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The First Record of *Aceria sacchari* Wangon, an Eriophyoid Mite, in Sugarcane Plantations in Sri Lanka

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Abstract- Some warty patches slightly raised from the surface of the leaf sheath of some sugarcane plants in a sugarcane field at Sevanagala (6° 36' N, 80° 87' E), Sri Lanka, were observed during a field inspection in July 2016. These patches were irregular in shape and watery in appearance initially. Later, they become dry and reddish to dark red in colour. Microscopic examination on the damaged leaf sheaths showed large a population of minute mite. This study was conducted from July to September 2016 to identify this mite species and to investigate its damage symptoms and the occurrence in all sugarcane-growing areas in Sri Lanka. Two hundred specimens of the mite were sent to Embrapa Recursos Geneticos e Biotenologia, Brazil, for identification. Fifty mite-infested plants from each age category, <5 months and >5 months, were inspected to study the damage symptoms and fifty randomly selected plants from each age group were inspected to record the damage incidence in the plantations in each sugarcane-growing site; Uda Walawe, Sevanagala, Pelwatte, Hingurana, Ethimale and Kantale. The specimens were identified as Sugarcane Blister Mite, *Aceria sacchari* Wang, 1964 (Acari: Trombidiformes: Eriophyidae). This is the first record of this mite on sugarcane in Sri Lanka. This mite has distributed in all sugarcane-growing areas in the country with different infestation levels. During the study period, the highest damage incidence on both age groups was recorded at Pelwatte while the lowest was at Hingurana.

Index Terms- *Aceria sacchari*, Eriophyoid Mite, Sugarcane Blister Mite, Sri Lanka

I. INTRODUCTION

Sugarcane is attacked by a variety of mites belonged to the Tetranychidae, Tarsonemidae and Eriophyoidea families. Most of these mites are considered as minor pests (Ozman-Sullivan *et al.*, 2006). Among them, researchers have given high priority to the family Eriophyoidea, a superfamily of [herbivorous mites](#), because it includes the smallest known species of mites and their damage is often attributed to other problems such as disease or malnutrition. The Eriophyoids are among the most diverse and economically important group of phytophagous mites. They are the highly-adapted plant-feeding mites living extremely intimate association with their host plants (Petanovic and Vidovic, 2009). They are among the smallest

arthropods in the world, and this is the key to their ecological success (Sabelis and Bruin, 1996).

So far, nine species of Eriophyoidea mites have been reported on sugarcane, namely *Abacarus delhiensis*, *Abacarus queenslandiensis*, *Abacarus doctus*, *Abacarus sacchari*, *Aceria sacchari*, *Aceria merwei*, *Cathetacarus spontanea*, *Catarhinus sacchari* and *Diptacus sacchari* (Ozman-Sullivan *et al.*, 2006; Navia *et al.*, 2011). *Abacarus doctus* is the only sugarcane-associated eriophyoid mite in Costa Rica (Navia *et al.*, 2011) and El Salvador (Guzzo *et al.*, 2014), causing clear symptoms of reddish or bronzed spots on the inner leaf surface, which is similar to those caused by rust fungi. Among them, the leaf vagrant, *Aceria sacchari* causes occasional chlorotic blotches on the leaves, which is symptomatically similar to the damage caused by thrips or some fungi. It is a potential vector of plant viruses, but the transmission mechanism has not been proven (Ozman-Sullivan *et al.*, 2006). It has been assumed as a possible vector of sugarcane streak virus (ChannaBasavanna, 1996).

After establishment of the commercial sugarcane cultivations in Sri Lanka in the early 1960s, only one species of sugarcane leaf mite of the family Tetranychidae (sugarcane yellow mite; *Oligonychus sacchari*) has been reported. They live and feed on the underside of leaves forming fine webs, in which eggs are laid and young nymphs develop. The affected leaves become discoloured and severe damage can result in dying leaves. A severe infestation of a mite species was observed on the variety SL 96 128 in 2012 and 2013 in the seedcane nurseries of the Lanka Sugar Company (Pvt) Ltd. Pelwatte, Sri Lanka. It was successfully controlled by the dominant biological control agent; *Stethorus* sp. (Coleoptera: Coccinellidae).

A hitherto unknown mite species living in distinct colonies on the inner surface of leaf sheaths of sugarcane was observed in July 2016 in sugarcane cultivations at Sevanagala (6° 36' N, 80° 87'E) in the dry zone, during a pest survey conducted by the Sugarcane Research Institute (SRI), Sri Lanka. Studies were conducted to identify this mite species and to investigate its damage symptoms and the occurrence in all sugarcane-growing areas in Sri Lanka from July to September 2016.

II. MATERIALS AND METHODS

Identification of the Mite Species

Two hundred specimens of the mite species were collected from infested leaf sheaths of sugarcane in the Research Farm of the Sugarcane Research Institute at Uda Walawe ($6^{\circ} 27'N$, $80^{\circ} 52'E$), Sri Lanka. The alcohol preserved specimens were dispatched to Dr. Denise Navia, Embrapa Recursos Geneticos e Biotecnologia, Brazil, for identification. The specimens were then slide-mounted in modified Berlese medium using a dissecting stereomicroscope and identified using a combined phase-contrast and differential interference contrast microscope (Nikon Eclipse 80i, Nikon, Tokyo, Japan).

Study on Damage Symptoms

Fifty mite-infested sugarcane plants from each age category, <5 months and >5 months, in the Research Farm at Uda Walawe, commercial sugarcane plantations at Sevanagala ($6^{\circ} 36' N$, $80^{\circ} 87'E$), Pelwatta ($6^{\circ} 45'N$, $81^{\circ} 14'E$) and Hingurana ($7^{\circ} 13'N$, $81^{\circ} 39'E$) and seed cane nurseries at Ethimale ($6^{\circ} 77'N$, $81^{\circ} 49'E$) and Kantale ($8^{\circ} 22'N$, $81^{\circ} 1'E$) were inspected and the damage symptoms were observed. Also digital photographs were taken and sent to Embrapa Recursos Geneticos e Biotecnologia, Brazil, for identification.

