Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol.7, No.19, 2017

Evaluation of Some Local Cultivars of Dioscorea Rotundata for Yield, Agronomic Characteristics and Nematode-Pest Incidence

OLUWATAYO J.I.[1*] ADEPOJU I.O.[2] ONWUEGBUZIE K.A.[1]
1.Department of Crop and Environmental Protection, University Of Agriculture, Makurdi, Benue state, NIGERIA
2.Department of Crop Production and Protection, Federal University Wukari, PMB 1020, Taraba State, NIGERIA

Abstract
Field experiments were conducted to evaluate some local varieties of *Dioscorea rotundata* for yield and pest incidence. Results showed that five cultivars were significantly different (p=5%) in agronomic characteristics which included percentage emergence and crop vigor. Yield attributes such as percentage stands count at harvest, number of seed tubers/plot, number of ware tubers/plot, tuber shape, tuber surface texture, yield of ware tubers/plot, total fresh tuber yield/plot were significantly different. The mean values of yield parameters showed Toryo cultivar gave the highest (14.33 Tuber/plot) yield both in ware tubers and total fresh tuber yield while Didie gave the lowest (14.33 Tuber/plot). Result on agronomic characteristics showed that crop vigor was highest in Toryo and Ayin at 12 weeks after planting. Visual observation showed mild damages caused by nematodes (*Meloidogyne incognita and Scutellonema bradys*), termites, yam beetles and yam mealybug on cultivars, especially Didie. Results of this study showed that Ayin, PNC, Didie, Toryo and Tilla are very good *D. rotundata* cultivars and therefore should be evaluated for food qualities.
Keywords: Cultivar, Nematode, Tuber, Vigor, Yam,

INTRODUCTION

Yam (***Dioscorea spp.***) is estimated to account for about 79% of the total world food yam. It has been reported that about 90% of the global yam production comes from West Africa. Nigeria is the largest world producer with 35.07 million metric tonnes and the largest consumer of yam (NBS, 2012). The freshly harvested yam tubers contain about 70% water, 25% starch, 1 – 2% protein and only traces of sugars, minerals and vitamins. Yam tubers are usually consumed in the forms of chunks, flour, fufu, and slices resulting from any of the processes of boiling, drying, fermentation, frying, milling, pounding, roasting, and steaming (Osunde, 2008). It contributes significantly to the daily dietary needs of average Nigerians (Chukwu and Ikwelle, 2000). Due to increasing world population, mainly in developing countries of Africa, guinea white yam production is no longer meeting the aggregate demand. In order to meet annual demand, yam production will have to increase by 3 – 4 percent. At present, the production is only marginal due to lack of improved high yielding varieties, climate change, pests and diseases (Schlecht et.al,2006; Egesi et.al. 2007). Plant-parasitic nematodes have been found associated with yam notably *Scutellonema bradys and Meloidogyne* spp (Adegbite et. Al 2005; Agbaje et.al 2003). They are not perceived as economically important parasites of crops since above-ground damage inflicted by these parasites are usually absent or confused with other limiting factors such as drought or nutrient deficiencies. Nevertheless, little information is available about plant parasitic nematodes in yam farms in the Makurdi, Benue state, as well as the host–parasite relationships between root-knot nematodes and yam cultivars. Therefore, the purpose of the study was to some local cultivars of *Dioscorea rotundata* for yield, agronomic characteristics and nematode incidence in Makurdi, Benue State, North Central Nigeria.

MATERIALS AND METHODS

The experiment was conducted at the Teaching and Research Farm of the Federal University of Agriculture Makurdi, Benue State, Nigeria during the 2015 and 2016 planting season. Five local cultivars of yams (*Dioscorea rotundata*) were used for the experiment which includes Ayin, PNC, Didie, Toryo and Tilla. The land preparation was done manually, clearing and construction of mounds, weeding and harvesting were all done using cutlass, dig hoe and small hoe respectively. The planting was done using a seed size of between 200 - 250g. The experiment was laid out in a Randomize complete Block Design (RCBD) with three replicates each. Weed control was also achieved manually. Harvesting was carried out using small local hoes, six months after planting (6MAP). The emergence and crop vigor were collected at 4WAP, 8WAP and I2WAP and the result was expressed per plot. The number of stands at harvest was counted and result was recorded and the mean was calculated for both years. Total number of tuber was measured using weighing balance and the result were expresses per plot. Undamaged tubers and damaged tubers were also recorded. Data collected were subjected to analysis of variance (ANOVA) using Genstat 7.2 Vision (2007) and means were separated using Duncan multiple range test at 5% level of probability.

