

**IMPACT OF CROPPING RATIOS OF MAIZE (*Zea mays*)-EGUSI MELON
(*Colocynthis citrullus*) AND NPK FERTILIZER ON SOIL PRODUCTIVITY
RATING OF AN ULTISOL OF EDO STATE **IN** NIGERIA**

ABSTRACT

Three separate field studies were conducted at the Research Farm of University of Benin in Nigeria to determine soil productivity index rating for ultisol in which seven cropping ratios of maize (MA) and egusi-melon (EM) Viz 1:0, 0:1, 1:1, 2:1, 3:1, 1:2 and 1:3) were tested using four rates (0, 200, 400, 600 kg/ha) of NPK 20:10:10 fertilizer for experiments 1 and 2 and six rates (0, 200, 400, 600, 800, 1000 kg/ha) of the fertilizer in experiment 3. The design of the experiment was factorial randomized complete block replicated three times. The soil productivity index rating (PI) was determined to measure the status of the soil for further productivity purposes after consecutive cultivations and harvests. The data at the end of experiment 2, denote the differences between the soil at the end of experiments 1 and 2, respectively, while those for experiment 3 are the differences between experiments 2 and 3 respectively. The highest nutrient depletion (with negative soil productivity rating) occurred in sole maize where no fertilizer was applied as opposed to maize plots treated with the fertilizer at the end of experiment 2. While in experiment 3, the highest nutrient rate was obtained in maize in ratios of 1:2 and 1:3 with egusi melon.

In case of egusi melon, soil productivity ratings were all positive, either sole or intercropped with maize under the various cropping ratios, thus suggesting no nutrient depletion.

Egusi melon in sole or intercrop with maize had positive soil productivity rating under the various fertilizer rates indicating that it did not use all the applied fertilizers and thus favoured the use of the soil for further productivity as nutrients were still available in the soil. It further suggests that egusi melon in mixture with maize does not require as much nutrient as maize does. This does not indicate insufficiency of fertilizer use rather economic purpose.

INTRODUCTION

The type of cropping systems and crops determine soil fertility and nutrient contents because nutrients are derived from the soil by crop for growth [1] Stresses experienced by land resource systems and the soils are quite many. Such stresses may include soil acidity, salinity, poor drainage, erosion [2] and nutrient imbalance or deficiency. These stresses result in reduction in soil productivity. The scientist proposed some methodologies and procedures to assess these factors relating to nutrient stress which includes land use and management systems [3]. Owing to scarcity and high cost of the mineral fertilizers, farmers apply the fertilizers to their crops. Seldom reliance on shifting cultivation system as means of nutrient recovery is no longer feasible due to upsurge in human population mounting pressure on available lands for other purposes [4].

Most small-scale farmers practice intercropping in which different crops are grown in mixtures or combinations; and there is no adequate information on the fertilizer needs of such crops in mixtures. The need for basic understanding of the soil fertility and cropping systems would therefore be relevant. The knowledge of the impact of crops combination will afford the understanding of suitable fertility management approach for the different crop combinations. The objective of this work was to evaluate the restorative and depletive effect of maize and egusi-melon under various cropping ratios using NPK 20:10:10.

MATERIALS AND METHODS

This study was conducted for three consecutive cropping seasons of (2009, 2010 and 2011) between March and August of each year on the University of Benin Teaching and Research Farm in Benin City, Nigeria. The farm lies within the geographical coordinates of longitude $05^{\circ} 04''$ and $06^{\circ} 43''$ E and latitude $05^{\circ} 44''$ N and $07^{\circ} 34''$ N. Soil samples were collected at depth of 0-30 cm in the plots under maize and egusi melon tested to various cropping ratios and fertilizer rates. To determine the physical (sand, silt, clay) and chemical (pH, % C, N, P, K, Ca, Mg, Na, S) of soils prior of planting and after harvest of the crops standard procedures [5] were used. The experimental site was manually cleaned-up with hoes and cutlasses and mapped out for the three experiments conducted in (2009, 2010 and 2011) as experiments 1, 2 and 3. Experiments 1 and 2, were laid as a 4 x 7 factorial experiment fitted into a randomized complete block design with three replications. The treatments consisted of 4 levels (0, 200, 400, 600 kg/ha) of NPK

