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# Management of serpentine leafminer (*Liriomyza trifolii*) (Diptera: Agromyzidae) on tomato (*Lycopersicon esculentum*) with a new insecticide cyantraniliprole

H P MISRA[1]

*Orissa University of Agriculture and Technology, Bhubaneswar, Odisha 751 003*

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ABSTRACT

A field experiment was conducted at the Central Research Station farm of Orissa University of Agriculture & Technology, Bhubaneswar, Odisha, India during winter seasons of 2009-10 and 2010-11 to evaluate the bio-efficacy of a new anthranilic diamide, cyantraniliprole (Cyazypyr) (HGW 86) 10% OD for its efficacy in controlling the serpentine leafminer [*Liriomyza trifolii* (Burgess)] (Diptera: Agromyzidae) infesting tomato (*Lycopersicon esculentum* Mill) crop and its safety to the coccinellid predators. Superiority of cyantraniliprole (HGW86) 10% OD @ 90 and 105 g a.i./ha was significantly envisaged with record of lowest number of serpentine leafminer (SLM) adults/5 plants (0.66-0.74 in 2009–10 and 0.77-0.85 in 2010–11) at 7 days after spraying (DAS) in comparison to other treatments registering a mean of 80.65-82.61% reduction in SLM adult population over control. The results further revealed significantly lowest number of live mines/20 leaves (2.33-2.58 in winter, 2009–10 and 2.40-2.67 in winter, 2010–11) by SLM in treatments cyantraniliprole (HGW 86) 10% OD @ 90 and 105 g a.i./ha with a mean reduction of 83.95-85.54% live mines over control compared to other treatments during both the seasons of experimentation. Significantly lowest number of SLM pupae was observed in the plots receiving treatments cyantraniliprole (HGW 86) 10% OD @ 90 and 105 g a.i./ha both during 2009–10 (1.15-1.33) and 2010–11 (1.10-1.25), when compared to untreated control, with a mean reduction of 83.67-85.76% SLM pupal population over control. The predatory coccinellid population did not differ significantly from that of control during post application period indicating safety of cyantraniliprole and spinosad at tested doses to the predators except for endosulfan treatment. The mean marketable tomato fruit yield was recorded significantly highest (16.26-16.65 tonnes/ha) in treatments cyantraniliprole (HGW 86) 10% OD @ 90 and 105 g a.i./ha with an increase of 48.90-52.49% over untreated control.

**Key words:** *Liriomyza trifolii*, Newer insecticide, Serpentine leafminer

The Serpentine leafminer [*Liriomyza trifolii* (Burgess)] (Diptera: Agromyzidae) a native of America was accidentally introduced to India along with chrysanthemum cuttings (Anonymous 1991). In India it was recorded infesting 79 plant species including vegetables, pulses, oilseeds, green manuring crops, fodder and fibre crops (Srinivasan *et al*. 1995). Galande *et al*. (2004) recorded this pest on 16 new crops and 16 weed species at Maharashtra. Adults of the insect puncture the leaves to lay the eggs and the maggots tunnels within the leaf and makes characteristic serpentine leaf mines. Extensive leaf mining activity reduces photosynthetic activity of the plants. Tomato (*Lycopersicon esclentum* Mill.) fruit yield was reduced when each leaflet averages one or more mines (Wolfenbarger and Wolfenbarger 1966). Farmers mostly rely on chemical pesticides for controlling invasive *L. trifolii* population (Gitonga *et al.* 2010). In the past several chemical insecticides have been proved effective in controlling the pest (Weintraub 1999, Civelek and Weintraub 2003, Partha Saradhi and Patnaik 2006). However, development of resistance to conventional insecticides against the pest has been reported from India (Nadagouda *et al*. 2010). Additional novel chemistries for management of the pest are therefore desirable because so few options currently exist. The anthranillic diamide insecticides cyantraniliprole which is having a novel mode of action targets the ryanodine receptors in insect muscle cells (IRAC mode of action classification, group 28) (IRAC 2007) leading to paralysis and death of insects. Therefore, in the present field experiment a novel anthranillic diamide insecticide cyantraniliprole having novel mode of action have been evaluated against the pest which if effective, would delay development of resistance and remain in the pipeline for management of the pest.

