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Influence of weeding frequency and poultry manure on the growth and yield of cucumber (*cucumis sativus)* in the humid region of Nigeria

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Abstract
Cucumber (*Cucumber sativus*) is a horticultural crop with increasing level of awareness with regard to health and environmental benefits. The study examined the influence of weeding frequency and poultry manure rates on the growth and yield of cucumber in Ndele, Rivers State. Despite the importance of cucumber in the Humid Region if Nigeria, the production rate in growth and yield have been on the decrease due to weed interference, poor soil fertility and tack of use of organic manure; hence, the need for this study to address the influence of different rates of poultry manure and weeding frequency on the vegetative growth and yield of cucumber. The experimental design used was a 5x3 factorial design. Five weeding frequency (weed free, 3 weeks after sowing 3-WAS), 4-WAS, and 5-WAS and weedy check were assigned to the main plots and three rates of poultry manure (0.5 and 10-tons ha^{-1}) as the subplots in a Completely Randomized Block Design (CRBD) replicated three times. Market more was used for the cultivation. The experiment measured growth and yield attributes growth - parameters included (vine length, number of leaves and leaf area) and yield parameters were (number of flowers, fruit length, fruit weight, fruit number and fruit diameter). The results of the study proved that the application of poultry manure and appropriate weeding frequency in the production of cucumber has the capacity of improving the growth and yield of the crop. Therefore, it is recommended that 10-tons ha^{-1} of poultry manure should be used for high quality production. Weeds should not be allowed to grow with the crops beyond 3WAS, government should make the training of weed Scientists a priority to enhance effective management of weeds and government should organize workshops to educate farmers on the importance of poultry manure and hence the need for its usage.

Keywords: cucumber, poultry manure, weeding frequency, creeping vine, humid region, nigeria fruit yield, growth

1. Introduction
Cucumber (*Cucumis sativus*) is a horticultural crop of great value. It is one if the fastest growing horticultural crops cultivated in the Humid Region of Nigeria. Cucumber is a creeping vine (Johnson and Mullinix, 2009) [22]. The varieties cultivated include hybrid (market more, market more 96, lemon, miss pickler etc) and local varieties (bush champion, yellow ring (Aniekwe and Anike, 2015) [7]. It is one of the oldest horticultural crops cultivated by the early agriculturist and most important member of cucurbitaceae family (Eifediyi and Remison, 2010). It produces cylindrical fruits that are used as food, medicine and in the various agro-based industries as a raw material. As food, cucumber is either eaten raw or prepared in various forms as part of the vegetable salad in the tropical regions. As medicine, cucumber contain about 90% water which keeps the body hydrated for the removal of various waste products of metabolism and the formation of essential fluids in the body. Water forms a major proportion of the blood. Cucumber contains various minerals and vitamins like vitamin A, B, B2, B6, B12 and vitamin C which are useful in the proper functioning of the human body (Duke, 2007) [12]. Cucumber helps to fight against cancers (breast-ovarian, uterine and prostate), treatment for diabetics, skin diseases and sunburn, necessary for reproduction processes, aids food digestion, cures open wounds, kills parasitic internal worms, useful in lowering dark circles, etc. It is annual crop that has been propagated by man for over 2000 years (Adetula and Denton, 2003) [3]. In the various agro-based industries, cucumber is vital in cosmetic industry for the manufacture of soaps, lotion, fragnants and shampoos. (Omeh, 2017 [18], Shetty and Wehner, 2002) [30].

The crop is cultivated in most agro-ecological zones of Nigeria, ranging from rainforest to savanna zones. The savanna zones of Nigeria have the highest potential for its production due to moderate rainfall and high sunshine. However, researchers have stated that it does well in Southern parts of Nigeria (Wiro and Iyaba, 2020). It holds a promising position among other vegetable crops due to its high quality and ability to mature within a very short period. Despite the usefulness of cucumber in the Humid Region of Nigeria, many factors constitute a major problem to its effective and optimal production. According to William and Warren, (2009) [32], weed and spacing are among the factors affecting cucumber growth and yield. Ansa and Wiro (2018) observed that the type of cropping system used in the cultivation of a crop affects its productivity. Agele *et al.*, (2007) [4]. observed that plant spacing is a major factor that affects crop performance. According to Ekwu and Nwokwu (2012) spacing has great effect on the growth and yield of crops. Poor soil fertility and lack of use of organic manure is also a factor lowering the production of cucumber in the Humid Region of Nigeria. Addition of organic manure has been shown to be one of the fastest and most effective way to enhance and increase yield of cucumber per unit area (Nweke *et al.*, 2014). Adesina and Wiro (2020) [2, 36] observed that the application of poultry manure resulted in increase in the growth and yield of okra. The application of poultry manure is one of the ways of improving soil fertility and thus crop yield. Poultry manure is a vital resource for

