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INFLUENCE OF DIFFERENT PRE- SOWING TREATMENTS ON *Piliostigmathonningii*

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Abstract: Seed dormancy is a state in which seeds are prevented from germination under environmental conditions normally favorable for growth, this study assessed emergence percentage and emergence rates of *Piliostigma thonningii* using different pre-sowing treatments at 1,2 and 3minutes. Seeds were sown in white plastic buckets filled with loose and well drained river sand at 2X 2 centimeters spacing and at sowing depth of 3 centimeters. Bucket diameter was 22 centimeters and bucket depth from base to the bream was 24 centimeters, 4 replications of 100 randomly picked seeds at 25seeds per bucket were used for each treatment and the buckets were laid in a complete randomized design. Viable seeds determined by floatation method were subjected to pre-sowing treatments using control, 98% concentrated sulphuric acid, hot water (wet heat) and physical abrasion. Result shows that physical scarification, 44- 62% and with lowest mean emergence time of 12 to 16 days were most efficient, acid treatment 15-27% and with mean emergence time of 18 to 28 days. Control was 10% emergence and mean emergence time of 27days and lastly wet heat (hot water) 3-5% and with mean emergence rate of 25 to 50 days. Thus, physical scarification with highest 44 to 62% emergence and lowest mean emergence time of 12 to 16 days is highly recommended for the propagation of *Piliostigma thonningii.*

Keywords: *Piliostigma thonningii*pre-sowing treatments, emergence percentage, emergence rate.

INTRODUCTION

Piliostigmathonningii (C. Schumach) Milne Redhead, formerly named *Bauhinia thonningii.* C. Schumach is a savanna woodland tree belonging to the natural Angiospermae Order Fabales, Family Fabaceae synonym Leguminosae and sub-family Caesalpinoideae. *Piliostigma* consist of three (3) species distributed in tropical Africa, Queensland, Australia and the drier monsoon regions of Indo- Malayasia in Asian continent) (Willis and Airyshaw, 1973).

Etymologically, the generic name *Piliostigma* refers to its cap shaped or cap like stigma, the specific epithet *thonningii* commenmorates Peter Thonning, the Danish plant collector who collected the type specimen in that portion of Danish guinea now presently in Ghana, West Africa.

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The common English name of *Piliostigma thonningii* is camel's foot because of its camel foot shaped leaves, it was also known as wild Bauhinia because it was originally named *Bauhiniathonningii.* C. Schumach but it was later re- named *Piliostigmathonnningii* and dissociatedfrom *Bauhinia* Genusbecause of its usually unisexual flowers and usually indehiscent pods distinct from the bisexual (hermaphrodite) flowers and dehiscent pods of *Bauhinia* Genus.

The plant is also called Monkey bread because some cultures such as the Bena and Hamer pastoralists in Aldubar, Ethiopiaeats the flesh of its matured pods when dried like biscuits when the seeds within the pod fruits are removed.

Piliostigmathonningi is usually common in open wood lands and wooded grasslands of sub-humid Africa at medium to low altitudes, the plant is found throughout tropical west in association with *Annonasenegalensis,*

Combretum spp* and *Grewiamollis

The tree is 4-15m in height with a short but often crooked or twisted bole (main stem), the bark of the matured tree is dark brownish grey with a rough surface. Leaves are simple, leathery and strongly reticulate (net veined), usually 3-6cm long and 4-7cm broad, the tree becomes nearly leafless (deciduous) during the dry season

Piliostigma thonningii flowers are whitish pink in color, the tree is a unisexual and dioecious tree with male and female flowers on separate trees and rarely if monoecious, the male flowers appear first, preceding the female flowers, so that self pollination is never possible. The tree's pod-fruits are ferruginous oriron coloured.

Economically important as source of tannins and dyes, the stem bark produces a red brown dye, while the roasted seeds and roots also produce dye.

The tree plant is also a source of fuel wood and the pods are nutritious and are highly relished by cattle and wild animals, the plant is preferred browse species of the African elephant- *Loxodonta africana.*

Piliostigma thonningii is used medicinally in many African countries to treat wounds, gastric and heart pains, toothache and gingivitis, chronic ulcer, diarrhea and skin infections.