## MATERIALS AND METHODS

The field experiment was conducted during the winter seasons of 2009–10 and 2010–11 to evaluate the bio-efficacy

[1] Professor (e mail: hara_agri@yahoo.co.in), Department of Entomology, College of Agriculture

of a new anthranillic diamide insecticide, cyantraniliprole (Cyazypyr) (HGW 86) in a randomized block design at the Central Research Station farm, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India growing tomato hybrid Ruturaj in plots of size 6.5 m × 2.4 m with a spacing of 60 cm × 50 cm. The crop was fertilized with 125:80:110 kg N: $P_2O_5$:$K_2O$/ha and grown with normal package of practices recommended for the state except plant protection. There were eight treatments replicated three times. The insecicide treatments included cyantraniliprole (HGW 86) 10%OD @ 45, 60, 75, 90 and 105 g a.i./ha, and two checks, viz. endosulfan 35EC @ 350 g a.i./ha, spinosad 45 SC @ 56 g a.i./ha and an untreated control (UTC). Chemical treatments were applied on appearance of the characteristic symptoms on the leaf of the pest on the crop through aerial spraying with high volume knapsack sprayer fitted with hollow cone nozzle and using 500 litres of spray fluid per hectare. Altogether three applications were done at 10 days intervals during both the seasons.

Weekly observations were taken on five tagged plants per plot after planting tomato crop in the main field. On appearance of the characteristic serpentine symptoms on the leaf, the number of adults of *L. trifolii* was recorded from five tagged plants. Besides, the number of live mines/20 leaves/plot and number of pupae/20 leaves at random at pre-treatment and at 3 and 7 days after each application was also recorded. For pupal population 20 infested leaves were collected randomly from each treatment, brought to laboratory and observed under binocular stereoscopic microscope. The population of lady beetle, *Coccinella septempunctata* was recorded on the same five tagged plants per plot from all treatment plots of bio-efficacy evaluation trial prior to every application and at 0, 3 and 7 days after each application. Treatment-wise marketable tomato fruit yield was recorded at each picking and a total of five economic pickings were done. The data were subjected to transformation before statistical analysis following Gomez and Gomez (1984) to test the significance of treatment effects.

## RESULTS AND DISCUSSION

The results revealed no significant variation as regards the number of serpentine leafminer (SLM) adults/5 plants (Table 1) was concerned during Season I, 2009–10 (3.22–4.10) and Season II, 2010–11 (3.45–4.36) indicating uniform distribution of the pest throughout the experimental plot before start of insecticide sprays. But, all the insecticidal treatments significantly brought down SLM adult population up to 7 DAS compared to untreated control (UTC) during

Table 1 Number of serpentine leafminer, *Liriomyza trifolii* adults / 5 tagged plants in Tomato at Bhubaneswar

| Treat-ment | Insecticides | Dose (g a.i./ha) | Number of serpentine leaf miner adults/5 tagged plants | | | | | | | | Mean % reduction over control |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Season I, 2009–10 | | | | Season II, 2010–11 | | | | |
| | | | 1 DBS | 3 DAS | 7 DAS | % reduction over control | 1 DBS | 3 DAS | 7 DAS | % reduction over control | |
| T1 | HGW 86 10% OD | 45 | 3.33 (1.96) | 1.67 (1.47)c | 1.98 (1.57)c | 49.62 | 4.12 (2.15) | 1.72 (1.49)c | 2.17 (1.63)c | 49.30 | 49.46 |
| T2 | HGW 86 10% OD | 60 | 3.67 (2.04) | 1.18 (1.30)b | 1.52 (1.42)b | 61.32 | 4.36 (2.20) | 1.33 (1.35)b | 1.67 (1.47)b | 62.15 | 61.73 |
| T3 | HGW 86 10% OD | 75 | 4.08 (2.14) | 0.77 (1.13)b | 1.38 (1.37)b | 64.88 | 3.84 (2.08) | 0.88 (1.17)b | 1.48 (1.41)b | 65.42 | 65.15 |
| T4 | HGW 86 10% OD | 90 | 3.92 (2.10) | 0.00 (0.71)a | 0.74 (1.11)a | 81.17 | 3.45 (1.99) | 0.16 (0.81)a | 0.85 (1.16)a | 80.14 | 80.65 |
| T5 | HGW 86 10% OD | 105 | 4.10 (2.14) | 0.00 (0.71)a | 0.66 (1.08)a | 83.21 | 4.22 (2.17) | 0.00 (0.71)a | 0.77 (1.13)a | 82.01 | 82.61 |
| T6 | Endosulfan 35%EC | 350 | 3.55 (2.01) | 2.02 (1.59)c | 2.16 (1.63)c | 45.04 | 3.75 (2.06) | 1.95 (1.56)c | 2.35 (1.69)c | 45.09 | 45.06 |
| T7 | Spinosad 45% SC | 56 | 3.22 (1.93) | 1.67 (1.47)c | 1.92 (1.55)c | 51.14 | 3.67 (2.04) | 2.02 (1.59)c | 2.20 (1.64)c | 48.60 | 49.87 |
| T8 | Untreated Check | | 3.33 (1.96) | 3.67d (2.04) | 3.93 (2.10)d | | 3.83 (2.08) | 4.14d (2.15) | 4.28 (2.19)d | | |
| | SE (m) ± | | (0.09) | (0.06) | (0.04) | | (0.10) | (0.06) | (0.03) | | |
| | CD (P=0.05) | | (NS) | (0.18) | (0.11) | | (NS) | (0.19) | (0.10) | | |

