INFLUENCE OF NPK (15:15:15) AND ORGANO-MINERAL FERTILIZER ON THE PERFORMANCE OF PEPPER

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ABSTRACT

A study was carried out in 2005 cropping season to determine the response of pepper (*Capsicum frutescens L.)* and organo-mineral fertilizer (OMF) in oxic paleustaff at parry road University of Ibadan ($7^0$21N 3^0 54 E). The experimental layout was a randomized complete block design with seven treatments; control (No soil additive), 50kgha^{-1}NPK, 100kgha^{-1}NPK, 150kgha^{-1} NPK, 2.5tonha^{-1} OMF +50kgha^{-1}NPK and 2.5tonha^{-1}OMF + 100kgha^{-1}NPK. The experiment was replicated three times. The parameters observed were plant height, number of leaves, plant branches, and number of fruit per plant and fresh weight of fruit.

Soil samples were taken randomly at different location on the experimental plot to the depth of 15cm. Routine analysis was carried out to determine the physical and chemical properties of the soil before planting. However, the nutrient status of the soil was found to be lower to the critical range for optimum crop production.

Result obtained showed that 100kgha^{-1} NPK (15:15:15) was significantly improved pepper plant height, number of leaves, plant branches, number of fruit per plant and fresh weight of fruit than other treatments. The result showed that optimum yield of pepper could be achieved with the application of 100kgha^{-1}NPK (15:15:15).
Key words: Pepper, NPK Fertilizer, Organo-mineral fertilizer

INTRODUCTION

Pepper (*Capsicum frutescens L.)* originated from West Indies, Peru, Mexico and America. Pepper production in West Africa was mainly for home consumption in the past. The trend has changed however in Nigeria; export of chili pepper to Europe is now a lucrative business (Erinle, 1989). It was considered useful because of its peculiar hot taste attributed to an alkaloid called capsicum, high vitamin and mineral contents (Chadwick and Craker, 1984).

However, fertilizer plays a catalytic part in protein synthesis, chlorophyll formation, carbon assimilation and acceleration of enzymatic actions (Hedge, 2001). Efficient use of fertilizer is necessary to balance and maintain the optimum levels at which fertilizer could be used without being detrimental to the soil. In the recent time, application of combined organic and inorganic fertilizers has been suggested and being more sustainable than the separate application of each organic and inorganic fertilizer (Aliyu and Olanrewaju, 2000; Giller, 2002).

Generally, many functions had been attributed to NPK Fertilizer and it serves as easy source of nutrient release to plants (Agboola, 1986). NPK fertilizer increases the ability of plants to

resist bacteria and fungi attack (Vanlauwe et al., 2002). With organo-mineral fertilizer, the mineral fertilizers present are readily available for the immediate use of crops while the organic components slowly release nutrients for plant use. It also has a residual effect on soil which application may not be necessary in the next cropping season (Giller, 2002). Therefore, this work was designed to comparatively study the effect of NPK (15:15:15) and organo-mineral fertilizer on the growth and yield of pepper.

MATERIAL AND METHODS

The study was carried out on the farm along parry road, University of Ibadan ($7^0$21N $3^0$54E). The soil of the area is oxic paleustaff according to the USDA classification and belongs to Egbeda series (Smyth and Montgomery, 1962). The experiment was a randomized complete block design of 7 treatments with three replicates. Each plot was $9m^2$ and treatment consisted of 50kgha^{-1}NPK, 100kgha^{1}1NPK, 150kgha^{-1}NPK, 2.5 ton ha^{-1}OMF, 2.5ton ha^{-1}OMF + 50kgha^{-1}NPK, 2.5ton ha^{-1}OMF + 100kgha^{-1}NPK and no soil additive were used as control treatments. Soil samples were taken randomly at different location on the experimental plot to the depth of 15cm with auger. The soil physical and chemical properties were analysed after air dried for 3 days to determine the soil type and nutrient status of the soil.

Data Collection: Starting from six weeks after planting (6WAP), four plants were randomly selected from each unit plot for 5 weeks (one-week interval). The following parameters were taken; plant height, number of leaves, number of branches, number of fruit per plant and fresh weight of fruit.