crop production and soil sustainability. It contains almost all the essential nutrients (Eghball, 2001) [14]. The use of organic manure enables the soil organic matter to appreciate due to improvement in soil structure, reducing its susceptibility to water and wind erosion. Plaster, (2006) [29]. and Enujeke *et al*., (2013) [18]. stated that poultry manure is cheap and efficient in the establishment and maintenance of optimum soil physical conditions for plant productivity. It is a good source of Nitrogen required for crop production Ewulo *et al*., (2008) [19]. stated that the application of poultry manure improves the soil physical properties by lowering soil Temperature, acidity, bulk density and increasing the porosity. Adekiya and Ojeniyi (2002) [19] reported that the application of high rates of poultry manure improves moisture availability which results in improved nutrient release to plants for increased production. Organic manure has been proved to increase the level of soil organic matter, promote root development, improves germination rates of seeds and increase water holding capacity of soil.

The type of farming, nature of vegetation and availability of organic manure determine the extent to which farmyard manure can be applied. The usefulness derived from poultry manure is partly determined by the rate of application. The rate of farmyard manure applied influences the yield and quality of crops (Gordon, 2001) [20]. Ferguson and Ziegler (2004) noted that the rate at which poultry manure should be spread will depend on the amount produced on the farm and the quality required by the plants for growth and yield. It is better to cover an entire field with light application than to give only a part of the field a heavy coating.

Aliyu (2000) [6], and Wiro and Adesina (2020) [2, 36] reported that poultry manure resulted in remarkable higher yield when compared with other manures. Poultry manure contains much nutrients that promote plant growth. It is used as a source of N, P and K with some quality of calcium, magnesium, sulphur and some micro-nutrients. To improve soil quality and soil fertility in the tropical and sub-tropical regions, the application of organic manure is recommended.

Lack of certified seeds is also a great constraint in the production of desirable quantity and quality of cucumber yield. Wiro (2020) reported that the utilization of uncertified seeds by horticultural farmers in Rivers State resulted in poor growth and yield as only 20% of farmers use certified seeds. Ellis *et al* (2005) maintained that the main goal of seed technology is to increase agricultural production through the provision of good quality seeds of high yielding varieties through rapid multiplication, timely supply, assured time quality seeds etc. When certified seeds are used, the productivity of crops is enhanced.

Weed interference in cucumber production is a major problem due to lack of appropriate weeding regime. (Wiro and Iyaba, 2020). The critical period of weed control in cucumber farming is between the first 2 to 3 weeks after sowing but most cucumber farmers are ignorant of this period of weed competition in crops and so they weed at their own pace which causes poor growth, development and yield.. Reduction in agricultural production causes many peasant farmers to abandon farming because of low income generation. Wiro and Ansa (2019) reported that desirable crop yield and high income earnings are reasons for the involvement and sustainability of small scale farmers in farming business. There are over 150 plants species which are troublesome globally and described as weeds (Akobundu, 1987) [5]. Some weeds are useful to man, livestock, soil, and environment. Ansa *et al*., (2019) reported that elephant grass (*pennisetum purpureum)* could be cultivated for its desirable pasture for the animals and for ethanol production for human consumption. Weeds are plants whose unwanted needs outweighs their benefits (Anon, 2006). Weeds compete with plants for nutrients, space, water and sunlight. They reduce farmers disposable income by adding heavily to crop cultivation practices (Lagoke, 2000) [1]. Weeds reduce the growth, development and yield of crop substantially (Adejonwo *et al*., 2009) [1]. The uncontrolled weed growth under the crop cycle of cucumber caused a remarkable reduction in the yield of the crop between 75 and 87% as compared with those kept free from weeds within the growth period. Farmers are concerned with the effects of weeds on the overall performance of the vegetative growth of crops (Noble, 2011) [27]. This has led to several researches been carried out on the possible ways to limit the influence of weeds on crops by providing more efficient measures of managing the weeds with the aim of increasing the productivity of crops.

