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INCIDENCE OF BANANA WEEVIL AND PARASITIC NEMATODES IN SECOND RATOON OF GROWN PLANTAIN FROM PARED AND UNPARED SUCKERS

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Abstract
The persistence and spread of parasitic nematodes and banana weevils have been implicated in the shortening of plantation lifetime to only one or two cycles of production beyond which most plants toppled became unproductive. This study evaluated the incidence of banana weevils and parasitic nematodes of the second ratoon crop plantain orchard at Ado-Ekiti. The orchard was planted to pared and unpared suckers and the growth performance after establishment measured at two week intervals. The trial was arranged in a completely randomized design (CRD) of ten treatments replicated five times. Growth parameters were better enhanced in non-pared suckers. Incidence of adult weevils and parasitic nematodes was high on non-pared suckers.

Key words: incidence, paring, plantain, ratoon, weevils, nematodes.

Introduction

Plantain (*Musa AAB*) is an important crop in sub-Saharan Africa, where about 70 million people derive their livelihood from it as a staple food and source of rural income (Vuylsteke, 2001). Nweke (1996) noted that about 49% of farming households produces plantain as a main crop in Eastern Nigeria while national annual is about 2.4 million metric tonnes (Ogazi, 1996). High yields are obtained in the planted (parent) crop and one to two ratoons after which orchard output declines. Unfortunately, problems that limit perennial orchard productivity range from difficulty in obtaining sufficient planting materials (Schill *et al*., 1997), and a high population of plantains failing to produce due to uprooting, psuedostem breakage to soil infertility, poor soil structure, severity of disease and pests, inappropriate husbandry practices, drought and low soil organic matter status (Swennen *et al*., 1988)

The major pests of plantain are the parasitic nematodes and the banana weevils whose combination limits the length of plantain orchards (Swennen *et. al*., 1988). Nematodes destroy plantain roots, undermining productivity especially under condition of poor soil fertility while the banana weevil, (*Cosmopolites sordidus*) attacks and weakens the plants causing stem breakage. This forces the farmers to abandon their fields in search of new farmlands (Hauser, 2000; Gowen *et al*., 2005). The routine husbandry practices with which to sustain orchard productivity emphasize the use of clean planting materials. Paring (peeling) of the suckers removes roots infested with nematodes, while corms with severe stem borer would be detected and discarded (Swennen, 1990). There is not much information available on the combined effects of paring and non-paring on weevils and nematode incidence in ratoon of grown plantain. This paper presents data from an investigation on the incidence of banana weevil and parasitic nematodes in second ratoon of grown plantain from pared and unpared suckers.

Materials and Methods

The study was conducted on the Teaching and Research Farm of the University of Ado- Ekiti between May and December 2009. The treatments were the suckers collected from ten farmers' fields in Ondo and Ekiti States. A total of 100 suckers were collected, 50 suckers were planted directly without paring (peeling) while the remaining 50 suckers were pared (peeled) and soaked in red acalypha plant extracts before planting them. Suckers from the farms were planted in a randomized complete design with five replicates in each field (pared A; unpared B). Weevils were trapped by using plantain pseudo stem portion collected after harvest of the bunch from farmers'

fields and were placed around the base of every mat. The traps were checked and replaced every two weeks for adult *C. sordidus* weevils and counted. Parasitic nematodes were extracted and identified using a modified Bearmann method (Gowen and Queneherve, 1990). Growth parameters measured include pseudo stem height and girth, number of functional leaves, number of non-functional leaves and leaf area. Data were analyzed using analysis of variance (ANOVA) and means were separated by the Duncan's Multiple Range Test (DMRT).

Results

Tables 1 and 2 show the growth performance of plantain in Farms A and B, respectively. In Farm A, there were no significant growth differences in pseudo stem height and girth, and leaf area during the second, fourth and sixth weeks under observation. Number of functional leaves counted was significantly higher at sixth and eighth weeks. The lower number at the tenth week is due to the fact that the plants have produced bunches. On the other hand, the non-functional leaves counted were significant at the tenth week for the same reason. The number of suckers counted was higher at tenth week but not significantly more than the previous observations. In Farm B, the tallest plants were observed at the tenth week but were not significantly taller than the observations in previous weeks. Stems were significantly thinner at the second and fourth weeks while leaf area was not significantly different. The numbers of functional leaves and non-functional leaves were significantly higher at fourth and sixth weeks. The number of suckers increased significantly during the ten weeks period.

