FIRST RECORDS OF ENTOMOPATHOGENIC DISEASES IN THE PARAGUAY TEA AGROECOSYSTEM IN ARGENTINA

DANIEL R. SOSA-GÓMEZ[1], ELLIOT W. KITAJIMA[2] AND MARCELO E. ROLON[3]
[1] Centro Nacional de Pesquisa da Soja, EMBRAPA - Caixa Postal 1061, 86001-970, Londrina, PR, Brasil

[2] Dept. Biol. Cel., Univ. Brasilia, 70919-970, Brasilia, DF, Brasil

[3]Establecimiento "Las Marías", 3342 Gobernador Virasoro, Corrientes, Argentina.

The northeastern region of Argentina leads that country in the production of Paraguay tea (*Ilex paraguariensis* Saint Hilarie) with 170 metric tons per year. The most important pests of tea in this region are: a psyllid *Metaphalara spegazziniana* (Lizer)(Homoptera: Psyllidae), the "paraguay tea hornworm" *Pengonia lusca ilus* Bsd. (Lepidoptera: Sphingidae), and the gall bud mite *Dichopelnus notus* Keifer (Acarina: Eriophyid)]. *M. spegazziniana* is usually controlled by foliar sprays with dimethoate

directed against adults to prevent damage by feeding and oviposition. *P. lusca ilus* is controlled mainly by pyrethroids.

The use of microbial control is a potentially valuable alternative to the high costs, possible pest resurgence, development of resistance, and environmental contamination associated with chemical insecticides. Thus, as a first step toward the development of a biocontrol program, an investigation was begun to find natural enemies of these pests in field-collected individuals. This note reports the finding of a fungus in the psyllid and a baculovirus in the "paraguay tea hornworm". These species are known by the common names "psílido de la yerba mate" and "marandová de la yerba mate", respectively.

Sampling was done by randomly collecting the terminal shoot of paraguay tea plants from groves in Gobernador Virasoro, Corrientes, Argentina. Cadavers of the psyllid were placed in humid chambers to induce the fungus to sporulate. After this they were mounted in Hoyer's medium and observed under a stereomicroscope at 400 magnification. Percent disease estimates were made by counting cadavers with mycelium and sporulating structures. The conidial stage of the fungus was observed during March, April and early May of 1991 and 1992. A high prevalence (82% mortality, n=28) of the disease caused by the fungus was observed in the first week of May,1991. In 1992, the infection rate on April 24, May 11 and July 10 was, respectively, 30% (n=10), 93% (n=30) and 2% (n=88). We identified the fungus as *Zoophthora radicans* (Brefeld) Batko based on the descriptions of Ben-Zeév & Kenneth (1981), Balazy (1986) and by careful comparisons of morphology and cultural characters with a specimen from a culture collection (ARSEF 2282). This fungus has potential value as a biological control agent, and basic knowledge about it's production process is available (McCabe & Soper, 1985).

In the summer of 1988, some larvae (1% mortality, n=102) of *P. lusca ilus* displayed symptoms typical of viral infection – the larvae changed color from typical green to pale green, they fed less, and after death they were found hanging from the branches of paraguay tea plants, attached by their anus and legs (Fig. 1). To confirm viral etiology, we examined hemolymph under the light microscope. This revealed large numbers of polyhedra-like particles. The suspected viral polyhedra were concentrated by homogenization of larval tissue, filtered through cheese cloth, and centrifuged at low (120 g for 2 min) and high speeds (6,000 g for 15 min). The pellet resulting from high-speed centrifugation was fixed in a modified Karnovsky fixative (2% glutaraldehyde, 2% paraformaldehyde in 0.05 M cacodylate buffer, pH 7.2), postfixed in 1% osmium tetroxide, dehydrated in acetone, and embedded in Spurr low viscosity medium. Blocks were sectioned in a LKB Ultratome III microtome equipped with a diamond knife, and the sections were stained with uranyl acetate and lead citrate before being examined in a JEOL JEM 100C electron microscope. Also, the suspension of suspected viral polyhedra was applied directly onto a specimen holder, air-dried, sputter-coated with gold in a Balzer's sputter coater, and examined in a JEOL 840A scanning electron microscope.

Electron microscopic examination demonstrated that the particles were typical baculovirus polyhedra containing large numbers of singly embedded rod-shaped virions (Fig. 2). Scanning electron microscopy revealed large numbers of polyhedral structures as the sole component of the nuclear polyhedra suspension (Fig. 3). These polyhedra measured 1-3 micrometers in diam, matching in size the polyhedra seen by transmission electron microscopy.

A crude preparation of this virus has been successfully used by farmers to control *P. lusca ilus* larvae, thus avoiding defoliation. This was achieved in a preliminary study conducted by farmers over approximately 900 ha in Gobernador Virasoro

Fig. 1. Diseased larvae of *Pengonia lusca ilus* with symptoms typical of viral infection.

county, in the province of Corrientes, Argentina in February of 1992. A large amount of the virus was obtained by collecting larvae from artificially-infested fields and stored frozen for use in the subsequent season. The virus was applied by airplane using the hemolymph from 15 infected last instar larvae per ha although, at that time, the etiology of the disease was not well understood. Cadavers were collected for use the next year. In January of 1993, the treated area reached 2,362 ha. This baculovirus is currently used empirically without the benefit of prior research on dosage, timing, and population levels.

