

The Incidence of Jassid *Amrasca biguttula biguttula* (Ishida) on Sunflower in Relation to Manuring and Spacing

By

N. RAJAMOHAN¹, C. RAMAKRISHNAN², J. KRISHNARAJ³ and
T. R. SUBRAMANIAM⁴

ABSTRACT

Observations were made on the incidence of leaf hopper on sunflower under different levels of manuring and spacing. It was evident from the study that increase of nitrogen, phosphorus and potash in combination resulted in higher population to certain level, while wider spacing in any direction tended to increase the incidence. Luxuriant plant growth due to higher manuring and wider spacing had harboured more leaf hopper population.

INTRODUCTION

Among the pests of sunflower in India, the leaf hopper *Amrasca biguttula biguttula* (Ishida) (*Empoasca devastans* D.) is serious during preflowering stage. Heavy population of these insects despoil the tender leaves and often lead to curling and yellowing, followed by premature leaf drop. Host plant condition in relation to certain agronomic factors, like manuring, spacing and irrigation has direct effect on the incidence of insects in general (Painter, 1951). Analyses of data on pest incidence and the corresponding agronomic factors over extended periods of time have often led to definite correlations. With this end in view, observations were made on the incidence of the leaf hopper in relation to manuring and spacing on sunflower.

MATERIALS AND METHODS

Observations were made in an "agronomic manuring cum spacing trial on sunflower" at Tamil Nadu Agricultural University, Coimbatore. The experiment was of a strip plot design replicated four times with the variety EC. 68413. The main plot treatments included five levels of manuring viz., N:P:K 20:30:20 kg/ha, 40:60:40 kg/ha, 80:120:80 Kg/ha and 100:150:100 Kg/ha. The sub plot treatments were ten levels of spacing viz., 45×25 cm, 45×30 cm, 45×45 cm, 60×22.5 cm, 60×30 cm, 60×45 cm, 75×22.5 cm, 75×30 cm, 75×45 cm, and 75×15 cm. N,P,K was applied as basal dressing in the form of urea, superphosphate and muriate of potash.

1, 2 and 4-Department of Entomology, 3. Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore 641003.

TABLE 1. Population data

Mean population of 16 observations

(Figures in parentheses are transformed value)

	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉	S ₁₀	Mean
M ₁	10.00	18.25	19.75	12.00	14.75	21.75	18.50	18.75	36.00	18.25	28.57
	[3.24]	[4.33]	[4.50]	[3.53]	[3.90]	[4.71]	[4.33]	[4.38]	[6.04]	[4.33]	[4.32]
M ₂	11.50	26.50	27.75	21.50	23.00	34.50	24.25	28.50	50.75	22.50	27.07
	[3.46]	[5.17]	[5.31]	[4.66]	[4.84]	[5.89]	[4.97]	[5.38]	[7.15]	[4.78]	[5.16]
M ₃	14.00	28.00	29.75	20.50	24.75	44.50	34.00	31.75	57.75	24.25	30.67
	[3.80]	[5.31]	[5.50]	[4.55]	[5.02]	[6.69]	[5.87]	[5.70]	[7.63]	[5.45]	[5.55]
M ₄	16.75	32.75	33.25	33.50	31.75	52.75	35.50	38.50	72.25	38.50	38.40
	[4.15]	[5.76]	[5.80]	[5.80]	[5.67]	[7.29]	[6.00]	[6.24]	[8.74]	[6.24]	[6.16]
M ₅	21.75	29.75	32.25	23.75	29.65	43.50	36.25	36.00	67.50	21.25	34.17
	[4.71]	[5.50]	[5.72]	[4.92]	[5.50]	[6.61]	[6.12]	[6.04]	[8.24]	[4.66]	[5.80]
Mean	14.80	27.05	28.55	22.25	23.30	38.45	29.70	30.30	56.95	24.55	
	[3.87]	[5.21]	[5.36]	[4.69]	[4.98]	[6.23]	[5.45]	[5.54]	[7.56]	[5.09]	

Between levels of manure Significant ** SED = 1.19 CD = 2.33

Between levels of spacing .. ** SED = 1.43 CD = 2.80

Between interaction .. **

Manure under spacing SED = 1.38 CD = 2.70

Spacings under manure SED = 1.60 CD = 3.13

Population counts of both adults and nymphs were taken once on three months old crop. Four plants were selected at random in each plot (24 sq. mt) and six leaves in each plant, two at the bottom, two in the middle and two at the top were examined. The data were statistically analysed after square root transformation.

RESULTS AND DISCUSSION

The population data of the leaf hopper in different treatments are furnished in Table 1. Different levels of manuring and spacing have significantly influenced the population of leaf hopper. In respect of manuring, lowest level of manure (20:30:20) was noted to harbour significantly lesser population than other levels where as successive increase of N,P,K, in combination registered higher incidence. A higher increase in incidence to the tune of 106.78 per cent over lowest level was observed in 80:120:80 level. Further increase in fertilizer dose was noted to record slight reduction in population. With respect to spacing of 45 × 22.5 cm (98764 plants/ha) was observed to have lesser population of jassids than other levels while 60 × 45 cm and 75 × 45 cm spacings (37037 and 29629 plants/ha respectively) recorded significantly higher incidence than other levels.

