Studies On Sprouting, Germination And Seedlings Of *Borassus Aethiopum,* A Nigerian Palm.

IJATO J.Y

Department of Plant Science, Faculty of Science, University of Ado- Ekiti, Nigeria.

jamesyeni@yahoo.com

GSM: 08067335124

ABSTRACT: Studies were carried out on the sprouting, germination and seedlings of *Borassus aethiopum* to determine the most suitable medium in which the seeds / fruits of this palm can be sprouted . The seeds of *Borassus aethiopum* germinated by sending out cotyledon sheaths into the soil up to a length of 70cm without the emergence of the plumule. Ripe fruits of *Borassus aethiopum* used for the studies were collected from the vegetation reserve of University of Ado-Ekiti, Ado-Ekiti, placed in a polyethene bag and taken to the laboratory of the Department of Plant Science, University of Ado-Ekiti for further studies. An experimental site of the Department of Plant Science was used for the study, the site was harrowed and heaped to a height of 2 ½ feet, ten fruits each of *Borassus aethiopum* were planted in each per treatment group. Some fruits were soaked in water for 15, 20 and 25 days dehusked while some remained undehusked, some were planted in the soil directly, some were just observed without planting in the soil, some were placed inside thick and transparent polyethene bags and observed for germination. Watering was done regularly and manual weeding was done to prevent weed invasion. Dehusked seeds of *Borassus aethiopum* soaked for 15 days required 16-20 days and 21-25 days to attain 30 and 40 percent cumulative germination respectively while soaking of dehusked seeds of *Borassus aethiopum* for 20 and 25 days required the same number of days (6-10) to attain 20 percent cumulative germination, undehusked fruits of *Borassus aethiopum* irrespective of number of days of soaking did not support any germination. Dehusked fruits of *B. aethiopum* planted in the soil directly germinated faster at 50 percent within 11-15 days while the undehusked fruits required 16-20 days and 21-25 days to attain 40 and 50 percent germination respectively. Sprouting *Borassus aethiopum* fruits in polyethene bags was not successful irrespective of number of days under observation whether dehusked or undehusked.

[IJATO J.Y. Studies On Sprouting, Germination And Seedlings Of *Borassus Aethiopum,* A Nigerian Palm. Stem Cell. 2010;1(3):1-5] (ISSN 1545-4570). http://www.sciencepub.net.

INTRODUCTION

Borassus aethiopum is a perennial plant of the palm family. It is a heavy, dioecious fan palm family widely cultivated in Thailand where it is used to provide shade for growing rice in the permanent site (Panyakul, 1995). They are grown throughout tropical Asia and Africa in huge stands which sometimes cover thousands of acres (Paul, 1995). A male *Borassus aethiopum* tree cannot be distinguished from the female until flowers are borne which usually occur between the 12^{th} and 15^{th} year (Paul, 1995). Mature *B. aethiopum* are cut into planks and these are used as roofing framework in Nigeria.

The species of *Borassus* are: *B. aethiopum,* an African species, *B. deleg,* found in Britain and Sudan, *B. heiniana,* found in New Guinea, *B. madagascariensis* and *B. sambiranensis* found in Madagascar, *B. flabellifer* which originated from India and Malaya (Paul 1995). Germination of *B. aethiopum* is remote tubular (Paul1995) due to the placing of the embryo. There is a rapid outgrowth of a thick, fleshy edible cotyledon stalk that penetrates into the soil with considerable speed, even when the fruit is laying unburied (Paul 1995). The cotyledon stalk carries the growing point of the young palm deep into the ground. Paul (1995) reported that this device provides protection from fire and physical damage in the early stages of growth. Germination of *Borassus aethiopum* requires considerable amount of moisture (Paul 1995) and protection from excessive light (Gassner, 1915). The germinating seed of *Borassus* spp form a starchy edible underground bulb-like and invented parsnip Paul (1955). Germination of *Borassus* spp can be hastened by scarification (Shell thinning) (Hart and Berrie, 1966;

Roberts and Smith, 1977) or by soaking the seeds in hot water for a short time so as to avoid damage to the embryo.

The objectives of these studies were: to evaluate the effect of soaking on the germination of seeds of *B. aethiopum*; to determine the effects of husk and dehusking on the germination of seeds of *B. aethiopum*, to determine the effects of polyethene bags on *B. aethiopum* germination and the effect of direct planting in the soil to observe for germination.

Materials and methods

PLANTING MATERIALS

Ripe fruits of *Borassus aethiopum* used for these studies were collected from a vegetation reserve of the University of Ado-Ekiti, Ado-Ekiti. These were placed in a bag polyethene and taken to the laboratory for further studies.