20:10:10 and seven cropping ratios of maize and egusi melon of maize (MA) and egusi-melon (EM) Viz (1:0, 0:1, 1:1, 2:1, 3:1, 1:2 and 1:3). While in Experiment 3 the fertilizer rates were increased to six levels of (0, 200, 400, 600, 800 and 1000 kg/ha) under the same test crops, this resulted in 42 experimental plots equally replicated three times translating to 126 plots. The reason for the increase in the treatments to six in experiment 3 was to validate the earlier results of experiments 1 and 2. Maize variety DMR-ESR-W (Downy mildew resistant, early maturing streak resistant white); and “serewe” variety of egusi melon were the test crops used in the experiment. In each experiment, maize (MA) and egusi melon (EM) were planted in seven cropping ratios (Ma – EM) as 1:0, 0:1, 1:1, 2:1, 3:1, 1:2 and 1:3, respectively, with plant population as 64:0, 64:0, 32:32, 48:24, 48:16, 24:48 and 16:48; both crops were spaced at 75 cm x 90 cm at 3 seeds per stand in 16.2 m² plot and thinned to 2 plants/stand at 5 days after seedling emergence. Manual weeding was done thrice each year using hand hoe. Maize was harvested at 85 days after planting (DAP) and for egusi-melon, pods were harvested at (98 DAP). Soil productivity index (PI) was calculated as follows[2] :

Pre cropping yield =

$$\frac{\text{Yield in the previous year} - \text{yield in current year}}{\text{Yield in previous year}} \times \frac{100}{1}$$

Data was collected on soil productivity and properties. The data obtained were subjected to statistical analysis of variance (ANOVA) using GENSTAT following the model for

factorial experiment in a randomized complete block design and means were separated by Duncan Multiple Range Test (DMRT).

RESULTS

Soil Productivity of maize and egusi melon in sole and intercrop systems

The sole productivity index/rating (PI) is a measure of the status of the soil for further productivity purposes after two consecutive harvests. Thus, the data at the end of Experiment 2 in Table 1 denotes the differences between the soil status at the end of Experiments 1 and 2, respectively, while those for experiment 3 are for the differences between Experiments 2 and 3, respectively.

At the end of experiment 2, the highest nutrient depletion (that is the lowest negative soil productivity rating) occurred in maize sole crop under no fertilizer application compared with where 20:10:10 NPK fertilizer was applied (Table 1) while in Experiment 3, the highest nutrient depletion rate was obtained in maize 1:2 and 1:3 ratios with egusi melon (Table 3); whereas, in the case of egusi melon, soil productivity ratings were all positive thus indicating no nutrient depletion (Table 2). The maize depleted more soil nutrients than did egusi-melon (Tables 3) ; suggesting left over of nutrients in plots where egusi-melon was cultivated. Maize had more negative ratings indicating high nutrient depletion. The few positive ratings observed in maize occurred where it was combined with egusi-melon meaning that egusi-melon moderated rate of nutrient consumption by maize.

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103 **Table 1: Soil productivity of maize in sole and intercrop with egusi-melon**

Cropping Ratios/ 20:10:10 NPK fertilizer rates (kg/ha)	Soil productivity index (P1) Experiments	
	2	3
Sole maize + 0 kg NPK	-28	-12
Sole maize + 200 kg NPK	-16	-17
Sole maize + 400 kg NPK	-12	-20
Sole maize + 600 kg NPK	-05	-17
Ma : Em 1:1 ratio + 0 kg NPK	+13	-23
Ma : Em 1:1 ratio + 200 kg NPK	+02	-24
Ma : Em 1:1 ratio + 400 kg NPK	+05	-26
Ma : Em 1:1 ratio + 600 kg NPK	+02	-24
Ma : Em 2:1 ratio + 0 kg NPK	-19	-10
Ma : Em 2:1 ratio + 200 kg NPK	-09	-10
Ma : Em 2:1 ratio + 400 kg NPK	+09	-14
Ma : Em 2:1 ratio + 600 kg NPK	-07	-18
Ma : Em 3:1 ratio + 0 kg NPK	-14	-25
Ma : Em 3:1 ratio + 200 kg NPK	-05	-24
Ma : Em 3:1 ratio + 400 kg NPK	-07	-11
Ma : Em 3:1 ratio + 600 kg NPK	-08	-16
Ma : Em 1:2 ratio + 0 kg NPK	-16	-57
Ma : Em 1:2 ratio + 200 kg NPK	-03	-35
Ma : Em 1:2 ratio + 400 kg NPK	-03	-36
Ma : Em 1:2 ratio + 600 kg NPK	-04	-28
Ma : Em 1:3 ratio + 0 kg NPK	+15	-40
Ma : Em 1:3 ratio + 200 kg NPK	+15	-42
Ma : Em 1:3 ratio + 400 kg NPK	+07	-44
Ma : Em 1:3 ratio + 600 kg NPK	-04	-30

