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**G Preetha**
Assistant Professor, Department of Agricultural Entomology, Agricultural College and Research Institute, Tamil Nadu Agricultural University, Killikulam, Vallanadu, Tamil Nadu, India

**J Stanley**
Senior Scientist, Department of Agricultural Entomology, Vivekananda Parvatiya Krishi Anusandhan Sansthan, Uttarakhand, India

**T Manoharan**
Retired Professor, Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

**S Kuttalam**
Retired Professor, Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

**Corresponding Author:**
**G Preetha**
Assistant Professor, Department of Agricultural Entomology, Agricultural College and Research Institute, Tamil Nadu Agricultural University, Killikulam, Vallanadu, Tamil Nadu, India

# Effect of imidacloprid 17.8 SL against whiteflies and thrips in cotton

**G Preetha, J Stanley, T Manoharan and S Kuttalam**

**Abstract**
Two field experiments were conducted to assess the effect of imidacloprid 17.8 SL against whiteflies and thrips in cotton. The treatment schedule included three different doses of imidacloprid 17.8 SL at 15, 25 and 50 g a.i. ha$^{-1}$ along with standard checks *viz.*, imidacloprid (Tatamida®) at 25 g a.i. ha$^{-1}$ and methyl demeton at 125 g a.i. ha$^{-1}$ and their efficacy was compared with untreated check. The pre- and post treatment counts were recorded on 1, 3, 7, 10 and 14 days on the incidence of whiteflies and thrips. The results revealed that the order of efficacy of different insecticides against whiteflies and thrips were as follows: imidacloprid 17.8 SL @ 50 g a.i. ha$^{-1}$ > imidacloprid (Tatamida®) @ 25 g a.i. ha$^{-1}$ > imidacloprid 17.8 SL @ 25 g a.i. ha$^{-1}$ > thiamethoxam @ 25 g a.i. ha$^{-1}$ > imidacloprid 17.8 SL @ 15 g a.i. ha$^{-1}$ > methyl demeton at 125 g a.i. ha$^{-1}$ (whiteflies) and imidacloprid 17.8 SL @ 50 g a.i. ha$^{-1}$ > imidacloprid 17.8 SL @ 25 g a.i. ha$^{-1}$ > imidacloprid (Tatamida®) @ 25 g a.i. ha$^{-1}$ > thiamethoxam @ 25 g a.i. ha$^{-1}$ > imidacloprid 17.8 SL @ 15 g a.i. ha$^{-1}$ > methyl demeton at 125 g a.i. ha$^{-1}$ (thrips). Though the double dose of imidacloprid 17.8 SL @ 50 g a.i. ha$^{-1}$ showed higher efficacy against whiteflies and thrips, the recommended dose of imidacloprid 17.8 SL @ 25 g a.i. ha$^{-1}$ was found to be effective in controlling whiteflies and thrips in cotton followed by thiamethoxam @ 25 g a.i. ha$^{-1}$.

**Keywords:** Cotton, whiteflies, thrips, imidacloprid, efficacy

## Introduction
Cotton (*Gossypium* spp.) is one of the most important cash crops of India, which accounts for about 50 per cent of the total fibre consumption of the world. In India, cotton is grown over an area of about 124.29 lakh ha, with a production and productivity of 370.00 lakh bales and 506 kg ha$^{-1}$, respectively (https://cotcorp.org.in/statistics.aspx) [8]. While in Tamil Nadu, cotton is cultivated with an average area, production and productivity of 1.48 lakh ha, 6.00 lakh bales and 689 kg ha$^{-1}$, respectively (Annual Report, 2017-18) [3]. Cotton is being ravaged by several insect pests contributing to drastic reduction in yield. As many as 1326 insect and mite pests all over the world (Hargreaves, 1948) [7] and about 200 in India (Anonymous, 1981) [4] have been documented, of which 10 are e conomically important in Tamil Nadu (Venugopal, 1998) [16]. Among a vast array of insect pests, the problem of sap sucking pests *viz*., aphids, *Aphis gossypii* Glover, leafhoppers, *Amrasca biguttula biguttula* (Ishida), whiteflies, *Bemisia tabaci* (Gennadius) and thrips, *Thrips tabaci* Lindeman have become more serious from seedling stage thereby resulting in considerable reduction in seed cotton yield up to 22.85 per cent (Satpute *et al*., 1990) [14]. The cotton whitefly, *B. tabaci* caused 10 to 45 per cent reduction in cotton yield (Reddy, 1987) [13].
Chloronicotinyls/neonicotinoids are the new group of crop protection agents highly effective against sucking pests which act on receptor protein of insect nervous system. Neonicotinoids constitute the compounds with a new mode of action (Leicht, 1996) [10]. They are acute contact and stomach poisons with translaminar activity and systemic properties. Thus in the present investigation the neonicotinoid compound, imidacloprid was tested for its efficacy against cotton sucking pests *viz*., whiteflies, *Bemisia tabaci* (Gennadius) and thrips, *Thrips tabaci* Lindeman.

