



Original article

EFFECTS OF CERCOSPORA LEAF SPOT ON GROWTH AND YIELD PARAMETERS ON DIFFERENT COWPEA (*Vigna unguiculata* L.Walp.) VARIETIES IN YOLA, ADAMAWA STATE, NIGERIA

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ABSTRACT

Cercospora Leaf Spot (CLS) of cowpea (*Vigna unguiculata* L.Walp) is a major constraint against cowpea cultivation. In the wake of rising cost of chemical control, ecological-friendly methods of curbing CLS was studied in Modibbo Adama University, Yola. The main objective of the study was to determine the effectiveness of neem and pawpaw leaves extracts for the control of CLS disease of cowpea while the varieties used include SAMPEA-1, SAMPEA-2, SAMPEA-3, SAMPEA-4, SAMPEA-5, SAMPEA-6, SAMPEA-7, SAMPEA-8, SAMPEA-9 and SAMPEA-10. The study comprised laboratory studies, screen house and field experiments. The field experiment was a factorial experiment consisting of 20 treatments laid out in a Randomised Complete Block Design replicated three times with plant extracts placed on the main plot while varieties placed on the sub-plot during 2019 and 2020 seasons. The obtained data were analysed using statistical analysis (SAS). The results revealed that all the varieties were infected by cercospora leaf spot disease at varying levels. On yield parameter, SAMPEA 10 had the highest yield of 2101 followed by SAMPEA 1 with 1999.88 while the least of 911.35 was obtained from SAMPEA 7. For most of the parameters, neem extracts produced higher results followed by pawpaw extract. Therefore, adoption of neem and pawpaw leaf extract as alternatives and better remedies to CLS disease control is recommended.

Keywords: Cowpea, Plant Extract, Cercospora, Plant Growth, Yield

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INTRODUCTION

Cowpea [*Vigna unguiculata* (L.) Walp] is a dicotyledonous plant that belongs to the family Leguminosae and sub-family Papillinoadea, order Fabaceae and genus *Vigna* [1]. It is an annual herb with strong principal root and many spreading lateral roots in surface soil. It is one of the most important legume crops grown throughout the tropical belt covering Asia, the East Africa, southern Europe, Central and Southern America, the Southern United States of America. It is the major source of protein in human diet and fodder to livestock as well as improving soil fertility. It is a tropical legume of African origin especially West and Central Africa (WCA). Approximately 90% of world cowpea is grown in sub-Saharan Africa, mostly in Nigeria and Niger. According to Ref [2], cowpea was grown on about 12.3 million ha of land globally and 6.9 million tons of grain was produced. Nigeria, the largest cowpea producer in the world accounts for about 3 million tons of the world production from a cultivated land area of 3.5 million ha. Currently more than 70% of the world production is concentrated in three countries, namely, Nigeria, Brazil and Niger. Nigeria is the leading country with 0.9 million tons annually on 0.4 hectares of land most of which comes from four northern states of Adamawa, Borno, Kano and Sokoto [3]. Cowpea is a higher drought tolerant crop than many other crops. It grows in areas with average annual rainfall less than 500 mm. It is best grown in areas with annual rainfall between 750-1,100mm [4]. One of the most remarkable things about cowpea is that it thrives in dry environment; available cultivars produce a crop with as little as 300 mm rainfall. Cowpea also has a great tolerance to water logging. Well distributed rainfall is important for normal

growth and development of cowpeas [4]. Yield loss attributed to *Cercospora* leaf spot in susceptible cowpea genotypes varies between 36% and 42% [5]. Out of 75 cowpea varieties evaluated in 1999 and 2000, about 40% of the germplasm were found susceptible to *Cercospora* leaf spot disease [6] with Ife brown, a widely adopted and cultivated cowpea cultivar in Nigeria having 80% *Cercospora* incidence on the field. Field observation revealed crop loss of over 40% in *Cercospora* endemic field [6]. This study is therefore going carried out to isolate and identify *Cercospora* leaf spot pathogen associated with different cowpea genotypes in Yola North Local Government Areas in Adamawa State. Similarly, field investigation will be carried out by planting some selected cowpea cultivars.

MATERIALS AND METHODS

This study was carried out in the Research Farm of Faculty of Agriculture, Modibbo Adama University of Technology, Yola in 2019 and 2020 rainy seasons.

Cowpea seeds, *Vigna unguiculata* (L.) WALP was used for the study and was procured from ITTA, Zaria. SAMPEA 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 was used.

