DEVELOPMENT OF INTEGRATED PEST MANAGEMENT PACKAGE FOR CHILLI PESTS AND DISEASES

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Introduction

Plant viruses still pose a big threat to the production of fresh chillies in Malaysia. Chilli planting is practised widely throughout the country by the small farmers who adopt polyculture i.e. intercropping chilli with other economic crops. However, research on intercropping and its effect on the intensity of pest and disease attack is only beginning (Hussein, 1992; Hussein et al. 1999). Researchers are still gathering critical and important basic information on the vector behaviour, virus transmission, habitat modification and natural enemies to help build a sustainable pest management system (Hussein and Norani, 1995; Hussein et al. 1999; Salim and Hussein, 1994). Since biological control using coccinellid beetles as predators form the major component of chilli IPM, more attention has been given to the mass rearing of the predators. Hence, the objectives of this research project was to develop an efficient, cost-effective and environment-friendly biological control system with minimum or no input of chemical pesticides.

Materials and Methods

Dynamics of development phenology of chilli plants and aphid (vector) rate of infestation, natural enemy-pest interaction, viral infection diffusion formed the basis of formulation of IPM package. Replicated plot (10mx10m) trials were conducted to evaluate t he impact of intercropping and predators and to correlate vector abundance and predator numbers with virus spread and crop yields. The activities of predators in relation the prey distribution within a chilli plant were monitored and analysed. The importance of colonising and non-colonising vectors within and outside the crop fields was also ascertained. A field experiment testing the effectiveness of staggered planting of maize within a chilli crop was carried out with the aim of establishing an in-field reservoir of coccinellid beetles. A suitable system of mass-rearing coccinellids using natural and artificial diet was tested under laboratory are critically needed before farm trials and commercial production could be conducted.

Results and Discussion

The results revealed that aphid (vector) population in the chilli ecosystem peaked twice in the span of 18 months. The first peak in numbers of aphids found on the chilli plants was very much correlated with the most active growth of the plants with high concentration of vectors in the middle and upper portion of the canopy. The coccinellid population increases following the increase in aphid numbers. There is evidence that the adult coccinellids were more active in the shoot region while the larval predators concentrate on the middle region of the canopy. There were other arthropod predators found on the chilli plants like lacewings, ants and spiders. Intercropping chilli with groundnut will carry a greater risk of the spread of chilli viruses by groundnut aphid (vector) which colonise chilli plants while making brief probes without colonising chilli plants. Coccinellid populations on maize plants (during antithesis) acted as reservoirs of predators. The continuos presence of flowering maize planted with chilli was achieved by planting maize on one-third of the crop at 2 weeks intervals. This has resulted in stabilising the coccinellid numbers and maintained longer suppression of vectors. Whenever this strategy is not permissible, mass releases of coccinellids will be employed. To mass rear coccinellids, a factory-like mass culturing of aphids and coccinellid was developed either using natural or artificial diets. Tests are now being conducted under large-field and glasshouse conditions to evaluate the effectiveness of coccinellids in chilli IPM.

Conclusions

Biological control using coccinellid beetles can be practically packaged together with intercropping in the chilli IPM system. Conserving the natural coccinellid population by planting maize with chilli to create field reservoirs of predators has been successfully demonstrated. Mass production of coccinellid beetles is a sure method of packaging biological, cultural and other non-chemical components of chilli IPM.

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