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POTENTIAL NEW PESTS IN THE NEIGHBOURHOOD: DIVERSITY AND ABUNDANCE OF SUGARCANE STEM BORERS IN THE PONDOLAND REGION OF THE EASTERN CAPE PROVINCE OF SOUTH AFRICA

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Abstract

Stem borers constitute an important constraint in sugarcane production. However, stem borer research in South Africa is concentrated on commercial farms because of their economic significance. Studies on the diversity and abundance of stem borers in small-scale sugarcane farms of South Africa are still lacking. The current study was conducted to determine the diversity and abundance of sugarcane stem borers in small-scale farms of the Pondoland region in the Eastern Cape Province of South Africa with the aim of studying the effect of cropping systems on stem borer diversity and abundance. Five species belonging to three genera of cereal stem borers were recorded with two species, *Sesamia calamistis* and *Eldana saccharina*, known to be pests of sugarcane in South Africa, while two others, *Busseola fusca* and *Chilo partellus* were recorded for the first time from South African sugarcane and one, *Conicofrontia sesamoides*, has never been reported from cultivated crops anywhere in the world. Pest populations differed in abundance and species composition among locations included in the study. The implication of these findings to commercial sugarcane production in South Africa is discussed.

Keywords: cropping systems, new records, Pondoland, small-scale farmers, stem borers, sugarcane

Introduction

Sugarcane, *Saccharum* spp. L. (Poaceae) is a perennial crop that is grown as a source of sugar primarily in the tropical and subtropical areas of the world, including several countries in Africa, the Mascarene Islands and Madagascar (Overholt *et al.*, 2003). In South Africa, sugarcane is a cash crop providing a major source of income for the country's economy. The crop is grown by commercial farmers in the KwaZulu-Natal and Mpumalanga provinces, the most important being KwaZulu-Natal (Goble *et al.*, 2012). These provinces produce an estimated average of 2.2 million tons of sugar per season, 70% of which is marketed in South Africa, and the remainder is exported to the rest of Africa, Asia and the Middle East (SASA, 2011). In addition to its economic benefit, the labour intensive sugar industry is a source of employment for 350 000 people. There are about 50 000 registered cane growers, more than 47 000 of which are small-scale growers (SASA, 2006). The majority of the workforce is from the two cane growing provinces, and also from neighbouring provinces. Pondoland people in the Eastern Cape are among the employees involved in commercial sugarcane production in the country. The sugarcane planted in the back yards of small-scale farmers in Pondoland probably originates from farm labourers who introduced the crop when they moved from commercial farming areas to rural areas. The growing of sugarcane for chewing is common in Pondoland, though how and when the practice started is not known. The sugarcane varieties planted in Pondoland are different from those that the commercial farmers have been growing for the past 50 years.

Unfortunately, the small sized sugarcane plots of Pondoland received very little attention from extension agents and researchers. The number of farmers involved in sugarcane production, the size of land allocated for the crop and the sugarcane varieties grown by Pondo people are not known. There is no record of sugarcane production constraints in subsistence sugarcane production in the areas of Pondoland. In the commercial sugarcane producing areas, the crop is attacked by several soil insects, sap suckers, stem borers and leaf feeders (Carnegie and Conlong, 1994; McArthur and Leslie, 2004). *Eldana saccharina* Walker (Lepidoptera: Pyralidae) is the major stem borer species on commercial farms (Carnegie and Conlong, 1994). *Sesamia calamistis* Hampson (Lepidoptera: Noctuidae) is also reported from sugarcane on commercial farms of South Africa, but is considered a minor pest (Cockburn, 2013). This paper presents results of an exploratory survey on the pest status and species complex of moth borers in small scale sugarcane farms in Pondoland and discusses the implications that this may have for cane production on commercial farms in the country.

Pondoland and its subsistence sugarcane plots

The Pondoland area is situated on the South African coast of the Indian Ocean, in the Eastern Cape Province. Pondoland stretches between the Mthatha River, whose mouth is its southernmost point, and the Mtamvuna River in the north along a coastal strip that is a maximum of 50 km wide. The Mzimvubu River divides Pondoland into an eastern Pondoland and western Pondoland.