## Materials and Methods
Two field experiments were conducted in the farmer's holding using cotton cultivar (Ranjit) at Annur and MCU 12 in Puliampatti to evaluate the efficacy of imidacloprid 17.8 SL against cotton whiteflies and thrips. The experiments were conducted in a randomized block design (RBD) and replicated thrice. Two sprays were given with a pneumatic knapsack sprayer with a spray fluid volume of 500 litres ha$^{-1}$. The pre and post treatment observations on 1, 3, 7, 10 and 14 days were recorded on the incidence of whiteflies and thrips. The observations were made on three leaves per plant, one each from top, middle and bottom region from ten plants per plot selected at random leaving border rows.

## Result and Discussion

### Whiteflies

The efficacy of imidacloprid on whitefly population is presented in Tables 1 and 2. In the first field trial, the whitefly population plant$^{-1}$ prior to first round of application varied between 3.60 and 4.27. Among the insecticidal treatments tested imidacloprid at 50 g a.i. ha$^{-1}$ with the population of 1.10 plant$^{-1}$ at 14 DAT was on par with the registered product of imidacloprid (Tatamida®) at 25 g a.i. ha$^{-1}$ (1.73 plant$^{-1}$), recommended dose of imidacloprid at 25 g a.i. ha$^{-1}$ (1.87 plant$^{-1}$) and thiamethoxam at 25 g a.i. ha$^{-1}$ (1.97 plant$^{-1}$).

The lower dose of imidacloprid at 15 g a.i. ha$^{-1}$ (2.93 plant$^{-1}$) and standard check, methyl demeton at 125 g a.i. ha$^{-1}$ (3.20 plant$^{-1}$) were on par with each other however, they were superior over untreated check (Table 1). However, after second application imidacloprid at 50 g a.i. ha$^{-1}$, imidacloprid (Tatamida®) at 25 g a.i. ha$^{-1}$, imidacloprid at 25 g a.i. ha$^{-1}$ and thiamethoxam at 25 g a.i. ha$^{-1}$ were equally effective in controlling whiteflies. Imidacloprid at 15 g a.i. ha$^{-1}$ and standard check methyl demeton at 125 g a.i. ha$^{-1}$ were the next best and were on par with each other (Table 1).

In the second field trial, among the treatments, imidacloprid at the dose of 50 g a.i. ha$^{-1}$ was significantly superior over other treatments with 0.70, 0.60, 0.90, 1.17 and 1.63 adults per three leaves per plant respectively on 1, 3, 7, 10 and 14 DAT, respectively. Similarly, imidacloprid (Tatamida®) at 25 g a.i. ha$^{-1}$ gave 0.97, 1.03, 1.60, 1.90 and 2.10, imidacloprid at 25 g a.i. ha$^{-1}$ (1.10, 0.97, 1.50, 2.00 and 2.23) and thiamethoxam (1.27, 1.23, 1.63, 2.30 and 2.40) respectively on 1, 3, 7, 10 and 14 DAT (Table 2) and were found significantly superior in checking the population of whitefly. However, the lower dose of imidacloprid at 15 g a.i. ha$^{-1}$ and methyl demeton at 125 g a.i. ha$^{-1}$ were comparatively less effective in restraining its population. A similar trend was noticed during second spray also (Table 2) in which, imidacloprid at 50 g a.i. ha$^{-1}$ recorded mean population of 0.83 adults per three leaves per plant followed by imidacloprid at 25 g a.i. ha$^{-1}$ (1.18 plant$^{-1}$), imidacloprid (Tatamida®) at 25 g a.i. ha$^{-1}$ (1.17 plant$^{-1}$) and thiamethoxam at 25 g a.i. ha$^{-1}$ (1.32 plant$^{-1}$). Based on the per cent reduction over untreated check, the order of efficacy of different treatments were as follows: imidacloprid at 50 g a.i. ha$^{-1}$ > imidacloprid (Tatamida®) at 25 g a.i. ha$^{-1}$ = imidacloprid at 25 g a.i. ha$^{-1}$ > thiamethoxam 25 g a.i. ha$^{-1}$ > imidacloprid at 15 g a.i. ha$^{-1}$ > methyl demeton 125 g a.i. ha$^{-1}$ > untreated check.

