THINK INDIA JOURNAL

ISSN:0971-1260
Vol-22-Issue-34-December -2019

Population dynamics and management of pumpkin beetle *Aulacophora foveicollis* Lucas in bottle gourd

S.K. Gharde*,Mohit Kumar, D. Mal, and A.M.Raut

School of Agriculture, Lovely Professional University, Phagwara,Punjab 144411
Corresponding Email: sgharde@rediffmail.com,

Abstract

Bottle gourd (Lagenaria siceraria) is one of the most important tropic vegetable crop grown world wide belongs to family cucurbiceae prone to wide range of insect and non insect pests includes pumpkin beetle, fruit fly, striped cucurbit beetle, twelve spotted cucumber beetles, spider mites, melon aphids, squash borer, squash bug and leaf minors etc. Population build-up of, A. foveicollis Lucas on calabash were studied at Instuctional farm, School of Agriculture, Lovely Professional University, Phgawara, Jalandhar (Punjab). During the investigation it was observed that red pumpkin beetle start infesting the crop from 8thSW with mean population 0.40 and it reach at peak level during 15th SW with mean population of 6.22. During the study of application of different chemicals against A. foveicollis, the result revealed that Thiamethoxam 25% WG @ 4g/lit) is the best one among all the treatments and reduced the population of A. foveicollisup to 90% followed by Treatment T1 (Lambda Cyhalothrin 4.9% CS@1ml/lit).

Keywords:*Bottle gourd, Red pumpkin beetle, Population dynamics, Insecicides, management.*

Introduction

Cucurbits crops are well known as vegetable food and medicine from prehetoric era.Bottle gourd*(Lagenaria siceraria)* is one of the tropic vegetable crop (Purseglove, 1974) which belongs to familycucurbitaceae and genus*Legenaria*. The bottle gourd are oldest cultivated climbing plants which bears hard-shelled and bottle shaped fruit gourd which grown in most often in warm season and grows up 7i37 inches long with diameter of 4-12 inches. It is also called white flower gourd. Bottle gourd known by various names in different countries like lauki in India, labu (Indonesia), hyotan, yugao (Japan), labuayer (Malaysia), upo (Philippines), diya labu (Sri Lanka), buap khaus, nam tao (Thailand), and bau (Vietnam).The young fruit are edible and cooked as vegetable. It is useful for management of many diseases like hepatic disease, ulcer

ISSN:0971-1260
Vol-22-Issue-34-December -2019

and cardiac disorders. The fresh juice of bottle gourd helps inlosing weight quickly, because of low fat and high dietary fibers.

Bottle gourd has good nutritional value and many benefits. It is rich source of vitamins, minerals as well as many medicinal values viz. aphrodisiac, anti-inflammatory, diuretic, cardio- tonic, hepatoprotective, analglsic and antioxidant agents (Mohan *et al.*, 2012). The edible portion have good source of ascorbic acid, beta carotene, minerals, amino acid and vitamins. The juice of bottle gourd is helpful in urinary disorders, constipation, premature graying hair and insomnia and helpful to regulate blood pressure of hypertensive patients. It contains beta glycosidase-elasterase enzyme, vitamin B and vitamin C complex and low calories (Parle andKaur., 2011). The regular consumption of bottle gourd juice provide good benefit to people suffering with convalescent, diabetics, digestive problems and liver disease (Ghule *et al.*, 2007). But on the other hand crop is attacked by wide rage of insect pests includes *B. cucurbitae*, *A. foveicollis*, Aphid *(Aphis gossypii* and *Myzus persicae)* and root knot nematode *(Meloidogyne incognita)* among these *A. foveicollis* is one of the major pest which significantly cause 100% losses. Its attack starts during the seedling stage up to still harvesting stage (Rashid *et al.*, 2014).