The objective of this research study was to determine the influence of weeding frequency and poultry manure rates on the growth and yield of cucumber in the Humid Region of Nigeria.

Materials and Method

The experiment was. carried out at the Teaching and Research Farm of the Department of Crop and Soil Science, Ignatius Ajuru University of Education (IAUE), Ndele Campus, Rivers State, Nigeria with attitude 4°58N and Longitude 6°48N), Ndele campus is in Emohua Local Government Area of Rivers State, Nigeria which is situated in the Humid Region of Nigeria that has many months of raining season than dry season.

The site was covered with different weeds such as Pennisetum purpureum (Elephant Grass), (Rich, L), Panicum maximum (Guinea Glass (Jac, Q.). *Imperata cylindrical (spear grass (L)), Andropigon gayanus* (Gamba grass), *Eleusin indica* (Goose grass or bull grass (Gaertn) etc.

The experimental area was cleared using machete. Measuring tools like peg, rope and tape were used to measure and map out the land for the experiment. Thirty (30) beds measuring 48m^2 were constructed. The cucumber seeds were sourced from the International Institute for Tropical Agriculture (IITA), Ibadan, Nigeria. Market more was used. It was treated with Thiraim before planting to ensure viability. The experimental design used was a split plot design. Five weeding frequencies duration (weed free, 3 Weeks After Sowing (WAS, 4 WAS, S WAS and weedy check were assigned to the main plots and three rates of poultry manure (0, 5 and 10 tons ha^{-1}) as the subplots in a Completely Randomized Block Design (CRBD), replicated three, times.

The planting of the cucumber was done on 25/05/2020. Three seeds were planted per hole and later thinned to one per stand after two weeks of germination.

Data collected were vine length, number of leaves, and leaf area for growth parameters while yield parameters collected were the number of flower per plant, fruit length, number of fruit per plant, fruit weight and fruit diameter.

Results and Discussion

Table 1: Physico-chemical properties of the experimental site

Physical Characteristics	Vine
Sand (%)	83.20
Silt (%)	11.40
Clay (%)	5.40
Textural class	Loamy sand
Chemical properties	
pH (H_2O)	6.2
Organic Carbon (%)	0.5
Total nitrogen (%)	0.9
Available potassium (mg Kg^{-1})	8.9
Exchangeable K (cmol Kg^{-1})	0.2
Exchangeable Ca (cmol Kg^{-1})	1.4
Exchangeable Mg (cmol Kg^{-1})*	0.7
Effective cation exchange capacity (cmol Kg^{-1})	2.5
Base saturation (g/kg)	92.30

***Source*:** Department of Agronomy University of Ibadan, March, 2020.

Soil Analysis

The soil analysis result (table 1) showed that the soil was predominantly sandy loam, an indication of a good water and nutrient holding capacity. The soil was slightly acidic with pH of 6.2. The available phosphorous (mg/kg) was 8.9%. The experimental site showed nitrogen content of 0.9 and the organic carbon and organic matter contents were 0.5% and 1.4% respectively. The soil needed more nutrients to support the growth and yield of the crop.

Table 2: Influence of Weeding Frequency on Cucumber Growth Parameters

Treatments/ Weeding Frequency	Vine length (cm)	No. of Leaves	Leaf Area (cm^2)
Weed free	172.10^a	60.30^a	110.80^a
3 WAS	169.30^a	60.10^a	100.40^a
4 WAS	115.80^b	51.70^b	90.60^b
5 WAS	92.40^c	46.10^c	82.95^c
Weedy check	70.80^d	40.00^d	70.20^d
Mean	124.08	51.64	90.99
SE±	55.49	23.09	40.69

***Source*:** Field work, May. 2020.

Values followed by the same letter in the column (s) are not significantly different at 5% level using DMRT.

