Management of Aphids (*Aphis gossypii* Glover and Aphis *craccivora* Koch) on Gherkins

M. Jyothsna, C. Narendra Reddy* and D. Jagdishwar Reddy

Department of Entomology, College of Agriculture, Acharya N. G. Ranga Agricultural University, Rajendranagar, Hyderabad, Andhra Pradesh (500 030), India

Article History

Manuscript No. 363
Received in 11th September, 2012
Received in revised form 11th October, 2012
Accepted in final form 1st December, 2012

Correspondence to

**E-mail*: narendrareddyento@yahoo.co.in

Keywords

Gherkin, Aphis gossypii, Aphis craccivora

Abstract

The experiment was carried out during *rabi*, 2010-11 at Student's Farm, College of Agriculture, Rajendranagar, Hyderabad wherein the efficacy of nine insecticides were evaluated against aphids on gherkin. Among all the chemicals, the reduction of *Aphis gossypii* population was more with thiacloprid at 120 g a.i. ha^{-1} (86.34%) followed by flubendiamide+thiacloprid at 48+48 g a.i. ha^{-1} (74.36%) and thiamethoxam at 31.25 g a.i. ha^{-1} (61.09%). Thiacloprid (120 g a.i. ha^{-1}), flubendiamide+thiacloprid at 48+48 g a.i. ha^{-1} and lambdacyhalothrin+thiamethoxam at 15.625+31.25 g a.i. ha^{-1} were highly effective in controlling *Aphis craccivora* population to 72.25, 71.35 and 62.61%, respectively.

1. Introduction

Gherkin (*Cucumis anguria* L.) is popularly known as pickling cucumber or small cucumber. It is now an important commercial garden vegetable and is also leading pickled vegetable in the world. It was introduced into India in 1990 for export purpose. Fresh gherkin is preserved in three different media depending on the customer's choice and exported to Europe, USA, Australia and other countries. The end use of the product is for human consumption as pickle. The gherkin industry in India is primarily concentrated in the three southern states of Karnataka, Andhra Pradesh and Tamil Nadu. Karnataka accounts for almost 60% of the gherkin production and it is cultivated in an area of 39,178 acres. Andhra Pradesh accounts for 20% in the districts of Mahaboobnagar, Rangareddy, Medak, Karimnagar, Warangal, Anantapur and Nalgonda. The entire volume of gherkins produced is exported, with little or no domestic demand, except for the five star hotels which serve pickled gherkins (Nageshprabhu, 2006). *Diaphania indica* Saunders, *Helicoverpa armigera* Hubner, *Liriomyza trifolii* Burgess, *Bactrocera cucurbitae* Conquillett, *Aphis gossypii* Glover and *Thrips palmi* Koch were identified as main pests of gherkins (*Cucumis anguria*). In view of increasing pest attack of gherkin, the present study was undertaken to investigate the efficacy of selective insecticides against gherkin.

2. Material and Methods

A field experiment was laid out in a simple randomized block design with ten treatments and three replications during *rabi,* 2010-11 at the Student's Farm, College of Agriculture, Rajendranagar, Hyderabad, Andhar Pradesh, India to study the efficacy of nine insecticides, viz. flubendiamide 480 SC at 60 g a.i. ha^{-1}, thiacloprid 240 SC at 120 g a.i. ha^{-1}, flubendiamide 480 SC+thiacloprid 240 SC at 48+48 g a.i. ha^{-1}, lambdacyhalothrin 5 SC at 18.75 g a.i. ha^{-1}, indoxacarb 14.5 SC at 21.75 g a.i. ha^{-1}, thiamethoxam 25 WG at 31.25 g a.i. ha^{-1}, lambdacyhalothrin 5 SC+thiamethoxam 25 WG at 15.625+31.25 g a.i. ha^{-1}, triazophos 40 EC at 500 g a.i. ha^{-1} and azadirachtin 0.15 EC at 1500 ppm against cotton aphid, *Aphis gossypii* Glover and cowpea aphid, *Aphis craccivora* Koch on gherkin. A popular variety Ajax F_1 seeds were sown on 29-11-2010 with a spacing of 45 cm @ 2 seeds $hill^{-1}$. Treatments were imposed as foliar sprays after taking pretreatment counts and coinciding substantial level of infestation and repeated depending on necessity.

