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The occurrence of sugarcane yellow aphid (Siphaflava (Homoptera: Aphididae),in Kakamega North Sub-County, Kenya

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Abstract: *The outbreak of sugarcane yellow aphid (Siphaflava (Homoptera: Aphididae) in Kenya was first reported in the Transmara and South Nyanza sugar zones in 2016. The pest has subsequentlybeenobserved in the major sugar producing counties in Western Kenya. Serious concerns emerged in the 2018 and 2019 crop seasons when several sugarcane farms in Kakamega County began withering following attack by the pest. A surveillance survey was necessary to ascertain the areas affected in Kakamega North sub county that hosts two leading private sugar millers. Surveys conducted over 6 months revealed that variety CO 421 predominantly grown in the factory zones was severely affected. Plant and ratoon cane crop aged 3-8 months was severely attacked. A prolonged dry spell in the region worsened the pest attacks.The aphids were observed in dense colonies on the lower leaf surface of the sugarcane. Use of pyrethrin lambda-cyhalothrin 17.5 g/L (Duduthrin 1,75EC) at 0.5 lt. in 200-300 L water was recommended as a short term measure with good control of the pest The crop on some farms recovered at late onset of the 2019 rainy season.*

Key words: *sugarcane yellow aphid, sugarcane, vector, insecticides*

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I. Introduction

Sugarcane yellow aphid (Siphaflava) is native to the temperate and subtropical regions of North America, and has been recorded in Central and South America, and in the Hawaiian and Caribbean Islands (Reagan, 1994). Abdelmajid (2008) recorded its first African presence in Morocco in 2006. The pathway and mode of entry (single or multiple) of into Morocco, and more recently into South Africa, Swaziland and Zimbabwe is unknown (Conlong and Way, 2014a). Occurrence of the pest on sugarcane in Kenya was first reported in 2016 and is currently spread in all the factory zones (SRI, 2018).

Aphids are insect pests of economic importance on several crops worldwide. Their primary importance is as vectors of virus diseases and high infestations of these pests can result in substantial losses (Munywa, 2007). The yellow sugarcane aphid, *Siphaflava* causes damage to sorghum, sugarcane, rice, wheat and several species of pasture grass (Conlong and Way, 2014b).

II. Biology And Description

Siphaflava reproduces without mating (i.e. parthenogenetically) in warm climates and produce live young. Females mate with wingless males in areas with cold winters. Nymphs go through four instars before molting directly into the adult stage (i.e., no pupal stage). Development from nymph to reproducing adult takes about 8 days on S. bicolor but 18 to 22 days on sugarcane. Females produce one to five nymphs per day for about 22 days on average on Sorghum bicolor and sugarcane (Hentz and Nuessly, 2004). Wingless yellow sugarcane aphid adults and nymphs are straw to bright yellow to light green in colour with two double rows of dusky coloured spots down the top of the abdomen. Rows of spots are also present along the lateral margins of the abdomen. Yellow sugarcane aphids are yellow on sugarcane. S. flava is covered with short, stiff hairs. The cornicles (siphunculi) are reduced to slightly elevated pores (Hentz and Nuessly, 2004). It is not uncommon to find *Melanaphissacchari* ('white sugarcane aphid') in small populations dispersed among *S. flava* on sugarcane leaves.

Damage To Sugarcane

The aphids prefer to feed by sucking on the lower surfaces of leaves, lining up along the parallel leaf veins of their grass hosts. Nuessly and Hentz (2002a) report that prolonged feeding can result in premature leaf senescence and stalk death. In Florida (USA), where *S. flava*is a major pest of economic importance, when two leaves are damaged due to aphid feeding when the crop is three months old, there may be a 6% drop in final

yield. Leaf chlorosis and death of three pairs or more of active growing leaves can result in 19% yield loss (Reagan, 1994). According to Hall (2001) yield reduction and reduced tillering are usually caused by feeding damage to early plant growth stages; however, late season crops may also suffer yield loss.

