INTERNATIONAL JOURNAL OF PLANT, ANIMAL AND ENVIRONMENTAL SCIENCES
IJPAES
VOLUME-2, ISSUE-1, JAN-MAR-2012 ISSN 2231-4490
Accepted: Dec-2011 *Research Article*

THE DISTRIBUTION OF MAIZE STEM BORERS IN CROSS RIVER STATE, NIGERIA.

Okweche, Simon Idoko and Umoetok, Sylvia B. A

Department of Crop Science, Faculty of Agriculture, Forestry and Wildlife, P. M. B. 1115, University of Calabar, Nigeria.

***Corresponding author: Tel - +234 -70 -3496-7125**

E-mail address: *idokosi@yahoo.com*

ABSTRACT : Field experiments were conducted to determine the distribution of stem borers in two agro-ecological zones of Cross River State, Nigeria. The experiments were conducted Akamkpa (rainforest agro-ecological zone) and Bekwarra (guinea savanna agro-ecological zone) during the 2009 and 2010 cropping seasons. The survey shows that species of *Busseola fusca, Sesamia calamistis, Eldana saccharina, Chilo partellus,* and *Coniesta ignefusalis* were found to be prevalent in the maize fields in the two agro-ecological zones of the state. *Busseola fusca* was however found to be significantly ($p<0.05$) more (17.741 per plant for early season and 26.667 for late season) than the other stemborer species (*Sesamia calamistis* 4.482 (early) and 4.926 (late),*Eldana saccharina* 2.259 (early) and 2.815 (late), *Chilo partellus* 3.444 (early and late) , *Coniesta ignefusalis* 1.889 (early) *and* 1.482 (late) in Bekwarra (guinea savanna agro-ecological) zone of the state while *Sesamia calamistis* population (15.963 (early) and 25.519 (late) was significantly ($p<0.05$) higher than other stemborer species (*Busseola fusca* 3.074 (early), 4.667 (late), *Eldana saccharina* 2.889 (early), 2.519 (late), *Chilo partellus* 4.296 (early), 4.482(late), *Coniesta ignefusalis* 0.963 (early) and 3.222 (late) in Akamkpa (rainforest agro-ecological) zone.

Keywords: Stem borer species, population, agro-ecological zones, Guinea savanna, rainforest.

INTRODUCTION

Maize (*Zea mays* L.) is a cereal crop in the family Poaceae. It is perhaps the most completely domesticated of all cereals (Benz, 1994,) and essentially a crop of warm countries with adequate soil moisture (Adeyemi, 1969). It originated from South America where it was taken to all parts of the world (Galinat, 1992; Gonzalez, 2001). Modern maize is considered to have evolved from Teosinte (God's corn) than from an early Mesoamerican maize called Chapalote or a Tripacum species (Doebley *et al.,* 1990; Brenneman, 2001). Due to remarkable diversity of vegetative types, maize is the predominant and widely distributed cereal crop followed by sorghum (*Sorghum bicolor*) and millet (*Pennisetum glaucum*). Maize production is threatened by pests and diseases (Adeyemi, 1969). FAO (2008) observed that pest related losses in the field and storage play a contributory role in keeping cereal production below quantities demanded for utilization by rapidly expanding livestock industries and increasing human population in Nigeria.

Species of stem borers infesting maize and distribution in Nigeria

The major species of stem borers associated with maize in Nigeria are the maize stalk borer, *Busseola fusca* Fuller (Noctuidae), the pink stalk borer, *Sesamia calamistis* Hampson (Noctuidae), the millet stem borer, *Acigona ignefusalis* Hampson (Pyralidae) and the Africa sugarcane borer, *Eldana saccharina* Walker (Pyralidae) (Polaszek, 1998; Balogun and Tanimola, 2001). Others of less importance are the spotted stalk borer (*Chilo partellus* Swinehoe. Pyralidae), *C. orichalcociliella, C. suppressalis,* and the ear borer (*Mussidia nigrivenella* Pyralidae) (NRI, 1996; Dike *et al.,*1999; Khan, *et al.,* 2001).

Usua (1966) reported that *B. fusca* (Fuller) and , *S calamistis* (Hampson) were predominant in Northern and Southern Western Nigeria respectively. Polaszek, (1998) also reported that *Chilo partellus* (Lepidoptera; Pyralidae) is dominant at altitude below 1200m while *B. fusca* (Lepidoptera: Nuctuidae) is dominant at higher altitudes. Usua (1997) observed that *S. calamistis* was abundant than both *B. fusca* in Eastern and Southern States of Nigeria. Okweche *et al.* (2010) reported that *B. fusca* is the most predominant borer species in the guinea savanna agro-ecological zone of Nigeria followed by *S. calamistis, E. saccharina, A. ignefusalis and C. partellus* in early and late maize plantings. Obhiokhenan *et al.* (2002) reported higher stem borer populations in the Mangrove zone followed by rain forest and derived savanna zones of Cross River State. The survey by Obhiokhenan *et al.* (2002) also showed that *S. calamistis* was more abundant than any other stem borers in all the vegetational zones of Cross River State followed by *Chilo spp* while *B. fusca* was absent.