2.1. Preparation of spray fluid and application of treatments

A measured quantity of insecticide was mixed with a little quantity of water and stirred well, after which the remaining quantity of water was added to obtain the required concentration of spray fluid. In case of wettable granules the required quantities were taken first and mixed with a little quantity of

water to dissolve and then the remaining quantity of water was added to obtain the desired concentration and stirred well. Sprayings were given by using a hand compression knapsack sprayer with spray fluid of 500 l ha^{-1} during morning hours. The plants in each treatment were sprayed with respective insecticide ensuring uniform coverage of insecticide. The sprayer and the accessories were thoroughly washed before changing the insecticides and also rinsed with the spray fluid of the chemical to be applied next.

2.2. Field observations and recording of data

Regular counts of insect population were recorded in each plot on 10 randomly selected labeled plants for each observation. Observations on the pest incidence were recorded one day before the spraying as pre-treatment counts and on 1st, 3rd, 5th and 10th day after spraying as the post-treatment counts. Three sprays were given at an interval of ten days and data on overall efficacy of three sprays were present. Population of different species of aphids was recorded early in the morning when they were inactive from ten randomly selected plants from each plot.

2.3. Statistical analysis

$$\text{Per cent population reduction} = 1 - \frac{\text{Post-treatment population in treatment}}{\text{Pre-treatment population in treatment}} \times \frac{\text{Pre-treatment population in untreated check}}{\text{Post-treatment population in untreated check}} \times 100$$

The per cent reduction of the population of aphids, leaf miner, pumpkin caterpillar and red pumpkin beetle over untreated control in different treatments was calculated using the Abbott's formula (Fleming and Ratnakaran, 1985) as shown below.

These values were transformed to the corresponding angular values and the data were subjected to statistical scrutiny.

3. Results and Discussion

3.1. Aphis gossypii

The efficacy of different insecticides against *A. gossypii* is presented in Table 1. Thiacloprid at 120 g a.i. ha^{-1} concentration was found to be the best treatment (86.34%) and was found to be superior to all the treatments and was at par with flubendiamide + thiacloprid at 48 + 48 g a.i. ha^{-1} (74.36%) at ten days after third spray. These were followed by thiamethoxam at 31.25 g a.i. ha^{-1} (61.09%) and triazophos at 500 g a.i. ha^{-1} (56.21%) and were on par with each other. The other treatments followed in descending order of efficacy were lambdacyhalothrin + thiamethoxam at 15.625 + 31.25 g a.i. ha^{-1} (45.41%), flubendiamide at 60 g a.i. ha^{-1} (35.74%) and azadirachtin at 1500 ppm (31.45%). Lambdacyhalothrin at 18.75 g a.i. ha^{-1} and indoxacarb at 21.75 g a.i. ha^{-1} were found to be least effective treatments with 18.93 and 14.58% reduction over untreated check and were on par.

The findings of the present study proved that thiacloprid at 120 g a.i. ha^{-1} and flubendiamide + thiacloprid at 48 + 48 g a.i. ha^{-1} were proved to be the most effective treatments in controlling the aphids population which is in conformity with the findings

Table 1: Efficacy of different insecticide against Aphis gossypii on gherkin after 3rd spray

Treatment	Concentration (g a.i. ha^{-1})	Mean % of reduction over untreated check				
		1 DAS	3 DAS	5 DAS	7 DAS	10 DAS
T_1 (Flubendiamide)	60	47.60 (43.60)	51.33 (45.74)	45.59 (42.45)	39.78 (39.08)	35.74 (36.69)
T_2 (Thiacloprid)	120	83.64 (66.13)	84.96 (67.02)	87.21 (66.21)	88.91 (65.89)	86.34 (63.12)
T_3 (Flubendiamide + Thiacloprid)	48+48	80.77 (64.10)	82.20 (65.06)	80.54 (63.80)	76.32 (60.96)	74.36 (58.15)
T_4 (Lambdacyhalothrin)	18.75	22.18 (28.06)	26.16 (30.72)	23.46 (28.95)	21.65 (27.71)	18.93 (25.75)
T_5 (Indoxacarb)	21.75	26.79 (31.14)	23.15 (28.71)	21.50 (27.61)	17.55 (24.75)	14.58 (22.38)
T_6 (Thiamethoxam)	31.25	74.50 (59.72)	72.32 (58.25)	71.64 (57.85)	69.28 (56.40)	61.09 (51.38)
T_7 (Lambdacyhalothrin + Thiamethoxam)	15.625 + 31.25	62.29 (52.09)	63.12 (52.59)	59.45 (50.42)	53.16 (46.80)	45.41 (42.34)
T_8 (Triazophos)	500	66.90 (54.88)	65.25 (53.89)	64.78 (53.60)	61.52 (51.64)	56.21 (48.55)
T_9 (Azadirachtin)	1500 ppm	46.09 (42.73)	48.89 (44.34)	42.35 (40.58)	37.65 (37.83)	31.45 (34.09)
T_{10} (Control)	-	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
SEm±	-	1.22	1.20	0.86	1.24	1.11
CD (p=0.05%)	-	3.67	3.62	2.59	3.71	3.34