The present study was undertaken using control, 98% concentrated sulphuric acid, wet heat (hot water) and physical abrasionpre- treatments focused at terminating seed coat dormancy to effect increased emergence percentage and emergence rates of *Piliostigma thonningii.*

A seed is a fertilized, ripe or matured ovary containing one or more ovules as in Spermatophyte – the Gymnosperm and Angiosperm plants. A typical seed consist of three (3)

basic parts (i) an embryo (ii) a supply of nutrients to the embryo and (iii) a protective seed coat consisting of an inner tegmen and an outer testa. The seed has the ability to regenerate into a new higher green Spermatophyte plant. Karuiki and PowelI (1988) defined seed germination as the process by which the dormant embryo grows out of the seed coats and establishes itself as a seedling.

One pertinent question in the field of seed germination biology and dormancy studies is what controls the timing of seed germination. Many factors such as levels of carbon dioxide, improper aeration, diseased growth medium and production of allelo- chemicals have all been suggested as preventing germination (Holm, 1979). However, in many leguminous seeds, hard seed coat prevents imbibitions of water and exchange of gases, this preventing initiation of the germination process (Maguire, 1975)

A healthy seed that does not germinate after providing it with the necessary conditions for germination is said to be in a dormant state (Lawal, 2004), dormancy is the condition of seed when it fails to germinate because of internal conditions, even though external conditions of light, temperature, sufficient oxygen, disease free soil and moisture are favorable (Osonubi and Chukwuka, 1999), Baskin and Baskin (2004) states that dormancy is established when seeds are unable to germinate in a specific period of time under a combination of environmental factors that are normally favorable for germination.

Any pre-treatment which reduces or destroys seed impermeability by weakening or softening the seed coat is known as scarification. Scarification treatment is used to soften the seed in order to make the seed coat permeable to water and gases without destroying the embryo (Seedbrock, 2006)

Methods used to artificially break down or overcome seed coat dormancy includes scarification with emery cloth, sand paper, concentrated sulphuric acid and other acids such as hydrochloric acid, nitric acid, addition of organic solvents such as acetone, alcohol and carbon disulphide, wet heat (hot water), cutting filing, nicking or treatment of seeds with objects such as pins, razor blades. Knife or even cutlass, plant (phyto) hormones, oven or dry heat treatments which is analogous to heating by vegetation fires (Martiner, 1975).

MATERIALS AND METHODS

Source of Seeds

Seeds of *Piliostigma thonningi* used for the experiment were sourced from Isua Akoko (latitude 7.4536^0N, longitude1223^0E, and 372 metres altitude). Abuja expressway, in Ondo State, Nigeria.

Study Site and Management

The study was conducted at the Screen house of Plant Science and Biotechnology Department, Adekunle Ajasin University, Akungba Akoko for a period of 60days. Seeds were sown in perforated white plastic buckets filled with loose and well drained river sand, the buckets were laid out in complete randomized design. Four (4) replication of 100 randomly picked seeds 25 seeds per bucket were used for each treatment. Seed spacing was 2x2 centimeters and at sowing depth of 3 centimeters.

Seed Viability Test

Floating method after Pandey and Sinha, 2010 was used to test for seed viability. The process involved dipping the seeds in a beaker filled with water, seeds that sank to the bottom of the beaker were regarded as viable and were used for the experiment.

Dormancy Studies

Seeds for the experiment were subjected to 98% concentrated sulphuric acid, wet heat (hot water), physical abrasion and control treatment at 100seeds for four (4) replications at 25seeds per bucket and then sown.

Acid Treatment

Concentrated sulphuric acid (98%) were poured on the seeds and stirred for 1, 2 and 3minutes. The acid was decanted and seeds were rinsed several times in distilled water and then sown.

Wet heat (hot water) treatment

Boiled water at 100° Celsius were poured on the seeds and stirred for varying time durations of 1, 2 and 3mintues and then sown.

Physical Scarification Treatment

Seeds were manually or physically abraded with rough sound paper on all sides for varying time durations of 40 seconds, 80seconds and 120seconds and then sown.