Table 1. Growth performance on farm A (unpared suckers)

Parameters	2wks	4wks	6wks	8wks	10wks
Plant height(cm)	75.12a	82.19a	84.93a	90.00ab	92.30ab
Plant girth(cm)	19.96ab	21.95ab	23.74c	24.00c	25.69c
Leaf area(cm^2)	2153.4a	2673.9a	2945.6a	2328.4a	2577.6a
Functional leaves	5.33a	6.17bc	6.62c	5.10a	5.79ab
Non-functional leaves	6.05ab	6.50b	6.70b	5.17a	5.29a
No of sucker	2.64a	4.7b	5.45c	6.57d	6.90d

Values with the same letters in the same column are not significantly different (P= 0.05)

Table 2. Growth performance on farm B (pared suckers)

Parameters	2wks	4wks	6wks	8wks	10wks
Plant height (cm)	96.07a	97.38a	98.93a	130.02b	132.27b
Plant girth(cm)	23.43a	25.44a	24.18a	35.57b	36.99b
Leaf area (cm^2)	3185.9a	3844.3a	3525.3a	4097.8b	4242.0b
Functional leaves	6.24a	6.62a	9.64b	6.84b	5.80a
Non-functional leaves	6.82a	6.84a	7.07a	6.73a	8.20b
No of sucker	5.18ab	5.47ab	5.98b	6.62b	7.18b

Values with the same letters in the same column are not significantly different (P= 0.05)

Figure 1 shows the percentage of banana weevil incidence in Farms A and B. There was similarity in the incidence of weevils as shown by a decrease at the fourth week relative to second week and subsequent increase till the eighth week and reduction thereafter. Thus, out of the total percentage trapped during the twelve-week period, the highest incidence occurred at the eighth week in both farms; 38.3% (Farm A) and 32.7% (Farm B). However, higher incidence of weevils was observed in Farm A.

There were 120 and 100 nematodes in Farms A and B respectively. The percentage distribution of nematode species in the two farms is shown in Figure 2. The incidence of nematodes was higher in Farm A (53.3%) than in Farm B (39.1%).

Figure 3 shows the distribution of nematode species in the two farms. *Radophilus similis* and *Pratylenchus coffea* were abundant in Farm B (pared suckers) while Farm A (unpared suckers) did not contain these species. The percentage of *Helicotylenchus multicinctus* was higher in Farm A (91.5%) than Farm B (8.5%) while the percentage of *Meloidogyne spp.* was observed to be the same in both Farms.

