

## Effect of Variety and Seed Dressing On Incidence and Severity of Cercospora Leaf Spot Disease of Cowpea (*Vigna Unguiculata*) In Sokoto, North-Western Nigeria

A.S. Muhammad And A.Y. Sajo

Department Of Crop Science, Usmanu Danfodiyo University Sokoto

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**Abstract:** Field Study Was Conducted During The 2015 Raining Season, At The Usmanu Danfodiyo University Dry Land Farm, To Evaluate The Effect Of Variety And Seed Dressing On Cercospora Leaf Spot Disease Of Cowpea. The Varieties Used Include Sampea-7, Sampea-8, Sampea-9, Sampea-11, Sampea-15 And Ex-Yumfa While Apron Star 42ws Was Used For Dressing The Seeds. Randomized Complete Block Design Was Used For The Study. Results Revealed That All The Varieties Were Infected By Cercospora Leaf Spot Disease At Varying Levels. Ex-Yumfa Had The Highest Disease Incidence And Severity Both At 9 Was And At Harvest. Lowest Disease Incidence And Severity Was Observed Both At 9 Was And At Harvest On Sampea-15. Significant Difference Was Also Recorded Between Dressed And Undressed Varieties. Ex-Yumfa Had Lowest 100 Grain Weight And Seed Yield While Sampea-7, Sampea-8, Sampea-9 And Sampea-11 Were Statistically Similar In Most Of The Disease And Yield Parameters Measured.

**Keywords:** Cowpea, Variety, Seed Dressing, Cercospora, Yield

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### I. Introduction

Cowpea (*Vigna Unguiculata* (L.) Walp) Is Known To Be Affected By Several Fungal, Bacterial And Viral Diseases. One Of Such Fungal Diseases Reported To Cause Serious Yield Loss In The Cowpea Is The *Cercospora* Leaf Spot Disease Caused By Two Fungi Namely, *Cercospora Canescens* Ellis And Martin And *Cercospora Cruenta* (Akande, 2007). Yield Loss Attributed To *Cercospora* Leaf Spot In Susceptible Cowpea Varieties Varies Between 36% And 42% (Scheider *Et Al.*, 1977; Fery *Et Al.*, 1977). Out Of 75 Cowpea Varieties Evaluated In 1999 And 2000, About 42 Percent Of The Germplasm Was Found To Be Susceptible To *Cercospora* Diseases (Ajibade Andamusa, 2001), With Ife Brown Having 80 Percent *Cercospora* Incidence On The Field. According To Booker And Pathmanathan (2007), A *Cercospora* Leaf Spot Disease Is A Serious Limitation To Cowpea Production, Resulting In Yield Loss Of As Much As 42 Percent.

Due To The High Cost Of Chemicals Use In The Control Of *Cercospora* Leaf Spot Disease Of Cowpea, Equipment And Misuse Of These Chemicals, Which Cause Harmful Effect In The Environment, Have Been The Major Factors That Necessitate The Search For Other Methods Of Disease Management. It Therefore, The Use Of Resistance Varieties, Thus, Can Help To Reduce The Incidence And Severity Of *Cercospora* Leaf Spot Disease Of Cowpea.

Therefore The Objectives Of This Study Are;

- To Evaluate Cowpea Varieties For Resistance To *Cercospora* Leaf Spot Disease Of Cowpea.
- To Determine The Effect Of Seed Dressing Chemical (Apron Star) On *Cercospora* Leaf Spot Disease Of Cowpea.

### II. Materials And Methods

The Experiment Was Carried Out At The Dry Land Teaching And Research Farm Of Crop Science Department, Usmanu Danfodiyo University, Sokoto, During The 2015 Cropping Season. The Farm Is Located Along Usmanu Danfodiyo University Model Secondary School. Sokoto Is Located In Sudan Savanna On Latitude 13° 01' N And Longitude 5° 15' E; The Soil Is Sandy And Lies At An Attitude Of 350m Above Sea Level, With Minimum And Maximum Temperature Of 15°C And 40°C Respectively (Singh *Et Al.*, 2011) And 645mm Of Rainfall (SERC, 2015).