104 Rates of 800 and 1000 kg/ha of 20:10:10 NPK fertilizer were not applicable in
 105 experiments 1 and 2.

106 Ma - Maize

107 Em - Egusi melon

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110 **Table 2: Soil Productivity of Egusi-Melon in Sole and Intercrop with Maize**

Cropping Ratios / 20:10:10 NPK fertilizer rates (kg/ha)	Soil productivity index (P1) Experiments	
	2	3
Sole maize + 0 kg NPK	+26	+24
Sole maize + 200 kg NPK	+30	+26
Sole maize + 400 kg NPK	+35	+22
Sole maize + 600 kg NPK	+43	+40
Ma : Em 1:1 ratio + 0 kg NPK	+33	+18
Ma : Em 1:1 ratio + 200 kg NPK	+33	+18
Ma : Em 1:1 ratio + 400 kg NPK	+36	+24
Ma : Em 1:1 ratio + 600 kg NPK	+06	+34
Ma : Em 1:2 ratio + 0 kg NPK	+35	+20
Ma : Em 1:2 ratio + 200 kg NPK	+35	+18
Ma : Em 1:2 ratio + 400 kg NPK	+34	+24
Ma : Em 1:2 ratio + 600 kg NPK	+37	+34
Ma : Em 1:3 ratio + 0 kg NPK	+33	+10
Ma : Em 1:3 ratio + 200 kg NPK	+31	+3
Ma : Em 1:3 ratio + 400 kg NPK	+33	+9
Ma : Em 1:3 ratio + 600 kg NPK	+36	+30
Ma : Em 2:1 ratio + 0 kg NPK	+37	+19
Ma : Em 2:1 ratio + 200 kg NPK	+32	+18
Ma : Em 2:1 ratio + 400 kg NPK	+34	+23
Ma : Em 2:1 ratio + 600 kg NPK	+35	+35
Ma : Em 3:1 ratio + 0 kg NPK	+32	+21
Ma : Em 3:1 ratio + 200 kg NPK	+35	+19
Ma : Em 3:1 ratio + 400 kg NPK	+37	+31
Ma : Em 3:1 ratio + 600 kg NPK	+28	+15

111 Rate 800 and 1000 kg/ha 20:10:10 NPK fertilizer were not applicable in experiments 1
 112 and 2.

113 Ma - Maize

114 Em - Egusi melon

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117 **Table 3: Effects of cropping ratios of maize and egusi melon on some soil properties**
 118 **in maize-melon plots**