Figures in the parentheses are x + 0.5 square root transformed values; Means followed by a common letter in a column are not significantly different from each other

DBS, Days before spraying; DAS, days after spraying; NS, non-significant

Table 2 Number of live mines by serpentine leaf miner, *Liriomyza trifolii* / 20 leaves in Tomato at Bhubaneswar

| Treatment | Insecticides | Dose (g a.i./ha) | Number of live mines by serpentine leaf miner / 20 leaves | | | | | | | | Mean % reduction over control |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Season I, 2009–10 | | | | Season II, 2010–11 | | | | |
| | | | 1 DBS | 3 DAS | 7 DAS | % reduction over control | 1 DBS | 3 DAS | 7 DAS | % reduction over control | |
| T1 | HGW 86 10% OD | 45 | 15.48 (4.00) | 3.14 (1.91)b | 6.60 (2.66)d | 58.90 | 16.80 (4.16) | 5.45 (2.44)c | 7.28 (2.79)d | 56.33 | 57.61 |
| T2 | HGW 86 10% OD | 60 | 16.44 (4.12) | 2.88 (1.84)b | 4.46 (2.23)b | 72.23 | 15.60 (4.01) | 4.67 (2.27)b | 5.16 (2.38)b | 69.05 | 70.64 |
| T3 | HGW 86 10% OD | 75 | 15.80 (4.04) | 2.63 (1.77)b | 3.86 (2.09)b | 75.96 | 16.33 (4.10) | 3.82 (2.08)b | 4.34 (2.20)b | 73.96 | 74.96 |
| T4 | HGW 86 10% OD | 90 | 16.08 (4.07) | 1.87 (1.54)a | 2.58 (1.75)a | 83.93 | 16.55 (4.13) | 2.02 (1.59)a | 2.67 (1.78)a | 83.98 | 83.95 |
| T5 | HGW 86 10% OD | 105 | 16.32 (4.10) | 1.22 (1.31)a | 2.33 (1.68)a | 85.49 | 15.75 (4.03) | 1.84 (1.53)a | 2.40 (1.70)a | 85.60 | 85.54 |
| T6 | Endosulfan 35% EC | 350 | 15.64 (4.02) | 3.67 (2.04)c | 6.72 (2.69)d | 58.16 | 16.67 (4.14) | 4.73 (2.29)b | 6.55 (2.65)c | 60.71 | 59.43 |
| T7 | Spinosad 45% SC | 56 | 15.88 (4.05) | 3.48 (1.99)b | 6.50 (2.64)d | 59.53 | 15.80 (4.04) | 4.55 (2.25)c | 6.45 (2.64)c | 61.31 | 60.42 |
| T8 | Untreated Check | | 15.33 (3.98) | 15.92 (4.05)d | 16.06 (4.07)e | | 16.10 (4.07) | 16.33 (4.10)d | 16.67 (4.14)e | | |
| | SE (m) ± | | (0.07) | (0.09) | (0.05) | | (0.07) | (0.07) | (0.06) | | |
| | CD (P=0.05) | | (NS) | (0.26) | (0.15) | | (NS) | (0.22) | (0.19) | | |

Figures in the parentheses are x+0.5 square root transformed values; Means followed by a common letter in a column are not significantly different from each other; DBS, Day before spraying; DAS, Days after spraying; NS, Non-significant

both the seasons of experimentation. Among the treatments evaluated, superiority of cyantraniliprole (HGW 86) 10% OD @ 90 and 105 g a.i./ha was significantly envisaged with record of lowest number of adults/5 plants (0.66-0.74 in 2009–10 and 0.77–0.85 in 2010–11) at 7 days after spraying (DAS) in comparison to other treatments registering a mean of 80.65–82.61% reduction in adult SLM population over UTC.

