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Full Length Research Paper

Effect of coconut milk and *bryophyllum pinnatum* extracts on seed germination of some tree seed species

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A study on the effect of coconut milk and *Bryophyllum pinnatum* milk extracts on four tree seed species namely: *Tamarindus indica, Albizia lebbeck , Parkia biglobossa* and *Prosopis africana* were investigated. The viability test of the seeds was equally carried out using HACH viability test meter. About 80-100 % range of germination percentage were recorded for the seeds. The research revealed how the seeds were favorably disposed to the use of the botanicals in order to enhance its germination by showing a percentage range of 80-100% germination. It was however recorded that the seeds treated as control showed a minimal level (10-20%) of percentage germination under the same experimental conditions. This method of raising seedlings from dormant seeds using botanicals may give raise to raising seedlings in order to promote a forestation, and also as one of the tools that could be used to combat problems of global warming. This method could also serve as a replacement for using some corrosive and expensive chemicals such as hydrogen tetraoxosulphate (VI) acid (H_2S0_4) for terminating dormancy in seeds with matured embryo.

Keyword: Seed ,afforestation, *Bryophylum pinnattum,* coconut milk and viability

INTRODUCTION

Germination is the growth of an embryonic plant contained within the seed which result in the formation of the seedling. The seed of higher plant is a small packaged produced in a fruit or cone after a union of the male and female sex cell. All fully developed seeds contain an embryo and in most plant species some food reserves are stored in the seed coat. Most seeds go through a period of quiescence where there is no active growth; during this time the seed can safely transported to a new location and survive adverse conditions until circumstances are favorable for growth. Quiescent seeds do not germinate after being ripe because they are subject to environmental conditions that prevent the initiation of metabolic processes and cell growth. Under favorable conditions, the seed begins to germinate and embryonic tissues resume towards a seedling development.

Coconut (*Cocosnucifera*) is an important member of the family Aracaceae (Palm family),which is the only accepted species in the genus Cocos . It is a large palm growing to 30 m tall with pinnae leaves 4-6 m long and pinnae 60-90 cm long . The plant is grown throughout the tropics for decoration as well as for its many culinary and non-culinary uses. Its flowers are polygamomonoecious with both male and female flowers in the inflorescence. The fruit is boyant and highly water resistant and evolved to disperse significant distances through marine current.

Bryophyllum pinnatum Lam is a succulent and basal rosette that has its leaves fleshy and alternate. The flowers occur in raceme and are bell-like with purplish stem. It grows up to 1m tall. It belongs to the family *Crassulacae.*

The genus *Tamarindus* is a monotypic plant. It is a native to tropical Africa and grows wild in Sudan,including parts of the Madagascar dry deciduous forest.I t was long introduced into india.The specific name “indica” perpetuates the illusion of Indian origin. It is the only important spice of Africa origin. The tree is grown as shade and fruit tree,along road sides, in dooryards and parks.*Tamarindus indica* (L) is a semi evergreen plant(Agi, 1991). It is associated with various socio economic benefits to areas where is habitated (Ajiboye, 2009). The benefits have made it to be known as one of

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the multipurpose Tree seed species incorporated into the ecological studies and research programmes as vindicated by the activities of Forest Research Institute of Nigeria (FRIN) , International Centre for Underutilised Crops (ICUC) and other related forestry organization in the world(Agi, 1991). All parts of the tree are used such as the barks,leaves,fruits,roots and seeds for food and fooders for livestocks,pharmaceutical raw- materials (Ajiboye,2009).The extract of the seeds are used in preparing a local drink called “Samia” in northern parts Nigeria(Ajiboye,2009).

Albizia lebbeck (L) Benth is a fast growing nitrogen-fixing heavy shade tree, recommended for reforestation and firewood plantation in the tropics.It is a deciduous tree that grows up to 30 m tall with dense shade producing crown.(Alabi,1993). The tree legume plays a vital ecological roles in the tropic nutrient recycling and prevention of soil erosion (Alabi,1993).

Parkia biglobossa(Jacq).R.Br.Ex is a leguminous tree seed that is commonly referred to as the “African Locust bean”(Aliero, 2004). It is often grow to a height of 20 m with dense spreading crown.(Aliero, 2004).The tree seeds are used as flavouring and nutritional additives called ‘Iru’ and “Dawa-dawa” in Yoruba and Hausa language respectively (Aliero , 2004).

