BEHAVIOUR OF SPLIT COTYLEDONS ON GROWTH AND FLOWER BUDS OF *TELFAIRIA OCCIDENTALIS* (HOOK. F.)

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Abstract

This study investigated the growth and the flower buds of the seedlings produced from split cotyledons of Telfairia occidentalis. Seeds of Telfairia occidentalis were cured and split into whole seed (control), ½, ¼ and 1/6 seeds. The whole and sectioned cured seeds were treated and planted into a plastic tray filled with saw dust. The seedlings were transplanted into the field at a spacing of 0.5 m x 0.3m using a randomized complete block design with three replicates. The results showed a decrease in vine length, stem girth, number of leaves and number of branches as the seed was sectioned i.e. it decreased in growth as the sizes of the propagules of T. occidentalis decreased. Whole seed had the highest vegetative growth and flower buds percentage (30.17 %). Therefore, farmers are encouraged to plant whole seed of T. occidentalis in order to obtain high biomass. This study has observed that half cotyledons can still be used when there is a shortage or limited seed but however recommends equally that half sectioned cotyledons can still be used in cases of limited seedling sufficiency.

Keywords: *T. occidentalis*, propagation, section seed, whole seed, growth and reproduction

INTRODUCTION

Telfairia occidentalis (Hook. F.), popularly called Fluted Pumpkin is a member of the family, Cucurbitaceae. It is a perennial vegetable commonly used diversely in Nigeria and it is propagated principally by seeds (FAO, 1992). *T. occidentalis* is generally used as a leaf and seed vegetable. Johnson and Johnson 1976 reported that 100 g of *T. occidentalis* contains 6.20 g moisture, 20.50 g protein, 45.00 g fat, 21.30 g carbohydrate, 2.20 g fibre and 4.80 g ash. Seeds of *T. occidentalis* are recalcitrant and their germination capacity declines when seed moisture is less than 40 % and is completely lost below 30 %. Seeds attain maximum physiological quality in terms of germination, vigour and storage reserve accumulation nine weeks after pod set and there after vivipary sets in (Ajayi *et al.*, 2000).

To overcome the problem of limited amount of seeds for propagation, Esiaba (1982) developed a technique where germinating seeds with young seedlings approximately 7cm large are carefully split into two cotyledonous parts, each cotyledon with one or two plants or roots. Approximately four seeds were obtained from one seed thus enabling a farmer to double their plant population. Akoroda and Adejero (1990), have found that seeds germinate better and faster in saw dust than in soil or sand (7 days instead of 10-14days). In addition, the highest germination percentages are found when it is relatively warm (25-30^{o}C) and humid (Schipper, 2000). In some cases, studies have been carried out to investigate the propagation of the crop by the use of stem cuttings or split root (Obiefuna, 1995), with little success. Esiaba (1982), reported that seed sections could be used as propagules for the propagation of *Telfairia*. Successful production of plantlets from split seeds of *T. occidentalis* could increase biomass production in the plants hence, combat food insecurity. Also, more fruit and seeds will be available for planting and industrial use.

Consequently, this study focused on how seedlings produced from split cotyledons can influence the growth, reproduction and fruiting since the seeds of *T. occidentalis* are recalcitrant and that there is a great competition between seeds for planting amnd for consumption purposes.

MATERIALS AND METHODS

Site Description

The study was carried out at the Plant Science and Biotechnology research garden Nasarawa State University, Keffi from April 2008 to August 2010. The study area was 18 m above sea level which lies between latitudes 8°7' and 9°7'N and longitudes 8° and 8°6'E. Annual rainfall ranges from 1000 mm to about 2800 mm and mean monthly temperature ranges from between 20°C and 34°C.

Seeds Preparation

The seeds of *T. occidentalis* were obtained from its fruits using a clean knife. Seeds were cured by spreading them out under shade for a day to reduce exogenous moisture and effect of pathogen. Cured seeds were split into three parts which are as follows: one set was split into two equal (1/2) cotyledons, the second set was split into four cotyledons (1/4) and the third set was split into six cotyledons (1/6) using a surgical blade, the whole seeds (control). Thereafter, seeds were treated with 1 % of 3.5 % M/v sodium hypochlorite.

Experimental layout

The whole seeds and sectioned seeds were sown and observation was done in plastic trays filled with saw dust of 3 m x 10 m. Watering was done once every two days. The seedlings were transplanted to seed beds at a spacing of 0.5 m x 0.3m in a randomized complete block design with three replications consisting of a total of 12 plots in each replication. Weeding was done manually once every 2 weeks and fertilizer (NPK, 15:15:15) was applied using the ring method after three weeks of planting. One week after planting, assessment of growth parameters commenced and continued till fruiting of the plant. Growth parameters included number of leaves, vine length, number of branches, stem girth and flower percentages which were randomly assessed. Vine length was measured using a meter rule while thickness of girth was measured using micro meter crew gauge.