Figures in the parentheses are angular transformed values; DAS=Days after spraying

of Gengotti and Brighi (2009), Gengotti et al. (2008) and Elbert et al. (2002). The perusal of the data obtained with the present investigation showed that thiamethoxam at 31.25 g a.i. ha^{-1} and lambdacyhalothrin + thiamethoxam at 15.625 + 31.25 g a.i. ha^{-1} were proved to be the next promising treatments. These results were in agreement with the findings of Misra (2002) who reported that thiamethoxam at 25 g a.i. ha^{-1} proved significantly superior in controlling aphids on okra. The findings of the present investigation were also in agreement with findings of Harrewijn et al. (1998), John et al. (2001), John (2002), and Anitha and Nandihalli (2009).

3.2. Aphis craccivora

The efficacy of different insecticides against *A. craccivora* is presented in Table 2. With 72.25 and 71.35% population reduction, thiacloprid at 120 g a.i. ha^{-1} and flubendiamide + thiacloprid at 48 + 48 g a.i. ha^{-1} concentrations continued to be superior to all other treatments at 10th day after 3rd spray. Thiamethoxam at 31.25 g a.i. ha^{-1} concentration registered 60.73% reduction while lambdacyhalothrin + thiamethoxam at 15.625 + 31.25 g a.i. ha^{-1} recorded 62.61% reduction of population respectively and were on par with each other. Lambdacyhalothrin at 18.75 g a.i. ha^{-1}, triazophos at 500 g a.i. ha^{-1} and flubendiamide at 60 g a.i. ha^{-1} recorded 38.39, 37.24 and 36.81% reduction of *A. craccivora* population over control and were on par with each other. Indoxacarb at 21.75 g a.i. ha^{-1} and azadirachtin at 1,500 ppm were found to be least effective treatments with 19.12 and 18.33% reduction over untreated check and were on par.

The findings of the present study proved that thiacloprid at 120 g a.i. ha^{-1} and flubendiamide + thiacloprid at 48 + 48 g a.i. ha^{-1} were proved to be the most effective treatments in controlling the aphids population which is in conformity with the findings of Elbert et al. (2002) who reported that thiacloprid, was a novel and highly active chloronicotinyl insecticide with broad spectrum efficacy against sucking and biting insects at 48-180 g a.i. ha^{1} depending on crop and pest. These results were also in agreement with the findings of Gengotti and Brighi (2009) and Gengotti and Censi (2008). The perusal of the data obtained with the present investigation showed that thiamethoxam at 31.25 g a.i. ha^{-1} and lambdacyhalothrin + thiamethoxam at 15.625 + 31.25 g a.i. ha^{-1} were proved to be the next promising treatments. The present result was supported by the John (2002) against aphids on lettuce.