#### Treatments And Experimental Design

The Treatment Consists Of Five Improved Cowpea Varieties, Sampea-7, Sampea-8, Sampea-9, Sampea-11 And Sampea-15, Sourced From Institute Of Agricultural Research Samara, Zaria (IAR), Department Of Crop Science, Seed Production Unit, And One Local Variety, Ex-Yunfa Which Was Obtained From Gidan

Yumfa Village And Apron Star (200g/Kg Thiamethoxam, 200/Kg Metalaxyl-M, 20g/Kg Difenconazole). The Experiment Was Laid Out In A Randomized Complete Block Design (RCBD) Made Up 36 Plots, With Three (3) Replications, Each Block Having 12 Plots; Each Plot Measured 4x3m (12m<sup>2</sup>). Each Plot Consist Of Four (4) Rows Spaced At 75cm And 30cm Intra - Row. The Blocks And Plots Were Separated By An Alley Way Of 1m And 0.5m Respectively.

### **III. Cultural Practices**

#### **Land Preparation**

The Land Was Cleared Of Shrubs And Stubbles, And Ploughed With A Tractor. The Soil Was Prepared To Provide Sufficient Tilth For Good Root Growth.

#### **Seed Dressing**

Seed Dressing Was Carried Out According To The Treatment With Undressed As Control.

#### **Sowing**

Sowing Was Carried Out On 06/07/2015 At A Spacing Of 75cm Between Rows (Inter-Row Spacing) And 30cm Intra-Row Spacing. The Sowing Was Carried Out With The Use Of Thread And Pegs To Make Straight Lines And To Plant The Seed At Regular Intervals.

#### **Fertilizer Application**

Fertilizer Was Applied At The Rate Of 15kg/Ha N As A Starter Dose For Good Crop And Phosphorus In The Form Of Single Super Phosphate, At The 30kg P/Ha Recommended For Cowpea Production To Help The Crop To Nodulate Well And Fix Its Own Nitrogen From The Atmosphere.

#### **Weeding**

Weeding Was Carried Out At Two, Five, And Nine Weeks After Planting.

#### **Insecticide Application**

Cowpea Plant Was Protected From Insect Attack By Application Of Cypermethrin + Dimethoate Insecticide At The Rate Of 50g A.I. /Ha. It Was Done At Flowering And Podding Stages.

### **IV. Data Collection**

#### **Growth Parameters**

##### **Stand Establishment Count**

Plant Establishment Count Was Taken For Each Plot Using The Following Formula:

$$\text{Establishment Count} = \frac{\text{Established Plants}}{\text{Number Of Seed Sown}} \times 100$$

##### **Plant Height (M)**

This Was Done At Nine Weeks After Sowing (WAS) And At Harvest, Five Plants Were Randomly Selected And Were Measured From The Soil Level To The Terminal Bud Using Meter Rule.

#### **Disease Parameters**

##### **Disease Incidence**

Data On Incidence Of The Disease Was Taken At 9 Weeks After Sowing, Number Of Stand Showing Symptoms Of The Disease In Each Plot Was Counted And Expressed As Percentage Of The Number Of Stand In Each Plot Using The Following Formula.

$$\text{Disease Incidence} = \frac{\text{Number of infected stands}}{\text{Number of total stand in the plot}} \times 100$$

##### **Disease Severity**

Severity Of The Disease Was Determined Using A Scale Of 1-9. Five Plants Were Selected At Random Which Were Observed And Scored Based On The Extent Of Disease Establishment On Each, A Scale Number Was Assigned.

##### **Disease Severity Scale:**

- 0 = Not Infected
- 1 = Slightly Infected
- 3 = Slightly Moderately Infected
- 5 = Moderately Infected
- 7 = Less Severely Infected
- 9 = Severely Infected

$$\text{Disease Severity} = \frac{\sum n}{NX9} \times 100$$

Where; DS = *Cercospora* Leaf Spot Severity (%)

$\sum_N$  = Summation Of Individual Ratings

N = Total Number Of Plant Assessed

9 = Highest Score On The Severity Scale.