The field was cleared into fine tilt and chemical like Round up was sprayed to kill all the weeds then the field was ploughed and harrowed twice to a fine tilt. Beds were prepared and arranged in a Randomized Complete Block Design (RCBD) with three replications. Each plot had an area of 3 x 2 meters (6 m²). The space between plots was 0.5 m and the space between replication was 1m. TVX-3236- a cowpea variety susceptible to *Cercospora* leaf spot was planted two weeks before planting the test varieties and the pathogen was isolated from the

plant and its inoculum was used to infect the test varieties.

The seeds were treated with Apron plus at the rate of 10 g/kg to protect the seed and were later planted at about 3cm depth.

Sowing was carried out manually using hoe on the prepared beds. The seeds were sown on an inter-row spacing of 70 cm and intra-row spacing of 30cm at the rate of 3 seeds per hill which was thinned to two per stand at 2 weeks after planting.

Fertilizer application was done in small quantity of 15 kg/ha nitrogen after 5 weeks as a starter dose and phosphorus at the rate of 30 kg for good crop, and phosphorus in single phosphate at the rate of 30 kg/ha recommended for cowpea production [7].

The weeds were controlled by hand weeding using hoe at 2 weeks first after planting, and second at 4 weeks after planting to ensure clean field as recommended by [7]. This was done adopting the method by [8], where fresh mature leaves from *Azadiracta indica* and *Carica papaya* were collected from plants within the university premises. In the laboratory, the leaves (1 kg of each species) were thoroughly rinsed in running tap water, air-dried at room temperature, blended in 15 L of sterile distilled water in an electric blender (Master Chef—®, China) and left for 24 hrs.

The pathogens were controlled by application of neem and pawpaw leaves extract on the cowpea plants. The sprayed field was inoculated with spore suspension of 5×10^4 conidial/ml for even distribution of the pathogen at 4WAS. Thereafter, the plants extract (10%) was sprayed as from 5WAS using ULV sprayer

and repeated at two weeks' interval until 10WAS. The unsprayed field was not inoculated but was sprayed with distilled water only and was compared with the sprayed field to know the effect of the pathogen on the cowpea plant also to know the efficacy of the plant extract in controlling the *Cercospora* leaf spot disease of cowpea.

Data that was collected during the experiment includes: percentage establishment, number of vines per plant, vine length, incidence of disease (%), severity of the disease (%), days to 50% flowering, number of seeds per pod, number of pods per plants and yield (kg ha^{-1}).

This was carried out 2 weeks after sowing by counting the number of established plants and was expressed in percentage of the total number of expected plants per plot.

Vine Length (cm)

Five (5) plants were randomly selected and tagged from each treatment from the middle and the vine length was measured using thread, which was placed on a ruler and the length was measured and recorded in cm.

Days to 50% flowering

Days to 50% flowering was collected by observation individual plots from the first appearance of flower until 50% of plants have flowered and the number of days taken from the date of planting.

Number of Seeds per Plants

Five (5) pods were randomly selected from each of the treatments, and the number of seeds per pods was counted. The number of seeds of the five pods was

recorded as the number of seeds per pods for each treatment.

100 Seeds Weight (g)

The pods were threshed and 100 seeds counted from each treatment and weigh using electric weighing scale.

Yield per Hectare (kg^{ha}⁻¹)

The grain yield per plot was calculated and expressed in kilograms per plot for each of the genotypes.

Data Analysis

Data collected was analyzed using Statistical Analysis System (SAS) appropriate for Randomized Completely Block Design (RCBD) and means separation was carried out using Ducans Multiple Range Test (DRMT).

RESULTS

Growth Parameters

Effects of plant extracts and cowpea varieties on establishment count

The result of the effects of plant extracts and varieties of cowpea on establishment count of cowpea in 2019 and 2020 seasons is presented in Table 1. The result showed that there was no significant difference ($p > 0.05$) in the extracts on establishment count both in 2019 and 2020 seasons, but there was no significant difference ($p > 0.05$) among the varieties in both 2019 and 2020 seasons. In 2019, SAMPEA5 recorded the highest mean value of 100.00% followed by SAMPEA2, 6 and 8 with equal mean value of 96.67% while the least was obtained from SAMPEA 10 with mean value of 90.00%. In 2020, SAMPEA1, 5 and 8 recorded the highest equal mean value of

