

Natural Enemies Associated With Jassid on Okra Crop under Natural Agro-Ecosystem

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Abstract

The okra crop is infested by a number of insect pests, but *Amrasca devastans* consider among notorious and major insect pests. Many insect and non-insect predators are the sources for control this noxious pest. The crop was observed after 25 days of germinations with 10 days intervals. The insect pest populations and natural enemies were recorded. Jassid population starts from second week of observation and continued till last picking. Different types of natural enemies were recorded at different time periods; among these are many sp. of spider, lady bird beetle, ant, and green lacewing. This study show that Jassid populations appeared after the germinations and infested the crop till the end of crop, jassid populations were significantly increased with increase of plant vegetative growth, different natural enemies appeared at different times, and populations were also increased with increased numbers of jassid per plant. It also observed that natural enemies suppressed the jassid populations and is the good sources of pest control in the field.

Keywords: Jassid, Natural Enemies, Okra, Agro-Ecosystem

1. Introduction

Okra (*Abelmoschus esculentus* L.) belongs to family Malvaceae. It is generally known as lady finger and is an important summer vegetable crop used all over the world. The okra crop is infested by a number of insect pests like *Amrasca devastans*, *Earias vittella*, *Bemisia tabaci*, *Helicoverpa armigera*, *Acrocercops bifasciata*, *Thrips tabaci*, *Aphis gossypii*, *Podagrica*, *Anomisflava*, *Sylepta derogata*, *Haritalodes derogata*, *Dysdercus koengii* and *Nezara viridula*. But *Amrasca devastans*, *E. vittella*, *H. armigera* and *B. tabaci*, are the notorious and major insect pests of okra (Dubey et al., 1999; Basu, 1995; Lohar, 2001). In Southeast Asian countries, the jassid, *Amrasca* sp., is considered as one of the major sucking pest of dicotyledonous species.

Natural enemies, parasitoids and predators are the main sources of reduction in the populations of noxious insect pests (Pfadt, 1980). Natural enemies control the pest population, also the same time agro ecosystem encourage the activities of predators (Wagan et al. 2014). Bio-control agents and neem extracts have been reported ecofriendly options for management of insect pests of okra (Al-Eryan et al., 2001; Bindu et al., 2003; Singh and Brar, 2004; Paulraj and Ignacimuthu, 2005). Indiscriminate use of insecticides has resulted in killing of natural enemies and environmental pollution problem on the large scale. Adoptions of IPM strategies ensure safety of environment. In this regard encouragement of natural enemies occupies a central position in integrated pest management because biological control of pests and weeds through natural enemies is eco-friendly (Kapadia and Puri, 1991; Stelzel and Devetak, 1999; Biesinger and Haefner, 2005; Sardana et al., 2005a; Shivalingaswamy et al., 2002; Telang et al., 2004). Very little information is available regarding the natural control of jassid on okra, six species of parasitoids on eggs (Singh, et al. 1993) and some generalists such as *Cheilomenes sexmaculatus* (Fabricius) and *Chrysoperla carnea* (Stephens) have been reported feeding on jassids (Yadav et al. 2009). Which need to investigate the more predators and parasitoids under natural ecosystem, the present study was undertaken to identify the natural enemies of jassid in okra crop under agro ecosystem in subtropical environment conditions.

1.1 Materials and Methods

Experimental design

The research was carried out at Moosa Khan Khatian village, near Tando jam; district Hyderabad, Pakistan, during spring season 2013, to evaluate the natural enemies of jassid on Okra crop. Okra cultivar Rama Krishna (3 Kg seed/acre) sown at well prepared soil on both sides of ridges on 28th January 2013. The distance between rows to row was 60 cms. All germinations were completed within 7 days after sowing. The field was fertilized with Urea (46% N) after 25days of germinations at the rate of 25kg per acre on every 15days of intervals. Agronomic practices such as; weeding and earthen up were done to keep the field free of weeds and grow healthy crop. Irrigation was done whenever were necessary, the crop was irrigated by underground water with help of tube-well. No any pesticide applications were used in the experimental field.