### Yield Parameters

#### Number Of Pods Per Plant

At The End Of Trial, Five Cowpea Plants Were Randomly Selected And Their Number Of Pods Was Taken, Average Obtained.

#### Harvesting

Harvesting Was Carried Out By Harvesting All The Pods And Cutting The Main Plant.

#### Weight Of 100 Seed

At The End Of The Study 100 Seeds Of Cowpea From Each Plot Were Counted, Weighed For Each Treatment.

#### Seed Yield

At The End Of The Study Seed Yield Per Plot Was Obtained By Weighing The Seeds From Each Treatment And Projected To Per Hectare.

## V. Data Analysis

Data Collected Were Subjected To Analysis Of Variance (ANOVA) Based On Randomized Complete Block Design, While Significant Means Were Separated Using The Duncan's Multiple Range Test (DMRT), At 5% Level Of Significance.

## VI. Results And Discussion

### Establishments Count

The Effect Of Seed Dressing Chemical And Variety On Stand Establishment Count During 2015 Cropping Season Is Presented On Table 1. The Result Revealed That, Seeds Dressed With Apron Star Gave The Highest Number Of Established Plants Than The Undressed. This Could Be As A Result Of The Effect Of Apron Star, Which Helped In Germination By Controlling Seed Borne And Seedling Diseases, As Stated By Ebofin (2008). The Table Also Revealed The Effect Of Variety On Establishment Count, Where Ex-Yumfa Had The Highest Number Of Established Plants And The Lowest Was Recorded On Sampea-9, Which Was At Par With Sampea-7, Sampea-8, Sampea-11 And Sampea-15. The Observed Varietal Differences In Germination May Be Related To The Differences In Seed Size. This Agrees With Borji *Et Al.* (2007), Who Observed That Inhibition Of Establishment May Be Related To Seed Coat Thickness, Number Of Seed Coat Pores And Seed Size. There Was No Significant Interaction Between The Seed Dressing And The Variety.

**1:** Establishment Count Of Cowpea As Influenced By Seed Dressing And Variety During Cropping Season In Sokoto.

Treatments	Establishment Count (%)
<b>Seed Dressing</b>	
dressed	94.132 <sup>a</sup>
undressed	84.373 <sup>b</sup>
incidence	1.716
significance	*
<b>Variety</b>	
Sampea-7	88.717 <sup>ab</sup>
Sampea-8	87.306 <sup>ab</sup>
Sampea-9	79.724 <sup>b</sup>
Sampea-11	83.872 <sup>ab</sup>
Sampea-15	89.231 <sup>ab</sup>
Ex-Yumfa	91.667 <sup>a</sup>
incidence	2.972
interaction	*
NS	NS

Values bearing the same superscript along the same column are statistically the same at 5% of significance. NS= Not Significant, \*= Significant.

### Plant Height

Result Of Effect Of Fungicide And Variety On Plant Height At 9 Weeks After Sowing And At Harvest Is Presented In The Table 2. Both Fungicide And Variety Produced Significant ( $P < 0.05$ ) Effect On Plant Height. Seeds Dressed With Apron Star Differed Significantly ( $P < 0.05$ ) From The Undressed Both At 9WAS And At Harvest. The Highest Mean Of Plant Height Was Recorded On Seeds Treated With The Fungicide Both At 9 WAS And At Harvest. The Differences Observed Both At 9 WAS And At Harvest May Be Due To Protection Offered By Apron Star Against Soil, Foliar Diseases And Pest. This Is In Agreement With Richards *Et Al.* (2009), Who Reported That Seed Dressing With Apron Star Gave Protection Against Soil And Foliar Diseases Which May Hinder Crop Growth.