Materials and methods:

The population dynamics of red pumpkin beetle were studies at Instuctional farm, School of Agriculture, Lovely Professional University, Phgawara, Jalandhar (Punjab) during 2018. The population build up was recorded at weekly basis on randomly selected plant by counting number of adult beetle infestation throughtout the growing season after appearing the red pumpkin beetle. The incidence of red pumpkin beetle data was recorded before spray and 1, 3, 5, 7 and 10 days after spray. The reduction percentage over the control was calculate by using following formula.

$$\text{Rrduction \% over control} = \frac{\text{Untreated plot} - \text{treated plot}}{\text{Untreated plot}}$$

Result and Discussion:

Population dynamics of *A. foveicollis* in bottle gourd.

During the experimental data (Figure-1) reveled that the incidence of *A. foveicollis*on bottle gourd was start from 8th SW with average population of 0.40 beetle/plant and it is continuously

ISSN:0971-1260
Vol-22-Issue-34-December -2019

increases up to 14th SW with average population 3.04 beetle/plant. The population reached its peak level during15thSW with highest population 6.22 beetle/plant. The population of red pumpkin beetle decreases till (17th SW) ranges from 6.22-2.33 beetle/plant.

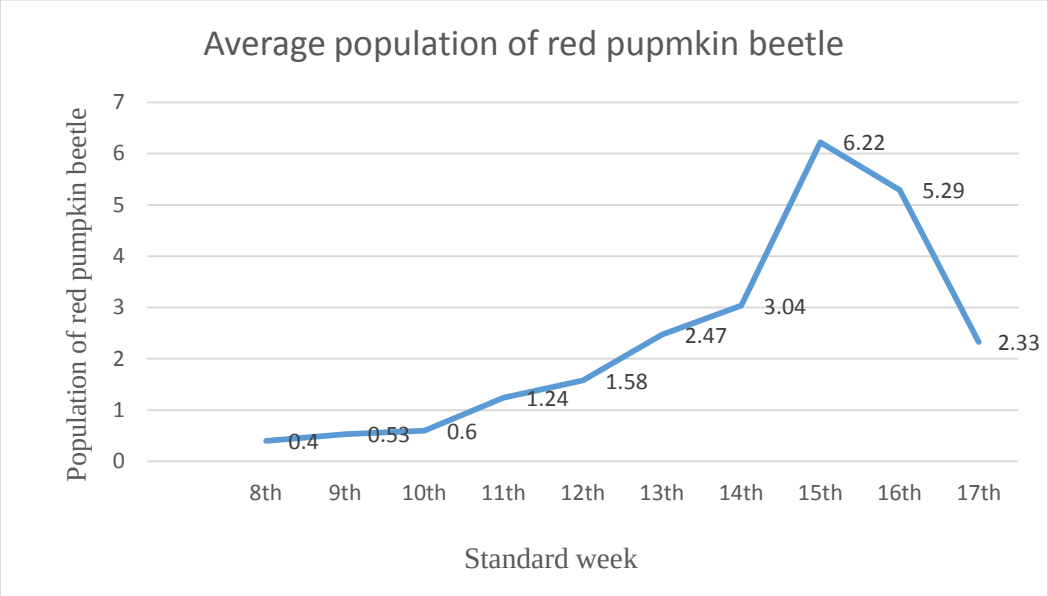

Figure1:Population dynamics of red pumpkin beetle

Evaluation of new generation insecticides against *A. foveicollis*in bottle gourd after first spray

The data reveled that (table-1) the avaerage population of red pumpkin beetle before treatment ranges from 1.2 to 2.0 beetle/plant. The maximum reduction percentage was observed in Thiamehtoxam @25WG 2ml/lit terated plot (95.95%) followed by Lambda cyhalothrin @4.9SC 1ml/lit(91.87%) one day after application and the mimimum reduction was observed when the polt treated with Imidacloprid @17.8SL 0.25ml/lit (50%).After 3 day of application, the treatments with recommended dose of Thiamethoxam(2ml/lit) and lambda-cyhalothrin (1ml/lit.) recorded most effective resulting in 88.43 and 80.23% reduction of red pumpkin beetle followed by treatment recommended dose of imidacloprid (0.5ml/lit) (70.66%). The lowest reduction was recorded in treatment imidacloprid (0.25ml/lit)which was treated with half dose of imidacloprid. The similar trend was observed in 3, 5 7 and 10 DAT.