Statistical Analysis: All data collected were subjected to analysis of variance and means were separated using least significant difference (LSD) at 5 % level of probability.

RESULTS

Table 1: Physical and Chemical Properties of the Soil before Planting

Soil properties	Measured Value
pH (1:1H_20)	6.2
Organic carbon (gkg^{-1})	10.20
Total Nitrogen (gkg^{-1})	1.20
Available P (mgkg^{-1})	1
Exchangeable cations (cmo/kg^{-1})	
Ca	1.3
Mg	1.7
K	0.8
Na	0.6
Mechanical analysis (gkg^{-1})	
Sand	752
Silt	100
Clay	148

Textural class	Sandy loam

Table 2: Effect of NPK and OMF Fertilizer on Pepper Plant Heights (cm) after 5 Weeks of Planting

Treatment	**Plant height (Weeks after planting**				
	6	**7**	**8**	**9**	**10**
Control	20.40	25.42	28.71	32.42	35.20
50kgha^{-1} NPK	22.67	30.46	38.17	39.96	42.52
100kgha^{-1} NPK	29.42	36.75	46.58	48.92	49.64
150kgha^{-1}NPK	25.71	33.46	39.92	44.83	47.56
2.5 tonnesha^{-1} OMF	20.04	25.67	28.50	32.04	35.12
2.5 tonnesha^{-1} OMF+50kgha^{-1}NPK	21.75	26.42	31.08	35.08	38.40
2.5 tonnesha^{-1} OMF+50kgha^{-1}NPK	25.17	29.17	34.37	38.67	41.54
LSD (0.05)	NS	NS	NS	NS	NS

NS: Non significant at $p<0.05$

Table 3: Effect of NPK and OMF Fertilizer on Number of Pepper Leaves after 5 Weeks of Planting

Treatment	**Number of leaves (Weeks after planting)**				
	6	**7**	**8**	**9**	**10**
Control	33.25ab	59.17ab	63.42ac	67.83ab	69.44ab
50kgha^{-1} NPK	36.25ab	63.92ab	68.75ac	72.91ab	75.32ab
100kgha^{-1} NPK	60.50a	111.58c	139.00b	134.50c	150.25c
150kgha^{-1}NPK	48.91ab	96.42ac	109.75bc	114.17bc	123.34b
2.5 tonnes/ha OMF	29.83ab	36.33b	44.88a	49.50a	52.60a
2.5 tonnesha^{-1} OMF+50kg/ha NPK	20.52b	50.50ab	55.83a	60.33ab	78.72ab
2.5 tonnes/ha OMF+100/kg/ha NPK	53.83ab	69.25ab	76.17ac	80.58ab	99.30ab
LSD (0.05)	34.21	47.36	49.45	54.62	55.44

Means with the same letters are not significantly ($P<0.05$) different

Table 4: Effects of NPK and OMF Fertilizers on Plant Branches after 5 Weeks of Planting

Treatment	Plant branches (weeks after planting)				
	6	7	8	9	10
Control	4.33a	6.50a	10.42ab	11.02	13.12
50kgha^{-1} NPK	5.08a	9.42bc	11.25ab	12.75	15.34
100kgha^{-1} NPK	8.75d	10.92c	13.50a	15.25	17.75
150kgha^{-1}NPK	4.75a	10.75c	12.92ab	14.74	16.25
2.5 tonnes/ha OMF	3.83b	5.57a	7.58b	11.08	13.67
2.5 tonnesha^{-1} OMF+50kg/ha NPK	3.42b	7.17a	11.00ab	12.83	14.64
2.5 tonnes/ha OMF+100/kg/ha NPK	5.92c	9.83bc	12.00ab	14.00	15.91
LSD (0.05)	0.79	2.10	5.75	NS	NS

NS: Non Significant at P<0.05
Means with the same letters are not significantly (P<0.05) different

