



## Effect of Poultry Manure on Growth and Yield of Cowpea Varieties Grown on Soil Infested with *Alectra Vogelii* Infestation

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### ABSTRACT

This research was carried out on the effect of poultry manure on growth and yield of cowpea varieties and *Alectra* infestation on *Alectra* inoculated soil. Two trials of pots experiments were conducted in the screen house, Department of Soil Science, Ahmadu Bello University, Zaria. poultry manures were applied at the rate of 15, 30 and 45kgN/ha with control (soil without *Alectra* inoculation). Cowpea varieties SAMPEA 7, SAMPEA 9 and SAMPEA 14 were planted in nylon bags of (20 x 18.9 cm) which served as pots for the experiment. All the pot soils (except the control) were inoculated with *Alectra* seeds. The treatments were laid out in completely randomize design. The cowpea plants were sampled for growth parameters at 5, 7 and 9 WAP. The parameters evaluated for vegetative growth include Plant height, Number of leaves, Number of branches, Number of root nodules, Root length, Shoot fresh weight and Root fresh weight, and yield parameters were Pods number, Pods weight, Seeds number, Seeds weight and 100 seeds weight. The result showed that, application of manures generally enhanced the vegetative growth parameters of cowpea varieties on most sampling dates, with the highest values recorded at 45kgN/ha followed by 30kgN/ha on most of the parameters evaluated while in most cases 15kgN/ha and control produced the lowest values in growth parameters in both Trials. Also, 30 and 45kgN/ha poultry manure treatments resulted in significant increase in most yield parameters in cowpea varieties than the control. Variety SAMPEA 7 produced the highest number of *Alectra* shoots followed by variety SAMPEA 9 which was significantly higher than the lowest produced by variety SAMPEA 14. It was recommended that poultry manure should be considered as an efficient control measure for *Alectra* infestation on susceptible cowpea varieties.

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### INTRODUCTION

There has been Significant crop yield losses caused by *Alectra* in legumes including cowpea, broad and velvet beans, groundnuts, bambara groundnut and grams (Riches, 1987; Lagoke *et al.*, 1988). Several cultivated lands have been abandoned due to high infestations with the noxious parasitic weeds (Lagoke *et al.*, 1988). Fields infested by these parasitic weeds are difficult to clean, because of the considerable number of seeds produced and the dormancy mechanisms, which enable them to survive in the

soil for several years (Emechibe *et al.*, 1983). *Alectra vogelii* has been reported to be the cause of considerable damage to cowpea, with substantial yield reductions especially in Africa (Emechibe *et al.*, 1991; Alonge *et al.*, 2001). Yield losses associated with *Alectra vogelii* have been reported to range from between 83 and 100 % (Cardwell and Lane, 1995; Singh *et al.*, 1993).

The control of *Alectra vogelii* is difficult mainly because of the unique adaptation of the parasite to its environment and the complexity of the host-parasite relationship (Botanga and

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Timko, 2005). General control measures for *Alectra* species include trap crops, hand pulling, cultivation of resistant cultivars and application of herbicides (Ogborn, 1987; Parkinson *et al.*, 1997, Sand *et al.*, 1990; Magani and Lagoke, 2009). Among these control measures, no one method has been found to be effective for the control of parasitic weeds. However, the use of resistant cultivars seemed to be a more viable option.

Maintenance of high crop yields under intensive cultivation is possible only through the use of fertilizers. The use of inorganic fertilizers has not been helpful as it is associated with increased soil acidity and nutrient imbalance (Ayoola and Makinde, 2009; Ondieki *et al.*, 2011). Inorganic fertilizers are usually not available and are always rather expensive for the low-income, small scale farmers (Kipkoech *et al.* 2010). Organic manures like poultry manure and crop residues can be used as an alternative for the inorganic fertilizers (Kumar *et al.*, 2000). The need to use renewable forms of energy has revived the use of organic fertilizers worldwide. Improvement of environmental conditions and public health as well as the need to reduce costs of fertilizing crops are also important reasons for advocating increased use of organic materials (Buresh *et al.*, 1997).

Over the years, several researchers have focused on the effect of inorganic fertilizers on growth and yield of cowpea varieties and their effect on *Alectra* infestation in cowpea. It is essential to carry out research on the effect of manure on the growth and yield of different cowpea varieties and their effect to *Alectra* infestation. Therefore, this research is aimed at evaluating the effect of poultry manure on the growth and yield of different cowpea varieties and *Alectra* infestation.

## MATERIALS AND METHODS

### Study Area

Pot experiments were conducted in the Screen house at Department of Soil Science, Ahmadu Bello University, Samaru (11° 11' N, 07°38' E and 686m above sea level), Zaria, in the Northern Guinea Savanna ecological zone of Nigeria. The region is characterized with average annual temperature of 24.4°C, relative humidity of

49 %, wind speed of 8 km/h and with annual rainfall of 1050 mm.

### Source of Materials

The seeds of the three varieties of cowpea that is SAMPEA 7, SAMPEA 9, and SAMPEA 14 were purchased from Seed Production Unit, Institute for Agricultural Research, Samaru- Zaria, for the study. Seeds of *Alectra* were obtained from International Institute of Tropical Agriculture, Kano. Poultry manure was collected from farmers from Kano state for the study.

### Preparation of *Alectra* Seeds Inoculum

About 10 g of *Alectra* seeds were weighed and put into polythene bag and 250 g sieved dried river sand were weighed and also put into the polythene bag. The *Alectra* seeds and 250 g sand were poured into a large polythene. These were mixed thoroughly by shaking in different direction for about 5 minutes. The same process was followed to obtain enough *Alectra* seeds inoculum for the experiment.

### Pot Preparation and Seed Planting

Top Soil obtained from the Botanical Garden, Ahmadu Bello University, Samaru-Zaria, were sieved and mixed with sharp sand from nearby river in ratio 1:1. Sample of mixed sand-soil was then taken to Department of Soil Science, Institute for Agricultural Research, Samaru- Zaria, for physico-chemical analysis. The mixture was used to fill the nylon bags (20 x 18.9 cm) to be used as pots for the experiment.

The animal waste that is poultry manure was sun dried before being used for the experiment. The manure was mixed with soil in the upper part of the pot. The manure was applied at the rates of 0, 15, 30, and 45 kgN/ha and covered with soil. This procedure was repeated for the control without manure application and *Alectra* inoculation. A hole was made in the centre of the soil in each pot, and a soft drink bottle top full of *Alectra* inoculums was introduced into the hole. The pot soil was watered for one week to precondition the *Alectra* seeds before sowing cowpea seeds.