In table 2 above, plots kept weed free had 172.10cm of vine length, 60.30 number of leaves and 100.81^2 leaf area while 3 WAS resulted in 169.30cm vine length, 60.10 in number of leaves and 100.40^2 in leaf area. There was no significant difference in these two weeding frequencies but there existed significant difference with 4 WAS as vine length gave 115.80cm, no of leaves was 51.70 and leaf area was 90.60^2. This was in consonance with Wiro and Iyagba(2020) that the critical period if weed control in cucumber production was 3WAS and that growth is reduced when weeds were allowed uncontrolled beyond this period.

In 5WAS, the result gave 92.40cm, 46,10 and 82.95^2 for vine length, no of leaves and leaf area respectively. Weedy check resulted in 70.80cm of vine length, 40.00 in no of leaves and 70.20^2 of leaf area. The highest vegetative growth of cucumber was observed in weed free and 3WAS and worst performance in weedy check. This confirmed the findings of Weaver, 2004, Adejonwo *et al*., 2009 [1]. and Wiro and Iyagba (2020) that plants growth is greatly affected by weeds competition.

Table 3: Influence of poultry manure rates on cucumber growth

Treatments/ Poultry manure rates (ton ha^{-1})	Vine length (cm)	No. of Leaves	Leaf Area (cm^2)
0	90.34^c	60.10^{-c}	14.91^c
5	125.70^b	67.82^b	21.70^b
10	160.60^a	80.60^a	32.44^c
Mean	125.55	69.51	23.02
SE±	72.49	40.13	13.30

***Source*:** Field work. May, 2020.

Values followed by the same letter in the column (s) are not significantly different at 5% level using DMRT.

Table 3 showed the influence of poultry manure rates on cucumber growth. The application of 0 tons resulted in 90.34cm of vine length, 60.10 in no. of leaves and 14.91^2 in leaf area, while 5 ton ha^{-1} caused a significant difference in the growth performance as it gave rise to 125.70cm, 67.82 and 21.70^2 vine length, number of leaves and leaf area respectively. The best growth came from the application of 10ton ha^{-1} which had 160.60cm of vine length. 80.60 of number of leaves and 32.44 of leaf area. From the above therefore, application of 10 ton ha^{-1} of poultry manure gave the best performance in cucumber growth followed by 5 tons while 0 tons ha^{-1} resulted in the poorest performance. This finding totally agreed with the observation of Adesina and Wiro (2020) [2, 36], that the application of 10 ton ha^{-1} caused a desirable performance in Okra production than 5 tons and 0 ton ha^{-1}.

Table 4: Influence of Weeding Frequency on Cucumber yield Parameters

Treatments/ Weeding Frequency	No of Flowers	Fruit Length(cm)	Fruit Weight Per Plant (g)	Fruit No	Fruit Diameter
Weed free	27.16^a	24.60^a	66.10^a	11.40^a	25.30^a
3 WAS	26.80^a	24.10^a	67.40^a	11.00^a	24.70^a
4 WAS	18.14^b	20.00^b	40.30^b	7.50^b	16.40^b
5 WAS	14.90^c	17.85^c	26.40^c	6.40^b	13.60^b
Weedy check	11.10^d	11.70^d	22.28^d	4.60^c	10.50^c
Mean	19.62	19.65	44.50	8.18	18.10
SE±	8.77	8.79	19.90	3.66	8.09

***Source*:** Field work. May, 2020.

Values followed by the same letter in the column (s) are not significantly different at 5% level using DMRT.

Weeding frequency showed a high influence on cucumber production in the experiment. In no of flowers, weed free plants resulted in 27.16 while 3WAS gave 26.80. There was number significant difference here. 4WAS gave 18.14, 5WAS gave 14.90 and weedy check gave only 11.10. The analysis indicated that while weed free and 3WAS produced the highest number of flowers, the performance decrease until weedy check with the worst number of flowers.

Fruit Length

In fruit length, the same superiority in yield production of weed free and 3WAS plots was maintained with a sharp reduction in the fruit length with addition of weeks allowed for weed interference with the crops, thus having the poorest fruit length-thus, weed free had 24.60cm, 3WAS had 24.10cm, 4WAS produced 20.00cm, 5WAS had 17.85cm

and weedy check resulted in only 11.70cm.

