ASSESSMENT OF INSECT PESTS ASSOCIATED WITH SUGAR BEET IN SOUTHERN GUINEA SAVANNAH NIGERIA

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ABSTRACT
This Experiment was carried out in 2023 wet season at Badeggi in Niger State, Nigeria, Located in Southern Guinea savanna agro-ecological zone at latitude 09°45' N, longitude 06°07' E, to assess Insect Pests Associated With Sugar Beet in Southern Guinea Savannah Nigeria. The experiment was laid in Randomized Complete Block Design (RCBD), replicated three (3) times. Data was collected on Plant height (cm), Number of leafs per plant, population of insects,types of insect, severity of damage due insects and tuber weight,. Descriptive analyses tool was used for result presentation. The result showed that Bison had higher numbers of leaves, taller plant height, fewer numbers of insects, lower insect damage, and higher tuber yield compared with Borneo. It is thus concluded from this investigation that sugar beet is susceptible to insect pests infestation and consequent damage in Badeggi in Southern Guinea Savannah Nigeria. However the level of infestation is more on Borneo than Bison

Key words: Pest, infestation, minners, insects, incidence.

Introduction

Sugar beet is a plant whose root contains a high concentration of sucrose and which is grown commercially for sugar production. The sugar beet is a root crop that flourishes in temperate climates. Egypt is the top country in the area of sugar beet production in Africa. As of 2021, Egypt cultivate 190,066 ha that accounts for 79.98% of total area of sugar beet in Africa. The top 5 other countries are (Morocco, Tunisia, Mali, and Algeria).Besides sugar production, for which it is mainly known, the sugar beet has many other uses in different areas. Nearly no waste is produced during sugar production. Every single part of the sugar beet crop is valorized and used to produce co-products like animal feed (for bees, cows, pigs, horses, etc.) in the form of sugar beet pulp pellets or molasses, fermentation additives, fertilizer, bioethanol, biomethane or even bioplastic (Solomon, 2013). The production of sugar beet is affected by both biotic and abiotic stressors among which insect pests constitute a major biotic stressor. Sugar beets are attacked by more than 150 species of insect-pests and mites and 40–50 of these species can cause damage either directly or indirectly to the tap root, often causing a great yield loss and quality decrease throughout growth stages (Bassyouny 1993). Like many agro-ecosystems, sugar beets have a few keys or primary pests that may actually limit production under certain conditions. In addition to the major pests, there are a number of species with worldwide distribution that inflict periodic losses to sugar beet, as well as a few species that exist at such low population levels that no serious harm is caused (Bazok*et a*l. 2018). In Egyptian sugar beet ecosystems, commonly known insect-pests are cotton leaf worm *Spodoptera littoralis* (Boisd.), *S. exigua* Hubner, sugar beet fly *Pegomya mixta* Vill., sugar beet beetle, *Cassida vittata* Vill., and sugar beet moth, *Scrobipalpaocellatella* Boyd (Badawy and Shalaby 2015).Many studies reported that defoliating insects, viz., beet armyworm, *Spodoptera litura* Fabricius; hairy caterpillar, *Diacrisiaobliqua* Walker; Semilooper, *Plusiaorichalcea* Fabricius; cut worm, and *Agrotisypsilon* Rott caused appreciable damage to sugar beet at different growth stages in India (Patil *et a*l. 2007). Wire worms, springtails, seed–corn maggots, root worms, soil mites, cutworms, army worms, and other pests are frequently present at the time of sowing and feeding on germinating seeds or young seedlings (Manoharan, 2010). Information about production and protection of sugar beet in Nigeria is low as the crop is still new in the country thus empirical evaluation of insect pests associated with its growing is worthwhile.