Statistical Analysis

Data collected were subjected to analysis of variance (ANOVA) and the treatment means were separated using least significant difference (L.S.D) at 5% level of probability.

RESULTS AND DISCUSSION

Vine length of *T. occidentalis*

Mean Vine length of sectioned *T. occidentalis* seeds from 2 to 10 weeks after planting are represented in Fig. 1. Vine length increased rapidly from 2 to 10 weeks after plant (WAP) in all the seed used (whole seed, ½, ¼ and 1/6 seed), Obiefuna and Ajekenrenbiaghan, 2006 reported that vine length increased as propagule seed size increased throughout the period of observation (2 to 12 WAP). Significance difference ($p < 0.05$) was observed in vine length produced from whole and sectioned *T. occidentalis* seeds. Vine length of a whole seed had significant higher values from 2 (69.32 cm) to 10 (247.90 cm) WAP. Vine length produced from 1/6 seed was the lowest for 2 (13.24cm) to 10 (89.23 cm) WAP. Also, Obiefuna and Ajekenrenbiaghan, 2006 reported that highest vine length was obtained from the whole seeds and the least from the one-eighth seeds with highest values of 254 cm and 194 cm respectively at 12 WAP. Vine length of *T. occidentalis* decreased in order (whole seed >½ > ¼ >1/6 seed) of sectioned seeds.

Plant girth of *T. occidentalis*

Mean plant girth of sectioned *T. occidentalis* seeds from 3 to 10 WAP is presented in figure 2. Significance difference was observed in number of leaves produced from the whole and sectioned *T. occidentalis* seeds. Plant girth increased from 3 to 10 WAP in all the seeds used (whole seed, ½, ¼ and 1/6 seed). Plant girth of whole seed had significant higher values from 3 (0.77 cm) to 7 (1.01 cm) WAP. However, plant girth of ½ seed had the highest stem girth at 8 (1.85 cm) WAP. The high vigor exhibited by the whole and halved seeds may be due to the high food reserve in whole seeds. The availability of this in relatively higher quantities may have given the whole seed the initial vigor to have well developed roots, enhancing nutrient and water uptake (Obiefuna and Ajekenrenbiaghan, 2006). Plant girth produced from 1/6 seed was the lowest for 2 to 10 WAP.

Number of leaves of *T. occidentalis*

Mean number of leaves of sectioned *T. occidentalis* seeds from 2 to 10 WAP are represented in figure 3. Number of leaves increased rapidly from 2 to 10 WAP in all the seed used (whole seed, ½, ¼ and 1/6 seed), this in line with Obiefuna and Ajekenrenbiaghan, 2006 that reported number of leaves of *T. occidentalis* generally increased with time for all the seed sections and the highest values were obtained at 12 WAP. Significance difference ($p < 0.05$) was observed among the *T. occidentalis* seed used during the research. Whole seed significantly had the highest number of leaves from 2 (18.77) to 10 (90.52) WAP. The superior values for larger propagule could be attributed to the advantage in their food reserves. The whole seed consistently had higher number of leaves (52.3) than the other seed sections (Obiefuna and Ajekenrenbiaghan, 2006). Number of leaves produced from 1/6 seed was the lowest from 2 (4.53) to 10 (33.40) WAP Number of leaves of *T. occidentalis* decreased in order (whole seed >½ > ¼ >1/6 seed) of sectioned seeds i.e. generally decreased with decrease in the size of the propagules.

Number of branches of *T. occidentalis*

Mean number of branches of sectioned *T. occidentalis* seeds from 2 to 10 WAP are represented in figure 4. Significance difference ($p < 0.05$) was observed in number of leaves produced form the sectioned *T. occidentalis* cotyledons. Little or no increase was observed from 2 to 4 WAP while rapid increases in stem girth were obtained from 5 to 10 WAP. Number of leaves of *T. occidentalis* decreased in order (whole seed >½ > ¼ >1/6 seed) of sectioned seeds. Whole seed significantly had the highest number of branches from 2 (3.13) to 10 (22.73) WAP. Number of branches produced from 1/6 seed was the lowest for 2 to 10 WAP.