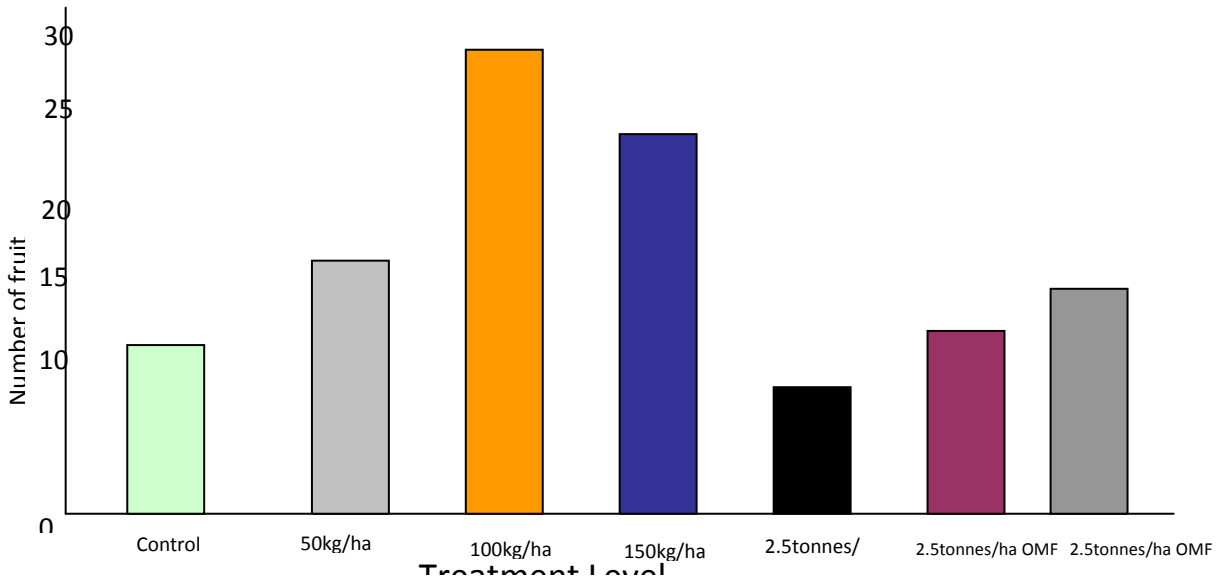

Fig. 1: Effects of NPK and OMF fertilizers on number of fruit per

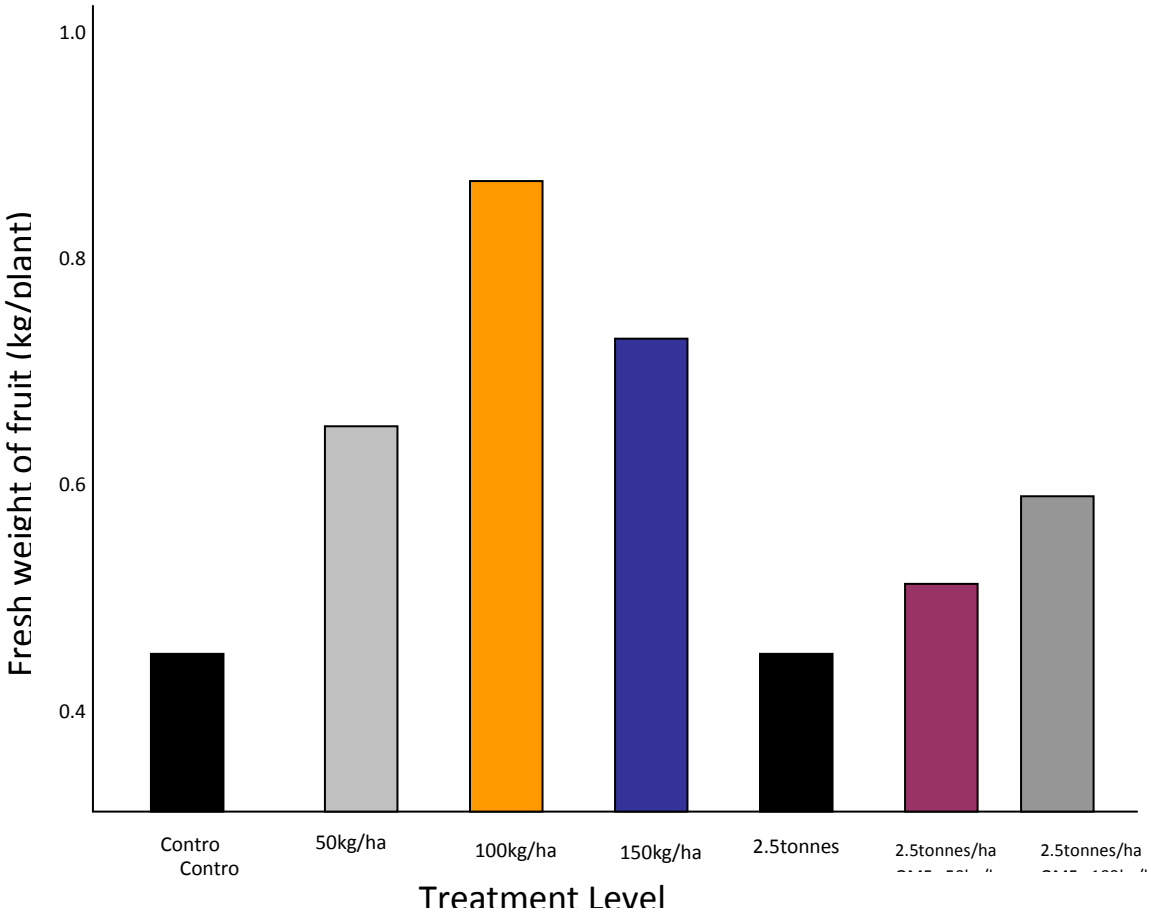

Fig. 2: Effects of NPK and OMF fertilizers on fresh weight of

DISCUSSION

The experimental soil is a soil of low fertility status with respect to total nitrogen, phosphorus, potassium and organic carbon contents (Table 1). However, the experimental soil test values are below the critical range for optimum crop production necessitating the addition of fertilizer.

From 6WAP to 10WAP, height of pepper was significantly influenced by nutrient sources with least height consistently obtained in the control and2.5 tonnesha^{-1}OMF, the highest was observed in plants which received 100kgha^{-1}NPK (Table 2). This could have been due to rapid supply of nutrients form NPK fertilizer compared to organo-mineral fertilizer (Agboola, 1986). The trend was similar at 10WAP in number of leaves and plant branches and these are presented in Table 3 and Table 4 respectively.

At 6WAP to 10WAP, plant height, number of leaves and number of branches with 100kgha^{-1} NPK and 150kgha^{-1}NPK were significantly higher than other treatments (Table 2, 3 and 4).

This shows that the nutrient composition of the NPK at 100kgha^{-1} and 150kgha^{-1} were available for plant utilization which greatly influence the number of fruit per plant and fresh weight of fruit (Figure 1 and 2). Fruit yield being the ultimate goal in pepper production was found to be highest by 0.8kg at 100kgha^{-1} NPK. This result clearly emphasized fertilizer use as a key factor in soil fertility management and yield increase