Incidence of the Mite Species in Sri Lankan Sugarcane-growing Areas

Field surveys were conducted in the research farm at Uda Walawe, commercial sugarcane plantations at Sevanagala, Pelwatta and Hingurana and seed cane nurseries at Ethimale and Kantale to study the damage incidence of the pest. From each location, 50 plants from the each age category (<5 months and >5 months) were randomly selected to record the damage incidence of the mite species by inspecting all the leaf sheaths. The percentage damage incidences in all the locations were estimated.

III. RESULTS AND DISCUSSION

Identification of the Mite Species

The mite species was identified as *Aceria sacchari* Wang, 1964 (Acari: Eriophyidae). This is the first report of *A. sacchari* from sugarcane in Sri Lanka. This species is commonly known as sugarcane blister mite, and it has been reported from India (Muthukrishnan, 1956), Indonesia, Java (Van Hall, 1923), Taiwan (Wang, 1964) and Queensland, Australia (Box, 1953). It is an interesting species having two female forms, one with slender body and 6-rayed feather claws and the other with thicker body and 7-rayed feather claws. The two forms are identical in all other features, such as shield design and setal pattern (Channa Basavanna, 1996). Also it has prodorsal shield with nearly complete median, admedian and submedian lines, lateral shield with granules, opisthosomal seta *e* (second ventral seta) much longer than seta *f* (third ventral seta) and empodium 6-7 rayed feather claws (Ozman-Sullivan *et al*; 2006).

Study on Damage Symptoms

The mite *A. sacchari* lives in distinct colonies on the inner surface of leaf sheaths. The infested areas can be seen as warty patches slightly raised from the surface (Blister) of the leaves. These patches are irregular in shape and watery in appearance initially. Later, they turn into reddish to dark red in colour and become dry (Figure 1, A and B). The feeding of *A. sacchari*

causes large spots with 1-2 cm diameter on both sides of sheaths. Hypertrophied spherical leaf blisters contain mite populations (Wang, 1964; Channa Basavanna, 1966; Jepson *et al.*, 1975).

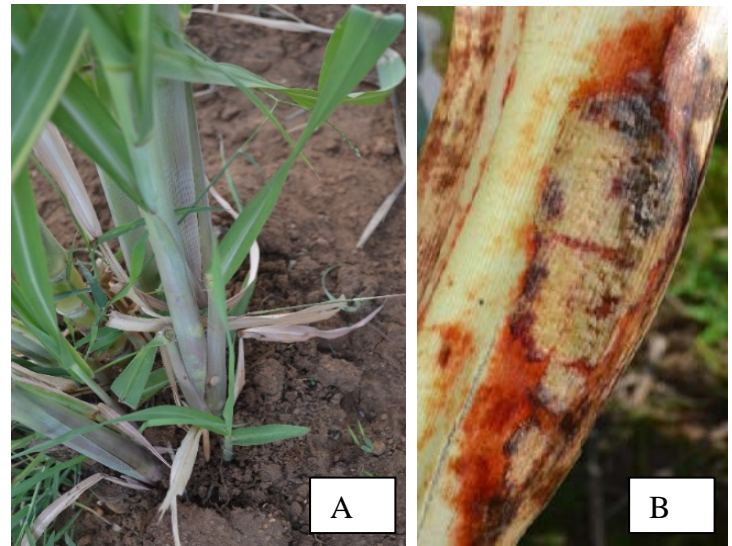


Figure 1: A-External appearance (warty patches) on sugarcane leaf sheaths infested by *A. sacchari*; B-Internal appearance of an infested leaf sheath

Most of the young (1-3 months old) sugarcane plants having “Dead Heart” symptom without the damages of sugarcane shoot borers; *Sesamia inferans* (Lepidoptera: Noctuidae) and *Chilo sacchariphagus* (Lepidoptera: Crambidae) were found to be infested with *A. sacchari*. It may be due to the infestation of the *A. sacchari* because the damage on the leaf sheath due to sugarcane blister mite can predispose to the infection of the damage site by saprophytic fungi such as *Gleosporium* sp., *Fusarium* sp. and *Alternaria* sp. (Muthukrishnan, 1956).

Incidence of the Mite Species in Sugarcane-growing Areas

Infestations of *A. sacchari* were observed in all the inspected sugarcane fields at Uda Walawe, Sevanagala, Pelwatta, Hingurana, Ethimale and Kantale. The highest percentage damage incidences for each age category were recorded at Pelwatta (99% at <5 months age and 98% at >5 months age) the lowest was at Hingurana (79% at <5 months and 81% at >5 months old crop). It indicated that *A. sacchari* has spread into almost all sugarcane-growing areas in the country with different infestation levels.

IV. FUTURE PROSPECTIVES

Identification of the morphological, biochemical and physiological characters of susceptible and tolerant/resistant varieties are important for developing tolerant/resistant varieties. It is also necessary to identify potential biological control agents against *A. sacchari* and to study their bio-ecology to establish a successful biological control programme. Predatory mites with flat idiosoma such as *Neoseiulus paspalivorus* which have been reported to be associated with plants in the Graminae family

would hold some promise. Eriophyoid mites are easily overlooked and can be disseminated through propagation material (Navia *et al*, 2011). Therefore, it is very important that the sugarcane germplasm exchanged in the form of stalk pieces among the countries should be free of eriophyoid mites to avoid the dissemination of *A. sacchari* to other countries

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