Soil Parameters Experiment 1	Before planting	Cropping Ratios				1:2 harvest	1:3	2:1	3:1	S.E.
		1:0	0:1	1:1	After					
pH (H ₂ O)	5.75	5.68	5.65	5.64	5.63	5.71	5.68	5.66	0.12	
% C	1.08	1.30	1.23	1.42	1.36	1.40	1.32	1.38	1.05*	
N (g-kg)	7.60	7.96	7.60	8.40	8.00	8.35	7.98	8.10	0.31*	
P (c.mol. kg)	15.85	16.15	17.75	18.35	18.10	17.90	17.80	17.90	0.77*	
Na (c.mol. kg)	7.90	7.80	7.90	7.80	8.00	7.90	7.75	7.70	0.31	
K (c.mol. kg)	41.10	39.60	40.90	41.85	40.60	42.25	42.70	40.70	1.62***	
Ca (c.mol. kg)	225.20	198.0	197.2	201.4	183.7	196.7	205.2	197.2	7.40***	
Mg (c.mol. kg)	41.10	32.90	33.40	32.75	34.15	35.05	34.60	34.00	0.52***	
S (c.mol. kg)	0.17	0.18	0.19	0.19	0.19	0.18	0.20	0.18	0.01***	
Sand (%)	75.64	77.64	78.72	76.84	78.12	79.10	77.13	76.16	4.1	
Silt (%)	12.34	11.35	12.24	12.06	12.14	11.56	12.09	12.60	1.28	
Clay (%)	12.02	11.01	9.04	11.10	9.74	9.34	10.78	11.26	0.40***	
Experiment 2										
pH (H ₂ O)	5.80	5.85	5.81	5.85	5.91	5.92	5.93	5.95	0.11	
% C	1.30	1.43	1.27	1.43	1.88	1.85	1.94	1.96	0.07*	
N (g-kg)	8.15	8.25	7.96	8.20	8.45	8.38	8.55	8.60	0.32*	
P (c.mol. kg)	15.06	16.75	18.02	18.22	18.42	18.65	19.01	19.03	3.9	
Na (c.mol. kg)	7.60	7.90	8.15	8.10	8.00	7.95	7.85	7.70	0.30*	
K (c.mol. kg)	39.20	40.66	40.23	42.02	42.93	43.40	43.70	44.10	0.62*	
Ca (c.mol. kg)	189.40	205.3	214.6	216.6	218.1	221.4	222.1	225.5	8.26*	
Mg (c.mol. kg)	33.90	35.60	34.6	36.6	37.5	37.8	38.0	41.0	0.57*	
S (c.mol. kg)	0.20	0.15	0.19	0.19	0.16	0.15	0.15	0.14	0.01*	
Sand (%)	77.46	75.64	77.11	76.35	77.43	78.46	76.74	78.00	2.23	
Silt (%)	11.35	12.34	11.35	11.74	11.57	7.66	11.11	12.60	0.49*	
Clay (%)	10.19	12.02	11.54	11.91	11.00	13.88	12.15	9.40	0.52*	
Experiment 3										
pH (H ₂ O)	5.95	5.83	5.87	5.84	5.84	5.90	5.86	5.88	0.09	
% C	1.40	1.45	1.86	1.74	1.68	1.95	1.83	1.79	0.07*	
N (g-kg)	7.86	8.62	8.78	8.50	8.53	9.10	8.20	8.35	0.79*	
P (c.mol. kg)	21.14	22.92	23.85	21.73	22.84	22.99	22.70	23.10	2.10	
Na (c.mol. kg)	6.50	5.70	6.75	6.70	6.85	6.80	6.70	6.75	0.30	
Mg (c.mol. kg)	40.38	41.98	43.86	41.25	42.52	42.75	41.05	40.50	0.57	
K (c.mol. kg)	44.25	42.34	45.15	43.75	44.80	43.60	42.41	41.85	0.71*	
Ca (c.mol. kg)	231.60	229.16	234.46	231.13	235.10	236.20	229.88	227.37	8.51*	
S (c.mol. kg)	0.17	0.16	0.18	0.18	0.19	0.18	0.12	0.18	0.07	
Sand (%)	74.61	75.22	73.67	75.03	74.77	73.81	75.51	76.51	0.03	
Silt (%)	13.33	14.34	15.21	15.01	15.06	14.33	13.46	13.73	0.52*	
Clay (%)	12.06	11.44	10.12	9.96	10.17	11.86	11.03	9.85	0.51*	

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120 * significant at 5 % level of probability

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122 ** highly significant at 1 % level of probability

Table 4: Effect of 20:10:10 NPK fertilizer rates (kg/ha) on some soil properties in maize-egusi melon in experiments 1, 2 and 3