100.00% followed by SAMPEA2, 3, 6 and 9 with equal mean value of 96.67% while the mean value of 93.33% was obtained from SAMPEA4, 7 and 10. On the other hand, 2020 had the highest establishment count of 96.67% while the least of 94.33% was recorded in 2019. There was no significant interaction ($P > 0.05$) between treatments-varieties, year-treatments, year-treatments-varieties both in 2019 and 2020, but there was significant difference ($p \leq 0.05$) between year-varieties. The year 2020 gave highest result of 96.67% while the least of 94.44% was recorded in the year 2019. There was no significant difference ($P > 0.05$) among the treatments of the combined analysis, but there was significant difference ($p \leq 0.05$) among the varieties. The highest mean value of 100.00% was obtained from SAMPEA5 followed by 96.67% obtained from SAMPEA1, 2 and 6 while the least of 91.67% was obtained from SAMPEA 10.

Effects of plant extracts and cowpea varieties on Vine Length

The result of the effects of plant extracts and varieties of cowpea on vine length of cowpea in 2019 and 2020 seasons is presented in Table 1. The result showed highly significant difference ($p \leq 0.05$) in the extracts and varieties on vine length in both 2019 and 2020. In 2019, neem extracts recorded the highest mean value of 133.74 followed by pawpaw extracts with 133.49 while the least of 133.41 was obtained from the control. In 2020, pawpaw extract had the highest mean value of 142.48, followed 139.60 obtained from neem while the least of 138.65 was obtained from the control. In 2019, SAMPEA 2, recorded the highest mean value of 171.75 followed by 151.17 obtained from SAMPEA10 while while the

least of 94.87 was obtained from SAMPEA1. In 2020, SAMPEA 2 recorded the highest mean value of 175.61 followed by 155.22 obtained from 10 while the least of 123.37 was obtained from SAMPEA7. There was also significant difference ($p \leq 0.05$) among years, 2020 had the highest vine length of 140.24 while the least of 133.54 was recorded in 2019. There was significant interaction ($P \leq 0.05$) between treatments-varieties year-treatment, year-varieties and year-treatment-varieties in both 2019 and 2020. There was also significant difference ($P \leq 0.05$) in the combined years in both treatments and varieties of the combined analysis. The highest treatment mean value of 137.99 was obtained from pawpaw extract followed by 136.67 obtained from neem while the least of 136.03 was obtained from the control treatment. On the other hand, SAMPEA 2 recorded the highest mean value of 173.46 followed by 153.17 obtained from SAMPEA 10 while the least of 102.87 was obtained from SAMPEA 1.

Effects of plant extracts and cowpea varieties on 50 Days to Flowering of the 10 cowpea Varieties

The result of the effects of plant extracts and varieties of cowpea on vine length of cowpea in 2019 and 2020 seasons is presented in Table 1. The result showed highly significant difference ($p \leq 0.05$) in the extracts and varieties on 50 days flowering in both 2019 and 2020. In 2019, control recorded the highest mean value of 53.10 followed by neem extracts with 52.40 while the least of 52.30 was obtained from the pawpaw extract. In 2020, neem extract had the highest mean value of 53.00, followed 52.90 obtained from control while the least of 52.60 was obtained from the pawpaw. In 2019, SAMPEA10, recorded the highest mean value of 62.00 followed by 61.33 obtained

from SAMPEA6 while while the least of 40.33 was obtained from SAMPEA8. In 2020, the trend continue almost the same way, SAMPEA10 recorded the highest mean value of 64.33 followed by 63.33 obtained from 6 while the least of 40.67 was obtained from SAMPEA 7. There was also significant difference ($p \leq 0.05$) among years, 2020 had the highest 50 days flowering of 52.83 while the least of 52.60 was recorded in 2019. There was significant interaction ($P \leq 0.05$) between treatments-varieties year-treatment, year-varieties and year-treatment-varieties in both 2019 and 2020. There was also significant difference ($P \leq 0.05$) in both treatments and varieties of the combined analysis. The highest treatment mean value of 53.00 was obtained from control followed by 52.70 obtained from neem while the least of 52.45 was obtained from the pawpaw. In the combined result, SAMPEA10 recorded the highest mean value of 63.17 followed by SAMPEA6 with mean value of 62.33 while SAMPEA 2 had the least of 50.50 recorded.

