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EFFECTS OF PERIODS OF PRIMING METHODS AND ORGANIC FERTILIZERS ON THE GERMINATION AND EARLY SEEDLING GROWTH OF THREE INDIGENOUS AGROFORESTRY TREE SPECIES

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ABSTRACT

The paucity of information on appropriate periods of seed priming methods and adequate soil fertility leads to poor seed germination and seedling growth of indigenous agroforestry tree species. In this light, investigations were conducted into effects of periods of priming methods and organic fertilizers on the germination and early seedling growth of *Vitexdoniana*,*Canarium schweinfurthii* and *Tamarindus indica*. Five experiments were conducted. The experimental design adopted for effects of periods (0, 6, 12, 18 and 24 hrs) of organo-priming and hydro-priming on the germination of *V. doniana* seeds and effects of periods (0, 6, 12, 18 and 24 hrs) of organo-priming and hormo-priming on the germination of *C.schweinfurthii*was a Completely Randomised Design with five replicates. Effect of organic manure (20g of each cow dung, goat droppings, rabbit droppings, poultry droppings and pig droppings) and control on the growth of *T. indica* adopted a Completely Randomized Design with five (5) replicates. The plant growth parameters evaluated. Data collected were subjected to one way Analysis of Variance (ANOVA).Highest germination percentage values were recorded in *V. doniana* seeds organo-primed for 18hours (63.33%), hydro-primed for 24 hours (40%) and *C. schweinfurthii* seeds organo-primed for 6 and 12 hours (40%) and hormo-primed for 12hours (28.57%).Highest height (23.14cm), widest girth(0.30cm) and widest leaflet area(9.82cm^2) were recorded from *T. indica* seedlings planted in the soil enhanced with poultry droppings at 8weeks after transplanting(WAT) relative to control. Organo-priming of *V. doniana* seeds for 18hours and planting of *T. indica* seedlings in the soil amended with poultry droppings enhance their germination and seedling growth.

Keywords: Soaked, Primed, Dormancy, Organo-priming, Hydro-priming, Hormo-priming

Introduction

The developing nations including Nigeria are endowed with many indigenous fruits that are of great importance to the rural communities (Okunlola and Akinyele, 2017). According to Okafor (2010), the contributions of wild fruits, nuts, seeds, vegetables and other classes of edible forest products and their potential in overcoming or ameliorating prevailing food problems are enormous. According to Pye-Smith (2010), there are around 3000 species of wild fruits in Africa representing enormous important and largely untapped natural resources.

To abate total loss or extinction of some of the important forest tree species, they should be cultivated more intensively through improved propagation either by seed or stem cuttings (Dolor, 2013) and enhancement of seedling growth through fertilizer. Seeds are still important starting materials for propagation of many vital tree species

(Mng'omba *et al.,* 2007) and they are the easiest and cheapest, and the most common means for propagating many agro-forestry and timber tree species (Akinnifesi *et al*., 2007). Seed represents the planting material that best conserves the gene pool in species or varieties, from one planting generation to another (N'Danikou *et al.,* 2015). Many fruit trees with a hard seed coat exhibit seed dormancy, posing problems for their regeneration(N'Danikou *et al.,* 2014).

Seed dormancy remains a bottleneck to the propagation of many forest species of economic importance, since about 70% of all major taxonomic groups of seed plants have dormant seeds (Baskin and Baskin, 2003). Germination is critical to regeneration and dormancy limits the seed germination and seedling availability for afforestation, domestication (Adelani 2015a) reforestation and (Aduraola *et al.,* 2005) as well as biodiversity conservation of indigenous agroforestry trees species. *Vitex doniana*, *Canarium schweinfurthii* and *Tamarindus indica* are examples of indigenous agroforestry and fruit tree species of immense potentials.*Vitexdoniana* is called Black plum; Dinya; Uchakoro and Oori-nla in English, Hausa, Igbo and Yoruba respectively (Orwa *et al.,* 2009). It belongs to the family Labiatae. The *V. doniana* is an important indigenous fruit or leafy vegetable in Africa (Burkill, 2000; Maundu *et al.,* 2009) for food, medicine and other purposes (Dadjo *et al.,* 2012). Hounkpèvi *et al.* (2018) stated that its leaves are used as fodder for livestock and the young leaves as leafy vegetables in sauces preparation.