Objective

To evaluate insect pests associated with two lines of sugar beet

Materials and Method

This Experiment was carried out in 2023 wet season at Badeggi in Niger State, Nigeria. Located in Southern Guinea savanna agro-ecological zone at latitude 09°45' N, longitude 06°07' E. The experiment was laid in Randomized Complete Block Design (RCBD), replicated three (3) times. Land clearing was done manually. Thereafter, it was ridged at 75cm apart. The seeds were planted two per hill at spacing of 50cm apart. The weeding was done twice at 3 and 9 weeks of planting. The two lines were the treatments. Data was collected on Plant height (cm), Number of leafs per plant, tuber weight, types of

insect and severity of damage due insects. The damage injury rates were calculated as follow:

Severity = No. of leafs with damage x 100
Total no. of leafs

Descriptive analyses tools was used for percentage infestation and damage indices

Results

It was observed that at all stages of growth Bison variety had higher number of leaves than the Borneo. At 3 weeks of growth while Bison recorded 15 leaves Borneo only recorded 7 and the same trend was seen at 6th and 9th weeks of growth. The peak of leave production was recorded at 6th weeks of growth and started to decline at 9th weeks of growth (figure 1). Equally too the mean Bison plant height was significantly taller compared to Borneo (figure 2). Figure 3 shows the indices of damage resulting from infestation of insect pest on two sugar beet varieties. At all stages of growth 3, 6th and 9th weeks the Bison variety had significantly (P <0.001)lower percentage leaves damage due to insect pests (2.67 %, 9.00 % and 12.33%) compared to thepercentage leaves damaged (5.67 %, 15.33 %and 16.33 %) in Borneo. The largest numbers of insect pests were found on Borneo sugar beet variety, while the lowest populations of insect pests were recorded on Bison (figure 4). Bison produces the biggest tuber compared to Borneo. The average tuber weight for Bison is 0.61 kg while that of Borneo is 0.39 kg (figure 5). Samples of insects were collected and identified on the two lines of sugar beet. The pests found across the lines are. Beet army worm, *Spodoptera exigua*; Root ahpid; black cut worm, *Agrotisipsilon* Hufnagel; leave mining flies and Grassshoppers; Beet leaf hopper (Table 1).

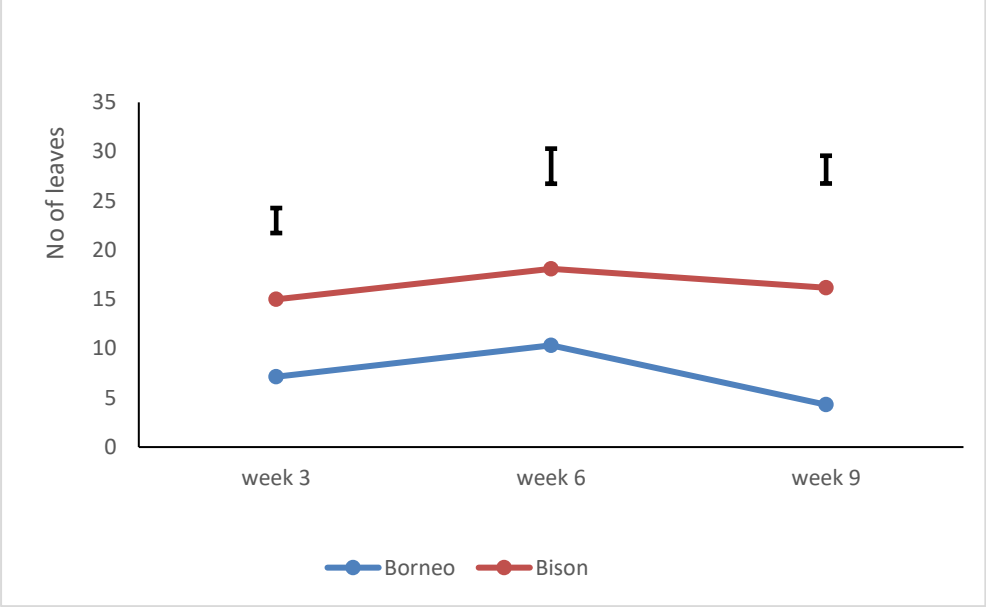

Figure 1 number of leaves per plant at 3, 6 and 9 weeks of growth.