Field studies and Data recording

Insect pest populations and natural enemies were start to record after 25 days of seed germination on every 10 days interval throughout the season. Randomly 10 spots selected in the field from the inner rows. The plants were observed early in the morning, at the first natural enemies and insect pests on plants were count and recorded, then numbers of leaves per plant were recorded. Jassid populations were observed on 3 plants per spot and make an average; whereas the natural enemies were record per spot.

Data Analysis

Obtained data were subjected to statistical analysis using statistical computer software, and Microsoft Excel 2010 to calculate the average, mean and figures drawing.

1.1.1 Results

Jassid Populations

Jassid population starts from second week of observation with 0.6 insects/plant and continuously infest the crop till the end, the insects peak populations were record 46.9/plant during 13th week of investigations. The results revealed that numbers of pest populations were increased as increased by numbers of plant leaves, the population were under controlled when the natural enemies were increased. The average populations were observed 11.45 insects/plant (Fig. 1)

Natural Enemies

The natural enemies associated with jassid were spider, lady bird beetle, Ant, and Crysopa sp.

Spider

Many sp. of spider were observed in different time periods. The predator's population was recorded maximum among all other predators in okra field, it started to appear with lowest population from 2nd week of observation and found in crop field throughout the season, it observed as worthy predator for jassid. The average population was recorded 1.62 per spot, highest populations (3.52 per spot) of spider were observed on the 10th week of observation. The population increased with the increase in pest population and vegetative growth of plant (Fig. 2).