**Table 1:** Effect of imidacloprid 17.8 SL on whiteflies in cotton (Field trial I)

(Mean of three replications)

| Treatments | Number/ 3 leaves/ plant | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Days after first application | | | | | | | | Days after second application | | | | | | | |
| | PTC | 1 | 3 | 7 | 10 | 14 | Mean | % Redn | PTC | 1 | 3 | 7 | 10 | 14 | Mean | % Redn |
| Imidacloprid 15 g a.i. ha$^{-1}$ | 3.60 | 1.73$^{b}$ (1.48) | 1.57$^{b}$ (1.43) | 2.03$^{ab}$ (1.51) | 2.57$^{ab}$ (1.70) | 2.93$^{b}$ (1.81) | 2.17 | 57.53 | 3.10 | 1.47$^{bc}$ (1.39) | 1.53$^{b}$ (1.41) | 1.87$^{b}$ (1.54) | 2.03$^{b}$ (1.58) | 2.37$^{b}$ (1.68) | 1.85 | 78.88 |
| Imidacloprid 25 g a.i. ha$^{-1}$ | 3.83 | 1.17$^{ab}$ (1.28) | 1.26$^{ab}$ (1.32) | 1.37$^{ab}$ (1.34) | 1.60$^{ab}$ (1.43) | 1.87$^{ab}$ (1.53) | 1.45 | 71.62 | 2.73 | 0.67$^{ab}$ (1.05) | 0.53$^{a}$ (1.01) | 0.83$^{a}$ (1.14) | 0.97$^{a}$ (1.21) | 1.13$^{a}$ (1.27) | 0.83 | 90.53 |
| Imidacloprid 50 g a.i. ha$^{-1}$ | 3.97 | 0.43$^{a}$ (0.96) | 0.47$^{a}$ (0.98) | 0.70$^{a}$ (1.06) | 0.97$^{a}$ (1.21) | 1.10$^{a}$ (1.24) | 0.73 | 85.71 | 1.83 | 0.33$^{a}$ (0.91) | 0.27$^{a}$ (0.88) | 0.50$^{a}$ (1.00) | 0.67$^{a}$ (1.08) | 0.83$^{a}$ (1.15) | 0.52 | 94.06 |
| Imidacloprid 25 g a.i. ha$^{-1}$ (Tatamida®) | 4.13 | 1.13$^{ab}$ (1.26) | 1.07$^{ab}$ (1.23) | 1.27$^{ab}$ (1.32) | 1.53$^{ab}$ (1.41) | 1.73$^{ab}$ (1.48) | 1.35 | 73.58 | 2.60 | 0.70$^{ab}$ (1.07) | 0.47$^{a}$ (0.98) | 0.79$^{a}$ (1.09) | 0.93$^{a}$ (1.18) | 1.10$^{a}$ (1.25) | 0.80 | 90.87 |
| Thiamethoxam 25 g a.i. ha$^{-1}$ | 3.70 | 1.27$^{ab}$ (1.33) | 1.20$^{ab}$ 1.28) | 1.50$^{ab}$ (1.39) | 1.77$^{ab}$ (1.43) | 1.97$^{ab}$ (1.51) | 1.54 | 69.86 | 2.83 | 0.83$^{ab}$ (1.15) | 0.67$^{a}$ (1.08) | 0.93$^{a}$ (1.19) | 1.10$^{a}$ (1.25) | 1.37$^{a}$ (1.36) | 0.98 | 88.81 |
| Methyl demeton 125 g a.i. ha$^{-1}$ | 4.27 | 2.10$^{b}$ (1.56) | 2.03$^{b}$ (1.54) | 2.47$^{b}$ (1.68) | 2.93$^{b}$ (1.82) | 3.20$^{b}$ (1.89) | 2.55 | 50.10 | 3.77 | 1.97$^{c}$ (1.56) | 1.83$^{b}$ (1.51) | 2.13$^{b}$ (1.61) | 2.73$^{b}$ (1.79) | 3.03$^{b}$ (1.87) | 2.34 | 73.29 |
| Untreated check | 3.87 | 3.80$^{c}$ (2.05) | 4.07$^{c}$ (2.12) | 5.43$^{c}$ (2.42) | 5.87$^{c}$ (2.51) | 6.40$^{c}$ (2.62) | 5.11 | - | 6.83 | 7.60$^{d}$ (2.84) | 8.33$^{c}$ (2.96) | 8.87$^{c}$ (3.05) | 9.30$^{c}$ (3.12) | 9.70$^{c}$ (3.19) | 8.76 | - |