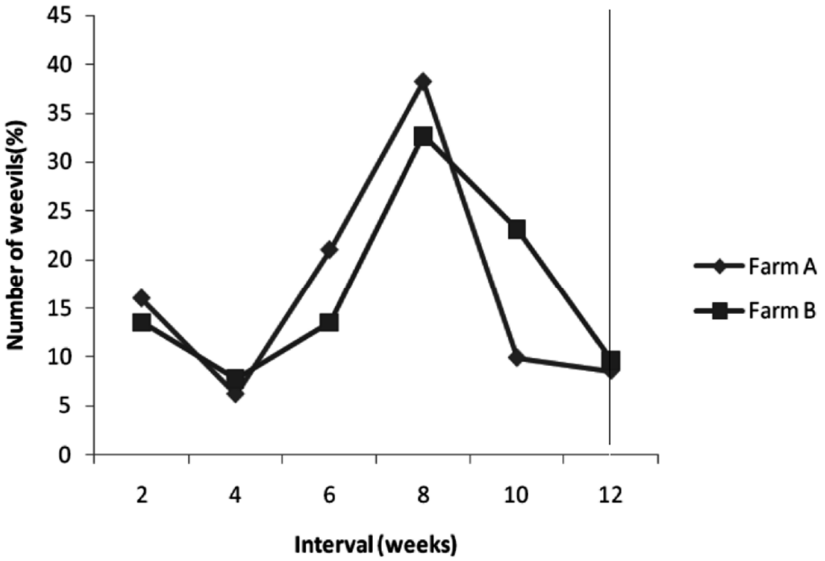

Figure 1: Percentage of weevil incidence in Farms A and B

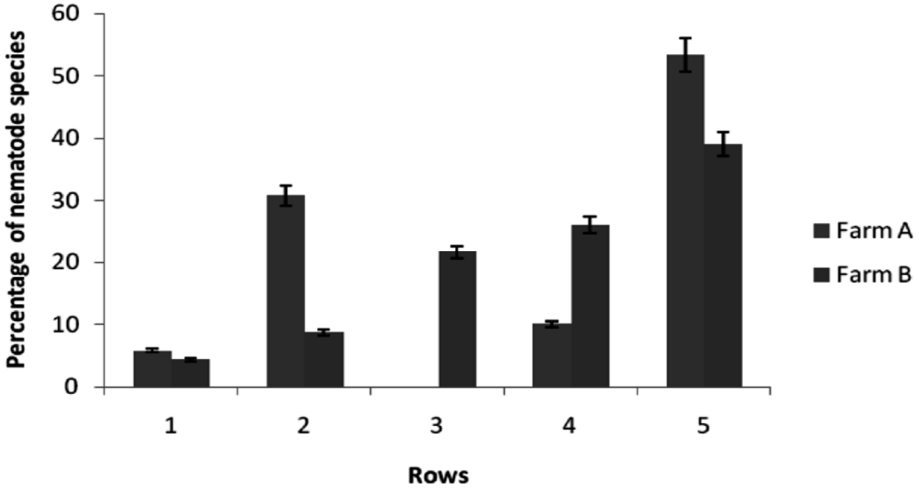

Figure 2: Percentage of parasitic nematode in Farms A and B

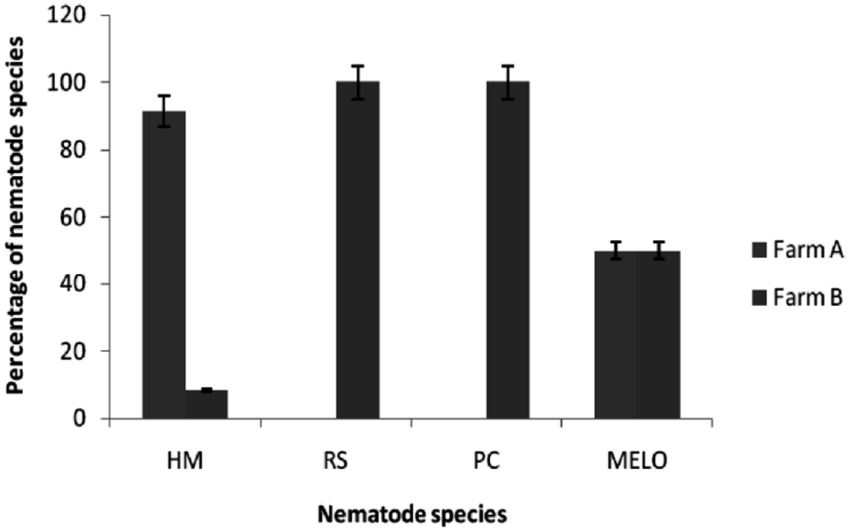

Figure 3: Percentage of nematode species in Farms A and B

Keys: HM—— *Helicotylenchus multicinctus*; RS—— *Radophilus similis*
PC—— *Pratylenchus coffea* MELO—— *Meloidogyne spp*

Discussion

This result showed that pseudo stem height and girth, leaf area, number of functional leaves, and non-functional leaves were better enhanced in a field planted to unpared (not peeled) suckers. Although planting of suckers directly to field (the traditional method for plantain establishment) without peeling the corm as been identified as a major cause to yield losses in plantain (Hauser, 2006); this has not been demonstrated in this study. In fact, paring to remove roots that are diseased and infested by pests is supposed to confer protection on the roots thereby reducing toppling over (uprooting) and improving root health status (Speijer and Gold, 1996; Sikora *et al.*, 2005).

The significant reduction in the incidence of banana weevil at fourth week is due to low rainfall which left the soil dry. The soil texture is sand which with low organic content mean low moisture content and retention after few days' absence of rain. The beetle is highly susceptible to desiccation and commonly dies within 3 to 10 days on a dry substrate (Viswanath, 1977; Gold *et al*., 1999c), but survives approximately 4 to 17 months in moist soil without food (Treverrow *et al.*, 1992). Incidence of banana weevil and parasitic nematodes were generally low in the field planted to pared suckers as compared to the field planted to unpared suckers. This may be due to the fact that the pared suckers were dipped in red acalypha plant extract for 15 minutes before planting. Olaniyi (2006) reported that 20 minutes dip of planting materials in the extract of red acalypha plant shows some promise in improving vegetative growth and root health of plantain. Considering the fact that non pared sucker field enhanced plantain growth in the second ratoon despite the high incidence of weevils and parasitic nematodes, majority of the farmers may be reluctant in adopting the paring of sucker's technique. Research has shown that observations taken after one or two years will give better information on the incidence of weevils and the performance of the crop (Seshu *et al.*, 1991). Rukazambuga *et. al*., (1998) also reported that yield loss due to banana weevil appears to increase gradually reaching 44% in the fourth ratoon cycle. The submission of Kwame Afresh- Nuamah (1991), confirms earlier reports that weevil population starts building up from the second year irrespective of the source of planting material or site of planting. Consequently, the major focus of any attempt to control banana weevil and parasitic nematodes should be directed at monitoring and ensuring plantation longevity of pared and non pared suckers' fields before a logical conclusion could be drawn on which of them actually enhances plantain growth and reduces weevils and nematode infestations on plantain.

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