



Studies on insect pest succession and natural enemies of ash gourd in Chhattisgarh

Manmohan Singh Bisen^{1*}, Vikas Singh¹, V. K. Dubey¹ and Dhananjay Sharma²

¹Department of Entomology, Indira Gandhi Agricultural University, Raipur (C.G.)

²Department of Horticulture, Indira Gandhi Agricultural University, Raipur (C.G.) Pin code- 492012

Corresponding author*: manmohanbisen@gmail.com

ABSTRACT

The present investigation entitled "Record and identification of different insect pests and natural enemies of ash-gourd during reproductive phase along with insect pest succession on it" was conducted during Kharif season of the year 2014-15 at Horticultural Instructional cum Research Farm of Department of Horticulture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). During the course of studies, ash gourd was found attack by five species of insect pest belonging to four order and four families in which viz. redpumpkin beetle (*Aulacophora foveicollis* Lucas) (Coleoptera: Chrysomelidae), fruit fly (*Bactrocera cucurbitae* Coq.), cucumber moth (*Diaphania indica*), Hadda beetle (*Henosepilachna vigintioctopunctata* Fabricius) and aphid (*Aphis gossypii*) were observed. Population of insect pest other than red pumpkin beetle and fruit flies appeared in trace number. First appearance of Red pumpkin beetle, Fruit fly, Cucumber moth on the crop was observed from first week of September (36th SMW), and active from September to December. Whereas, appearance of Hadda beetle and Aphid was started from 37th SMW and 41th SMW, respectively. During the experiment maximum population of red pumpkin beetle, cucumber moth, fruit fly, hadda beetle and aphids were accounted 4.5 grub and adult/plant, 3.1 larvae/plant, 3.8 maggot/plant, 3 grubs and adult/plant, 3.1 nymphs and adult/three leaf, respectively. However, peak population of lady bird beetle and spider was noticed 2.5 adult/plant and 1.9 per plant with fifth week of October and second week of November, respectively.

Key words: Ash guard, Red pumpkin beetle, pest succession, natural enemies, weather parameter.

Received 11.08.2017

Revised 19.08.2017

Accepted 29.08.2017

INTRODUCTION

Vegetable cultivation in India is mostly practiced by small and marginal farmers, for additional income generation. The worldwide area, production, and productivity under vegetable crop cultivation in the year 2013 was 58971 ha, 1159179 million tonnes and 19.7 million tonnes ha⁻¹, respectively. The total area, production, and productivity under vegetable crop cultivation in India during 2012-2013 was 9396 ha, 162897 million tonnes, and 17.3 million tonnes ha⁻¹ (FAOSTAT, 2013). In Chhattisgarh, it is cultivated in an area of 380.7 ha and production of 4993.9 million tonnes (Anonymous, 2013).

Cucurbits are vegetable crops belonging to family Cucurbitaceae which are consumed as food worldwide. The family *Cucurbitaceae* consists of about 118 genera and 825 species in which *Benincasa hispida*, commonly known as ash gourd, tallow gourd, chinese preserving melon, chinese water melon, white gourd, wax gourd and 'chaal kumra' in Bengali (Tindall, 1986).

They are attacked by a wide range of cucurbitaceous and non-cucurbitaceous insect-pests including red pumpkin beetle, striped cucurbit beetle, twelve spotted cucumber beetles, fruit fly, spider mites, melon aphids, squash borer, squash bug, leaf minors etc. (Dhillon and Wehner, 1991).

MATERIALS AND METHODS

The investigation was conducted during kharif season of the year 2014-15 at Horticultural Instructional cum Research Farm of Department of Horticulture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). Weekly observation of different insect pest and natural enemies were recorded on ash gourd up to harvesting of fruits.

RESULTS AND DISCUSSION

During the course of studies, ash gourd was found attack by five species of insect pest belonging to four order and four families in which *viz.* redpumpkin beetle (*Aulacophora foveicollis* Lucas), fruit fly (*Bactrocera cucurbitae* Coq.), cucumber moth (*Diaphania indica*), Hadda beetle (*Henosepilachna vigintioctopunctata* Fabricius) and Aphid (*Aphis gossypii*) were observed. Population of insect pest other than red pumpkin beetle and fruit flies appeared in trace number (Table 1). Similarly, along with insect pest of ash gourd association of different natural enemies were also found *viz.* Lady bird beetle belonging family Coccinellidae; order Coleoptera and Spider belonging to order Acari. These findings are also agreement with Dhillon and Wehner (1991) who reported that insect – pest *viz.* red pumpkin beetle, fruit fly, spider mites, aphid, squash borer, leaf minors *etc.* are the important insects pest of ash gourd.

