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DETECTION OF CHILLI LEAF CURL SRI LANKA VIRUS IN CHILLI PLANTS SHOWING DIFFERENT VIRUS LIKE SYMPTOMS AND IN ALTERNATIVE WEED HOSTS *

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INTRODUCTION

Chilli (*Capsicum annuum* L.), (family: Solanaceae) is a commonly grown spice crop in Sri Lanka. Chilli is grown in diversed climatic regions during both *Maha* and *Yala* seasons. Average dry chilli yield in Sri Lanka is 1.0 t/ ha though the potential yield is 3 t/ ha. Low yield of chilli is mainly due to abiotic and biotic stresses (Weerarathne and Yapa, 2002). Leaf curl disease of chilli (LCDC) is the most damaging disease reported from all the chilli growing areas in Sri Lanka and it causes a serious yield losses (Rajapakse *et al.*, 2003). Most popular chilli varieties recommended for cultivation are MI-1, MI-2, KA-2, Arunalu and MI- Hot and all these chilli varieties have been found to be susceptible to leaf curl disease of chilli (Senanayake *et al.*, 2014). Association of begomoviruses with chilli leaf curl symptoms has been confirmed (Senanayake, 2006). Major reasons for LCDC are thrips and mite attacks and involvement of viruses transmitted by whitefly (*Bemisia tabaci* Genn, family: Aleyrodidae) Chilli leaf curl Sri Lanka virus (a begomovirus) has recently been reported in association with LCDC in Sri Lanka. In this study, the possible association of Chilli leaf curl Sri Lanka virus with seven different symptom types in chilli plants and 18 commonly growing weeds were tested using Chilli leaf curl Sri Lanka virus specific primers (Senanayake *et al.*, 2014) in Polymerase Chain Reaction (PCR).

MATERIALS AND METHODS

Chilli leaf curl associated symptoms were observed in chilli fields of the Field Crops Research and Development Institute (FCRDI), Mahailluppallama

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during 2014/15 *Maha* and chilli plants with conspicuous different symptoms were selected. Tender leaf samples were collected from those plants separately as composite samples. DNA was isolated from 100 mg of leaf samples using CTAB method (Ausubel *et al.*, 1987). Next 18 weeds commonly found in and around chilli fields, which were showing leaf curling associated symptoms and which were not showing any symptom were selected. Presence and absence of symptoms were recorded from them and DNA isolation was done from younger leaf samples of those weeds as above. Polymerase chain reaction (PCR) was performed using Chilli leaf curl Sri Lanka virus specific primers, JS 35F; TGCCAGAGCGGCATCAGCGG, JS 36R; GTCCCCATTGTCCCCCATTCC (Senanayake *et al.*, 2013) for both chilli and weed DNA. The amplified products were run on 1% Agarose gel.

RESULTS AND DISCUSSION

The primers used in the study are based on the DNA- A of a monopartite begomovirus and are capable of detecting the presence of Chilli leaf curl Sri Lanka virus in plant samples. In this study, except three samples, which showed the symptoms; a) Reduced leaf size in younger leaves and boat shaped leaves with bushy appearance (symptom group 2), b). Margins rolled upwards, necrosis at tip and reduced leaf size (symptom group 4), and c). Mild puckering (symptom group 5), all the others samples showed positive reaction in PCR with Chilli leaf curl Sri Lanka virus specific primers giving the correct amplicon size (501 bp). It confirms the presence of Chilli leaf curl Sri Lanka virus in those samples. The sample with reduced leaf size in younger leaves and boat shaped leaves with bushy appearance (symptom group 2) did not show any amplification with the specific primers. The samples with Margins rolled upwards, necrosis at tip and reduced leaf size (symptom group 4) and Mild puckering (symptom group 5) showed PCR band sizes in PCR, which were different from expected band size. These results may be due to the presence of a different virus or a variation in the viral genome.

The PCR reaction with Chilli leaf curl Sri Lanka virus specific primers to common weeds showed that nine weeds, out of 18 tested, were positive to Chilli leaf curl Sri Lanka virus The positive weeds were Pitusudupala (*Boerhavia diffusa* of family Nyctaginaceae), Gandapana (*Lantana camara* of family Verbenaceae), Maduruthala (*Ocimum tenuiflorum* of family Ocimum), Wathupalu (*Mikania micrantha* of family Asteraceae), Balunaguta (*Stachytarpheta indica* of family

Verbinaceae), Wal Aba (*Cleome viscosa* of family Capparidaceae), Wal rubber (*Euphorbia heterophylla* of family Euphorbiraceae), Walkoththamalli (*Scoparia dulcis* of family Scrophulariaceae) and Pethithora (*Cassia tora* of family Fabaceae).

In this study the association of Chilli leaf curl Sri Lanka virus with different symptoms was confirmed through molecular tools. However, presence of other begomoviruses in association with tested chilli samples is also possible. Information on the association of the virus with different symptoms is useful to identify the viral involvement in LCDC and to apply management practices in controlling LCDC. Most of these weeds that do not show leaf curl or related symptoms may act as hidden carriers. The results of this study show that plants belong to different families can harbor Chilli leaf curl Sri Lanka virus. Chilli leaf curl Sri Lanka virus is a monopartite begomovirus and transmitted by the whitefly (*Bemisia tabaci* Genn.; Senanayake *et al.*, 2013). All the weeds, which showed the positive reaction to Chilli leaf curl virus specific primers in this study in Sri Lanka, have been reported to harbour other known begomoviruses in other countries.

CONCLUSIONS

In this study it was able to confirm the presence of Chilli leaf curl Sri Lanka virus with different symptoms in chilli plants and this information is valuable for disease management. This is the first study in Sri Lanka that determined a number of hosts for a begomovirus using molecular tools. In this study the presence of Chilli leaf curl Sri Lanka virus was reported from nine weeds belonging to different families, Pitasudupala (*Boerhavia diffusa* of family Nyctaginaceae), Gandapana (*Lantana camara* of family Verbenaceae), Maduruthala (*Ocimum tenuiflorum* of family Ocimum), Wathupalu (*Mikania micrantha* of family Asteraceae), Balunaguta (*Stachytarpheta indica* of family Verbinaceae), Wal Aba (*Cleome viscosa* of family Capparidaceae), Wal rubber (*Euphorbia heterophylla* of family Euphorbiraceae), Walkoththamalli (*Scoparia dulcis* of family Scrophulariaceae) and Pethithora (*Cassia tora* of family Fabaceae). This information can be used to reduce the leaf curl disease incidence in chilli cultivation in Sri Lanka through efficient management of alternative weed hosts of the virus.

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