

Effect of Neem Litter, Cowdung and Poultry Droppings on the Growth of African Spinach (*Amaranthus viridis* L)

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Abstract: Experiment was conducted during raining season (June/July) at the Biological Sciences garden of Usmanu Danfodiyo University Sokoto, to determine the effect of different kinds of manure (neem litter, cow dung and poultry droppings) on the growth of *Amaranthus viridis*, Grown in polythene bags. The fertilizers (neem litter, Cowdung & poultry droppings) were applied at the rate of 1.5 g (gram) per polythene bag. The result showed that the plants fertilized with poultry droppings produced taller shoots and larger number of leaves, whereas the plants fertilized with neem litter, showed the lowest growth. The plants fertilized with cowdung were taller than plants fertilized with neem litter but smaller than plants fertilized with poultry droppings. Therefore based on this research it can be said that, poultry droppings may be used for high quality organic plant production.

Keywords: *Amaranthus viridis*, fertilizers, organic farming, cow dung, poultry dropping, neem litters etc.

INTRODUCTION

Fertilization has been a component of improved culture practice for most crops since most of the lands in Nigeria are under frequent cultivation, problem of soil nutrients of low to medium level of available nutrients have caused the yield below potential levels [1], the best way of preventing soil from becoming poor in fertility is to put back what the plant has taken out from it and this can be achieved only by the use of fertilizer [2]. *Amaranthus viridis* is a member of Amaranthacea family commonly known as green amaranthus or African spinach. It is cosmopolitan weed in the tropical and subtropical region of the world.

In tropical Africa, it is a common weed that spread widely.

Amaranthus viridis is known as “Alayyahu” in the northern part of Nigeria. *Amaranthus viridis* is an excellent source of vitamin A, C and E. it also contain iron, several vital anti-oxidants and about 40% potassium. It is good for lymphatic, urinary, digestive system and in weight loss diet [3]. The leaves provides energy because it is highly packed with carbohydrates, protein and vitamins, it improves digestion and reduces constipation it is easily digestible and good for both young ones and elders. It helps in weight management because the protein in the leaves help reduce insulin level in the blood. Also improves eye sight because of the vitamin A&C found in the leaves contribute towards healthy vision. It also helps in preventing and treatment of cardiovascular diseases [4].

Part of the major problems associated with cultivation of plant in Nigeria is poor and inadequate nutrition in the soil, soil health is a crucial factor for realizing higher yield of vegetables. Excessive application of inorganic fertilizers may affect soil health

and sustainable productivity [5]. Therefore this experiment was carried out to evaluate the performance of the three types of fertilizers on *Amaranthus viridis*.

Application of fertilizers has been found to enhance plant growth and development, many research activities have reported an increase in the vegetative development of crops with fertilizer application. Organic farming is appreciated by vegetable consumers as it enhances quality of the products [6].

The aim of the study is to determine the effect of neem litter, cow dung, and poultry manure on the growth of *Amaranthus viridis*.

The study was carried out to find which one among the three fertilizers has more influence on the growth of *Amaranthus viridis*.

MATERIALS AND METHODS

Experimental site

The experiment was carried out at Biological Science garden of Usmanu Danfodiyo University Sokoto.

Materials used

Cutlass, hoe, shovel, bucket, cup, polythene bags and meter rule.

Plant material

The seeds of the (*Amaranthus Viridis*) were obtained from Sokoto central market, the organic fertilizers (poultry droppings, cowdung) were obtained from Kara market Sokoto while the neem litter was obtained within the school premises in Usmanu Danfodio University.

METHODS

Preparation of growing medium for spinach

The land was cleared using cutlass. The grasses were removed and the grasses were divided into three plot. Each plot was mixed with different variety of fertilizer. The spinach seeds were then planted into twelve different clean polythene bags each containing 2kg of soils and were placed in the biological science garden of Usmanu Danfodio University Sokoto. Three of the polythene bags were treated 1.5g each of Neem litter and one polythene bag of control. Similarly Three polythene bag were treated with 1.5g each of cow dung and one control and lastly another 3 polythene bags were treated with 1.5g of poultry droppings including one control.

Data collection

The measurement of the plant was started two weeks after the emergence of the seedlings data were collected weekly for the period of five weeks the plant height was measured using meter rule and number of leaves were counted. The results were tabulated.