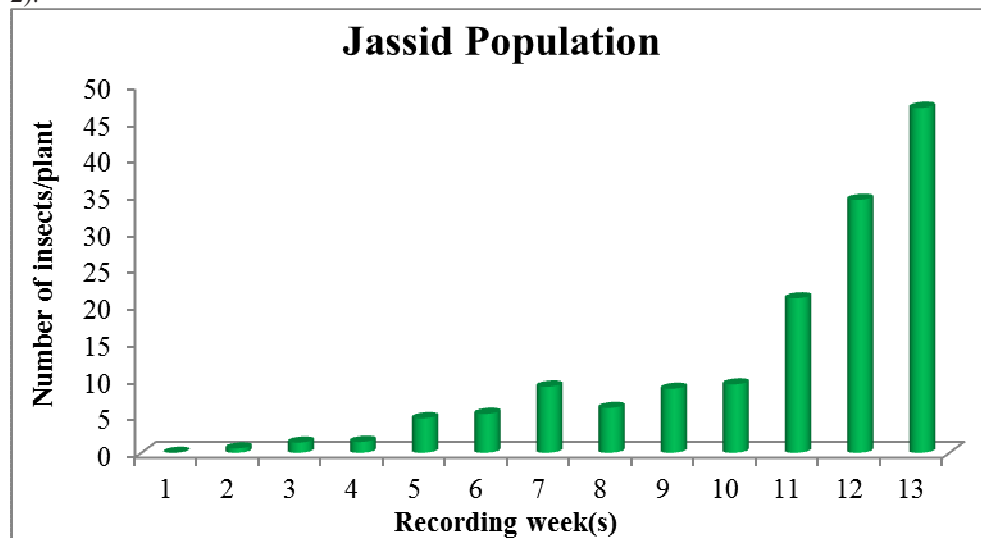


Fig. 1. Weekly observed Jassid population per plant in okra field

Lady bird beetles

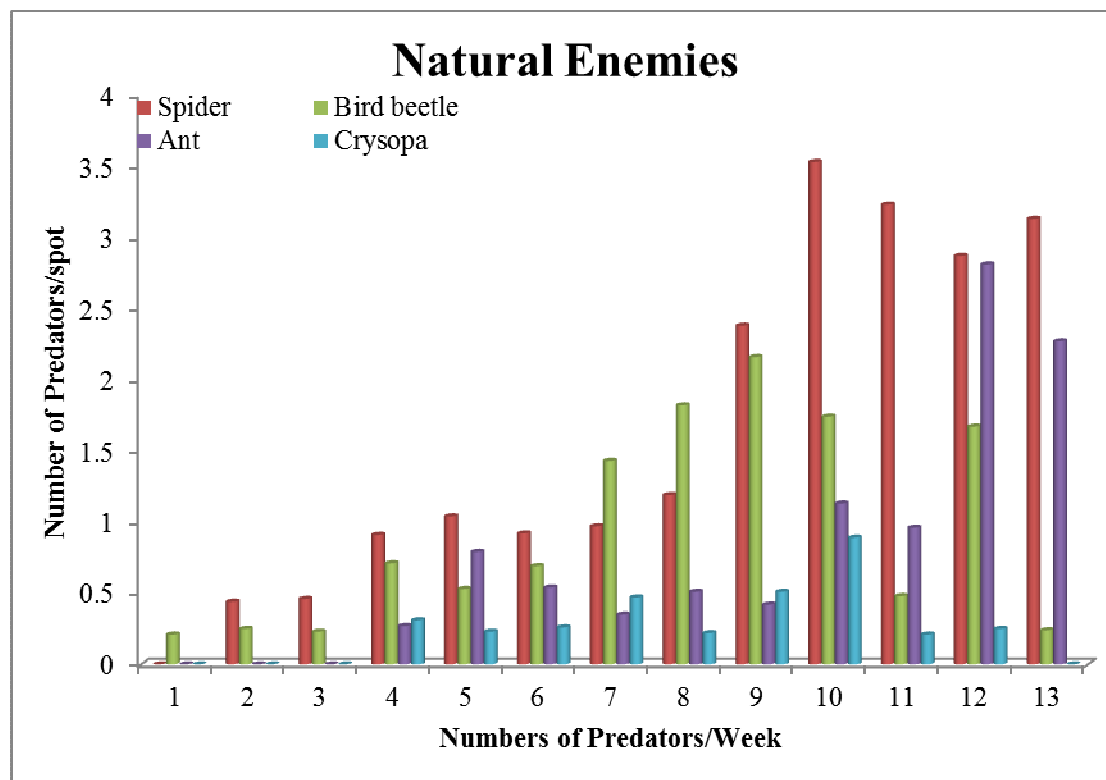


Fig. 2.

Weekly observed natural enemies per spot in okra field

Different species of lady bird beetles were found in different time period in the okra field. Population of bird beetles were found higher after spiders in the field, bird beetles were appeared with low populations (0.21/spot) from the 2nd week of observation and demolished continued till last observation of crop, their population was at peak in the 9th week of observation which was 2.16/spot; and the average population (0.94/spot) was recorded (Fig. 2).

Ant, *Solenopsis geminata* (F.)

Ants appeared in okra field at 4th week of observation, which started to damage different stages of pest and were active till the last field observation. The seasonal average population was detected 0.77 per spot, the maximum ant population was recorded (2.81/spot) in the 12th week of observation, and the minimum population (0.27/spot) recorded in the 4th week of observation (Fig. 2).

Green lacewing, *Chrysoperla carnea* (Stephens)

Chrysoperla is an important predator of soft bodied insect pests. Different stages of Chrysoperla were recorded throughout the season. It appears in the field from 4th week of observation and continuously noticed till 12th week of field recording. The maximum population (0.89/spot) was recorded in the 10th week of observation whereas the averagely population (0.26/spot) was recorded (Fig. 2).

