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Effect of Variety and Seed Dressing Chemical on Root Rot and Damping-Off Diseases of Cowpea (*Vigna Unguiculata* L.) in Sokoto North-Western Nigeria

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ABSTRACT
A field study was conducted at Usmanu Danfodiyo University, Sokoto Teaching and Research Dry Land Farm, during the 2015 cropping season to assess the effect of variety and seed dressing chemical on Root rot and Damping off diseases of cowpea. The two cowpea varieties were Ex-Auna and Ex-Nasko and three seed dressing chemicals were Apron star, Ciba plus, Dress force and a control, giving a total of 8 treatment combinations, which were laid out in Randomized Complete Block Design, replicated three times. Data were collected on disease incidence, number of pods, pods weight, 100 seed weight, seed and hay yield. Results of the study showed that the varieties were at par in all the parameters assessed. Contrastingly, the seed dressing chemicals were significantly effective in the management of damping off and root rot diseases of cowpea by reducing the disease incidence. There was yield increase of 34.7%, 32. 6% and 32.5% as a result of dressing the cowpea seeds with Apron star, Ciba plus and Dress force respectively.

KEYWORDS: *Variety, Seed Dressing Chemical, Root Rot, Damping-off, Cowpea Yield*

INTRODUCTION

Cowpea (*Vigna unguiculata* (L.*)* Walp) is a leguminous crop that is cultivated in most of the continents to provide us with cheap sources of protein (25%), vitamins and minerals, which can supplement the human protein needs (IITA, 2012). Although the protein in cowpea approximates the proposed maximum daily protein intake of 25% (Bilsborough and Mann, 2006), and in spite of Nigeria being the world largest producer of cowpea, the country is faced with many challenges and one of the most important of them under production is diseases infection. Root rot (*Rhizoctonia solani* and *Rhizoctonia bataticola*) and Damping-off (*Rhizoctonia solani*) are among the many diseases that infect cowpea whenever it is grown. These diseases cause substantial losses to cowpea crop, yield losses in severely infested areas may be as high as 50% and control depends largely on fungicide application (Adandonon, 2000).

With proper management practices, such as seed dressing the desired goal of 20 – 25% of protein intake from cowpea can be made by controlling the diseases that limit cowpea production in the country so that the production will be high and more yields will be obtained (Adandonon, 2000).

The objective of the study is to assess the effect of variety and seed dressing chemical on root rot and damping-off diseases of cowpea.

MATERIALS AND METHODS

The trial was carried out at the Dry Land Teaching and Research Farm of the Department of Crop Science, Faculty of Agriculture, Usmanu Danfodiyo University Sokoto, during the 2015 cropping season. Sokoto is located in the Sudan Savanna on latitude $13^{0}0^{1}$N and longitude $5^{0}15^{1}$E, the soil is sandy and lies at an altitude of 350m, above sea level, with minimum and maximum temperature of 15^{0}C and 40^{0}C (Singh *et al.,* 2013) and 645mm mean annual rainfall (SERC, 2014).

The treatments consisted of two cowpea varieties, Ex-Nasko and Ex-Auna and three seed dressing chemicals, Apron star, Ciba plus, Dress force and control, giving a total of 8 treatment combinations, which were laid out in Randomized Complete Block Design (RCBD), replicated three times. The size of each plot was 4m x 3m and a space of 0.5m was left between plots and 1m between blocks and the total experimental area was 27.5m x 13.5m (371.25m^2).

The land was ploughed and harrowed by a tractor and the experimental plots were laid out using ranging pole, measuring tape, rope, pegs, cutlass, and hoe. The seeds were treated with Apron star, Ciba plus, Dress force at equal level of 10g and control (untreated). The seeds were sown on the 5^{th} – 7 – 2015 to each plot after seed treatment. The seeds were sown at a spacing of 75 x 30cm. Weeding was carried out in the third week on 26-07-2015 and sixth week 16-08-2015 after sowing; it was carried out using hoe and hand pulling. N: P: K (15:15:15) fertilizer was applied at the rate of 221.67kg per ha as starter dose, followed by SSP at 221.67kg per ha as second dose to augment the remaining P, the method use was side placement. Karate (Lambda cyhalothrin) was used to control insect pests, it was applied every seventh (7) days immediately first flowers were noticed, the application was done at 6:00pm using a knapsack sprayer. Data were collected on disease incidence, number of pods, pods weight, 100 seed weight, seed yield and hay weight. All data collected were subjected to analysis of variance (ANOVA) and mean were separated using Duncan Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

