PROGRESS IN MICROBIAL CONTROL - 1975-1980
- SOUTH AND CENTRAL AMERICA -

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The use of microbial agents for control of arthropod pests in Latin America is not as advanced as it is in many other parts of the world. This paper gives the present status of the use of microbial agents to control arthropod pests in Latin America. Special emphasis will be given to commercial use and present research trends.

Commercial Use

Few commercial products are available to the vast majority of farmers in the area. Aside from certain exceptions, the use of microbial agents for control of arthropod pests is not a widespread commercial practice. The most commom product presently in use is Bacillus thuringiensis, which is sold commercially under several brand names and is available in most of Latin America, although not in all parts of these countries. The commercial use of B. thuringiensis appears to be on the increase in Latin America. Insects that are being controlled by this product include Diatraea sacchalis and Spodoptera frugiperda on maize; Erinnyis ello on cassava (Manihot esculenta) and rubber trees; Plutela xylostella, Hullula phidilealis, Trichoplusia ni and Pieris rapae on cabbage; Heliothis virescen on pigeon peas; Anticarsia gemmatalis on soybeans; Stenoma cecropia and Brassolis astyra on oil palms; Scrobipalpula absoluta on tomatoes; and Sibine apicalis on bananas.

As can be seen from this partial list , B.thuringiensis is being used on numerous crops, and nearly all reports indicate that control is successful. Studies done at CIAT on control of E. ello, the cassava hornworm, show that applications of 400-500 g/ha of B. thuringiensis gave over 90% control. Field testing of the bacteria has disclosed no detrimental effects on other biological control agents such as Trichogramma sp. and Polistes sp.

The use of the fungal agent Metarhizum anisopliae var. Anisopliae for controlling certain pests has become more common practice in recent years, especially for spittle bugs on sugar cane (Mahanarva posticata, Aeonolamia selecta) and

forage grasses (Zulia entreriana, Deois flavopicta) in Brazil. It is also being tested on other crops such as potatoes, coffee, bananas and cassava, but not commercially. It appears that one of the basic problems limiting the success of this fungal agent in Brazil is the unavailability of more virulent strains.

The Brazilian government has given permission to private companies to mass produce the fungus. Approximately 150,000 ha of sugar cane is presently being treated with Metarhizum in Brazil. On forage grasses the use of this fungus is still in the experimental stage. It should be pointed out that laboratory studies with this fungus have given quite favorable results, but there is lack of data for adequate analysis of its efficiency in the field.

One of the most successful examples of control of pests by microbial agents is the use of the nuclear polyhedrosis virus Trichoplusia ni. In Colombia the massive application of this virus in the field to control T. ni on cotton has been so successful that it has replaced all other control systems, and this pest has ceased to be of importance on this crop in Colombia.

Research

A review of the literature indicates that numerous identifications of arthropod pathogens have been made throughout Latin America and the Caribbean. Actual research has been active but limited over the past five years.

Research studies center around four main areas: (1) identification of pathogens collected from insect pests in the field; (2) the effectiveness of these pathogens in controlling the target pest, mainly under laboratory conditions although some field trials are done; (3) the mass culture of insect pathogens, both on the target insect and artificial media; (4) the compatibility of these pathogens with pesticides (insecticides, fungicides and herbicides).

Identification studies of naturally occurring insect pathogens are usually of two types: (1) A survey is done of a specific pest. Diseased material is brought into the laboratory, and an effort is made to identify the pathogen. Reports in the literature of this type of survey are common; casual agents identified include bacteria, fungi, viruses, protozoa and nematodes. (2) The second type of survey is that done on a wide range of pests attacking specific crops. In Colombia pathogens were isolated from insects

collected from citruses, cotton, soybeans and cocoa. This type of study has also been done on certain crops in other countries.

Laboratory studies on the effectiveness of pathogens causing insect mortality are numerous. Extensive studies with B. thuringiensis are being conducted in most countries in the region. Results show that this bacteria will control a wide range of lepidopterous pests although S. frugiperda appears to be resistant.

The fungal pathogen M. anisopliae has received considerable attention in recent years. Several races of this pathogen are being tested for control of the spittle bug on forage grasses in both laboratory and field studies. Numerous races of the pathogen are now available and researchers report that several of these are very virulent. Additional problems with the effectiveness of Metarhizum is its adaptation to environmental factors and its formulation for field application. There appears to be no methodology for evaluating its effectiveness in the field, which has led to reluctance among workers to publish their results. Therefore, field results over the last several years have been inconsistent.

A microbial organism in which there has been increased interest in recent years and offers promise for control of lepidopterous and coleopterous pests of crops such as coconut palms, potatoes and soybeans is Beauveria bassiana. This fungal disease has been observed causing high mortality of certain pests, but there has been very limited commercial use thus far. Insects that this pathogen have been tested on include Nezara viridula and Diabrotica speciosa on soybeans, Premnotypes suturicallus on potatoes, Brassolis sophorae on coconut palms and Galleria mellonella.

Several other microorganisms are being studied under laboratory and/or field conditions. The fungal pathogen Cordyceps sp.has been found causing mortality of E. ello in Colombia. The bacterium Pseudomonas aeruginosa has been found to cause mortality of Alabama argillacea on cotton in Brazil. Entomophthora spp. is being studied in Chile on wheat, oats and barley. Natural epizootics of Entomophthora have been found in Chile; these maintain control of the pests in the field. In Mexico a species of Entomophthora (which is not E. coronata) has been identified for control of Prosapia sp. and Aeonolamia sp. This work is in the experimental stage.

Protozoa of the order Microsporidae are being studied for control of S. frugiperda in Brazil. The fungus Nomuraea rileyi has been studied for control of Anticarsia gemmatalis, Plusia sp. and Pseudoplusia includens on soybeans in Brazil. Natural field epizootics have been found maintaining control of the pests. The nematode Neoaplectana carpocapsae gave successful laboratory control of the tomato pinworm (Scrobipalpula absoluta) in Colombia.

The occurrence of virus diseases of insect pests has been reported from several countries, but there does not appear to be any on-going research programs in this area. A nuclear polyhedrosis virus was found to be pathogenic to the larvae of Heliothis zea and S. frugiperda in Puerto Rico. Laboratory studies in Colombia showed 100% control of S. frugiperda with a nuclear polyhedrosis virus. High mortality of Glena bisulca larvae was found to be caused in the field by a granulosis virus in Colombia. Control of Sibine fusca on African palm, was achieved in Colombia. A granulosis virus of the cassava hornworm has been observed in field colonies at CIAT.