The result obtained after first spraying is similar to the result observed by McLeod*et. al.* (2002)

ISSN:0971-1260
Vol-22-Issue-34-December -2019

in egg plant in which they observed that the mortality produced by Thiamethoxam in flea beetle occurred more quickly than that for the other tested materials as shown with LT50 values 1.8, 3.0 and 3.6. They tested three different chemicals *viz.* spinosad, chlorfenapyr and Thiamethoxam against the flea beetle and they observed that the chemical Thiamethoxam gave the mortality rate of beetle more quickly as compared to the other chemicals. Pena*et al.*, 2011 recorded that the insecticide with contact and systemic (Thiamethoxam + lambda-cyhalothrin) gave the effective control against the red bay ambrosia beetle.

Table 1:Reduction percentage of *A. foveicollis* during first spray

Treatments	Dose	1DBT	1DAT	3DAT	5DAT	7DAT	10DAT
T1-Lambda cyhalothrin @4.9SC	1ml/lit.	1.6	91.02 (75.00)	80.23 (71.42)	71.85 (68.75)	64.07 (64.5)	52.09 (53.84)
T2-Lambda cyhalothrin @4.9SC	0.5ml/lit	1.6	79.37 (55.00)	70.62 (42.85)	58.12 (37.5)	41.87 (36.00)	40.77 (30.76)
T3-Thiamehtoxam @25WG	2gm/lit.	1.73	95.95 (85.00)	88.43 (78.57)	72.83 (75.5)	65.31 (72.00)	57.80 (57.69)
T4-Thiamehtoxam @25WG	1gm/lit.	2.00	86.54 (65.00)	73.54 (50.00)	63.54 (43.75)	60.00 (40.00)	50.00 (34.61)
T5-Imidacloprid @17.8SL	0.5ml/lit	1.66	88.87 (70.00)	70.66 (64.28)	66.87 (56.25)	58.12 (52.00)	54.37 (46.15)
T6-Imidacloprid @17.8SL	0.25ml/lit	1.2	72.54 (50.00)	63.33 (35.71)	60.83 (31.25)	55.83 (28.00)	39.16 (23.07)
T7- control	.....	1.93	0.73	1.06	1.33	1.66	1.73
SEm (±)		0.33	0.12	0.13	0.14	0.16	0.19
C.D.(P=0.05)	.....	0.99	0.37	0.39	0.43	0.48	0.58

Evaluation of new generation insecticides against *A. foveicollis* in bottle gourd after first spray

During second spray data reveled that (Table-2) application of Thiamethoxam with their recommended (2ml/lit) was found effective against red pumpkin beetle and reduced 91.66 per cent population of red pumpkin beetle followed recommended dose of lambda-cyhalothrin(1ml/lit) 88.41 per cent reduction in red pumpkin beetle population which was followed by imidacloprid with recommended dose81.42 per cent at par the treatment. Half dose of lambda-cyhalothrin (0.5ml/lit) and imidacloprid was found less effective which gave the 79.65

ISSN:0971-1260
Vol-22-Issue-34-December -2019

per cent and 71.92 per cent reduction in red pumpkin beetle population. The similar trend was observed in 3, 5 7 and 10 DAT.

The result obtained after second spraying is similar to the result of (Martínez*et al.* 2004) by comparative toxicity of six insecticides on the rhinoceros beetle. They used six different insecticides *viz.* imidacloprid, fipronil, lambda-cyhalothrin and Thiamethoxam.The higher mortality was observed in Thiamethoxam, lambda-cyhalothrin, imidacloprid and fipronil after 74hrs of treatment.