Effects of plant extracts and cowpea varieties on Seed/Pods of the 10 cowpea Varieties

The result of the effects of plant extracts and varieties of cowpea on seed/pods of cowpea in 2019 and 2020 seasons is presented in Table 2. The result showed significant difference ($p \leq 0.05$) in the extracts and varieties on seed/pods in both 2019 and 2020. In 2019, neem recorded the highest mean value of 13.77 while the least equal mean value of 13.50 was obtained from pawpaw and control. In 2020, pawpaw extract recorded the highest mean value of 13.97, followed by 13.83 obtained from neem while the least of 13.73 was obtained from control. In 2019, SAMPEA 10, recorded the highest mean value of 14.56 followed by 14.33

obtained from SAMPEA 1 while the least of 12.33 was obtained from SAMPEA 7. In 2020, SAMPEA 9 recorded the highest mean value of 15.00 followed by 14.78 obtained from 10 while the least of 13.67 was obtained from SAMPEA 4 and 6. There was also significant difference ($p \leq 0.05$) among years, 2020 had the highest seed/pods of 13.84 while the least of 13.59 was recorded in 2019. There was significant interaction ($P \leq 0.05$) between treatments-varieties, year-treatment, year-varieties and year-treatment-varieties in both 2019 and 2020. There was also significant difference ($P \leq 0.05$) in both treatments and varieties of the combined analysis. The highest treatment mean value of 13.80 was obtained from neem followed by 13.73 obtained from pawpaw while the least of 13.61 was obtained from the control. In the combined varieties, SAMPEA 10 recorded the highest mean value of 14.67 followed by SAMPEA 9 with mean value of 14.50 while SAMPEA 4 had the least of 13.33 recorded.

Effects of plant extracts and cowpea varieties on Seed Weight of the 10 cowpea Varieties

The result of the effects of plant extracts and varieties of cowpea on seed weight of cowpea in 2019 and 2020 seasons is presented in Table 2. The result showed no significant difference ($p > 0.05$) in the extracts on seed weight in both 2019 and 2020. There was also no significant difference observed among the ($p > 0.05$) in 2019 but significant difference ($P \leq 0.05$) was observed in 2020. In 2020, SAMPEA 3 recorded the highest mean value of 16.99 followed by 15.56 obtained from 10 while the least of 14.94 was obtained from SAMPEA 1 and 2. There was also significant difference among years, 2019 had the highest seed weight of 30.86 while the least of 15.29 was recorded in

2020. There was no significant interaction ($p > 0.05$) between treatments-varieties, year-treatment, year-varieties and year-treatment-varieties in both 2019 and 2020. There was also no significant difference ($p > 0.05$) in both treatments and varieties of the combined analysis.

Effects of plant extract on Yield of the 10 cowpea Varieties

The result of the effects of plant extracts and varieties of cowpea on yield of cowpea in 2019 and 2020 seasons is presented in Table 2. The result indicated no significant difference ($p > 0.05$) in the extracts on yield in 2019 but there was significant difference ($P \leq 0.05$) observed in 2020. There was also significant difference ($P \leq 0.05$) among the varieties in both 2019 and 2020. In 2020, control recorded the highest mean value of 1513.57 followed by 1511.07 obtained from neem while the least of 1487.21 was obtained from pawpaw. In 2019, SAMPEA 1, recorded the highest mean value of 2033.35 followed by 1983.69 obtained from Sampea 10 while the least of 731.34 was obtained from SAMPEA 9. In 2020, SAMPEA 10 recorded the highest mean value of 2101.03 followed by 1999.88 obtained from SAMPEA 1 while the least of 1062.32 was obtained from SAMPEA 4. There was also significant difference ($p \leq 0.05$) among years, 2020 had the highest yield of 2101.03 while the least of 1983.61 was recorded in 2019. There was significant interaction ($P \leq 0.05$) between treatments-varieties, year-treatment, year-varieties and year-treatment-varieties in both 2019 and 2020. There was no significant difference ($P > 0.05$) in the treatments but there was significant interaction ($P \leq 0.05$) among the varieties of the combined analysis. In the combined varieties, SAMPEA 10 recorded the highest mean value of 2042.48 followed by SAMPEA 1

with mean value of 2016.62 while SAMPEA 9 had the least of 876.02 recorded.