PTC – Pre treatment count

Figures in parentheses are $\sqrt{x+0.5}$ transformed values

In a column, means followed by a common letter(s) are not significantly different by DMRT (p=0.05)

**Table 2:** Effect of imidacloprid 17.8 SL on whiteflies in cotton (Field trial II)

(Mean of three replications)

| Treatments | Number/ 3 leaves/ plant | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Days after first application | | | | | | | | Days after second application | | | | | | | |
| | PTC | 1 | 3 | 7 | 10 | 14 | Mean | % Redn | PTC | 1 | 3 | 7 | 10 | 14 | Mean | % Redn |
| Imidacloprid 15 g a.i. ha$^{-1}$ | 7.40 | 2.20$^{d}$ (1.64) | 2.00$^{d}$ (1.58) | 2.50$^{c}$ (1.73) | 2.90$^{c}$ (1.84) | 3.37$^{e}$ (1.97) | 2.59 | 70.87 | 5.27 | 1.23$^{c}$ (1.31) | 1.17$^{c}$ (1.29) | 1.50$^{b}$ (1.41) | 1.90$^{c}$ (1.55) | 2.37$^{d}$ (1.69) | 1.63 | 83.88 |
| Imidacloprid 25 g a.i. ha$^{-1}$ | 8.27 | 1.10$^{bc}$ (1.26) | 0.97$^{b}$ (1.21) | 1.50$^{b}$ (1.41) | 2.00$^{b}$ (1.58) | 2.23$^{c}$ (1.65) | 1.56 | 82.45 | 4.60 | 0.93$^{b}$ (1.20) | 0.87$^{b}$ (1.17) | 1.17$^{b}$ (1.29) | 1.17$^{a}$ (1.29) | 1.77$^{b}$ (1.51) | 1.18 | 88.33 |
| Imidacloprid 50 g a.i. ha$^{-1}$ | 7.97 | 0.70$^{a}$ (1.09) | 0.60$^{a}$ (1.05) | 0.90$^{a}$ (1.18) | 1.17$^{a}$ (1.29) | 1.63$^{a}$ (1.46) | 1.00 | 88.75 | 3.00 | 0.50$^{a}$ (1.00) | 0.50$^{a}$ (1.00) | 0.67$^{a}$ (1.06) | 1.17$^{a}$ (1.29) | 1.30$^{a}$ (1.34) | 0.83 | 91.79 |
| Imidacloprid 25 g a.i. ha$^{-1}$ (Tatamida®) | 7.53 | 0.97$^{b}$ (1.21) | 1.03$^{b}$ (1.24) | 1.60$^{b}$ (1.44) | 1.90$^{b}$ (1.55) | 2.10$^{b}$ (1.61) | 1.52 | 82.90 | 4.70 | 0.87$^{b}$ (1.17) | 0.83$^{b}$ (1.15) | 1.00$^{ab}$ (1.22) | 1.23$^{a}$ (1.31) | 1.90$^{bc}$ (1.55) | 1.17 | 88.43 |
| Thiamethoxam 25 g a.i. ha$^{-1}$ | 8.73 | 1.27$^{c}$ (1.30) | 1.23$^{c}$ (1.32) | 1.63$^{b}$ (1.46) | 2.30$^{b}$ (1.67) | 2.40$^{d}$ (1.70) | 1.77 | 80.09 | 4.87 | 0.97$^{b}$ (1.21) | 1.03$^{c}$ (1.24) | 1.20$^{b}$ (1.30) | 1.43$^{b}$ (1.39) | 1.97$^{c}$ (1.57) | 1.32 | 86.94 |
| Methyl demeton 125 g a.i. ha$^{-1}$ | 7.50 | 2.60$^{e}$ (1.76) | 2.43$^{e}$ (1.71) | 3.10$^{d}$ (1.90) | 4.00$^{d}$ (2.12) | 4.70$^{f}$ (2.28) | 3.37 | 62.09 | 7.30 | 1.90$^{d}$ (1.55) | 2.10$^{d}$ (1.61) | 2.60$^{c}$ (1.76) | 2.90$^{d}$ (1.84) | 3.13$^{e}$ (1.91) | 2.53 | 74.98 |
| Untreated check | 7.87 | 8.43$^{f}$ (2.99) | 8.67$^{c}$ (3.03) | 8.73$^{e}$ (3.04) | 9.10$^{e}$ (3.10) | 9.50$^{g}$ (3.16) | 8.89 | - | 9.70 | 10.13$^{e}$ (3.26) | 9.93$^{e}$ (3.23) | 9.97$^{d}$ (3.24) | 10.30$^{e}$ (3.29) | 10.20$^{f}$ (3.27) | 10.11 | - |