Table 2: Reduction percentage of *A. foveicollis* during Second spray

Treatments	DOSE	1DBT	1DAT	3DAT	5DAT	7DAT	10DAT
T1-Lambda cyhalothrin @4.9SC	1ml/lit.	2.33	88.41 (76.92)	79.82 (64.28)	77.25 (63.54)	68.66 (52.86)	51.50 (37.64)
T2-Lambda cyhalothrin @4.9SC	0.5ml/lit	2.53	79.65 (53.84)	68.37 (46.42)	63.24 (42.70)	52.56 (38.67)	47.43 (20.00)
T3-Thiomethoxam @25WG	2gm/lit.	2.40	91.66 (84.65)	83.33 (78.57)	77.91 (76.04)	75.00 (63.20)	61.25 (43.52)
T4-Thiomethoxam @25WG	1gm/lit.	2.13	81.22 (61.53)	75.11 (57.14)	59.15 (47.91)	53.05 (43.39)	46.94 (23.52)
T5-Imidacloprid @17.8SL	0.5ml/lit	2.53	81.42 (69.23)	79.05 (60.71)	76.28 (59.37)	63.24 (50.00)	50.19 (30.58)
T6-Imidacloprid @17.8SL	0.25ml/lit	2.60	71.92 (46.15)	69.23 (42.85)	56.15 (39.58)	33.46 (31.13)	30.76 (16.47)
T7- control	……	3.27	0.86	1.86	4.00	7.06	5.66
SEm(±)		0.14	0.13	0.08	0.44	0.57	0.65
C.D.(P=0.05)	…….	0.41	0.38	0.24	1.34	1.74	1.91

Conclusion:

From the above discussion it is concluded that the *A. foveicollis*started infestation on crop from the seedling stage to harvesting stage of bottle gourd. The population builds up from the 8th of standard of week of February with the average of 0.43 beetle/plant. However, one population peak was observed during 15th of standard week with the average 6.22 beetle/plant. The chemical Thiamethoxam gave the effective result followed by Lambda- cyhalothrin during frist and second spray. The chemical imidacloprid not reduced much higher population of *A. foveicollis*as compare to the Thiamethoxam and Lambda-cyhalothrin.

ISSN:0971-1260
Vol-22-Issue-34-December -2019

References:

Purseglove, J.W. (1974). *Tropical Crops-Dicotyledons*, Longmans, London

Mohan, R., Birari, R., Karmase, A., Jagtap, S., & Bhutani, K. K. (2012). Antioxidant activity of a new phenolic glycoside from Lagenaria siceraria Stand. fruits. Food chemistry, 132(1), 244-251.

Parle, M., & Kaur, S. (2011). Is bottle gourd a natural guard. *International Research Journal of Pharmacy*, *2*, 13-17.

Ghule, B. V., Ghante, M. H., Yeole, P. G., & Saoji, A. N. (2007). Diuretic activity of Lagenaria siceraria fruit extracts in rats. Indian Journal of Pharmaceutical Sciences, 69(6), 817.

Rashid, M. A., Khan, M. A., Arif, M. J., & Javed, N. (2014). Red pumpkin beetle, Aulacophora foveicollis Lucas; a review of host susceptibility and management practices.Academic Journal of Entomology, 7(1), 38-54.

McLeod, P., Diaz, F. J., & Johnson, D. T. (2002). Toxicity, persistence, and efficacy of spinosad, chlorfenapyr, and thiamethoxam on eggplant when applied against the eggplant flea beetle (Coleoptera: Chrysomelidae).Journal of Economic Entomology, 95(2), 331-335.

Pena, J. E., Crane, J. H., Capinera, J. L., Duncan, R. E., Kendra, P. E., Ploetz, R. C., ... & Cave, R. D. (2011). Chemical control of the redbay ambrosia beetle, Xyleborus glabratus, and other Scolytinae (Coleoptera: Curculionidae). Florida Entomologist, 94(4), 882-897..

Martínez, L. C., Plata-Rueda, A., Zanuncio, J. C., & Serrao, J. E. (2014).Comparative toxicity of six insecticides on the rhinoceros beetle (Coleoptera: Scarabaeidae).Florida Entomologist, 97(3), 1056-1063.