

RAPID COMMUNICATION

First report of yellow sugarcane aphid *Sipha flava* Forbes (Homoptera: Aphididae) in Tanzania

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Abstract

The yellow sugarcane aphid (YSA), *Sipha flava* Forbes (Homoptera: Aphididae) is an invasive insect pest of many graminaceous plants which include cultivated crops, like sorghum, sugarcane, rice, maize and several species within non-cultivated genera e.g. *Digitaria*, *Panicum*, *Paspalum*, and *Pennisetum*. A survey conducted in the Kagera region indicated an infestation by YSA in nine sugarcane varieties grown. This pest causes damage to leaves leading to yellow, purple and red discoloration. This is the first report of YSA infestation in the Tanzanian sugarcane industry. Efforts to develop control measures are still in progress.

Keywords: graminaceous plants, *Sipha flava*, sugarcane, yellow sugarcane aphid

Introduction

The yellow sugarcane aphid (YSA), *Sipha flava* Forbes (Homoptera: Aphididae) is native to North America, and occurs in temperate and subtropical regions (Wilson 2019). Its presence on African sugarcane was reported in Morocco in November 2006 (Adbelmajid 2008). It was then recorded in southern Africa in May 2013 (South Africa) and subsequently in Swaziland, Zimbabwe, Malawi and Zambia (Way *et al.* 2015).

Hosts of yellow sugarcane aphid include cultivated cereal crops, like sorghum (*Sorghum bicolor*), rice (*Oryza sativa*), wheat (*Triticum aestivum*) and non-crop members of the same genera as well as plants in the genera *Digitaria*, *Panicum*, *Paspalum*, and *Pennisetum* (Blackman and Eastop 1984).

Yellow sugarcane aphid is readily distinguished from the common sugarcane aphid (*Melanaphis sacchari*) by longitudinal rows of stout, erect bristles, which are a bit stouter than the others (Nuessly 2019). The legs are conspicuously hairy, and the ventral segments are also covered with short hairs. The aphid is generally pale-yellow, with a darker

mesothorax and metathorax, verging upon brownish orange (Blackman and Eastop 1984). *Sipha flava* is highly responsive to environmental change due to its short generation time, high reproductive rates and efficient dispersal mechanisms (Way *et al.* 2015). Its lifecycle takes approximately 8–15 days to complete (Akbar *et al.* 2010) at a temperature range of 16–29°C (Hinson 2017). *Sipha flava* feeds on the underside of leaves causing a yellow to red or purple discoloration of tissues which leads to leaf chlorosis and senescence (Nuessly *et al.* 2010).

There was no documented information regarding the existence of YSA in Tanzania prior to this study. Therefore, this study reports for the first time the invasion of YSA in the sugarcane industry in Tanzania.

Materials and Methods

A survey was conducted on Kagera Sugar Limited (KSL) estate fields located in the Kagera region in

August 2016 once, after one KSL agronomist reported a suspect YSA infestation in one of the sugarcane fields. Kagera region is located at Lake Zone, Tanzania at latitude 2°09'54.72" S and longitude 31°34'41.16" E.

Assessment of YSA infestation in sugarcane fields

Eighteen sugarcane fields (of 4–13 ha) with 1–6 months old sugarcane were surveyed for assessment of YSA infestation. The assessment technique was according to the methodology of Thomas *et al.* (2018) with some modification. Modification involved the estimation of YSA infestations per sampling unit (25 m) instead of estimating it per leaves on a stalk. Nine sugarcane varieties, were assessed: R570, R579, Co617, N41, N25, N49, N47, MN1 and N19. Two fields of each variety (18 fields) were assessed. Sampling units (of 25 m each) from each field for assessment of YSA infestation were obtained by dividing the total number of hectares of a particular field by two. In every field, sampling units were measured in a double row of sugarcane plants sampled at random. One row contained about 50 sugarcane stools, therefore, a total of 100 stools was inspected in every unit. One person inspected each row by carefully observing both the above and below parts of each leaf in a stool. Each sugarcane stool was inspected carefully in every row for the presence of YSA. The % of YSA infestation was calculated using the formula:

$$\text{Infestation} = \frac{\text{Number of infested stools}}{\text{Total number of stools}} \times 100 [\%].$$

Since the total number of stools in a sampling unit was 100, any stool infested with YSA was counted as 1% infestation (Blackman and Eastop 1984). Yellow sugarcane aphid samples were collected and sent to

TARI-Kibaha entomology laboratory for identification. Identification was done according to Blackman and Eastop's (1984) identification guide. Specimens were also sent to the International Centre of Insect Physiology and Ecology (ICIPE), Nairobi Kenya for molecular identification. Cytochrome oxidase-I (COI) gene-based taxonomic analysis to match the deoxyribonucleic acid (DNA) profile with records in Genbank and Barcode of Life Data Systems (BOLD) were performed and confirmed as *S. flava* with accession number A0A2S2R0D1.

Results and Discussion

Effects of YSA in different sugarcane varieties

The results of YSA infestation assessment indicated that, sugarcane varieties R570, R579, Co617, N41, N25, N49, N47, MN1 and N19 were all infested with YSA. The highest YSA infestations and those above the threshold level of 20% were recorded in MN1, N47 and N19 sugarcane varieties. The least infestation was recorded in varieties R570, Co617, N41, N25, N49 and R579 (Fig. 1). This study reports for the first time the occurrence of YSA in the Tanzanian sugar industry. Previous studies in African countries (Adbelmajid 2008; Way *et al.* 2013) did not report YSA infestations in Tanzania. This indicates that the spreading rate of this pest to African countries might have increased over the years.

Since the invasion by YSA in the Tanzanian sugar industry in 2016, efforts are still being made to develop management tactics. Nevertheless, the use of YSA resistant varieties, chemical, and biological control strategies have been reported to be effective against this pest elsewhere.

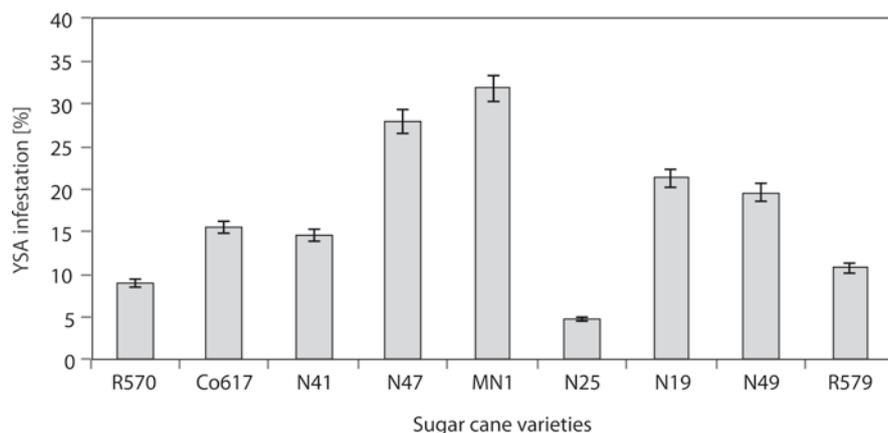


Fig. 1. Yellow sugarcane aphid (YSA) infestation on Kagera Sugar Limited estate fields in different sugarcane varieties

Conclusions

Regular field scouting is recommended and appropriate control measures need to be taken as YSA infestation reaches economic threshold. Since this insect pest is newly recorded in the Tanzanian sugar industry, efforts to develop management strategies for tackling the problem are on-going.

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