Table 1: Effects of Plant Extracts and Varieties on Establishment Count% in Yola in 2019 and 2020 Seasons

	Estb Count	Vine Length	Flowering	Estb Count	Vine Length	Flowering
Treatments	2019	2019	2019	2020	2020	2020
Neem	94.33 ^a	133.74 ^a	52.40 ^b	96.67 ^a	139.60 ^b	53.00 ^a
Pawpaw	94.33 ^a	133.49 ^b	52.30 ^c	96.67 ^a	142.48 ^a	52.60 ^c
Control	94.33 ^a	133.41 ^c	53.10 ^a	96.67 ^a	138.65 ^c	52.90 ^b
P<F	1.000	<.0001	<.0001	1.000	<.0001	<.0001
Variety						
SAMPEA 1	93.33 ^{bc}	94.87 ^j	50.33 ^f	100.00	110.86 ^h	52.00 ^d
SAMPEA 2	96.67 ^{ab}	171.75 ^a	50.33 ^f	96.67 ^{ab}	175.61 ^a	51.00 ^e
SAMPEA 3	93.33 ^{bc}	138.09 ^e	50.10 ^g	96.67 ^{ab}	151.85 ^c	51.00 ^e
SAMPEA 4	90.00 ^c	120.28 ⁱ	51.00 ^e	93.33 ^b	127.17 ^f	51.00 ^e
SAMPEA 5	100.00 ^a	123.34 ^f	60.33 ^c	100.00 ^a	129.79 ^e	62.00 ^c
SAMPEA 6	96.67 ^{ab}	122.37 ^g	61.33 ^b	96.67 ^{ab}	125.98 ^f	63.33 ^b
SAMPEA 7	93.33 ^{bc}	120.77 ^h	49.30 ^h	93.33 ^b	123.37 ^g	40.67 ^g
SAMPEA 8	96.67 ^{ab}	149.99 ^c	40.44 ⁱ	100.00 ^a	152.74 ^c	41.00 ^f
SAMPEA 9	93.33 ^{bc}	142.78 ^d	51.33 ^d	96.67 ^{ab}	150.27 ^d	52.00 ^d
SAMPEA 10	90.00 ^c	151.17 ^b	62.00 ^a	93.33 ^b	155.22 ^b	64.33 ^a
P<F	0.0006	<.0001	<.0001	0.0062	<.0001	<.0001
Year	94.44 ^b	133.54 ^b	52.60 ^b	96.67 ^a	140.24 ^a	52.83 ^a
P<F	0.0017	<.0001	<.0001			
Interaction						
Treatment X Variety	NS	**	**	NS	**	**
Year X Treatment	NS	**	**	NS	**	**
Year X Variety	*	**	**	*	**	**
Year X Treatment X Variety	NS	**	**	NS	**	**

Table 2: Effects of Plant Extracts and Varieties Yield Parameters in Yola in 2019 and 2020 Seasons

Treatments	Seed Weight	Seed/Pod	Yield	Seed Weight	Seed/Pod	Yield
	2019	2019	2019	2020	2020	2020
Neem	15.68 ^a	13.77 ^a	1511.07 ^a	15.31 ^a	13.83 ^{ab}	1539.37 ^b
Pawpaw	15.76 ^a	13.50 ^b	1487.21 ^b	15.30 ^a	13.97 ^a	1606.01 ^a
Control	15.12 ^a	13.50 ^b	1513.57 ^a	15.24 ^a	13.73 ^b	1539.01 ^b
P<F	0.3744	0.0019	<.0001	0.083	0.0154	0.0234
Variety						
SAMPEA 1	15.06 ^a	14.33 ^a	2033.35 ^a	14.93 ^d	14.00 ^b	1999.88 ^b
SAMPEA 2	16.87 ^a	13.33 ^d	1513.87 ^f	14.93 ^d	14.00 ^b	1449.35 ^d
SAMPEA 3	16.89 ^a	12.67 ^f	1301.05 ^g	16.99 ^a	12.78 ^d	1491.16 ^d
SAMPEA 4	14.66 ^a	13.00 ^e	1051.16 ^h	14.96 ^d	13.67 ^c	1062.32 ^e
SAMPEA 5	15.33 ^a	14.00 ^b	1752.68 ^c	15.34 ^c	14.00 ^b	1990.23 ^b
SAMPEA 6	15.56 ^a	13.67 ^c	1766.49 ^e	15.03 ^d	13.67 ^c	1789.38 ^c
SAMPEA 7	15.18 ^a	14.00 ^b	908.74 ⁱ	15.04 ^d	14.00 ^b	911.35 ^f
SAMPEA 8	15.15 ^a	12.33 ^g	1796.91 ^d	15.04 ^d	12.57 ^d	1799.25 ^c
SAMPEA 9	15.63 ^a	14.00 ^b	731.34 ^j	15.03 ^d	15.00 ^a	1020.70 ^e
SAMPEA 10	16.69 ^a	14.56 ^a	1983.69 ^b	15.56 ^b	14.78 ^a	2101.03 ^a
P<F	0.460	<.0001	<.0001	<.0001	<.0001	<.0001
Year	30.86 ^a	13.59 ^b	1503.95 ^b	15.29 ^b	13.84	1561.46 ^a
P<F	<.0001	<.0001	<.0001			
Interaction						
Treatment X Variety	NS	*	**	NS	NS	**
Year X Treatment	NS	*	**	NS	*	**
Year X Variety	NS	**	**	NS	**	**
Year X Treatment X Variety	NS	*	**	NS	*	**

