22-068

BIOCONTROL OF ARTHROPOD PESTS IN EGGPLANT IN ITALY

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The arthropod pests of eggplant in Italy are approximately 10 species. In northern Italy, the Colorado potato beetle (CPB) *Leptinotarsa decemlineata* (Say) (Coleoptera Chrysomelidae) is the key pest. Before the registration of preparations based on *Bacillus thuringiensis* subps. *tenebrionis* (*B.t.t.*), trials were carried out on biocontrol using seasonal inoculative releases of *Edovum puttleri* Grissell (Hymenoptera Eulophidae) (EP). For several years we reared this egg parasitoid on CPB. Releases of EP pupae gave satisfactory control of CPB infestation in eggplant grown under plastic tunnels. Mass production of EP was not developed due to high labour cost for the CPB and EP rearings. Another reason was also the success of CPB control by means of *B.t.t.* Five cases involving others arthropod pests and biocontrol agents are listed. (1) Spidermite, *Tetranychus urticae* Koch (Acarina Tetranychidae) is usually controlled by only one release of *Phytoseiulus persimilis* Ath.Hnr. (Acarina Phytoseiidae). (2) Whiteflies are more dangerous in southern Italy; their control can be achieved by releasing the predator *Macrolophus caliginosus* Wagn. (Rhynchota Miridae) that attacks both *Trialeurodes vaporariorum* (Westw.) and *Bemisia* spp. (Rhynchota Aleyrodidae). Releases of the two parasitoids *Encarsia formosa* Gah. and *Eretmocerus mundus* Merc. (Hymenoptera Aphelinidae) can improve the efficiency of the predator used alone. (3) *Frankliniella occidentalis* (Perg.) (Thysanoptera Thripidae) and other thrips species control is conducted releasing *Orius laevigatus* (Fieb.) (Rhynchota Anthocoridae) as soon as the first thrips captures in blue sticky traps are made. (4) *Aphis gossypii* Glover, *Myzus persicae* (Sultz.), *Macrosiphum euphorbiae* (Thom.) (Rhynchota Aphididae), in relation to location and rate of infestation can be controlled, respectively, by releases of *Aphidius colemani* Viereck and/or *Lysiphlebus testaceipes* Cres. (Hymenoptera Aphidiidae), *Chrysoperla carnea* (Steph.) (Neuroptera Chrysopidae), and/or *Harmonia axyridis* Pallas (Coleoptera Coccinellidae). (5) *Liriomyza* spp. (Diptera Agromyzidae) are well controlled by releases of *Diglyphus isaea* (Walker) (Hymenoptera Eulophidae). In some areas, the implementation of biocontrol in eggplant will be particularly difficult due to the necessity of releasing many species of natural enemies. However, farmers can choose this strategy since all the biocontrol agents herein listed are sold in Italy by biofactories.

22-069

DEVELOPMENT AND USAGE OF SEQUENTIAL SAMPLING IN A BIOLOGICAL CONTROL INTENSIVE PEST MANAGEMENT PROGRAM

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Sequential sampling has been used in agricultural systems to rapidly estimate pest densities relative to the need for instituting control measures for many years. In the mid to late 1980's a biologicial control intensive pest management (BCIPM) program targeting the Colorado potato beetle (CPB) was implemented in New Jersey for eggplant. This program included releases of the egg parasitoid, Edovum puttlerii for the suppression of beetle populations; monitoring of fields; and recommendations for chemical sprays. Initially, CPB populations were monitored twice a week by determining the mean number of eggmasses, small larvae (1st and 2nd instars), large larvae (3rd and 4th instars) and adults found on 100 plants selected from within each field. Decisions were then made regarding parasitoid effectiveness and the need for insecticides. This type of time intensive monitoring program, however, limited the number of hectares that could be managed by the program. Due to this, two sequential sampling programs, one for eggmasses and a second for adult and larvae, were developed. The sampling program for adults and larvae utilizes a single economic threshold that accounts for differences in the consumption rates between life stages. The placement of larvae and adults on an equivalent basis accelerates monitoring by allowing the sampler to count individuals independent of life stage. Both sampling programs were field tested prior to release to the BCIPM program and have been used since 1992.

22-070

DEVELOPMENT AND IMPLEMENTATION OF A BIOLOGICAL CONTROL INTENSIVE PEST MANAGEMENT PROGRAM IN EGGPLANT

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The methods and techniques of implementing a biological control intensive pest management program in eggplant are discussed. The biology and behavior of Edovum puttleri a parasitoid of the Colorado potato beetle are presented as a major tool in preventing plant damage.

22-071

ERADICATION OF *CYDIA POMONELLA* (L.) FROM WESTERN AUSTRALIA

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Cydia pomonella (L.) is a worldwide pest of apples and pears. Japan and Western Australia are the only two major apple growing regions of the world free from the pest. In January 1993, *C. pomonella* was found at Bridgetown in the south-west of Western Australia and three months later further south at Albany. Following the first discovery, an eradication campaign was commenced based on a protocol developed through a consensus process during the early weeks of the campaign. The protocol, which needed only slight modification for the Albany eradication, had two aims: (1) local containment of the outbreaks and (2) surveillance of other fruit growing districts and urban areas to ensure the region was returned to its former codling moth free status, an important trade advantage.

The eradication campaign had four components: regulation, sanitation, pest monitoring and public education. Regulatory powers allowed the affected areas to be quarantined, restricted the movement of any fruit likely to be a host of the insect and allowed likely sources of infestation to be checked. Fruit, trees, and in some cases whole orchards, were removed and any material likely to harbour the pest burned and buried. A cover spray program was required on commercial orchards. Sex pheromone traps were used to monitor adults in the infested areas and a grid of traps was established elsewhere in the state to ensure the pest had not moved from the quarantined areas. The presence of larvae was monitored by examining trees, dissecting fruit and by trapping with trunk bands. An extensive public awareness campaign backed up the field operations.

By December 1995, *C. pomonella* had not been detected anywhere in Western Australia for two years and it was concluded that eradication was successful.