The Table Also Revealed The Result Of Plant Height As Influenced By Variety Both At 9WAS And At Harvest With Sampea-15 Having Highest Plant Height Both At 9WAS And At Harvest And Lowest Plant Height At 9WAS Was Obtained From Sampea-11 And Sampea-11 At Harvest. While Sampea-7 And Sampea-8 Are Statistically Similar At 9WAS, And Sampea-7 And Sampea-8 Are Similar At Harvest. The Varietal Differences Observed On Plant Height Under The Same Environmental Condition May Be An Inherent Trait Peculiar To Each Of The Varieties.

Table 2: Plant Height Of Cowpea As Influenced By Seed Dressing And Variety At 9 Weeks After Sowing And At Harvest.

Treatments	Plant Height(Cm)	
	At 9 WAS	At Harvest
<b>Seed Dressing</b>		
Dressed	165.3 <sup>a</sup>	259.5 <sup>a</sup>
Undressed	135.6 <sup>b</sup>	209.9 <sup>b</sup>
Significance	*	*
SE±	0.12	1.70
<b>Variety</b>		
Sampea-7	165.6 <sup>b</sup>	258.5 <sup>ab</sup>
Sampea-8	160.0 <sup>c</sup>	247.6 <sup>abc</sup>
Sampea-9	130.0 <sup>d</sup>	206.6 <sup>cd</sup>
Sampea-11	127.0 <sup>d</sup>	200.0 <sup>d</sup>
Sampea-15	173.6 <sup>a</sup>	273.4 <sup>a</sup>
Ex- Yumfa	146.1 <sup>cd</sup>	221.7 <sup>bcd</sup>
Significance	*	*
SE±	0.104	0.147
<b>Interaction</b>		
SD X V	NS	NS

Means Bearing The Same Superscript Along The Same Column Are Statistically The Same At 5% Level Of Significance According To DNMR. \* = Significant, NS=Not Significant, WAS = Weeks After Sowing.

### Disease Incidence At 9 WAS And At Harvest

Table 3 Indicates The Effect Of Fungicide And Variety On Disease Incidence At 9WAS And At Harvest. The Result From The Table Revealed That, There Was Significant Difference ( $P > 0.05$ ) On Disease Incidence At 9WAS And At Harvest Between Dressed And Undressed Seeds, But Significant Difference ( $P < 0.05$ ) Exists Between The Varieties, Where Ex-Yumfa Had Highest Disease Incidence Both At 9WAS And At Harvest, And Lowest Was Observed On Sampea-15 Both At 9WAS And At Harvest, Followed By Sampea-7 At 9WAS, And Sampea-8, Sampea-9, And Sampea-11 Are Statistically Similar At 9WAS And Sampea-7, Sampea-8 And Sampea-9 Are Similar At Harvest. The Differences Observed In Disease Incidence Between The Varieties May Be Due To The Inherent Genetic Make-Up Of The Varieties, Which Is Supported By (Allerd *Et Al.*, 1992). They Reported That Varieties React Differently To Diseases Due To Their Different Inherent Genetic Make-Up. There Was No Significant Effect Between Variety And Fungicide.

### Disease Severity At 9 WAS And At Harvest

Table 3 Also Indicates The Effect Of Fungicide And Variety On Disease Severity At 9 WAS And At Harvest. The Table Showed That Seed Dressing Had Significant ( $P < 0.05$ ) Effect On Disease Severity Both At 9 WAS And At Harvest, As Well As Between The Varieties. Highest Severity Was Observed On Ex-Yumfa Both At 9 WAS And At Harvest, And Lowest Severity Was Observed On Sampea-15 At 9 WAS And At Harvest Respectively. Similarly Sampea-8 And Sampea-9 Were Statistically Similar At 9 WAS, But Differed Significantly At Harvest. The 6 Varieties Reacted Differently To The Disease Incidence And Severity Of *Cercospora Cruenta* And *Cercospora Canescens*, Which Indicated That Varieties Have Different Level Of Resistance To The Disease. This May Be Due To The Inherent Genetic Make-Up Of The Varieties To Resist The Disease At Different Levels (Allerd *Et Al.*, 1992; Sinsiri *Et Al.*, 2006).

