Effect of different seed dressers on the growth and yield of cowpea (*vigna unguiculata* l. Walp)

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Abstract: This study was carried out at the Agronomy Department, Delta University Asaba Campus in 2012 cropping season to determine the effect of seed dressers on the growth and yield of cowpea in Asaba area. Five different seed dressers calthio Apron plus 60, Dress force 42 WS, seed plus 30 WS were used. This experiment was set in a complete randomized design (CRD) consisting of six treatments and replicated 5 times. The data collected included number of laves, plant height , leaf area, biomass of the whole plant (fresh and dry weight, and yield related parameters. In all the parameters the different seed dressers had a significant effect on the growth parameters as compared to the control. Among the seed dressers performed well but the SEEDREX performed best with a significant effect on the growth and yield of cowpea.
Keywords: Seed dressers, Biomass, Cowpea.

Introduction

Cowpea *(Vigna unguiculata* L. Walp) is one of the most ancient human food sources and has probably been used as a crop plant since Neolithic times (Suliman, 2000).Cowpea is the most important food legumes in the hot-dry tropics and sub-tropics and especially in Sub-Saharan Africa (Singh, 2007). Cowpea plays a significant role in the lives of millions of people in Africa and other parts of the developing world, where it is a major source of dietary protein that complements low protein cereal and tuber crops and also it is a valuable and dependable commodity that produces income for farmers and traders (Singh, 2002 and Langyintuo *et al.,* 2003).

According to FAO (2007), Cowpea is produced annually on 11.2million hectares ranking 3rd after common bean *(Phaseolus vulgaris*) and chick peas (*Cicer arietenum*) with Africa taking the lead followed by Asia. Central and West Africa contributed about 64% of the total production. The main producers of cowpea are Nigeria, Senegal, Niger, Burkina Faso and Cameroon, though some regions of South Africa and South Asia, Central and South America, have high production capacities (Grubben and Denton, 2004).

Yield potential of cowpea is high, averaging 1.5 tonnes/ha depending on genotype (Asiwe *et al.*, 2008), though actual yields are the World's lowest among pulses averaging 0.3 tonnes/ha. As a result, its annual total production is small ranking 8th among the ten pulse crops (FAO, 2007) despite its wide coverage.

According to Singh and Eaglesfield (2000), cowpea seeds can be grown under various production system including rainfed and irrigated environments as well as in areas of poor soil in low rainfall regions. Cowpea varieties grown in the Sahel and on the periphery of the Sahara are drought and heat tolerant.

Cowpea can be bushy, erect, prostrate or creeping and having a deep taproot system with numerous spreading laterals in surface soil. Their pods are 10-30cm long, each having 8-20 seeds (Singh *et al.,* 2000). Cowpea is susceptible to a wide range of pests and pathogens that attack the crop at all stages of growth and storage. These include insects, bacteria, viruses and fungi i Allen, 1983).

Agrawal (1995) defined "seed dressing" as the application of fungicide, insecticide to seed, in order to prevent the seed from seed borne or soil pathogenic organisms and storage insects. These chemicals are dust formulation comprising of lindane, imidacloprid, metalaxyl-m, carbonderzine, permethrin, chlorothalonil, tebuconazole, fenthion, caolin and thirame all in percentage.

The essence of seed dressing is to maintain the

seed in good physiological and physical condition from the time they are harvested until the time they are planted. Seed dressing improves germination and prevents the seed from rot and seedling blight. When seed are properly dressed, their viability is increased and their proneness to dormancy and susceptibility to disease and fungal attack are reduced.

In view of the enormous problems associated with cowpea production, it has become necessary to screen some known fungicides to ascertain their effectiveness in combating the diseases that affect cowpea.
Therefore, the objective of the study was:

1. To determine the most appropriate seed dresser for growth and germination of cowpea in Asaba agro-ecological zone.

Materials and method
The experiment was carried out at the Research farm of the Agronomy Department, Delta State University, Asaba Campus, Nigeria. The area lies on latitude 6°14N and longitude 6°49E of the equator characterized by rainfall between April to October. The annual rainfall ranges from 1500mm to 1849.3mm, the mean temperature is 23°C and the mean monthly soil temperature at 100cm depth is 28.3°C and the soil pH is 6.5 and the monthly sunshine is 4.8 bars (Federal Ministry of Aviation Asaba, Unpublished).

Land preparation/ Experimental Design
The land preparation was done manually through the use of shovel, cutlass slashing. Packing of the debris was also done. Thirty polyethylene bags were arranged in the experimental plot for the six treatments including the control. Each treatment was replicated five times. The garden soil was collected and fertilized by autoclave at l.lkg/cm^2 pressure and at temperature of 121°c for one hour then repeated after 24hours, then left to cool for two days before use. 5kg of the cooled soil was put in each of the polyethylene bags. The experiment was laid out in a completely randomized design (CRD).