The results on the number of live mines by SLM/20 leaves in tomato crop revealed no significant variation (15.33–16.44) during Season I, 2009–10 and during Season II, 2010–11 (15.60–16.80) at one day before spraying (DBS) registering uniform distribution of the pest in the experimental plot (Table 2). All the insecticidal treatments effectively brought down the number of live mines significantly at 3 and 7 DAS during both the seasons of experimentation in comparison to UTC. But, at 7 DAS significantly lowest number of live mines/20 leaves (2.33–2.58) in Season I, 2009–10 and 2.40–2.67 in Season II, 2010–11 by SLM was observed in treatments of cyantraniliprole (HGW 86) 10% OD @ 90 and 105 g a.i./ha with a mean reduction of 83.95–85.54% in number of live mines over UTC compared to other treatments during both the seasons of experimentation.

The number of SLM pupae/20 leaves on tomato crop at I DBS (Table 3) did not vary significantly during Season I, 2009–10 (7.55–8.42) and Season II, 2010–11 (7.33–8.33) implying uniform distribution of the pest in the experimental plots. All the insecticidal treatments significantly brought down pupation by SLM on leaves of tomato during both the seasons of evaluation when compared to UTC at both 3 and 7 DAS. However, among the treatments, significantly lowest number of SLM pupae was observed in the plots receiving treatments of cyantraniliprole (HGW86) 10% OD @ 90 and 105 g a.i./ha both during winter, 2009–10 (1.15–1.33) and winter, 2010–11 (1.10–1.25), both being at par at 7 DAS, when compared to UTC, with a mean reduction in pupation of SLM by 83.67–85.76 % over UTC.

There is no report on effectiveness of cyantraniliprole (HGW 86) 10% OD on larvae, pupae and adults of *L. trifolii* in the literature implying the present finding a new report. The anthranillic diamide insecticide group possesses anti-feedant properties that differ between chemicals of this group and insects (Gonzales-Coloma *et al*. 1999) which might be the reason of record of significantly low population of all stages of SLM in the present field evaluation trial.

The population of coccinellid predators (nymphs and adults) per five plants at 1 DBS did not vary significantly (Table 4) during Season I, 2009–10 (6.26–7.08) and Season II, 2010–11 (6.67–7.33) registering uniform distribution in the experimental sub-plots. At zero hour after insecticide

Table 3 Number of serpentine leaf miner, *Liriomyza trifolii* pupae/20 leaves in tomato at Bhubaneswar

| Treatment | Insecticides | Dose (g a.i./ha) | Number of serpentine leaf miner pupae/20 leaves | | | | | | | | Mean % reduction over control |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Season I, 2009–10 | | | | Season II, 2010–11 | | | | |
| | | | 1 DBS | 3 DAS | 7 DAS | % reduction over control | 1 DBS | 3 DAS | 7 DAS | % reduction over control | |
| T1 | HGW 86 10% OD | 45 | 8.42 (2.99) | 1.56 (1.43)b | 3.20 (1.95)c | 59.75 | 8.14 (2.94) | 1.48 (1.41)b | 3.15 (1.91)c | 59.87 | 59.81 |
| T2 | HGW 86 10% OD | 60 | 7.67 (2.59) | 1.42 (1.38)b | 2.33 (1.68)b | 70.69 | 8.25 (2.96) | 1.33 (1.35)b | 2.25 (1.66)b | 71.34 | 70.92 |
| T3 | HGW 86 10% OD | 75 | 8.14 (2.94) | 1.33 (1.35)b | 1.82 (1.52)b | 77.11 | 7.95 (2.91) | 1.25 (1.32)b | 1.78 (1.51)b | 77.32 | 77.21 |
| T4 | HGW 86 10% OD | 90 | 7.83 (2.89) | 0.90 (1.18)a | 1.33 (1.35)a | 83.27 | 7.67 (2.86) | 0.85 (1.16)a | 1.25 (1.32)a | 84.08 | 83.67 |
| T5 | HGW 86 10% OD | 105 | 7.92 (2.90) | 0.67 (1.08)a | 1.15 (1.28)a | 85.53 | 7.33 (2.80) | 0.67 (1.08)a | 1.10 (1.26)a | 85.99 | 85.76 |
| T6 | Endosulfan 35% EC | 350 | 8.25 (2.96) | 1.82 (1.52)c | 3.45 (1.99)c | 56.60 | 8.33 (2.97) | 1.80 (1.52)c | 3.33 (1.96)c | 57.58 | 57.09 |
| T7 | Spinosad 45% SC | 56 | 7.70 (2.86) | 1.78 (1.51)c | 3.33 (1.96)c | 58.11 | 7.44 (2.82) | 1.80 (1.52)c | 3.33 (1.96)c | 57.58 | 57.84 |
| T8 | Untreated check | | 7.55 (2.84) | 7.87 (2.89)d | 7.95 (2.91)d | | 7.33 (2.80) | 7.67 (2.59)d | 7.85 (2.89)d | | |
| | SE (m) ± | | (0.20) | (0.04) | (0.06) | | (0.12) | (0.03) | (0.05) | | |
| | CD (P = 0.05) | | (NS) | (0.12) | (0.18) | | (NS) | (0.09) | (0.16) | | |