Fruit Weight
The plots with best fruit weight were from weed free with 66.10, and 3WAS with 67.40g. There was no significant difference between the two. 4WAS produced 40.30g, 5WAS produced 26.40g while the worst plot with fruit weight was from weedy check with only 22.28g.

Fruit Number
Weed free and 3WAS gave rise to 11.40 and 11.00 respectively with no significant difference. 4 WAS and 5 WAS produced 7.50 and 6.40 respectively with no significant difference. The worst performed plot was weedy check with only 4.60. This clearly showed that weed free and 3 WAS plots performed better than other plots with weedy check maintaining the poorest.

Fruit Diameter
The palatable performance of weed free and 3WAS again reflected in this yield characters as they yielded 25.30 and 24.70 respectively haven no significant difference. 4WAS and 5WAS had 16.40 and 13.60 (with no significant difference). The worst fruit diameter came from weedy check with 10.50. From the above, it was obvious that weeding frequency had remarkable influence in the yield of cucumber. Adejonwo, *et al*., 2009 [1], Noble, 2011 [27], Wiro and Iyogba, 2020 and Weaver, 2004 all supported the result of this experiment in their different research experiment on the influence of weeding (weeds) on the growth and yield of crops..

Table 5: Influence of Poultry Manure rates on Cucumber yield Parameters

Treatments/ Poultry manure rate (ton ha^{-1})	No of Flowers	Fruit Length(cm)	Fruit Weight Per Plant (g)	Fruit No	Fruit Diameter
0	14.03^{c}	14.37^{c}	40.04^{c}	3.11^{c}	10.00^{c}
5	30.61^{b}	27.50^{b}	70.33^{b}	6.30^{b}	13.45^{b}
10	47.96^{a}	39.80^{a}	90.75^{a}	9.35^{a}	17.19^{a}
Mean	30.87	27.22	67.04	6.25	13.55
SE±	17.82	15.72	38.71	3.61	7.82

***Source*:** Field work. May, 2020.

Values followed by the same letter in the column (s) are not significantly different at 5% level using DMRT.

Number of Flowers
Poultry manure has been known to have huge influence on the yield of crops. In table 5, the application of 0 (no manure application) resulted in 14.03, 5 tons was 30.61 and 10 tons ha^{-1}was 47.96.The potentiality of 10 ton ha^{-1} of poultry manure in number of flowers was conformed. The worst was in 0 tons ha^{-1}.

Fruit Length
Here, 0 tons, 5 tons and 10 ton ha^{-1} of poultry manure resulted in 14.37cm, 27.50cm and 39.80cm respectively. There was significant difference in all. The performance of 10 tons ha^{-1} was much better than 5 tons and 0 tons.

Fruit Weight
Manure application had influence on cucumber fruit weight as the application of 0, 5 and 10 tons ha^{-1} produced40.04g, 70.33g and 90.75, respectively. There was a wide range of significant difference here.

Fruit Number
The same trend in desirable performance of higher poultry manure rate application also showed up in the number of fruit produced per plant. The results gave 3.11, 6.30 and 9.35 for 0, 5 and 10 ton ha^{-1} poultry manure application respectively. Here, while the application of 10 ton ha^{-1} gave the highest number of fruits; the 0 tons gave the worst output.

Fruit Diameter
Application of 0, 5 and 10 tons of (poultry manure)produced 10.00, 13.45 and 17.19 respectively. Application of 10 ton ha-1 kept the lead in yield performance followed by 5 tons and worst was 0 tons.These finding enjoyed the support of Eifidiyi and Remison, (2010), Adetula and Denton, (2003) [3], Adesina and Wiro, (2020) [2, 36]. and Aliyu, 2000 [6] in their research work on the effect of poultry manure on the performance of crops.