It was also noted that if row to row spacing (45, 60 and 75 cm) was constant, the population was observed to increase proportionate to that of space increase from plant to plant. If the plant spacing (22.5, 30, and 45

cm) was constant, proportionate to that of increase in row spacing, the population was noted to rise. In short wider spacing in any direction was observed to record an increase in population.

The present results have clearly indicated that the growth of the sunflower plant as influenced by manuring and spacing has a definite bearing on the incidence of the leaf hopper *Amrasca biguttula biguttula* (Ishida). Among the manurial levels, lower dosage of manure was observed to have less population while incidence was more in higher dosages. Such a phenomenon of increased incidence of insects with an increase of macro elements N,P,K, individually or in combination had been reported earlier. High amount of combined fertilizer had resulted in increased population in the case of *Aphis rumicis* Koch on beans (Davidson 1925), *Trialeurodes vaporariorum* (West wood) on petunia and *Toxoptera graminum* (Rondani) on wheat (Haseman, 1946). Similarly the leaf hopper *Empoasca devastans* (Dist) was found to thrive better under excessive manuring in cotton (Balasubramanian and Iyenger, 1950; Appa Rao *et al.*, 1959). But Jayaraj and Venugopal (1964) had not observed significant influence of combined fertilizers on the incidence of *Empoasca devastans* (Dist) on cotton.

In the present study, further increase of fertilizer dose over 80:120:80 combination was noted to record slight reduction in population. The plausible explanation may be that

nutritional status of plant at that level of manuring might not have been suitable for its prolific multiplication. Similar observations were made earlier by Roach (1939) in the leaf hopper *Empoasca fabae* (Harris) on apple and Thompson (1941) in the purple scale *Lepidosaphes beckii* (New man) on orange.

Wider spacing in any direction resulting in lesser plants in unit space tended to significantly increase the population. Close proximity of the plants on either direction recorded minimum incidence. In this regard, it may be presumed that the microclimatic condition as affected by the population and growth of the plant might have contributed to this differential level of population since Cloudsley-Thompson (1962) had reported that not only the height of the plant, but also the quality and density of herbage affected the temperature and humidity of the microclimate. In the present study, wider spacing coupled with heavy manuring had induced luxuriant plant growth. As the interaction between manuring and spacing had significant relationship on the population of leaf hopper, this phenomenon is explicable, in conformity with that of Suenga (1963) who earlier reported that the plant hoppers *Sogata fruiifera* Horvath and *Nilaparvata lugens* Stal. congregated in areas of more luxuriant growth and population increased under favourable conditions such as higher nitrogen application, high humidity and optimum temperature.

ACKNOWLEDGEMENT

Sincere thanks are due to Indian Council of Agricultural Research for having sponsored the scheme on sunflower.

REFERENCES

- APPARAO, P. V., U. J. RAJU and S. B. P. RAO, 1959. A note on the incidence of jassids on cotton. *Indian Cotton Gr. Rev.* 13: 187-90.
- BALASUBRAMANIAN, R. and N. K. IYENGAR, 1950. The problem of jassids on American Cotton in Madras with special reference to black soils of ceded districts. *Indian Cotton Gr. Rev.* 4: 199-211.
- CLOUDSLEY-THOMPSON, J. L. 1962. Microclimate and the distribution of arthropods. *Ann. Rev. Entomol.* 7: 199-222.
- DAVIDSON, J. 1925. Biological studies of *Aphis rumicis* Linn. Factors affecting the infestation of *Vicia faba* with *Aphis rumicis*. *Ann. appl. Biol.* 12: 472-507.
- HASEMAN, J. 1946. Influence of soil minerals on insects. *J. Econ. Ent.* 39: 8-11.
- JAYARAJ, S. and M. S. VENUGOPAL. 1964. Observations on the effect of manuring on the incidence of the cotton leaf hopper *Empoasca devastans* Dist. and the cotton aphid *Aphis gossypii* G. at different periods of crop growth. *Madras agric. J.* 51: 189-96.
- PAINTER, R. H. 1951. *Insect resistance in crop plants*. The Macmillan Co. New York pp. 520.
- ROACH, W. A. 1939. Plant injection as a physiological method. *Ann. Bot.* 3: 155-226.
- SUENGA, H. 1963. Analytical studies on the ecology of the two species of plant hoppers the white back plant hopper (*Sogata fruiifera*) and the brown plant hopper (*Nilaparvata lugens*) with special reference to their outbreaks. *Bull. Kyushu. Agr. Expt. Sta.* 8: 1-152.
- THOMPSON, W. A. 1941. Pest control studies. Effect of fertilizer on purple scale development. *Flo. Agr. Exp. Sta. Rpt.* 1939-40, 156-60.