Cowpea seeds were dressed with Apron star prior to planting, each treatment was assigned 8 pots, and each treatment was replicated thrice. Then four seeds of cowpea were dropped in the hole and the hole was covered with soil. Cowpea seeds were planted at 2-3 cm depth in the pot. The treatments were laid out in completely randomized design. The pot soil was watered daily except when the sand was observed to have enough moisture. After germination, the seedlings were thinned to two plants per pot at three weeks after planting (WAP).

Cowpea seedlings were sprayed with benomyl and mancozeb (maneb/zinc complex) at the rate of 0.6 and 2.5 kg/ha respectively, to control fungal diseases and dimethoate at 0.75 kg/ha was applied at 3 weeks after planting (WAP), to prevent viral diseases.

Cypermethrin and dimethoate (sherpa plus) was applied fortnightly at the rate of 1.0 kg/ha beginning from 7 WAP until harvest, to control insect pests during flowering and pod development. These chemicals were applied using a knapsack sprayer.

### Sampling and Data Collection

Sampling of the cowpea plants were conducted at 5, 7 and 9 WAP. On each of the sampling date, one pot was sampled per replicate from each treatment. The plants roots were gently separated from the soil and the plant was washed with water. The washed plant was spread on clean table for the water to drain off, then three plants from the replicates of each treatment were selected for determination of the vegetative growth parameters of the plants. Razor blade was used to separate the plants into root and shoot and each part was weighed on Metler balance and recorded.

## VEGETATIVE GROWTH PARAMETERS

### Plant Height

Metre rule was used to measure the plant height of each sampled plants from the soil level to the stem tip at 5, 7, and 9 WAP from each treatment.

### Number of leaves

The number of leaves from sampled plants from each treatment were counted and recorded.

### Number of branches

Number of branches from sampled plant from each treatment were also counted and recorded.

### Root Nodules

The root nodules were counted from each plant and recorded.

### Yield Parameters

Dried pods were harvested at intervals into labeled envelopes and at the end of the harvest the following parameters were determined:

### Pod Number

Number of pods harvested were counted and recorded for each treatment replicate. This was used to calculate the number of pods per plant from each treatment.

### Pod Weight

The pods harvested from each treatment replicate were weighed on Metler balance. This was used to calculate pods weight per plant from each treatment. After this, the pods were threshed and winnowed to determine the following:

### Seed Number

Number of seeds from each treatment replicate were counted and used to calculate seeds number per plant.

### Total Seed Weight

The cowpea total seeds obtained per treatment were weighed on Metler balance and recorded and used to calculate seeds weight per plant.

### 100 Seed Weight

From the threshed and winnowed seeds, 100 seeds were counted from each treatment and weighed on the weighing balance.

### *Alectra* Infestation Measurement

Reactions of the cowpea varieties to *Alectra* infestation were determined by the following parameters viz; number of plants infected, *Alectra* shoot counts and crop damage score from each treatment on each sampling date.

### Data Analyses

The data collected from the experiment was subjected to descriptive statistics. Analysis of variance (ANOVA) was used to test the means, where there is significant difference in treatment

means Duncan Multiple Range Test (DMRT) was used to separate the means.

## RESULTS

### Physicochemical Properties of the Soil used for the Experiment

The physicochemical properties of the soil showed that, among the particle size distribution the sand recorded the highest value and this was followed by silt and the lowest value recorded was in clay (Table 1). The textural class analysis revealed that, the soil was predominantly sandy loamy. The pH of the soil showed that, the soil was slightly alkaline on both media (Table 1). The Available phosphorus (AP) and other mineral elements analyzed are as shown in Table 1.

Table 1: Physicochemical Properties of the Soil used for the Experiment

Soil Parameters	Value
<b>Particle Size</b>	
Clay (%)	6
Silt (%)	16
Sand (%)	78
<b>Textural Class</b>	Loamy Sand
pH-H <sub>2</sub> O	7.6
pH-CaCl <sub>2</sub>	7.46
OC (%)	1.537
TN (%)	0.21
P (ppm)	64.87
Ca (cmol/kg)	5.05
Mg (cmol/kg)	0.936
K (cmol/kg)	0.395
Na (cmol/kg)	0.254
H+Al	0.1
CEC	7.8

NB: OC= Organic Carbon, TN= Total Nitrogen, AP= Available Phosphorus, CEC= Cation Exchange Capacity, H+Al=Aluminium hydroxide.

### Effect of poultry manure treatments on the plant height of cowpea varieties on *Alectra* inoculated soil

Generally, the data showed that, there was marked significant difference in plant height based on poultry manure treatments on most of the sampling dates in both trials with the exception of those at 5 and 9 WAP in Trial I. The 45kgN/ha

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poultry manure treatment resulted in the highest plant height in cowpea varieties compared with other treatments in Trial II on each sampling date. Also, significant difference in plant height was observed among cowpea varieties on all the sampling dates of the two trials (Table 2).

### Treatments

At 5 and 9 WAP in Trial I, poultry manure treatments had no significant effect on plant height as the highest plant height due to 15 kgN/ha (at 5 WAP) and the control (at 9 WAP) poultry manure treatment was similar to that due to all the other treatments in the two sampling dates (Table 2). At 7 WAP of Trial I, the lowest plant height due to control was only significantly lower than the highest due to 15 kgN/ha poultry manure treatment. At 5 WAP in Trial II, the highest plant height due to 45 kgN/ha was only significantly higher than the lowest due to 30 kgN/ha poultry manure treatment. Also, at 7 WAP in Trial II, the highest plant height due to 45 kgN/ha was

significantly higher than that due to all the other treatments. This was followed by that due to 15 and 30 kgN/ha poultry manure treatments. The lowest plant height was due to the control. At 9 WAP in Trial II, the lowest plant height due to control and 15 kgN/ha poultry manure treatment were only significantly lower than the highest due to 45kgN/ha poultry manure treatments (Table 2).

### Varieties

At 5 and 7 WAP in Trial I, the lowest plant height due to SAMPEA 14 at 5 and 7 WAP and SAMPEA 7 at 9 WAP were only significantly lower than the highest due to SAMPEA 9. Also, at 5 and 7 WAP in Trial II, the lowest plant height due to SAMPEA 14 (at 5 WAP) and SAMPEA 9 at 7 WAP was only significantly lower than the highest due to SAMPEA 7 on both sampling dates. The plant height due to SAMPEA 14 at 9 WAP in Trial II was significantly higher than that due to all the other varieties and it was followed by that due to SAMPEA 7 (Table 2).

