

Effects of Pretreatment Protocols on Seed Germination of *Irvingia gabonensis* (Aubry-lecomte exo'Rorke) Bail

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ABSTRACT---- Seeds from freshly picked fruit of *Irvingia gabonensis* var *gabonensis* with an average moisture content of 50.5% fail to germinate within 60 days after sowing (DAS). Seeds slowly dried at 25°C for 12 – 24 hours to a moisture content of 35.1 – 25.1% and rehydrated to an estimated moisture content of 40.5 – 31.3% gave 100% germination. There was a positive correlation and significant ($P > 0.01$) relationship between the moisture content and germinability when seeds were freshly picked and dried at both 25°C and 35°C. This study shows that freshly picked fruit of *Irvingia gabonensis* slowly dried at 25°C for 12 – 24 hours and rehydrated can enhance germination.

Keywords--- pretreatment, seed germination, *Irvingia gabonensis*

1. INTRODUCTION

In Nigeria, several forest fruit tree species serve as sources of food, wood, fibre and medicine to indigenous people. The forest fruit tree species also have added value of conservation for scenic purposes, stabilization of climate, maintenance of water supply and preservation of erosion. It is unfortunate that man misused these forest fruit resources due to over exploitation and lack of purposeful management, with a resultant negative effect on the environment [1]. In order to prevent the extinction and derive maximum benefits from these forest fruit trees, it is necessary to preserve their germplasm, as well as promote their conservation in the environment. However, most of these forest fruit trees are uncultivated and exhibit varying levels and different kinds of seed dormancy. Therefore, overcoming the problem of seed dormancy in these forest fruit species becomes imperative, as seed germination is crucial to the survival of the next generation, and by extension, the environmental conservation of forest species.

Irvingia gabonensis (Bush Mango) belongs to the family Irvingiaceae. The tree may be readily recognized by its dense dark green ever green foliage and characteristics stipules which are similar to those of *klainedoxa* but smaller [2]. The bark is greenish, smooth or very slightly scaly, yellowish-brown to light yellow. The leaves are 5 – 15cm long by 2.5cm broad, leathery and dark green, the stalk is stout, about 60mm long. The ripe fruit is yellowish, broadly ellipsoid somewhat flattened and is about 5 – 6cm long. It has a smooth skin a fibrous exocarp and hard endocarp. The economic importance is reflected in the economy. The seeds are dried, pulverized or pounded and added to soups as a thickener. The oil is refined for consumption while the unrefined oil is used for soap-making [3]. This work is therefore aimed at determining a highly effective pretreatment protocol on the germinability of fresh seed of *Irvingia gabonensis* to enhance germination value and germination capacity to aid seed propagation for seedling production in nurseries.

2. MATERIALS AND METHODS

Seed collection

One hundred mature fruits of *Irvingia gabonensis* var *gabonensis* were collected from local cultivar at Uyo L. G. Area of Akwa Ibom State. Seeds extracted from the freshly harvested fruits were used for moisture content determination, seed pretreatment and germination studies.

Seed Pretreatments

Ten (10) seeds were sown immediately after extraction from freshly harvested fruits to a depth of about 5cm in rubber containers filled with moist sawdust for retention of moisture [4]. Batches of 12 – 15 seeds extracted from freshly picked fruits were dried under ambient condition (26°C – 28°C) on the laboratory bench (slow drying) for 6, 12, 18, 24 hours. Other batches of seeds were dried for similar intervals but at 35° C in an incubator (rapid drying) and sun dried at the

temperature of 28°C – 48°C. Moisture content of dehydrated seeds was determined and ten seeds from each batch were sown directly. Another batch were rehydrated (steeping in water for 24 hours) before sowing [5]

Germination Studies

Germination studies were carried out in the botanical garden of the Akwa Ibom State College of Education, Afaha Nsit using rubber containers containing freshly collected moist sawdust. The medium was drenched several times with water 24 hours before seeds were sown in order to minimize substrate contamination of the germinating seeds. The rubber containers were arranged in randomized complete block design with five replicates. Emergence of radicle through the seed coat by more than 2mm was used as index for germination of whole seeds. The number of germinated seeds were recorded daily. The seeds were watered daily during the germination period. All data were subjected to an analysis of variance and the standard error of means were compared. Linear correlation and regression analysis were also carried out in order to ascertain the level of relationship between germinability and the moisture content level.

3. RESULTS AND DISCUSSION

Seeds from freshly picked fruits of *Irvingia gabonensis var garbonensis* with an average moisture content of 50.5% failed to germinate within 60 days after sowing (DAS). Seeds slowly dried at 25°C for 12- 24 hours without rehydration had 40% maximum percentage germination while seeds slowly dried at 25°C for 24 hours and rehydrated had 100% germination (Figure 1). Seeds rapidly dried at 35°C for 24 hours without rehydration had maximum percentage germination of 60% while seeds rapidly dried at 35°C within the same hours but rehydrated had 80% maximum germination (Figure 2). There was a positive correlation and significant ($P > 0.01$) relationship between the moisture content and germinability when seeds were freshly picked and dried at both 25°C and 35°C.