Flower Percentage

Flowering percentage of sectioned *T. occidentalis* cotyledons is shown in figure 5. Whole seed of *T. occidentalis* had the highest flowering percentage (30.71 %). Flowering percentage of *T. occidentalis* decreased in order (whole seed >½ > ¼ >1 6 seed) of sectioned seeds.

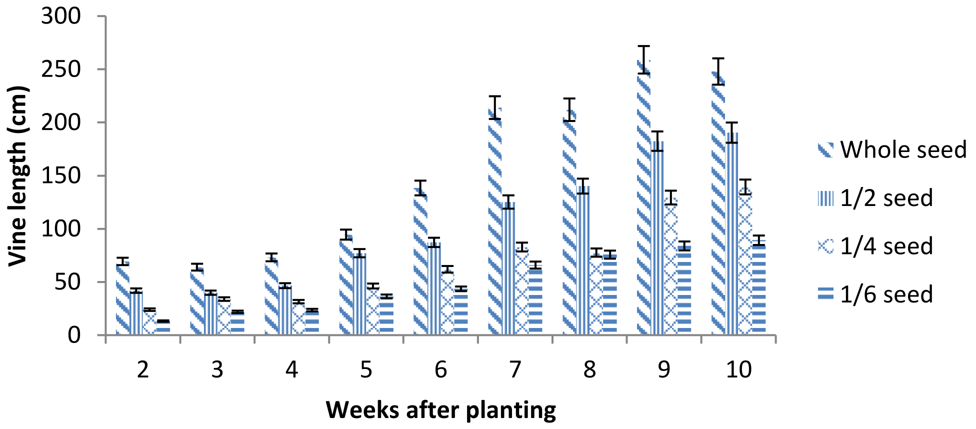

Figure 1: Mean vine length of whole and sectioned *T. occidentalis* seeds
Legend: Bar represents LSD at P=0.05

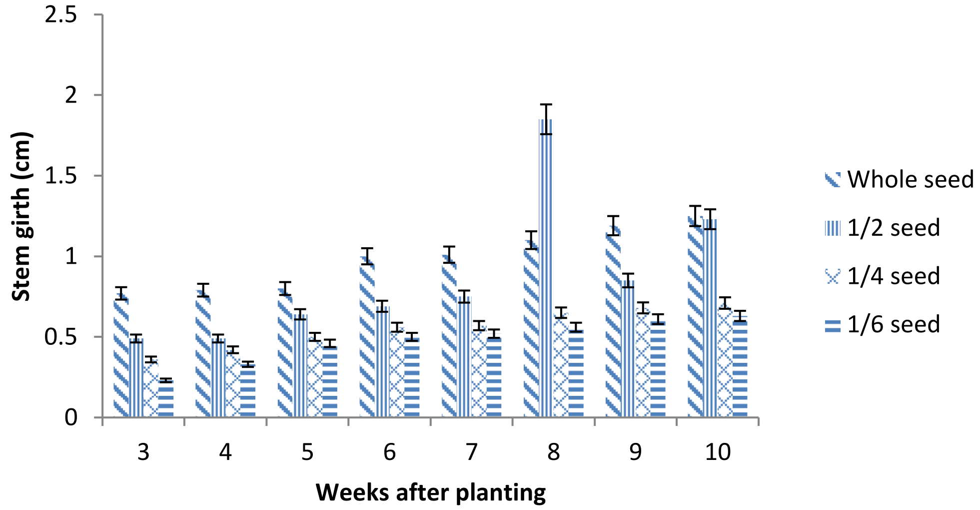

Figure 2: Mean stem girth of whole and sectioned *T. occidentalis* seeds
Legend: Bar represents LSD at P=0.05

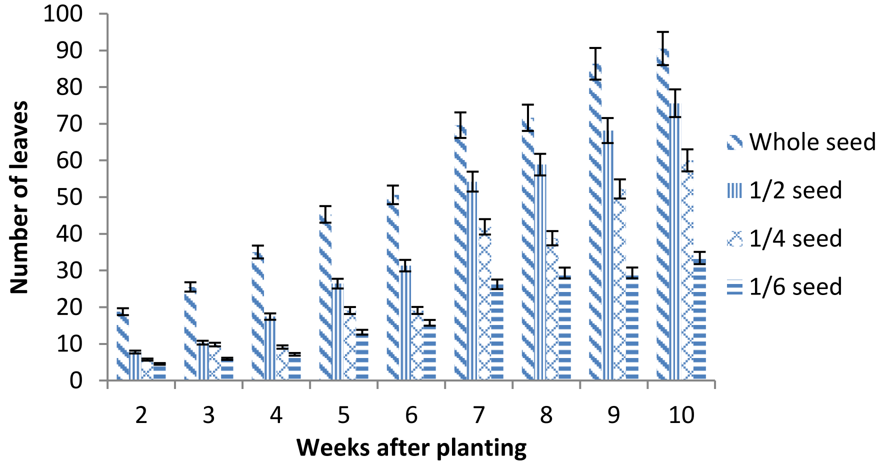

Figure 3: Mean number of leaves of whole and sectioned *T. occidentalis* seeds
Legend: Bar represents LSD at P=0.05

