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EFFECT OF SEED SIZE AND POSITION OF SEEDS IN POD ON THE SEED VIGOUR OF FLUTED PUMPKIN *(Telfaria occidentalis* Hook)

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ABSTRACT

Selection of high-quality seeds is important for optimum productivity of fluted pumpkin. This study aimed to evaluate the effects of seed position in pod and size of seeds on the vigour of fluted pumpkin seeds. It was a 3 x 3 factorial combination of 3 seed position in pod viz: anterior, middle and posterior section (close to pedicel) and three seed sizes viz: (big, medium and small). These were arranged in completely randomized design with five replicates. Data were collected on number of days to emergence, percentage emergence, emergence rate index. Data collected were subjected to analysis of variance (using Statistical Analysis System SAS) version of 9.2. The results showed that the first emergence count was observed at 7 days after sowing (DAS) in big and medium seeds. Anterior seeds consistently had the highest emergence percentage at 12-19 DAS. Anterior seeds had the highest emergence rate index value statistically similar to the value recorded in the middle seeds. The medium sized seeds had the significantly highest emergence rate index. It can therefore be concluded that medium sized seeds extracted from the anterior and middle position of fluted pumpkin pods has the potential to give more vigorous seedlings in a non-stressed environment.

Keywords: fluted pumpkin, seed quality, seed position, seed size and seed vigour

INTRODUCTION

Seed is a vital element in increasing crop yield and output. Improving seed quality is one of the most affordable and effective agricultural growth inputs since it can considerably increase any crop's potential output (Jerlin and Vadivelu, 2014). Seed is a mature, fertilized ovule that is protected by a seed coat. It is a component of horticultural, sericultural, and silvicultural plants used for sowing. Given its significance in the development of agriculture and agrarian communities, seed quality has always been revered. The early growth and development of a plant is supported by the abundance of protein, carbohydrate, and oil in its seed. Seed vigour is defined as the ability of seed to germinate and establish seedlings rapidly and robustly across diverse environmental condition (Finge-Savage and Bassel, 2016)

Fluted pumpkin (*Telfaria occidentalis*) commonly called 'ugu' is a very important vegetable that is popular in West Africa. It belongs to the family of *cucurbitaceae*. It is a leafy vegetable that produces fruits used for culinary purposes. Due to its nutritional value, it is used to increase the dietary quality of soups (Nwosu

et al., 2012; Akanni-John, 2020). The main method of fluted pumpkin propagation is seed. Seed size is a measure of seed qualitythat can affects seedling growth and establishment in crops (Nik *et al.*, 2011). Vigor, germination, and seedling establishment are all impacted by seed size. Position of seeds in the pod also affects the quality of the seed hence, the performance of the resultant crop (Modupeola *et al.*, 2014).Germination and consequent seedling emergence depend on the ability of seeds to use reserves more effectively (Bewley *et al.*, 2013). Fluted pumpkin seed is recalcitrant in nature with short viability duration and erratic seedling emergence and establishment which affects the yield per unit area and reduces the return on investment. Sowing mixed seeds of a species may result in a non-uniform stand establishment which may lead to heterogeneity in the plant vigour and size (Nik *et al.*, 2011).This study was carried out to evaluate the effects of seed size and seed position in pod on the seed vigour of fluted pumpkin.

METHODOLOGY

The experiment was carried out at the horticultural nursery Federal University of Technology, Minna, Niger State. Five fluted pumpkin pods of equal sizes were obtained from Niger river basin authority, Minna Niger state. The pods were gently opened and the bunch of the seeds were measured and divided into three equal portions viz, interior, middle and posterior section (close to pedicel) of the fruit. The seeds from each position were collected separately and washed under running water. The seeds were air dried for four days in the laboratory and sorted into three sizes: big, medium and small respectively i.e The weight range are ≥ 8.6g as big, 7.6 - 8.5 as medium and ≤ 7.5g as small. Top soil was collected and sterilized; a kilogram of the sterilized soil was filled intoeach polythene bag.

Treatments and Experimental Design

The experiment was a 3 x 3 factorial combination of three seed position in pod (anterior, middle and posterior section) and three seed sizes(big, medium, and small). The treatments were arranged in completely randomized design with five replicates. Each of the polythene bags was planted with one seed each at 7cm depthand watered every day. Data were collected on number of days to emergence, percentage emergence, and emergence rate index. Emergence rate index was calculated as:

$$ERI = \frac{EP1}{N1} + \frac{EP2}{N2} + \cdots \frac{EPn}{Nn}$$

Where ERI= Emergence rate index, EP1, EP2, EPn corresponds to the emergence percentage at first, second, up to the last count respectively and N1, N2, Nn represent the number of days to the first, second up to the last count respectively (Adapted from Hartman *et al.*, 2007).