Table 2: Effect of poultry manure treatments on the plant height (cm) of cowpea varieties on *Alectra* inoculated soil

Trial	Poultry manure Treatments (KgN/ha)	Plant age (WAP) Plant height (cm)		
		5	7	9
I	0	27.49 <sup>a</sup>	27.70 <sup>b</sup>	36.82 <sup>a</sup>
	15	28.08 <sup>a</sup>	30.38 <sup>a</sup>	28.78 <sup>a</sup>
	30	27.30 <sup>a</sup>	29.33 <sup>ab</sup>	32.23 <sup>a</sup>
	45	26.24 <sup>a</sup>	30.10 <sup>ab</sup>	31.80 <sup>a</sup>
	Mean	27.28	29.49	32.41
	SE ±	1.86	1.04	3.63
	Varieties			
	SAMPEA 7	25.71 <sup>b</sup>	27.28 <sup>b</sup>	31.11 <sup>b</sup>
	SAMPEA 9	30.89 <sup>a</sup>	33.67 <sup>a</sup>	41.12 <sup>a</sup>
	SAMPEA 14	23.10 <sup>b</sup>	25.70 <sup>b</sup>	34.13 <sup>ab</sup>
II	Mean	26.57	28.88	35.45
	SE ±	1.44	0.81	2.81
	0	14.93 <sup>a</sup>	16.04 <sup>c</sup>	16.60 <sup>b</sup>
	15	15.10 <sup>a</sup>	18.21 <sup>b</sup>	16.57 <sup>b</sup>
	30	12.67 <sup>b</sup>	18.92 <sup>b</sup>	18.68 <sup>ab</sup>

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Trial	Poultry manure Treatments (KgN/ha)	Plant age (WAP) Plant height (cm)		
		5	7	9
	45	15.67 <sup>a</sup>	20.58 <sup>a</sup>	20.90 <sup>a</sup>
	Mean	14.59	18.44	18.19
	SE ±	1.22	1.45	1.44
	Varieties			
	SAMPEA 7	15.34 <sup>a</sup>	18.15 <sup>a</sup>	17.43 <sup>b</sup>
	SAMPEA 9	13.95 <sup>b</sup>	16.13 <sup>b</sup>	14.75 <sup>c</sup>
	SAMPEA 14	12.93 <sup>b</sup>	18.41 <sup>a</sup>	20.46 <sup>a</sup>
	Mean	14.07	17.56	17.54
	SE ±	1.21	1.45	1.45

NB: Means with the same letter(s) within each column, under each factor are not significantly different ( $P=0.05$ ), using DMRT. 0 = Control without *Alectra* inoculation, WAP= Weeks after planting

#### Effect of poultry manure treatments on the number of leaves of cowpea varieties on *Alectra* inoculated soil

Generally, the result showed that, there was no significant difference in number of leaves based on poultry manure treatments on most of the sampling dates in both trials with the exception of those at 5 and 7 WAP in Trial II. Also, significant difference in number of leaves was observed among varieties on most of the sampling dates in the two trials (Table 3).

#### Treatments

At 5, 7 and 9 WAP in the Trial I and 9 WAP in Trial II, poultry manure treatments had no significant effect in number of leaves in cowpea varieties (Table 3). At 5 and 7 WAP in Trial II, the lowest number of leaves due to 15 kgN/ha and control respectively were only significantly lower

than the highest due to 30 kgN/ha poultry manure treatment on both sampling dates (Table 3).

#### Varieties

At 5 and 7 WAP in Trial I, the highest number of leaves due to SAMPEA 14 and SAMPEA 9 respectively were only significantly higher than the lowest due to SAMPEA 7 and SAMPEA 14 respectively. At 9 WAP, the highest number of leaves due to SAMPEA 9 was significantly higher than that due to all the other varieties and it was followed by that due to SAMPEA 7 in Trial I. However, in Trial II, the highest number of leaves due to SAMPEA 9 at 5 and 7 WAP was only significantly higher than the lowest due to SAMPEA 14. Also, at 9 WAP in Trial II, there was no significant difference in number of leaves among varieties (Table 3).

Table 3: Effect of poultry manure treatments on the Number of leaves of cowpea varieties on *Alectra* inoculated soil

Trial	Poultry manure Treatments	Plant age (WAP) Number of leaves		
		5	7	9
I	0	19.00 <sup>a</sup>	24.44 <sup>a</sup>	32.22 <sup>a</sup>
	15	19.33 <sup>a</sup>	25.22 <sup>a</sup>	30.89 <sup>a</sup>
	30	17.22 <sup>a</sup>	25.56 <sup>a</sup>	33.67 <sup>a</sup>

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Trial	Poultry manure Treatments	Plant age (WAP) Number of leaves		
		5	7	9
I	45	17.57 <sup>a</sup>	29.44 <sup>a</sup>	29.67 <sup>a</sup>
	Mean	18.28	26.17	31.61
	SE ±	2.43	3.99	3.46
	Varieties			
	SAMPEA 7	17.20 <sup>b</sup>	24.47 <sup>ab</sup>	30.00 <sup>b</sup>
	SAMPEA 9	22.67 <sup>a</sup>	31.20 <sup>a</sup>	43.33 <sup>a</sup>
	SAMPEA 14	24.27 <sup>a</sup>	19.47 <sup>b</sup>	21.80 <sup>c</sup>
	Mean	21.38	25.05	31.71
	SE ±	1.88	3.10	2.68
	0	8.67 <sup>ab</sup>	11.56 <sup>b</sup>	15.56 <sup>a</sup>
	15	7.00 <sup>b</sup>	12.89 <sup>ab</sup>	14.11 <sup>a</sup>
	30	11.00 <sup>a</sup>	15.00 <sup>a</sup>	16.22 <sup>a</sup>
	45	8.67 <sup>ab</sup>	13.33 <sup>ab</sup>	15.67 <sup>a</sup>
	Mean	8.84	13.20	15.39
	SE ±	1.22	1.35	1.55
II	Varieties			
	SAMPEA 7	8.80 <sup>a</sup>	13.93 <sup>a</sup>	16.00 <sup>a</sup>
	SAMPEA 9	10.13 <sup>a</sup>	15.07 <sup>a</sup>	15.33 <sup>a</sup>
	SAMPEA 14	6.73 <sup>b</sup>	11.60 <sup>b</sup>	14.33 <sup>a</sup>
	Mean	8.55	13.53	15.22
	SE ±	1.21	1.39	1.58

NB: Means with the same letter(s) within each column, under each factor are not significantly different ( $P=0.05$ ), using DMRT. 0 = Control without *Alectra* inoculation, WAP= Weeks after planting

#### Effect of poultry manure treatments on the number of branches of cowpea varieties on *Alectra* inoculated soil

Generally, the data showed that, there was marked significant difference in number of branches based on poultry manure treatments on most of the sampling dates in both trials with the exception of 7 and 9 WAP in Trial I and 9 WAP in Trial II. Also, significant difference in number of branches was observed among varieties on most of the sampling dates in the two trials (Table 4).