MATERIALS AND METHODS

A survey of the distribution of the major stem borers of maize in the guinea savanna zone (Bekwarra Local Government) and the rain forest zone (Akamkpa) of Cross River State of Nigeria was undertaken between May and October in 2009 and 2010 planting seasons respectively. Early and late seasons farms were visited to identify dominant stem borers species and their distributions. During the survey, 10 farms each for early and late seasons in the main vegetational zones (maize- growing areas in the derived guinea savanna and the rain forest zone) were visited. The distance between farms was approximately 20km except where maize was not grown in which case any available and accessible maize farm was examined.

Twenty (20) affected maize plants were cut, dissected and the larva or pupae preserved for subsequent examination in pempels fluid. The collections were later identified in the laboratory and analysed using t-test.

RESULTS

Table I and II show the relative abundance, composition and distribution of maize stem borers species collected in 2009 and 2010 plating seasons in the two locations. *Busseola fusca was* significantly ($P \leq 0.05$) higher than other stem borer species in Bekwarra location for both 2009 and 2010 planting season,. In contrast, *S. calamistis* was significantly ($P \leq 0.05$) higher in Akamkpa for the two years. *C .partellus* was significantly ($P \leq 0.05$) higher in Akamkpa for early planting season of 2009 and late planting season of 2010. There was no significant ($P \geq 0.05$) difference in the distribution and composition among other borer species (*E. saccharina; C. ignefusalis*). Higher number of borers were observed from late season planting than in early season planting for both years except for *E. saccharina* and *C. ignefusalis* which were slightly lower. *Coniesta ignefusalis* was the least borer species in the two locations (Akamkpa and Bekwarra) in both years (2009 and 2010) and seasons (early and late). *Eldana saccharina* one of the least borers species recorded in the two locations maintained a stable population in both locations and seasons.

TABLE I: Mean number of predominant borer species for 2009.

Species	Stem borers means		t- value	P- value
Early planting	Bekwarra	Akamkpa		
Busseola fusca	17.741	3.074	7.867	0.0001
Sesamia calamistis	4.482	15.963	5.763	0.0001
Eldana saccharina	2.259	2.889	2.019	0.0540
Chilo partellus	2.074	4.296	3.792	0.0008
Coniesta ignefusalis	1.889	0.963	2.279	0.0311
Late season				
Bussela fusca	26.667	4.667	5.831	0.0001
Sesamia calamistis	4.926	25.519	6.833	0.0001
Eldana saccharina	2.815	2.519	0.576	0.0569
Chilo partellus	3.444	4.482	1.199	0.2413
Coniesta ignefusalis	1.482	3.222	1.997	00563

Table II: Predominant borer species for 2010

Species	Stem borers means			P- value
Early planting.	Bekwarra	Akamkpa	t- value	
Busseola fusca	9.704	3.556	7.000	0.0001
Sesamia calamistis	3.704	10.44	7.447	0.0001
Eldana saccharina	1.593	1.296	0.795	0.4341
Chilo partellus	2.148	2.593	1.488	0.1489
Chilo ignefusalis	0.485	0.926	1.345	0.1903
Late season				
Bussela fusca	17.037	5.852	5.125	0.0001
Sesamia calamistis	5.815	20.260	6.123	0.0001
Eldana saccharina	2.815	2.815	0.000	-
Chilo partellus	3.037	4.148	2.126	0.0431
Coniesta ignefusalis	2.111	2.111	0.000	-