DISCUSSION

The results show that the vine length was observed to be highest in plants treated

with neem and pawpaw leaves extract. It was realised that plants treated with neem and pawpaw leaves have good primary vine and vine length in 2019 and 2020

excluding the control. This observation could be attributed to the fact that they were able to reduce the disease incidence and severity and therefore prevented stunting. Ref. [9] also observed that water extract of 23 plant materials which included neem seed and neem leaves gave considerable reduction in disease incidence and increased growth parameters compared to the control on cowpea crops

Plants treated with neem leaves extract recorded the highest seed/pods among treatments in 2019 but pawpaw recorded the highest seed/pods in 2020 cropping season respectively. This could be attributed to the antifungal properties which retarded and inhibited the activity of the fungi leading to a decreased in spot number per leaf, defoliation per plant, incidence of leaf spot and number of infected leaf per plant. These results support the finding of Ref [9], who observed that plant materials which included aqueous neem seed and leaf extracts caused significant increase in seeds/pod compared to control. In one hundred seed weight, all plants sprayed neem and pawpaw leaves extract produced highest seeds/pod than all negative control plants in 2019 and 2020 cropping seasons. This is confirmed of the study of Ref [9], that plant extracts considerably reduced disease severity thereby increasing yield in cowpea.

Neem and pawpaw leaves extract produced highest seeds/pod than control treated plants thereby resulted to better yield in both 2019 and 2020 cropping seasons than the control. In 2019 cropping season, plants treated neem leaves extract produced considerable dry pod yields. Plants sprayed with pawpaw leave extract had dry pod yield in 2020 cropping season.

Neem and pawpaw treated plants yielded more than negative control plants and this can be attributed to their antifungal properties which suppressed the activities of the fungi leading to decreased spot number per leaf, defoliation per plant, incidence of leaf spot and number of infected leaf per plant. This could have led to the increase in photosynthetic activity, faster cowpea plant establishment, and subsequently dry pod yield. This is in line of the findings by Ref [10], that plant extracts and benlate used for the control of *Cercospora* leaf leaf spot of sesame significantly had 40.71 and 38.22 % higher yields than unsprayed plots. This observation could be attributed to the fungicidal effects of the plant extracts which decreased disease incidence and severity, promoted growth parameters and increased yield. This confirms the report that aqueous plant extracts such as neem leave extract decreased spot number per leaf, defoliation per plant, incidence of leaf spot, and number of infected leaf per plant and increased pod yield [9]. Plants treated with neem and paw-paw leaves extract produced highest seed/pod and yield which may due to the phytochemicals contained in these extracts was more and reduced the negative impact of the disease and increased yields. Ref. [9] reported that the application of plant extracts increased seed/pod, and haulm yield by 64.37-111.41 and 32.35-74.71 %, respectively. This was in agreement with the finding of [5] who reported that, *Cercospora canescens* have a serious effect on yield under severe infestation up to 42% loss in yield. Furthermore, [11] also reported that seed yield of cowpea was correlated with *Cercospora* leaf spot disease severity from artificially and naturally occurring epidemics at Ibadan.

CONCLUSION

Cercospora leaf spot is a serious disease of cowpea in Nigeria. It may be considered as one of the major limiting factors to grow cowpea which is widely distributed all over the country wherever the crop is cultivated. In the present study, application of botanical extracts against *Cercospora leaf spot* was studied under screenhouse and field experiment. It is evident that both of the treatments showed significant effect leaf spot and plant disease incidence (% infected plant). It has been observed that neem and pawpaw leaves extract resulted in significant reduction of *Cercospora leaf spot* of cowpea over untreated (control). It is evident that the treatments (neem and pawpaw leaf extracts) showed significant effect in respect of growth and yield parameters.

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