Disease Incidence of Damping-off and Root Rot of Cowpea

The results of the effect of variety and seed dressing chemical on incidence of root rot and damping-off diseases of cowpea is presented in Table 1. The result reveals that variety did not significantly ($p > 0.05$) affected disease incidence of both diseases. This suggests that the two varieties have similar susceptibility or resistance to the two diseases. On the other hand, the seed dressing chemicals had significantly ($p<0.05$) affected damping off and root rot incidence to a lowest level of 1.46 and 0.34% respectively compared to the untreated plots. Among the seed dressing chemicals, no significant difference exist; Ciba plus had the lowest incidence of damping off and root rot of 0.83 and 0.00% respectively, followed by Apron star with 1.17 and 0.17% and Dress force with 5.17 and 0.33% respectively. Also there was no significant ($p>0.05$) interaction effect between the variety and the seed dressing chemical. This agrees with the finding of Akpa and Manzo (1991) and Ebofin (2008), they reported that seed dressing chemical had significantly suppressed seed borne and seedling diseases. Urrea et *al.* (2013) also reported that, all of the fungicide seed treatments improved stands over the control at all three temperatures in one or both years.

Table 1: Disease incidence of damping off and root rot on two cowpea varieties and three seed dressing chemicals during 2015 cropping season at Sokoto.

	Disease Incidence	
Treatment	**Damping-off (%)**	**Root rot (%)**
Variety		
Ex-Auna	6.50	1.25
Ex-Nasko	5.75	0.75
SE±	1.46	0.34
Significance	NS	NS
Seed Dressing Chemical		
Apron star	1.17^{bc}	0.17^{bc}
Ciba plus	0.83^{d}	0.00^{d}
Dress force	5.17^{b}	0.33^{b}
Control	17.33^{a}	0.50^{a}
SE±	1.46	0.34
Significance	*	*
Interaction		
V x SDC	NS	NS

Within a treatment group, means in column followed by the same letter(s) are not significantly different at 5% probability according to Duncan Multiple Range Test (DMRT).

Number of Pods

The result of the effect of variety and seed dressing chemical on number of pods per stand is presented in Table 2. The result reveals that variety did not produce any significant ($p>0.05$) effect on number of pods per stand. This further revealed the similarities of the two local varieties as far as growth and yield parameters are concerned. Contrastingly, the seed dressing chemicals produced significant ($p>0.05$) effect on number of pod per stand. Cowpea plants treated with Ciba plus recorded the highest number of pods, followed by those treated with Apron plus, then those treated with Dress force, while the lowest was recorded by the control plants. This could be attributed to the efficacy of the dressing chemical in suppressing the pathogens responsible for the two diseases. 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. Urrea et *al.* (2013) also reported that, all of the fungicide seed treatments improved stands over the control at all three temperatures in one or both years.

Pods Weight

Table 2 reveals that variety did not significantly ($p>0.05$) affect pods weight, but on the other hand, seed dressing chemical significantly affected pods weight. The cowpea treated with Ciba plus produced the heaviest pods followed by those treated Apron star, and then those that received Dress force. The lowest pod weight was recorded by the control. This may be due to the higher efficacy of Ciba plus, then Apron star then Dress force in controlling the two diseases, which is in agreement with Ebofin (2008) and Manzo (1991). They reported that seed dressing chemical suppressed root rot and damping off disease and bring enabling condition for proper pod formation.

100 Seed Weight

Table 2 shows that variety did not significantly ($p>0.05$) 100 seed weight, but on the other hand, seed dressing chemical significantly affected 100 seed weight. The cowpea plants that were treated with Ciba plus, Apron star and Dress force produced pods with similar weights, which were significantly heavier that those produced by the control cowpea plants. This could be as a result of the effect of the seed dressing chemicals in inhibiting the activity of the pathogens causing the diseases. This is in conformity with the finding of Akpa and Manzo (1991) and Ebofin (2008) as well as Adandanon (2000).They reported that seed dressing chemicals suppressed root rot and damping off disease of cowpea at lowest level. There was no significant ($p \geq 0.05$) interaction between the variety and the seed dressing chemical.