Canarium schweinfurthii is indigenous to tropical Africa in rain forest, gallery forest and
transitional forest of Senegal to west Cameroon, Ethiopia, Tanzania, Angola (Orwa *et al.,* 2009). It is also found in Nigeria, Mali, Cameroon, Senegal, Ghana, Guinea-Bissau, Liberia and Sierra Leone (Okpala, 2016) and native to Sudan, Togo, Uganda and Zambia (Orwa *et al.,* 2009; Maduelosi and Angaye, 2015). It belongs to the Burseraceae family (Orwa *et al.,* 2009). It is called African elemi or bush candle tree in English. In Nigeria, it is also known by quite a number of local names which include; Berom (Pwat), Hausa (Atile or Atilis), Igbo (Ube agba) and Yoruba (Origbo, Elemi or Agbabubu) (Dawang *et al.,* 2016).Its fruits are cooked, and in Nigeria, sometimes prepared into a vegetable butter and eaten as a substitute for shea-butter (Orwa *et al.,* 2009; Ayoade *et al.,* 2017). The *C. schweinfurthii* tree makes a good fuel wood, igniting readily and burning with a lot of heat. Locally, the wood is used for mortars, planks, canoes, boats and furniture (Orwa *et al.,* 2009; Okpala, 2016).

Adeola and Aworh (2010) stated that *Tamarindus indica* grows wild in Africa in locales as diverse as Sudan, Cameroon, Nigeria, Zambia and Tanzania. Lewis *et al.*(2005) stated that *T. indica* is a member of the family Fabaceae, sub-family Caesalpinioideae which is the third-largest family of flowering plants with a total of 727 genera and 19, 327 species. The tree is commonly known as "tsamiya" in Hausa, "Icheku Oyibo" in Igbo, Ajagbon" in Yoruba, and "Tamarind" in English languages respectively. Samina *et al.* (2008) reported that its young seedlings, leaves and flowers of mature trees are eaten as a vegetable and in curries, salads and soup. Its sour pods are cooked as seasoning with rice, fish and meats. Its fruit pulp is used for the preparations of beverages in different regions (Samina *et al.,* 2008).

These ample benefits of these indigenous agroforestry trees species can be enjoyed after

successful germination that emanated from overcoming dormancy of their seeds. Uniform germination is one of the important agronomic requirements for successful domestication of wild harvested economic plants(N'Danikou *et al.*, 2015).To ensure uniform germination and environmental safety, natural methods of breaking dormancy is a viable option.To overcome challenges of danger, high cost, unavailability and adoptability problems of other methods of pre-sowing, planters need to embrace natural sources of nutrients from the leaves of trees to break dormancy of seeds of agro-forestry tree species. Most of the methods of pre-sowing treatment such as physical, chemical and mechanical scarification only degrade the seed coat for germination; without, always, rapidly and uniformly influencing the physiology of the seeds and seedlings as well as not overcoming physiological dormancy of seeds(Aliero, 2004;Dewir*et al.*, 2011; Gehlot and Kasera, 2012;Abubakar and Muhammad, 2013;Habib*et al.*, 2015).

To avoid wastage of time, money and energy, planters need to use appropriate periods of organo-priming and hydro-priming to overcome the dormancy of seeds and appropriate fertilizer application improves seedling growth of agro-forestry tree species. In light of this, these experiments were conducted to assess the effects of periods of priming methods on the germination and organic fertilizerson seedling growth of three indigenous tree species. Relieving seeds of physiological, physical and mechanical dormancy encourage mass production of seedlings for agro-forestry systems.Appropriate fertilizer application improves the growth of indigenous tree species to meet their population demand for immense benefits.

