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The Quality of 'Egusi-Itoo' Melon (Cucumeropsis Mannii Naudin.) Seed Harvested at Different Fruit Ages.

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Abstract- Experiments were conducted in 2005, 2006 and 2007 at the Teaching and Research farm of the University of Agriculture, Makurdi, Nigeria, to study the effects of variable harvest ages (days after anthesis-DAA) on the quality of 'egusi-itoo' melon (Cucumeropsis mannii Naudin.) seed. A bulk crop was raised and fruits that developed from date-tagged flowers were harvested at five days interval beginning from 20 DAA to 65 DAA in 2005 and from 15 DAA to 60 DAA in 2006 and 2007 to monitor seed development and maturation with time. End of the seed-filling phase was attained at 50 DAA in 2005 and 40 DAA in 2006 and 2007. The highest seed germination values of 96.5, 93.5 and 94% were obtained in 2005, 2006 and 2007 respectively at the last harvest (60/65 DAA). Germinability of stored seeds increased with DAA and the longevity of more mature seeds was better than that of less mature seeds. It was therefore concluded that delayed harvest until when fruits were between 60 and 65 DAA resulted in higher quality seeds of Cucumeropsis mannii.

Index Terms- Anthesis, harvest, storage, germination, longevity.

I. Introduction

Egusi-itoo' melon *Cucumeropsis mannii* Naudin is one of the most important cucurbit seed crops used mainly as a condiment in soups in West Africa (Egunjobi and Adebisi, 2004). The production is high in Nigeria and some African countries where the seeds are roasted and used as a snack (Egunjobi and Adebisi, 2004).

The grain melon agronomic and other management practices adopted by producers in most West African countries do not differ from those for a seed crop. Following harvest, the more robust and good looking seeds are selected and reserved for the next planting season. Storage practices are often inadequate resulting in poor germination and seedling vigour. Farmers have therefore use of high seed rates followed with thinning where seedling emergence is impressive, a practice that is not only labourious but also wasteful.

The yield of viable and vigorous seed is an important goal for a seed producer (Younesi and Moradi, 2009). Optimum timing of harvest is also a prerequisite for the production of high quality seed (Demir *et al*., 2004). 'Egusi-itoo' melon is a long duration crop which could take six to eight months before it would be due for harvest (Egunjobi and Adebisi, 2004). The need for careful timing is therefore especially important for this crop which could be harvested at variable maturation ages depending on the level of pressure on the land. It has been observed that some farmers harvest as soon as leaves senesce to use the land for another purpose while others do not gather the fruits until much later. Studies on several crops have revealed that harvesting at specific ages produce excellent germination and that seeds harvested before or after the recommended ages resulted in poor quality seeds. (TeKrony *et al.*, 1980; Demir and Ellis, 1992, 1993; Zanakis, 1994; Oladiran and Kortse, 2002; Demir *et al.*, 2004; Passam *et al.*, 2010). This study therefore intends to examine the changes in seed quality due to variable harvest ages.

II. MATERIALS AND METHODS

'Egusi-itoo' *Cucumeropsis mannii* Naudin. crop was produced in three consecutive years (2005, 2006 and 2007) at the Crop Production Research Farm of the University of Agriculture Makurdi. In each year, land was cleared and ploughed and seeds were sown on the flat on 5th, 3rd and 7th June in 2005, 2006 and 2007 respectively. Bulk crop was raised and each female flower was date tagged at anthesis to monitor fruit age. In 2005, fruits that developed from the tagged flowers were harvested at five days interval starting from 20 to 65 days after anthesis (DAA) *i.e*. 20, 25, 30, 35, 40, 45, 50, 55, 60 and 65 DAA. In 2006 and 2007 however, harvesting was done at five days interval from 15 to 60 DAA (*i.e.* 15, 20, 25, 30, 35, 40, 45, 50, 55 and 60 DAA). The changes in time of harvest in 2006 and 2007 became necessary to ascertain the exact point in time at which seeds acquired the capability to germinate since the 2005 study revealed that some germination was recorded at 20 DAA which was the earliest harvest age.

At each harvest, fruits were broken and left to decompose for seven days. Thereafter, seeds were extracted, washed and dried. Number of seeds per fruit, dry seed weight per fruit, 100-seed weight and germination percentages were then determined.

Seeds produced in 2005 were packaged in polyethylene bags and stored in an ambient environment (32^{o} C and 40% relative humidity). Germinability was then tested after one, two, and three years of storage. Germination tests made immediately before and during storage, were conducted on four replicates of 50 seeds each, spread over distilled water-moistened absorbent paper in Petri dishes and incubated at 30^{o} C for 28 days. Counts were taken every other day.

III. RESULTS

Figure 1 and 3 shows that both dry seed per fruit and 100-seed weight increased with fruit age in the three years of study.

It is also shown in Figure 1 that seed yield was significantly lower in 2005 compared to the other two years. Seed yield was also higher in 2007 than in 2006 except at 55 and 60 DAA.

Figure 2 reveals that 100-seed weight was generally lower from 20 to 40 DAA in 2005 compared to what was recorded in 3006 and 2007.