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SUMMARY

We report for the first time natural and artificial epizootics of pest populations on Paraguay tea in Corrientes Province, Argentina. The natural epizootic was caused by *Zoophthora radicans* on *Metaphalara spegazziniana* and the artificial epizootic was caused by a nuclear polyhedrosis virus on *Pengonia lusca ilus.*

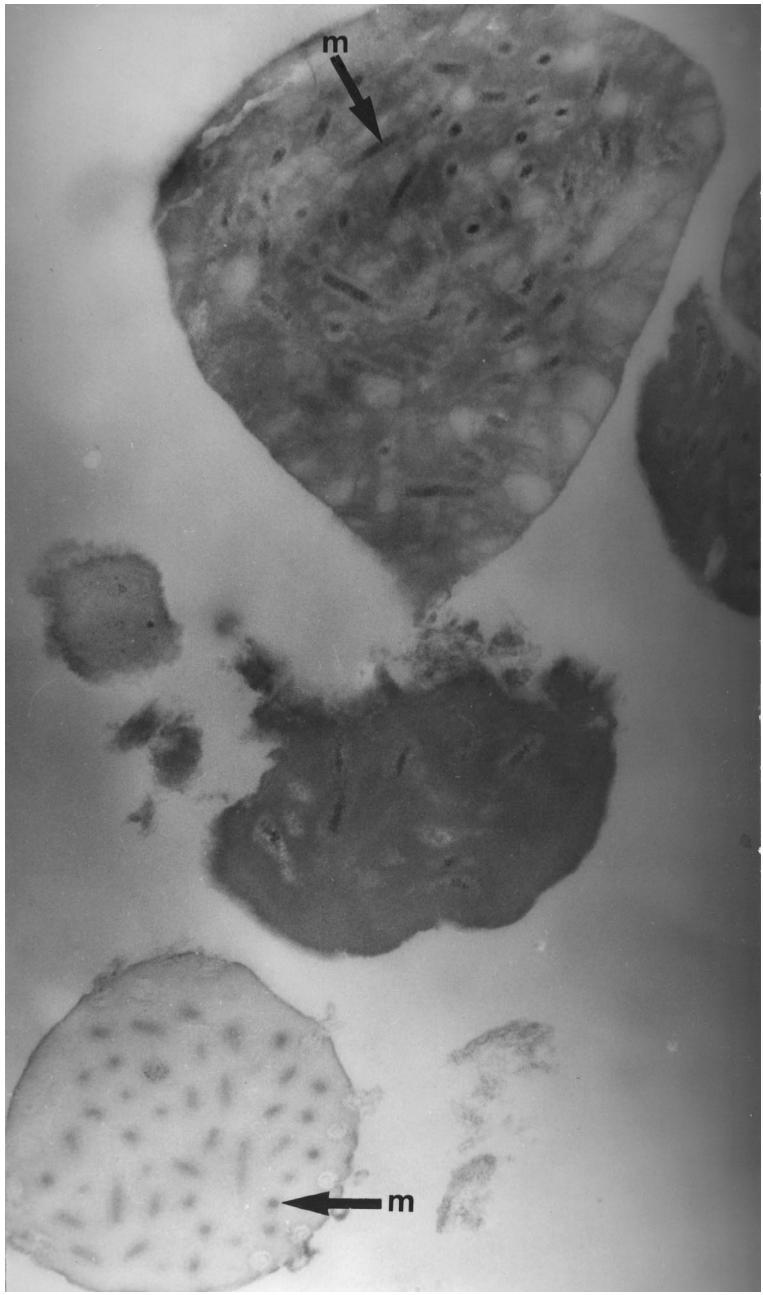

Fig. 2. Transmission electron micrographs of thin sections of polyhedral inclusion bodies of the virus. Note that the m=nucleocapsids are wrapped individually by the membrane characterizing a SNPV (x 40,000)

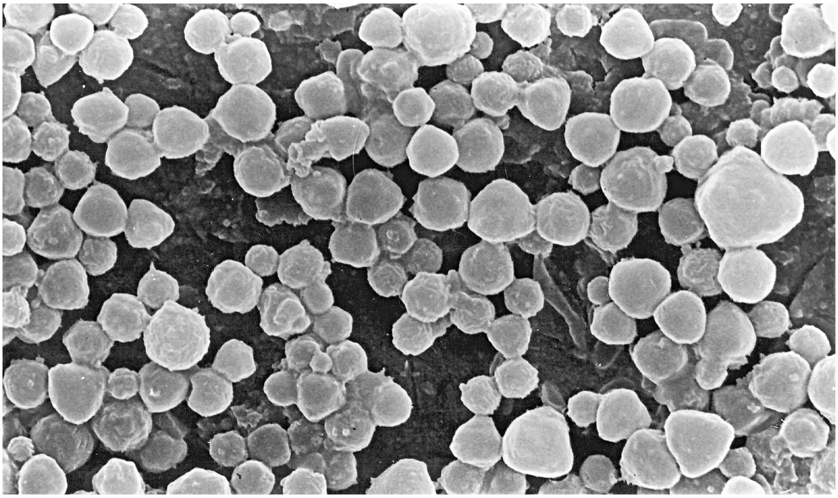

Fig. 3. Scanning electron micrographs of purified polyhedral inclusion bodies of the virus.

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