#### Treatments

At 7 and 9 WAP in Trial I and 9 WAP in Trial II, poultry manure treatments had no significant effect on the number of branches (Table 4). At 5 WAP in Trial I, the highest number of branches due to 30 kgN/ha poultry manure treatment was only significantly higher than the lowest due to control. At 5 and 7 WAP of Trial II, the highest number of branches due to 45 kgN/ha (at 5 WAP) and 30KgN/ha (at 7 WAP) was only significantly higher than the lowest due to 15 kgN/ha poultry manure treatment (at 5 WAP) and the control (at 7 WAP) (Table 4).

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### Varieties

At 5 and 7 WAP of Trial I, the lowest number of branches due to SAMPEA 7 was only significantly lower than the highest due to SAMPEA 9. At 9 WAP in Trial I, the highest number of branches due to SAMPEA 9 was only significantly higher than that due to SAMPEA 7 and SAMPEA 14 (Table 4). At 5 and 9 WAP in Trial

II, there was no significant difference in the number of branches among all the varieties. However, at 7 WAP, the highest number of branches due to SAMPEA 9 was only significantly higher than the lowest due to SAMPEA 7 (Table 4).

Table 4: Effect of poultry manure treatments on the Number of branches of cowpea varieties on *Alectra* inoculated soil

Trial	Poultry manure Treatments ( KgN/ha)	Plant age (WAP) Number of branches		
		5	7	9
I	0	6.80 <sup>b</sup>	10.78 <sup>a</sup>	14.11 <sup>a</sup>
	15	8.44 <sup>a</sup>	10.78 <sup>a</sup>	13.33 <sup>a</sup>
	30	8.67 <sup>a</sup>	8.89 <sup>a</sup>	12.33 <sup>a</sup>
	45	7.89 <sup>a</sup>	11.78 <sup>a</sup>	12.11 <sup>a</sup>
	Mean	7.95	10.56	12.97
	SE ±	0.38	1.13	0.98
	Varieties			
	SAMPEA 7	6.40 <sup>b</sup>	8.33 <sup>b</sup>	12.27 <sup>b</sup>
	SAMPEA 9	8.87 <sup>a</sup>	13.27 <sup>a</sup>	16.07 <sup>a</sup>
	SAMPEA 14	8.53 <sup>a</sup>	8.53 <sup>b</sup>	11.40 <sup>b</sup>
	Mean	7.93	10.04	13.25
II	0	3.22 <sup>a</sup>	6.33 <sup>b</sup>	9.00 <sup>a</sup>
	15	2.78 <sup>b</sup>	6.89 <sup>b</sup>	8.33 <sup>a</sup>
	30	3.44 <sup>a</sup>	8.56 <sup>a</sup>	9.67 <sup>a</sup>
	45	3.67 <sup>a</sup>	8.44 <sup>a</sup>	9.22 <sup>a</sup>
	Mean	3.28	7.56	9.06
	SE ±	0.35	0.73	0.91
	Varieties			
	SAMPEA 7	3.40 <sup>ab</sup>	7.20 <sup>b</sup>	9.20 <sup>a</sup>
	SAMPEA 9	3.87 <sup>a</sup>	8.27 <sup>a</sup>	8.40 <sup>a</sup>
	SAMPEA 14	2.93 <sup>a</sup>	7.67 <sup>ab</sup>	9.27 <sup>a</sup>
	Mean	3.40	7.71	8.96
	SE ±	0.33	0.89	0.93

NB: Means with the same letter(s) within each column, under each factor are not significantly different (P=0.05), using DMRT. 0 = Control without *Alectra* inoculation, WAP= Weeks after planting

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### Effect of poultry manure treatments on the number of root nodules of cowpea varieties on *Alectra* inoculated soil

Generally, the data showed that, there was no significant difference in number of root nodules based on treatments on most of the sampling dates in both trials with the exception of those at 7 and 9 WAP in Trial II. Generally, all the poultry manure treatments produced non-significant increase compared with the control in the number of root nodules on cowpea varieties on each sampling dates. Also, significant difference in number of root nodules was observed among varieties in the two trials (Table 5).

#### Treatments

At all the sampling dates in Trial I and 5 WAP in Trial II, poultry manure treatments had no significant effect on number of root nodules (Table 5). At 7 WAP in Trial II, the highest number of root nodules due to 45 kgN/ha was comparable with that due to 30 kgN/ha poultry manure treatment but significantly higher than that due to all the

other treatments. However, the lowest due to control was comparable to that at 15 kgN/ha but significantly lower than all the other treatments. At 9 WAP, the lowest number of root nodules due to 15 kgN/ha poultry manure treatment was comparable with that due to control but significantly lower than the highest due to 45 kgN/ha and that at 30 kgN/ha poultry manure treatment (Table 5).

#### Varieties

On all the sampling dates in Trial I, the highest number of root nodules due to SAMPEA 9 at 5 and 7 WAP and due to SAMPEA 7 at 9 WAP were only significantly higher than the lowest due to SAMPEA 14. Similar trend was also observed in Trial II in the sense that, the lowest number of root nodules due to SAMPEA 9 at 7 and 9 WAP was only significantly lower than the highest due to SAMPEA 14 (Table 5). However, at 5 WAP in Trial II, the number of root nodules among varieties were not significant (Table 5).

