

EFFECT OF A NUCLEAR POLYHEDROSIS ON SOME MINERAL
CONTENTS OF *SPODOPTERA LITURA* F.

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Virus infection in insects has been reported to cause significant changes in the metabolism of nucleic acids, protein, amino acids and similar compounds (Bergold, 1959; Benz, 1963; Vander Geest and Craig, 1967). But very little information is available on its effect on the mineral metabolism of insects. The present paper reports changes in calcium, magnesium, sodium and potassium contents in the larvae of *Spodoptera litura* caused by a nuclear polyhedrosis.

Materials and Methods

Larvae used in these experiments were reared in the laboratory on castor (*Ricinus communis* L.) leaves. A purified suspension of freshly isolated polyhedra from diseased larvae of *S. litura* was used as the infective material. Fourth instar larvae within 6 to 8 hours of moulting were inoculated with 100,000 polyhedra each by a spot feeding technique. Those larvae which consumed the inoculated spot in 6 to 8 hours were transferred to individual plastic jars and supplied with virus free foliage. Control larvae were fed on leaf spot of water alone. Three samples of larvae each from control (healthy) and virus infected groups were taken at intervals of 1, 2, 3, 4 and 5 days after inoculation for the mineral estimation. The number of larvae per sample varied depending on the weight. The larvae in the samples were starved for 10 hours before taking the weights. They were then dried to constant weight at 100°C. The dried larvae were powdered and kept sealed in vials.

Aliquots (500 mg. each) of the dried larval samples were digested in ternary acid mixture consisting of HNO₃, HClO₄ and H₂SO₄, 10:1:4 and filtered extracts used for estimation of minerals. Calcium was estimated by titration against 0.02 N veresenate murexide indicator. Magnesium was determined from the values of total Ca+Mg obtained by titration of 0.02 N veresinate with eriochrome black T as indicator. Sodium and potassium were estimated using an EEL flame photometer as described by Jackson (1962). The data were analysed statistically by the analysis of variance technique.

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Results and Discussion

The results are presented in Tables 1 and 2. It may be seen that there was no significant difference in the magnesium content of healthy and the virus infected larvae. But calcium levels were significantly lower in diseased larvae at 1, 4, and 5 days after inoculation than in healthy larvae the difference being more pronounced on the fourth and fifth days recording a decrease of 21.4 and 31.0 per cent respectively over the control. No previous report is available on the effect of virus infection on calcium content in insects. Gershenson (1958) reported that addition of cobalt sulphate (0.05%) to the food of silk worm, *Bombyx mori* decreased the frequency of spontaneous polyhedrosis' particularly if 1 per cent calcium chloride was added. Calcium thus appears to be a factor involved in the susceptibility of larvae to nuclear polyhedrosis.

Analyses of sodium and potassium contents (Table 2) revealed that sodium levels were not altered with age or by the virus infection. Potassium levels were lower at all intervals in infected larvae than in healthy ones. The difference was significant on the second, fourth and fifth days after inoculation, the percentage decrease over control during these intervals being 31.6, 34.4 and 28.2 respectively. Akune (1951) found that potassium content decreased in larvae of *B. mori* infected with nuclear polyhedrosis. According to Arsenieva and Bromley (1951) insufficient amounts of potassium in the oak leaves favoured the outbreak of polyhedrosis in *Antheraea pernyi* larvae. Thus, as in the case of calcium, the levels of potassium also may be acting as factor in the susceptibility of insect larvae to nuclear polyhedrosis.

Table 1

Magnesium and calcium contents of healthy and virus larvae of *S. litura* (Expressed as percentage of dry weight)

Days after inoculation	Magnesium		Calcium	
	Healthy	Diseased	Healthy	Diseased
1	0.31	0.36	0.41	0.33*
2	0.35	0.34	0.44	0.40
3	0.39	0.35	0.31	0.35
4	0.35	0.40	0.42	0.31*
5	0.38	0.38	0.42	0.29*

Significant at 5 per cent level.

Table 2**Sodium and potassium contents of healthy and virus infected larvae of *S. litura* (Expressed as percentage of dry weight)**

Days after inoculation	Sodium		Potassium	
	Healthy	Diseased	Healthy	Diseased
1	0.37	0.37	5.00	4.90
2	0.42	0.44	5.10	4.00*
3	0.45	0.40	4.77	4.27
4	0.45	0.46	5.23	3.43*
5	0.55	0.42	3.90	2.80*

* Significant at 5 per cent level.

Summary

The change in the levels of calcium, magnesium, sodium and potassium in the larvae of *Spodoptera litura* during the course of a nuclear polyhedrosis were studied. Calcium and potassium contents decreased in the diseased larvae especially towards the later stages of infection while the levels of magnesium and sodium were not affected.

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