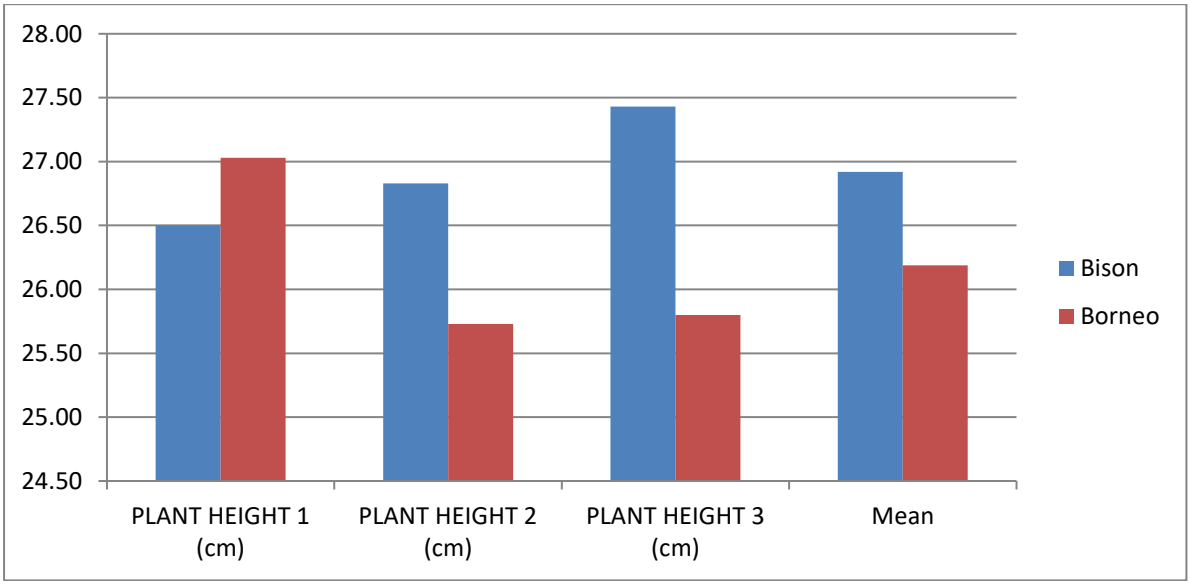

Figure 2: plant height.