Table 6: Influence of Weeding Frequency on Weed Fresh and Dry Weight (g/m^2)

Treatments/ Weeding Frequency	Weed Fresh Weight (g)	Weed dry Weight (g)
Weed Free	0.00^{e}	0.00^{e}
3 WAS	270.00^{d}	7.00^{d}
4 WAS	362.00^{c}	15.00^{c}
5 WAS	470.00^{b}	21.00^{b}
Weedy Check	600.00^{a}	28.00^{a}
Mean	340.40	14.20
SE±	152.23	6.35

***Source*:** Field work. May, 2020.

Values followed by the same letter in the column (s) are not significantly different at 5% level using DMRT. In table 6 above, weeding frequency also influenced the weed fresh and dry weights. In weed free, both weed fresh and dry were 0.00 because weeds were never allowed on that plot. In 3WAS, 270.00g of fresh weeds was recorded. 4WAS gave 362.00g, 5WAS produced 470.00 while the highest weed fresh weight was observed in weedy check with 600.00. This explained that the more the weeds were allowed uncontrolled, the more was the weed growth, thus heavier weight.In weed dry weight, there was a progressive increase in the weight of the plots as the weeds were given longer time to remain with the crops thus 3WAS, 4WAS, 5WAS and weedy check resulted in 7.00g, 15.00g, 21.00g and 28.00g respectively.

Table 7: Influence of Poultry Manure Rates on Weed Fresh and Dry Weight (g/m^2)

Treatments/ Poultry Manure rate (ton ha^{-1})	Weed Fresh Weight (g)	Weed dry Weight (g)
0	173.00^{c}	7.00^{c}
5	205.00^{b}	13.00^{b}
10	615.00^{a}	22.00^{1}
Mean	231.00	14.00
SE±	133.37	8.08

***Source*:** Field work. May, 2020.

Values followed by the same letter in the column (s) are not

significantly different at 5% level using DMRT. Weeds are plants. So, the application of poultry manure significantly influence their growth and development and thus their weight.

0 tons ha^{-1} gave rise to 7.00g of weed dry weight, 5 tons produced 13.00g while 10 ton ha^{-1} produced 22.00g.

The weed fresh weight with the application of 0,5 and 10 ton ha-^{1} resulted in 173.00, 205.00 and 615.00 respectively while in weed dry weight with the same 0,5 and 10 poultry manure gave 7.00, 13.00 and 22.00 respectively.

Table 8: Interaction between Influence of Weeding Frequency and Poultry Manure Rate (ton ha-^{1}) on growth parameters of cucumber

Treatments Level	Vine Length (cm)	Number of Leaves	Leaf Area (cm^2)
0 (ton ha^{-1})			
Weed Free	80.20^a	26.90^a	18.30^a
3 WAS	79.40^a	26.85^a	18.20^a
4 WAS	75.80^b	20.01^b	15.20^b
5 WAS	71.70^c	91.60^b	13.90^b
Weedy Check	60.40^d	14.90^c	11.70^c
Mean	73.50	21.65	15.46
SE±	32.87	9.68	6.91
5 (ton ha^{-1})			
Weed Free	87.60^a	30.80^a	21.40^a
3 WAS	68.70^a	30.70^a	20.90^a
4 WAS	75.20^b	27.10^b	18.00^b
5 WAS	73.40^b	27.00^b	17.10^b
Weedy Check	66.90^c	18.50^c	12.40^c
Mean	77.76	26.82	17.96
SE±	34.87	11.99	8.03
10 (ton ha^{-1})			
Weed Free	95.40^a	33.00^a	24.60^a
3 WAS	94.50^a	32.80^a	22.90^a
4 WAS	82.10^b	29.30^b	17.40^b
5 WAS	76.70^c	26.60^c	14.20^c
Weedy Check	67.90^d	19.70^d	11.80^d
Mean	83.32	28.28	18.18
SE±	37.26	12.65	8.13

***Source*:** Field work. May, 2020.

Values followed by the same letter in the column (s) are not significantly different at 5% level using DMRT.