Source of Planting Materials
Ife Brown cowpea seeds were collected from International Institute of Tropical Agriculture (IITA) Ibadan, Oyo State. The seed dressers were obtained from the local market and they are:

1. Calthio DS (Lindane, Thirame)
2. Seed plus 30 WS (Imidacloprid, metalaxyl and Carbendazim WS).
3. Apron plus 60 (Hexaconazole, Imidacloprid, Fenthion, Caolin).
4. Seedrex (Permethrin, Carbonderzine, Chlorothalonil).
5. Dress force 42 WS (Imidacloprid, Metalaxy-m).

Slurry Application and Planting
Five milliliter of water was poured in a bowl and mixed with each seed dressers 2g of each seed dressers was used. Then the required quantity of seeds as added and shakes for 5minutes. The seeds were coated evenly and are ready for planting. Four seeds were planted in each polyethylene bag. Thinning of seedlings to two plants per stand and supply of ungerminated or missing seeds was done in each polyethylene bag seven days after plant emergence. Agronomic practices such as clean weeding as well as other planting operation were carried out as necessary till crop maturity and harvest.

Spraying of the cowpea with pesticides (Cypermethrin) was done to control insect pests four to six weeks after planting.

Data Collected
Growth, yield and yield related parameters were taken from each polyethylene bag. The parameters taken were as follows.

Growth Parameters

1. **Plant Height:** The plant height was measured from the base of the plant to the tip of the last leaf at 2,3,4,5,6,7,8 weeks after planting. This was done with a measuring tape.
2. **Number of Leaves:-** This was counted at 2,3,4,5,6,7.8 weeks after planting.
3. **Leaf Area:** This was taken by measuring the length and width of three leaves on a stand (the topmost leaf, middle leaf and the bottom leaves) after which the average calculated and was multiply by a given correction factor.
   The formula is given as:

$$Y = (2.325\ LW)n$$

Where Y = Cowpea leaf area
L = Cowpea leaf length
W = Cowpea leaf Width
And n = Cowpea leaf number (Osei- Yeboah

et al., (1983) and Ekeleme *et al.*, (2005).

Yield and Yield Related Parameters:

1. **Number of pods per plant:** This was counted at 8 and 10 weeks after planting.
2. **Number of seeds per pod:** Twenty pods were randomly selected from each plot, this was shelled and the number of seed per pod estimated.
3. **Length of pod:** The length of the matured pod was taken and recorded at harvest using a rope and read out on a meter rule.
4. **100 seed weight:** This was carried out by weighing 100 seeds of cowpea,
5. **Biomass:** The plant were uprooted with the root system from the polyethylene bag. The root was washed to dislodge superfluous soil. The fresh biomass was weighed, the plants were oven dried and the final weight were taken for all the treatments.

Data Analysis

Data was collected and subjected to analysis of variance and significant means were separated using least significant difference (LSD) at 5% level of probability.

RESULTS AND DISCUSSION

Effect of Different Seed Dressers on the Plant Height (cm) of Cowpea

The results of plant height are presented in Table 4.1 below and plant height were statistically analyzed. The results showed that at 2,3,4 WAP there no significant difference (P>0.05) among treatments.

At 5WAP, there was significant difference among treatment but seedrex treatment was observed to be the highest at 6 WAP. There was significant difference among treatments, although dress force was highest. At 7 and 8 WAP, there was significant difference among treatments but seedrex had the highest plant height.

Effect of Different Seed Dressers on the Number of Leaves of Cowpea

There was no significant difference between all the treatment means of the number of leaves of cowpea at 2 to 8WAP at 5% level of probability.

Table 1: Effect of Different seed dressers on the plant height (cm) of Cowpea at 2 to 8 WAP

	Weeks After Planting						
Treatment	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Seed plus	12.50	18.30	21.30	25.90	33.30	38.20	40.40
Calthio Ds	14.66	22.50	25.80	43.60	55.90	66.10	66.50
Apron Plus	16.18	24.00	25.90	35.50	55.90	65.10	64.00
Dress Force	17.32	23.40	30.00	45.00	58.60	65.10	65.40
Seedrex	17.72	24.80	32.50	47.00	57.40	67.30	67.40
Control	11.76	16.80	20.90	25.70	33.10	37.60	40.10
LSD (0.05)	NS	NS	NS	13.07	14.57	16.18	18.59

WAP = Weeks After Planting
NS = Not significant

Table 2: Effect of different seed dressers on the number of leaves of Cowpea at 2 to 8 WAP

	Weeks After Planting						
Treatment	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Seed plus	3.20	6.40	12.00	16.80	22.20	27.40	33.60
Calthio Ds	4.00	8.00	15.00	20.8	27.80	34.40	41.80
Apron Plus	4.00	8.00	15.00	21.20	28.00	33.20	40.80
Dress Force	4.00	8.00	16.20	21.60	28.00	34.80	37.60
Seedrex	4.00	8.00	16.20	22.20	28.60	35.40	43.20
Control	3.20	6.40	11.60	16.80	21.20	25.60	31.60
LSD (0.05)	NS	NS	NS	NS	NS	NS	NS

WAP = Weeks After Planting
NS = Not significant

Effect of Different Seed Dressers on Cowpea Leaf Area (cm^3)

At 2 and 3WAP, there was no significant difference at 5% level of probability there was a general increase in all treatments and apron plus treatment had the highest mean value and the least was control treatment. At 4 to 8WAP, there was significant difference among treatments. Seedrex treatment had the highest mean value and control the least.