DISCUSSION

The study reveals that *B. fusca* was the most abundant borer species in Bekwarra location (Guinea savanna), Cross River State, Nigeria, followed by *S. calamistis, C. partellus, E. saccharina,* and *C. ignefusalis* for both years and seasons. In Akamkpa location (rain forest), *S. calamistis* was the most predominant borer species followed by *B. fusca, C. partellus, E. saccharina and C. ignefusalis.* This agrees with the finding of Obhiokhenan *et al.* (2001) who reported higher percentage of *S. calamistis* in the mangroove and rain forest zones. NRI (1996) and Polaszek (1998) had earlier reported that *B. fusca, S. calamistis, C. partellus, E. saccharina* and *C. ignefusalis* are the most important and widely distributed lepidopterous stem borers in Nigeria. Similar observations have been made in studies carried out in South-western Nigeria (Balogun and Tanimola, 2001). The total number of borer larvae dissected out of maize stems and the relative proportions of *S. calamistis*, and *B. fusca* varied by location as reported by Ogunwolu (1987). Ogunwolu (1987) further reported that the differences in population among the two borer species is attributed to the feeding habit of the borers. Although Balogun and Tanimola (2001), reported that *A. ignefusalis* is among the five major stemborers of maize in Nigeria. This studies revealed that *A. ignefusalis* population was not significant ($P< 0.05$) compared to other borer species in the two locations. This observation confirms report by Polaszek (1998) that *A. ignefusalis* is not a primary pest of maize and is also restricted to certain areas and suitable habitats. Youm (1990) also reported that *A. ignefusalis* is a major pest of pearl millet and has not been predominantly found in maize. Maize is grown only once in the year in the mangrove, fresh water and rain forest zones of the southern and eastern part of Nigeria. Planting usually starts in April in the year, after the long dry season when there would have been high mortality of borer larvae. Since *B. fusca* is more susceptible to high mortality at higher temperatures than *S. calamistis* (Usua 1997), in time *B. fusca* became eliminated to the advantage of *S. calamistis.* In the derived savanna zone where maize is planted twice a year *B. fusca* has been able to sustain and maintain its population.

REFERENCES

1) Adeyemi, S. A. O. (1969). The survival of stemborer population in maize stubble. *Bulletin of Entomological Society of Nigeria. 2: 16 – 22*
2) Balogun, O. S & Tanimola, O. S. (2001). Preliminary studies on the occurrence of stem borer and incidence of stalk rot under varying plant population densities in maize. *Journal of Agricultural Research and Development 1: 67-73*
3) Benz, B. F. (1994). Maize: origin, domestication and development. In: Carraso, D. (editor). *The Oxford Encyclopedia of Mesoamerican Cultures: the Civilization of Mexico and Central America.* Oxford University Press, New York. Pp 147-150.
4) Brenneman, D. S. (2001). The verdict is in: corn is the direct descendant of Teosinte. *Southwestern Mission Research Centre Newsletter 35:52*
5) Dike, M. C., Ajiboye, T. O. & Ajayi, O. (1999). Survey of millet stem borer (*Acigona ignefusalis* (Hampson) Lepidoptera, Pyralidae) and other insects on late maturing pearl millet in Nigeria. *Journal of Arid Agriculture 9:1-8*
6) Doebley, J. F.; Stec, A.; Wendel, J. & Edwardds, M. (1990). Genetics and morphological analysis of maize-teosinte F_2 population: implications for the origin of maize. *Proceedings of the National Academy of Science 87:9888-9892.*

7) Galinat, W. C. (1992). Maize. Gift from America's First Peoples. Chiles to Chocolate. Food the Americans Gave the World. University of Arizona Press, Tucson.
8) Gonzalez, R. F. (2001). Zapotec Science: Farming and Food in the Northern Sierra Oaxaca. University of Texas Press, Austin, U.S.A.
9) Khan, Z. R. Pickett, J. A., Wadhams L. J. & Muyekho, F. (2001). Habitat management strategies for the control of cereal stemborers and striga in maize in Kenya. Insect Sci. Applied, 21:275-380
10) NRI (1996). Insect Pest of Nigerian Crops. Identification, Biology and Control Natural Resource Institute. Chatham, UK. Pp. 36-48
11) Obhiokhenan, A. A.; Usua E J. & Umoetok S. B. A (2002). Distribution of Lepidopterous stemborers of maize (Zea mays L.) in ecological zones of Cross River State of Nigeria. Glo. J. Agric. Sci., 1:89-92
12) Okweche, S. I., Ukeh D. A. & Ogunwolu E. O. (2010). Field infestation of three maize (Zea mays L.) genotypes by lepidopterous stem borers in Makurdi, Nigeria. Global Journal of Agricultural Science Vol 9(1):41-45
13) Ogunwolu, E. O. (1987). Efficacy of carbofuran against lepidopterous stem borer of maize. Nigerian Journal of Agronomy 2(2):27-32
14) Polaszek, A. (1998). Africa cereal stem borers. Economic Importance, Taxonomy, Natural Enemies and Control. CAB International. Wallingford.
15) Usua, E. J. (1966). Stem borers of maize in western Nigerian with particular reference to Busseola fusca (Fuller) and Sesamia species (Lepidoptera: Noctuidae). M.Sc thesis, University of Ibadan. Nigeria. 169pp
16) Usua, E. J. (1997). Distribution of stem borers of maize in the eastern states of Nigeria. Nig. J. Sc. and Education. 4: 1-15