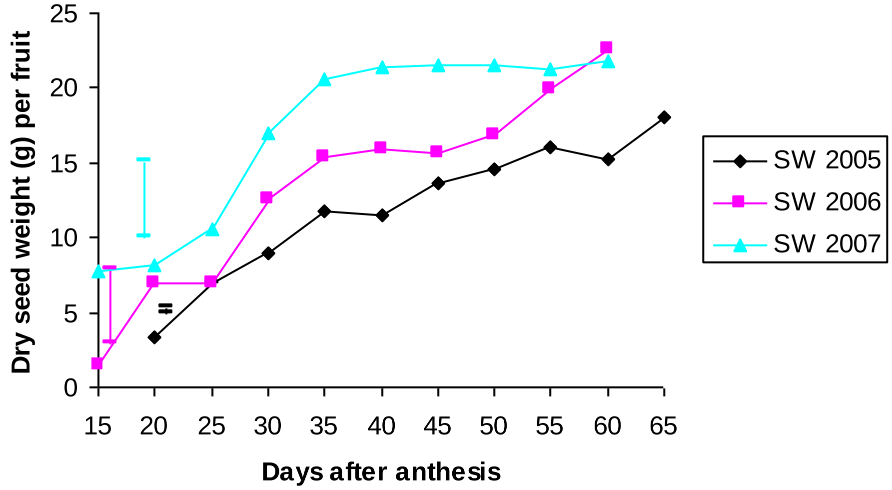

Fig. 1 Variations in average dry seed weight (g) per fruit of *Cucumeropsis mannii* harvested at different days after anthesis in 2005, 2006 and 2007.

LSD at P = 0.05

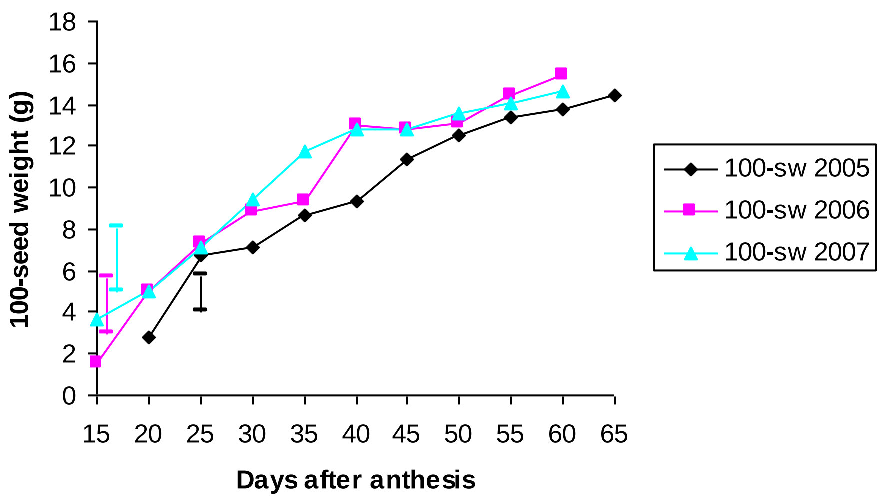

Fig. 2 Variations in 100-seed weight (g) of *Cucumeropsis mannii* harvested at different days after anthesis in 2005, 2006 and 2007.

LSD at P = 0.05

Contrary to the above observation seeds developed germination ability earlier in 2005 than in 2006 and 2007 (Figure 3). Whereas the germination of the seed harvested at 30 DAA in 2005 was about 53 %, seeds of corresponding DAA produced in 2006 and 2007 gave germination percentages of about four and zero respectively. However, all seed lots germinated about 91 % when fruits were harvested at 60/65 DAA.

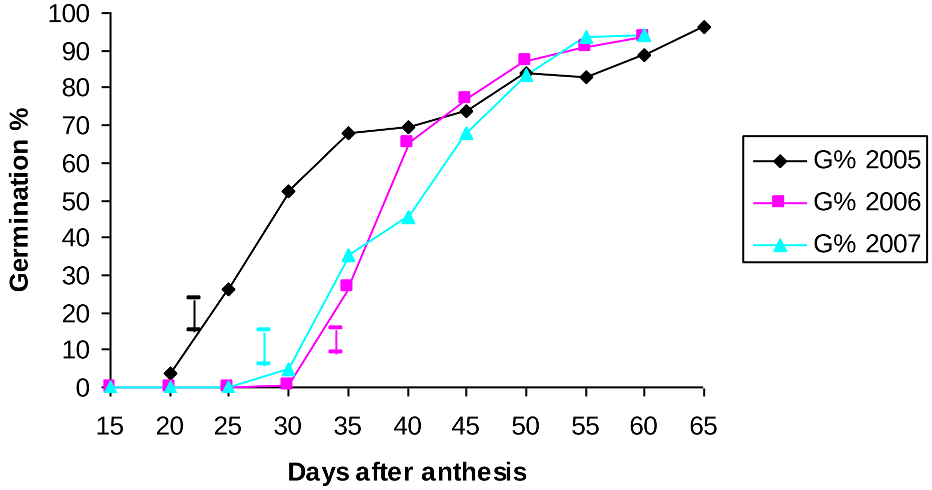

Fig. 3 Variations in germination percentage of *Cucumeropsis mannii* harvested at different days after anthesis in 2005, 2006 and 2007.