Table 3: Effect Of Seed Dressing And Variety On Incidence And Severity Of *Cercospora* Leaf Spot Of Cowpea At 9 Weeks After Sowing And At Harvest

Treatments	Disease Incidence (%)		Disease Severity (%)	
	At 9 WAS	At Harvest	At 9 WAS	At Harvest

<b>Seed Dressing</b>				
Dressed	25.427	37.393	24.204	39.704
Undressed	30.987	41.453	27.000	47.624
Significance	*	*	*	*
SE±	1.034	1.022	1.027	1.002
<b>Variety</b>				
Sampea-7	23.718 <sup>c</sup>	38.982 <sup>bc</sup>	21.602 <sup>c</sup>	35.463 <sup>e</sup>
Sampea-8	26.282 <sup>bc</sup>	34.936 <sup>cd</sup>	31.037 <sup>a</sup>	47.037 <sup>c</sup>
Sampea-9	25.962 <sup>c</sup>	34.296 <sup>cd</sup>	29.916 <sup>ab</sup>	50.741 <sup>bc</sup>
Sampea-11	33.013 <sup>b</sup>	44.551 <sup>b</sup>	29.611 <sup>b</sup>	53.704 <sup>b</sup>
Sampea-15	19.85 <sup>c</sup>	28.884 <sup>d</sup>	11.911 <sup>d</sup>	21.852 <sup>e</sup>
Ex-Yumfa	40.385 <sup>a</sup>	55.128 <sup>a</sup>	35.537 <sup>a</sup>	65.186 <sup>a</sup>
Significance	*	*	*	*
SE±	2.311	2.809	2.817	1.736
<b>Interaction</b>				
SD X V	NS	NS	NS	NS

Means Bearing The Same Superscript Along The Same Column Are Statistically The Same At 5% Level Of Significance According To DNMR. NS= Not Significant, \* Significant, WAS= Weeks After Sowing.

### Weight Of 100 Grain

The Result Of Effect Of Fungicide And Variety On 100 Grains Weight Is Presented In Table 4. The Result Showed That, There Was No Significant ( $P > 0.05$ ) Difference Between Dressed And Undressed Seeds But Significant ( $P < 0.05$ ) Difference Exist Between The Varieties. Highest Mean Of 100 Grains Weight Was Obtained On Sampea-9 And Lowest Was Obtained From Ex-Yumfa, While Sampea-9, Sampea-8, Sampea-11 And Sampea-15 Are Statistically The Same. This May Be As A Result Of Effect Of *Cercospora* Leaf Spot On The Performance Of The Variety (Plantwise, 2010) Coupled With The Ability Of Varieties To Accumulate Assimilates Under The Disease Condition.

### Seed Yield

The Result Of Effect Of Variety And Fungicide On Seed Yield Is Presented In The Table 4. Table Showed That There Was Significant ( $P > 0.05$ ) Difference Between Dressed And Undressed Seeds On Seed Yield Per  $\text{Ha}^{-1}$ . Also Significant Difference Exist Between The Varieties, Where Ex-Yumfa Produced Significantly Lower Than Sampea-7, Sampea-8, Sampea-9, Sampea-11 And Sampea-15 In Terms Of Yield Per  $\text{Ha}^{-1}$ . Which Might Be Due To Higher Defoliation On Ex-Yumfa. This Was In Agreement With The Finding Of Booker And Pathmanathan (2007) Who Reported That, *Cercospora Cruenta* And *Cercospora Canescens* Have A Serious Effect On Yield Under Severe Infestation Up To 42% Loss In Yield. Furthermore, Plantwise (2010) Also Reported That Seed Yield Of Cowpea Was Correlated With *Cercospora* Leaf Spot Disease Severity From Artificially And Naturally Occurring Epidemics At Ibadan.