in crop production (Akinrinde, 2006). However, low fruit yield was discovered at the control and 2.5 tonnes ha^{-1}OMF (Figure 1 and 2). The reason for the result obtained from 2.5 tonnes ha^{-1}OMF and control could be due to slow response of pepper to the treatment as a result of the nutrient concentration which was not at sufficiency level suitable for growth and yield of pepper.

The present investigation reveal that application of NPK fertilizer up to 100kgha^{-1} increases plant height, number of leaves, number of branches, number of fruit per plant and fresh weight of fruit. This result contradicted the findings of Aliyu and Olanrewaju (2000) which reported that the use of combined organomineral fertilizer and NPK fertilizer gave highest fruit yield, and recommended rate of 300kgha^{-1} NPK obtained by Hedge (2001) as a satisfactory yield of pepper in Nigeria. However, this research finding also against Oni (2006) which reported that highest yield of pepper gave 71.0g at 9 WAP under 2.5 ton ha^{-1} OMF and 300 kgha^{-1} NPK respectively. Therefore, as a result of this application of 300kgha^{-1}NPK would not be economical for farmer and the soil type in our environment.

From this experiment, it could be concluded that application of 100kgha^{-1}NPK would be beneficial than applying 300 kgha^{-1} NPK, 2.5ton ha^{-1} OMF and combine organo-mineral and NPK fertilizer. However, for good performance of pepper (Capsicum frutescens L.) under low soil fertility status, application of 100kgha^{-1}NPK fertilizer will be appropriate for sustainable .production.

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