On-farm surveys in this study covered 38 subsistence plots in eastern and western Pondoland. The sites visited are situated in Bizana, Libode, Ngqeleni, Port St John's, Lusikisiki and Flagstaff divisions (Figure 1). These small-scale farms are plots with a few stands of sugarcane plants that rarely exceed 0.01 ha in size. Farmers grow sugarcane in their gardens under rainfed conditions and the crop is planted near or mixed with other crops such as maize, fruit and vegetables. The sugarcane produced by these farmers is used for home consumption and/or sold to suburban settlers for chewing. None of the sugarcane is supplied to mills for sugar production.

Survey and sampling methods

Surveys were conducted from May to June 2014. Survey sites were selected on the basis of the presence of sugarcane plots and accessibility. Levels of infestation were estimated from 10-50 randomly selected sugarcane plants from different corners of the selected plots. Infestation was determined by looking at signs and symptoms of stem borer attack (indicated by the presence of frass, adult exit holes on the rind of the stalk and/or dead hearts). Stalks were examined *in situ*. The method of selecting sample plants and the number of plants inspected were modified to give even sampling across the plot depending on the size and shape of the sugarcane plots. After identification of infested plots, the geographic coordinates (latitude and longitude) were recorded using a GARMIN 12X portable Global Positioning System (GPS).

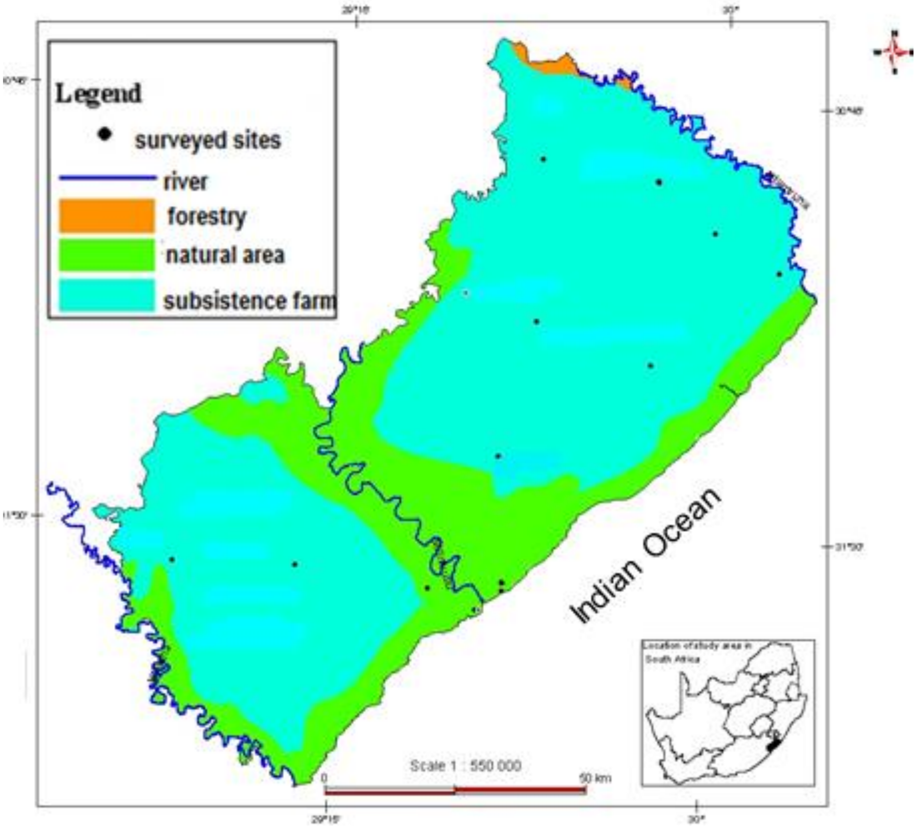

Figure 1. Map of Pondoland showing locations of subsistence sugarcane farms infested by stem borers.

Data analysis, specimen handling and identifications

Ten infested sugarcane plants per plot were cut, dissected and carefully examined to determine the existence of any borer stage. Any live specimen found was collected and placed into a 30 ml plastic vial containing a piece of sugarcane stalk (Graham and Conlong, 1988). The vial was sealed with a perforated lid. The perforation was covered with very fine mesh stainless steel gauze. Dead or diseased larvae, cocoons of parasitoids, predators and pupae were placed in empty 30 ml plastic vials, and sealed with the perforated lids and numbered. These numbers corresponded with numbers on a data sheet, where relevant information about the samples collected was recorded. These data included information on amount of damage, name of the organism (where known), developmental stage, and date and area of collection.