Soil Parameters	Before planting	0	200 After	400 harvest	600	Cropping Ratios		S.E
						800	1000	
Experiment 1								
pH (H ₂ O)	5.75	5.73	5.72	5.76	5.88	-	-	0.07
% C	1.08	1.39	1.42	1.40	1.56	-	-	0.21
N (g kg ⁻¹)	7.60	7.48	7.87	7.78	7.92	-	-	0.26
P (c.mol. kg)	15.85	15.92	17.55	7.50	6.95	-	-	0.17
Na (c.mol. kg)	7.90	7.60	7.55	7.50	6.95	-	-	0.17***
K (c.mol. kg)	41.10	42.13	41.85	42.40	43.51	-	-	0.88
Ca (c.mol. kg)	225.20	192.9	193.7	194.6	196.7	-	-	16.72
Mg (c.mol. kg)	41.00	32.75	33.50	34.40	35.00	-	-	0.36*
S (c.mol. kg)	0.17	0.18	0.18	0.20	0.22	-	-	0.02
Sand (%)	75.64	77.00	77.02	76.76	74.68	-	-	1.67
Silt (%)	12.34	11.35	11.59	12.64	13.06	-	-	0.30*
Clay (%)	12.02	11.65	11.39	12.10	12.26	-	-	0.78
Experiment 2								
pH (H ₂ O)	5.80	5.88	5.91	5.94	5.89	-	-	0.06
% C	1.30	1.74	1.65	1.88	2.01	-	-	0.53
N (g kg ⁻¹)	8.15	7.60	7.96	8.40	8.20	-	-	0.20*
P (c.mol. kg)	15.06	16.15	17.31	18.02	18.22	-	-	0.52*
Na (c.mol. kg)	7.60	7.85	7.93	7.85	8.10	-	-	0.33
K (c.mol. kg)	39.20	41.10	40.23	39.86	43.40	-	-	0.41*
Ca (c.mol. kg)	189.40	225.2	225.2	221.4	220.1	-	-	18.41
Mg (c.mol. kg)	33.90	41.0	39.7	38.0	36.6	-	-	0.39*
S (c.mol. kg)	0.20	0.17	0.19	0.18	0.19	-	-	0.02
Sand (%)	77.46	75.64	74.66	76.42	78.24	-	-	1.61
Silt (%)	11.35	12.34	12.12	12.36	10.60	-	-	0.30*
Clay (%)	10.19	12.02	13.22	11.22	11.16	-	-	0.29*
Experiment 3								
pH (H ₂ O)	5.95	5.83	5.85	5.84	5.81	5.84	5.86	0.07
% C	1.40	1.42	1.44	1.51	1.48	1.63	1.68	0.08
N (g kg ⁻¹)	7.86	8.20	8.90	9.32	9.47	9.56	9.72	0.09
P (c.mol. kg)	21.14	24.29	25.43	22.62	19.56	24.78	21.28	0.71***
Na (c.mol. kg)	6.50	6.20	6.35	6.85	6.93	6.55	6.40	0.43***
K (c.mol. kg)	231.60	198.8	223.60	222.10	216.30	221.50	227.7	0.53***
						0		
Ca (c.mol. kg)	44.25	39.57	41.40	40.24	38.75	42.23	43.02	1.34
Mg (c.mol. kg)	40.38	20.29	20.96	21.33	21.84	22.54	24.82	1.06
S (c.mol. kg)	0.17	0.19	0.20	0.21	0.23	0.22	0.20	0.03
Sand (%)	74.61	76.61	75.21	74.83	75.41	73.31	73.16	2.01
Silt (%)	13.33	12.74	12.77	13.51	12.84	14.74	14.70	1.84
Clay (%)	12.06	10.65	12.02	11.66	11.75	11.95	12.14	1.54

Rates of 800 and 1000 kg-ha of 20:10:10 NPK fertilizer were not applicable in experiments 1 and 2.

* significant at 5 % level of probability

** highly significant at 1 % level of probability

130 **Table 5: Effect of 20:10:10 NPK fertilizer rates (kg / ha) on some soil properties in**
 131 **maize-egusi melon in experiment 3**

Soil properties Experiment 1	Cropping Ratios							S.E
	1:0	0:1	1:1 After	1:2 harvest	1:3	2:1	3:1	
P ^H (H ₂ O)	5.95	5.83	5.85	5.84	5.81	5.84	5.86	0.07
% C	1.40	1.42	1.44	1.51	1.48	1.63	1.68	0.08
N (g-kg)	7.86	8.20	8.90	9.32	9.47	9.56	9.72	0.09
P (c.mol. kg)	21.14	24.29	25.43	22.62	19.56	24.78	21.28	0.71***
Na (c.mol. kg)	6.50	6.20	6.35	6.85	6.93	6.55	6.40	0.43***
K (c.mol. kg)	231.60	198.8	223.60	222.10	216.30	221.50	227.70	0.53***
Ca (c.mol. kg)	44.25	39.57	41.40	40.24	38.75	42.23	43.02	1.34
Mg (c.mol. kg)	40.38	20.29	20.96	21.33	21.84	22.54	24.82	1.06
S (c.mol. kg)	0.17	0.19	0.20	0.21	0.23	0.22	0.20	0.03
Sand (%)	74.61	76.61	75.21	74.83	75.41	73.31	73.16	2.01
Silt (%)	13.33	12.74	12.77	13.51	12.84	14.74	14.70	1.84
Clay (%)	12.06	10.65	12.02	11.66	11.75	11.95	12.14	1.54

132 * significant at 5 % level of probability

133 ** highly significant at 1 % level of probability

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DISCUSSION

In maize intercropped with egusi melon, nutrient depletion occurred mainly in maize-egusi melon sown at 2:1 and 3:1 ratios and the intensity of nutrient depletion in soil was highest when no fertilizer application (0 kg/ha of 20:10:10 NPK) took place. At the end of Experiment 2, the PI was positive for cropping ratios of both 1:1 and 1:3 which indicated that a maize-egusi melon mixture of either a similar population component or a higher component of egusi melon did not deplete the soil nutrients and favoured the use of the soil for further productivity as nutrient was still available in the soil.

