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EFFECTS OF LOCATION OF SEED IN FRUIT ON SEED QUALITY OF OKRA (Abelmoschus esculentus (L.) Moench)

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ABSTRACT

The experiment was carried out at the Crop Production Department Laboratory, Federal University of Technology, Minna Niger State, Nigeria. Field work for seed multiplication was done at the research farm of Crop Production Department during the raining season of 2019. Two plots of land (plot 1 and 2) measuring 15m by 26m each were prepared for the mass production of seeds of LD88 okra varieties Treatments were locations (base, middle and top) replicated four times and fitted into a Completely Randomized Design (CRD). Sample of seeds of each of the different treatments was placed in an open plastic plate measuring 300 mL. The containers were placed in the incubator at a temperature of 37 ^{0}C. Data were collected on number of seed per fruit, seed yield, seed moisture content, 100-seed weight, germination percentage, germination speed and electrical conductivity of the seeds. Data collected were subjected to analysis of variance (ANOVA) and means were separated using Duncan Multiple Rang Test (DMRT). The results showed that significantly higher ($p<0.05$) number of seeds and seed yield were recorded at middle and top over the base. The base had a significantly heaviest ($p<0.05$)100-seed weight, followed by the middle while the top had the least value.. Germination percentage was generally best at the base and middle locations. The top seeds had the highest leachate. Germination speed was insignificantly similar in the three locations

Keywords: Anthesis, viability, leachates.

INTRODUCTION

One of the most popular vegetables consumed across Nigeria is okra (Johnson, 2017). Okra (*Abelmoschusesculentus (L) Moench*), belongs to the family "Malvaceae". The crop originated from Ethiopia (Sathish and Eswar., 2013) but spread to other countries through the Portuguese..Okra is one of the most widely known and utilized species of the family "Malvaceae" (Naveed *et al*., 2009). It is grown as a fruit vegetable on almost all West African farms and high values are attached to its edible green pods, leaves and seeds. The tender leaves of okra are chopped together with the fruits for making soup. The fruits are used either in the green or dried form. It may be chopped green and cooked as soup to accompany dish or sliced, dried and ground into powder for future use (Ibrahim and Oladiran,2011). The matured stem contains fibre of good strength and is used for domestic purposes which include making of fish line, traps and hammocks. The edible parts are the cheapest source of essential minerals like iron, phosphorus, and calcium. They are also sources of iodine which prevent the development of goitre in people whose drinking water is deficient of the mineral. Numerous small-holder farmers (who produce the bulk of the crops in circulation) still hold on to the practices of leaving okra fruits at various positions on mother-plant until all the fruits are mature and completely dried before they are harvested at the end of the season; seeds from such fruits are extracted and bulked irrespective of the position of the seeds within the fruit/pod. It therefore means that farmers take no account of the differences in quality that may exist among seeds in the various locations within the fruit It is believed that the bulked seed lot might have varied qualities brought about by the differences in the positions/location of seeds within the fruits.It is clear that population at present increases in geometrical progression while the accessible land to produce food for the exploded human population is limited in supply. Although, there are various ways of carrying out soil improvement to increase crop productivity, wrong choice of seeds will definitely make no meaning out of the planned programme. Hence, good quality seeds (in terms of higher germination /emergence rate and increase in vigour) will definitely complete the race towards achieving food sufficiency. Therefore, the objective of the study was to examine the effects of differences in locations of seeds in fruits on seed quality.

MATERIALS AND METHODS

This study was carried out at the Teaching and Research Farm of Federal University of Technology, Minna (Latitude 9^o 31^1 N and Longitude 6^o 29^IE) during the raining season of 2019. Seed quality studies were carried out in the laboratory of Crop Production Department, Federal University of Technology, Minna.

LD88 variety of okra was obtained from the National Horticultural Research Institute (NIHORT), Ibadan Nigeria.Mass planting technique was adopted to produce adequate seeds for seed parameters studies. A plots of land which measured 15m by 26 m was prepared for the mass production of seeds of LDD88 varieties of okra. The plots of land was cleared, ploughed and narrow ridges (0.40m wide) of 15m in length were constructed manually (using hoes) at a spacing of 0.75m apart. Seeds of the variety LD88   were sown at a spacing of 50 cm along the ridges. Two seeds were sown per hole and seedlings were later thinned to one per stand after two weeks of sowing. Weeding was done manually using hoes at interval of two weeks from the day of crops emergence from the soil to keep the field weed free. Flowers were date-tagged at various positions as they opened to index anthesis; ensuring easy identification of fruit age. Fruits that developed from tagged flowers were harvested at 42 Days After Anthesis (DAA) when the initial green colour of the fruits had turned straw brown and the fruits completely split along the ridges. The treatments comprised of location (base, middle and top) replicated four times and fitted into a Completely Randomized Design (CRD).Freshly harvested fruits were immediately taken to the laboratory of Crop Production for further studies. Each fruit from each replicate was divided into three equal parts (Base, Middle and Top). Each part of the fruit was then opened and seeds extracted were counted (to determine seed number) and weighed fresh (to determine seed yield) before shade-drying for two weeks on top of paper placed on the table in the laboratory. Data were collected based on number of seeds, seed yield, seed moisture content, 100-seed weight, germination percentage (GP), germination speed (GS) and electrical conductivity (EC) test. All data collected were subjected to analysis of variance (ANOVA) using Statistical Analysis System (SAS) package; version: 2017 7.0. Means were separated using Duncan Multiple Range Test (DMRT) at 5 % level of probability.