PTC – Pre treatment count

Figures in parentheses are $\sqrt{x+0.5}$ transformed values

In a column, means followed by a common letter(s) are not significantly different by DMRT (p=0.05)

**Thrips**

During first season trial, the highest reduction in thrips population was recorded by imidacloprid at 50 g a.i. ha$^{-1}$ (1.83 thrips plant$^{-1}$) at 14 DAT which was as effective as imidacloprid (Tatamida®) at 25 g a.i. ha$^{-1}$ (2.80 plant$^{-1}$), thiamethoxam (2.83 plant$^{-1}$), imidacloprid at 25 g a.i. ha$^{-1}$ (2.97 plant$^{-1}$) and imidacloprid at 15 g a.i. ha$^{-1}$ (3.83 plant$^{-1}$) (Table 3) after first spray. In the second spray, all the imidacloprid doses except lower dose of imidacloprid (15 g a.i. ha$^{-1}$) and thiamethoxam were equally effective in reducing the thrips population (Table 3).

The data on overall efficacy of imidacloprid 17.8 SL during the field trial I against thrips distinctly showed that the treatment, imidacloprid at 50 g a.i. ha$^{-1}$ was effective which registered 9.97 thrips per three leaves per plant on 14 DAT (Table 4), which was on par with imidacloprid (Tatamida®) at 25 g a.i. ha$^{-1}$ (10.03 plant$^{-1}$), imidacloprid at 25 g a.i. ha$^{-1}$ (10.43 plant$^{-1}$), and thiamethoxam (10.37 plant$^{-1}$). The lower dose of imidacloprid at 15 g a.i. ha$^{-1}$ (11.87 plant$^{-1}$) and standard check, methyl demeton (15.77 plant$^{-1}$) were found to be significantly more effective than control (30.27 plant$^{-1}$). However after second spray, imidacloprid at 50 g a.i. ha$^{-1}$ was superior in controlling thrips population at 14 DAT, whereas imidacloprid (Tatamida®) at 25 g a.i. ha$^{-1}$, imidacloprid at 25 g a.i. ha$^{-1}$ and thiamethoxam were equally effective and on par with each other (Table 4). This was followed by imidacloprid at 15 g a.i. ha$^{-1}$ and methyl demeton.

