Evaluation of newer acaricides against yellow mite polyphagotarsonemus latus (Banks) on Bt cotton.

KA Biradarpatil, ST Prabhu

DOI: https://doi.org/10.22271/chemi.2020.v8.i1u.8463

Abstract
Field trial was conducted for two consecutive years during kharif 2017 and 2018 at farmer’s field, Kadarmandalagi by using randomized block design (RBD). In both years, among the 12 treatments including untreated plot tested against yellow mite stages indicated that lowest mean population of yellow mite egg and active stages recorded in spiromesifen 280 SC @ 100 g.a.i/ ha and propargite 57 EC @ 570 g.a.i/ ha treated plots followed by diafenthiuron 50 WP @ 400 g.a.i/ ha and fenazaquin 10 EC @ 125 g.a.i/ ha. However, among the chemicals, predatory mite activity noticed more in bifenthrin 10 EC @ 80 g.a.i/ ha treated plot followed by buprofezin 25 SC @ 150 g.a.i/ ha treated plot. Seed cotton yield revealed that the treatment with propargite 57 EC @ 570 g.a.i/ ha recorded highest yield and net returns (26.99 q/ ha and 110348 Rs/ ha) and significantly superior compared to other treatments.

Keywords: Cotton, yellow mite, acaricide, management, yield

Introduction
Cotton (Gossypium spp.) is one of the important cash crops in India. It is often referred as “White Gold” or “King of fibers” and it belongs to the family Malvaceae. It is one of the most ancient and important commercial crop next only to food grains and is the principal raw material for a flourishing textile industry. Cotton finds mention in the Rig Veda and Manu’s Dharma Shastra (Narayanan et al., 2002). Cotton is harvested as ‘seed cotton’ which is then ‘ginned’ to separate the seed and lint. Despite the promising scenario in cotton, several factors are responsible for reduction in yield and quality deterioration of cotton in India. Insect pests form a vital factor. About 162 species of insects occur in cotton at various stages of growth of which 15 are key pests (Kannan et al., 2004). The development of transgenic cotton has resulted in an immensely increase in the seed cotton yield and reduction in the number of insecticidal sprays from 3.10 to 1.17 and second generation Bt cotton has given solution to the bollworm complex to the large extent but at the same time they are susceptible to most of the sucking pests. In Karnataka, yellow mite, Polyphagotarsonemus latus is serious pest on chilli and causes considerable damage but in recent past years, it is assuming a major status on Bt cotton ecosystem also and causing puckering of leaves, reddening and stunted growth (Hosamani et al., 2009). It was felt necessary to study evaluate acaricides to combat P. latus on Bt cotton.

Material and Methods
To evaluate different newer acaricides for the management of yellow mite, P. latus, a field experiment was laid out in randomized block design (RBD) at Farmer’s field during kharif 2017-18 and 2018-19. The experiment consists of twelve treatments including an untreated control with three replications. Bt cotton hybrid MRC-7351 was raised with 90 cm x 60 cm spacing between the rows and plants, respectively. In each plot, five plants were randomly selected and tagged for observation. Based on the incidence of yellow mite, acaricides were applied twice at 45 and 65 DAS. Pretreatment observations were recorded a day before application and post-treatment observations at 1, 3, 7 and 10 days after each application. Three young growing leaves were sampled from five tagged plants to record the number of eggs, active stages (Nymphs +...
Adults) and predatory mite per leaf. All agronomic practices were followed as per the recommended package of practices and later data were subjected to analyzed statistically after (\(\sqrt{x+0.5}\) transformations.

Results

Ovicidal action of newer acaricides on yellow mite eggs in Bt cotton during kharif 2017

The results on the efficacy of various treatments in reducing the yellow mite egg population are furnished here under

Pooled (1st and 2nd spray)

The pooled analysis of two sprays revealed that, among different chemical treatments, spiromesifen 280 SC @ 100 g.a.i/ ha was found to be quite promising by recording the least mean number of yellow mite egg and highest per cent reduction over control (0.55 yellow mite egg/ leaf and 92.40%) followed by diafenthiuron 50 WP @ 400 g.a.i/ ha (0.64 yellow mite egg/ leaf and 91.16%) while propargite 57 EC @ 570 g.a.i/ ha (0.75 yellow mite egg/ leaf and 89.64%), fenazaquin 10 EC @ 125 g.a.i/ ha (0.83 yellow mite egg/ leaf and 88.53%) and chlorfenapyr 10 SC @ 100 g.a.i/ ha (0.94 yellow mite egg/ leaf and 87.02%) were found to be next best treatments. However, the mean number of yellow mite egg (7.24/ leaf) was continued to be on higher side in untreated check (Table 1).