Experimental site

An experimental area of the Department of Plant Science, University of Ado- Ekiti was used for the studies. The site was harrowed and heaped to a height of 2 ½ ft, some thick transparent polyethene bags were also used.

Planting operation and treatment

Ten seeds each were planted in each per treatment group. Some seeds were planted directly in the soil (dehusked), some were planted undehusked, some were soaked in water for 15, 20 and 25 days and observed for germination, while some were placed directly undehusked in transparent and thick polyethene bags, watering was done regularly and weeding was carried out regularly to check weeds invasion

Uprootings and measurements

Uprooting and measurements were carried out at regular intervals. Germinating fruits / seeds of *B. aethiopum* from the experimental site were uprooted and conveyed to the laboratory at intervals of 5 days where measurements were carried out using thread and metre rule. The parameters measured included the length of embryo, length of cotyledon sheath, length of the channel and circumference of the seeds / fruits. The days required for the cotyledon sheath to emerge through the operculum were also recorded.

Seed planted inside polythene bag had poor germination and this agreed with the report of Cumming (1993) that germination will not occur under a canopy, it also agreed with Totterdel and Robert (1980) who reported the same thing in *Rumex spp.*

Paul (1995) reported that once the germination began, the seed threw out a shoot directly downward 40-50 inches, during a period of about 5 months. This shoot then turned upward and required another 5 months to reach the surface of the soil and produced the first cotyledon leaf. Consequently, the seed must be planted in very deep containers or in kits permanently positioned in the ground *(in situ*).

Table 1 showed that seeds soaked for 15 days had the highest cumulative percent germination, although they required linear days to germinate than seeds soaked for 20 and 25 days. This indicated the significance of soaking duration in *Borassus* germination it can also be inferred from Table 1 that 20 and 25 days soaked seed germinated faster but had low cumulative percentage germination. Soaked undehusked fruit did not germinate. The effect of dehusking on the germination of *Borassus* seeds as presented in Table 2, there was no significance in terms of cumulative percentage germination, the number of days of germination being different, the dehusked seeds germinated faster than the undehusked seeds. Seeds placed in polythene bags did not germinate under the days of observation and had low cumulative percentage germination when eventually germinated.

It was observed that *Borassus* fruits dehusked or undehusked had poor viability, only those that were planted in the soil attained 50% germination, this could not be attained by planting in polythene bags and on the soaked seeds. The results showed that it is advantageous to plant in the soil whether dehusked or not while it is not advisable to sprout *Borassus* seeds in polythene bag.

When soaking is to be used, it should be for few days and the water should be changed daily to check foul odour and re-absorption of likely inhibitor in the spongy fibres of the fruit.

Soaking *Borassus* seeds for 15 days before planting promoted germination, this agreed with the report of Opeke (1992) that germination occur at optimum moisture .This also corresponded with the report of Paul (1995), that germination of *Borassus* seeds requires considerable moisture.

Results and discussion

Table 1 Effect of soaking on germination of *B. aethiopum* Treatment/ Dehusked	0-5	6-10	11-15	16-20	21-25 days
+15 days soaking	00	00	10	30	40
+20 days soaking	10	20	00	00	00
+25 days soaking	10	20	00	00	00
Total	20	40	10	30	40

Control

Undehusked	0-5	6-10	11-15	16-20	21-25 days
+15 days soaking	00	00	00	00	00
+20 days soaking	00	00	00	00	00
+25 days soaking	00	00	00	00	00

Table 2 Effect of husk on the germination of *B. aethiopum* planted in the soil

Planted in the soil	1-10	11-15	16-20	21-25 days
Treatment Dehusked	00	50	00	00
Control Undehusked	00	00	40	50

Table 3 Effect of husk on germination of *B. aethiopum* planted in polythene bag

Parameters	10-20	21-30	31-40	41-50 day
Dehusked	00	00	00	00
Undehusked	00	00	00	00

Table 4 Seed characteristics of *B. aethiopum*

Parameters	(means)
seed circumference	20cm
Length of cotyledon sheath	30cm at 25 days of germination
Length of embryo	4cm at 25 days of germination
Length of channel	2.5cm at 25 days of germination

Soaking beyond 15 days resulted into poor germination, this agreed with the report of Edward (1969), Kidd and West (1917) that long period of soaking allowed building and influx of inhibitors since the water was not changed. This poor germination agreed also with the report of Waggon and Parlange (1976) that large seed may leach relatively more than small seeds and so exposed to a greater chance of damage.

The 50% germination in the seeds planted in the soil was attained as a result of ability of *Borassus* seeds to germinate where excessive light was prevented, this agreed with Paul (1995) who wrote that *Borassus* germinated in considerable moisture and limited light, this also agreed with Berrie (1966). Thompson (1974) that reported that photosensitivity lessened or even removed by germinating the seeds at low temperature since the seeds were covered up with soil. However, this does not mean that the light is not needed at all but excessive light must be prevented.

