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IMPACT OF CROPPING RATIOS OF MAIZE (zea mays)-EGUSI MELON (colocynthis citrullus) AND NPK FERTILIZER ON SOIL PRODUCTIVITY RATING OF AN ULTISOL IN EDO STATE, NIGERIA.

ABSTRACT

Three separate field studies were conducted at the University of Benin farm in Nigeria to determine soil productivity index rating for ultisol in which seven cropping ratios of maize (MA) and egusi-melon (EM); (MA:EM 1:0, 0:1, 1:1, 2:1, 3:1, 1:2 and 1:3) were tested using four rates (0, 200, 400, 600kg/ha) of NPK 20:10:10 fertilizer for experiments 1 and 2; six rates (0, 200, 400, 600, 800, 1000kg/ha) of the fertilizer in experiment 3. The design of the experiment was factorial fitted in a randomized complete block design that was 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 in table 1 denotes the difference 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. And in experiment 3, the highest nutrient rate was obtained in maize in ratios of 1:2 and 1:3 with egusi melon.

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In the case of egusi melon, soil productivity ratings were all positive, either where planted 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 producing 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 for this 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.

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 [5] Stresses experienced by land resource systems and the soils are quite many. Such stresses may include soil acidity, salinity, poor drainage, erosion [4] and nutrient imbalance or deficiency. These stresses result in reduction in soil productivity. [12] proposed some methodologies and procedures to assess these factors relating to nutrient stress which includes land use and management systems.

Owing to scarcity and high cost of the mineral fertilizers, farmers seldomly apply the fertilizers to their crops. And reliance on shifting cultivation system as means of nutrient

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recovery is no longer feasible due to upsurge in human population mounting pressure on available lands for other purposes [8].

Most small-scale farmers practice intercropping in which different crops are grown in mixtures or combinations; and no adequate information on the fertilizer needs of such crops in mixtures. Farmers usually base their information in the fertilizer need of crops grown in mixtures on any one of the crops. 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 as the soil quality indicators.

MATERIALS AND METHOD

This study was conducted for three consecutive cropping seasons (2009, 2010 and 2011) on the University of Benin teaching and Research farm in Benin City, Nigeria (5^0 04' and 6^0 43E, 6^0 14'S and 7^0 34'N) between March and August of each year. Soil samples were obtained at depth of 0 – 30cm in the plots under maize and egusi melon tested to various cropping ratios and fertilizer rates. Standard procedures for the analysis of the soil's physical (sand, silt, clay) and chemical (P^H, % C, N, P, K, Ca, Mg, Na, S) were used as

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described by [5] to determine these properties prior to planting and after harvest of the crops.

The experimental site was manually cleared and mapped out for the three experiments (2009, 2010, 2011) as experiments 1, 2 and 3 respectively. The experiment consisted of 4 levels (0, 200, 400, 600 kg/ha) of NPK 20:10:10 and seven cropping ratios of maize and egusi melon functional in a randomized complete block design replicated three times. The factorial combination of the experiment resulted in 28 treatments replicated three times amounted to 84 plots of 16.2m^2 each for experiments 1 and 2; while in experiment 3 the fertilizer rates were increased to six (0, 200, 400, 600, 800 and 100 kg/ha) under the same test crops, plot size and NPK 20:10:10 fertilizer rates. 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 nuldew resistant, early maturing streak resistant white); and “serewe” variety of egusi melon as described by [1] were the test crops under four rates (0, 200, 400, 600 kg/ha) of NPK 20:10:10 for experiments 1 and 2, respectively and six rate (0, 200, 400, 600, 800, 1000 kg/ha) in experiment 3.

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 75cm x 90cm as recommended [10] at 3 seeds per stand in 16.2m^2 plot and thinned to 2

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seeds/stand at 5 days after seedling emergence. Manual weeding was done thrice each year using hand hoe.

Maize was harvested dry at 85 days after planting (DAP) and for egusi-melon, pods were partially split open to allow for fermentation to occur before seed extraction and sun drying (for 5 days) when the leaves had dried up completely (98 DAP).

The objective of this study was to develop soil productivity rating index (PI) for various crops using maize and egusi-melon as the test crops under varying fertilizer rates and cropping ratios. The PI procedure is used to develop an index of soil productivity rating which can be used by farmers to calculate or predict safe and unsafe cropping systems. Soil productivity index (PI) as described by [4] states that:

Pre cropping yield =

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

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RESULTS

Soil Productivity of maize and egusi melon in sole and intercrop

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 where planted sole 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 1); whereas, in the case of egusi melon, soil productivity ratings were all positive thus indicating no nutrient depletion (Table 2). The maize depleted the soil more of nutrients than did egusi-melon (Tables 3, and); 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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Table 1: Determination of 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
Maize in 1:1 ratio with melon + 0 kg NPK	+13	-23
Maize in 1:1 ratio with melon + 200 kg NPK	+02	-24
Maize in 1:1 ratio with melon + 400 kg NPK	+05	-26
Maize in 1:1 ratio with melon + 600 kg NPK	+02	-24
Maize in 2:1 ratio with melon + 0 kg NPK	-19	-10
Maize in 2:1 ratio with melon + 200 kg NPK	-09	-10
Maize in 2:1 ratio with melon + 400 kg NPK	+09	-14
Maize in 2:1 ratio with melon + 600 kg NPK	-07	-18
Maize in 3:1 ratio with melon + 0 kg NPK	-14	-25
Maize in 3:1 ratio with melon + 200 kg NPK	-05	-24
Maize in 3:1 ratio with melon + 400 kg NPK	-07	-11
Maize in 3:1 ratio with melon + 600 kg NPK	-08	-16
Maize in 1:2 ratio with melon + 0 kg NPK	-16	-57
Maize in 1:2 ratio with melon + 200 kg NPK	-03	-35
Maize in 1:2 ratio with melon + 400 kg NPK	-03	-36
Maize in 1:2 ratio with melon + 600 kg NPK	-04	-28
Maize in 1:3 ratio with melon + 0 kg NPK	+15	-40
Maize in 1:3 ratio with melon + 200 kg NPK	+15	-42
Maize in 1:3 ratio with melon + 400 kg NPK	+07	-44
Maize in 1:3 ratio with melon + 600 kg NPK	-04	-30

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

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Table 2: Determination of 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
Maize in 1:1 ratio with melon + 0 kg NPK	+33	+18
Maize in 1:1 ratio with melon + 200 kg NPK	+33	+18
Maize in 1:1 ratio with melon + 400 kg NPK	+36	+24
Maize in 1:1 ratio with melon + 600 kg NPK	+06	+34
Maize in 1:2 ratio with melon + 0 kg NPK	+35	+20
Maize in 1:2 ratio with melon + 200 kg NPK	+35	+18
Maize in 1:2 ratio with melon + 400 kg NPK	+34	+24
Maize in 1:2 ratio with melon + 600 kg NPK	+37	+34
Maize in 1:3 ratio with melon + 0 kg NPK	+33	+10
Maize in 1:3 ratio with melon + 200 kg NPK	+31	+3
Maize in 1:3 ratio with melon + 400 kg NPK	+33	+9
Maize in 1:3 ratio with melon + 600 kg NPK	+36	+30
Maize in 2:1 ratio with melon + 0 kg NPK	+37	+19
Maize in 2:1 ratio with melon + 200 kg NPK	+32	+18
Maize in 2:1 ratio with melon + 400 kg NPK	+34	+23
Maize in 2:1 ratio with melon + 600 kg NPK	+35	+35
Maize in 3:1 ratio with melon + 0 kg NPK	+32	+21
Maize in 3:1 ratio with melon + 200 kg NPK	+35	+19
Maize in 3:1 ratio with melon + 400 kg NPK	+37	+31
Maize in 3:1 ratio with melon + 600 kg NPK	+28	+15

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

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Table 3: Effects of Cropping ratios of maize and egusi melon on some soil properties in maize-melon plots.

Soil Parameters	Before planting	1:0	01:	1:1 After	1:2 Harvest	1:3	2:1	3:1	S.E
		←			Cropping Ratios		→		
Experiment 1									
P^H (H_2O)	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									
P^H (H_2O)	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									
P^H (H_2O)	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	675	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*

*($P<0.05$)

***($P<0.001$)

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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 800	1000	S.E
Experiment 1								
P^H (H_2O)	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)	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						-	-	
P^H (H_2O)	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)	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								
P^H (H_2O)	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

Rates of 800 and 100 kg-ha of 20:10:10 NPK fertilizer were not applicable in experiments 1 and 2.

*($p<0.05$)
**($P<0.001$)

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136 **Table 5: Effect of 20:10:10 NPK Fertilizer rates (kg-ha) on some soil properties in**
137 **maize-egusi melon in experiment 3**

Soil Parameters Experiment 1	Before planting	1:0	01:	1:1 After	Cropping Ratios 1:2 Harvest	1:3	2:1	3:1	S.E
P^H (H_2O)	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	

138 *(P<0.05)

139 ***(P<0.001)

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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 (0kg/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 was indicative 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 for this 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 generally increased the lower the rate of 20:10:10: NPK application as shown in mixture ratios of 3:1, 1:2 and 1:3 respectively. 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.

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The trend in the PI rating of the soil was similar for all the treatments of egusi melon, that is, egusi melon grown as either sole crop or intercropped with maize and at various cropping ratios and fertilizer rates (Table 2). At the end of Experiments 2 and 3 respectively the soil productivity rating was positive, which indicated that egusi melon did not use all the applied fertilizer nutrients, an indication that nutrients were still available in the soil. This was reflected in the high amounts of nutrients left in the soil after harvest as shown in tables 3, and 4. This suggests that egusi melon intercropped with maize does not require as much nutrient as maize does. It does not suggest insufficiency of fertilizer use by the egusi melon. The implication of these ratings for the maize and egusi melon components of the crop mixture is that maize depleted soil productivity more than egusi melon at the end of Experiment 2 and 3 respectively. The few +PI ratings recorded for maize suggest moderate influence of the egusi melon on maize uptake of fertilizer nutrients [9]. 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 1000kg/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 NPK fertilizer is not the only factor that can determine soil productivity; as many factors interactively govern the appreciation and depreciation of soil productivity [2] ; [4]

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It is reasonable to emphasize that egusi melon is a poor competitor with maize for applied fertilizers [4] as cowpea was with millet [13] 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 [7] as cowpea was with millet [13] 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 [7] as was the case of the former crop with Okra in a similar experiment [7].

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CONCLUSION

Maize depleted the soil of nutrients more than the 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 for this in the soil.

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