Table 5: Effect of poultry manure treatments on the Number of root nodules of cowpea varieties on *Alectra* inoculated soil

Trial	Poultry manure Treatments (KgN/ha)	Plant age (WAP) Number of root nodules		
		5	7	9
I	0	36.89 <sup>a</sup>	50.33 <sup>a</sup>	49.56 <sup>a</sup>
	15	40.33 <sup>a</sup>	66.00 <sup>a</sup>	60.00 <sup>a</sup>
	30	39.44 <sup>a</sup>	54.33 <sup>a</sup>	52.56 <sup>a</sup>
	45	51.11 <sup>a</sup>	67.22 <sup>a</sup>	58.11 <sup>a</sup>
	Mean	41.94	59.47	55.06
	SE ±	5.88	5.98	6.20
	Varieties			
	SAMPEA 7	51.93 <sup>a</sup>	61.93 <sup>a</sup>	75.64 <sup>a</sup>
	SAMPEA 9	52.67 <sup>a</sup>	68.80 <sup>a</sup>	66.33 <sup>a</sup>
	SAMPEA 14	28.53 <sup>b</sup>	36.93 <sup>b</sup>	32.00 <sup>b</sup>
	Mean	44.38	55.89	57.85
	SE ±	4.56	4.63	4.81

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Trial	Poultry manure Treatments (KgN/ha)	Plant age (WAP) Number of root nodules		
		5	7	9
II	0	18.94 <sup>a</sup>	15.06 <sup>c</sup>	21.46 <sup>bc</sup>
	15	18.54 <sup>a</sup>	18.96 <sup>bc</sup>	20.34 <sup>c</sup>
	30	24.80 <sup>a</sup>	21.38 <sup>ab</sup>	25.40 <sup>ab</sup>
	45	20.37 <sup>a</sup>	24.92 <sup>a</sup>	26.64 <sup>a</sup>
	Mean	20.66	20.08	23.46
	SE $\pm$	2.26	2.32	3.36
	Varieties			
	SAMPEA 7	19.18 <sup>a</sup>	19.32 <sup>b</sup>	21.31 <sup>b</sup>
	SAMPEA 9	16.21 <sup>a</sup>	17.67 <sup>b</sup>	19.13 <sup>b</sup>
	SAMPEA 14	24.06 <sup>a</sup>	24.57 <sup>a</sup>	29.31 <sup>a</sup>
	Mean	19.81	20.52	23.25
	SE $\pm$	2.24	2.33	2.36

NB: Means with the same letter(s) within each column, under each factor are not significantly different ( $P=0.05$ ), using DMRT. 0 = Control without *Alectra* inoculation, WAP= Weeks after planting

#### Effect of poultry manure treatments on the root length of cowpea varieties on *Alectra* inoculated soil

Generally, the data showed that, there was marked significant difference in root length based on treatments on most of the sampling dates in both trials with the exception of those at 5 and 7 WAP in both Trials. Also, significant difference was not observed among varieties on most of the sampling dates in the two trials (Table 6). The 30 and 45kgN/ha poultry manure treatments produced non-significant increase in root length of cowpea varieties on most sampling dates compared with the control (Table 6)

#### Treatments

At 9 WAP in Trial I, the lowest root length due to 45 kgN/ha poultry manure treatment was only significantly lower than the highest due to the control. (Table 6). There was no significant difference in root length among treatments on

most sampling dates in Trial II except at 9 WAP where the lowest root length due to control was only significantly lower than the highest due to 45 KgN/ha poultry manure treatment (Table 6).

#### Varieties

At 5 WAP in Trial I, the result based on varieties showed that, the lowest root length due to SAMPEA 7 was only significantly lower than the highest due to SAMPEA 14. However, there was no significant difference in the root length among all the varieties at 7 and 9 WAP in Trial I and 5 WAP in Trial II (Table 6). At 7 WAP in Trial II, the lowest root length due to SAMPEA 14 was only significantly lower than the highest due to SAMPEA 7. Also, at 9 WAP, the highest root length due to SAMPEA 14 was only significantly higher than the lowest due to SAMPEA 9 (Table 6).

Table 6: Effect of poultry manure treatments on the Root length of cowpea varieties on *Alectra* inoculated soil

Poultry manure		Plant age (WAP) Root length (cm)		
Trial	Treatments (KgN/ha)	5	7	9
I	0	27.91 <sup>a</sup>	37.71 <sup>a</sup>	48.57 <sup>a</sup>
	15	28.14 <sup>a</sup>	41.46 <sup>a</sup>	37.87 <sup>ab</sup>
	30	28.39 <sup>a</sup>	42.36 <sup>a</sup>	34.39 <sup>b</sup>
	45	29.63 <sup>a</sup>	44.57 <sup>a</sup>	33.87 <sup>b</sup>
	Mean	28.52	41.53	38.68
	SE ±	2.21	3.10	3.81
	Varieties			
	SAMPEA 7	26.67 <sup>b</sup>	40.12 <sup>a</sup>	38.62 <sup>a</sup>
	SAMPEA 9	31.08 <sup>b</sup>	39.45 <sup>a</sup>	38.46 <sup>a</sup>
	SAMPEA 14	36.83 <sup>a</sup>	38.97 <sup>a</sup>	39.59 <sup>a</sup>
	Mean	31.53	39.51	38.89
	SE ±	1.71	2.40	2.94
II	0	15.78 <sup>a</sup>	13.44 <sup>a</sup>	19.00 <sup>b</sup>
	15	16.78 <sup>a</sup>	18.11 <sup>a</sup>	21.89 <sup>b</sup>
	30	18.22 <sup>a</sup>	21.78 <sup>a</sup>	23.11 <sup>b</sup>
	45	19.11 <sup>a</sup>	21.33 <sup>a</sup>	37.78 <sup>a</sup>
	Mean	17.47	18.67	25.45
	SE ±	1.43	2.34	2.75
	Varieties			
	SAMPEA 7	14.07 <sup>a</sup>	30.07 <sup>a</sup>	34.07 <sup>a</sup>
	SAMPEA 9	14.93 <sup>a</sup>	25.07 <sup>b</sup>	28.60 <sup>b</sup>
	SAMPEA 14	14.53 <sup>a</sup>	23.07 <sup>b</sup>	35.33 <sup>a</sup>
	Mean	14.51	26.07	32.67
	SE ±	1.23	2.35	2.74

NB: Means with the same letter(s) within each column, under each factor are not significantly different (P=0.05), using DMRT. 0 = Control without *Alectra* inoculation, WAP= Weeks after planting

#### Effect of poultry manure treatments on the shoot fresh weight of cowpea varieties on *Alectra* inoculated soil

Generally, the data showed that, there was no marked significant difference in shoot fresh weight based on treatments on most of the sampling dates in both trials with the exception of 7 and 9 WAP in Trial II. Also, significant difference in shoot fresh weight was only observed among

varieties in all the sampling dates in Trial II (Table 7). The 30 and 45kgN/ha treatments significantly increased the shoot fresh weight of cowpea varieties at 7 and 9 WAP in Trial II compared with the control (Table 7).

