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EFFECT OF VEGETABLE COWPEA POPULATION ON COMPONENT CROPS YIELDS AND PRODUCTIVITY OF YAM MINISET BASED SYSTEMS

BY

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ABSTRACT

Field trials were conducted at the research farm of the National Root Crops Research Institute at Umudike in 1999 and 2000 to determine the effect of vegetable cowpea population on the component crops yield and productivity of yam minisett/vegetable cowpea intercropping system. Thirty five gram yam minisett (*Dioscorea rotundata* cv obiaoturugo) planted at 40000/ha was intercropped with vegetable cowpea 'akidi ani' (*Vigna unguiculata* L.Walp sub species *sesquipedallis*) at five cowpea population (0, 20000, 40000, 60000, 800000/ha). Results obtained indicated that intercropping yam minisett with vegetable cowpea decreased yam tuber yield. The decrease became significant at cowpea populations greater than 20000/ha. Vegetable cowpea yield significantly increased with increased with increased cowpea population up to 40000/ha. There was no significant difference between cowpea yields of 1.37, 1.33 and 1.33 t/ha obtained with 40000, 60000 and 80000/ha cowpea populations respectively. Intercropping yam minisett with vegetable cowpea consistently resulted to significantly higher productivity over the sole yam minisett. The highest productivity was obtained with vegetable cowpea intercropped at 4000/ha. Mean productivity over the two years increased from thirty seven two hundred Naira (N 37,200/ha) without cowpea to one hundred and thirty seven thousand two hundred Naira (N 137200/ha) with cowpea at 40000/ha

INTRODUCTION

Yam production in southeastern Nigeria is declining because of low productivity associated with the cropping systems in the region (Unamma *et al* 1985). Yam tubers are relatively cheaper than either cereals or legume grains on per kilogram basis (Ano *et al,* 2003). Moreover, yam tuber yield in the traditional farming system is low because of declining soil fertility. In the time past, yam was the first crop that was planted to a land after long fallow because the nutrient requirement of yam is high. Under high soil nutrient status good yam yield yam tuber yield was obtained and the productivity of the system was high and encouraging to farmers. Presently the fallow period has reduced greatly due to population pressure and this has led to reduced soil fertility resulting to low yam tuber yield in the traditional farming system of southeastern Nigeria. As the productivity of yam cropping system is low, yam (especially seed yams) production in the south eastern Nigeria is no more attractive to the farmers. One of the problems facing yam Scientists now is therefore to develop packages that could improve the productivity of yam based systems in southeastern Nigeria. Mba *et al* (2003) have shown that the productivity of root crops system was improved through intercropping with legume. Ano *et al* (2003) attributed the improvement to the higher cost of legume grains compared to root

crops tubers. Vegetable cowpea 'akidi ani' (*Vigna unguiculata* L.Walp sub species *sesquipedallis*) is a legume that is well adapted to the farming systems of south eastern Nigeria (Udealor, 2002) but presently information on the appropriate population of this legume in yam/vegetable cowpea intercropping system is scarce and there is no literature on the influence of vegetable cowpea on the productivity of yam production system. The objective of this study was to determine the effect of vegetable cowpea population on the yield of component crops and the productivity of yam minisett/vegetable cowpea based system.

MATERIALS AND METHODS

The trial was conducted at the research farm of the National Root Crops Research Institute, Umudike (05° 29'N, 07° 38'E) in the 1999 and repeated in 2000. The soil was sandy loam having pH in water of 5.6, 2.87% organic matter, 15.0 ppm available P, 0.03 c mol/kg exchangeable K, 5.4 c mol/kg ECEC and 0.08% total N.