Red pumpkin beetle, *Aulacophora foveicollis* Lucas

First appearance of Red pumpkin beetle on the crop was observed in fourth week of September (36th SMW), and active from September to December. Whereas, it is evident from observation on beetle population indicating the fourth week of September, it was most favourable for buildup of red pumpkin beetle population. During the experiment maximum population red pumpkin beetle was 4.5 grub and adult / plant. These findings are in accordance with Rathod and Borad (2010) who observed the pest population was fluctuated between 2.95 to 5.15 per plant from 35th standard week (end of August) to 41st standard week (2nd week of October). Thereafter, the activity suddenly decreased from 42nd and 43rd standard week (second fortnight of October).

Fruit fly, *Bactrocera cucurbitae*

Periodical observations of fruit fly incidence on ash gourd, revealed that the maggot population of fruit fly appeared in mid October and remain active up to last week of November. Whereas, peak activity of fruit fly population was noticed during fourth week of October, 3.8 maggot/plant. The present finding are accordance with Banerjiet *al.* (2005) who recorded the activity of melon fruit fly during first week of August, however, the highest incidence was noticed during middle of October and then infestation started declining at Kalyani, West Bengal during *Khari*.

Cucumber moth, *Diaphania indica*

Periodical observations on the incidence of leaf damaging insect pests of ash gourd revealed that the larvae of cucumber moth, *Diaphania indica* active during first week of September to third week of November. During the experiment, peak activity was observed between last week of October with maximum population of cucumber moth 3.1 larvae / plant. Present finding are agreement with Kinjo and Arakaki (2002) who found that the development of *Diaphania indica* slowed down at high temperatures, and the development time at 35°C was significantly greater than 30°C.

Hadda beetle, *Henosepilachna vigintioctopunctata*

The adult of hadda beetle, *Henosepilachna vigintioctopunctata* appeared in second week of September (37th SMW) and active from second week of September to third week of November month. Whereas, it is evident from observations, indicating that third week of November, it was most favorable for buildup of hadda beetle. During the experiment maximum population of hadda beetle was 3 grubs and adult / plant. There is no report found to the activity of hadda beetle on ash gourd. Whereas our finding are supported by Iftekar and Khan (1980) who reported epilachna beetle remained active from July to November on brinjal and was more prevalent during the month of August.

Aphid, *Aphis gossypii*

The nymph and adult of aphid *Aphis gossypii* appeared in the second week of October (41th SMW) and active second week of October to last week of November month. On the experimental field nymph and adult population constitutently remain lower in number throughout period. However it reaches maximum population only 30.2 nymphs and adult / three leaf (U,M,L) during mid November. Similarly, Mohapatra (2008) observed three major sucking pests *viz.*, leaf hopper, aphids and whitefly infestation in cotton from 30th to 50th standard week. Peak population of the three pest was attained during 41st standard week (October 8-14), 44th standard week (October 29th to November 4th) and 35th standard week (August 27th to September 2nd) respectively.

Natural enemies of ash gourd insect pests

In the experimental field, maximum population of natural enemies was recorded during the crop maturity stage. Natural enemies associated with insect pest of ash gourd included the ladybird beetles and lynx spider is presented in Table 1.

Lady bird beetles

Two species of lady bird beetles, *Coccinella septempunctata* and *C. sexmaculata* were observed as potential biotic agents. Nymph and adult of thrips, aphids and jassids were preyed upon by lady bird beetle and their peak activity noticed in the fourth week of October as 2.1 adult per plant. Lady bird beetle remain active from September to November. These findings are supported by Singh and Brar

(2004) who reported that coccinellids are the most important predators they prey upon large numbers of sucking insect pest.

Spiders

Predatory spiders viz. *Neosconatheisp.*, *Araneusspsp.* and *Oxyopessp.* were found preying upon thrips, jassids aphids and thrips. In experimental trial of ash gourd, first appearance of spider in the second week of October and their peak activity was noticed in the second week of November as 1.9 spiders per plant. Kumar et al. (2004) and Kubaret al. (2006) they also observed many spider species in vegetable crop feeding on phytophagous insects.

Table 1 : Insect pests and natural enemies of Ash gourd, *Benincasa hispida* Thumb during Kharif 2014-15.

Sr. No.	(A) Major insect pests		Active period	Peak activity period	Peak Population	Nature of damage	Pest status
	Name of insect	Scientific name, family and order					
1	Red pumpkin beetle	<i>Aulacophora foveicollis</i> (Lucas) F- Chrysomelidae O- Coleoptera	September to December	Fourth week of September	4.5 grub & adult / plant	Grub and adult feed on leaves, flower, and fruits	Regular
2	Fruit fly	<i>Bactrocera spp.</i> F - Tephritidae O - Diptera	Mid October to last week of November	Fourth week of November	3.8 maggot / plant	Maggot and adult feed on leaf and fruits	Regular
3	Cucumber moth	<i>Diaphania indica</i> F -Pyralidae O - Lepidoptera	first week of September to third of November	Fourth week of October	3.1 larvae /plant	Caterpillar feed on leaves	Sporadic
4	Hadda beetle	<i>Henosepilachna vigintioctopunctata</i> (Fabricius) F- Curculionidae O- Coleoptera	Second week of September. to third week of November	Third week of October	3 grub & adult / plant	Grub and adult feed on leaves, fruits	Sporadic
5	Aphid	<i>Aphis gossypii</i> F- Aphididae O- Homoptera	Second week of October to last week of November	Mid of November	30.2 / three leaves nymph and adult	Nymph and adult sucking from lower surface of leaf	Sporadic