Prosopis africana (Guill & Perr) Taub is a perennial tree that belong to the family leguminousae.About 44 species are known to exist but only one is native to Africa.The rest occur in torpical America and asia (Agboola , 1995).The tree serves as good furniture materials,its stems are used for making hoes and tobacco pipes. In the northern parts of Nigeria,membrane drum are made from wood (Agboola,1995).The leaves are rich in protein and also used for feeding livestocks.In Nigeria,the seeds are used by Idoma,Ighala.Ebira and Tiv people to prepare a spice called ‘Ukpehe” a soup condiment that is rich in protein and fatty acids (Sanni *et al,* 1993).The dried roots are used as chewing sticks called “Ayan” which contain antimicrobial properties against toothache (Agboola,1995).

This research work focus on raising the seedlings of the tree seeds using the extracts obtained from the *bryophyllum pinnatum* and coconut milk extracts.

MATERIALS AND METHODS

Seed collections and processing: Matured seeds were collected from the Forestry research Institute of Nigeria (FRIN) Jericho , Ibadan. The tree seeds were processed in the Botany/Zoology Laboratory of the Department of Biological sciences, University of Agriculture Abeokuta.

Viability test: the viability testing of the seeds were investigated using HACH viability test meter (model VTM 536).The meter was caliberated with ultra- pure water that was wiped off from the electrodes of the meter with tissue paper.The seeds were then put in an extraction cup while the electrode of the meter was dipped in the cup containing the seeds while the records of the readings were taken accordingly.

Initial germination test: seeds were surface sterilized with 0.1% HgCl solution for 30secs and rinsed in several changes of distilled water and air-dried at room temperature for 20secs.Ten seeds were randomly selected for each species and prepared for germination in 9 cm Petri dishes containing two sterile filter papers soaked with distilled water. This was monitored for some days in the laboratory for germination.

Bryophyllum pinnatum and coconut milk extracts: The matured and the young leaves of *Bryophyllum* were obtained directly from the parent plant found growing in the botanical garden of the University of Agriculture, Abeokuta. About 20 counted leaves of the *Bryophyllum* were soaked for more than 24hours in order to imbibe water. The leaves were grated and sieved continuously until there were no particles in the extracts .The extracts of these leaves were then used to soak the seeds for 3-5days before slating them for germination in 9cm petridishes lined with two sterile filter papers. The germination period were monitored for 12days.The same grating and soaking processes were used to obtain milk extract form the coconut of a sizeable fruits before slated the seeds in the extracted for germination for the same period of days.

RESULTS

Viability test: The *Prosopis africana* had the highest percentage seed germination being 100% , while *Tamarindus indica ,Parkia biglobosa* and *Albizia lebbeck* showed up to 80-90% state of viability (Figure1).

The effect of *Bryophyllum* extract on seed germination of *Tamarindus indica* showed 60 % , 80 % and 100 % germination at 5min,10min and 15min respectively. *Albizia* showed 80 % , 100 % and 100 % at 5min , 10min and 15min respectively . The control for the two species that is *Tamarindus* and *Albizia* showed 10 % respectively . The*Parkia* seeds showed 90 % , 100 % and 100 % germination at 5min , 10min and 15 min respectively while the seeds of Prosopis showed 60%,80%and 90% respectively at the same set of treatment regime. However, the control for the Parkia and the prosopis seeds ranges from 10-20% within a period of 12 days. (Table 1 and 2) .

The seeds of *Tamarindus*, *Albizia*, *Parkia* and *Prosopis* treated with coconut milk extract at 5mins duration gave 100 %, 80 %,60 % and 100 % germination respectively. It was observed that those seeds of the same species treated at 10mins duration had up to 80 %, 100 %, 100 % and 80 % respectively. Those seeds of *Tamarindus*, *Albizia*, *Parkia* and *Prosopis* showed 100 %, 80 %100 % and 60 % respectively. However, the control for all the treatments ranges from 10-20 %.

