MPhil Thesis Abstrct

IImpacts of climatic parameters and crop management practices on induction of host plant resistance and population dynamics of beneficial insects towards management of iral diseases of chilli and tomato

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ABSTRACT

A study was conducted to determine the effects of climatic parameters and different crop management practices on induction of host plant resistance and population of beneficial insects towards management of viral diseases in chilli and tomato crops. Chilli (*Capsicum annuum* L.) variety MI Green and tomato (*Solanum lycopersicum* L.) variety Thilina were grown at five different locations of Sri Lanka, namely Kilinochchi, Mahailluppallama, Kundasale, Peradeniya and Rahangala under two crop management systems *viz.* pesticide-based management system and an IPM-based management system with less reliance on pesticides, during *maha* 2012/2013 and *yala* 2013 seasons. At each location, two crop management systems were tested in a nested treatment structure using a randomized complete block design with six replicates. Activity of defense enzymes, namely peroxidase, β-1,3-glucanase, chitinase, phenylalanine ammonia lyase and polyphenol oxidase was quantified spectrophotometrically in field grown chilli and tomato tissues collected at the first harvesting stage of the crops. Incidence of different types of virus diseases of tomato and leaf curl virus disease incidence of chilli were recorded over four crop growth stages, namely initial, crop development, midseason and late season. Abundance of different types of beneficial insects and herbivorous insects was quantified over the four different growth stages of two crops. Data on mean day temperature and daily rainfall were collected from each experimental site during the two cropping seasons. Relationships among virus disease incidence, defense enzymes activities of crops, population of beneficial insects and insect herbivores and climatic parameters were also analyzed. Findings of the study revealed that activity of all the defense enzymes in chilli and tomato tissues had a significant influence ($p<0.05$) by the cropping season, location, cropping season x location interaction effect, location x crop management practice interaction effect and cropping season x location x crop management system interaction effect. In general, there was no significant variation ($p=0.05$) between the two crop management systems on the activity of the enzymes in chilli and tomato tissues. It indicates the equal efficiency of both crop management systems on inducing the activity of enzymes in both types of crop tissues. There was no significant relationship ($p=0.05$) of virus disease incidence of the two crops with mean temperature of location or total rainfall of location. The beneficial insect population was significantly higher ($p<0.05$) in the two crops grown under IPM system than that under the pesticide management system. Moreover, the effect of management system on beneficial insect population was significantly influenced ($p<0.05$) by the location effect. A significant polynomial relationship ($p<0.05$) was observed between beneficial insect population and the mean temperature of location for both crops. No significant relationship ($p=0.05$) was found between the beneficial insect population and virus disease incidences of the two crops. Combined effect of virus disease incidence and herbivorous insect count had a significantly high influence ($p<0.05$) on the activity of defense enzymes in the two crop tissues. The IPM-based management system had lower environmental impact of pesticides compared to the pesticide-based management system used for both crops. Hence, it can be concluded that the IPM package tested in the study is as equally-capable as the pesticide-based management system in inducing defense-related enzymes in the plant tissues towards the management of virus diseases in chilli and tomato crops.