Feeding initially results in yellowing and reddening of leaves, depending on host plant and temperature. Prolonged feeding can lead to premature senescence of leaves and plant or stalk (sugarcane) death. *S. flava* tolerates dense populations on the leaves and usually begin to move to other leaves only after the host leaf has become mostly yellow and begun to die. Honeydew produced by the feeding aphids collects on lower leaves and supports growth of sooty mold fungi (Nuessly and Hentz MG. 2002a)

Yield reductions usually occur due to feeding damage to early plant growth stages, including reduced tillering (Hall 2001). Many sugarcane cultivars frequently have six to eight leaves below the terminal leaves. Yield can be reduced by 6% following the *S. flava*-induced death of as few as two of those leaves within the first three months of growth (Nuessly and Hentz 2002a). Chlorosis and death of three pairs of those leaves due to aphid feeding can result in 19% yield loss. Yellow sugarcane aphid also transmits sugarcane mosaic potyvirus (Blackman and Eastop 2000).

Survey Methodology

The survey targeted three out seven divisions in Kakamega North sub-county. They lie in the larger Kakamega county which is the industry leader in area under cane at 44,500 Ha. (Figure 1). Pest infestation was very severe in Chemuche, Shirugu-Mugai and South Kabras wards. Other wards not visited include East Kabras, West Kabras, Butali-Chegulo and Manda –Shivanga.

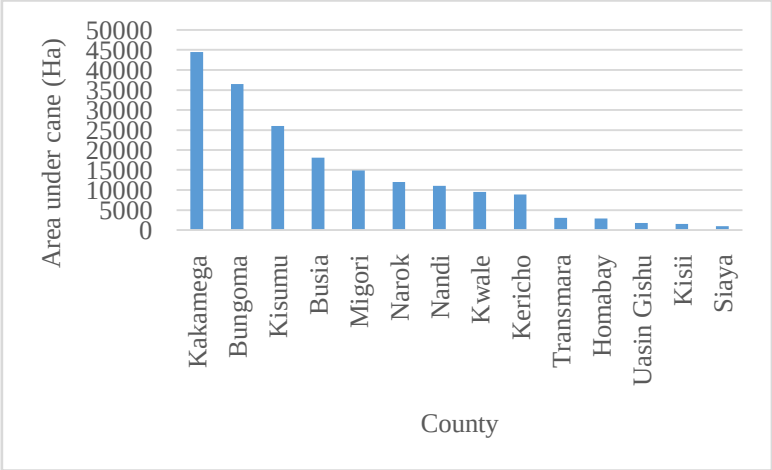

Fig. 1: Area nder cane by County

Source: AFA, Sugar Directorate, 2017

Observations

Out of the total of 268 farms visited only two farms had variety N14 and KEN 83737. The rest of the farms had variety CO 421. Some farmers interviewed said they initially applied fertilizer on their crop when they noticed the yellowing since they thought it was a result of nutrient deficiencies. However, the problem persisted and they started noticing the pests. Pest incidence and abundance was scored as present (+) or absent (-) as shown (Table 1). The crop on most farms appeared yellowish brown and dried out in severe infestation. The condition was exacerbated by prolonged drought and delayed onset of the 2019 long rains season. Images taken from different locations corroborated those of findings from other studies in Louisiana and Florida USA (Nuessly, 2005). Farmers were advised to scout their farms in order to notice the pest attack in good time. Timing of insecticide treatment was also critical to avoid yield or stand loss. Aphid numbers quickly build to numbers too large to count for sampling purposes. Richardson (2018) observed that no controls are consistently recommended for the yellow sugarcane aphid (YSA). The only insecticides labeled for aphid control in sugarcane are pyrethroids, and these products are not particularly effective against this pest. Pyrethroids have potential to disrupt populations of natural enemies, leading to greater infestations in the weeks following the application. YSA populations usually declined naturally by mid-summer. Heavy rainfall and natural enemies, which include ladybeetles, suppressed infestations.

Table 1: Incidence of sugarcane yellow aphids

Zone	No. of farms	Incidence of yellow aphids		
		CO 421	N14	KEN 83787
Chemuche	86	+		
Shirugu	80	+		
South Kabras	102	+	+	-
Total	268			

Key: + pest observed - pest not observed

Figure 1. Damage to sugarcane crop in Monica Shole's field, South Kabras by yellow aphids; image by Dr. J. Mutonyi, Kibabii University, Kenya

Figure 3. Variety N 14 on Jacob Muhonjia's field next to field in Fig. 4 infested by aphids Photograph by Dr. J. Mutonyi, Kibabii University, Kenya

Figure 2. Damage to sugarcane plant cane (background) in Peter Kwoma's field, Mugai-Shirugu; Photograph by Dr. J. Mutonyi, Kibabii University, Kenya