RESULTS AND DISCUSSION

Location of seeds in fruit significantly $(p<0.05)$ affected all seed parameters measured as shown in Table 1. The number of seeds were significantly higher at middle (45.41) than the top (43.09); but lowest at the base (22.41). Similarly, seed yield was significantly lowest at the base(1.12), higher $(p<0.05)$ at the middle but highest $(p<0.05)$ at top (2.14). The significantly high number of seeds recorded at middle and top over the base is as a result of more flesh (nutrient transporting tissues) which normally accumulate at the base of the fruit leaving less space for seeds while the 'middle' and 'top' have more space for the formation of more seeds due to lesser flesh. This was clearly noticed in the study during the process of seed extraction. This is also connected to the higher seed yields observed at the 'middle' and 'top'. Carol *et al.*, (2011) revealed that numerous nutrient transporters occupy the base of the pod and they control the importation of nutrient elements into the seed.

100-seed weight was significantly highest$(p<0.05)$ at the base (4.54), followed by those at the middle (4.30) but significantly lowest$(p<0.05)$ at the top (4.11). The highest value observed at the base is traced to the fact that more nutrients get to the basal seeds since they are closest to the environment of higher concentration of macronutrients than the top; hence, bigger and heavier seeds due to more dry matter (assimilates) deposited in the basal seeds than the middle and lesser at the top. (Kolodziejek 2017) observed in *Peucedanum oreoselinum* (Apiaceae), that high quantity of macronutrient in surrounding of the fruit often lead to the production of seeds that are heavier. So, the abundant nutrient transporters that fill the base of the pod (Carol *et al.*, 2011) will likely increase the amount of assimilates available to the basal seeds; but, least at the top.

Table 1 : Effects of location of seed in fruit on seed parameters of LD88 variety of okra

Treatments	Number of seeds	Seed yield (g)	Seed moisture content (%)	100-seed weight (g)
Base	22.00c	1.12c	18.46a	4.54a
Middle	45.00a	2.12b	18.43a	4.30b
Top	43.00b	2.14a	17.24a	4.11c
SE±	0.32	0.014	3.25	0.01
LSD	0.63	0.01	86.21	0.01

Means with the same letter in the same column are not significantly different at ($P<0.05$) level of probability

Location of seed in fruit significantly ($P<0.05$) affected the germination percentage as indicated in Table 2 . The base had a significantly highest ($P<0.05$) germination percentage after the followed by the middle but lowest at the top. The best and better germination percentage values associated with the base and middle respectively are traced to greater dry matter accumulation which can likely give the seeds upper hand over the top seeds.Location of seeds in fruit insignificantly affected germination speed among the 'base', 'middle' and 'top' seeds. Germination speed were statistically similar as evident in table 2.

Location of seed in fruit significantly ($P<0.05$) affected the electrical conductivity of seed as it is observed on table 2.The 'top' seeds had a significantly highest ($P<0.05$) leachate than those from the 'base' and 'middle'. This suggests that the top seeds were of lesser quality than the basal and middle seeds right from the time of harvest. .Kennya, *et al.*,(2012) explained that electrical conductivity is based on the principle that low conductivity (lower output seed leachate) means a high-quality seed while high-conductivity references greater output seed leachate, suggesting lesser quality

Table 2: Effects of location of seed in fruit on the germination percentage, germination speed and electrical conductivity of seeds of LD88 variety of okra

Treatments	Germination percentage	Germination speed (days)	E C Test (ms/cm
Base	69.63a	3.87a	247.26b
Middle	67.70b	4.00a	234.36c
top	64.70c	4.00a	269.57a
SE±	0.33	0.35	3.18
LSD	0.67	0.69	6.33

Means with the same letters in the same column are not significantly different at ($P<0.05$) level of probability

CONCLUSION

Considering the results of this research work carried out using the LD88 varieties of okra, the conclusion can be drawn based on the fact that seed-filling was greater in seeds extracted from the base and middle part of the fruit than those from top locations of the fruit. This was clearly observed from the 100-seed weight where the basal and middle seeds had significantly higher values than those from the top. In addition, germination percentage significantly favoured the basal and middle seeds than those from the top location of the fruit. Electrical conductivity values of the seeds also indicated lesser quality of the top seeds than those from the base and middle. It is therefore recommended that the extraction of okra seeds to be sown as the next season cropping should be restricted to the base and middle location of the pod for better viability and vigour.

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