The collected specimens were transported to the Entomology laboratory of the Department of Zoology and Entomology at the University of Fort Hare in Alice, where they were reared to the adults stages. Adults and dead larva were then grouped into morpho-species, and sample specimens from each group were subjected to molecular identification.

Molecular analysis

DNA extraction, amplification and sequencing were done following the protocol in Assefa *et al.* (2007). Resulting chromatograms were edited and assembled using the Staden package (Staden, 1996). Individual sequences were then blasted in IBOLD species identification, and positively identified species names were recorded. The identified sequences and sequences of previously identified stem borer specimens were then aligned using ClustalX (Thompson *et al.*, 1997) and manually corrected using BioEdit sequence alignment editor (Hall, 1999). Phylogenetic analysis of the samples was performed by Maximum Parsimony (MP) using heuristic search, tree-bisection-reconnection (TBR) swapping and comprised 100 random addition sequence starting trees. Tree reliability was assessed by the bootstrap method with 1000 replications using PAUP* v4.0b10 (Swofford, 1998).

Damage analysis

The incidence of damaged sugar cane plots was obtained by dividing the proportion of infested sugarcane plots by the total number of plots sampled, and this value was translated into a percentage. The significance of difference in percentage infestations between divisions and the proportions of infested and non-infested plots was tested using Chi-square (x^2) procedure (Bella, 1985). Level of infestation was calculated by dividing the number of infested sample sugarcane plants to the total number of sample plants and by multiplying the resulting figure by 100. Relative abundance of each stem borer species was determined as the total number of that species, expressed as the percentage of the total population (number) of all stem borer species found at each site.

Results

Stem borer identification

The BOLD Identification System (IDS) provided species-level identification for all the specimens submitted. Based on the results of the blast in the system, five lepidopterous species of stem borers occur in sugarcane in Pondoland. They were identified as *Busseola fusca* (Lepidoptera: Noctuidae), *Chilo partellus* Swinhoe (Lepidoptera: Crambidae), *Sesamia calamistis* Hampson (Lepidoptera: Noctuidae), *Eldana saccharina* Walker (Lepidoptera: Pyralidae) and *Conicofrontia sesamoides* (Lepidoptera: Noctuidae) (Table 1).

Table 1. Localities in Pondoland where specimens of stem borers were collected for use in molecular identification and phylogenetic analysis.

DNA Name	Division	Location	Coordinate		Species name
			South	East	
Pondoland013	Bizana	Mbizana	30°88.865"	29°87.875"	*Busseola fusca*
Pondoland009	Bizana	Mbizana	30°88.865"	29°87.875"	*Busseola fusca*
Pondoland006	Bizana	B-Fls road	30°86.535"	29°64.520"	*Busseola fusca*
Pondoland042	Bizana	B-Fls road	30°86.535"	29°64.520"	*Busseola fusca*
Pondoland051	Bizana	B-Fls road	30°86.535"	29°64.520"	*Busseola fusca*
Pondoland052	Bizana	B-Fls road	30°86.535"	29°64.520"	*Busseola fusca*
Pondoland001	Bizana	Xhoselelwa	31°04.075"	30°12.987"	*Sesamia calamistis*
Pondoland016	Bizana	Xhoselelwa	31°04.075"	30°12.987"	*Sesamia calamistis*
Pondoland011	Flagstaff	Mkambati Rd	31°20.905"	29°87.625"	*Chilo partellus*
Pondoland012	Flagstaff	Mkambati Rd	31°20.905"	29°87.625"	*Conicofrontia sesamoides*
Pondoland026	Flagstaff	Mkambati Rd	31°20.905"	29°87.625"	*Chilo partellus*
Pondoland058	Flagstaff	Mkambati Rd	31°20.905"	29°87.625"	*Chilo partellus*
Pondoland048	Flagstaff	Mkambati Rd	31°20.905"	29°87.625"	*Conicofrontia sesamoides*
Pondoland024	Flagstaff	Fla-Mkamb	31°13.362"	29°64.337"	*Busseola fusca*