#### Treatments

There was no significant difference in shoot fresh weight among treatments at all the

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sampling dates in Trial 1 and 5 WAP Trial II. At 7 and 9 WAP in Trial II, the highest shoot fresh weight due to 45 kgN/ha was comparable with that at 30 kgN/ha poultry manure treatment but significantly higher than that due to all the other treatments across the two sampling dates. The lowest shoot fresh weight due to control on both sampling dates was significantly lower than that due to all the other treatments across the two sampling dates (Table 7).

### Varieties

The result based on varieties showed that, there was no significant difference in the shoot fresh weight among all the varieties on all the sampling dates in Trial I. However, at 5 WAP in Trial II, the highest shoot fresh weight due to SAMPEA 7 was only significantly higher than the lowest due to SAMPEA 14. At 7 WAP of Trial II, the lowest shoot fresh weight due to SAMPEA 14 was only significantly lower than the highest due to SAMPEA 7 (Table 7). Similarly, at 9 WAP where the highest shoot fresh weight due to SAMPEA 14 was only significantly higher than the lowest due to SAMPEA 9 (Table 7).

Table 7: Effect of poultry manure treatments on the Shoot fresh weight of cowpea varieties on *Alectta* inoculated soil

Trial	Poultry manure Treatments (KgN/ha)	Plant age (WAP) Shoot fresh weight (g)		
		5	7	9
I	0	13.22 <sup>a</sup>	14.28 <sup>b</sup>	22.01 <sup>a</sup>
	15	14.89 <sup>a</sup>	19.49 <sup>a</sup>	25.47 <sup>a</sup>
	30	14.33 <sup>a</sup>	18.08 <sup>a</sup>	23.83 <sup>a</sup>
	45	13.99 <sup>a</sup>	18.50 <sup>a</sup>	23.84 <sup>a</sup>
	Mean	14.12	17.59	23.79
	SE ±	1.01	1.20	3.81
	Varieties			
	SAMPEA 7	13.48 <sup>a</sup>	16.36 <sup>a</sup>	27.14 <sup>a</sup>
	SAMPEA 9	15.27 <sup>a</sup>	18.09 <sup>a</sup>	26.79 <sup>a</sup>
	SAMPEA 14	14.79 <sup>a</sup>	18.01 <sup>a</sup>	28.95 <sup>a</sup>
	Mean	14.51	17.49	27.62
	SE ±	0.78	0.93	2.95
II	0	2.18 <sup>a</sup>	2.79 <sup>c</sup>	4.74 <sup>c</sup>
	15	5.00 <sup>a</sup>	4.09 <sup>b</sup>	5.58 <sup>bc</sup>
	30	2.19 <sup>a</sup>	4.71 <sup>ab</sup>	6.64 <sup>ab</sup>
	45	2.31 <sup>a</sup>	5.20 <sup>a</sup>	7.47 <sup>a</sup>
	Mean	2.92	4.20	6.12
	SE ±	0.42	0.65	0.92
	Varieties			
	SAMPEA 7	4.43 <sup>a</sup>	4.81 <sup>a</sup>	6.01 <sup>a</sup>
	SAMPEA 9	1.96 <sup>a</sup>	3.89 <sup>b</sup>	4.45 <sup>b</sup>

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Trial	Poultry manure Treatments (KgN/ha)	Plant age (WAP) Shoot fresh weight (g)		
		5	7	9
	SAMPEA 14	1.54 <sup>b</sup>	3.42 <sup>b</sup>	6.41 <sup>a</sup>
	Mean	2.64	4.04	5.59
	SE ±	0.22	0.54	0.82

NB: Means with the same letter(s) within each column, under each factor are not significantly different ( $P=0.05$ ), using DMRT. 0 = Control without *Alectra* inoculation, WAP= Weeks after planting

### Effect of poultry manure treatments on the root fresh weight of cowpea varieties on *Alectra* inoculated soil

Generally, the data showed that, there was marked significant difference in root fresh weight based on treatments on most of the sampling dates in both trials with the exception of that at 5 WAP of Trial I and II. Also, significant difference among varieties was not observed in all the sampling dates with the exception of that at 9 WAP of Trial II (Table 8).

### Treatments

The result based on treatments showed that, at 7 WAP in Trial I, the lowest root fresh weight due to control was only significantly lower than the highest due to 30 kgN/ha poultry manure treatments. At 9 WAP, the lowest root fresh weight due to control was only significantly lower than the highest due to 15 kgN/ha poultry manure

treatment (Table 8). There was no significant difference in root fresh weight among treatments at 5 WAP in Trial II. At 7 and 9 WAP in Trial II, similar trend was observed in the sense that, the lowest root fresh weight due to control at 7 and 9 WAP was only significantly lower than the highest due to 45 kgN/ha poultry manure treatments in the two sampling dates (Table 8).

### Varieties

The result based on varieties showed that, there was no significant difference in the root fresh weight among all the varieties in all the sampling dates of the two trials with the exception of that at 9 WAP in Trial II where the highest root fresh weight due to SAMPEA 7 was only significantly higher than the lowest due to SAMPEA 9 (Table 8).

Table 8: Effect of poultry manure treatments on the Root fresh weight of cowpea varieties on *Alectra* inoculated soil

Trial	Poultry manure Treatments (KgN/ha)	Plant age (WAP) Root fresh weight (g)		
		5	7	9
I	0	1.46 <sup>a</sup>	2.23 <sup>b</sup>	3.36 <sup>b</sup>
	15	1.49 <sup>a</sup>	3.52 <sup>ab</sup>	5.62 <sup>a</sup>
	30	1.57 <sup>a</sup>	4.32 <sup>a</sup>	3.40 <sup>b</sup>
	45	2.10 <sup>a</sup>	2.43 <sup>b</sup>	3.57 <sup>b</sup>
	Mean	1.66	3.13	3.99
	SE ±	0.28	0.52	0.69
	Varieties			
	SAMPEA 7	2.19 <sup>a</sup>	3.03 <sup>a</sup>	6.09 <sup>a</sup>
	SAMPEA 9	1.97 <sup>a</sup>	3.78 <sup>a</sup>	5.02 <sup>a</sup>

