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EFFECT OF SEED SIZE ON PHYSIOLOGICAL CHARACTERISTIC (GERMINATION AND EARLY GROWTH) OF *ZEA- MAYS*

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ABSTRACT

The study examines the influence of seed size on the germination and early growth of Zea-mays grown in the demonstration farm of Ignatius Ajuru University of education, Port-Harcourt. Seeds of Zea-mays were procured from the Agricultural Development Project (ADP) (seed unit) Rumuodomaya. Port–Harcourt. The seeds were pretreated and sun dried before being separated according to their sizes (small and large). Forty seeds from each size given a total of Eighty (80) seeds, were sown in seed trays filled with loamy soil and applied with constant water to avoid dehydration. Eight seed trays were used for the experiment with each size represented by four trays. Ten seeds were planted on each tray. Seed growth, leaf number, seedling height, seedling width and biomas were investigated. From physiological observation, result showed faster growth in larger seed with dark colouration in larger seeds than small size seeds.

KEY WORDS: Physiological observation, Seed Size, Germination and early growth.

INTRODUCTION

Maize botanically known as *Zea-mays* or *Zea maydis* is one of the major cereals known all over the world. It belongs to the family of Graminea in the class Angiospermae, with its origin traced to Central and South America. It's close associate includes Gama-grass, Teosinite and Job tea. The crop requires occasional rain fall and is drought resistant, requiring temperature range of 21-27^{0}C. The crop is propagated by seed, raised permanently in the field and produces large quantity of its product which serves as a foreign exchange to many countries where it is grown (Cutis et al, 1965). The seed constituent includes carbohydrate, protein and small amount of oil. The seed also is a medium of transfer of genetic materials and maintenance of generation of plant species. Various sizes of seeds exist according to height of plant which is related to the endosperm within the seed and this has also been documented to influence germination and early growth (Ries *et al* 1973).

It has also been observed that the size of a seed is not an important factor in considering early growth but rather the condition of seed is most necessary (Kidd and Wist 1983). Inference from the works of Makersic *et al* (1981) has shown that there are strong correlation between seed viability, seed vigor and seed size. Various researchers Viz- Ries et al (1973), Mc Faden *et al* (1970), Offor and Ansa (1989) has shown that seed size influenced plant resistant to diseases, high protein and carbohydrate content and early plant development.

Physiological studies has further demonstrated the relationship between seed size and field condition stating that larger seeds were superior in rate of seedling growth and size of the first two leaves (Buries *et al* 1971, Kangman and Cultere 1969). Their research further records that larger seeds produce large embryo and

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have high respiration rate and possess greater field emergence potential than smaller seeds. Ferma *et.al* (2010,) further stated that the yield difference between large and small seed sizes were as a result of vigorous seeding from larger seeds, hence producing better plants.

These literatures records that enough work has been carried out on the effect of seed size on germination, seeding growth and other parameters of other crops with less reference to *Zea-mays* hence this research.

MATERIALS AND METHOD

Mature *Zea-mays* seeds were procured from the Agricultural Development Project (ADP) Rumuodomaya Port-Harcourt. The seeds purchased were separated into large and small and treated with 0.5% hydrochloric acid Solution there after, it was allowed to dry. Forty seeds were taken form each size and were sown in seed trays filled with sandy loamy soil. They were watered everyday to ensure adequate water needed for germination. In all, eight (8) seed trays were used for the experiment from each unit (size) while ten seeds were sown in each of trays according to their sizes. The small size seeds were labeled SM_I, SM_2, SM_3 and SM_4 while the larger seeds were noted as LM_1, LM_2 LM_3 and LM_4. Percentage germination of the seeds were taken 4 - 5 days after planting while other parameters measured, seeding height, width, leaf number and biomas was carried out for weeks. The roots were carefully cut off from the shoots using sharp object (razor) and placed in envelops. Separate envelops were dried in an oven. 2.0gramm of the dried material was used to determine the dry weight of the shoots and roots and this was carried out at the end of Analysis of Variance (ANOVA).