Continued…

DNA name	Division	Location	Coordinate		Species name
			South	East	
Pondoland014	Libode	Sikelueni	31°57.395"	29°16.780"	*Busseola fusca*
Pondoland046	Libode	Sikelueni	31°57.395"	29°16.780"	*Busseola fusca*
Pondoland047	Libode	Sikelueni	31°57.395"	29°16.780"	*Busseola fusca*
Pondoland2489	Libode	Sikelueni	31°57.395"	29°16.780"	*Busseola fusca*
Pondoland056	Lusikisiki	Lusikisiki-town	31°36.667"	29°57.167"	*Chilo partellus*
Pondoland0488	Lusikisiki	Lusikisiki-town	31°36.667"	29°57.167"	*Busseola fusca*
Pondoland005	Lusikisiki	Lusikisiki	31°37.833"	29°57.491"	*Busseola fusca*
Pondoland015	Lusikisiki	Lusikisiki	31°37.833"	29°57.491"	*Busseola fusca*
Pondoland002	Ngqeleni	Qulu	31°56.817"	28°91.860"	*Busseola fusca*
Pondoland007	Ngqeleni	Qulu	31°56.817"	28°91.860"	*Busseola fusca*
Pondoland017	Port St. Johns	Ferry Point Rd	31°59.678"	29°58.885"	*Busseola fusca*
Pondoland027	Port St. Johns	Ferry Point Rd	31°59.678"	29°58.885"	*Chilo partellus*
Pondoland036	Port St. Johns	Ferry Point Rd	31°59.678"	29°58.885"	*Busseola fusca*
Pondoland045	Port St. Johns	Ferry Point Rd	31°59.678"	29°58.885"	*Busseola fusca*
Pondoland057	Port St. Johns	Ferry Point Rd	31°59.678"	29°58.885"	*Chilo partellus*
Pondoland022	Port St. Johns	Ferry Point Rd	31°59.678"	29°58.885"	*Sesamia calamistis*
Pondoland041	Port St. Johns	Ferry Point Rd	31°59.916"	29°59.767"	*Sesamia calamistis*
Pondoland008	Port St. Johns	Ferry Point Rd	31°60.220"	29°59.015"	*Busseola fusca*
Pondoland2486	Port St. Johns	Ferry Point Rd	31°60.220"	29°59.015"	*Conicofrontia sesamoides*
Pondoland010	Port St. Johns	Ferry Point Rd	31°60.220"	29°59.015"	*Chilo partellus*
Pondoland034	Port St. Johns	Ferry Point Rd	31°60.220"	29°59.015"	*Busseola fusca*
Pondoland037	Port St. Johns	Ferry Point Rd	31°60.220"	29°59.015"	*Busseola fusca*
Pondoland049	Port St. Johns	Ferry Point Rd	31°60.220"	29°59.015"	*Chilo partellus*
Pondoland050	Port St. Johns	Ferry Point Rd	31°60.220"	29°59.015"	*Chilo partellus*
Pondoland018	Port St. Johns	Manzana	31°59.888"	29°59.770"	*Busseola fusca*
Pondoland023	Port St. Johns	Manzana	31°59.888"	29°59.770"	*Eldana saccharina*
Pondoland019	Port St. Johns	Manzana	31°60.011"	29°59.583"	*Busseola fusca*
Pondoland031	Port St. Johns	Manzana	31°60.011"	29°59.583"	*Busseola fusca*
Pondoland053	Port St. Johns	Manzana	31°60.011"	29°59.583"	*Busseola fusca*
Pondoland2485	Port St. Johns	Mthumbane Rd	31°64.280"	29°53.471"	*Busseola fusca*
Pondoland020	Port St. Johns	Port St. Johns	31°60.382"	29°44.600"	*Chilo partellus*
Pondoland028	Port St. Johns	Port St. Johns	31°60.382"	29°44.600"	*Chilo partellus*

Further validation of the results were done using pairwise genetic divergence and phylogenetic analysis. The phylogenetic analysis on an aligned sequence data included 127 variable sites of which 121 sites are parsimony informative. The length of strict consensus of two MP trees is 185 and the retention index is 0.9759 (Figure 2).

