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Key Parameter Comparisons of Fungal Induced Mortality in Alfalfa Weevil Larvae (Coleoptera: Curculionidae)

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KEY PARAMETER COMPARISONS OF FUNGAL INDUCED MORTALITY IN ALFALFA WEEVIL LARVAE (COLEOPTERA: CURCULIONIDAE)[1]

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ABSTRACT

Key parameters of alfalfa weevil larval mortality by *Entomophthora phytonomi* were compared weekly in three alfalfa fields. Rainfall appeared to be the overriding factor in seasonal larval infection rates.

The fungus, *Entomophthora* (= *Zoophthora) phytonomi* (Zygomycetes: Entomophtoraceae), was first detected in larvae of the alfalfa weevil, *Hypera postica* Gyllenhal (Coleoptera: Curculionidae), in Illinois in 1979 (Barney et al. 1980). Harcourt et al. (1974) and Puttler et al. (1980) reported alfalfa weevil infection rates of over 90% in some alfalfa fields in Ontario and Missouri, respectively, and suggested that this fungus may become a key mortality factor.

The objective of this paper is to compare the following key parameters of alfalfa weevil larval mortality by the fungus in three fields: *H. postica* host density, density of the clover leaf weevil, *Hypera punctata* (Fabricius), which is also infected by this fungus, and the infection rate in *H. punctata* larvae.

MATERIALS AND METHODS

Sampling was conducted in three alfalfa fields in Washington County, southern Illinois. On each sampling date, ten 0.09 m^2 areas of alfalfa (1.0 ft^2) from each field were removed to be placed on Berlese funnels in the laboratory (Barney et al. 1978). As the samples were being placed on the funnels, large (3rd and 4th instars) alfalfa weevil and clover leaf weevil larvae were picked out to be reared individually in plastic diet cups to determine the incidence of infection and parasitism. The larvae were reared individually to prevent the spread of infection to larvae which were not infected when removed from the field. The Berlese funnel measurements gave host densities by instar for both the alfalfa weevil and clover leaf weevil during the entire sampling period until cutting (2 April–7 May).

RESULTS AND DISCUSSION

Dead clover leaf weevil larvae were visually found on the alfalfa leaflets from 9 April to 23 April. The mean number of infected larvae for the three fields increased from 6.1% on 9 April to 25.0% on 7 May (3rd and 4th instars).

The initial sighting of diseased alfalfa weevil larvae was 30 April. The mean number of infected larvae increased from 6.0% on 23 April to 21.6% on 7 May. A slightly greater percentage of 4th instars (25.5%) than 3rd instars (22.8%) were found to be diseased.

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Table 1. Comparison of key parameters affecting alfalfa weevil mortality by *Entomophthora phytonomi* in three alfalfa fields in Washington County, Illinois, 1980.

	Alfalfa Fields		
	Davis	Shubert	Karg
H. postica % diseased[a]	45.6	17.3	4.9
H. postica density[ab]	200.1	84.3	164.3
H. punctata % diseased[a]	13.9	17.6	2.4
H. punctata density[ab]	7.2	3.6	6.3

[a]Average over duration of sampling period.
[b]Per foot^2.

Harcourt et al. (1974) suggested that the key parameters in alfalfa weevil larval mortality by the fungus appear to be host density, temperature, rainfall, and the density of *H. punctata* which may serve as a reservoir for the fungus. A comparison of these parameters for the three study fields showed that the Davis field, which had the highest percentage of diseased alfalfa weevil larvae, had the greatest *H. postica* and *H. punctata* densities (Table 1.). However, the Karg field also had very high *H. postica* and *H. punctata* densities but had a very low incidence of larval infection for both species.

The overriding factor in the incidence of *E. phytonomi* in alfalfa weevil larvae may be rainfall, and the resulting higher humidity. Watson et al. (in press) determined that high humidity was the primary factor initiating sporulation of *E. phytonomi* in alfalfa weevil larvae. The condition of high humidity protects against rapid dessication and inactivation of the conidea and is advantageous to further infections (Newman and Carner 1974).

During last year's statewide survey for this fungus in alfalfa weevil larvae, we found many fields in this area to have infection rates greater than 80%. A comparison of rainfall data for this area in 1979 and 1980 showed a 78.9% decrease of April rainfall from 1979 to 1980. April 1979 was an exceptionally wet month, 2.76 inches above normal, which may explain why the fungal incidence was so much greater in 1979 than 1980 in this area.

In summary, there were some indications during this study that high host densities of both *Hypera* species and a high percentage of diseased *H. punctata* larvae would facilitate the increase and spread of *E. phytonomi* through the *H. postica* population. However, it appears that April 1980 was a period of very low precipitation which inhibited the conidial sporulation and spread of the fungus in both the *H. postica* and *H. punctata* populations.

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