The whitefly population was comparatively lesser in winter and occurred in more numbers during summer. Whitefly population was reduced to 90.53 and 88.33 per cent after II application of imidacloprid at 25 g a.i. ha$^{-1}$ in the first and second season trials, respectively.

In the summer season trial, thrips population was doubled and observed throughout the period of investigation. The per cent reduction of thrips ranged from 66.86 to 87.19 (I spray) and 75.35 to 89.25 (II spray). The recommended dose of imidacloprid (25 g a.i. ha$^{-1}$) recorded 82.56 and 72.32 per cent reduction from control in first and second trials, respectively. The effectiveness of imidacloprid against thrips was slightly lesser than other sucking pests.

The results obtained on the efficacy of imidacloprid against sucking pests are in accordance with the findings of Kumar (1998) [9]. Ameta and Sharma (2005) [2] indicated that Confidor® 200 SL at 100 and 125 ml ha$^{-1}$ and 70 WG at 30 and 35 g ha$^{-1}$ were effective against the sucking pests of cotton *viz.*, *Aphis gossypii* Glover, *Amrasca biguttula biguttula* (Ishida) and *Thrips tabaci* Lindeman. Raghuraman and Gupta (2005) [12] stated that imidacloprid 200 SL at 100 g a.i. ha$^{-1}$ was the most effective treatment against *Bemisia tabaci* (Gennadius). Mathirajan and Regupathy (2005) [11] reported that thiamethoxam at 25, 50 and 100 g a.i. ha$^{-1}$ was effective in reducing the whitefly populations on cotton. Suganthy (2003) [15] stated that imidacloprid 17.8 SL at 25 g a.i. ha$^{-1}$ was highly effective against sucking pests complex on cotton and was on par with imidacloprid (Confidor® 200 SL) at the same dose. Calafiori *et al*. (1999) [6] proved that imidacloprid at 0.25 l ha$^{-1}$ gave more than 80 per cent control of thrips on Hirsutum cotton with residual effect up to 20 days. Afzal *et al.* (2014) [1] revealed that imidacloprid, diafenthiuron, acetamiprid and thiamethoxam were most effective insecticides against whitefly up to seven days after application. While, imidacloprid and diafenthiuron gave maximum mortality during first spray (89.52 and 85.80%) and second spray (91.67 and 87.51%) after 72 h of application. Barpoda *et al.* (2014) [5] reported that among different insecticides evaluated against sucking insect pests of cotton (RCH-2 Bt (BG-II)), imidacloprid 17.8 SL @ 0.008% (7.50 aphid and 1.47 whitefly/ leaf), thiamethoxam 25 WG @ 0.0125% (1.22 leaf hopper/ leaf) and diafenthiuron 50 WP @ 0.05% (1.43 thrips/ leaf) found more effective and safer to the natural enemies.

**Table 3:** Effect of imidacloprid 17.8 SL on thrips in cotton (Field trial I)

(Mean of three replications)