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Trial	Poultry manure Treatments (KgN/ha)	Plant age (WAP) Root fresh weight (g)		
		5	7	9
II	SAMPEA 14	2.27 <sup>a</sup>	3.41 <sup>a</sup>	4.64 <sup>a</sup>
	Mean	2.14	3.41	5.25
	SE ±	0.22	0.40	0.54
	0	0.12 <sup>a</sup>	0.31 <sup>b</sup>	0.54 <sup>b</sup>
	15	0.21 <sup>a</sup>	0.43 <sup>b</sup>	0.84 <sup>ab</sup>
	30	0.14 <sup>a</sup>	0.47 <sup>b</sup>	0.79 <sup>ab</sup>
	45	0.16 <sup>a</sup>	1.08 <sup>a</sup>	1.07 <sup>a</sup>
	Mean	0.16	0.57	0.81
	SE ±	0.05	0.09	0.11
	Varieties			
	SAMPEA 7	0.21 <sup>a</sup>	0.63 <sup>a</sup>	0.94 <sup>a</sup>
	SAMPEA 9	0.17 <sup>a</sup>	0.64 <sup>a</sup>	0.63 <sup>b</sup>
	SAMPEA 14	0.13 <sup>a</sup>	0.41 <sup>a</sup>	0.69 <sup>ab</sup>
	Mean	0.17	0.56	0.75
	SE ±	0.05	0.08	0.10

NB: Means with the same letter(s) within each column, under each factor are not significantly different ( $P=0.05$ ), using DMRT. 0 = Control without *Alectra* inoculation, WAP= Weeks after planting

#### Effect of poultry manure treatments on the yield parameters of cowpea varieties on *Alectra* inoculated soil

##### Treatments

The data on yield parameters in the both trials showed that, poultry manure treatment had a significant effect on all the yield parameters with the exception of pods number, seeds number, seeds weight and 100 seeds weight in Trials I and 100 seeds weight in Trial II (Table 9). In Trial I, the highest pods weight due to 45 kgN/ha poultry manure treatment was only significantly higher than the lowest due to 30 kgN/ha poultry manure treatment. Also, in Trial II, all the yield parameters with the exception of the 100 seeds weight followed similar trend in the sense that, the lowest due to control was only significantly lower than the

highest due to 45 kgN/ha poultry manure treatment (Table 9).

##### Varieties

Cowpea varieties under poultry manure treatments produced comparable 100 seeds weight in Trial I and in all the yield parameters in Trial II (Table 9). However, in Trial I, the lowest value in pods number and pods weight parameters due to variety SAMPEA 9 was only significantly lower than the highest due to SAMPEA 14. Also, the lowest value in seeds number and seeds weight parameters due to variety SAMPEA 7 was only significantly lower than the highest due to SAMPEA 14 (Table 9).



Table 9: Effect of poultry manure treatments on the Yield parameters of cowpea varieties on *Alectra* inoculated soil

Trial	Yield parameters					
	Treatments (kgN/ha)	Pods number	Pods weight (g)	Seeds number	Seeds weight (g)	100 seeds weight(g)
I	0	10.25 <sup>a</sup>	12.68 <sup>a</sup>	48.59 <sup>a</sup>	7.66 <sup>a</sup>	11.40 <sup>a</sup>
	15	10.25 <sup>a</sup>	11.33 <sup>a</sup>	53.25 <sup>a</sup>	8.24 <sup>a</sup>	16.42 <sup>a</sup>
	30	7.00 <sup>a</sup>	7.33 <sup>b</sup>	36.44 <sup>a</sup>	4.93 <sup>a</sup>	15.90 <sup>a</sup>
	45	11.67 <sup>a</sup>	11.33 <sup>a</sup>	53.25 <sup>a</sup>	8.39 <sup>a</sup>	14.54 <sup>a</sup>
	Mean	9.79	10.67	47.88	7.31	14.57
	SE ±	1.12	1.13	4.88	0.86	1.18
	Varieties					
	SAMPEA 7	8.67 <sup>b</sup>	10.13 <sup>b</sup>	22.23 <sup>b</sup>	5.48 <sup>b</sup>	14.30 <sup>a</sup>
	SAMPEA 9	6.43 <sup>b</sup>	5.19 <sup>b</sup>	43.14 <sup>b</sup>	6.08 <sup>b</sup>	14.98 <sup>a</sup>
	SAMPEA 14	16.14 <sup>a</sup>	18.23 <sup>a</sup>	96.57 <sup>a</sup>	13.49 <sup>a</sup>	14.91 <sup>a</sup>
	Mean	10.41	11.18	53.98	8.84	14.65
	SE ±	1.12	1.13	4.78	0.86	1.18
II	0-	6.78 <sup>b</sup>	2.16 <sup>b</sup>	19.89 <sup>b</sup>	1.88 <sup>b</sup>	9.40 <sup>a</sup>
	15	7.89 <sup>b</sup>	3.38 <sup>b</sup>	28.78 <sup>ab</sup>	2.94 <sup>ab</sup>	9.57 <sup>a</sup>
	30	10.56 <sup>ab</sup>	4.56 <sup>ab</sup>	32.56 <sup>ab</sup>	3.86 <sup>ab</sup>	11.22 <sup>a</sup>
	45	13.69 <sup>a</sup>	6.11 <sup>a</sup>	39.10 <sup>a</sup>	4.93 <sup>a</sup>	12.28 <sup>a</sup>
	Mean	9.73	4.05	30.08	3.40	10.62
	SE ±	0.98	0.41	2.78	0.46	1.10
	Varieties					
	SAMPEA 7	33.64 <sup>a</sup>	4.06 <sup>a</sup>	31.86 <sup>a</sup>	3.41 <sup>a</sup>	10.85 <sup>a</sup>
	SAMPEA 9	8.29 <sup>a</sup>	3.95 <sup>a</sup>	24.29 <sup>a</sup>	3.45 <sup>a</sup>	11.89 <sup>a</sup>
	SAMPEA 14	10.43 <sup>a</sup>	3.82 <sup>a</sup>	32.71 <sup>a</sup>	3.16 <sup>a</sup>	9.56 <sup>a</sup>
	Mean	17.45	3.94	29.62	3.34	10.68
	SE ±	0.98	0.41	2.78	0.46	1.10

NB: Means with the same letter(s) within each column, under each factor are not significantly different (P=0.05), using DMRT. 0 = Control without *Alectra* inoculation, WAP= Weeks after planting

#### Effect of Poultry manure treatments on *Alectra* infestation of different cowpea varieties

Generally, the result showed that, the highest number of *Alectra* shoots produced due to variety SAMPEA 7 was significantly higher than the number of *Alectra* shoots produced due to SAMPEA 9 and 14 in Trial I. Also, in Trial II, the highest number of *Alectra* shoots produced due to

variety SAMPEA 7 was only significantly higher than the number of *Alectra* shoots produced due to SAMPEA 14. (Table 10).