Five clades each representing a species are apparent (Figure 2). Uncorrected pairwise sequence distances within clades (species) ranged from zero to 1.94% (Table 2). Twenty-six of the 46 sequences from Pondoland are included in the first clade, together with the positively identified sequence of *B. fusca* from our collection. The uncorrected pairwise distance between the sequences in this clade ranged from zero to 0.86%. Included in the second clade are four sequences from this survey and a positively identified sequence of *S. calamistis* with a within-clade sequence divergence of up to 1.27%. Clade three has a total of four sequences, three sequences from Pondoland sugarcane and a *C. sesamoides* sequence downloaded from GenBank. This clade has a relatively low within-clade sequence divergence (zero to 0.42%; Table 2). The fourth clade is comprised of *C. partellus* sequences GenBank, from previous collections and from the current survey. This clade has a within-clade sequence divergence ranging from zero to 1.94% (Table 2). The fifth clade included a sequence from this survey and its closest match downloaded from GenBank. The two sequences had shown a divergence of 0.21% (Table 2).

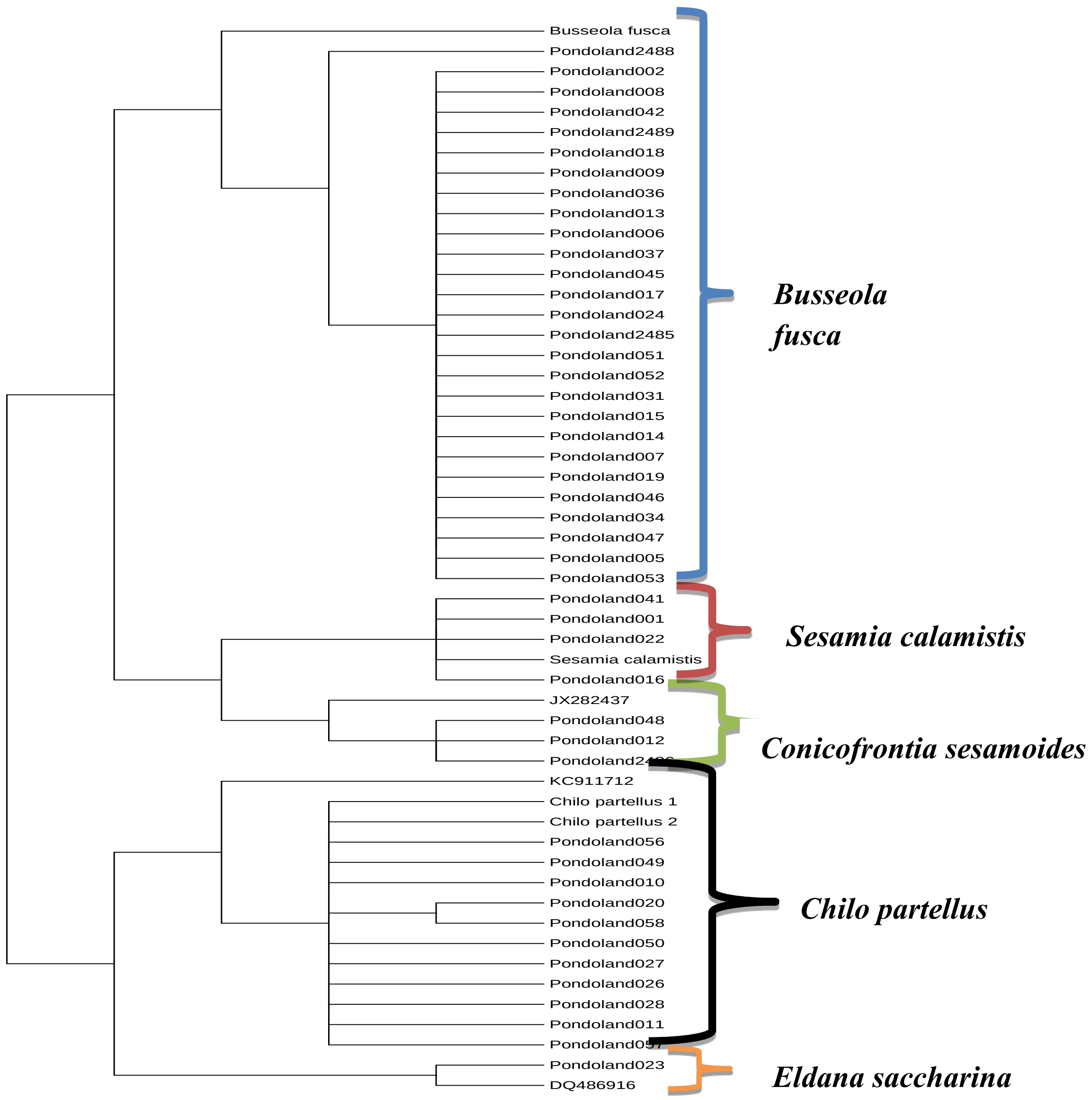

Figure 2. Strict consensus of the two most parsimonious trees representing relationships of the 46 specimens of sugarcane stem borers from different localities in Pondoland (Table 1) with positively identified specimens from GenBank (represented by their accession numbers) and the collection of specimens represented by full scientific names.