**Table 4:** Effect Of Seed Dressing And Variety On 100 Grain Weight And Seed Yield Of Cowpea At 9 WAS And At Harvest

Treatments	100 Grain Weight (G)	Seed Yield (Kg/Ha)
<b>Seed Dressing</b>		
Dressed	12.519 <sup>a</sup>	2838.756 <sup>a</sup>
Undressed	11.739 <sup>b</sup>	2456.869 <sup>b</sup>
Significance	*	*
SE±	0.223	124.830
<b>Variety</b>		
Sampea-7	12.332 <sup>a</sup>	1135.783 <sup>b</sup>
Sampea-8	12.563 <sup>a</sup>	1381.267 <sup>a</sup>
Sampea-9	12.713 <sup>a</sup>	1382.583 <sup>a</sup>
Sampea-11	13.208 <sup>a</sup>	530.025 <sup>c</sup>
Sampea-15	12.847 <sup>a</sup>	1313.100 <sup>a</sup>
Ex-Yumfa	8.813 <sup>b</sup>	574.117 <sup>c</sup>
Significance	*	*
SE±	0.278	113.414
<b>Interaction</b>		
SD X V	NS	NS

Means Bearing The Same Superscript Along The Same Column Are Statistically The Same At 5% Level Of Significance (DMRT). NS= Not Significant, \* = Significant.

## VII. Summary, Conclusion And Recommendation

### Summary

Field Study Was Conducted To Evaluate Six Cowpea Varieties For Their Resistance To *Cercospora* Leaf Spot Disease Of Cowpea And Also To Evaluate The Effect Of Seed Dressing With Apron Star On

Incidence And Severity Of Leaf Spot Caused By *Cercospora Cruenta* And *Cercospora Canescens*, At The Dry Land Teaching And Research Farm Of Crop Science Department Usmanu Danfodiyo University, Sokoto During The 2015 Cropping Season. Randomized Complete Block Design (RCBD) Was Used For The Study. A Scale 1-9 Was Used, Five Plants Were Randomly Selected From Each Treatment Which Were Observed And Scored Based On The Extent Of Disease Establishment. From The Result Obtained In The Study Ex-Yumfa Had Highest Disease Incidence And Severity Both At 9 WAS And At Harvest Respectively. Lowest Disease Incidence And Severity Was Observed On Sampea-15 At 9 WAS And At Harvest. The Results Also Revealed That, Seed Dressing Had Significant Effect On 100 Grain Weight And Seed Yield. Significant Differences Were Further Observed Between The Varieties Both In Terms Of 100 Grain Weight And Seed Yield; With Sampea-9 Having The Highest And Lowest Was Observed On Ex- Yumfa.

### Conclusion

From The Result Obtained In This Study, It Could Be Concluded That, All Varieties Were Susceptible To *Cercospora Cruenta* And *Cercospora Canescens* With Ex-Yumfa, Sampea-11 And Sampea-9 Having Higher Susceptibility. The Least Susceptible Variety Is Sampea-15, Therefore May Be Regarded As Tolerant To *Cercospora Cruenta* And *Cercospora Canescens*. Furthermore Seed Dressing With Apron Star Had Significant Effect On Incidence And Severity Of The Disease.

### Recommendations

Therefore, Farmers Are Advised To Dress Cowpea Seeds Of The Varieties Used In The Study With Apron Star 42WS For The Control Of *Cercospora Cruenta* And *Cercospora Canescens*. Furthermore, Sampea-7, Sampea-8, Sampea-9, And Sampea-15 Are Recommended As Tolerant Varieties To Farmers As A Means Of Controlling The Disease In Sokoto.