DISCUSSION

The seeds were observed to show low rate of germination rate based on the fact that the seed coats were somehow hard therefore impeding the influx of water.(Ajiboye,2009).The influx of water would promote the rapid imbibition of water that may serve as bases for the mobilization of food reserves.The degree of dormancy in seeds has been associated with many

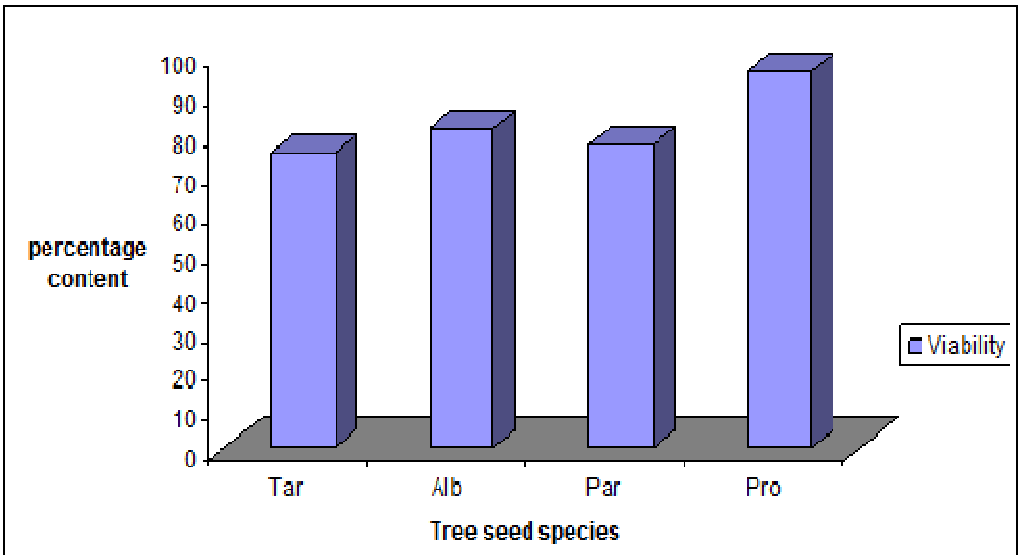

Figure 1. Percentage viability of the seeds

Table 1. Effect of *Bryophyllum pinnatum* extract on the germination of the tree seed species Treatment regimes

Species	5min (%)	10min (%)	15min (%)	Control (%)
Tamarindus	60^{a}	80^{b}	100^{a}	10^{d}
Albizia	80^{b}	100^{a}	100^{a}	10^{e}
Parkia	60^{c}	100^{a}	100^{a}	20^{d}
Prosopis	60^{c}	80^{c}	90^{b}	10^{d}
LSD	1.22	1.24	1.62	1.00
SEM	0.82	0.61	0.30	0.63

Table 2. showed the effect of coconut milk extract on the germination of the tree seed species Treatment regimes

Species	5min (%)	10min (%)	15min (%)	Control (%)
Tamarindus	100^{b}	80^{c}	100^{a}	10^{d}
Albizia	80^{c}	100^{b}	80^{b}	10^{e}
Parkia	60^{c}	100^{b}	100b	20^{d}
Prosopis	100^{a}	80^{a}	60^{c}	10^{e}
LSD	1.24	1.44	1.52	1.11
SEM	0.72	0.65	0.60	0.53

reasons including hard seed coats which serves as a barrier for permeability of water and gases into the embryo of the seeds.(Agboola,1995).

Seed the part of a plant that can grow into new plant, it is a reproductive structure which disperses, and can survive for some time. A seed include three parts namely : an embryo ,supply of nutrient for the embryo and the seed coat.

There are many types of seeds , some plants make a lot of seeds while some make only a few. Seeds are often hard and very small, but some are larger. The coconut fruit contains more than a seed. A seed needs all conditions necessary for germination such as warmth, water, air, enzymes for it to germinate but not sunlight, and when it needs water then it is no longer a seed but has become a seedling.

Having observed the germination trends of these seeds under the influence of the germination promoters, it could then be deduced that the coconut milk extract and the *Bryophyllum pinnatum* extracts are favorably disposed to mobilizing the food reserves embedded in the seed coats which lead to the imbibitions of water within the seed coats and therefore leading to the emergence of radical which would later give rise to plumule for it to trap sunlight for its photosynthetic capabilities.

The seeds that are treated as control may had resisted germination on the ground that they were not treated with the germination inducers, or probably the embryo of some of the seeds were immature(Ajiboye,2010) .

This research work focused on the use of some botanicals to improve the germination effect of some savanna tree seeds, most especially those with high economic value in the lives of the people living in the savanna regions of the country. This work would also assist in raising seedlings of dormant seeds for a forestation purposes in order to combat some of the challenges facing global warming.

CONCLUSION

This research will go a long way to assist in raising seedlings from dormant seeds using botanicals, rather than the use of chemicals that may damage the embryo of the seeds. This research will in turn promote raising of seedlins for a forestation of valuable seeds in most of the savanna

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