Statistical analysis

Statistical analysis were carried out using analysis of variance to find out variations that exist among the different treatments.

RESULTS

The result obtained during the research work is presented in the following table described below.

Result of the effect of Neem litter on the growth (Shoot height and number of leaves) of *Amaranthus viridis* from two to six weeks.

The result in table one showed *Amaranthus viridis* treated with neem litter had a mean shoot height of 4.8cm with four leaves in the second week, shoot height of 9.7cm with six leaves in the third week. Then in the fourth week a mean short height of 13.3cm with six leaves was observed. In the fifth week mean shoot height was of 15.3cm with eight leaves and in the sixth week mean shoot of 17.2cm with nine leaves was observed.

Table-1: The effect of Neem litter on the growth parameters of *A.viridis*

Weeks	Growth parameters	
	Shoot height (cm)	No of leaves
2 nd	4.8	4
3 rd	9.7	6
4 th	13.3	6
5 th	15.3	8
6 th	17.2	9
Total	60.3	33
Mean	12.06	6.6

The result in table-2 showed that *Amaranthus viridis* treated with cow dung have a mean shoot height of 8.6cm with five leaves in the second week, in the 3rd week it had a mean shoot height of 15.7 cm with six leaves, in the fourth week it had a mean shoot height of 22.7cm with eight leaves while in the 5th week it had a mean shoot height of 23.7cm with 12 leaves and lastly in the 6th week it had a mean shoot height of 24.7cm with 16 leaves.

Table-2: The effect of cow dung on the growth parameters of *A.viridis*

Weeks	Growth parameters	
	Shoot height (cm)	No of leaves
2 nd	8.6	4
3 rd	15.7	6
4 th	22.8	6
5 th	23.7	8
6 th	24.7	9
Total	95.5	47
Mean	19.1	9.1

Result of effect of poultry droppings on the vegetative growth (shoot height and number of leaves) of *Amaranthus viridis* at 2nd to 6th weeks.

The result in table-3 showed that *Amaranthus viridis* treated with poultry droppings had a mean shoot height of 10.3cm with seven leaves in the 2nd week, in the third week it had a mean shoot height of 18.6cm with 9 leaves and in the 4th week it had a mean shoot height of 27.0cm with 10 leaves and in the 5th week had a mean shoot height of 35cm with 21 leaves.

Table-3: The effect of poultry droppings on the growth parameters of *A. viridis*

Weeks	Growth parameters	
	Shoot height (cm)	No of leaves
2 nd	10.3	7
3 rd	18.6	9
4 th	27.0	10
5 th	31.0	15
6 th	35.0	21
Total	121.9	62
Mean	24.3	12.4

DISCUSSION

Plant treated with poultry droppings were found to have taller shoot and larger number of leaves followed by cow dung and lastly neem litter which showed the least growth. This is in agreement with similar studies reported by Akanbi *et al.*, [7] which was attributed to the nutrient content of the fertilizer used. This is because poultry droppings contains more nutrients content such as 1000kg of dried cage poultry droppings is equivalent to 100kg urea, 150kg super phosphate, 50kg sulphur, 12kg sodium chloride, 10kg magnesium sulphate, 5kg ferrous sulphate, 1kg manganese sulphate, zinc sulphate and other trace minerals each Narahari and Prabhu [8]. Furthermore, cowdung is also high in organic materials but not much as poultry droppings where it contains about 3% nitrogen, 2% phosphorus and 1 % potassium in addition cow dung contains high level of ammonia and potentially dangerous pathogens for this reason, it is usually recommended that it should be aged or composted prior to its use as fertilizer, and lastly, the neem litter which has least nutrients contents compared to that of poultry droppings and cow dung. Similar result were obtained with Broccoli and Mahodeer [9]. This could also be attributed to the quantities of available phosphorus and available potassium contained in the poultry dropping studies carried out by Rao [10]. Indicated that soil could be enriched with the application of organic materials which tend to decompose and release relatively large amount of nitrogen into the soil before planting it fresh crop to yield. Xu *et al.*, [11] also reported similar results in their study on yield and quality of leaf vegetables grown with organic fertilizers grew better and resulted in higher total yield. It was also noticed that the growth of the plant increased with age of the plant. Thus at two weeks, the plants were shorter compared to 3rd 4th 5th and 6th weeks which had taller shoot height and large number of leaves.

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