Ovicidal action of newer acaricides on yellow mite eggs in Bt cotton during kharif 2018

The data on the efficacy of various treatments in reducing the number of yellow mite egg are described below

Pooled (1st and 2nd spray)

The results on pooled analysis of two sprays recorded that, among the treatments spiromesifen 280 SC @ 100 g.a.i/ ha was found to be superior by recording the least number of yellow mite egg and highest per cent reduction of yellow mite egg (0.53 yellow mite egg/ leaf and 92.49%) followed by diafenthiuron 50 WP @ 400 g.a.i/ ha (0.63 yellow mite egg/ leaf and 91.07%) and propargite 57 EC @ 570 g.a.i/ ha (0.73 yellow mite egg/ leaf and 89.66%). However, fenazaquin 10 EC @ 125 g.a.i/ ha (0.82 yellow mite egg/ leaf and 88.38%) and chlorfenapyr 10 SC @ 100 g.a.i/ ha (0.90 yellow mite egg/ leaf and 87.25%) were found to be next best treatments. On the contrary, the number of yellow mite egg was continued to be on higher side in untreated control (7.06 yellow mite egg/ leaf) (Table 2).

Efficacy of newer acaricides against active stages of yellow mite in Bt cotton during kharif 2017

The results on the efficacy of various treatments in reducing the active stages of yellow mite population are furnished below

Pooled (1st and 2nd spray)

The results on the mean population of active stages of yellow mite after two sprays revealed that, among the treatments propargite 57 EC @ 570 g.a.i/ ha was found to be quite promising by recording the least population and highest per cent reduction of yellow mite (0.31 yellow mite/ leaf and 93.46%) and followed by spiromesifen 80 SC @ 100 g.a.i/ ha (0.34 yellow mite/ leaf and 92.83%) and diafenthiuron 50 WP @ 400 g.a.i/ ha (0.51 yellow mite/ leaf and 89.24%). However, fenazaquin 10 EC @ 125 g.a.i/ ha (0.53 yellow mite/ leaf and 88.82%), chlorfenapyr 10 SC @ 100 g.a.i/ ha (0.61 yellow mite/ leaf and 87.13%) and fenpyroximate 5 EC 30 g.a.i/ ha (0.65 yellow mite/ leaf and 86.29%) were found to be next best treatments. On the contrary, the population of yellow mite (4.74 yellow mite/ leaf) was continued to be on higher side in untreated check (Table 3).

Efficacy of newer acaricides against active stages of yellow mite in Bt cotton during kharif 2018

The bioefficacy of acaricides against active stages of yellow mite are described below

Pooled (1st and 2nd spray)

The results on mean yellow mite population after two sprays revealed that, propargite 57 EC @ 570 g.a.i/ ha was found to be best chemical by recording the least population and highest per cent reduction (0.31 yellow mite/ leaf and 93.61%) of yellow mite among the treatments and followed by spiromesifen 280 SC @ 100 g.a.i/ ha (0.35 yellow mite/ leaf and 92.78%) and diafenthiuron 50 WP @ 400 g.a.i/ ha (0.52 yellow mite/ leaf and 89.28%). However, fenazaquin 10 EC @ 125 g.a.i/ ha (0.54 yellow mite/ leaf and 88.86%), chlorfenapyr 10 SC @ 100 g.a.i/ ha (0.61 yellow mite/ leaf and 87.42%) and fenpyroximate 5 EC 30 g.a.i/ ha (0.66 yellow mite/ leaf and 86.39%) were found to be next best treatments. On the contrary, the population of yellow mite was continued to be on higher side (4.85 yellow mite/ leaf) in untreated control (Table 4)

Impact of newer acaricides on predatory mite Amblyseius ovalis (Evans) population in Bt cotton during kharif 2017

The results on the effect of various treatments on activity of predatory mite are described below

Pooled (1st and 2nd spray)

The results on pooled analysis of two sprays recorded that, among the treatments bifenthrin 10 EC @ 80 g.a.i/ ha was found to be quite promising by recording the highest number of predatory mite and least per cent reduction of predatory mite (0.34 predatory mite/ leaf and 62.64%) followed by buprofezin 25 SC @ 150 g.a.i/ ha (0.31 predatory mite/ leaf and 65.93%) and dicyofol 18.50 EC @ 85 g.a.i/ ha (0.29 predatory mite/ leaf and 68.13%). However, propargite 57 EC @ 570 g.a.i/ ha (0.07 predatory mite/ leaf and 92.31%) and spiromesifen 280 SC @ 100 g.a.i/ ha (0.09 predatory mite/ leaf and 90.11%) treatments were found to be highest negative effect on activity of predatory mite (Table 5).