Table 2. Percentage uncorrected pairwise distance observed in COI gene between and within the identified stem borer species.

Clade (species)	*B. fusca*	*S. calamistis*	*C. sesamoides*	*C. partellus*	*E. saccharina*
1. *Busseola fusca*	***0.00-0.86***				
2. *Sesamia calamistis*	*7.36*	***0.00-1.27***			
3. *Conicofrontia sesamoides*	*9.24*	*8.41*	***0.00-0.42***		
4. *Chilo partellus*	*9.54*	*10.70*	*11.84*	***0.00-1.94***	
5. *Eldana saccharina*	*10.92*	*12.28*	*13.25*	*12.68*	***0.21***

Pairwise distances within species are shown in bold on the diagonal and the values below them represent mean distances between the species.

Stem borer distribution, species composition, incidence and damage

Stem borer species varied in their distribution, with only *B. fusca* found in all the six divisions of Pondoland (Table 3). *Chilo partellus* was common in sugarcane only in the coastal areas and was recorded only from three divisions, i.e. Lusikisiki, Flagstaff and Port St Johns. *Sesamia calamistis* was recovered from sugarcane in Bizana and Port St Johns while *C. sesamoides* is restricted to the Port St Johns area.

This is the first record of *C. sesamoides* from a cultivated crop. The presence of *C. sesamoides* in the continent was reported very recently from two wild grass hosts (Moolman *et al.*, 2014). *Eldana saccharina* was known to exist only in coastal belt and low-lying sugarcane producing areas of KwaZulu-Natal that extends in a narrow coastal belt up to Port Shepstone (Atkinson, 1980). No live stage of *E. saccharina* has, however, been recovered from sugarcane beyond this limit despite the fact that the crop extended further south (Atkinson, 1980). In this study, *E. saccharina* was recovered from sugarcane at Manzana in Port St Johns, which is more than 200 km away to the south of the previously known southern limit (Table 1).

Table 3. Mean percentage incidence, percentage infestation and species composition of stem borers in sugarcane in Pondoland.

Division	% infected stalks (x±SEM)	No. of larvae recovered	Species composition (%)				
			C. partellus	***B. fusca***	***S. calamistis***	***E. saccharina***	***C. sesamoides***
Bizana	13.4±4..37	13	-	84.6	15.4	-	-
Ngqeleni	20	3		100			-
Lusikisiki	17.5±2.50	4	25	75			
Flagstaff	15±5.00	8	62.5	12.5	-	-	25
Port St Johns	16.7±2.43	34	26.5	55.9	11.8	2.9	2.9
Libode	37.5±12.50	7	-	100	-	-	-
Total		69	27.7	62.3	10.1	1.4	4.3

Stem borer species composition varied between sites (Table 3). *Busseola fusca* was the predominant species in all the divisions surveyed (62.3%), followed by *C. partellus* (21.7%) and S. *calamistis* (10.1%). *Eldana saccharina* and *C. sesamoides* constituted only 1.4 and 4.3% of the larvae recovered, respectively. *Busseola fusca* was the dominant species in four of the six divisions surveyed (Table 3).

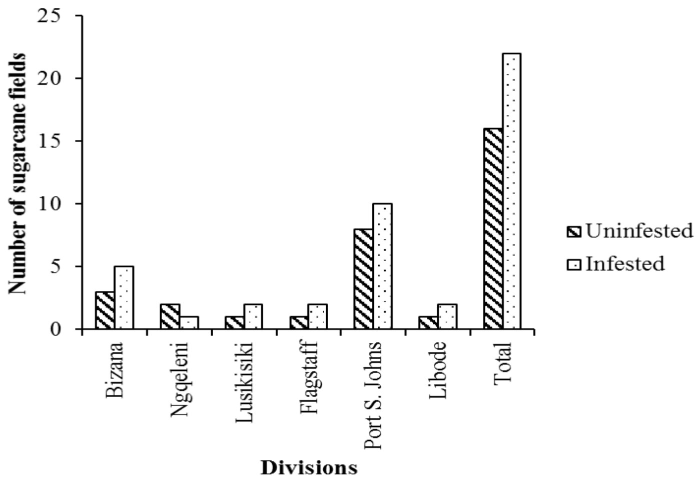

Figure 3. Percentage of stem borer infested and uninfested sugarcane plots in the six divisions of Pondoland region.