| Treatments | Number/ 3 leaves/ plant | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Days after first application | | | | | | | | Days after second application | | | | | | | |
| | PTC | 1 | 3 | 7 | 10 | 14 | Mean | % Redn | PTC | 1 | 3 | 7 | 10 | 14 | Mean | % Redn |
| Imidacloprid 15 g a.i. ha$^{-1}$ | 10.67 | 3.17$^{b}$ (1.91) | 2.80$^{ab}$ (1.82) | 2.67$^{ab}$ (1.78) | 3.57$^{ab}$ (1.88) | 3.83$^{ab}$ (1.96) | 3.21 | 73.47 | 4.07 | 1.97$^{a}$ (1.49) | 1.90$^{ab}$ (1.46) | 2.27$^{ab}$ (1.60) | 2.70$^{ab}$ (1.74) | 3.33$^{b}$ (1.92) | 2.43 | 81.34 |
| Imidacloprid 25 g a.i. ha$^{-1}$ | 11.03 | 1.93$^{ab}$ (1.56) | 1.90$^{a}$ (1.55) | 1.90$^{a}$ (1.55) | 2.37$^{ab}$ (1.69) | 2.97$^{ab}$ (1.76) | 2.21 | 81.74 | 3.13 | 1.17$^{a}$ (1.25) | 1.10$^{ab}$ (1.24) | 1.60$^{ab}$ (1.37) | 1.97$^{a}$ (1.51) | 2.43$^{ab}$ (1.60) | 1.65 | 87.33 |
| Imidacloprid 50 g a.i. ha$^{-1}$ | 10.10 | 0.93$^{a}$ (1.20) | 1.37$^{ab}$ (1.36) | 1.40$^{a}$ (1.38) | 1.70$^{a}$ (1.48) | 1.83$^{a}$ (1.53) | 1.45 | 88.02 | 2.17 | 0.97$^{a}$ (1.18) | 0.90$^{a}$ (1.15) | 1.23$^{a}$ (1.29) | 1.87$^{a}$ (1.45) | 2.03$^{a}$ (1.51) | 1.40 | 89.25 |
| Imidacloprid 25 g a.i. ha$^{-1}$ (Tatamida®) | 10.53 | 1.97$^{ab}$ (1.57) | 1.53$^{ab}$ (1.42) | 2.03$^{a}$ (1.59) | 2.27$^{ab}$ (1.66) | 2.80$^{ab}$ (1.81) | 2.12 | 82.48 | 2.97 | 1.20$^{a}$ (1.29) | 1.13$^{ab}$ (1.26) | 1.57$^{ab}$ (1.43) | 2.03$^{a}$ (1.56) | 2.37$^{ab}$ (1.09) | 1.66 | 87.25 |
| Thiamethoxam 25 g a.i. ha$^{-1}$ | 10.60 | 2.03$^{ab}$ (1.54) | 1.47$^{a}$ (1.33) | 2.10$^{a}$ (1.57) | 2.23$^{ab}$ (1.61) | 2.83$^{ab}$ (1.79) | 2.13 | 82.40 | 3.10 | 1.30$^{a}$ (1.31) | 1.17$^{ab}$ (1.28) | 1.53$^{ab}$ (1.42) | 2.10$^{a}$ (1.58) | 2.47$^{ab}$ (1.68) | 1.71 | 86.87 |
| Methyl demeton 125 g a.i. ha$^{-1}$ | 11.27 | 3.20$^{b}$ (1.89) | 3.37$^{b}$ (1.93) | 3.97$^{b}$ (2.09) | 4.57$^{b}$ (2.23) | 4.93$^{b}$ (2.31) | 4.01 | 66.86 | 5.23 | 2.37$^{a}$ (1.65) | 2.50$^{b}$ (1.69) | 3.03$^{b}$ (1.85) | 3.97$^{b}$ (2.09) | 4.20$^{c}$ (2.15) | 3.21 | 75.35 |
| Untreated check | 11.20 | 11.47$^{c}$ (3.46) | 11.93$^{c}$ (3.52) | 12.17$^{c}$ (3.56) | 12.40$^{c}$ (3.59) | 12.53$^{c}$ (3.61) | 12.10 | - | 12.70 | 12.87$^{b}$ (3.65) | 12.93$^{c}$ (3.66) | 13.10$^{c}$ (3.68) | 13.13$^{c}$ (3.69) | 13.07$^{d}$ (3.68) | 13.02 | - |

PTC – Pre treatment count

Figures in parentheses are $\sqrt{x+0.5}$ transformed values

In a column, means followed by a common letter(s) are not significantly different by DMRT (p=0.05)