Figures in the parentheses are x + 0.5 square root transformed values; Means followed by a common letter in a column are not significantly different from each other; DBS, Day before spraying; DAS, days after spraying; NS, Non-significant

Table 4 Number of lady beetle (Coccinellid beetle), *Coccinella Septempunctata*/5 plants in tomato at Bhubaneswar

| Treatment | Insecticides | Dose (g a.i./ha) | Number of coccinellids/5 plants on tomato crop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Season I, 2009–10 | | | | Season II, 2010–11 | | | |
| | | | 1 DBS | 0 DAS | 3 DAS | 7 DAS | 1 DBS | 0 DAS | 3 DAS | 7 DAS |
| T1 | HGW 86 10% OD | 45 | 6.84 (2.71) | 6.78 (2.70)a | 3.72 (2.03)a | 3.98 (2.12)a | 7.12 (2.76) | 7.06 (2.75)a | 3.83 (2.03)a | 4.08 (2.14)a |
| T2 | HGW 86 10% OD | 60 | 6.52 (2.65) | 6.55 (2.65)a | 3.45 (1.98)a | 3.76 (2.06)a | 7.24 (2.78) | 7.18 (2.77)a | 3.65 (2.04)a | 4.12 (2.15)a |
| T3 | HGW 86 10% OD | 75 | 7.08 (2.75) | 6.98 (2.73)a | 3.67 (2.04)a | 3.88 (2.09)a | 6.98 (2.73) | 6.67 (2.68)a | 3.71 (2.05)a | 3.77 (2.07)a |
| T4 | HGW 86 10% OD | 90 | 6.34 (2.61) | 6.40 (2.63)a | 3.58 (2.02)a | 4.06 (2.13)a | 7.33 (2.81) | 7.18 (2.77)a | 3.55 (2.01)a | 3.67 (2.04)a |
| T5 | HGW 86 10% OD | 105 | 6.67 (2.68) | 6.65 (2.67)a | 3.77 (2.04)a | 4.10 (2.14)a | 6.67 (2.68) | 6.73 (2.69)a | 3.67 (2.04)a | 3.83 (2.03)a |
| T6 | Endosulfan 35% EC | 350 | 6.93 (2.72) | 2.30 (1.67)b | 0.00 (0.71)b | 0.67 (1.08)b | 6.75 (2.69) | 2.12 (1.62)b | 0.33 (0.94)b | 0.67 (1.08)b |
| T7 | Spinosad 45% SC | 56 | 6.26 (2.60) | 6.28 (2.60)a | 3.83 (2.08)a | 4.12 (2.15)a | 6.81 (2.70) | 6.67 (2.68)a | 3.84 (2.08)a | 3.91 (2.10)a |
| T8 | Untreated check | | 6.42 (2.63) | 6.38 (2.62)a | 4.48 (2.23)a | 4.52 (2.24)a | 6.67 (2.68) | 6.60 (2.66)a | 3.92 (2.10)a | 4.08 (2.14)a |
| | SE (m) ± | | (0.07) | (0.05) | (0.09) | (0.07) | (0.06) | (0.05) | (0.04) | (0.05) |
| | CD (P=0.05) | | (NS) | (0.15) | (0.26) | (0.20) | (NS) | (0.14) | (0.13) | (0.16) |