Materials and Methods

Experimental Site

The researches were conducted in the screen house of the Federal College of Forestry Mechanization, Afaka, Kaduna. The college is located in the Northern Guinea Savannah ecological zones of Nigeria. It is situated in Chikun Local Government Area of Kaduna state, Nigeria. It lies between Latitude 10^{o} 35' and 10^{o} 34' and Longitude 7^{o} 21' and 7^{o} 20' (Adelani, 2015b). The mean annual rainfall is approximately 1000 mm. The vegetation is open woodland with tall broad leave trees (Otegbeye*et al.*, 2001).

Fruit Collection and Seed Extraction

The fruits of *V. doniana* were sourced from the mother tree in Buruku Forest Reserve, Kaduna State of Nigeria. The fruits of *C. schweinfurthii* were sourced from the mother tree in Pankshin, Plateau State of Nigeria. The seeds were extracted from the fruits and air dried for thirty minutes. Three hundred seeds were extracted from their fruits. The viability of the randomly selected *V. doniana and C. schweinfurthii* seeds samples were assessed using the cutting method (Schmidt, 2000).The river sand used for the experiment was collected from the floor of the college dam and made to pass through 2 mm sieve and then sterilized in the laboratory oven at 160^{o}C for 24 hours. The polythene pots used was 20 x 10 x 10 cm^3 in dimension and filled with the sterilized river sand and arranged in the screen house.

Experimental design

The experimental design adopted for investigation on the effects of periods of organo-priming and hydro-priming on the germination of *V. doniana* seeds was a Completely Randomized Design with five replicates. *S*eeds were soaked for periods (0, 6, 12, 18 and 24 hrs) in the solution of the leaves of nitrogen fixing trees, *Jacaranda*

mimosifolia and water. Organo-priming experiment involved soaking of seeds in 0.5%concentration of solution of the leaves of nitrogen fixing trees, *J. mimosifolia;* while that of hydro-priming employed soaking of seeds in water for different periods. The choice of *J. mimosifolia* was based on its excellent performance among selected nitrogen fixing species investigated on *Citrus tangelo* (Adelani *et al.,* 2020). Twelve seeds represented a replicate. Three hundred (300) seeds were soaked in 0.5 % concentration of solution of the leaves of nitrogen fixing trees, *J. mimosifolia* and water for different periods (0, 6, 12, 18 and 24 hrs). Stirring or bubbling was done to ensure uniform treatment and aeration. After each treatment, the seeds were removed, washed, air dried for 30 minutes and treated with fungicide (Vinclozolin).

Treated seeds were planted in 4 cm depth of the sterilized sand and 200 ml of water per pot was applied regularly at two days interval for twelve weeks.Seeds that were not soaked in the 0.5 % concentration of solution of leaves of nitrogen fixing tree, *J.mimosifolia* served as control.

The experimental design adopted for investigation on the effect of periods of organo-priming on the germination of *C. schweinfurthii* seeds was a Completely Randomized Design with five replicates. The organo-priming of *C. schweinfurthii* experiment followed the same pattern as that of organo-priming of *V. doniana* above.

The experimental design adopted for the investigation on the effect of periods of hormo-priming on the germination of *C. schweinfurthii* seeds was a Completely Randomized Design with five replicates. *S*eeds were soaked for periods (0, 6, 12, 18 and 24 hrs) in the solution of the *Citrus sinensis* juice respectively. The choice of *Citrus sinensis* was based on the adoption of the method of Ubalua *et al.* (2015) who successfully established that ripped orange juice could substitute the use of conventional growth hormones cytokinins (BAP) and auxins (NAA) in *in-vitro* regeneration and rapid multiplication of cocoyam shoot explants. Twelve seeds represented a replicate. Three hundred (300) seeds were soaked in 100% concentration of *Citrus sinensis* juice for different periods (0, 6, 12, 18 and 24 hrs). The experiment on hormo-priming followed the similar procedure as organo-priming of *V.doniana* but *C. schweinfurthii* seeds were soaked in the 100% solution of *Citrus sinensis* in this experiment. Seeds that were not soaked in the 100% of *Citrus sinensis* juice served as control.