**Table 4:** Effect of imidacloprid 17.8 SL on thrips in cotton (Field trial II)

(Mean of three replications)

| Treatments | Number/ 3 leaves/ plant | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Days after first application | | | | | | | | Days after second application | | | | | | | |
| | PTC | 1 | 3 | 7 | 10 | 14 | Mean | % Redn | PTC | 1 | 3 | 7 | 10 | 14 | Mean | % Redn |
| Imidacloprid 15 g a.i. ha$^{-1}$ | 25.10 | 8.43$^{b}$ (2.99) | 7.97$^{bc}$ (2.90) | 9.30$^{b}$ (3.13) | 10.47$^{b}$ (3.31) | 11.87$^{b}$ (3.51) | 9.61 | 67.00 | 13.13 | 7.20$^{b}$ (2.77) | 7.07$^{cd}$ (2.75) | 8.93$^{b}$ (3.07) | 11.73$^{c}$ (3.50) | 15.30$^{c}$ (3.97) | 10.05 | 72.95 |
| Imidacloprid 25 g a.i. ha$^{-1}$ | 24.77 | 6.17$^{a}$ (2.58) | 6.93$^{ab}$ (2.72) | 7.87$^{a}$ (2.89) | 8.90$^{a}$ (3.07) | 10.43$^{a}$ (3.30) | 8.06 | 72.32 | 12.77 | 6.23$^{ab}$ (2.59) | 6.10$^{b}$ (2.57) | 8.23$^{b}$ (2.95) | 10.77$^{bc}$ (3.36) | 13.27$^{b}$ (3.71) | 8.92 | 76.00 |
| Imidacloprid 50 g a.i. ha$^{-1}$ | 25.23 | 5.23$^{a}$ (2.39) | 6.10$^{a}$ (2.57) | 7.37$^{a}$ (2.81) | 8.60$^{a}$ (3.01) | 9.97$^{a}$ (3.23) | 7.45 | 74.42 | 11.20 | 5.17$^{a}$ (2.36) | 4.93$^{a}$ (2.32) | 6.97$^{a}$ (2.73) | 9.30$^{a}$ (3.13) | 11.73$^{a}$ (3.50) | 7.62 | 79.49 |
| Imidacloprid 25 g a.i. ha$^{-1}$ (Tatamida®) | 25.40 | 6.20$^{a}$ (2.59) | 7.07$^{ab}$ (2.75) | 8.10$^{a}$ (2.93) | 9.13$^{a}$ (3.10) | 10.03$^{a}$ (3.24) | 8.11 | 72.15 | 12.13 | 6.40$^{ab}$ (2.62) | 6.23$^{bc}$ (2.59) | 8.10$^{b}$ (2.93) | 10.70$^{b}$ (3.35) | 13.13$^{b}$ (3.69) | 8.91 | 76.02 |
| Thiamethoxam 25 g a.i. ha$^{-1}$ | 24.67 | 6.33$^{a}$ (2.60) | 7.20$^{ab}$ (2.77) | 8.13$^{a}$ (2.94) | 8.97$^{a}$ (3.08) | 10.37$^{a}$ (3.30) | 8.20 | 71.84 | 12.93 | 6.83$^{b}$ (2.70) | 6.47$^{bcd}$ (2.64) | 8.40$^{b}$ (2.98) | 11.63$^{bc}$ (3.41) | 13.30$^{b}$ (3.71) | 9.23 | 75.16 |
| Methyl demeton 125 g a.i. ha$^{-1}$ | 26.53 | 8.97$^{b}$ (3.08) | 8.83$^{c}$ (3.05) | 10.67$^{c}$ (3.34) | 12.73$^{c}$ (3.63) | 15.77$^{c}$ (4.03) | 11.39 | 60.89 | 19.33 | 7.27$^{b}$ (2.78) | 7.43$^{d}$ (2.81) | 9.20$^{b}$ (3.11) | 13.27$^{d}$ (3.71) | 17.33$^{d}$ (4.22) | 10.90 | 70.67 |
| Untreated check | 25.87 | 27.33$^{c}$ (5.27) | 28.40$^{d}$ (5.37) | 29.67$^{d}$ (5.49) | 29.93$^{d}$ (5.51) | 30.27$^{d}$ (5.55) | 29.12 | - | 32.33 | 34.57$^{c}$ (5.92) | 35.23$^{e}$ (5.98) | 37.10$^{c}$ (6.13) | 38.27$^{e}$ (6.23) | 40.63$^{e}$ (6.41) | 37.16 | - |

PTC – Pre treatment count

Figures in parentheses are $\sqrt{x+0.5}$ transformed values

In a column, means followed by a common letter(s) are not significantly different by DMRT (p=0.05)

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