | 33.57 | 8.20 (2.94)$^{bcd}$ | 35.58 | 10.66 (3.27)$^{bcd}$ | 27.97 | 11.53 (3.43)$^{de}$ | 34.48 |
| 11 | NPK alone | 8.13 (2.92)$^{e}$ | – | 12.73 (3.60)$^{d}$ | – | 14.80 (3.87)$^{d}$ | – | 17.60 (4.25)$^{f}$ | – |
| 12 | Untreated control | 6.60 (2.64)$^{f}$ | 18.81 | 9.53 (3.16)$^{cd}$ | 25.13 | 11.86 (3.44)$^{cd}$ | 19.86 | 14.26 (3.83)$^{e}$ | 18.97 |

**Table 1.** Continued.

| | | Insect mean numbers —Days after transplanting (DAT) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 55 | | 65 | | Mean | |
| | Treat-ments | Leaf hopper no / 3 leaves* | Reduction over NPK (%) | Leaf hopper no / 3 leaves* | Reduction over NPK (%) | Leaf hopper no / 3 leaves* | Reduction over NPK (%) |
| 1 | FYM | 8.53 (3.00)$^{bcd}$ | 37.87 | 7.00 (2.70)$^{cde}$ | 41.95 | 8.03 (2.89)$^{bcd}$ | 39.02 |
| 2 | VC | 8.20 (2.92)$^{bcd}$ | 40.27 | 6.66 (2.67)$^{bcd}$ | 44.17 | 7.37 (2.78)$^{bc}$ | 44.03 |
| 3 | FYM + BF | 6.60 (2.65)$^{abc}$ | 51.93 | 5.73 (2.48)$^{bc}$ | 52.48 | 5.88 (2.51)$^{ab}$ | 55.35 |
| 4 | VC + BF | 6.33 (2.60)$^{ab}$ | 53.89 | 5.66 (2.48)$^{c}$ | 53.06 | 5.65 (2.46)$^{ab}$ | 57.09 |
| 5 | FYM + BF +NC | 5.00 (2.34)$^{a}$ | 63.58 | 4.73 (2.27)$^{bc}$ | 60.77 | 4.98 (2.32)$^{a}$ | 62.18 |
| 6 | VC + BF +NC | 4.60 (2.25)$^{a}$ | 66.49 | 4.33 (2.19)$^{ab}$ | 64.09 | 4.57 (2.23)$^{a}$ | 65.29 |
| 7 | FYM +BF +INS | 5.26 (2.40)$^{a}$ | 61.68 | 2.80 (1.80)$^{a}$ | 76.78 | 4.34 (2.18)$^{a}$ | 67.04 |
| 8 | VC + BF + INS | 5.20 (2.38)$^{a}$ | 62.12 | 2.66 (1.77)$^{a}$ | 77.94 | 4.00 (2.11)$^{a}$ | 69.62 |
| 9 | FYM + BF +NPK | 10.33 (3.26)$^{cd}$ | 24.76 | 8.73 (3.02)$^{de}$ | 27.61 | 9.31 (3.11)$^{cd}$ | 29.30 |
| 10 | VC + BF +NPK | 10.13 (3.25)$^{cd}$ | 26.22 | 8.60 (3.01)$^{de}$ | 28.68 | 9.08 (3.07)$^{cd}$ | 31.05 |
| 11 | NPK alone | 13.73 (3.77)$^{d}$ | – | 12.06 (3.53)$^{f}$ | – | 13.17 (3.67)$^{e}$ | – |
| 12 | Untreated control | 11.66 (3.48)$^{cd}$ | 15.07 | 9.53 (3.16)$^{ef}$ | 20.97 | 10.59 (3.30)$^{de}$ | 19.74 |

respectively) with the corresponding per cent reduction of 66.49 and 63.58 over NPK. On 65 DAT, the treatments VC + biofertilizer + insecticide and FYM + biofertilizer + insecticide had significantly less leafhopper (2.66 and 2.80/3 leaves per plant ) and were at par, followed by VC + biofertilizer + neemcake(4.33/3 leaves per plant) and FYM + biofertilizer + neemcake (4.73/3 leaves per plant) compared to the maximum of 12.06 and 9.53/3 leaves per plant in inorganic NPK and untreated, respectively.

Thus the four treatment combinations, VC + biofertilizer + insecticide, FYM + biofertilizer + insecticide, VC + biofertilizer + neemcake and FYM + biofertilizer + neem cake were found to be significantly effective in reducing the leafhopper population with a mean population ranging from 4.00 to 4.98/3 leaves per plant compared to 13.17 and 10.59 in NPK as inorganic form and untreated control. The corresponding per cent reduction over NPK was 69.62, 67.04, 65.29 and 62.18%, respectively.

The present findings hold good with results of Suroshe et al. (2004) who reported endosulfan, 350 g a.i./ha was the most effective chemical in controlling sucking pests of brinjal. The effectiveness of endosulfan against sucking pests on different crops was also reported by several workers (Jaganmohan 1985, Pareek et al. 1987, Sharma et al. 1996, Yadav et al.1988).Godase and Patel (2003) reported low aphid incidence and leafhoppers (3.5 and 3.41/9 leaves) in neem cake (1.700 kg /ha) applied plots in brinjal. Application of FYM (20 t/ha) reduced the population of leafhopper, *A. bigutulla bigutulla* and aphid, *A. gossypii* (11.30 and 15.36 insects/9 leaves) compared to application of NPK (100 : 37.5 : 37.5 kg/ha) which reached 18.65 and 25.74 insects/9 leaves, respectively. Plots treated with vermicompost (4 t/ha) recorded 11.50 and 15.80 insects compared to NPK in brinjal (Godase and Patel, 2001). The impact of FYM along

with neem cake and biofertilizers in reducing the incidence of aphid, *Myzus persicae* (Suizer) and thrips, *Scirtothrips dorsalis* (Hood) in chillies was well documented by Rajendran and Chandramani (2002). Combined application of organic and inorganic materials may offer adequate and highly preferred food to the insects leading to heavy insect population (Surekha and Arjuna Rao 2001).

## *Conclusion*

Use of organics like neem cake along with VC + biofertilizer and FYM+ biofertilizer can also suppress the insect pests. The per cent reduction of shoot damage by these treatments is more or less same as in insecticide treated plots. So, insecticides can be avoided and use some of organic materials which is having induced resistance or insecticidal properties against pests to get pesticide free produce for human consumption.

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