Impact of newer acaricides on predatory mite Amblyseius ovalis (Evans) population in Bt cotton during kharif 2018

The effect of various treatments on activity of predatory mite population after first, second and pooled sprayings are furnished below.

Pooled (1st and 2nd spray)

The results on the mean population of active stages of predatory mite after two sprays revealed that, bifenthrin 10 EC @ 80 g.a.i/ ha was found superior by recording the highest population and least per cent reduction predatory mite (0.36 predatory mite/ leaf and 60.44%) among the treatments and followed by bifenthrin 25 SC @ 150 g.a.i/ ha (0.31 predatory mite/ leaf and 65.93%) and dicyofol 18.50 EC @ 85 g.a.i/ ha (0.31 predatory mite/ leaf and 65.93%). However, etoxazole 10 EC @ 40 g.a.i/ ha (0.29 predatory mite/ leaf and 68.13%) and hexythiazox 5.45 EC @ 25 g.a.i/ ha (0.24 predatory mite/ leaf and 73.63%) were found to be next best treatments. On
the contrary, the population of predatory mite (0.91 predatory mite/leaf) was continued to be on higher side in untreated check (Table 6).

**Seed cotton yield**

Pooled data of two seasons on seed cotton yield revealed that propargite 57 EC @ 570 g.a.i/ha (26.99 q/ha) recorded significantly highest yield and was on par with spiromesifen 280 SC @ 100 g.a.i/ha (26.30 q/ha). Next best in order of superiority was diafenthiuron 50 WP @ 400 g.a.i/ha (25.21 q/ha) and was on par with fenazaquin 10 EC @ 125 g.a.i/ha (24.22 q/ha). However, untreated check recorded least yield (17.69 q/ha) and was inferior to rest of the treatments (Table 39).

With respect to cost effectiveness, propargite 57 EC @ 570 g.a.i/ha proved to be the best economical treatments as realized by the highest net returns (Rs 110348). The next best treatments were spiromesifen 280 SC @ 100 g.a.i/ha and diafenthiuron 50 WP @ 400 g.a.i/ha by recording net returns Rs 106660 and Rs 100692 respectively (Table 7).

**Discussion**

The post treatment mean indicated the superiority of spiromesifen 280 SC @ 100 g.a.i/ha in reducing number of yellow mite egg followed by diafenthiuron 50 WP @ 400 g.a.i/ha, propargite 57 EC @ 570 g.a.i/ha and fenazaquin 10 EC @ 125 g.a.i/ha. For the reduction of active stages of yellow mite, propargite 57 EC @ 570 g.a.i/ha showed significant superiority and the next best treatments were spiromesifen 280 SC @ 100 g.a.i/ha, diafenthiuron 50 WP @ 400 g.a.i/ha and fenazaquin 10 EC @ 125 g.a.i/ha. However, among the chemicals, predatory mite activity noticed more in bifenthrin 10 EC @ 80 g.a.i/ha treated plot followed by buprofezin 25 SC @ 150 g.a.i/ha treated plot.

Seed cotton yield revealed that the treatment with propargite 57 EC @ 570 g.a.i/ha recorded highest yield and net returns (26.99 q/ha and 110348 Rs/ha) and significantly superior compared to other treatments. Next best treatments were spiromesifen 280 SC @ 100 g.a.i/ha, diafenthiuron 50 WP @ 400 g.a.i/ha and fenazaquin 10 EC @ 125 g.a.i/ha.

Documented evidences of using newer acaricides against yellow mite egg in cotton are very limited. Present results obtained with the application of spiromesifen 280 SC @ 100 g.a.i/ha corroborates with earlier results of Samanta A. et al. (2017) who noticed that, among the treatments, spiromesifen 24SC @ 120 g a.i. ha-1 and diafenthiuron 50 WP @ 375 g a.i. ha-1 were observed to be very much effective against yellow mite. Results with respect to effect of acaricides on active stages are in agreement with Chinniah (2013) also reported that propargite 57% EC @ 3ml/lt., spiromesifen 240 SC @ 0.7ml/lt., abamectin 1.8% EC @ 0.5ml/lt. and fenpyroximate 5% EC @ 0.8ml/lt. were equally effective in suppressing mite population.