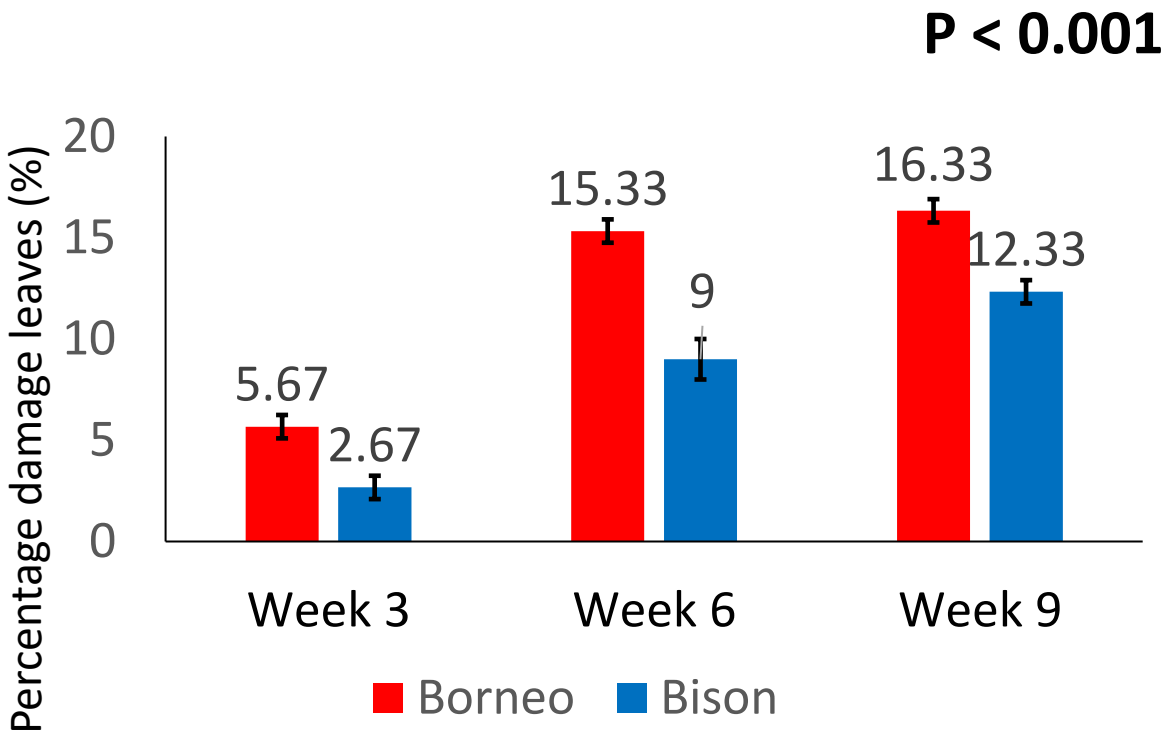

Figure 3: Percentage damage leaves by insect pests on sugar beets

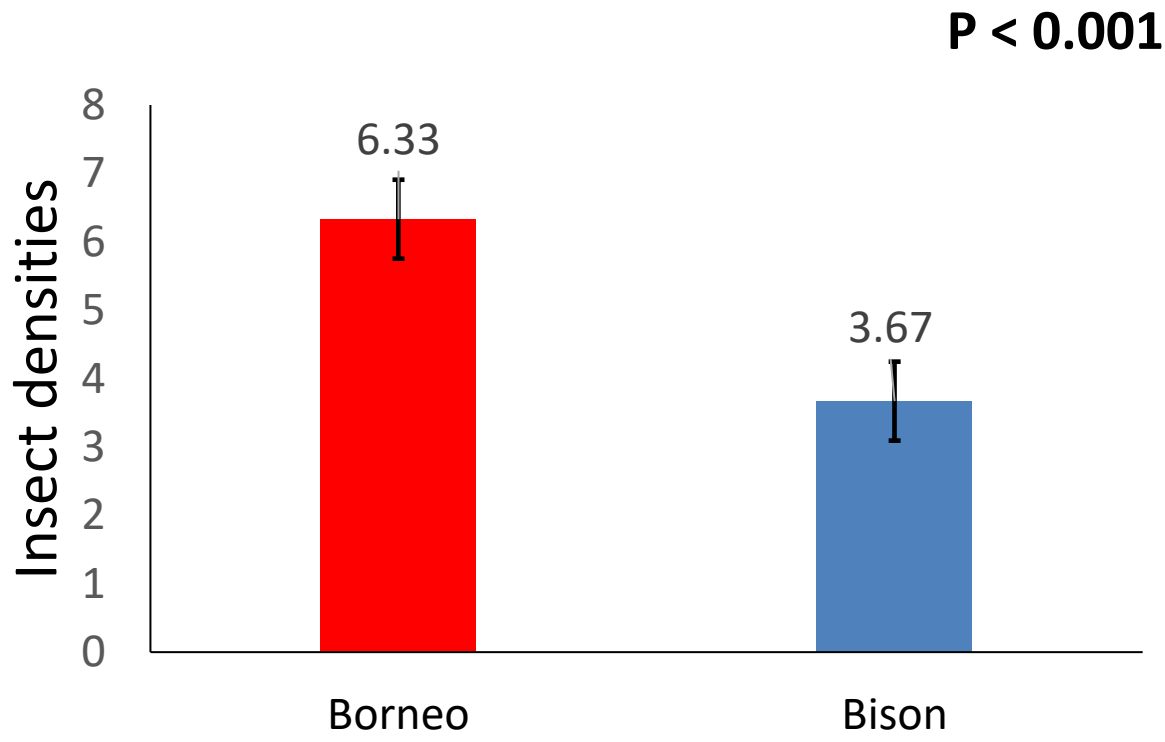

Figure 4: Population densities of insect pests of sugar beet

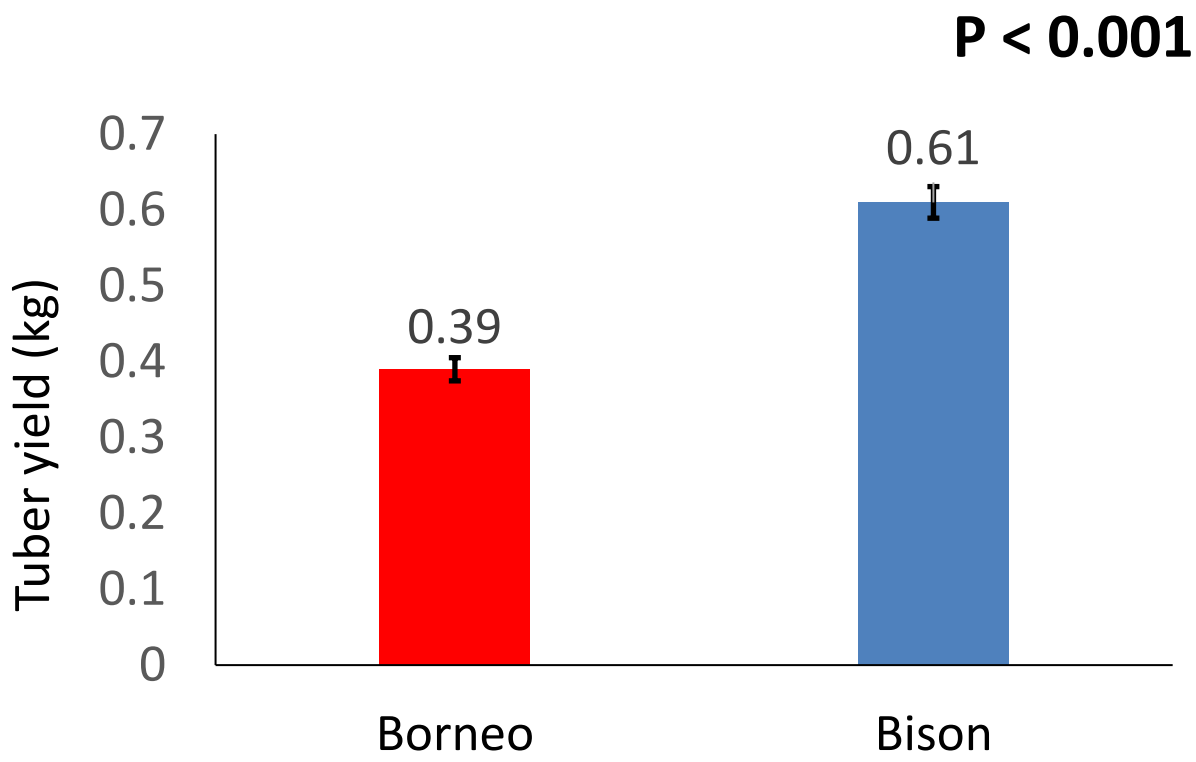

Figure 5: Tuber yield on two varieties of sugar beet

Table 1; Insect pests found on sugar beet in Badeggi, Southern Guinea Savannah Nigeria

			Variety	
Common name	**Scientific name**	**Order/Family**	**Borneo**	**Bison**
Beet army worm	***Spodoptera exigua***	**Lepidoptera: Noctuidae**	**Yes**	**Yes**
Root ahpid	***Pemphigus populivenae***	**Hemiptera: Aphididae**	**Yes**	**Yes**
Black cut worm	***Agrotisipsilon***	**Lepidoptera: Noctuidae**	**Yes**	**Yes**
Leave mining flies	***Pegomyabetae***	**Diptera:Anthomyiidae**	**Yes**	**Yes**
Grass hoppers	***Phyllochoreiaramakkrinai***	**Orthoptera Cicadellidae**	**Yes**	**No**
Beet leaf hopper	***Circulifer tenellus***	**Hemiptera:Cicadellidae**	**Yes**	**No**

Discussion

Variations was observed in number of leaves and plant height among the two varieties evaluated with Bison having more leaves and taller plants than the Borneo sugar beet variety this may be attributed to their inherent trait not due to influence of insect pest infestation. A correlation was noted between the population infestation and level of crop damaged. The Borneo variety that had the largest population of insects also had more crop damaged, this findings is consistent with research indicating that crop damage intensifies with extended pest infestation, as prolonged exposure allows for cumulative damage (Ranjan *et al.*, 2022; Ibrahim and Ojo, 2022). The lowest yields in Bison plots shows that heavy infestations of pest organism on the vegetation of sugar beet indirectly have negative effect on its yield. This is line with the findings of (Souleymane *et al.*, 2016) in rice field insect pest studies, who observed that one per cent of tillers damaged by African rice gall midge (*Orseolia*. *Oryzivora)* in rice fields resulted in 2% grain yield loss.

Conclusion:

It is concluded from this investigation that sugar beet is susceptible to insect pests infestation and consequent damage in Badeggi in Southern Guinea Savannah Nigeria. However the level of infestation is more on Bison than Borneo

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