Table 2: Number of pods per stand, pods weight and 100 seed weight of cowpea as influenced by variety and seed dressing chemical during the 2015 cropping season in Sokoto.

Treatment	Number of Pods per Stand	Pods Weight (Kg/ha)	100 Seed Weight (g)
Variety			
Ex-Auna	22.68	1007.60	13.3
Ex-Nasko	22.89	1010.12	13.2
SE±	0.529	14.397	0.25
Significance	NS	NS	NS
SeedDressing Chemical			
Apron star	24.75[b]	1146.49[b]	14.09a
Ciba plus	25.56[a]	1153.45[a]	13.99a
Dress force	23.76[c]	1082.42[c]	13.83a
Control	18.50[d]	653.09[d]	11.35b
SE±	0.422	4.390	0.250
Significance	*	*	*
Interaction			
V x SDC	NS	NS	NS

Within a treatment group, means in column followed by the same letter(s) are not significantly different at 5% probability according to Duncan Multiple Range Test (DMRT).

Seed Yield

The result of the effect of variety and seed dressing chemical on seed yield is presented in Table 3. The result reveals that variety did not produce any significant ($p>0.05$) effect on seed yield, however, seed dressing chemical significantly affected seed yield, with all the treated cowpea plant out yielding the control. This further confirmed the earlier assertion that the two varieties used in this study are very similar in all traits tested. While the seed treatment chemicals exerted their effect on the pathogens, mostly fungi, that are reported to be responsible for these diseases. This is in agreement with Akpa and Manzo (1991) and Adandanon (2000), who reported that for cowpea to give out optimum yield, the seeds had to be treated with seed dressing chemical during planting and to be accomplished with proper pest control during flowering and podding. There is no significant ($p>0.05$) difference on the interaction between the variety and the fungicide.

Hay yield

Table 3 reveals that variety did not produce any significant ($p>0.05$) effect on hay yield, however, seed dressing chemical significantly affected hay yield, with all the treated cowpea plants out yielding the control. The highest hay yield was produced by Apron star treatment, followed by Ciba plus and the Dress force. This further confirmed the earlier assertion that the two varieties used in this study are very similar in both growth and yield parameters. On the other hand, the seed treatment chemicals exerted their effect on the pathogens, mostly fungi, that are reported to be responsible for these diseases. This is in agreement with Akpa and Manzo (1991) and Adandanon (2000), who reported that for cowpea to give out optimum yield, the seeds had to be treated with seed dressing chemical during planting and to be accomplished with proper pest control during flowering and podding. There is no significant ($p>0.05$) difference on the interaction between the variety and the fungicide.

Table 3: Seed and Hay yield as influenced by cowpea variety and seed dressing chemical during the 2015 cropping season in Sokoto.

Treatment	Seed Yield (kg/ha)	Hay Yield (Kg/ha)
Variety		
Ex-Auna	399.63	4.084
Ex-Nasko	395.33	4.085
SE±	7.498	0.043
Significance	NS	NS
Seed Dressing Chemical		
Apron star	320.83[a]	4.192[a]
Ciba plus	315.83[a]	4.250[b]
Dress force	315.50[a]	4.084[c]
Control	238.17[b]	3.830[d]
SE±	7.498	0.043
Significance	*	*
Interaction		
V x SDC	NS	NS

Within a treatment group, means in column followed by the same letter(s) are not significantly different at 5% probability according to Duncan Multiple Range Test (DMRT).

CONCLUSION AND RECOMMENDATION

From the result of this study, it was observed that there was yield increase of 34.7%, 32. 6% and 32.5% as a result of dressing the cowpea seeds with Apron star, Ciba plus and Dress force respectively. Therefore it could be concluded that, seed dressing chemicals had significant effect on root rot and damping-off of cowpea and salvage the yield that would have been lost to the two soil borne and seedling diseases.

In view of the above result, it is recommended that farmers should treat their cowpea seed of the varieties used in the study with Apron star, Ciba plus or Dress force for the control of root rot and damping off diseases of cowpea in the study area or any similar agro ecological zone.

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