Table 2: Efficacy of different insecticide against Aphis craccivora on gherkin after 3rd spray

Treatment	Concentration (g a.i. ha^{-1})	Mean % of reduction over untreated check				
		1 DAS	3 DAS	5 DAS	7 DAS	10 DAS
T_1 (Flubendiamide)	60	41.92 (40.32)	43.17 (41.05)	44.72 (41.95)	42.26 (40.53)	36.81 (37.25)
T_2 (Thiacloprid)	120	76.85 (61.30)	79.09 (62.87)	80.38 (63.80)	77.28 (61.60)	72.25 (58.22)
T_3 (Flubendiamide + Thiacloprid)	48 + 48	75.68 (60.47)	77.58 (61.76)	79.10 (62.79)	78.40 (62.28)	71.35 (57.69)
T_4 (Lambdacyhalothrin)	18.75	42.79 (40.83)	44.12 (41.60)	45.47 (42.38)	42.77 (40.82)	38.39 (38.26)
T_5 (Indoxacarb)	21.75	21.63 (27.68)	23.61 (29.04)	25.08 (30.02)	21.14 (27.32)	19.12 (25.90)
T_6 (Thiamethoxam)	31.25	65.86 (54.24)	67.57 (55.27)	68.74 (55.99)	66.22 (54.45)	60.73 (51.18)
T_7 (Lambdacyhalothrin + Thiamethoxam)	15.625 + 31.25	68.13 (55.67)	70.53 (57.17)	71.48 (57.76)	69.62 (56.59)	62.61 (52.32)
T_8 (Triazophos)	500	42.64 (40.75)	43.68 (41.35)	42.71 (40.79)	40.56 (39.53)	37.24 (37.57)
T_9 (Azadirachtin)	1500 ppm	21.71 (27.72)	22.97 (28.58)	23.21 (28.75)	20.94 (27.09)	18.33 (25.22)
T_{10} (Control)	-	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
SEm±	-	1.32	1.25	1.258	1.32	1.62
CD (p=0.05%)	-	3.95	3.76	3.76	3.97	4.87

Figures in the parentheses are angular transformed values; DAS=Days after spraying

4. Conclusion

Thiacloprid at 120 g a.i. ha^{-1} and flubendiamide + thiacloprid at 48 + 48 g a.i. ha^{-1} were established to be effective in checking aphids on gherkin.

5. References

Anitha, K.R., Nandihalli, B.S., 2009. Bioefficacy of newer insecticides against leafhopper and aphid in okra. Karnataka Journal of Agricultural Sciences 22(3), 714-715.

Elbert, A., Ebbinghaus, D., Maeyer, L., Nauen, R., Comparini, S., Pitta, L., Brinkmann, R., 2002. Calypso Reg., a new foliar insecticide for berry fruit. Acta Horticulturae 585, 337-341.

Fleming, R., Ratnakaran, A., 1985. Evaluating single treat-

ment data using Abbott's formula with reference to insecticides. Journal of Economic Entomology 78(5), 1179-1186.

Gengotti, S., Censi, D., Brighi, C., 2008. Natural and synthetic insecticides against aphids (*Aphis gossypii*) on zucchini crops in Emilia-Romagna Region (Italy). Giornate Fitopatologiche, Cervia (RA), 12-14 marzo(1), 279-284.

Gengotti, S., Censi, D., 2008. Evaluation of some insecticides against aphids (*Acyrtosiphon pisum*) on pea in Emilia-Romagna Region (Italy). Giornate Fitopatologiche Cervia (RA), 12-14 marzo(1), 257-262.

Gengotti, S., Brighi, C., 2009. Efficacy of systemic insecticides against aphids on Cucurbitaceae. Informatore Agrario 65(26), 58-60.

Harrewijn, P., Kogel, W.J., Drion, P.G.M., Kogel, W.J., 1998. CGA 293343 Effects on *Myzus persicae*, electrical penetration graph studies and effect on non persistant virus transmission. Brightos Crop Protection Conference, Pests and Diseases 3, 813-818.

John, C.P., Reyes, F.J., Mullis, C.H., Amaya, A., Ledesma, L., Carey, L., 2001. Neonicotinoids and Azadirachtin in Lettuce: Comparison of Application Methods for Control of Lettuce Aphids. Vegetable Report, College of Agriculture and Life Sciences, University of Arizona.

John, C.P., 2002. Influence of Planting Date and Insecticidal Control on Seasonal Abundance of Lettuce Aphids on Head Lettuce. Vegetable Report, College of Agriculture and Life Sciences, University of Arizona.

Misra, H.P., 2002. Field evaluation of some newer insecticides against aphids *Aphis gossypii* and jassids *Amrasca biguttula biguttula* on okra. Indian Journal of Entomology 64(1), 80-84.

Nageshprabhu, 2006. State's gherkin outputs, export triple. The Hindu, April 17.