RESULT AND DISCUSSION

From the study, there was considerable influence of seed size on germination and early growth of *Zea-mays.*

In Table I, the result obtained showed that the large seeds have high germination percentage compared to the small seed with a significant difference of 0.01 **p**robability level.

In Table II, the effect of seed size on mean number of leaves over time showed no significant difference between treatments. Both seed sizes (large and small) responded positively on average.

The Result on seeding height (Table III) indicates that significant differences occurred between treatments at P<0.01. Table IV shows that no significant difference occurred in seedling width in all the size. This result is synonymous with what was obtained in Table V on the influence of seed size on dry matter (Biomas) – root and shoot of the crop.

This study has shown that seed size has influences on germination and seeding growth, such that larger seeds produce high germination rate with high seedling height, weight and biomas Compared to small seeds. This is in conformity with the works of Jerry *et al* 1976, and Schaal 1980, which states that the high germination rate which may be attributed to larger food available to the seedling. Schaal (1980) further stated that the ability of seedling from the large seed size to elongate faster and grow healthier compared to the seedling from small seed may be as a result of the food reserves which were made available to the seeding during growth period, and this may also have direct relationship with the productivity. Other result has also reported physiological reason in support of better performance of the larger seeds than small seeds when planted (Hycenth *et al* 2011). The yield obtained may also differ resulting from seed size. It has also been argued that larger seedling showed greater resistance to disease as compared to the small seed. Hence leading to healthy growth (Rics and Exerssion 1973).

In this study, apart from germination there was a corresponding increase in productivity as shown by increase in biomas even though previous works has reported of no significant different in leaf member which

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also applied to this research. The non significance different obtained from the literature and present study suggest that leaf numbers may not be a good index of measuring production (Kidd and West 1981).

The differences in mean for large and small size seeds on height, width and biomas of *Zea-mays* were significant and shows direct correlation with physiological response of the different size seed of *Zea mays*.

This study therefore suggest that appropriate seed size for planting has potentials for improving grain production hence is necessary to select larger seed size for planting.

Table 1: The Germination Percentage between the treatment

Treatment	Total number of seed planted	Total number seedling germinated	Percentage Germination
Larger seed	40	39	97%
Small seed	40	37	90%

Table II: Effect of seed size on mean number of leaves per plant of maize between the treatments for period of 4 weeks

Treatment	Weeks			
	1^{st}	2^{nd}	3^{rd}	4^{th}
Larger seed	4	6	8	9
Small seed	4	6	8	9
Mean Difference	0	0	0	0

Table III: Effect of seed size on mean height of seedling between the treatments form weeks 1 – 4

Weeks (s)		Sum of square	Df	Mean square	F	Significant
1	Treatment	6.386	1	6.386	598.567	0.01
	error	.047	4	.009		
	Total	6.423	5			
2	Treatment	6.940	1	6.950	295.149	0.01
	error	.897	4	.022		
	Total	7.006	5			
3	Treatment	2.500	1	2.500	95.226	0.01
	error	.070	4	.018		
	Total	2.570	5			
4	Treatment	2.591	1	2.591	73.953	0.01
	error	.100	4	.025		
	Total	2.691	5			

Table IV: Effect of seed size on mean seedling between the treatments form weeks 1 – 4

Weeks (s)		Sum of square	Df	Mean square	F	Significant
1	Treatment	52.431	1	2.430	292.918	0.01
	error	.040	4	.007		
	Total	2.470	5			
2	Treatment	3.332	1	3.330	76.575	0.01
	error	.140	4	.035		
	Total	3.472	5			
3	Treatment	3.419	1	3.418	754.778	0.01
	error	.016	4	.004		
	Total	3.435	5			

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4	Treatment	2.938	1	2.937	348.034	0.01
	error	.032	4	.008		
	Total	2.970	5			

Table V: Effect pf seed size on dried weight of root and shoot (biomas) between the treatment

Root/Shoot	Sum of square	Df	Mean Square	F	Significant
Treatment	4.558	1	2.848	9392.600	0.01
Error	.001	4	.000		
Total	4.559	5			
Treatment	2.848	1	4.557	15246.000	0.01
Error	.001	4	.001		
Total	2849	5	.000		

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