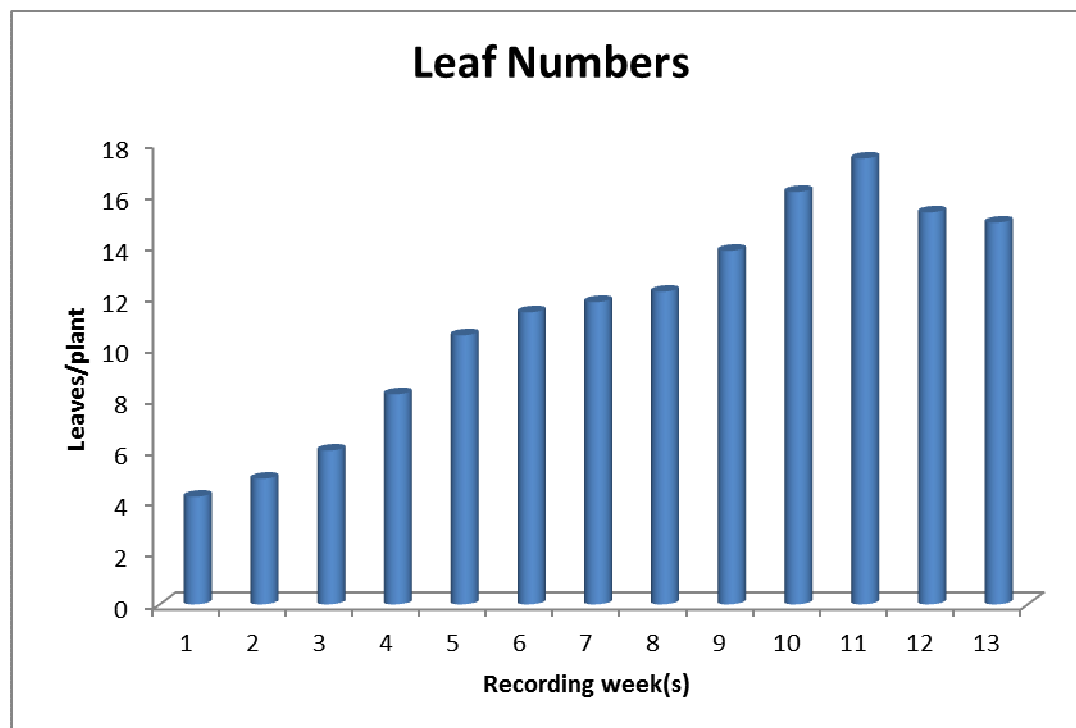


Fig. 3. Number of plant leaves recorded on weekly basis

Leaves per plant

The data regarding leaves per plant were recorded significant relations with jassid population and plant age, the number of leaves were increased with the age of plant till the 11th week of observation and when the plant become older the leaf falling down (Fig. 3).

1.1.2 Discussion

The present study show that Jassid populations appeared after the germinations and infested the crop till the harvest, jassid populations were significantly increased with increase of plant vegetative growth, similar study defined by Bindra and Mahal (1981) that Jassid can damage from premature seedling stage to the fruit setting stage, resulting in a loss of 50% in yield. Rawat and Sadu (1973) resulted jassids can reduce 49.8% and 45.1% number of leaves and decrease in the height, respectively.

The present study showed that predator populations were increased with increased of jassid population and plant growth. Different natural enemies appeared at different times of investigations and their populations were fluctuated with time; Natural enemies start appeared with lowest population and observed till the last field investigation. Spider population was observed maximum numbers among all other predators in okra field then bird beetles, ants and green lacewing with an average population 1.62, 0.94, 0.81, and 0.26 per spot, respectively. The current study concurs with previous findings by Wagan et al. (2014) the occurrence of insect pests under natural agro ecosystem, the natural enemies then appears and continue their predatory habit till the pest populations comes under control, also the same time agro ecosystem encourage the activities of predators. (Shabozoi et al. 2011) Synthetic insecticides effect on population of natural enemies viz. lady bird beetles, chrysoperla spp. spiders and predatory bugs compared to botanicals in the fields, the natural enemies suppressed the insect pests and have good impact on agro-ecosystem. Natural enemies, parasitoids and predators are the main sources of reduction in the populations of noxious insect pests (Pfadt, 1980).

1.1.3 Conclusion

The present study indicated that pest populations appeared after the germinations of crop till the harvest, populations was increased with increase of plant age, but later on different predator's populations were appeared and suppressed the jassid populations which can be consider the good sources of pest control in the field.