Control Treatment

100 untreated 100 untreated seeds were sown as control.

Emergence counts.

Seeds were recorded as how many days that it took for individual seed to emerge, the experimental duration was 60 days.

Emergence percentage

Emergence percentage were recorded as the total number of seeds that grew out or emerged out of a sample size of 100 seeds per treatment

$$\text{Emergence percentage} == \frac{\text{total number of seeds that emerged}}{\text{Total number of seeds shown}} \times 100$$

Results

DURATION/ TYPE OF TEST	SULPHURIC ACID	WET HEAT	PHYSICAL ABRASION
ONE MINUTE	0.42 ± 2.123	0.57 ± 2.504	1.91 ± 2.989
TWO MINUTES	1.91 ± 4.590	0.37 ± 2.135	1.77 ± 2.514
THREE MINUTES	1.76 ± 3.279	0.45 ± 2.572	3.41 ± 3.901
Control	0.43 ± 1.409		

Graphical Representations

Bar graphs were plotted for both emergence percentage and emergence rates of *Piliostigma thonningii.*

Results

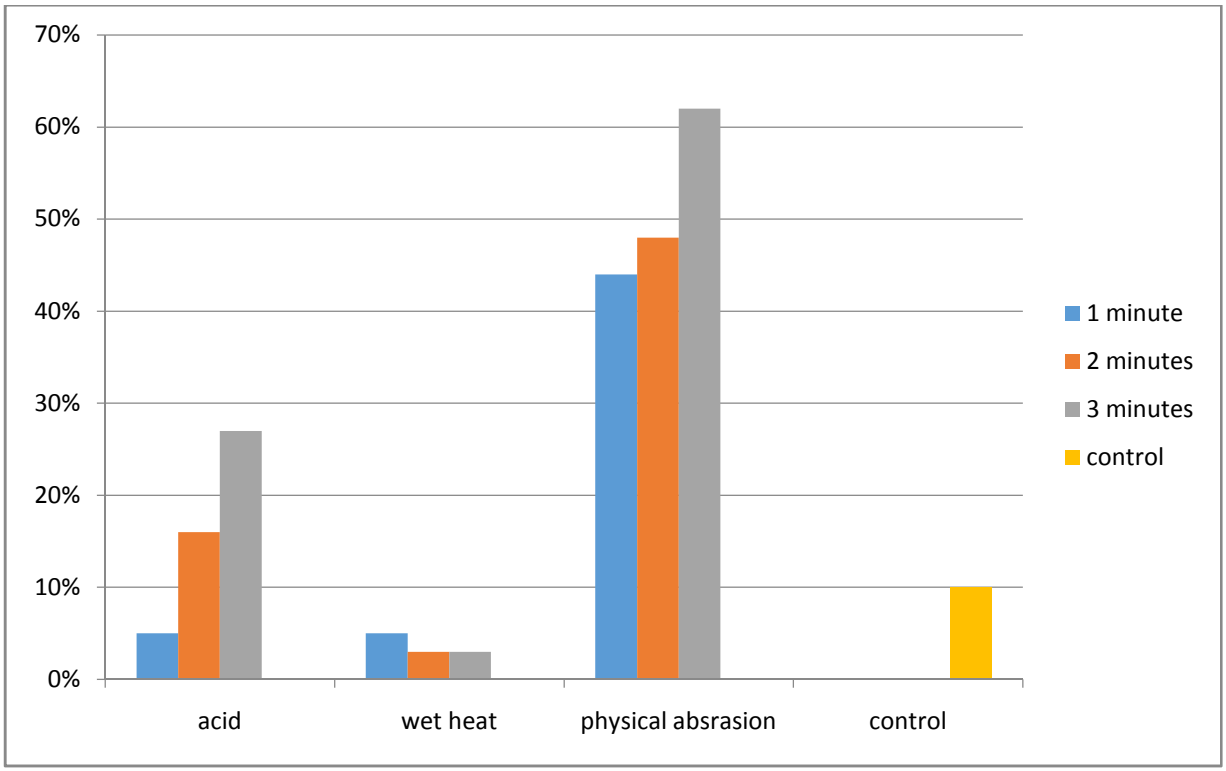

Figure 1: Effects of 1,2 and 3minutes pre-sowing treatments on percentage seedling emergence of *Piliostigma thonningii*