A seed was considered to have germinated when the radicle was able to break open the seed coat and at the sight of plumule emergence. For these experiments, germination percentage and mean germination time were calculated using the following formula (1 and 2) suggested by Schelin *et al*. (2003)

Germination percentage (%)

Germination percentage was computed using the formula:

$$\text{Germination Percentage} = \frac{Totalseedgerminated}{Totalseedsown} \times 100 \quad (1)$$

Germination count was recorded every two (2) days interval until no more germination was observed and this lasted for 12 weeks.

Mean germination time is a measure of the rate and time spread of germination (Soltani *et al.,* 2015). It is denoted as MGT. The unit of mean germination time can be hours, days or other time unit (Ranal and Santana, 2006).

$$\text{MGT} = \frac{\sum(f_x)}{\sum X} \quad \text{Schelin } et\ al. \text{ (2003)} \quad (2)$$

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Where: x is the number of newly germinated seeds on each day; f is the numbers of days after seeds were set to germinate; X is the Total number of seeds that germinated at the end of the experiment.

The experimental design adopted for experiment on the effect of organic manure on the growth of *T. indica* was a Completely Randomized Design with five (5) replicates during dry season. The treatments consisted of 20g of each organic fertilizer (cow dung, goat droppings, rabbit droppings, poultry droppings and pig droppings) and control. Sand was also soaked in 98% concentration of hydrochloric acid for 24hours; washed with distilled water and air dried for 24 hours. One seedling was transplanted into a pot contained the mixture of sand and each manure. Seedlings planted in sand without the mixture of manure served as control. A seedling was planted in 5cm depth of potting mixture in a pot and 120ml of water daily per seedling was applied regularly. Schmidt (2000) recommendation of subjecting the seedlings to thorough and regular watering at initial stage of establishment was adopted in this experiment

Seedling's height and girth were assessed using meter rule and vernier caliper respectively. Number of leaves was counted manually while the leaf area was obtained by linear measurement of leaf length and leaf width as described by Clifton-Brown and Lewandowski (2000).

$$LA = 0.74xLxW \quad [1]$$

Where, LA = leaf Area = Product of linear dimension of the length and width at the broadest part of the leaf. The mean of all growth parameters across the week was used for tabulation.

Data analysis

Data were collected for seed germination and seedling growth and subjected to analysis of variance (ANOVA) using SAS (2003) software. Mean separations at 5 % significant level of probability were carried out with use of Least Significant Difference (LSD).

Results

Effects of periods of organo-priming and hydro-priming on the germination of *V. doniana* seeds

Highest germination percentage value of 63.33% was recorded in seeds organo-primed for 18hours. The least mean germination time of 13.33 days was recorded in seedsorgano-primed for 12 hours.Highest germination percentage value of 40 % was recorded in *V.doniana*seeds hydro-primed for 24 hours (Table 1). It can be inferred that germination percentage increased with increasing periods of soaking of *V. doniana* seeds in water. The least mean germination time of 13days was recorded for seeds hydro-primed for 12days (Table 1).

Table 1: Effects of periods of organo-priming and hydro-priming on the germination of *V.doniana* seeds

Organo priming of *V.doniana*			Hydro-priming of *V.doniana*		
P.O.P	P.G	MGT (days)	P.H.P	P.G	MGT(days)
0	43.33^{ab}	14.67^{b}	0	0.00^{b}	0.00^{c}
6	43.33^{ab}	20.67^{ab}	6	7.00^{ab}	13.01^{c}
12	30.00^{ab}	13.33^{b}	12	7.01^{ab}	13.00^{c}
18	63.33^{a}	24.00^{a}	18	33.00^{ab}	82.00^{b}

24	26.67[b]	14.00[b]	24	40.00[a]	117.00[a]
SE±	13.51	8.96	SE±	15.91	10.8

*Means on the same column having different superscript are significantly different (P<0.05) vertically

Key: P.O.P= Periods of Organo-Priming, P.G=Percentage germination, MGT=Mean Germination Time. P.H.P=Periods of hydro-priming.

