



Full Length Research Article

VERTICAL DESTRUCTIVE PATTERN OF *AMRASCA BIGUTTULA* (ISHIDA) TO SUNFLOWER AND ITS CONTROL IN KOLHAPUR DISTRICT OF MAHARASHTRA

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ABSTRACT

*Amrasca biguttula biguttula* (Ishida) (Hemiptera: Cicadellidae) is cell sap sucking insect pest of Sunflower *Helianthus annuus* (L.) which affect the yield of crop by allowing leaves yellow, curly, causing sooty moulds and affecting photosynthesis of the crop plant. Therefore, vertical destructive pattern of this species has been reported. The lower leaves had lowest number of nymphs and upper highest. The peak of incidence was noticed in the month of August and it was higher in low rainfall spots (Shirol and Kolhapur) than in higher rainfall spot (Radhanagari). During the non flowering stage vertical migratory damage towards top leaves was noticed. Hence chemical control with 0.03% Azadirachtin or 0.15% carbaryl and biological control with *Coccinella* sp. are integrated parts of pest management of Jassid in Kolhapur region.

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INTRODUCTION

Sunflower, *Helianthus annuus* (L.) (Asteraceae) is one of the most important oil seed crops of the world growing over 22 million hectares worldwide. In Maharashtra it is cultivated in about 7.94 lakh of hectares of land. For Maharashtra Morden, Surya and BSH-1 varieties are recommended. Sunflower has also ornamental and medicinal value. However, its expected yield is not achieved so far because of the damage caused by several insect pests including jassids *Amrasca biguttula biguttula* (Ishida). *A. biguttula biguttula* is polyphagous pest in Maharashtra. It causes the damage to sunflower by sucking the cell sap from leaves and other tender parts of the crop. Review of literature indicates that damage and occurrence of jassids on crop plants have been studied by Faleiro (1982), Faleiro & Rai (1985), Faleiro & Singh (1990), Mahto (1990), Sekhar et al. (1993), Sathe & Margaj (2001), Langar et al. (2014), Sathe et al. (2014) Sarwan kumar & Dhillon (2014) etc.

MATERIALS AND METHODS

The studies were conducted under natural sunflower field conditions in tahsils of Kolhapur district namely, Kolhapur, Shirol, Gargoti, Ajra and Radhanagari during the year 2012 - 2013 with the selection of BSH-1 variety. The selection of

study spots was based on the conditions of rainfall and forest and agroecosystems (Table-1). The Kharif season of crop was taken into account for studying vertical damage pattern of *A. biguttula biguttula*. A farm of 100 sq.ft. was visualized with five points, one at centre and four at four corners. Row to row and plant to plant distance was 60 cm and 30 cm respectively. The observation on population count of the pest (nymph only) was taken in every week since sowing to harvest of the crop at different study centres. One plant from each five selected points were situated and population was counted on upper, middle and lower portions / leaves.

RESULTS

Results recorded in table-1 indicated that the lower leaves had the lowest number of nymphs and the upper one the highest while, the middle leaves showed moderate number of *A. biguttula biguttula*. During the non-flowering stage of the crop vertical migratory damage, towards top leaves has been noted. The peak of incidence of jassid was in August (Fig.1). Jassids occurred on sunflower in second week of July and disappeared in second week of November with the harvest of the crop. The abundance of jassid was studied in climatically different tahsils (table-2). Its incidence was highest in Shirol and Kolhapur and lowest in Radhanagari. The nymphs and adults of jassid injected beak into the leaf surface and sucked the cell

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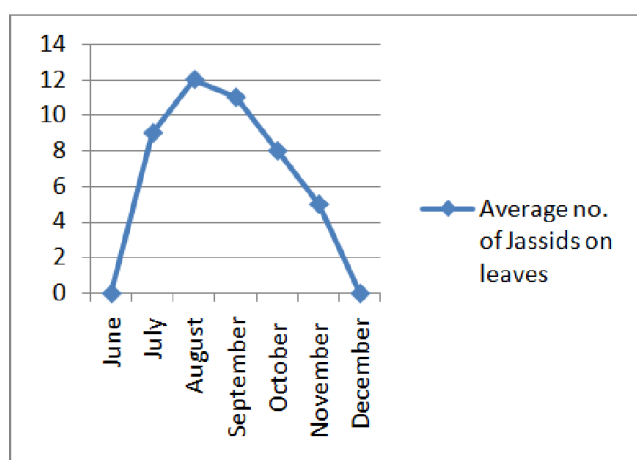
**Table 1. Vertical distribution of *A. biguttula biguttula* on sunflower in Kolhapur district, India in Kharif Season**

Leaf considered	Per leaf Jassid populations in different months.						
	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Upper	--	04	05	04	03	02	--
Middle	--	03	04	03	02	01	--
Lower	--	02	03	04	03	02	--

**Table 2. Abundance of *A. biguttula biguttula* in Kolhapur district on sunflower**

Place	Rain fall	Jassid populations in different months.		
		Upper leaf	Middle leaf	Lower leaf
Shirol	750	+++	+++	+++
Kolhapur	1050	+++	+++	+++
Gargoti	1375	+++	++	++
Ajara	2000	++	++	++
Radhanagari	2500	+	+	+

+ = low, ++ = moderate, +++ = high



**Fig. 1. Incidence of *Amrasca biguttula biguttula* on Sun flower**

sap. They also secreted honey dew like substance over the leaves which invited dust and saprophytic fungus to grow, causing thick black coating, so called "sooty mould". Sooty moulds further affected the photosynthesis, growth of the crop and finally the yield adversely. Jassids also allowed leaves to become curly, yellowing, drying and dropping down on the ground. They also transmitted viral diseases to other crops. Spray of Azadirachtin 0.03% or Carbaryl 0.15% controlled the pest on sunflower. Lady bird beetle *Coccinella* sp. was also found suppressing the pest population of jassid.