References

- Al-Eryan, M.A.S., Zaitoon, A.A. and Rezk, H.A., 2001. The use of *Coccinella 11-punctata* (Coleoptera: Coccinellidae) against *Aphis gossypii* (Homoptera: Aphididae) on okra plant. *Alexand. J. agric Res.*, 46: 107-114.
- Basu, A.N., 1995. *Bemisia tabaci* (Genn.) crop pest and principal whitefly vector of plant viruses. West View

- Press, San Francisco, pp. 183.
- Biesinger, Z. and Haefner, J.W., 2005. Proximate cues for predator searching: a quantitative analysis of hunger and encounter rate in the ladybird beetle, *Coccinella septempunctata*. *Anim. Behav.*, 69: 235-244.
- Bindra, O.S. and M.S. Mahal. 1981. Varietal resistance in egg plant (brinjal) (*Solanum melongena* L.) to the cotton jassid (*Amrasca biguttula biguttula*). *Phytoparasitica* 9: 119-131.
- Bindu, P., Bharpoda, T.M., Patel, J.R. and Patel, J.J., 2003. Evaluation of various schedules based on botanical and synthetic insecticides in okra ecology. *Indian J. Ent.*, 65: 344-346.
- Dubey, V.K., Bhagat, K. and Yadu, Y.K., 1999. Insect pest succession studies on okra. *J. appl. Zool. Res.*, 10: 144-145.
- Kapadia, M.N. and Puri, N., 1991. Biology and comparative predation efficacy of three heteropteran species recorded as predators of *Bemisia tabaci* (Genn.) in Maharashtra. *Indian J. Ent.*, 36: 555-556.
- Lohar, M.K., 2001. Biological control. In: *Applied entomology* Published by Dr. Kashif Raza under Kashif Publication, Hyderabad. pp.147-167.
- Paulraj, M.G. and Ignacimuthu, T., 2005. Predatory insect fauna in mixed cropping agro ecosystems in Northeastern Tamil Nadu. *Insect Environ.*, 11: 79-82
- Pfadt, R.E., 1980. *Fundamentals of applied entomology*. Macmillan Company, New York, pp. 99-104, 24-126.
- Rawat, R.R. and H.R. Sadu. 1973. Estimation of losses in growth and yield of okra due to *Empoasca devastans* (dist.) and *Earias* spp. *Indian J. Ent.* 35:252-254.
- Sardana, H.R., Bambawale, O.M., Singh, D.K. and Kadu, L.N., 2005a. Monitoring of insecticide residues in IPM and non-IPM fields of okra and brinjal. *Indian J. Pl. Protect.*, 33: 197-201.
- Shabozoi, N.U.K., G.H. Abro, T.S. Syed and M.S. Awan (2011). Economic Appraisal of Pest Management Options in Okra. *Pak. J. Zool.*, 43(5), pp. 869-878
- Shivalingaswamy, T.M., Satpathy, S. Singh, B. and Kumar, A., 2002. Predator-prey interaction between jassid (*Amrasca biguttula biguttula*, Ishida) and a staphylinid in okra. *Veget. Sci.*, 29: 167-169.
- Singh, J. and Brar, K.S., 2004. Mass production and biological control potential of coccinellids in India. In: Singh, S.P., Rao, N.S., Henneberry, T.J. (1993) *Leafhoppers and their natural enemies*. Technical Bulletin. Project Directorate of Biological Control, ICAR. No 6:1-65
- Stelzel, M. and Devatak, D., 1999. Neuroptera in agriculture ecosystem. *Agric. Ecosyst. Environ.*, 74: 305-321.
- Telang, S.M., Rathod, K.S. and Rathod, R.M., 2004. Parasitization by different parasites of *Earias Vittella* in okra. *Indian J. Soils Crops*, 14: 335-339.
- Wagan T. A., H. X. Hua, Y. P. He, S. A. Wagan, and S. K Baloch. 2014. Seasonal Incidence of Insect Pest and Natural Enemies on Onion Agro Ecosystem at Tandojam, Pakistan. *J. Bio. Agri. Healthcare*. (4) 27: pp. 205-212.
- Yadav, J.B, Singh, R.S., Singh, H.P. and Singh, A.K. (2009) Effect of abiotic and biotic factors on jassid and fruit and shoot borer in kharif okra crop. *International Journal of Plant Protection* 2(1): 119-122.

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