RESULTS AND DISCUSSION

The five *rotundata* cultivars showed significant difference in emergence at 4 weeks after planting (4WAP) and 8 Weeks After Planting (8WAP). There was significant difference (P> 0.05) in percentage emergence between the five cultivars. While emergence was high at 4WAP and 8WAP for Ayin, it was low for Tilla and Didie at 4WAP and 8WAP respectively. PNC variety gave the highest percentage emergence of 95.67% at 8WAP with 59.67% at 4WAP. Ayin cultivar gave the highest percentage emergence of 66.33% at 4WAP. The lowest percentage emergence at 4WAP was by Tilla with 51.67% while at 8WAP Didie gave the lowest percentage as 75.00% (Table 1). There is significant difference in plant vigor between the five cultivars (Table 1). Ayin and Toryo showed no significant difference in crop vigor both at 8WAP and I2WAP (3.00 and 5.00). This means that, there is high vigor in the two varieties. Whereas PNC, Didie and Tilla also showed no significant difference.

Results of the yield parameters also shows significant difference (P>0.05) between the various cultivars. Percentage number of stands at harvest was significantly different for all cultivars with Ayin having the highest number of stands (Table 1). Again, the number of seed and ware yams produced per plot and the total fresh tuber yield per plot were significantly (P>0.05) different for all cultivars with the highest values recorded for Toryo. There was no significant difference in number of stand at harvest of Ayin and Torgo cultivars. PNC and Didie gave a significant high yield of 77.67 and 79.33 respectively. There are variability in the mean number of seed and ware tubers per plot with Didie having the highest number of seed tubers. Mean number of total fresh tubers were also significantly different for all cultivars. No significant difference was observed in the mean number of ware tubers in Toryo (14.33) and Ayin (14.33), but there was difference among the other three cultivars. Tuber yield was significantly highest in Toryo and Ayin and lowest in Tilla and Didie.

Different kinds of nematodes and pests were also observed to be associated to the different yam cultivars during the study. In PNC cultivar, those observed include; root-knot nematode, *Scuteionema bradys*, termites and yam mealy bug. termites, yam mealybug and yam beetle were observed. Didie cultivar has a great dominance of *S. bradys* which were highly severed. Those observed on Ayin include root-knot nematode and yam beetle with root-knot attack more severe. Root-knot nematode and mealybug were observed on Tilla, the more severe was root-knot. The yam nematode, *S. bradys;* lesion nematode, *Pratylenchus coffeae*, and termite were observed on Tilla with lesion nematode accounting for more severity. Some visible symptoms of these Infections ranges presence of cracks, necrotic lesions, galls or knots to abnormal tuber shape. The availability of *S. bradys* infection symptoms such as cracks, necrotic lesion, dry-rot. Root-knot nematode, *Meloidogyne spp* showed presence of knots or galls, excessive rooting and knobby or warty appearance while *Pralylenchus spp* with pronounced dry rot.

Variation observed on all cultivars during the emergence and in the yield of total fresh tuber could be attributed to genetic and environmental factors. This agreed with the findings of Alvarez and Hahn (1983) which showed that there is great variation in rate of sprouting among cultivars and consequently their potentials difference for seed yam production. The normal sprouting of infected tubers is suppressed and when they sprout; their performance is lower than the ones obtained from healthy seed yams (Fawole, 1998). The susceptible tuber develops crack longitudinally, and flaking off of yam periderm. This is so because *S. brady* is completely an endorparasite in yam tubers. The dry rot was revealed by peeling the skin. The colour seen at first was yellowish and later become brown to dark colouration. The *S. bradys* can result to loss of edible part of tubers, reduced tubers weight or moisture loss (Emehute *et al., 1998*). Characteristic multiple heavy galls, dry rots and lesions observed on infected tubers is associated with the root-knot nematode (*Meloidogyne spp*), the yam nematode (*S. bradys*) and the lesion nematode (*Pralylenchus coffeae*) respectively.