Figures in the parentheses are x + 0.5 square root transformed values; Means followed by a common letter in a column are not significantly different from each other; DBS, Day before spraying; DAS, days after spraying; NS, Non-significant

Table 5 Marketable fruit yield of tomato (Var-Ruturaj) at Bhubaneswar

| Treatment | Insecticides | Dose (g a.i./ha) | Season I, 2009-10 | | Season II, 2010-11 | | Pooled | |
|---|---|---|---|---|---|---|---|---|
| | | | Fruit yield (q/ha) | % increase over control | Fruit yield (q/ha) | % increase over control | Fruit yield (q/ha) | % increase over control |
| T1 | HGW 86 10% OD | 45 | 135.75d | 17.23 | 112.35d | 9.50 | 124.05d | 13.60 |
| T2 | HGW 86 10% OD | 60 | 148.50c | 28.24 | 123.75c | 20.61 | 136.12c | 24.65 |
| T3 | HGW 86 10% OD | 75 | 162.10b | 39.98 | 135.90b | 32.46 | 149.00b | 36.45 |
| T4 | HGW 86 10% OD | 90 | 176.80a | 52.68 | 148.40a | 44.64 | 162.60a | 48.90 |
| T5 | HGW 86 10% OD | 105 | 180.45a | 55.83 | 152.60a | 48.73 | 166.52a | 52.49 |
| T6 | Endosulfan 35% EC | 350 | 163.20b | 40.93 | 136.70b | 33.23 | 149.95b | 37.32 |
| T7 | Spinosad 45% SC | 56 | 165.70b | 43.09 | 138.55b | 35.04 | 152.12b | 39.30 |
| T8 | Untreated check | | 115.80e | | 102.60e | | 109.20e | |
| | SE (m) ± | | 2.02 | | 1.68 | | 1.85 | |
| | CD (P=0.05) | | 6.05 | | 5.05 | | 5.55 | |

Means followed by a common letter in a column are not significantly different from each other

spray, except in endosulfan treatment their population was on par with UTC during both the seasons. On 3rd and 7th DAS, although a general reduction in their number was observed in insecticide treated plots but, the predatory coccinellid population did not differ significantly from that of UTC indicating safety of tested chemicals to the predators except for endosulfan treatment. The general reduction in coccinellid predatory population may be attributed to reduction of host density in the insecticide treated plots and resultant congregation of more number of predators in the untreated plots further reducing the host number in UTC. Misra (2011) reported safety of anthranillic diamide group of insecticide chlorantraniliprole to coccinellid predators which corroborates with the present findings.

The marketable fruit yield (tonnes/ha) recorded significantly more (Table 5) in all the insecticidal treatments during Season I, 2009–10 (13.57–18.04 tonnes/ha) and Season II, 2010–11 (11.23–15.26 tonnes/ha) compared to UTC (11.58 and 10.26 tonnes/ha, respectively). Among the treatments, significantly highest marketable tomato fruit yield was recorded in the treatments of cyantraniliprole (HGW86) 10% OD @ 90 and 105 g a.i./ha during both 2009–10 (17.68–18.04 tonnes/ha) and 2010–11 (14.84–15.26 tonnes/ha) seasons. The pooled mean yield data also revealed similar results establishing superiority of cyantraniliprole (HGW 86) 10% OD @ 90 and 105 g a.i./ha over other treatments registering highest fruit yield of 16.26-16.65 tonnes/ha with an increase of 48.90–52.49% in fruit yield over UTC. These two treatments were followed by cyantraniliprole (HGW 86) 10% OD @ 75 g a.i./ha, endosulfan 35EC @ 350 g a.i./ha and spinosad 45 SC @ 56 g a.i./ha with a mean marketable tomato fruit yield of 14.90–15.21 tonnes/ha and an increase in yield of 36.45-39.30% over UTC. The greater fruit yield recorded in cyantraniliprole treated plots in the present field evaluation trial may be attributed to the anti-feedant effect of cyantraniliprole decreasing leaf damage by *L. trifolii*. Higher marketable fruit yield of brinjal was recorded by Misra (2011) with the use of anthranillic diamide insecticide chlorantraniliprole.

Thus, it may be concluded from the present study that the new anthranillic diamide insecticide cyantraniliprole (HGW 86) 10% OD @ 90 g a.i./ha may be recommended as an alternative for the management of serpentine leafminer, *L. trifolii* on tomato whose efficacy was at par with its higher dose of 105 g a.i/ha.

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