Data Analysis

Data collected were subjected to analysis of variance using Statistical Analysis System (SAS) version 9.2.

The means were separated using least significant difference (LSD), where treatment means shows significant differences.

RESULTS AND DISCUSSION

Seeds extracted from the middle position had the highest (29.58%) seedling emergence at 8days after sowing. This was statistically similar to the value recorded (24.71%) for seeds from the anterior position . The least value (5.11%) was recorded for seeds in posterior end of the fruit. Similar trend was observed at 11,13, and 15 days after sowing. The posterior seeds consistently had the least emergence percentage up to 16 days after sowing (DAS) while the anterior seeds consistently had the highest emergence percentage at 12-19 DAS (Figure 1). Ekwealor *et al.*, 2019 reported that seeds extracted from the middle of fluted pumpkin pod had higher germination percentage, vine length, stem girth, number of leaves and leaf area, which corroborates the result obtained at 12-19 DAS in this study. Aremu and Akinwale (2012) observed that seeds from the anterior position had the highest vigour performance. However, in their own study, Ekwealor *et al.* (2019) reported the least emergence percentage was recorded in the anterior (near head) position. The disparity in result may be attributed to the genetic make up and growth environment of the seeds, both of which influences germination and seedling growth. In seed formation, pod encapsulate the seeds and protect the seeds. It is the immediate environment of growing seeds. Pods can regulate seed growth and maturity (Bennette *et al.*, 2011). Signals originating from the pod may act to coordinate grain filling and regulate the reallocation of reserves from damaged seeds to those that have retained viability.

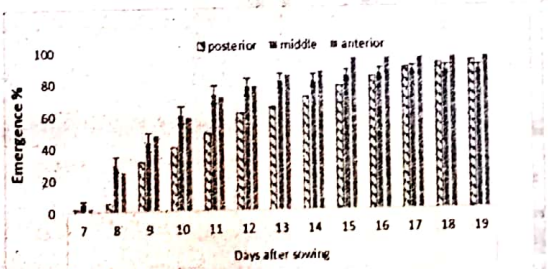

Fig 1. Effect of seed position in pod on the seedling emergence of *Telfria occidentalis*

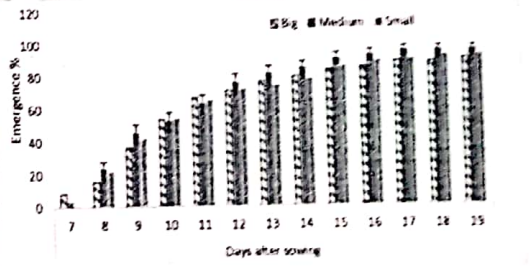

Fig 2. Effect of seed size on the seedling emergence of *Telfria occidentalis*

Big sized seeds were the fastest to emerge having significantly highest emergence percentage at 7 DAS. None of the small seed emerged at 7DAS. Big sized seeds contain more food reserve for the growing embryo than their smaller counterpart. Therefore, it is generally believed that large seeds have higher surviving rate than smaller seeds. Saeed and Sauka (2000), reported that larger seeds of *Senna occidentalis* emerged more rapidly than the smaller seeds. This was attributed to the longer root and shoot observed in the larger seeds. They however reported that smaller seeds germinated faster (had higher germination

velocity). In this study, the middle seeds consistently had the highest emergence percentage from 12-19 DAS similarly at 8 and 9 DAS (Figure 2)

Anterior seeds had the highest (input value here) emergence rate index value and it was statistically significant as well as the value recorded in the middle seeds. The least was recorded in the posterior seeds (Figure 3). The medium sized seeds had the significantly highest emergence rate index while the values recorded in the small sized seeds and the big sized seeds were at par (Figure 4). The emergence rate index is an indicator of vigour. It reveals the germination capability and the speed of emergence. Rapid seedling emergence increases the chance of seedling establishment. Sousa and Fagundes (2014) reported that small seeds had higher germination percentage and germinated faster than larger seeds though larger seeds gave more vigorous seedlings. The significantly higher emergence rate index observed in the medium seeds in this study might be attributed to the fact that the medium seeds being midway combined the advantages of faster germination of smaller seeds and longer plumule and radicle length of larger seeds to obtain higher emergence rate index. There was no significance interaction between the position of seed in pod and size of seed in all the parameter measured.

CONCLUSION

The position of seed within the pod and their sizes had significant effects on the seed vigour of fluted pumpkin. Medium sized seeds extracted from the middle and anterior position of fluted pumpkin pods appear to have more potential to give uniform and better field establishment for optimum productivity of the crop.

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