Fairchild reported that *Borassus* palm thrived in sandy beach conditions, because this soil type gave little or no resistance due to texture. Hence penetration by the cotyledon stalk is facilitated.

Nikolaeva (1977) reported that there are many cause of dormancy. Cumming (1963) reported that no germination would be observed under the shade. Henderick and Miller (1956 and 58) reported that introduction of growth regulators would facilitate growth. High temperature was also reported to aid growth Black and Wavering (1955), Reynords and Thompson (1971), Borthwick and Robins (1927) contradicted this. Edward (1969) and Khan (1960) reported that reduced oxygen tension together with water stress induced dormancy. It can be deduced that *Borassus aethiopum* seeds/fruit should be planted directly and permanently into soil or sprout it where necessary in a deep sandy soil container for easier transplant.

REFERENCES

Berries, A. M. M and Drennan, D. S. H (1971). The effect of hydration – dehydration on Seed Germinations New Physiol 70, 135 – 42

Berrie, A. M. M. (1966). The effect of temperature and light on lettuce germination: Physiol Plant 19, 429-436

Panyakul, V (1995). “Palm sugar” The indigenous sweetness.

Paul T. (1995). The palm of Africa

Hart, G. W and Berrie, A. M. M (1966). The germination of *Avena Fatua* under different environments Physiol Plant 19, 1020-5

Gassner G. (1915a). Einige neve Falle Von Keinnung Sau Slosender Wirking der sticks to Hoerbindugen (aut linea temp Findlinche Samen Ber. Deutsen Bot. Ges 33:217 -32

Robert, E. H. and Smith R. D (1977). The physiology and Biochemistry of seed dormancy and germination Ed, A. A. Khan, North – Holland, Publishing Co. Amsterdam.

Murray, R. O.H, Mendez, J and Brown, S. A. (1982). The natural coumarin occurrence, chemistry and biochemistry, John Wiley and son Ltd, Chichester, P. 702.

Nikolaeva, M.G (1977). Factors controlling seed dormancy pattern in physiology and biochemistry of seed dormancy and germination. Ed. A. A. Khan. North – Holland Publishing Co. Amsterdam.

Moewus, F and Schadder, E (1951). Uber die Keimungsund Washstuff hemmende wirking eininger phythalide Ber deutch Bot. lies 64, 124 Moewus, F and Schadder, E (1951). Uber die Keimungsund Washstuff hemmende wirking eininger phythalide Ber deutch Bot. lies 64, 124 -9

Cumming B. G. (1963). The dependence of germination of photo period, light –quickly and temperature in *Chenepodium* spp. Can J. Bot. 41, 1211 – 33.

Hendericks S. B and Taylorson, R. B (1972). Promotion of seeds germination by Nitrate and Cyanide nature, 237, 167 – 70.

Ketrings, O. L (1977). Ethylene in seed germination in the physiology and biochemistry of seed germination, ed A. A. Khan, North – Holland Publishing Co. Amsterdam.

Khan A. A. (1960). An Analysis of dark – osmotic inhibition germination of lettuce seeds. Plant physiol 35, 1 -7

Miller C. O (1956). Similarities of some kinnentin and red Light effect. Plant physiol. 31, 318-19

Miller C. O. (1958). The relationship of the kinnentin and Red light promotion of lettuce seed germination. Plant physiol 33, 115-17

Black, M. and Wavering, P. F (1955). Growth studies in wood species Viii Photo – periodic control of germination in B. *pubescence*. Physiol plant 8,300-16.

Borthwick, H. A and Robbins, W. W. (1929). Lettuce seed and its germination. Hilgardia 3, 275 – 304

Edwards, M. M. (1960). Dormancy in seeds of charlock iv, Interrelationships of Growth oxygen supply and concentration of inhibitors J. Exp. Bot 20, 876 – 94.

Reynolds, T and Thompson, P A (1971). Characterization on high temperature inhibition of germination of Lettuce. Physiol plant, 24, 544-7

Kidds, F and West, C (1917). The controlling influence of carbon dioxide. Part iv on the production of secondary dormancy in seed of *Brassica alba*.

Opeke L. K. (1972). Tropical trees crops.

Thompson I. (1974). New method of recording germination data. Nature 207, 216 – 17

Waggon, P. E. and Parlange, J.Y (1976). Water uptake and water diffusivity of seeds. Plant physiol.57,153-6

Totterdel. S and Roberts E.H (1980).Characteristics of Alternating Temperature which stimulates loss of dormancy in seed of ***Rumex obtusifolium.***

7/3/2010