Table 3: Major insect pests on ash gourd at weekly interval, during the crop growth period (Kharif - 2014-15)

SMW	Months and date	Insect population/plant				
		Red pumpkin beetle	Fruit fly	Cucumber moth	Hadda beetle	Aphid
36	Sep 03-09	1	0.2	0.3	0	0.00
37	10-16	2.2	0.4	0.4	0.1	0.00
38	17-23	2.5	0.6	0.5	0.2	0.00
39	24-30	3.5	0.9	0.8	0.3	6.60
40	Oct 01-07	3.9	1.2	1.2	0.5	15.53
41	08-14	4.5	1.5	1.5	0.8	17.13
42	15-21	3.1	1.8	2.8	2.3	23.80
43	22-28	2.8	3	2.9	3	30.20
44	29-04	2.1	3.8	3.1	2.1	16.00
45	Nov 05-11	1.5	3.5	2.5	1.5	15.66
46	12-18	0.9	2.1	1.2	0.3	5.30
47	19-25	0.5	0.6	0.9	0.1	0.00
48	26-2	0.3	0	0	0	0.00
49	Dec 3-9	0.2	0	0	0	0.00
Seasonal mean		2.07	1.40	1.29	0.80	9.30

Sr. No.	(B) Natural enemies		Peak activity period	Active period	Peak Population	Praying on	Natural enemies status
	Name of natural enemies	Scientific name, family and order					
1	Lady bird beetle	<i>Menochilus sexmaculata</i> Family: Coccinellidae Order: Coleoptera	Fourth week of October	September to December	2.1 grub and adult / plant	larvae and adults praying aphids and other sucking pest	Major
2	Spider	<i>Neosconatheis</i> sp. <i>Araneus</i> sp., <i>Oxyopes</i> sp. Order: Acarina	Fourth week of November	October to November	1.9 spider / plant	Nymph and adult prayed on flying insect	Major

REFERENCES

- Anonymous, 2013. Area, Production and Productivity 2013-14. Directorate of Horticulture, Government of Chhattisgarh, Raipur (C.G.).
- Banerji, R., Sahoo, S.K., Das, S.K. and Jha, S. 2005. Studies on incidence of melon fly, *Bactrocera cucurbitae* (Coq.) in relation to weather parameters on bitter melon in new alluvial zone of West Bengal. Journal of Entomological Research, 29:179-82.
- Dhillon, N.P.S. and T.C. Wehner. 1991. Host-plant resistance to insects in cucurbits-germplasm resources, genetics and breeding. Trop. Pest Manage. 37:421-428.
- FAOSTAT, 2013. FAO Statistical yearly book 2013.
- Iftekar B and Khan NH 1980. Effect of temperature and relative humidity conditions on the occurrence of certain coccinellids on brinjal plant. Indian Journal of Environmental Research, 1(11): 83-86.
- Kumar, P.S., Alagarsamy, N., Sevarkodiyone, S. and Baskaran, S. 2004. Predatory potential of spiders on some insect pests on Bhendi. Bionotes, 6(4): 109-110.
- Kubar, M.I., Khuhro R.D., Rajput L.B. and Khuhro, S.N. 2006. Proceedings 3rd National Conference on Agriculture and Animal Sciences. Sindh Agriculture University, Tandojam, pp.47-51.
- Kinjo, K. and Arakaki, N. 2002. Effect of temperature on development and reproductive characteristics of *Diaphania indica* (Saunders) Lep.: Pyralidae. Applied Entomology and Zoology, 37: 141-145.
- Mohapatra, L. N., 2008, Population dynamics of sucking pests in hirsutum cotton and influence of weather parameters on its incidence in western Orissa. J. Cotton Res. Dev., 22 (2): 92-194.
- Rathod, S.T. and Borad, P.K. 2010. Population dynamics of red pumpkin beetle, *Aulacophora foveicollis* (Lucas) on pumpkin. Journal of Current Biotica, 3(4): 565-569.
- Singh, J. and Brar, K.S. 2004. Mass production and biological control potential of coccinellids in India. Indian Insect Predators in Biological Control. pp. 204-260.
- Tindall, H.D. 1986. Vegetables in the Tropics. Manmillan Education Ltd., Basingstake, Hampshire, UK. pp.147.

CITATION OF THIS ARTICLE

M Singh Bisen, V Singh, V. K. Dubey and D Sharma. Studies on insect pest succession and natural enemies of ash gourd in Chhattisgarh. Bull. Env. Pharmacol. Life Sci., Vol 6 Special issue [3] 2017: 213-216