CONCLUSION AND RECOMMENDATION

Results obtained from this trial showed that the five local *rotundata varieties* performed very well with good yield and agronomic traits, however, on comparison of the five cultivars based on agronomic characteristics and yield attributes, Toryo cultivar showed evidences of high yield and good food quality. It is therefore, recommended for comparative study with improved varieties for food quality in addition to agronomic characteristics, yield attributes and susceptibility to pests and diseases.

REFERENCES

Adegbite AA, Adesiyan, SO, Agbaje GO, Omoloye AA (2005). Host Suitability of Crops under Yam Intercrop to Root-knot Nematode (***Meloidogyne incognita*** Race 2) in South-Western Nigeria. J. Agric. Rural Develop. Trop. Subtrop. 106 (2): 113-118.

Agbaje GO, Adegbite AA, Akinlosotu TA (2003). Performance of new hybrid yam (***D. rotundata*** Poir) varieties in the forest zone of Nigeria. Tropicultura 21(3): 149-152.

Chukwu G.O. and Ikwelle M. C. (2000), Yam: Threats to its sustainability in Nigeria In: *PalawijaNews* 17 (1): 1-14.

Egesi c., Okogbenin, E., Mbanaso E. and Fregene M. (2007) Induced mutations and marker-breeding for the

improvement of root quality traits in cassava. NrCRI, Umudike Annual Report 2007. Pg 22-23

NBS 2012. National Bureau of Statistics/ Federal Ministry of Agriculture and Rural Development Collaborative Survey on National Agriculture Sample Survey (NASS) 2010/2011 Report. Abuja: .Fed Rep of Nigeria.

Osunde ZD 2008. Minimizing post-harvest losses in yam (*Dioscorea sp*p) treatment and techniques. In: GL Robertson, JR Lupien (Eds.): *Using Food Science and Technology to Improve Nutrition and Promote National Developmen*t. Canada: International Union of Food Science and Technology, Chapter 12.

Schlecht et al. (2006), In: Tchabi A (2008), Arbuscular mycorrhizal fungi in the Sub-Saharan

Savannah of Benin and their Association with yam (*Dioscorea spp*). potential for yam growth promotion and reduction of Nematode infestation Inaugural dissertation. Universitat Basel,Togo.

Table1: Mean Values Of Growth Parameters And Yield Of Five Local Varieties Of *Dioscorea Rotundata*

S/N	Cultivars	% Emergence 4wap	8Wap	Crop Vigor 8wap	No. Of Stand at Harvest 12wap		No. Of Seed Tuber/Plot	No.Of Ware Tuber/ Plot	Tuber Shape (1=Smooth ,2=Rough)	Yield Of Ware Tuber/Plot (Kg)	Total Fresh Tuber Yield Plot(Kg)
1.	Ayin	66.33a	93.33b	3.00a	5.00a	92.67a	25.67ab	14.33a	1.00a	17.77ab	25.43ab
2.	PNC	59.67b	95.67a	2.00b	4.00b	77.67b	22.00b	11.33ab	1.00a	14.67ba	22.57ba
3.	Didie	58.33c	75.00e	2.00b	4.00b	79.33b	30.33a	9.00b	1.00a	10.67b	20.07b
4.	Toryo	56.00d	90.67c	3.00a	5.00a	91.00a	26.00ab	14.33a	1.00a	20.47a	29.70a
5.	Tilla	51.67e	81.33d	2.00b	4.00b	77.67b	28.00a	10.33ba	1.00a	13.33ba	21.13ba

. Means with the same letter are not significantly different.

Table2: Pest incidence

S/No	Cultivars	Observed Pests
1.	Ayin	*Meloidogyne sp* *, Yam beetle
2.	PNC	*Meloidogyne sp* *, Yam mealbug*, Termite
3.	Didie	*Scutellonema bradys*, Termite, yam beetle, Mealybug
4.	Toryo	*Pratylenchus coffee*, *Scutellonema bradys*, Termite
5.	Tilla	*Meloidogyne sp*, Yam mealybug

*Indicate more severity and dominance.