

STUDIES ON THE EFFECT OF PLANT NUTRIENTS ON INSECT INFESTATION ON LADY'S FINGER

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It is well known that the abundance of insects infesting cultivated crops is to a great extent correlated with the soil conditions, particularly with fertility levels and deficiencies of certain major and minor nutrient elements. But very little information is available on these correlations on the insects injuring crops in India. Das (1945) found reduction in the infestation of *Apion corchori* on jute with application of lime, phosphorus and potash. Abraham (1957) recorded increase of infestation of *Nilaparvata lugens* on rice with higher doses of nitrogen. Similar results were recorded for cotton jassid by Jayaraj and Venugopal (1964). Waghray and Singh (1965) observed that the fecundity of *Aphis craccivora* increased with higher doses of nitrogen. The present studies were undertaken to ascertain the effect of four important plant nutrients and their various combinations on pests of lady's finger (*Abelmoschus esculentus*).

Material and Methods

"Pusa sawani" variety of lady's finger was grown in red loam soil of the Agricultural College farm, Vellayani, during the monsoon of 1966, following a randomised block design. Each plot measuring 3m × 3m was planted with 16 plants and manured uniformly with farm yard manure. The nutrients tried were, nitrogen at 0, 125 and 250 kg per hectare, calcium at 0 and 625 kg per hectare, magnesium at 0 and 625 kg per hectare and zinc-copper at 0 and 25 kg each per hectare. These were used singly and in combinations, there being a total of 24 treatments each of which was replicated thrice.

Nitrogen was given as ammonium sulphate, phosphorus as super phosphate, potash as muriate of potash, calcium as lime, magnesium as magnesium carbonate, zinc as zinc sulphate and copper as copper sulphate. Besides the different nutrient combinations given above each plot received P and K at 50 kg each per hectare. All the fertilizers except lime were applied two days before sowing. Ammonium sulphate and muriate of potash were given in three split doses at twenty days' intervals.

The results of the experiments were assessed in terms of the degree of pest infestation, determined by counting the various insects on the plants and in terms of the yield of fruits. The statistical analysis was confined to the effects of the four individual nutrients and their possible two factor interactions.

Results and Discussion

The response to increasing different nutrients and their combinations on the degree of infestation of aphids and borers on the plants are presented in Table 1.

There was a positive correlation between aphid population on the one hand and the doses of N, Mg, N+Ca, N+Mg, N+Zn **Cu**, **Ca+Mg** and Ca+Zn **Cu** on the other. Similar positive correlations for nitrogen were reported on *Aphis craccivora* on groundnut (Waghray and Singh 1965) and on *Rhopalosiphum maidis* on corn (Terry *et al* 1965), A negative correlation was however, reported on *Toxoptera graminum* (Arant and Jones 1951). Positive correlations for magnesium were observed in bean pests (Davidson 1925).

Table 1

Dosage-population relationship between nutrients and pests of lady's finger

Nutrients	Pests	
	Aphids	Borers
N	+	0
Ca	-	0
Mg	+	0
ZnCu		0
N+Ca	+	
N+Mg	+	0
N+ZnCu	+	0
Ca+Mg	+	0
Ca+ZnCu	+	
Mg+ZnCu	0	0

+ Significant positive correlation, — Negative correlation, 0 No correlation.

There was a negative correlation between the doses of calcium and zinc copper and the aphid population when they were used alone; combination of Ca and Zn Cu, however, as **indicated** above gave a positive correlation indicating a sort of synergistic effect when the two were combined.

Table 2

Dosage-population relationship between **nutrients** and jassids of lady's finger at different stages of growth

Nutrients	Stages (days old)							
	7	14	21	28	35	42	49	56
N	0	+	+	+	+	+	+	+
Ca	0	—	0	0	0	0	—	—
Mg	0	0	+	+	+	+	—	—
ZnCu	0	0	+	+	0	0	0	+
N+Ca	0	+	+	+	+	+	+	+
N+Mg	0	0	0	0		0	—	—
N+ZnCu	0	0	0	+	+	—	+	0
Ca+Mg	0	0	0	0	+	+	+	+
Ca+ZnCu	0	0	0	+	+	+	+	+
Mg+ZnCu	0	0	0	0	+	+	+	+

The population of the fruit and shoot borer *Earias fabia*, showed significant responses only to two nutrient associations, viz, N+Ca and Ca+Zn Cu; these two fertilizer combinations showed a negative correlation between their doses and the borer infestations.

Table-2 gives an overall picture of the responses of the jassid population (*Empoasca devastans*) at various stages of the growth of the plant in relation to increased doses of the nutrients. Nitrogen doses had a positive correlation with the jassid population throughout the life of the plant. Calcium showed a negative correlation throughout. Magnesium by itself and in combination with Ca manifested a positive correlation; calcium by itself, however gave a negative correlation.

The present results showed that Ca is effective in reducing the jassid and aphid infestations and Zn Cu in reducing the aphid infestation. Both these are not effective in influencing the borer incidence. On the other hand N and Ca and Ca+Zn Cu treatments are effective in decreasing borer infestation, while they increase the jassids and aphid infestations. Since aphids and jassids are amenable to insecticidal control and the borers are not, the adjustments in the application of fertilizers for pest control have to be made for the control of the borers. Thus application of increased doses of N+Ca or Ca+ZnCu supplemented with insecticidal application to control jassids and aphids may prove to be advantageous in increasing the fruit yield of the crop.

Summary

The effect of the four plant nutrients, nitrogen, calcium, magnesium and zinc copper individually and in combinations on the extent of infestation by *Aphis gossypii*, *Empoasca devastans* and *Earias fabia* on lady's finger was ascertained in field experiment.

Ca and Zn Cu reduced the aphid population whereas the remaining nutrients as well as their combinations increased it.

All the treatments except calcium gave a significant increase in the population of the jassids either throughout the life of the plant or during its active growth; calcium by itself showed a negative correlation with the jassid population though in association with the other nutrients, it increased the population.

The population of *E. fabia* showed a significant negative response to the two nutrient associations N+Ca, and Ca+Zn Cu; the other treatments did not show any significant correlations.

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