The highest number of *Alectra* shoots produced due to poultry manure was at 30 kgN/ha treatment in Trial I and it was only significantly higher than the lowest due to control. In trial II, the highest number of *Alectra* shoots produced due to

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45 kgN/ha treatment was only significantly higher than the lowest number of *Alectra* shoots

produced due to control poultry manure treatment (Table 10).

Table 10: Effect of poultry manure treatments on *Alectra* infestation (combined data) of cowpea varieties

Trial	Treatments (KgN/ha)	Alectra Shoots Number
I	0	0.00 <sup>b</sup>
	15	6.67 <sup>a</sup>
	30	8.89 <sup>a</sup>
	45	6.56 <sup>a</sup>
	Mean	5.53
	SE±	1.67
	Varieties	
	SAMPEA 7	10.79 <sup>a</sup>
	SAMPEA 9	3.53 <sup>b</sup>
	SAMPEA 14	0.00 <sup>c</sup>
	Mean	4.77
	SE±	1.07
II	0	0.00 <sup>c</sup>
	15	5.00 <sup>ab</sup>
	30	5.56 <sup>ab</sup>
	45	6.33 <sup>a</sup>
	Mean	4.22
	SE±	1.05
	Varieties	
	SAMPEA 7	6.64 <sup>a</sup>
	SAMPEA 9	5.29 <sup>a</sup>
	SAMPEA 14	0.00 <sup>b</sup>
	Mean	3.98
	SE±	0.98

NB: Means with the same letter(s) within each column, are not significantly different (P=0.05) using DMRT  
0 = Control without *Alectra* inoculation

## DISCUSSION OF FINDINGS

The increase in growth parameters at 7 WAP could be attributed to low nutrient demand or low *Alectra* infestation at the age. This is in line with Bashir (2008), who reported an increase in plant height in *Alectra* inoculated cowpea varieties as compared with the uninoculated cowpea

varieties. In Trial I, cowpea variety SAMPEA 9 produced the highest values in most growth parameters, excluding Root Fresh Weight. On the other hand, in Trial II SAMPEA 7 produced the highest Number of Leaves, Root Length, Shoot Fresh Weight and Root Fresh Weight, but SAMPEA 9 produced the lowest Plant Height, Number of Root Noodles, Root Length, Shoot

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Fresh Weight and Root Fresh Weight in Trial II. These differences could be the character resulting from the crop genetic makeup and their differences in response to the effect of manure and this agrees with the findings of Abayomi *et al* (2008) that, application of fertilizer leads to more leaves and branches of cowpea. Also, Omotosho (2014) reported that, the number of leaves and number of branches per plant were also significantly increased with the increased rate of fertilizer application. Control resulted with the lowest values of parameters recorded especially at the Trial II when compared with the *Alectra* inoculated soil.

Poultry manure application significantly improved seeds weight in Trial I, and it significantly increased all the yield parameters. This is due to the activities of the manure on root/vegetative growth and root nodulation. These growth parameters were significantly improved by the application of manure and hence significant increase in grain yield and yield parameters. This is in line with the report of Abayomi *et al*. (2008) that, yield parameters and consequently grain yield were significantly increased by fertilizer application at 30-15-15-kgN-P-K/ha. *Alectra vogelii* inoculation did not significantly reduced the yield parameters of cowpea varieties on *Alectra* inoculated soil in Trials I and II. This is not in accordance with the report that, *A. vogelii* infestation causes a reduction in number of pods per plant, weight of pod, number of seeds per pod, weight of seeds and chlorophyll contents of the leaves among susceptible genotypes (Kutama *et al.*, 2013).

However, despite the *Alectra* inoculation, the application of manure resulted in an increase in pod number, pod weight, seed number, seed weight, and 100 seed weight. This increase was due to the presence of adequate nutrient in the soil resulting from the manure application. This observation is in line with the findings of Kwaga *et al.* (2010) that, *Alectra* incidence was suppressed with fertilizer application at 50 kgN/ ha and thus increased pod yield above that of unfertilized plant. Emechebe *et al.* (1991) also reported that, the application of high nitrogen dose (120 kgN/ha) drastically

reduced the incidence of infestation by *Striga gesnerioides* in cowpea without significantly affecting grain yield but enhanced yield components. Since the tolerant genotype can produce high yield in spite of high parasitism, it implies that it is very efficient in the production of assimilates to support the parasites and still have enough to give high yields (Musell, 1980).

Control produced the lowest *Alectra* shoot when compared with the other treatments in the two Trials. This might be a result of absence of *Alectra* infestation in the treatment. The 15kgN/ha in the two trials generally resulted in the lowest *Alectra* shoot growth compared with the other treatments. The highest growth of *Alectra* shoot due to 45kgN/ha followed by 30kgN/ha in the two trials could be due to the presence of high level of Nitrogen in the soil. This is in contrast to the efficacy of nitrogen in reducing *Alectra* shoots in Soybean as reported by Tarfa *et al.* (1996). Similar effect of the nutrient was observed on cowpea by Magani (1994). Similarly, Kwaga *et al.* (2010), reported significant reduction in of *Alectra vogelii* shoots when 25 kgN/ha was applied to groundnut. The suppressing effect of nitrogen on parasitic weeds has to do with the lethal effect of the nutrient on the weeds. However, it was shown that, variety SAMPEA 14 exhibited the highest resistance to *Alectra* having shown the lowest *Alectra* incidence in Trials I and II. This could be attributed to the possibility of its producing the least germination stimulant (Kwaga *et al.*, 2010). However, SAMPEA 7 was found to support the highest number of *Alectra* shoots throughout the growth period.

## CONCLUSIONS AND RECOMMENDATIONS

Application of manure at 15 – 45 kgN/ha generally increased the vegetative growth and yield parameters of the cowpea varieties on *Alectra* inoculated soil. Also, application of different manures at 45 kgN/ha had the highest incidence of *Alectra vogelii* which was generally similar to that due to 30kgN/ha treatment in all the varieties in most cases. Based on the findings of this study, it was recommended that, the poultry manures should be considered as an efficient control measure for *Alectra* infestation on

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susceptible cowpea varieties due to its ability to supply adequate nutrient to the soil to enhance its fertility.

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