### REFERENCES

- [1] Ajibade, S.R. And Amusa N.A. (2001). Effect Of Fungal Diseases On Some Cowpea Line In The Humid Environment Of South West Nigeria. Journal Of Sustainable Agricultural Environment 3: 246 – 253.
- [2] Akande, S.R. (2007). Genotype By Environment Interaction For Cowpea Seed Yield And Disease Reaction In The Forest And Derived Savanna Agro Ecologies Of South-West Nigeria. American - Eurasian Journal Of Agriculture And Science,2 (2): 163-168.
- [3] Akande, R.R. (2005). Genotype By Environment Interaction For Cowpea Seed Yield And Disease Reaction In Forest And Dried Savannah Agro Ecologies South West Nigeria. American Erosion Journal Of Agro Culture And Science. 2(2): 163-168.
- [4] Allerd, R.W., Zhang, Q., Maroof, M.A.S. And Mouna, O.M. (1992). Evolution Smultiloocus Genetic Structure In An Experimental Barley Population.
- [5] Booker, H.M. (2006). Studies On Resistance To Cercospora Leaf Spot (CLS) Disease And The Impact Of CLS And Cowpea Severe Mosaic Virus (CPSMV) Diseases On Productivity Of Vigna Unguiculata (L) Walp. In Trinidad. Phd Dissertation, The University Of West Indies, St. Augustine, Trinidad And Tobago.
- [6] Booker, H.M. And Pathmanathan, U. (2007). Identification Of Resistance To Cercospora Leaf Spot Of Cowpea. European Journal Of Plant Pathology 118: 401-410.
- [7] Borji, M., Ghorbanli, M. And Sarlak, M. (2007). Some Seed Traits And Their Relationship To Seed Germination, Emergence Rate, Electrical Conductivity To Common Bean (*Phaseolus Vulgaris* L.). Asian Journal Of Plant Science, 6: 781-787.
- [8] Ebofin, A.O. (2008). Some Physiological Studies On Seed Germination And Seedling Growth Of Three Savanna Tree. University Of Agriculture, Abeokuta, Pp1.
- [9] Fery, R.L., Dukes, P. D. And Cuthbert, F.P Jr. (1976). Yield Loss Of Southern Peas (*Vigna Unguiculata*) Caused By *Cercospora* Leaf Spot. Australian Journal Agricultural Engineering 61 (9), 741 – 743.
- [10] [Http://Www.Plantwise.Org/?Dsid=35270&Loadmodule=Plantwisedatasheet&Page=4270&Site=234](http://www.plantwise.org/?Dsid=35270&Loadmodule=Plantwisedatasheet&Page=4270&Site=234). Accessed May, 2012.
- [11] Richards, B.I., Anaso, A.B., And Bdliya, B.S. (2009). Effect Of Seed Dressing And Cultivar On The Incidence And Severity Of Covered And Long Smut In Nigeria Sudan Savanna. Nigerian Journal Of Experimental And Applied Biology, 9(2), 65-70.
- [12] Schneider, R.W., Williams, R.J., And Sinclair, J.B. (1976). *Cercospora* Leaf Spot Of Cowpea Models For Estimating Yield Loss. Phytopathology, 66, 384-388.
- [13] SERC (2015), Sokoto Energy Research Centre Usmanu Danfodiyo University Sokoto.
- [14] Singh, A., Baoule, A.L., Ahmad, H.G., Dikko, A.U., Aliyu, U., Sokoto M.B., Alhassan, J., Musa, M., And Haliru, B. (2011). Influence Of Phosphorus On The Performance Of Cowpea (*Vigna Unguiculata* (L) Walp.) Varieties In The Sudan Savannah Of Nigeria. Trend In Advance Science And Engineering, 1(3): 37-42.
- [15] Sinsiri, N., Loahasiriwong, S., Jogloy, S. Toomson, B. And Sanksirirut, W. (2006). A Varietal Screening Of Cowpea Cultivars (*Vigna Unguiculata*) For Highest Resistance To Pseudocercospora Cruenta ( Sacc.) Deington In Northern Thailand. Pakistan Journal Of Biological Sciences,9(4): 641-648.
- [16] Williams, R. J. (1975). Disease Of Cowpea (*Vigna Unguiculata* L.) In Nigeria PANS (2010).21: 253 – 267.

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