Preliminary report on the status and host plant utilization by the Black Coffee Twig Borer, *Xylosandrus compactus* (Eichhoff) (Coleoptera: Curculionidae) in Uganda


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SUMMARY
The black coffee twig borer, *Xyalosandrus compactus* (Eichhoff) is a new but rapidly spreading pest of coffee and other plant species. However, knowledge of its pest status, damage and host plant species utilization in Uganda is still limited. To ascertain its spread and impact, a survey was conducted on 250 farms in 25 districts in the 5 major coffee growing regions of Uganda. At farm level, 12 coffee trees were randomly sampled along a diagonal transect and assessed for *X. compactus* infestation. In addition, host plant utilization by the pest was determined through farmers’ interviews and direct search by researchers. Our data show that the pest was present in all the 5 districts (100%) sampled in central region viz:- Mukono, Luwero, Mityana, Mubende and Mpigi, and at least 50% of the districts in southwestern viz:- Bundibugyo, Kasese and Rubirizi. However, the beetle was not observed in northwestern (West Nile), northern and eastern (Mt. Elgon) regions. *X. compactus* prevalence (percentage of infested farms), incidence (percentage of infested trees) and damage (percentage of infested twigs) were 58.1, 34.0 and 3.8% respectively in the central region whereas, 22.1, 7.7 and 0.8% respectively in the southwestern region. At district level, the highest prevalence (100%) was observed in Mukono and Luwero followed by Bundibugyo (62.5%), Mityana (50.0%), Rubirizi (40%) and Kasese (30%). Similarly, high incidence rates of 91.7, 73.3 and 44.8% were observed in Mukono, Luwero and Bundibugyo respectively. Likewise, high damage rates of 13.6, 5.2 and 4.8% were observed in Mukono, Luwero and Bundibugyo districts respectively. Further, this study identified and documented at least 30 plant species in 17 families as potential hosts for the pest. These include important commercial and food crops, and forest, fruit and shade trees and shrubs. In conclusion, this study confirms earlier surveys and reports that the twig borer is fast and rapidly spreading away from its initial occurrence and epicenter in central Uganda to new infestation areas, posing a big threat to coffee production in the country. Therefore, there is an urgent need to put in place comprehensive mitigation measures in order to prevent the pest from spreading to new areas and also to minimize its impact on coffee production within the already affected areas.

Key words: Black-coffee-twig-borer, damage, host-plant-species, incidence, prevalence, *Xylosandrus-compactus*

INTRODUCTION
The Black Coffee Twig Borer (BCTB), *Xyalosandrus compactus* Eichhoff is currently a major pest of coffee in Uganda, particularly in the central, southwestern and part of eastern regions
These regions happen to produce the bulk of Robusta coffee [2] which contributes about 80% of the Uganda coffee export volume [3]. The female beetle bores into the berry-bearing primary branches (twigs) causing them to wilt and eventually die after a few weeks [4, 5]. Therefore, the infested twigs will not bear berries which will definitely result into loss of income [6]. BCTB is a highly invasive and damaging pest that spreads far and wide over a short period of time [5]. It is probably native to Southeast Asia [7], but currently distributed worldwide, particularly in tropical and subtropical countries. In Uganda, it was first reported in 1993 in the southwestern district of Bundibugyo and then in the neighboring districts of Rukungiri, Kanungu, Bushenyi and Rubirizi in 2002-4 [5]. In 2007/8, another serious outbreak of the pest was reported in Kayunga and Mukono districts of central Uganda. In the two districts, 38% of the farms were infested. Within the infested farms, 21.2% of the coffee trees had been attacked and 3.7% of their berry bearing branches killed [5]. Since nearly all the Robusta coffee produced in Uganda is for export [2], this loss could be extrapolated into a 3.7% loss of the coffee export volume and value which may be translated into a financial loss of US$14.3 million earned in Financial Year 2007/2008 [5]. Further, the twig borer is highly polyphagous and has been reported to infest >224 plant species in about 62 families [8] including those listed as threatened and endangered. In Uganda, although the pest was initially mainly reported on Robusta coffee, recent reports show that it also attacks Arabica coffee as well as a number of other plant species. Basing on this background, a survey was conducted in the 5 major coffee growing regions of Uganda with the aim of: - determine the extent of spread of the pest and its impact on coffee production, and, documenting host plant species utilization for X. compactus in Uganda.

MATERIALS AND METHODS

A survey was conducted in 2011/12 in the 5 major coffee growing regions of Uganda. 250 households in 25 districts were surveyed, sampled in an earlier study by Piet van Asten et al. (Unpublished data). The districts included: - Luwero, Mityana, Mubende, Mpiigi and Mukono (central), Ibanda, Rubirizi, Kasese, Bundibugyo, Kabarole and Kisoro (southwestern), Zombo, Nebbi, Arua, Maracha and Yumbe (West Nile), Lira, Oyam, Gulu and Amur (northern) and Kapchorwa, Sironko, Manafa, Mbale and Bududa (Mt. Elgon). On each farm, 12 coffee trees along a diagonal transect were sampled and the total number of twigs and those infested with BCTB determined. BCTB prevalence, incidence and damage were computed for each farm. In addition, host plant species for the twig borer were searched for through farmers’ interviews and direct observation by the research team. These were identified by both their indigenous and taxonomic names. Data were analyzed using descriptive statistics including means and percentages.