Effects of periods of organo-priming and hormo-priming on the germination of *C. schweinfurthii* seeds

Germination percentages of seeds soaked for 0, 6, 12, 18 and 24 hours ranged between 11.67-40 %. Highest germination percentage of 40 % was recorded from seeds soakedin the 0.5 % solution of *J. mimosifolia* for 6 and12 hours. The least mean germination time value of 67.4 days was recorded in seeds soaked for 24 hours (Table 2). Untreated seeds did not germinate. Highest germination percentage value of 28.57% was recorded from seeds soaked in *Citrus sinensis* juice for 12hours; while the lowest germination percentage was recorded from seeds soaked for 6hours (14.29%). The least mean germination time value of 44.8days was recorded from seeds soaked in *Citrussinensis*juice for 12hours (Table 2).

Table 2: Effects of periods of organo-priming and hormo-priming on the germination of *C. schweinfurthii* seeds

Organo-priming of *C.schweinfurthii*			Hormo-priming of *C.schweinfurthii*		
P.O.P (hrs)	P.G (%)	MGT (days)	P.O.HP (hrs)	P.G %	MGT (days)
0	0.00[d]	0.00[b]	0	25.71[a]	50.21[a]
6	40.00[a]	69.60[a]	6	14.29[b]	48.80[ab]
12	40.00[a]	74.11[a]	12	28.57[a]	44.80[ab]
18	11.67[c]	71.20[a]	18	17.14[b]	51.50[a]
24	25.00[b]	67.40[a]	24	22.86[a]	54.86[a]
SE±	5.71	4.90	SE±	3.31	4.90

*Means on the same column having different superscripts are significantly different (P<0.05)

Key: P.O.P=Periods of Organo-priming, P.G=Percentage Germination, M.G.T=Mean Germination Time, P.O.HP=Periods of Hormo-priming.

Effect of sources of manure on the growth parameters of *T. indica* seedlings

Highest height of 23.14cm was recorded from seedlings planted in the soil influenced with poultry droppings at 8 weeks after transplanting (WAT); while the lowest height value of 17.12cm was recorded from seedlings planted in the soil enhanced with goat droppings at 2 WAT. Highest number of leaflets (66.20) and lowest number of leaflets (17.20) were recorded from seedlings planted in the soil influenced with goat dropping at 8 and 2 WAT respectively. Widest girth (0.30cm) was recorded from seedlings planted in the soil enhanced with poultry droppings, while the narrowest girth(0.19cm) was recorded from seedlings planted in the soil influenced with goat droppings at 8 and 2 WAT respectively. Narrowest girth of 0.19cm was also recorded from seedlings planted in the soil enhanced with pig droppings at 2 WAT. Widest leaflet area (9.82cm^2) and

narrowest leaflet area(3.36cm^2) were recorded from seedlings planted in the soil enhanced with poultry droppings at 2 and 8 weeks after transplanting (Table 3).

Table 3: Effect of sources of manure on the growth parameters of *T. indica* seedlings

Manure	H(cm)		NL		G(cm)		LA(cm^2)	
	2	8	2	8	2	8	2	8
Cowdung	18.82^a	20.08^a	23.80^b	45.60^a	0.23^a	0.29^a	4.60^a	6.52^a
Goat droppings	17.12^a	20.24^a	17.20^c	66.20^a	0.19^a	0.25^a	4.02^b	7.68^a
Rabbit droppings	19.96^a	23.02^a	17.40^b	64.60^a	0.25^a	0.28^a	4.14^b	9.52^a
Poultry droppings	20.96^a	23.14^a	23.00^b	61.00^a	0.26^a	0.30^a	3.36^b	9.82^a
Pig droppings	18.20^a	19.80^a	30.60^b	63.80^a	0.19^a	0.25^a	6.98^a	8.80^a
SE±	3.59	11.35	9.79	25.08	0.52	0.50	1.81	1.80

*Means on the same columns with the same alphabets are not significantly different at ($p<0.05$)
Key: H=Height, NL=Number of leaf, G=Girth, LA=Leaf area

Nutrient composition of the same rate of manure (20g) mixed with equal quantity of sand

Highest percentages composition values of N (0.23%), P (3.92mg/kg) and K (24.81%) were recorded for pig droppings, poultry droppings and poultry droppings respectively. The least values of N(0.007%), P(0.34mg/kg) and K(1.58%) were recorded from goat droppings, cow dung and pig droppings respectively.

