Viruses Could be Key to Natural Insect Control

Most people associate viruses with plagues. Insect virologists, however, are working on the concept that viruses may be used to benefit man—to biologically control an insect pest.

Some 400 different viruses have been isolated from insects and mites. Among those showing particular promise in lessening dependence upon chemical insecticides is the **Heliothis** nucleopoly-hedrosis virus (NPV), now being used against the cotton bollworm or tobacco budworm on cotton.

Natural epidemics which completely wipe out populations of some insects annually attest to the effectiveness of insect viruses. Unfortunately, in such cases, "natural" control often comes after the damage has been done. By spraying plants with a viral insecticide while caterpillars are still young, extensive crop damage could be prevented.

A recent experimental finding that may advance the use of viral insecticides was made by the USDA's Agricultural Research Service entomologists Carlo M. Ignoffo, Frank D. Parker, Robert E. Pinnell, and Donald L. Hostetter, in cooperation with the Missouri Agricultural Experiment Station, Columbia, and Orlin P. Boening of the International Minerals and Chemical Corporation.

They found that activated charcoal protects **Heliothis** NPV against sunlight when sprays containing the virus are used to control corn earworm.

Normally, one-half of the **Heliothis** NPV, unprotected from sunlight, is inactivated in about 1 day. Addition of activated carbon to the spray application extended the half-life of the virus on sweet corn silks in the field to about 3 days. The spray material, suspended in water, was applied at the rate of 17 gallons per acre. This amount contained 1 pound of carbon and 150 grams of a commercial virus preparation. On cotton foliage, activated carbon extended the half-life to about 5 days.

The corn earworm, also known as tomato fruitworm and bollworm, is a major pest of cotton as well as corn. The **Heliothis** NPV was granted the status of temporary exemption from a requirement of a tolerance for residues in and on cotton seed. This was the first time an exemption was granted for a viral insecticide.

The virus has been fed to many different insects, tested on other invertebrates and vetebrates including man, and repeatedly applied in tests to many different crops without any reported ill effects to users, wildlife, beneficial insects, or plants. It was found to replicate only in species of **Heliothis** larvae. Further study would be needed before the pesticide could be registered for use on corn.

Within the past 10 years, five different viruses have been produced by American and foreign commercial firms and made available for experimental control of insect pests. All are of the nucleopolyhedrosis type, so called because they replicate in the nucleus of infected cells and because they contain virions embedded in a polyhedral-shaped protein matrix or inclusion body. Virions are particles that contain nucleic acid which in turn induces viral diseases.

Viral diseases have been found in all major orders of insects. Some 83 percent of the viruses isolated have come from caterpillars of moyhs and butterflies, perhaps because many economic pests are in that group

Caterpillars feed on plants where viruses are present and consequently ingest the viral inclusion bodies, which dissolve in their stomachs. Seconds later, the virons, or infective units are released. These pass through the gut wall of the caterpillar and infect the nuclei of susceptible cells until the caterpillar eventually dies.

Caterpillars must be reared and infected with the virus to produce the biological insectide, because viruses can only be grown on living systems. Improvement in the production technology is needed for further development of insect viruses into practical, effective, safe, specific, and biodegradable insecticides.

2 Promoted At Weavers

Glenn E. Esbenshade, of 56 Homestead Drive in Lancaster, and Dwane L. Hostetter, Route 1, New Holland, have been named to the newly created positions of district sales supervisors at Victor F. Weaver, Inc.

Esbenshade, a 5 year veteran of the Weaver sales force will supervise the sales efforts for Weaver's Prepared Foods in the New York, Ohio, and Western Pennsylvania areas.

Hostetter, who joined Weaver in 1968 will be responsible for directing the Weaver Sales program in the New England and Eastern Pennsylvania area.