Interaction of Poultry manure and weeding frequency on weed free and 3WAS did not cause any significant difference in the growth of cucumber (vine length, number of leaves and leaf area). But there was significant difference with 4WAS, 5WAS and weedy check (Table 8). Weed free and 3WAS had 80.20cm and 79.40cm of vine length respectively. In number of leaves, they produced 26.90 and 26.85 respectively and in leaf area, the result was 18.30^2 and 18.20^2 respectively. But 4WAS and 5WAS resulted in 75.80cm and 75.80cm of vine length respectively. They produced 20.01 and 19.60 of number of leaves respectively and 15.20^2 and 13.60 of leaf area respectively. The worst growth parameters of cucumber were observed in weedy check plots with 60.40cm, 14.90 and 11.70 of vine length, number of leaves and leaf area respectively. Cucumber performed poorly in weedy check plots in all the growth parameters measured. This was due to serious weed competition with the crop for the available growth resources like space, water, nutrient and light. Mahadi (2011) [24]; Iremiren, (2008) and Burnside (2003) [11]. had reported similar observations on the influence of weed competition with some crops. The same trend was observed in the interaction of 5 ton ha^{-1} manure application and weeding frequency where plots of weed free and 3WAS had no significant difference in vine length. number of leaves and leaf area but significant difference existed in 4WAS, 5WAS. Weedy check had the poorest performance. Again, all the plots had higher values of the growth parameters with 5 tons of poultry manure application when compared with no poultry manure application (0 tons), meaning that manure helps to increase crop production. Similarly, the interaction of 10 tonsha^{-1} of manure application and weeding frequency on vine length, number of leaves and leaf area on weed free and 3WAS plots did not differ significantly. Performance of weed free and 3WAS plots in vine length, number of leaves and leaf area, were better than other plots with no significant difference but significant difference existed in other plots. Again, the vine length, number of leaves and leaf area values in the interaction between weeding frequency and 10tons manure application were better when compared with the application of 0 and 5 tonsha^{-1} manure application. The increase in performance was due to the application of higher rate of poultry manure (10 tons). Some researchers like (Enujeke 2013 [18], and Eifediyi and Remison, (2010) had reported similar findings on the effect of poultry manure application on cucumber production.

Table 9: Interaction between Weeding Frequency and Poultry Manure Rate (ton ha^{-1}) on yield parameters of cucumber

Treatments Level	Flower Number	Fruit Number	Fruit Length (cm)	Fruit Weight(g)
0 (ton ha^{-1})				
Weed Free	22.10^a	8.40^a	20.10^a	40.60^a
3 WAS	21.00^a	7.50^a	20.00^a	40.20^a
4 WAS	15.63^b	5.80^b	16.80^b	37.00^b
5 WAS	12.48^c	5.00^b	14.30^b	36.60^b
Weedy Check	9.30^d	3.80^c	11.40^c	31.80^c
Mean	16.10	6.10	16.52	37.24
SE±	7.20	2.73	7.39	16.65
5 (ton ha^{-1})				
Weed Free	22.60^a	9.00^a	22.00^a	43.90^a
3 WAS	21.80^a	8.40^a	21.40^a	42.80^a
4 WAS	17.30^b	6.85^b	17.30^b	38.60^b
5 WAS	14.00^c	6.23^b	16.80^b	37.80^b
Weedy Check	10.90^d	4.00^c	12.20^c	33.50^c
Mean	17.32	6.90	17.94	39.32
SE±	7.76	3.09	8.02	17.58
10 (ton ha^{-1})				
Weed Free	23.10^a	9.20^a	23.00^a	45.70^a
3 WAS	21.90^a	8.70^a	22.40^a	44.80^a
4 WAS	17.60^b	7.80^b	19.70^b	39.30^b
5 WAS	15.40^b	6.30^c	14.10^c	37.50^c
Weedy Check	11.80^c	4.00^d	13.30^c	35.30^d
Mean	17.96	7.20	18.50	40.52
SE±	8.03	3.23	8.27	18.12

***Source*:** Field work. May, 2020.

Values followed by the same letter in the column (s) are not significantly different at 5% level using DMRT.

Interaction of 0 tons poultry manure application and weeding frequency on yield parameters at weed free and 3WAS did not differ significantly. Weed free produced 22.10, 8.40, 20.10cm and 40.60 of flower number, fruit number, fruit length and fruit weight respectively. 3WAS resulted in 21.00 (flower number), 7.50 (fruit number), 20.00 (fruit length) and 40.20g (fruit weight). There existed significant difference in 4WAS, 5WAS and weedy check.

