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"Towards securing human welfare through management of insect diversity in a changing world"

"Vers une amélioration du bien-être humain grâce à la gestion de la diversité des insectes dans un monde en mutation"

"نحو تأمين الرفاهية البشرية من خلال إدارة تنوع الحشرات في عالم متغير"



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كتاب المستخلصات

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“TOWARDS SECURING HUMAN WELFARE THROUGH MANAGEMENT OF
INSECT DIVERSITY IN A CHANGING WORLD”

“VERS UNE AMÉLIORATION DU BIEN-ÊTRE HUMAIN GRÂCE À LA GESTION
DE LA DIVERSITÉ DES INSECTES DANS UN MONDE EN MUTATION”

“نحو تأمين الرفاهية البشرية من خلال إدارة تنوع الحشرات في عالم متغير”



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Gezira Scheme, the largest irrigated cotton growing area, the percentage mean level of infestation varied from 0-45% during September- December, whereas percentage infestation ranged between 2-39%, 0-40% in Rahad and New halfa, respectively during the same period. Optimization of cultural practices, namely sowing date and host plant resistance suppressed the pest incidence particularly early sowing during first season of 2015/2016. The BT cotton was more vulnerable and sensitive to the bug attack compared to other tested cultivars. Screening of some insecticides for efficacy against the pest indicated that profenfos, endosulfan, thiamethoxam and thiacloprid had efficiently performed against the pest attack. Moreover, predatory insect species found in association with the pest in the Gezira scheme included *Exochomus sp.*, *Scymnus sp.*, *Chrysoperla spp.* in addition to spiders.

Key words: Bt-cotton, pest succession, emerging pest, integrated pest management

ST-1.11. Behavioral Responses of *Tuta absoluta* Mated Females to a Wild and Cultivated Tomato Plants and Characterization of the Mediating Semiochemical Blends

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Abstract

Although tomato has been rated the second most important crop after potato in most parts of the world, its cultivation is threatened by infestations of *Tuta absoluta*, which originated from South America. This study was based on field observations that wild tomato, *Lycopersicon esculentum* var. *cerasiforme*, which grows in the tea zones of Mount Kenya region, Kenya, is not attacked by *T. absoluta*, unlike the cultivated commercial varieties. We hypothesized that the wild variety may be actively avoided by gravid females because of compounds signaling its unsuitability. We compared the responses of gravid *T. absoluta* females to the wild tomato and cultivated tomato, *Solanum lycopersicum* L (Rambo F1 variety) in a dual-choice olfactometer and in field experiments. The mated females were attracted to the cultivated variety but repelled by the wild variety. Similarly, there was significantly lower infestation of the commercial tomato in the intercrop arrangement, compared to the monocrop. Gas chromatography-linked mass spectrometry (GC-MS) of the headspace volatiles collected during the day and at night from the two varieties revealed large differences in their chemical profiles. 162 compounds were identified and quantified. Principle component analysis (PCA) resolved the compounds into 12 distinct principle component (PC) clusters. PC1 and PC2 captured over 79.0% of the total variation. MANOVA and ANOVA tests on PC1 and PC2 revealed significant differences in the volatile compositions. Gas chromatography-linked electroantennography (GC-EAD) revealed EAG-active compounds from the two varieties. Of these, trans-3-hexenol, verbenene, 4-keto-isophorone, camphor, citronellal, isopulegol, limonene oxide, linalool propanoate, germacrene A, -elemene, germacrene B, germacrene D, and -bisabolene were unique to the wild tomato. A blend of available compounds (trans-3-hexenol, camphor, citronellal and limonene oxide) showed dose-dependent repellence to mated *T. absoluta* females in the dual-choice olfactometer. This study shows the potential of exploiting semiochemical traits of the wild tomato variety in novel management of *T. absoluta*.

Keywords: *Tuta absoluta* · dual-choice olfactometer · principle components · semiochemical

ST-1.12. On the Control of the Invasive Banana Bunchy Top Disease in Africa: Lessons from a Conciliate Interaction

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Montpellier, France; ¹⁰ISABU, Bujumbura, Burundi; ¹¹University of Kinshasa, Kinshasa, DR Congo; ¹²University of Kisangani, Kisangani, DR Congo; ¹³Ministry of Agriculture, Blantyre, Malawi; ¹⁴University of Ketoh, Benin; ¹⁵Nigerian Horticultural Research Institute, Ibadan, Nigeria; ¹⁶Agricultural Research Institute, Brazzaville, Congo; ¹⁷IITA Cameroon, ¹⁸Vitropic, Montpellier, ¹⁹Agrobiotec, Bujumbura, Burundi.

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Abstract

Controlling an invasive species, in Agriculture, is a context variable activity, borrowing the technical advances of numerous sciences, including the insect sciences. The Banana bunchy top disease (BBTD), caused by the bunchy top virus (BBTV), is spread between regions through planting infected suckers and locally by the banana aphid feeding off infected plants. It is present in 16 countries in Sub Saharan Africa; and causes accelerating production losses and reduced access to clean seed. Although yield decline is more rapid in some cultivars, none is resistant. Our work towards recovery of banana production in nine BBTD-affected sites in eight countries; thus includes a cross talk between different natural sciences, social sciences and policy studies, relying on existing knowledge and technologies: reliable clean seed supply system and tactics to reduce re-infection pressure, vector entomology, virus detection, epidemiology, imaging and mapping. We developed a non-intrusive DNA extraction methods and used it to amplify the mtCOI gene to differentiate the two species of banana aphids, *Pentalonia nigronervosa* and *P. caladii* while preserving voucher specimens for morphological studies. ELISA, key diagnostic approach should be supplemented by early symptom recognition. We also studied cropping systems and banana diversity as potential options and indicators of long term BBTD control, as varieties showed different attractiveness to the vector and human preferences. Seed systems studies revealed that clean seed systems (like other control approaches) need to incorporate diversity, vector, human behaviour and policy. BBTD is a spreading invasive disease, a potential model in regional invasive species management. What then is our role as Insect Scientists working in this region in limiting of the spread of BBTD? How can we foster an interplay between entomology, ecology, other natural scientists, social sciences and regulatory services and the private sector to prevent its spread to the banana growing areas in Africa.

Key words: Quarantine pest, *Babuvirus*, *Musa* spp, Gender, *Pentalonia* sp., DNA barcoding,

SUB-THEME 2

Modelling, Monitoring, Forecasting and Climate change

ST-2.01. Advances in Crop Insect Modelling Methods –Towards a Whole System Approach

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