**DISCUSSION**

According to Sekhar et al. (1993) the green jassid *E. kerri* was serious pest of pigeon pea in 1988. The field experiments conducted by them during Kharif 1988 and 1989 indicated that incidence of *E. kerri* increased as the crop growth progressed and its peak activity was observed from first fortnight of September to first fortnight November. Correlation coefficients and linear regression models showed that among the different weather factors daily mean temperature had a positive significant and wind speed had a significant negative influence on the green jassid build up on pigeon pea cultivars. They also said that a definite conclusion could not be derived from the linear regression models of 1988 in predicting *E. kerri* build because of negative pure constant values. In order to evolve a rational approach to the management of leaf

hopper *A. biguttula biguttula* population in Okra experiments were conducted by Faleiro & Rai (1985) on determination of vulnerable stage of crop growth, economic injury level (EIL) and crop losses in randomized block design at the farm, the Indian Agricultural Research Institute, New Delhi in June 1981 through a schedule of insecticide treatments.

Observations on discrete levels of jassid population were recorded from the 3 leaves below the crown leaf of 5 previously marked plants in each plot at 1, 7 and 14 days after every spray operation. The average of 3 counts was considered as the jassid population having caused damage to the crop during that particular fortnight. Fruits were picked plot wise at a regular interval of 3-4 days. The data showed that the plots which received protection from the jassid attack either during the early or late stages of the plant growth i.e. upto 30 and after 60 days of germination respectively, yielded significantly lower than those which were protected upto 45 and after 45 days of germination. There was no significance difference between the fruit yields obtained from plots receiving 3-5 sprays either during early or late stages. The leaf hopper damage to Okra during early and late stages of its growth had very little influence on fruit yield (Faleiro & Rai, 1985). *E. kerri* is serious pest of pigeon pea hence weekly observations on jassids were recorded on 3 randomly tagged plants in each plot starting from second week after sowing till harvest. The individual and cumulative effects of different weather factors viz., temperature, relative humidity, rainfall, wind speed and sunshine hours on the buildup of jassid population on different pigeon pea cultivars was determined through correlation and multiple linear regression analysis. Field experiments conducted during Kharif 1988 and 1989 showed that incidence of green jassid *E. kerri* increased as the crop growth progressed and its peak activity was observed from first fortnight of September to first fortnight of November.

Correlation coefficients and linear regression models showed that among the different weather factors daily mean temperature has a positive significant and wind speed had a significant negative influence on the green jassids on pigeon pea. *A. biguttula biguttula* is also a serious pest of cotton, okra and brinjal throughout the year. Suman et al. (1990) studied distribution behaviour of *A. biguttula biguttula* on okra. According to them the average density of nymph population was highest on top portion of the plant followed by middle and lower. It revealed that the leaf hopper nymphs preferred to feed on young growing leaves than matured fully functional leaves. The adult population was distributed more on the middle portion followed by upper and lower parts. This indicated that the leaf hopper population migrates from new leaves to old leaves with the growth of the nymphs. The comparison between the nymph and adults indicated that adult population was more scattered within the plants than nymphs. Over all their study revealed that the cotton leaf hopper *A. biguttula biguttula* followed aggressive dispersion and was adequately expressed by the negative binomial distribution. Sathe and Margaj (2001) also studied population dynamics and occurrence of *Amrasca devastans* in Kolhapur region and found quite destructive pest of cotton and okra. Recently, Sarwan kumar and Dhillon (2014) screened the sunflower hybrids viz., PSH 930, PSH 569, PSH 652, NSFH 36, PSFH 118, SH 3322, GKSFH 2002 and Jawala mukhi against - insect pests including jassids under field conditions. During the early stage of crop growth sucking jassids were abundant.

Among the different hybrids tested, the population of jassid was lower on GKSFH 2002 than other hybrids indicating its suitability and resistance against jassids. Similarly, Lanjar *et al.*, (2014) tested the impact of physiochemical characteristics of sunflower leaves against some insect populations including jassids. On the crop jassid's mean population was  $2.98 \pm 0.76$  per leaf. There was strong positive correlation of jassids with plant height ( $r = 0.8801$ ) suggesting that improvement in plant height will result increase in jassid population. Sathe *et al.* (2014) studied biodiversity of jassids from agro-ecosystems of Kolhapur district, India.

They reported 22 species of jassids belonging to the genera *Deltocephalus*, *Empoasca*, *Nilaparvata*, *Nephotettix*, *Recilia*, *Cofia* and *Typhlocyba*. Jassid diversity was more associated with Mango *Mangifera indica* (L.). On *M. indica* there were two peaks of jassid population first in July-August and second in February-March synchronizing the tender leaves and tender inflorescence respectively. In the present study, vertical destructive pattern was studied in *A. biguttula biguttula* on sunflower variety - Morden in climatically different Kolhapur regions indicating that upper leaves were more susceptible for jassid attack than lower ones. This might be due to more tenderness of the upper leaves than lowers. In the present study, it was also noted that incidence of jassids was more in low rain fall spots specially Shirol and Kolhapur than higher rain fall spots Radhanagari and Gaganbawada indicating the important role of natural source (rain). Probably, the upper leaves were more suitable to the jassid nymphs but heated more than lower ones by rain. The lower leaves protected jassids from under surface but matured leaves caused more difficulties to jassids for injecting its beak into plant surface. However, jassids were potential pests of sunflower and needs their control by either chemicals or by biological means suggested in the text.

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