



Short Communication

Identification and distribution of aphid vectors spreading Citrus tristeza virus in Darjeeling hills and Dooars of India



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ABSTRACT

Darjeeling hills and Dooars of West Bengal (India) are well known for production of mandarin orange and lime. *Citrus tristeza virus* (CTV) is wide spread in this region. Role of insect vectors in spreading CTV in this region has not been studied so far. Therefore, a study on identification of insect vectors along with their temporal and spatial distribution was undertaken. Five aphid species were identified from citrus orchards of Darjeeling and Dooars viz. *Toxoptera citricida*, *T. aurantii*, *Aphis gossypii*, *Myzus persicae* and *Brachycaudus helichrysi*. *T. citricida* was found predominant in the orchards of lower altitude and was responsible for maximum spread of CTV. *T. aurantii* was dominant in the citrus orchards at high altitude (>500 m). Incidence of CTV was higher in the orchards where *T. citricida* was present either alone or with other species. Under caged conditions, *T. citricida* was more efficient to transmit CTV than the other aphid species. Occurrences of all aphid species were highly influenced by the advent of new flushes.

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Introduction

Citrus is cultivated in almost every state of India despite the diversity of soil, climate and topography (Chenulu and Ahlawat, 1993). Total area under citrus in India is 0.62 million hectare producing 4.79 million tonnes (Jagtap et al., 2013). The Darjeeling hill in India is well known for production of mandarin orange with a yearly production over 36.45 thousand tonnes from 3.7 thousand hectare area (Chattopadhyay and Roy, 2011). The foothills of Darjeeling and the floodplains popularly known as 'Dooars', comprise the major producing area of kagzi (*Citrus aurantifolia*) and Assamese lime (*Citrus assamensis*). Citrus is reported to be the host of several aphid species (Barbagallo, 1966; Blackman et al., 1984; Komazaki, 1981; NietNafria et al., 1984; Viggiani, 1988; Yokomi et al., 1992). Globally nineteen aphid species have been recorded to harbour citrus plants so far (Blackman and Eastop 2000) having regional variation in composition and occurrence. In India, ten aphid species colonize on citrus (Chakrabarti and Sarkar, 2001; Raychaudhuri et al., 1983). Only five of these viz. *Toxoptera citricida*, *Toxoptera aurantii*, *Aphis gossypii*, *Aphis spiraeicola* and *Myzus persicae* are important having ability to transmit different strains of citrus tristeza virus (CTV) in a semi-persistent manner (Ahlawat and Raychaudhuri, 1988; Costa and Grant, 1951; Norman and Grant, 1956; Sasaki, 1974; Varma et al.,

1960). CTV is now widespread in this region causing severe loss in production (Ghosh et al., 2014; Mukhopadhyay et al., 1986). Earlier studies on CTV from this region were focused on molecular diagnosis of CTV, host resistance, sequencing of the complete genome, characterisation of isolate and distribution of CTV (Biswas, 2008; Biswas et al., 2012; Ghosh et al., 2014a,b). There were no evidence on the identity, spatial distribution and temporal occurrence of the vector responsible for spread of CTV in this region. The present study was undertaken to identify the vector species co-existing with CTV along with their temporal occurrence and distribution in citrus orchards of Darjeeling hills and Dooars.

Methodology

Collection of aphids and plant samples

Extensive survey was conducted in citrus orchards of Darjeeling hills and Dooars region during 2012–2014. Samples were collected during late winter to spring (February–March) and late summer to early rainy season (June–July) when new flushes of citrus appeared. Place of sampling, altitude, citrus species, time of collections are mentioned in Table 1. Bark and mid-rib parts from representative citrus plants were sampled randomly from each orchard. Samples packed in plastic bags, were taken into the laboratory and processed immediately. Aphids were collected from randomly selected citrus plants of each orchard and carried to laboratory in glass vials for further study.

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