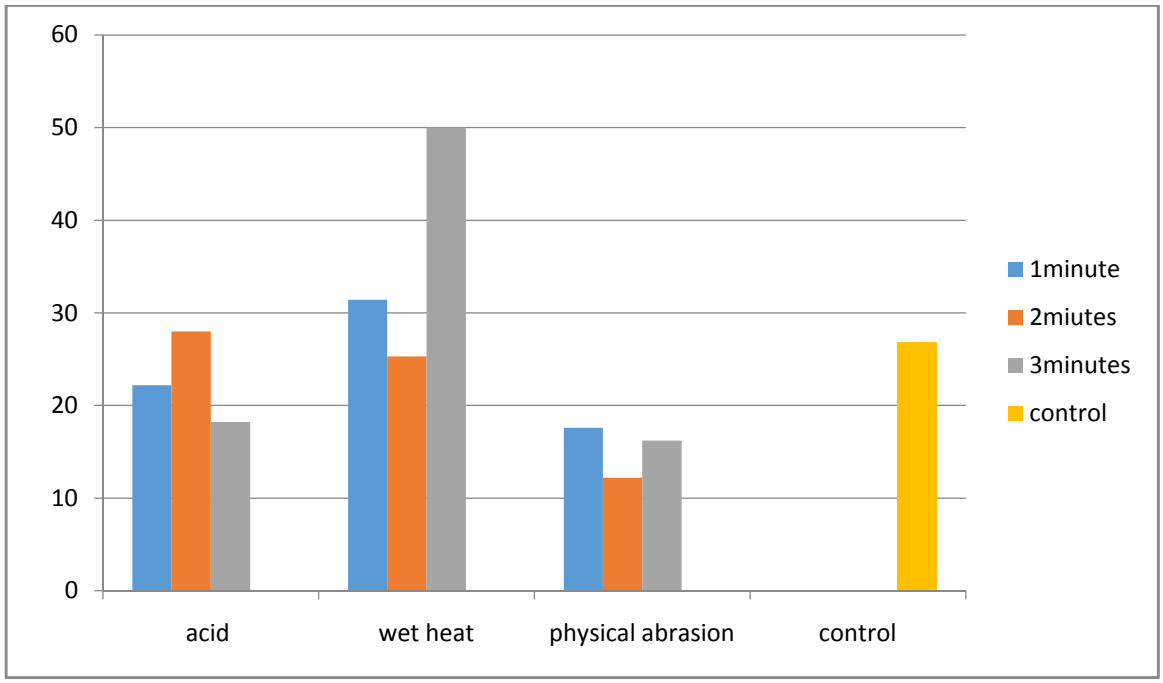

Figure 2: Influence of 1,2 and 3 seconds pre-sowing treatmentson emergence rate of *Piliostigma thonningii*

DISCUSSION

Results from this experiment show that impervious seed coat may be the cause of dormancy in *Piliostigma thonningii*. Breaking or over coming seed coat dormancy in legumes using concentrated sulphuric acid, wet heat (hot water), oven or dry heat, plant (phyto)- hormones, physical abrasion and other treatments has been demonstrated by Ajiboye and Agboola 2010, Ajiboye et. al, 2011, Missanjo et. al; 2014

Copeland (1976), Egley (1989) reported that hard seed coat create barriers to water uptake and entry of gases and that the presence of continuous layers of tightly packed cells in the seed coat constitute barrier to gases and water imbibition.

Control (10%), wet heat (3 to 5%) and acid treatments (5 to 27%) gave relatively low emergence percentage result compared to physical abrasion with higher results (44 to 62%) and fastest mean emergence time of 12 to 16days.

Physical scarification results may explain how abrasion of the seed coat caused by ploughing, harrowing and charring of seed coats by field implements.

(Awodoyin et. al; 2000).Thus, 3minutes physical abrasion (62%) treatments which the most efficient is recommended for overcoming dormancy of *Piliostigma thonningii.*

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