4WAS and 0 poultry manure resulted in 15.63 (flower number), 5.80 (fruit number), 16.80cm (fruit length) and 37.00g (fruit weight). Weedy check interaction with 0 tons poultry manure produced the poorest yield as shown on table 9 where no of flower (9.30), fruit no (3.80), fruit length (11.40cm) and fruit weight (31.80g). This was due to the influence of weeds on the crop and lack of nutrients. The findings of Wiro and Iyagba (2020) supported the same observations. The above could also be attributed to lack of nutrient in the soil (Enujeke, 2013) [18]. On the other hand, cucumber yield increased with the application of 5 tons of poultry manure when compared with zero manure application. Interaction of 5 tons and weed free and 3WAS produced values that were not significantly different which were better when compared with the values obtained from 4WAS and 5WAS. The worst performed plots were weedy check due to immense competition of weeds with the cucumber. Finally the highest cucumber yield were obtained from 10 tonsha^{-1} poultry manure application with 23.10 for flower number, 9.20 for fruit number, 23.00cm for fruit length and 45.70g for fruit weight (result for weed free plots) which were not significantly different with the result of 3WAS. 4WAS and 5WAS had no significant different in flower number (17.60 and 15.40 respectively). But there was significant difference in fruit number (7.80 and 6.30 respectively), 17.70 and 14.10cm respectively for fruit length respectively and 39.30 and 37.50 (fruit weight) for 4WAS and 5WAS respectively. Weedy check produced the poorest yield in all the parameters measured, 11.80 (flower number), 4.00 (fruit number), 13.30cm (fruit length) and 35.30g (fruit weight). Both weeds and cucumber benefited from the poultry manure application but increased degree of weed infestation caused reduction in yield of cucumber in 4WAS, 5WAS and weedy check. It has been noted that higher weed infestation causes severe competition for light, nutrients, space and water which lowers photosynthetic potential of the crop and subsequently the yield (Adejowo *et al*., 2009), Ansa and Iyagba (1999).

Table 10: Weed flora cumulative found in the experimental site during growth and development of cucumber (*Cucumis sativus*)

Weed Types	Family	Life Cycle	Growth Habit	Degree of Occurrence
Cyperusreturidus	Cyperacca	P	S	++
Cynododactylon	Poaccea	P	G	++
Paspalum Conjugatium	Poaceac	P	G	++
Eleusineindica (L)	Poaceac	A	G	+++
Panicum maximum	Poaceac	P	G	+++
Mimosa pudica Linn	Legurninosac	P	BL	++++
Adconopus compress us	Poacene	A	G	+++
Ageratum con yzoides	Asteraccea	P	BL	++++
Chromoleanaodorata	Asteracene	A	BL	+++
Aspiliaafricana	Asteraceae	P	BL	+++
Tridaxprocumbens	Asteraceae	P	BL	++
Phyllantusamarus	Euphirbiaceae	A	BL	+
Sidaacuta	Mahiaceae	P	BL	++
Boerhchaviadiffusa	Nycroginoceae	P	BI	++
Eragrostisatrovirens	Poaceae	P	G	++
Stctyrczhetoeoyenesis	Verbenonceae	P	BL	++
Cyperestuberosus	Cyeroceae	P	S	++
Commlinadiffusa	Commelinaceae	P	S	+

A = Annual, P=Perennial, S=sedges, G=Grass, BL=Broad Leaf, SB=Sidge broad + = Low weed occurrence, ++ = medium weed occurrence, +++ = High weed occurrence

Leguminocceae and *asteracceae* were the weed families with the highest degree of occurrence while *euphorbiaceae* and *commelinaceae* were the least degree of occurrence.

Many weeds were observed in the experimental area. These weeds which are also plants competed with the cucumber crop for space, nutrient, water, light etc. thus lowering the productivity level of the crop. The degree of occurrence of these weeds is of paramount importance in the cultivation of this vital crop (cucumber).

Conclusion

The results of the research study on the influence of weeding frequency and poultry manure rate on the growth and yield of cucumber showed that the application of poultry manure and appropriate weeding frequency in the production of cucumber have great potential of improving the soil structure and adequately controlling the weeds with a result of efficient, effective and better growth and yield of the crop.

Therefore, it was recommended that for the production of desirable quality and quantity of cucumber, the application of 10 ton ha^{-1} of poultry manure should be considered, weeds should not be allowed to grow with the crop beyond three weeks after sowing (3WAS) as this was discovered to be the critical weed control period of cucumber, other manures should be investigated to find out their productivity capacity on cucumber.

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