I LSD at P = 0.05

The longevity of the seeds produced in the three years was affected by level of maturity (Figure 4). Though all seed lots declined in germination irrespective of stage of fruit harvest as storage progressed, the more mature a seed lot was, the longer the seed survived. It is worthy of note that even though the increase in 100-seed weight between 50 and 65 DAA was insignificant in 2005 (Figure 2), it is apparent from Figure 4 that seeds from fruits harvested at 55 to 65 DAA exhibited greater longevity after two years of storage. Also in 2006 and 2007, even though the differences in 100-seed weight among 40 to 60 DAA were insignificant (Figure 2), seed germination still increased significantly beyound 40 DAA (Figure 3).

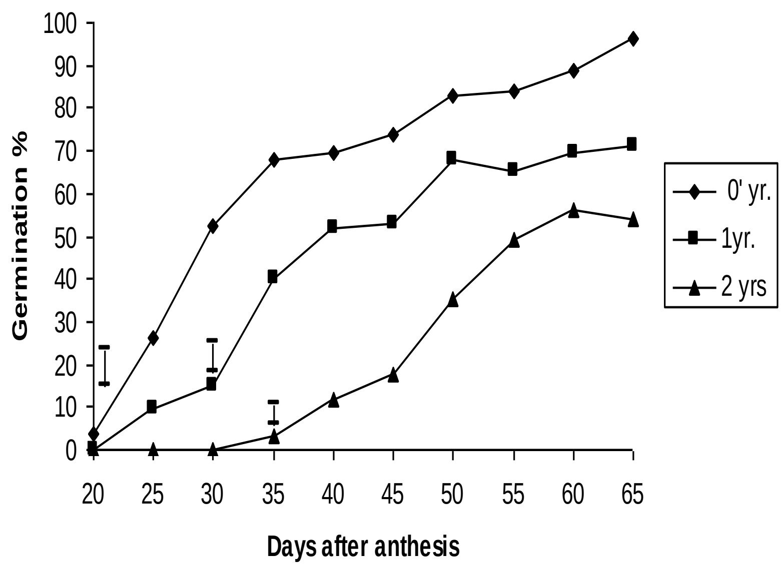

Fig. 4 Variations in the longevity of *Cucumeropsis mannii* seeds harvested in 2005 at different days after anthesis and germinated before storage (♦) and after storage for one (■) and two (▲) years respectively under ambient conditions.

I LSD at P = 0.05

IV. DISCUSSION

The annual rainfall values recorded in the study area during the productive period (June to December) were 716 mm, 981 mm and 1046 mm in 2005, 2006 and 2007 respectively. Egunjobi and Adebisi (2004) referred to *Cucumeropsis mannii* as a crop of the forest and also humid savanna ecologies. The poor seed yield per fruit and relatively low seed weight recorded in 2005 might therefore be connected with the lower rainfall recorded that year while the rainfall recorded in 2007 must have been adequate for high seed yield. van der Vossen *et al.* (2004) put the rainfall requirement of *Citrullus lanatus* (a relative of *Cucumeropsis mannii* and which is more of savanna crop) as about 700 – 1000 mm.

The progressive increases recorded in 100-seed weight with corresponding increases in germination percentage suggest that seed weight has a positive linear correlation with germination. Spurr *et al.* (2002) also found a positive relationship between seed weight and germination rate and uniformity in onion. Demir *et al.* (2004) who also reported a positive relationship between seed weight and seed quality assessed by potential longevity in watermelon again supported this position. Going by the 100-seed weight values, the period between 40 DAA and 50 DAA (depending on year of production) marked the end of seed-filling period in *Cucumeropsis mannii.* Seed germination however increased significantly beyound these points during the three consecutive years of production. The significant increase in seed germination beyound these points during the three years of study is in conformity with what has been reported in tomato. According to Demir and Ellis (1992) and Demir *et al.* (2008), tomato seeds do not attain maximum quality until some time after the end of the seed-filling period. The superiority in the longevity of more matured seeds over the less matured ones in this study agrees with what has been reported by other workers. Demir and Ellis (1993) reported that the longevity of marrow seeds was best in fruits collected at the end of maturation period. Similarly, Oluoch and Welbaum (1996) working on muskmelon recorded better seed longevity in fruits harvested when plants had aged. In addition, mature watermelon seeds have been reported to retain high germinability for 10 years whereas immature and half mature seeds declined in germinability earlier. Oladiran and Kortse (2002) and Demir *et al.* (2004) also reported the superiority of more mature seeds over immature ones. The decline in seed viability after a storage period of one and two years respectively is indicative of seed deterioration which is linked with disruption of cell organelles due to free radical production in the cells of embryos (Sung and Jeng, 1994; Sung, 1996).

It is concluded that seeds of *Cucumeropsis mannii* harvested earlier than 60/65 DAA may not be of good quality.

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