

ENTOMOLOGY

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ABSTRACTS

Aphid Feeding Behavior and Resistance to Barley Yellow Dwarf Virus in *Agropyron* Species. DAVID LAMPE, RICHARD SHUKLE AND JOHN FOSTER, Department of Entomology, and RICHARD LISTER, Department of Botany and Plant Pathology, Purdue University, West Lafayette, Indiana 47907.—Various *Agropyron* species have been tested for resistance to the PAV, MAV, and RPV strains of barley yellow dwarf virus (BYDV). Virus content in plants was assessed by enzyme-linked immunosorbent assay (ELISA) and resistance to the strains of BYDV tested for was identified in the *Agropyron* species. Probing/ingestion behavior of the two major aphid vectors of BYDV, *Rhopalosiphum padi* and *Sitobion avenae*, on the *Agropyron* species was also monitored electronically. By evaluating vector probing behavior on the grasses tested it was possible to determine if resistance in seedling plants was due to structural characteristics that prevented aphids from infecting plants by contacting phloem or was due to failure of virus to establish itself within the plant even though phloem contact was made by the vectors. Results indicate that several *Agropyron* species are resistant to the PAV, MAV, and RPV strains of BYDV and that resistance in the seedling plants was due to failure of virus to establish itself within the plant and not to failure of aphids to contact phloem.

Surplus Killing in *Toxorhynchites* (Diptera: Culicidae). RAYMOND RUSSO, Department of Biology, Indiana University-Purdue University at Indianapolis, Indianapolis, Indiana 46223.—*Toxorhynchites* are predators on container-breeding mosquitoes during their larval stage. They also exhibit an interesting behavior called surplus killing where they attack, but do not consume a prey larva. We have found 3 distinct patterns of predation in *Toxorhynchites* differentiated by the characteristics of surplus killing. The first pattern is an early onset of surplus killing with increasing intensity as development proceeds. The second pattern is one of late onset with a low intensity of surplus killing, typified by *Tx. rutilus* and *Tx. theobaldi*. The third pattern shown by *Tx. splendens* is one of late onset of surplus killing, but an intensity which rivals the first group. In no case do any of these species display surplus killing before their populations have achieved the minimum weight required for pupation.

Ecdysteroid Levels throughout Larval Development of Two Species of *Toxorhynchites* (Diptera: Culicidae). ANNE WESTBROOK AND RAY RUSSO, Department of Biology, Indiana University-Purdue University at Indianapolis, 1125 East 38th Street, Indianapolis, Indiana 46223.—Ecdysteroids are steroid hormones which occur in larval insects and are best known for their role in the control over processes associated with molting. Ecdysteroid levels were measured using a radioimmunoassay in two species of predatory

mosquitoes of the genus *Toxorhynchites*. The two species investigated were *Tx. amboinensis* and *Tx. rutilus*. A high level of ecdysteroids is found in first instar larvae, then the level decreases. The quantity of hormone is found to increase prior to each larval-larval molt. The amount of ecdysteroids also increases to a high level just prior to the larval-pupal molt. The levels of ecdysteroids and the temporal pattern of hormone fluctuations are similar to insects from other orders. However, the specific timing of each pulse is different in the two species studied. These differences are accounted for possibly by differing lengths of time required to complete larval development.

Selection of an Insect Pathogen. HAROLD L. ZIMMACK, Department of Biology, Ball State University, Muncie, Indiana 47306.——The purpose of the present work is to determine a list of characteristics necessary for a microorganism to be used in biological control of a given insect. The European corn borer, *Ostrinia nubilalis*, is known to be infected by three microorganisms: *Beauveria bassiana*, a fungus, *Nosema pyraustae*, a protozoan, and *Bacillus thuringiensis*, a bacterium. A study revealed these three microorganisms all have the following characteristics:

1. spore-forming resistant stage
2. aerobic and/or facultative anaerobe
3. produce exotoxin and/or protease
4. optimum growth range between 30° - 37° C
5. optimum pH range between 6 - 8
6. harmless to man and vertebrates

A number of bacteriological research laboratories (American Type Culture Collection, Special Bacterial Pathogens Laboratory, and Culture Collection Research-USDA) have specified eight additional bacterial species which possess the characteristics given above. These bacteria will be examined in the insect pathology laboratory, Ball State University, to determine their biological control potential for the corn borer. Should this technique prove successful, insect pathologists could identify the characteristics of microorganisms which have biological control for other destructive insects.