Except in bifenthrin 10 EC @ 80 g.a.i/ha and buprofezin 25 SC @ 150 g.a.i/ha, remaining all acaricide were highly detrimental to predatory mite in both seasons (kharif 2017 and kharif 2018). It may be probably due to good control of yellow mite, which resulted in poor activity or survival of this obligate predatory mite, *A. ovalis*.

However, in present study prey to predator ratio is wider so pest population may be increase in future. Scanty literature is available on the safety or effect of various acaricides on the activity of predatory mite under field conditions. However, ill effects of acaricides on predatory mites was reported by Hegde (1993) and Smitha (2002) in cotton and chilli ecosystem, respectively. Chandrashekarappa (1995) documented similar results under laboratory conditions. With decrease in the mite population, the predatory mite population also decreased accordingly. This shows density dependent predatory prey interaction.

As a result cotton yield obtained from these acaricide (propargite 57 EC, spiromesifen 280 SC, diafenthiuron 50 WP and fenazaquin 10 EC) treatments were statistically on par and thus it may be suggested to use any of these acaricides for satisfactory control of yellow mite in *Bt* cotton (eggs as well as active stages) and to obtain good yield from cotton crop.

Table 1: Ovicidal action of newer acaricides on yellow mite eggs in *Bt* cotton during kharif 2017 (pooled)

| Treatment          | Dosage (g.a.i/ha) | 1 DBS | 1 DAS | 3 DAS | 7 DAS | 10 DAS | Mean | Percent reduction over control |
|--------------------|------------------|-------|-------|-------|-------|--------|------|-------------------------------|
| T1- Diafenthiuron 50 WP | 400              | 3.75* | 2.23 (1.65)² | 0.32 (0.90)² | 0.00 (0.71)² | 0.00 (0.71)² | 0.64 | 91.16 |
| T2- Propargite 57 EC | 570              | 3.38* | 2.43 (1.71)² | 0.47 (0.98)² | 0.10 (0.77)² | 0.00 (0.71)² | 0.75 | 89.64 |
| T3- Fenazaquin 10 EC | 125              | 3.78* | 2.56 (1.75)² | 0.62 (1.06)² | 0.15 (0.81)² | 0.00 (0.71)² | 0.83 | 88.53 |
| T4- Chlorfenapyr 10 SC | 100             | 4.21* | 2.69 (1.78)² | 0.76 (1.12)² | 0.31 (0.90)² | 0.00 (0.71)² | 0.94 | 87.02 |
| T5- Fenpyroximate 5 EC | 30              | 4.01* | 2.98 (1.87)² | 0.89 (1.18)² | 0.42 (0.96)² | 0.00 (0.71)² | 1.07 | 85.22 |
| T6- Buprofezin 25 SC | 150              | 4.28* | 3.48 (2.00)² | 1.26 (1.32)² | 0.77 (1.13)² | 0.30 (0.89)² | 1.45 | 79.97 |
| T7- Bifenthrin 10 EC | 80               | 4.25* | 3.58 (2.02)² | 1.37 (1.37)² | 0.82 (1.15)² | 0.34 (0.91)² | 1.54 | 78.72 |
| T8- Spriomesifen 240 SC | 100             | 4.30* | 2.03 (1.59)² | 0.15 (0.80)² | 0.00 (0.71)² | 0.00 (0.71)² | 0.55 | 92.40 |
| T9- Hexythiazox 5.45 EC | 25              | 4.38* | 3.08 (1.89)² | 0.98 (1.22)² | 0.54 (1.02)² | 0.12 (0.79)² | 1.18 | 83.70 |
| T10- Etoxazole 10 SC | 40               | 4.30* | 3.16 (1.91)² | 1.06 (1.21)² | 0.62 (1.06)² | 0.24 (0.86)² | 1.27 | 82.46 |
| T11- Dicofol 18.50 EC | 85               | 4.06* | 3.27 (1.94)² | 1.17 (1.29)² | 0.70 (1.10)² | 0.26 (0.87)² | 1.35 | 81.35 |
| T12- Untreated control | 6.30            | 7.05 (2.74)² | 7.08 (2.75)² | 7.39 (2.81)² | 7.45 (2.83)² | 7.24 | |
Table 2: Ovicial action of newer acaricides on yellow mite eggs in Bt cotton during kharif 2018 (pooled)