RESULTS AND DISCUSSION

Our data clearly show that although the twig borer is relatively a new pest in Uganda, it was confirmed in all the 5 districts (100%) surveyed in central Uganda i.e. Mukono, Luwero, Mityana, Mubende and Mpiigi districts and 50% of the districts sampled in the southwestern region i.e. Bundibugyo, Kasese and Rubirizi. The incidence and damage were 34 and 3.8% respectively in the central region whereas in the southwestern region they were 7.7 and 0.8% respectively. These results agree and confirm several earlier surveys [5] and reports [1, 6, 9]. These reports show that the pest is fast and rapidly spreading from its place of initial incidence (Bundibugyo district) and its epicenter (Mukono and Kayunga districts) to several other new infestation areas across the county particularly in the central, southwestern and
Busoga regions. Incidentally, these regions produce the bulk of Robusta coffee, *Coffee canephora* in Uganda [2] which contributes >80% of the coffee export volume in the country [3]. At district level, Mukono and Luwero had the highest prevalence level (100%). In addition, Bundibugyo, Mityana and Rubirizi also had high prevalence rates of 62.5, 50 and 40% respectively. These data are in agreement with some reports [e.g. 6] which show high prevalence rates of the twig borer in some of the surveyed districts, including, Mukono/Kayunga and Mityana/Mubende (40-50%) and Luwero/Nakaseke (40-60%). It should be noted that these districts with high prevalence, incidence and damage levels happen to be located in the center of origin (southwestern region) and epicenter (central region) of the pest [5]. However, the present survey was limited to only 25 districts out of the >80 coffee growing districts of Uganda. This calls for an urgent need to conduct a broader and more comprehensive countrywide survey to establish the status, impact and damage of the pest. This information is critical in formulating a national strategy to protect coffee plantations in free/threatened zone, halt further advance of the pest in frontline zone (the advance edge of the pest endemics) and eradicate the pest in already infested zone (endemic). The control strategies in the three zones definitely differ. For example, in endemic zone, phytosanitary measures followed by “blanket spraying” with chemicals may be the best option whereas in free/threatened zones, quarantine strategy whereby movement of plant materials from endemic zone is restricted may work best.

Further, the study provided a preliminary inventory of host plant species range of *X. compactus* in Uganda. This adds vital information to the existing literature on host plant species utilization by the twig borer [e.g. 8, 10]. Here we report >30 plant species belonging to 17 families as potential plant hosts for the twig borer including: *Acanthus pubescens* Engl. (Acanthaceae), *Mangifera indica* L. (Anacardiaceae), *Crassocephalum crepidioides* (Benth.) S.Moore, *Tithonia diversifolia* (Hemsley) A. Gray, *Vernonia amygdalina* Delile, *V. auriculifera* Hiern (Asteraceae), *Markhamia lutea* (Benth.) K. Schum. (Bignoniacaeae), *Maerua duchesnei* (De Wild.) F (Capparaceae), *Sapium ellipticum* Pax (Euphorbiaceae), *Sesbania sesban* (L) Merr., *Senna occidentalis* (L) Link., *Entada abyssinica* Steud., *Albizia coriaria* Oliv., *A. chinensis* (Osbeck) Mer, *A. zygia* (DC) Macbr., *Indigofera arrecta* A. Rich., *Leucaena leucocephala* (Lam.) De Wit, *Calliandra calothyrsus* Meissner and *Senna spectabilis* (DC.) Irwin & Barneby (Fabaceae), *Persea americana* Mill. (Lauraceae), *Ficus natalensis* Hochst., *Artocarpus heterophyllus* Lam. (Moraceae), *Eucalyptus* spp. (Myrtaceae), *Grevillea robusta* A. Cunn. ex R. Br. (Proteaceae), *Maesopsis eminii* Engl. (Rhamnaceae), *Coffeea arabica* L. and *C. canephora* Pierree (Rubiacaeae), *Solanaceous aethiopicum* L., *S. melongena* L., and *S. incanum* L. (Solanaceae), *Theobroma cacao* L. (Sterculiaceae), *Camellia sinensis* (L.) Kuntze (Theaceae) and *Grewia trichocarpa* A. Rich (Tiliaceae). The findings are in agreement with several other researchers [e.g. 8, 10] who have reported that the twig borer is a highly polyphagous pest which infests >224 plant species in 62 families including those listed as threatened and endangered. Incidentally, these host plant species recorded in this study are important food and commercial crops, forest, fruit (horticultural), shade and fodder trees, and, medicinal and ornamental plants. These plants are usually deliberately planted and/or maintained in or near coffee agro-systems by farmers [11]. This may have a lot of management implications for the pest whereby farmers have to make a choice between protecting the coffee from BCTB infestation by eliminating the alternate hosts or maintaining the trees for various purposes. Secondly, most farmers in Uganda [5] and elsewhere [e.g. 4, 12] are currently relying on pruning and burning and/or burying of infested plant materials and/or removing them from the vicinity for controlling the beetle. However, these cultural methods require a thorough understanding and knowledge of the host plant
range and utilization of the pest in question [13]. This is because occurrence of alternative hosts may influence the ecological dynamics [14] and biology [15] of the pest and thus complicate cultural control strategies. Nevertheless, a more extensive search for more host plant species needs to be conducted particularly in the place of origin of the pest, its epicenter and the new infestation areas. This information is vital in designing management practices particularly phytosanitary (cultural) practices in order to reduce or eliminate the source of infestation.

REFERENCES CITED