Table 4: Effect of different seed dressers on the leaf Area (Cm^2) of Cowpea at 2 to 8 WAP

	Weeks After Planting						
Treatment	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Seed plus	10.29	13.40	15.20	17.70	18.90	22.30	23.20
Calthio Ds	11.80	18.20	20.50	23.30	26.50	29.60	30.70
Apron Plus	14.52	20.20	22.90	26.30	29.00	30.70	33.50
Dress Force	12.46	14.90	17.30	18.50	21.50	34.10	35.20
Seedrex	12.36	20.10	29.50	30.80	34.30	35.90	39.80
Control	8.70	12.50	14.20	16.30	18.80	20.80	22.60
LSD (0.05)	NS	NS	7.86	8.67	9.25	10.51	10.72

WAP = Weeks After Planting
NS = Not significant

Effect of Different Seed Dressers on Cowpea Yield and Yield Related parameters

The yield and yield related parameters collected included number of pods per plant, pod length, number of seeds per pod and 100 grain weight. These are presented in Table 4.5.

The statistical analysis showed that there was significant difference in number of pods per plant. Seedrex treatment had the highest number of pods per plant, though some were empty, control and seed treatments has the least number of pods. There was no significant difference in pod length number of seeds per pod and 100 grain weight but seedrex had the highest mean value followed by Calthio Ds treatment. There was no significant difference in total grain yield and yield per hectare at 5% level of probability.

Effect of Different seed dressers on Yield and Yield Related Parameters

Treatment	No. of Pods/plant	Pod length (cm)	No. of seeds per pod	100 grain weight (g)	Total grain yield (kg)	Yield per hectare
Seed plus	17.40	10.63	6.86	11.21	0.279	2,790
Calthio Ds	32.70	12.22	8.09	12.72	0.402	4,020
Apron Plus	22.60	11.57	9.24	15.18	0.399	3,990
Dress Force	32.00	10.17	7.36	11.78	0.311	3,110
Seedrex	47.40	13.07	9.24	15.62	0.418	4,180
Control	12.60	9.22	6.84	9.95	0.210	2,100
LSD (0.05)	14.77	NS	NS	NS	NS	NS

NS = Not significant

Effect of different seed dressers on Biomass (fresh weight and dry weight)

There were no significant difference in fresh weight and dry weight of cowpea but there was a total reduction in dry weight among treatments. The result showed high weight of biomass in all the treatments. The control gave a weight of 44.2g.Dress force had a weight of 45.30g. The highest weight was recorded Calthio Ds which was 73.50g.

Table 6: Effect of Different Seed Dressers on Biomass of Cowpea Plant

Treatment	Fresh weight (g)	Dry weight (g)
Seed plus	289.00	58.30
Calthio Ds	342.00	73.50
Apron Plus	351.00	70.90
Dress Force	293.01	45.30
Seedrex	364.00	73.2
Control	284.00	44.20
LSD (0.05)	NS	NS

NS = Not significant

Discussion

The results obtained from this study showed that seed dressers had significant effect on the growth and yield of cowpea. The highest plant height **was** observed in Seedrex followed by dress force. This could be as a result of proper seed dressing which agreed with the findings of Agrawal (1995), that seed dressing reduces the effect of fungal attack which results in increased plant growth.

Maximum number of leaves was observed in Seedrex as against control. This trend was also observed for the leaf area. The highest number of pods per plant, pod length number of seeds per pod, 100 grain weight and the biomass was observed in Seedrex. The control was heavily infected when compared with the treated pots, this could be as a result of not treating the seeds with seed dressers which agreed with the findings of (Pataky *et al.*, 2000 and Munkvold *et al*, 1996) who worked on the control of diseases in sweet corn with seed treatment insecticides and finds out that the treated corn performed better than the untreated.

Dewar (1992), worked on the virus yellow in sugar beet using imidacloprid seed treatment. From the results he found that imidacloprid treated plant was less susceptible and resistant on the virus compared to untreated ones. Bluett and Birch (1992), work on the disease of barley control with imidacloprid seed treatment. They found out that it was effective. Harvey *et al*, (1994) used different seed dressers on the control of wheat curl mite. He found out that seeds that were treated performed very well as compared to the control.

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