At the end of experiment 3, the PI became negative in all the treatments irrespective of cropping ratios and fertilizer rates (Table 1) and the soil nutrient depletion was highest in intercropped maize, compared with sole maize, and the intensity of this depletion generally increased in the lower rate of 20:10:10: N P K application as shown in mixture ratios of 3:1, 1:2 and 1:3, respectively. Maize which depletes the soil more of its nutrients when intercropped with some other crops [6] On the other hand, the intensity of soil nutrient depletion increased with higher fertilizer rates in maize-egusi melon ratio of 2:1 while the PI was similar at all rates in the 1:1 crop mixture.

The depletion in nutrients by maize intercropped with egusi melon at the end of experiment 3 was higher in the mixture ratio of 1:3 and next was the crop mixture of 1:2 ratio which was indicative of the poor competitive ability of the high egusi melon component in the mixtures for nutrient. The reason might be that maize demands more N fertilizer for growth and development than the egusi melon [7]. The depletion of soil

156 nutrients by maize occurred where its population was higher than that of egusi melon.
157 Earlier reports indicated that increasing maize population in cassava/maize/melon [7, 8]
158 and cassava/maize/melon mixtures [9] removed more N, P and K than the other crops in
159 association with maize. Similar experience indicated that increasing maize population
160 also decreased yield of cassava [10, 11] and egusi melon [12] in separate trials. This
161 confirms the indispensibility of N, P and K in the nutrition of maize [8].

162 The trend in the PI rating of the soil was similar for all the treatments of egusi melon, that
163 is, egusi melon grown as either sole crop or intercropped with maize and at various
164 cropping ratios and fertilizer rates. At the end of Experiments 2 and 3, respectively, the
165 soil productivity rating was positive, which indicated that egusi melon did not use all the
166 applied fertilizer nutrients, an indication that nutrients were still available in the soil. This
167 was reflected in the high amounts of nutrients left in the soil after harvest. This is
168 considered to be an advantage to the farmer as the cost of fertilizer input will be reduced
169 with respect to egusi melon cultivation unlike interspecific competition by maize which
170 prevented much vegetative growth of cassava crop and subsequently its yield in intercrop
171 with maize [10, 11, 8]. This suggests that egusi melon intercropped with maize does not
172 require as much nutrient as maize does. It does not suggest insufficiency of fertilizer use
173 by egusi melon. The implication of these ratings for the maize and egusi melon
174 components of the crop mixture is that maize depleted soil productivity more than egusi
175 melon at the end of Experiment 2 and 3 respectively. The few +PI ratings recorded for
176 maize suggest moderate influence of egusi melon on maize uptake of fertilizer nutrients

[12]. It is reasonable to assume that the soil productivity would therefore increase or decrease according to the changes in the soil nutrient content.

In computing the PI in Tables 1 and 2, 800 and 1000 kg/ha fertilizer rates were not used as these rates were introduced as treatments only in Experiment 3.

Results from this study suggest that the ascribed index rating can be used to predict the restorative or depletive power of both crops. However, it needs to be emphasized that N P K fertilizer is not the only factor that can determine soil productivity; as many factors interactively govern the appreciation and depreciation of soil productivity [13, 14].

It is reasonable to emphasize that egusi melon is a poor competitor with maize for applied fertilizers [14] as cowpea was with millet [15] and that maize will deplete the soil more of nutrients than egusi melon. Furthermore, egusi melon in mixture with maize can help to improve total productivity of the later crop [16] as cowpea was with millet [15] and that maize will deplete the soil more of nutrients than the egusi melon. Furthermore, egusi melon in mixture with maize can help to improve total productivity of the later crop as was the case of the former crop with Okra in a similar experiment [16].

CONCLUSION

Maize depleted more soil nutrients than egusi-melon. Intensity of the nutrient depletion increased with higher rates of the NPK fertilizers in maize-egusi melon ratios of 2:1 and 3:1. The few +PI ratings recorded for maize indicated moderate influence of the egusi melon on maize uptake of the nutrients and that egusi-melon had poor competitive ability with maize for the nutrients. Egusi-melon does not require as much nutrients as maize does. Maize and egusi-melon are compatible in intercrop with respect to nutrient demand. The higher components of egusi melon with maize did not deplete the soil nutrients and thus favour the use of the soil for further productivity as nutrients were still available in the soil.

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