| Treatment      | Dosage (g.a.i./ha) | 1 DBS | 1 DAS | 3 DAS | 7 DAS | 10 DAS | Mean     | Percent reduction over control |
|----------------|------------------|-------|-------|-------|-------|--------|----------|--------------------------------|
| T1- Difamethion 50 WP | 400              | 2.65  | 1.55  | 0.78  | 0.46  | 0.17   | 0.44     | 80.00                          |
| T2- Propargit 57 EC  | 570              | 2.71  | 1.60  | 0.95  | 0.53  | 0.25   | 0.35     | 83.24                          |
| T3- Fenazaquin 10 SC | 125              | 2.46  | 1.36  | 0.72  | 0.41  | 0.17   | 0.29     | 86.62                          |
| T4- Chlorfenapyr 10 SC | 100             | 2.91  | 1.74  | 1.06  | 0.60  | 0.30   | 0.40     | 89.44                          |
| T5- Fenpyroximate 5 EC | 30              | 2.45  | 1.45  | 0.76  | 0.40  | 0.21   | 0.26     | 84.76                          |
| T6- Buprofezin 25 SC | 150              | 2.65  | 1.65  | 1.10  | 0.65  | 0.35   | 0.39     | 83.24                          |
| T7- Bifenthiran 10 SC | 80               | 2.86  | 1.86  | 1.31  | 0.76  | 0.36   | 0.42     | 85.00                          |
| T8- Spiromesifen 240 SC | 100             | 2.77  | 1.74  | 1.06  | 0.60  | 0.30   | 0.40     | 89.44                          |
| T9- Hexythiazox 5.45 EC | 25              | 2.46  | 1.45  | 0.76  | 0.40  | 0.21   | 0.26     | 84.76                          |
| T10- Etoxazole 10 SC | 125              | 2.46  | 1.36  | 0.72  | 0.41  | 0.17   | 0.29     | 86.62                          |
| T11- Dicofol 18.50 EC | 85               | 2.54  | 1.54  | 1.06  | 0.60  | 0.30   | 0.40     | 89.44                          |
| T12- Untreated control | 80              | 2.54  | 1.54  | 1.06  | 0.60  | 0.30   | 0.40     | 89.44                          |

Table 3: Efficacy of newer acaricides against active stages of yellow mite in Bt cotton during kharif 2017 (pooled)

| Treatment      | Dosage (g.a.i./ha) | 1 DBS | 1 DAS | 3 DAS | 7 DAS | 10 DAS | Mean     | Percent reduction over control |
|----------------|------------------|-------|-------|-------|-------|--------|----------|--------------------------------|
| T1- Difamethion 50 WP | 400              | 2.65  | 1.55  | 0.78  | 0.46  | 0.17   | 0.44     | 80.00                          |
| T2- Propargit 57 EC  | 570              | 2.71  | 1.60  | 0.95  | 0.53  | 0.25   | 0.35     | 83.24                          |
| T3- Fenazaquin 10 SC | 125              | 2.46  | 1.36  | 0.72  | 0.41  | 0.17   | 0.29     | 86.62                          |
| T4- Chlorfenapyr 10 SC | 100             | 2.91  | 1.74  | 1.06  | 0.60  | 0.30   | 0.40     | 89.44                          |
| T5- Fenpyroximate 5 EC | 30              | 2.45  | 1.45  | 0.76  | 0.40  | 0.21   | 0.26     | 84.76                          |
| T6- Buprofezin 25 SC | 150              | 2.65  | 1.65  | 1.10  | 0.65  | 0.35   | 0.39     | 83.24                          |
| T7- Bifenthiran 10 SC | 80               | 2.86  | 1.86  | 1.31  | 0.76  | 0.36   | 0.42     | 85.00                          |
| T8- Spiromesifen 240 SC | 100             | 2.77  | 1.74  | 1.06  | 0.60  | 0.30   | 0.40     | 89.44                          |
| T9- Hexythiazox 5.45 EC | 25              | 2.46  | 1.36  | 0.72  | 0.41  | 0.17   | 0.29     | 86.62                          |
| T10- Etoxazole 10 SC | 125              | 2.46  | 1.36  | 0.72  | 0.41  | 0.17   | 0.29     | 86.62                          |
| T11- Dicofol 18.50 EC | 85               | 2.54  | 1.54  | 1.06  | 0.60  | 0.30   | 0.40     | 89.44                          |
| T12- Untreated control | 80              | 2.54  | 1.54  | 1.06  | 0.60  | 0.30   | 0.40     | 89.44                          |