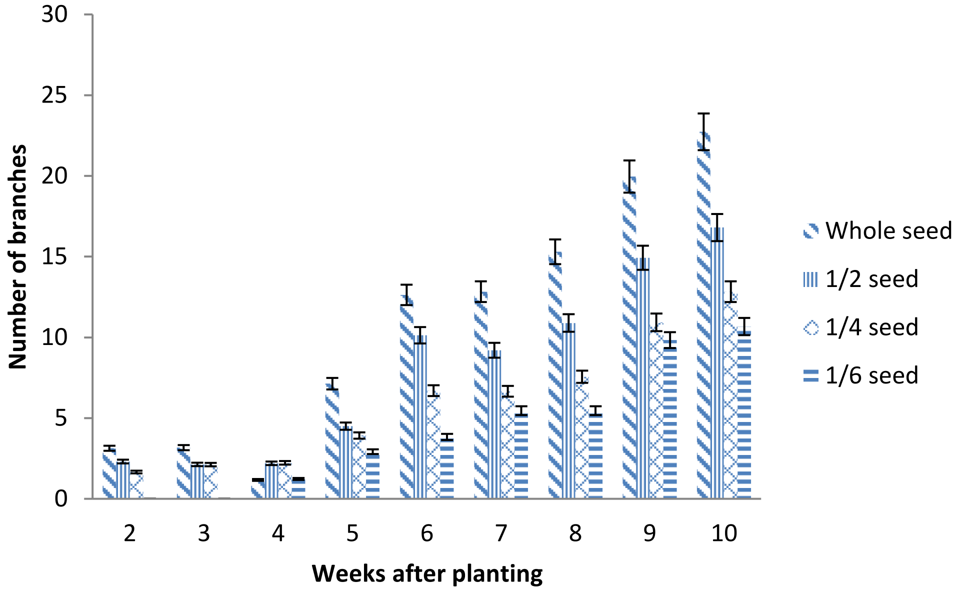

Figure 4: Mean number of branches of whole and sectioned *T. occidentalis* seeds
Legend: Bar represents LSD at P=0.05

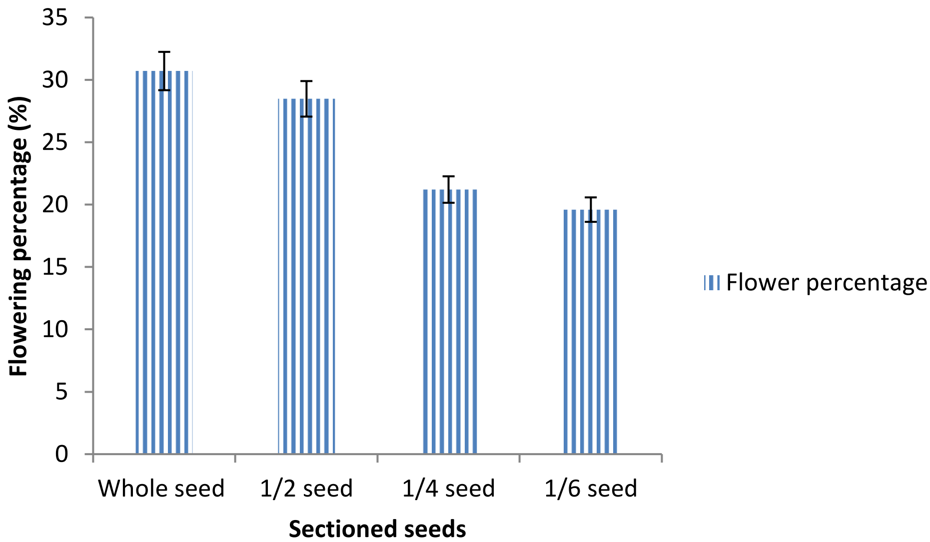

Figure 5: Flowering percentage of whole and sectioned *T. occidentalis* seeds

CONCLUSION

This study has shown that though whole seed produced the highest values of vine length, number of leaves, number of branches and flowering percentage however, ½ split cotyledons can also be used for production of *T. occidentalis* when there is seed scarcity for propagation.

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