The distribution of stem borer infested sugarcane plots are shown in figure 1. In general, more infested than uninfested plots were observed (Figure 3). Stem borer infestation was observed in 22 of the 38 plots (57%) surveyed (Figure 3). However, Chi-square analyses on the incidence of infested plots showed no significant difference between the numbers of infested and un-infested plots in the divisions included in this study. Results of the test indicated the presence of constant and moderate incidence in all the divisions (Table 4).

Table: 4. Chi-square values for each division for all plots (16 uninfested and 22 infested sugarcane plots).

Division	No of uninfested plots		No of Infested plots		x^2
	Observed	Expected	Observed	Expected	
Bizana	3	3.368	5	4.632	0.0696[ns]
Ngqeleni	2	1.263	1	1.737	0.7424[ns]
Lusikisiki	1	1.263	2	1.737	0.0947[ns]
Flagstaff	1	1.263	2	1.737	0.0947[ns]
Port St Johns	8	7.579	10	10.421	0.0404[ns]
Libode	1	1.263	3	1.737	0.9735[ns]

[ns] = non-significant at the 0.05 level, each x^2 has 1 Degree of Freedom

The mean percentage infested stalks ranged between 13.4% in Bizana and 37.5% in Libode (Table 3). Relatively high stem borer infestations (up to 50%) were recorded from sugarcane plots in inland areas of Libode division. The majority of the sugarcane plots (87%) visited were infested by a single species of stem borer (Table 1). The remaining (13%) sugarcane plots were attacked by a complex of stem borer species. Of all the divisions visited, infestation was very common in the Port St Johns division. Three species, *C. partellus, S. calamistis* and *B. fusca,* were reared from a plot at Ferry Point Rd, while *C. partellus, C. sesamoides* and *S. calamistis* were the species encountered in a nearby plot of sugarcane in the same area. A sugarcane plot at Manzana was found to host *E. saccharina* and *B. fusca.* Sugarcane farms in Lusikisiki and Flagstaff divisions were also infested by a complex of stem borer species. *Chilo partellus* and *B.* fusca were recovered from a plot in Lusikisiki Town while *C. partellus* and *C. sesamoides* were the main species recorded from a plot on the side of Mkambati Road in the Flagstaff division (Table 1).

Discussion

The COI sequences from this survey have provided sufficient data to delimit the species of stem borers both at intra and interspecific species level. This is contradictory to the criticism on the power of COI as a taxonomic tool voiced by many authors (e.g. Will and Rubinoff, 2004). This study has strongly validated the efficacy of sequence diversity in the COI gene for identifying stem borer species in sugar mill areas in South Africa. The identified species, which are all new records for sugarcane in the region, showed both low intraspecific variation (0-1.94%), and clear sequence divergence from their congeners (7.36-13.25%). The high level of success in species identification in this study is largely due to previous investigations into on molecular diversity of African stem borers and availability of COI sequence data of positively identified specimens (Assefa *et al.,* 2006, 2007, 2009; Sezolnin *et al.,* 2006; Moolman *et al*., 2014).

