

## Comparative effects of organic manure sources and rates on performance of groundnut varieties

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**Key words:** Organic manure, groundnut varieties, sources, rates.

### Abstract

*An experiment was conducted at the Teaching and Research farm of the Institute for Agricultural Research (IAR), Ahmadu Bello University (ABU) Zaria. The aim was to study effects of different organic manure sources on performance of groundnut varieties. Treatments consisted of three organic manure source, (Poultry manure, (PM) cow dung (CD) and household waste (HW) each at two levels (1 ton and 2 tons), two varieties of groundnut SAMNUT 21 (V<sub>1</sub>) and SAMNUT 23 (V<sub>2</sub>) and a control. The treatments were factorially combined and assigned in a randomized complete block design and replicated three times. The results indicated that pod yield of groundnut was highest with the application of 2 tons poultry manure. Canopy spread was significantly highest with application of all the manures compared to the control. Plant height and haulm yield were however not significantly affected by manure application.*

### Introduction

Groundnut removes fairly large quantities of nutrients from the soil. It depletes the soil nutrients rapidly unless the soil is adequately fertilized. If present levels of soil productivity are to be sustained, alternative sources of plant nutrients such as poultry manure, cow dung and household wastes must be promoted. Adequate fertilization in the form of application of organic manures does not only improve yield but also maintains soil health and sustains the soil productivity (Lourduraj, 1999).

Organic manures as valuable by-products of farming and agro-allied industries, contribute to plant growth through their favourable effects on the physical, chemical and biological properties of soil and nutrient availability. Stevenson (1994), Maheswarappa et al., (1999), Bhuma (2001), Mukhtar et al., (2006, 2009) have documented many benefits attributable to the use of organic manures. This study was therefore initiated to find out the effect of different organic manure on groundnut crop.

### Material and methods

A field experiment was conducted during the rainy season of 2013 at the Institute for Agricultural Research Farm Samaru, Ahmadu Bello University Zaria, to examine the comparative effects of types and rates of organic manure on performance of groundnut varieties.

The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. The treatments were composed of two varieties of groundnut SAMNUT 21 and SAMNUT 23, three manure rates as follows: poultry manure, cow dung and household waste and a control plot where no manure was applied and ; two different rates each of all the manures 1 ton and 2 tons/ha.

There were totally fourteen treatments as follows; T1: 1 ton/ha cow dung + SAMNUT 21, T2: 1 ton/ha cow dung + SAMNUT 23, T3: 2 tons/ha cow dung + SAMNUT 21, T4: 2 tons/ha cow dung + SAMNUT 23, T5: 1 ton/ha household waste + SAMNUT 21, T6: 1 ton/ha household waste + SAMNUT 23, T7: 2 tons/ha household waste + SAMNUT 21, T8: 2 tons/ha household waste + SAMNUT 23, T9: 1 ton/ha poultry manure + SAMNUT 21, T10: 1 ton/ha poultry manure + SAMNUT 23, T<sub>11</sub>: 2 tons/ha poultry manure + SAMNUT 21, T12 : 2 tons/ha poultry manure + SAMNUT 23, T13 : SAMNUT 21 only, T14: SAMNUT 23 only.

The poultry manure and cow dung were obtained from College of Agriculture Samaru and National Animal Production Research Institute Farms respectively while the household waste was collected from backyard waste that was routinely piled and burnt. At two weeks prior to sowing, all the manures were drilled in plots as per treatment. Groundnut varieties SAMNUT 21 and SAMNUT 23 were sown on 17<sup>th</sup> of July 2013. All other agronomic practices necessary for groundnut cultivation, with the exception of fertilizer application were adopted. Data was collected on the following growth parameters:- plant height at 4 weeks after sowing (WAS), 6WAS, 8WAS and 12WAS; Canopy spread at 6WAS, 8WAS and 12WAS; and days to 50% flowering.

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Data collected was analyzed using SPSS version 17. Where significant, means were separated using Duncan Multiple Range Test (DMRT 1955).

## Results

The result of chemical analysis for the various manures used in the experiment is presented in Table 1. Percent nitrogen was higher in poultry manure (4.48%) than in cow dung (2.90) and household waste (2.4) in that order. Phosphorus and potassium contents were highest in household waste than in poultry manure (0.79; 0.74) or cow dung (0.14; 0.20).

**Table 1. Chemical properties of cow dung, household waste and poultry manure**

Sample	% N	P (meq/kg)	K (meq/100g)	Na (meq/100g)
Cow dung	2.90	0.74	0.20	0.04
Household waste	2.40	2.50	1.00	0.87
Poultry manure	4.48	0.79	0.14	0.08

The result of effect of sources and types of organic manure on performance of groundnut varieties is presented in Table 2. Plant height of the groundnut was not significantly affected by sources and rates of manure used although increase in height of the plant was observed in response to increasing rates of cow dung and poultry manure from one to two tons.

**Table 2. Effect of sources and rates of organic manures on plant height, canopy spread, pod yield and haulm yield of groundnut varieties in 2013 rainy season at Samaru.**

Treatment	Plant height (cm)	Canopy spread (cm)	Pod yield (g)	Haulm yield (Kg)
Organic manure				
CD1	37.38	45.3b	109.9b	0.4000
CD2	36.97	54.4a	225.78ab	0.23
HW1	40.92	57.07a	124.95ab	0.38
HW2	37.47	54.25a	185.58ab	0.23
PM1	37.23	56.55a	170.57ab	0.42
PM2	40.40	51.62a	173.80am	0.43
Control	41.97	55.10a	240.52a	0.35
Variety				
SAMNUT 21	39.92	38.42	155.20	0.34
SAMNUT 23	37.89	38.27	196.55	0.36

The significantly widest canopies were observed in plots that received organic manures compared with the control. Poultry manure at 2 tons/ha led to the significantly highest pod yield of groundnut compared to the control which was statistically at par with all other treatments. However no significant differences were observed among the manure sources and rates types on haulm yield of the groundnut.

The varieties used were not significantly different in their response to organic manure rates and types with respect to plant height, canopy spread, pod yield and haulm yield.

## Discussion

Organic manures have a profound effect on improving soil physical, chemical and biological properties and enhancing productivity of field crops. The positive response of groundnut to increase in application poultry manure from one to two tons indicates that the crop has benefited from the manure application. This result is similar to that obtained by Subrahmaniyan et al., (2000) who reported that application of FYM at 10 to 15tha<sup>-1</sup> increased the pod and haulm yields and improved the yield parameters like shelling percentage, 100 seed weight and sound mature kernel compared to the recommended dose of fertilizers.

## Conclusion

In most small holder farms in developing countries, poor soil fertility and nutrient management combined with use of unimproved crop varieties are major causes of low yield of groundnut. The use of organic manures alongside improved varieties coupled with appropriate agronomic practices suitable for a particular crop variety and ecology will go a long way towards improving the yield of groundnut.

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