Figure 4. Variety KEN83737 on Rose Mulamba's field generally unaffected by aphidsdespite being next toinfested field in Fig. 3. Photograph by Dr. J. Mutonyi, Kibabii University, Kenya

Figure 5. Damage to sugarcane plant in field, by yellow sugarcane aphids, Siphaflava (Forbes). Photograph by G. S. Nuessly, University of Florida, USA

Figure 6. Damage to sugarcane crop in Masungutsa, Chemuche ward; Photograph by Dr. J. Mutonyi, Kibabii University, Kenya

III. Recommendations

A pest surveillance survey in all sugar industry zones was necessary to identify the areas affected.Senzitization of the industry stakeholders on the short term measures of control i.e. spray with insecticides like lambda-cyhalothrin (Duduthrin), beta-cyfluthrin (Bulldock), chlorpyrifos and alpha-cypermethrin, Research should be done to determine the pest populations and species occurring in Kenya, sugarcane variety resistance and identification of natural enemies such lady bird beetles, flower flies, ants and spiders.

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References

[1]. Adbelmajid N (2008). First finding of *Siphaflava* (Homoptera: Aphididae) on sugarcane in Morocco. Bulletin OEPP/EPPO Vol. 38. No. 2. pp 220-222.
[2]. AFA, SRI, 2018. Advisory on the occurrence sugarcane yellow aphid in Kenya. Agriculture and Food Authority- Sugar Research Institute P.O. Box 44-40100, Kisumu Kenya
[3]. Blackman RL and Eastop VR (1984). Aphids on the World's Crops: An Identification Guide. John Wiley and Sons, New York, USA.
[4]. Conlong D and Way M (2014a). New Pest Alert, Yellow Sugarcane Aphid. The Link. Published by the South African Sugarcane Research Institute. May, Vol. 23, No. 2, pp 12-13.
[5]. Conlong DE and Way MJ (2014b). Sugarcane. In: Prinsloo GL and Uys VM (Eds), Insects of Cultivated Plants and Natural Pastures in Southern Africa. Entomological Society of Southern Africa, Pretoria. (in press).
[6]. Hall DG (2001). Notes on the yellow sugarcane aphid Siphaflava (Homoptera: Aphididae) and the lady beetle Diomusterminatus (Coleoptera: Coccinellidae) in Florida. J Am SocSug Cane Technol 21: 21-29.
[7]. HentzMG and NuesslyGS. 2004. Development, longevity, and fecundity of Siphaflava (Homoptera: aphididae) feeding on Sorghum bicolor. Environmental Entomology 33: 546-553
[8]. Munyua LM. 2007. Management of Aphid vectors of virus diseases on commercial potato (Solanumtuberosume L.) cultivars in Kenya. The University of Nairobi repository. A Thesis submitted to the University of Nairobi, Department of Plant Science and Crop Protection in Partial Fulfillment of Master of Science in Crop Protection
[9]. Nuessly GS, Hentz MG. 2002a. Feeding effects of yellow sugarcane aphid on sugarcane. Journal of the American Society of Sugar Cane Technology 22: 126-127.
[10]. Nuessly GS, Hentz MG. (2002b). Evaluation of insecticides for control of yellow sugarcane aphid on sugarcane, 2000. Arthropod Management Tests 27: F113. Entomological Society of America. http://www.entsoc.org/Protected/AMT/AMT27/index.asp (1 August 2005).
[11]. Nuessly GS (2005). Yellow Sugarcane Aphid, Siphaflava (Forbes) (Insecta: Hemiptera: Aphididae). Features Creatures from the Entomology and Nematology Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Floria. Document EENY-354 (IN635). http://entomology.ifas.ufl.edu/creatures.
[12]. Reagan TE (1994). Pest Status, Biology and control measures of sugar cane sap suckers in the North American sugar growing regions. pp 123-124 In: AJM Carnegie and DE Conlong (Eds), Biology, Pest Status and Control Measure Relationships of Sugar Cane Insect Pests. Proceedings of Second Sugar Cane Entomology Workshop. Mount Edgecombe, KwaZulu-Natal, South Africa, held 30 May to 3 June 1994.
[13]. Richardson WB. 2018. LSU Vice President for Agriculture Louisiana State University Agricultural Center Louisiana Agricultural Experiment Station Louisiana Cooperative Extension Service LSU College of Agriculture Pub. 3630 (online only) 06/18 The LSU AgCenter and LSU provide equal opportunities in programs and employment.

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