Thirty five gram yam minisett was planted on tractor made ridges at 40000/ha and vegetable cowpea 'akidi ani' was planted on the sides of the ridges at various populations. All the crops were planted on the same day in June. The treatments comprised vegetable cowpea populations as follows: (i) 20000/ha (ii) 40000/ha (iii) 60000/ha (iv) 80000/ha (v) 0, control, no vegetable cowpea. The plot size was 5 m x 4 m. The treatments were arranged in a randomized complete block design and replicated three times. Vegetable cowpea pods were harvested green from September to October while yam was harvested in December. The crop yields were weighed at harvest. Farm gate prices of the harvested crops were obtained. Productivity of the system was taken as the monetized aggregate yield (Ikeorgu, 2002). The data obtained was subjected to analysis of variance (Gomez and Gomez, 1984) and treatment means compared at 5% probability level.

RESULTS AND DISCUSSION

Yield of component crops

The effect of vegetable cowpea population on the yield of seed yam in yam minisett/cowpea intercrop is shown in Table 1. Intercropping vegetable cowpea with yam minisett progressively decreased seed yam yield as the population of the vegetable cowpea increased. However even though the seed yam yield at vegetable cowpea population of 20000/ha was lower than that of sole yam, the difference was not significant but beyond this

cowpea population, significant decrease in seed yam yield was obtained. In an intercropping system component crops compete for growth resources, this competition becomes more pronounced as population of the crops increases (Udealor, 2002) and may lead to low crop yield in the intercropping systems compared to the yield of the same crop in the sole cropping system (Fregman and Venkateshwarlu(1977) Increasing the vegetable cowpea population in yam minisett/vegetable cowpea intercrop resulted in vegetable cowpea pod yield. Highest mean pod yield of 1.38 t/ha was obtained with vegetable cowpea population of 80000/ha, however this differed only from yield obtained with 20000/ha (Table 2).

Table 1. Effect of vegetable cowpea population on yam tuber yield in 1999 and 2000

Vegetable cowpea population /ha	*Seed Yam Yield (t/ha)*		*Mean (t/ha)*
	1999	*2000*	
0	1.27	2.45	1.86
20000	1.12	2.37	1.75
40000	0.37	2.28	1.38
60000	0.45	2.26	1.36
80000	0.62	1.85	1.24
LSD 0.05	0.52	0.42	0.40

Table 2. Effect of vegetable cowpea population on vegetable cowpea yield in 1999 and 2000

Vegetable cowpea population /ha	*Vegetable cowpea Yield (t/ha)*		*Mean (t/ha)*
	1999	*2000*	
20000	1.97	0.71	0.78
40000	1.43	0.76	1.37
60000	1.75	1.22	1.33
80000	0.62	1.01	1.38
LSD 0.05	0.41	0.21	0.30

Table 3 Effect of vegetable cowpea population on the productivity of yam minisett/ vegetable cowpea intercrop.

Vegetable cowpea population/ha	Productivity* (N/ha)
0	37200
20000	97400
40000	137200
60000	133600
80000	135200
LSD 0.05	32000

* Productivity = monetized aggregate yield

1 t of yam tubers = N 20000; 1 t of vegetable cowpea = N 80000

Productivity of the systems

The effect of vegetable cowpea on the productivity of yam minisett/vegetable cowpea systems is shown in Table 3. Intercropping yam minisett with vegetable cowpea consistently resulted to significantly higher productivity over the sole yam. Mean productivity per hectare over the two years was increased from thirty seven thousand two hundred Naira (N 37200.00) without cowpea to one hundred and thirty seven thousand two hundred Naira with cowpea at 40000/ha. Mba et al (2003) and Ano et al (2003) have also reported that the productivity of root crops systems were improved through intercropping with legume. Ano et al (2003) attributed the improvement to the higher cost of legume grains compared to root crops tubers. One tonne of yam tubers and vegetable cowpea cost twenty thousand and eighty thousand Naira respectively (Table 3). This therefore explains why intercropping yam with vegetable cowpea resulted to higher productivity over sole yam minisett.

CONCLUSION

Intercropping yam minisett with vegetable cowpea increased the productivity of yam minisett based system. Yam minisett intercropped with vegetable cowpea at 40000/ha gave the highest productivity.

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