Table 4: Efficacy of newer acaricides against active stages of yellow mite in Bt cotton during kharif 2018 (pooled)

| Treatment      | Dosage (g.a.i./ha) | 1 DBS | 1 DAS | 3 DAS | 7 DAS | 10 DAS | Mean     | Percent reduction over control |
|----------------|------------------|-------|-------|-------|-------|--------|----------|--------------------------------|
| T1- Difamethion 50 WP | 400              | 2.65  | 1.55  | 0.78  | 0.46  | 0.17   | 0.44     | 80.00                          |
| T2- Propargit 57 EC  | 570              | 2.71  | 1.60  | 0.95  | 0.53  | 0.25   | 0.35     | 83.24                          |
| T3- Fenazaquin 10 SC | 125              | 2.46  | 1.36  | 0.72  | 0.41  | 0.17   | 0.29     | 86.62                          |
| T4- Chlorfenapyr 10 SC | 100             | 2.91  | 1.74  | 1.06  | 0.60  | 0.30   | 0.40     | 89.44                          |
| T5- Fenpyroximate 5 EC | 30              | 2.45  | 1.45  | 0.76  | 0.40  | 0.21   | 0.26     | 84.76                          |
| T6- Buprofezin 25 SC | 150              | 2.65  | 1.65  | 1.10  | 0.65  | 0.35   | 0.39     | 83.24                          |
| T7- Bifenthiran 10 SC | 80               | 2.86  | 1.86  | 1.31  | 0.76  | 0.36   | 0.42     | 85.00                          |
| T8- Spiromesifen 240 SC | 100             | 2.77  | 1.74  | 1.06  | 0.60  | 0.30   | 0.40     | 89.44                          |
| T9- Hexythiazox 5.45 EC | 25              | 2.46  | 1.36  | 0.72  | 0.41  | 0.17   | 0.29     | 86.62                          |
| T10- Etoxazole 10 SC | 125              | 2.46  | 1.36  | 0.72  | 0.41  | 0.17   | 0.29     | 86.62                          |
| T11- Dicofol 18.50 EC | 85               | 2.54  | 1.54  | 1.06  | 0.60  | 0.30   | 0.40     | 89.44                          |
| T12- Untreated control | 80              | 2.54  | 1.54  | 1.06  | 0.60  | 0.30   | 0.40     | 89.44                          |
1. Chandrashekarappa B. Effect of temperature, humidity, host plant and some plant products on Amblyseius longispinosus and Amblyseius tetranychivorus (Acari: Phytoseiidae). M. Sc. (Agri) Thesis, University of Agricultural Sciences, Bangalore, 1995.

2. Chinniah C. Field evaluation of certain new acaricide/insecticide molecules for their bio-effficacy against two spotted spider mite Tetranychus urticae Koch on brinjal (Solanum melongena L.). Pestology. 2013; 37(3):34-38.

3. Hegde M. Biology of predatory mite, Amblyseius longispinosus (Evans) and its interaction with cotton red spider mite, Tetranychus macfarlanei Beher and Pritchard. M.Sc. (Agri) Thesis, University of Agricultural Sciences, Dharwad, 1993.

4. Hosamani AC, Bhemanna M, Sharanabalappa Hanchinal, Shivaleela SG. Incidence of yellow mite on Bt cotton National Symposium on Bt cotton: Opportunities and Emerging Threats, CICR, Nagpur, 2009, 65-69.

5. Kannan M, Uthamasamy S, Mohan S. Impact of insecticides on sucking pests and natural enemy complex of transgenic cotton. Curr. Sci, 2004; 86:726-729.
6. Narayanan NN, Baisakh N, Vera Cruz CM, Gnanamanickam SS, Datta K, Datta SK. Molecular breeding for the development of blast and bacterial blight resistance in rice cv. IR50. Crop Sci, 2002; 42:2072-2079.

7. Samanta A, Sen K, and Basu I. Evaluation of insecticides and acaricides against yellow mite and thrips infesting chilli (Capsicum annum L.) J. of Crop and Weed, 2017;13(2):180-186.

8. Smitha MS, Management of yellow mite, Polyphagotarsonemus latus Banks (Acari Tarsonemidae) on chilli. M.Sc. (Agri.) Thesis, University of Agricultural Sciences, Dharwad, 2002.