During the past 75 years, several surveys have been carried out to catalogue the abundance and diversity of lepidopteran stem borers in South African sugarcane (e.g. Dick, 1945; Conlong, 2000). In the course of these surveys, two species, *S. calamistis* and *E. saccharina* were reported as pests of sugarcane in the country. Unfortunately, none of the previous studies assessed the stem borer diversity and abundance in small-scale sugarcane in South Africa. The present study is, therefore, the first to record the diversity and abundance of stem borers in small-scale sugarcane plots of the country. Five species belonging to three genera were recovered from sugarcane in Pondoland. Two of the stem borer species, *S. calamistis* (Moolman *et al.,* 2014) and *E. saccharina* (Conlong, 2000), are known to be pests of sugarcane in South Africa, while *B. fusca* and *C. partellus* were recorded for the first time from this crop and *C. sesamoides*, has never been reported from cultivated crops anywhere in the world. The incidence of stem borers in small scale sugarcane plots of the six divisions of Pondoland is moderately high. These insect pests occurred on about 58% of the sugarcane plots visited. The moderately high stem borer abundance in sugarcane in the region might have resulted from the interconnected small-scale cereal and sugarcane plots which are separated by patches of wild host plants. Evidences from a variety of investigations also indicate that insect populations can be directly influenced by the concentration or dispersion of their hosts (Unsicker *et al*., 2008; Baraza *et al*., 2006). Besides, sugarcane which is a perennial cultivated host plant may be serving as a refugee and carry a high stem borer complex in the absence of cereals in off-seasons. Similar results have been reported for the small-scale sugarcane farms in Ethiopia (Assefa *et al*., 2010), where sugarcane is produced in strikingly similar conditions to what is practiced in Pondoland.

The current study also revealed the significant difference in the pest status of sugarcane stem borer species between the commercial and small scale cropping systems. *Eldana saccharina* is a serious pest of sugarcane in commercial sugarcane producing areas of South Africa (SASA, 2014). However, the pest has not been recovered from sugarcane south of Port Shepstone (Assefa *et al.,* 2009). The presence of this pest in sugarcane in a site more than 200 km south of the previously known locality is an indication of the pest's ability to survive in low latitude areas and cooler environmental conditions than previously anticipated (Dick, 1945; Way, 1994). However, *E. saccharina* was the least significant of the five species of stem borers recorded in the small-scale sugarcane farms. This insect was recorded only from one sugarcane plot, which is contrary to what was expected. The lower proportion of this insect in small-scale areas may, therefore, be associated with unsuitability of the climatic conditions of the area rather than the difference in the cropping systems. In an investigation by Way (1994), *E. saccharina* eggs failed to hatch in temperatures below 15°C and egg fertility and adult longevity were also adversely affected by lower temperatures.

One of the interesting observations in this study is the dominance of *B. fusca* in sugarcane in the study area. *Busseola fusca* is a known pest of maize and sorghum in Sub-Saharan Africa (Calatyud *et al*., 2014). Even though *B. fusca* was collected as part of the stem borer complex in sugarcane in West Africa (Conlong, 2000), it is not a common borer in the more extensive cultivation of sugarcane in the African continent, despite its wide distribution in the continent (Calatyud *et al*., 2014). Recent investigations on this insect concluded that its host plant range is narrow and limited to only seven host plant species (Calatyud *et al*., 2014). The discovery of *B. fusca* as the dominant sugarcane stem borer in the region is surprising not only because it has included sugarcane as a novel host plant but also it is unexpected of a specialist herbivore to increase in abundance in areas with higher vegetation diversity (Root, 1973). However, a very recent report on *B. fusca* from sugarcane in Ethiopia as the dominant pest of this crop (Assefa *et al*., 2010), contradicts this hypothesis. Results of this study also show the unfolding of the same event of increasing pest status that occurred in Ethiopia. Studies show that planting conspecific neighbours artificially increases host plant concentration and may result in higher levels of pest damage on the focal host plant (Giffard *et al.*, 2012). The high proportion of the insect in sugarcane may, therefore, be a result of the practice of planting sugarcane mixed with/close to maize. *Busseola fusca* is no more in the wild (Le Ru *et al*., 2006) and the practice of cultivating maize and sugarcane together by the Pondoland farmers might have provided a refugia for the off-seasons. This potential artefact should be detectable in the future by studies on the performance of the recorded stem borers on sugarcane and their distribution and abundance in wild host plants in the region which are excluded here.

The presence of *S. calamistis* and *C. partellus* in the Eastern Cape is not new as both insects were previously reported from maize in the Province (Waladde *et al.*, 2002). The populations of these recovered from sugarcane areas in Pondoland may be part of the maize population previously reported. The presence of *C. sesamoides* infestation in small grower sugarcane in the Port St Johns area is, however, the first record of the insect in sugarcane. This stem borer was described by Moolman *et al.* (2014) very recently from wild grasses. Research on oviposition preference and larval performance as well as natural enemies' performance in sugarcane plots will shed more light on the potential risk that this pest may pose to cereal and sugarcane production and assist in formulation of possible mitigation measures.

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