PEST CONTROL BY BIOLOGICAL AGENTS

R.P. JAYEWARDENE

Director-General, Natural Resources, Energy & Science Authority of Sri Lanka,
47/5, Maitland Place, Colombo 7, Sri Lanka

Rice and vegetable crops are the main products of agriculture from the small farms. To increase the productivity of these farms it is necessary to identify and control the losses. The overall national loss of the rice harvest is estimated to be about 20%. A further 10% loss occurs after the harvest. The losses in the vegetable crops are considerably higher. These losses are caused by diseases, insect pests, weeds and animals.

Chemical agents for the control of agricultural pests have been used for many years and have been fairly successful. The use of toxic chemicals throughout the country introduces a new hazard and danger to the human population. These chemicals are used as sprays or as systemic pesticides, the latter cannot be washed away as they are in the plant tissues and the danger of cumulative poisoning, over a period of time, is now recognised as a definite health hazard for persons who eat such vegetables. These toxic chemicals are also dangerous to the workers who use them and accidental poisoning is common when precautions are not taken.

Imported chemical pesticides are costly and an ever increasing continuous drain on foreign exchange, therefore any substitute which can save foreign exchange will be welcome. Chemical pesticides used in agriculture have created a new problem for the malaria control program. Mosquitoes which spread malaria have become resistant to chemical pesticides so that control becomes ineffective.

Because of these many disadvantages and dangers, alternative methods for pest control are being examined. The most promising of these appears to be biological control. This method attempts to use the natural enemies of pests to destroy them and thereby to control their numbers. Bacteria, viruses, fungi and insects are identified and their biological characteristics studied so that they can be produced in the laboratory in large numbers. These are released in the pest affected areas wherever necessary.

Research work in biological control in Sri Lanka is done at the Central Agricultural Research Institute, Gannoruwa, which collaborates with the Commonwealth Institute of Biological Control through its Indian laboratories in Bangalore. A consultant from this laboratory will soon visit Sri Lanka to work at the Gannoruwa Research Station. Advice and guidance from research workers in the region will be invaluable.

The first bacterial agent developed for bio-control was the Bacillus thuringiensis - H14, in 1967. Extensive field trials have been carried out for the control of vegetable crop pests.

Bio-control has been attempted to check the tea tortrix - Homona coffearia and the coconut caterpillar - Nephantis seneriopa. The coconut leaf - miner, Promecotheca cumingi, a recent introduction to Sri Lanka, caused widespread damage and was finally checked by biological control

employing the parasite the Dimmockia javanica.

The bio-control of the pests of rice and other vegetable crops has received little attention and provides a wide field and extensive scope for investigation. The cabbage pest - the Diamond Back Moth - though chemical control is extensively used, causes losses up to 80%. Natural enemies which parasitize the larva and pupa and a virus infection are now being studied as a control agent. Similarly attempts are being made to control the bean fly - a serious pest of legumes, the tomato fruit borer and the melon fly a pest of the bitter gourd and snake gourd. Losses are estimated as high as 50%. Chemical control of the pests is widely used with varying degrees of success. Bio-control has not been attempted though the known parasites from Sri Lanka have been introduced in Mauritius and Hawaii.

Biological control of the malaria and filaria mosquito is receiving World Health Organisation (WHO) funding. The Bacillus thuringiensis and sphaericus have been identified as successful larvicides and field trials are now being conducted in Thailand. Other predators of mosquito larvae such as fungi, nematodes and fish are under investigation. An alternative to chemicals is urgently necessary since the mosquito appears to develop resistance fairly rapidly. Research in biological control needs to be extended by providing more trained research staff and funds. A biological control laboratory within the Central Agricultural Research Institute when established should be able to do very useful work. Funds may be available through the USA-Sri Lanka Science Agreement.