Freshly collected seeds of *Irvingia gabonensis var gabonensis* failed to germinate at 60 DAS. Some seeds which shed at high moisture content i.e at moisture content above 30% have the tendency to germinate immediately precucious and post shedding germination in such seeds can be checked by the interaction of several factors including high content of endogenous inhibitors (abscissic acid), hard seed coat and embryo development [4][6][7]. The low mean percentage germination recorded in *Irvingia gabonensis var gabonensis* when seeds were not rehydrated could be due to the recalcitrant nature of the seed which unlike orthodox seeds do not conform with the rule of increasing longevity with fall in temperature and moisture contents [4]. The enhancing effects of rehydration after drying on germination may be due to the stimulating effect of rehydration on germination, which may be related to enzyme activities. Drying and rehydration may also cause cracking or soften of the hard coat. This probably explains why local farmers leave the fruits for several weeks under cool shade to decompose and dry out before sowing [8]. However, rehydration after drying may enhance leaching of inhibitors [4].

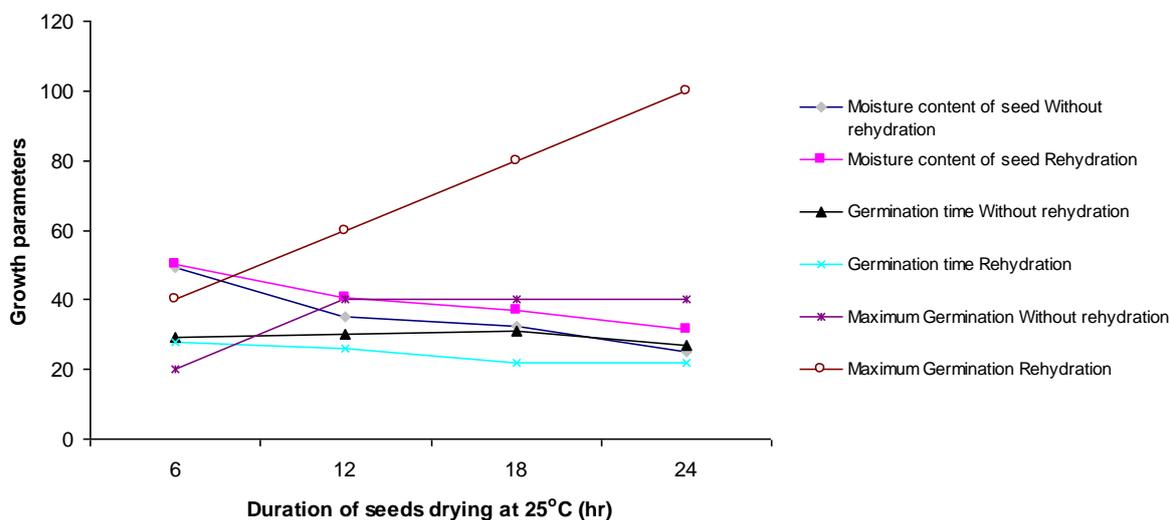


Figure1: Effect of slow drying, with and without dehydration of seeds obtained from freshfruits of *Irvingia gabonensis*

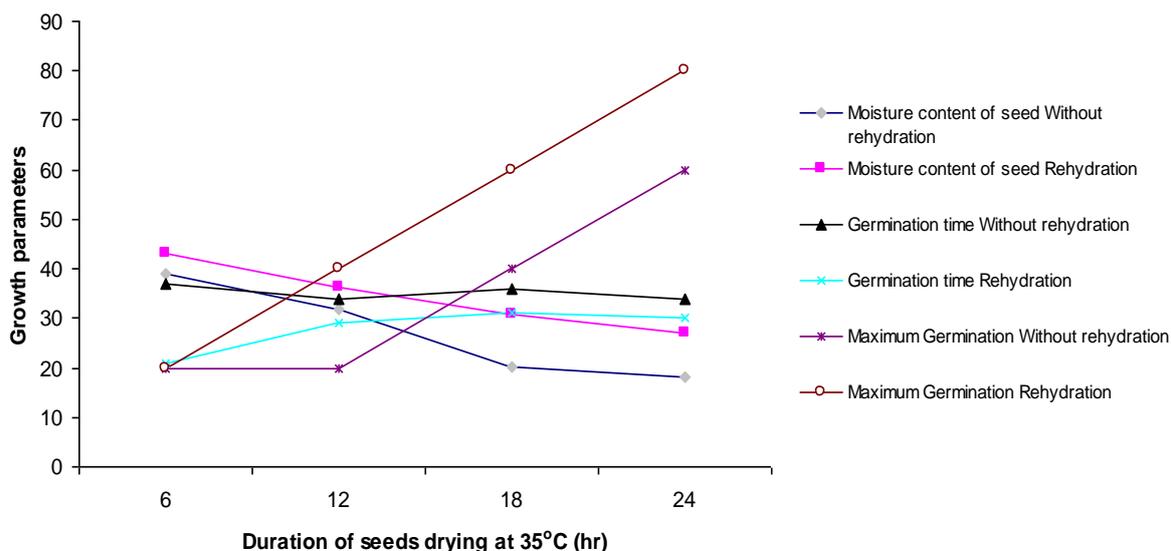


Figure2: Effect of rapid drying, with and without dehydration of seeds obtained From fresh fruits of *Irvingia gabonensis*

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