Entomology, Ornithology & Herpetology: Current Research

Calatayud et al., Entomol Ornithol Herpetol 2014, 3:3
http://dx.doi.org/10.4172/2161-0983.1000132

Case Report Open Access

Busseola segeta, a Potential New Pest of Maize in Western Kenya

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Rec date: Jul 15, 2014; **Acc date:** Jul 22, 2014; **Pub date:** Jul 24, 2014

Keywords: Africa; Stem borers; Lepidoptera; Noctuidae; Poaceae; *Zea mays.*

Introduction

In sub-Saharan Africa, *Busseola fusca* (Fuller) (Lepidoptera, Noctuidae) is considered as one of the major stem borer pests of maize (*Zea mays*) and sorghum (*Sorghum bicolor*) [1]. Recent surveys in Western Kenya indicated the presence of another *Busseola* species on maize, *Busseola segeta* Bowden (Lepidoptera, Noctuidae) [2,3]. *Busseola segeta* can develop on at least nine host plants, including Napier grass (*Pennisetum purpureum*), maize and sorghum spp. [4]. We investigated the composition of stem borer pest communities in a cultivated plot in Western Kenya in a location known to cultivate maize continuously throughout the year.

Materials and Methods

A plot situated in Keroka (S00°46.216', E34°58.788', 2223 m), Kisii district (Kenya), which was planted with maize every year, was monitored four times in 2001, twice in 2003, and four times in 2012. The farmer planted the maize in a random fashion every year.

Field infestations were estimated by inspecting 100 randomly selected maize plants for stem borer infestation symptoms or damages. Infested plants were characterised by scarified leaves, dry leaves and shoots (dead hearts), frass and holes [3]. Infested plants were dissected for recovery of stem borer larvae and pupae.

The larvae were reared on artificial diet developed by Onyango and Ochieng' Odero [5] in cylindrical glass vials (diameter, 2.5 cm; height, 7.5 cm). Rearing vials were plugged with cotton wool and maintained under ambient conditions in the laboratory until pupation (26 ± 1°C; 65 ± 5% relative humidity). Pupae from the diet or maize stems were kept in separate plastic jars (16 cm × 10 cm) closed with perforated plastic lids until emergence of moths. Emerging moths were identified at the International Centre of Insect Physiology and Ecology (*icipe*, Nairobi, Kenya). The percentage infestations, the stem borer density per stem, and the relative importance of a stem borer species in percent were calculated.

The different field visits per year were considered as replicates. One-way analysis of variance (ANOVA) was done for each parameter between years and means were separated by pairwise Tukey's contrast test after ANOVA. Data on stem borer density was log-transformed whereas all data on percentages were arcsin-transformed. Untransformed results are presented in the table. The statistics were done using R (http://www.r-project.org/).

Results and Discussion

Percentage infestations, stem borer densities and the relative importance of species not belonging to *Busseola* spp. did not vary significantly between years (Table 1). However, the relative importance of *B. fusca* found in infested maize plants decreased significantly whereas that of *B. segeta* increased with time, suggesting a displacement of *B. fusca* by *B. segeta* in that area. Such displacement of *B. fusca* by another Lepidoptera stem borer species, an important introduced pest of maize in Africa, *Chilo partellus* (Lepidoptera: Crambidae), has been previously reported [6].

Years		% infestation	Stem borer density per stem	% *Busseola fusca*	% *Busseola segeta*	% other species
2001		14.5±7.3a	0.45±0.37a	84.4±31.2 b	0a	15.6±31.2 a
2003		31.5±14.8 a	1.15±1.06a	70.0±19.5 b	13.6±1.4b	16.5±18.1 a
2012		14.0±0.8a	0.52±0.17a	30.9±3.5a	61.9±11.4 c	7.2±11.2a
Results of ANOVA	F2, 7	2.499	1.275	10.62	265.3	1.569
	P	0.152	0.337	0.00759	< 0.0001	0.274

Table 1: Percentages of infestation stem borer density per stem and the relative importance of the different species in percent found in 2001, 2003 and 2012. Within each column, means followed by the same letter are not significantly different at 5% according to the Tukey's contrast test (lines comparisons within each column).

The present results confirm the presence of *B. segeta* on maize crop in Western Kenya as already reported in earlier studies [2,3]. Ong'amo et al. [2] reported the presence of *B. segeta* on maize in the Kakamega forest in Western Kenya, but it was of low relative importance compared to *B. fusca*. This could be the result of the presence of a wide range of alternative hosts in the area [2,3]. By contrast, in Keroka, the surface of wild habitats is low compared to that planted with maize, which could have caused a host switch. Such host switch from wild habitat to cultivated habitat has been reported for another Lepidoptera stem borer, an important pest of sugarcane, *Eldana saccharina* (Lepidoptera: Pyralidae), which switched from *Cyperus papyrus* to sugarcane in South Africa [7].

However the question arises if *B. segeta* can be considered as a new pest of maize. Further field studies are required to assess yield losses caused by *B. segeta.*

The fact that *B. segeta* can infest maize plant is an important information to take into account for any further management program aimed at controlling Lepidoptera stem borers infesting of maize in the region and for the planned introduction of maize GMO in Kenya (CIMMYT, personal information).

Acknowledgement

We thank the French Ministry of Foreign Affairs, IRD (Institut de Recherche pour le Développement) and *icipe* (Nairobi, Kenya) for financial support and Fritz Schulthess for his review.

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