Table 4: Nutrient composition of the same rate (20g) of manure mixed with equal quantity of sand

Manure	N%	Pmg/kg	K%
Cowdung	0.13	0.34	2.91
Goat droppings	0.01	3.41	21.58
Rabbit droppings	0.11	3.41	8.56
Poultry droppings	0.07	3.92	24.81
Pig droppings	0.23	3.87	1.58
Control	0.04	0.74	0.17
Plant	0.57	0.56	0.90

Discussion

Highest germination percentage recorded in *V. doniana* seeds organo-primed for 18hours could be traced to the ability of the nutrient in the solution having sufficient time for degrading the seed coat for imbibition as well as provision of nutrient to increase the embryo vigour for germination. Highest germination percentage recorded in seeds hydro-primed for 24 hours revealed that longer period of hydro-priming gave the seeds more time for degrading the seed coat and absorbing water for imbibition as well as germination to take place. This result is in consonance with the reports of Akinola *et al*. (2000) who stated that higher duration of exposure to seed treatment resulted in higher cumulative germination in wild sunflower. Positive effect of seed priming on seed invigoration depends on priming duration (Ashraf and Foolad, 2005).

Germination percentage increased with increasing periods of soaking of *V. doniana* seeds in water. Similar observation has been reported by Adelani (2015a) on *Balanites aegyptiaca.* The inability of untreated *V. doniana* seeds to germinate compared to hydro-primed ones was an indication that hydro-priming enhanced the germination of forest tree seeds. This is in consonance with the report of Kaya *et al.* (2006) working on germination of sunflower under drought and salt stress reported that hydro-priming improved both rate of germination and mean germination time both under salt and drought stress conditions.

The ability of hydro-priming to enhance *V. doniana* seeds germination could be traced to stimulatory effects which emanates from three stages of uptake of water which are the rapid initial uptake due to the seed low water potential and proteins synthesized as well as mitochondria repair, initiation of physiological activities as synthesis of protein by translation of new mRNAs and synthesis of new mitochondria and the completion of process of germination with radicle emergence. The least mean germination time recorded for seeds organo-primed and hydro-primed for 12hours compared to that of unprimed seeds showed that *V. doniana* seeds prefer average periods of soaking. It also showed that priming reduces the germination period of *V. doniana* seeds compared to that of unprimed ones. Similar observation has been made by Demir and Mavi (2004) who stated that prime seeds of water melon emerged 4 days earlier more than those of unprimed ones.

Excellent growth performance recorded from *T. indica* seedlings planted in the soil enhanced with poultry manure showed efficacy of poultry manure in improving the growth of *T. indica* compared to other studied fertilizer. Similar observation has been made by Adeyemi and Dike(2018)who stated that among all the fertilizer applied, poultry droppings was the most positively impactful as it produced the highest mean effects on the growth of *Pterocarpusmildbraedii* seedlings. This result corroborates the work of Mahantappa *et al.* (2011) who noted significantly maximum seedling growth in poultry manure compared to other eleven different fertilizer treatments tried on *Pterocarpus santalinus.* This result is in consonance with that of Fasalejo *et al*. (2019) who concluded that poultry manure has significant effect in improving leaf production of *Mansonia altissima.*

Despite the fact that the same quantity of fertilizer (20g) was used for all fertilizers studied, 20g of poultry manure enhanced the seedlings growth of *T.indica* better than that of others investigated. Similar observation has been made by Olajiire-Ajayi *et al.* (2018) who recommended application of poultry manure (30g) for the healthy seedling growth of *Mansonia altissima.* This result is also corroborated by the statement poultry manure at 10g, 7.5g and 5g enhanced the number of leaflets, number of leaves and stem growth of *Tamarindus indica* seedlings respectively (Adedokun *et al.*, 2020). Ndubuaku *et al.* (2015) opined that application of 5 and 10 t ha^{-1} of poultry manure to the soil medium ensured consistent increase in the *Moringa oleifera* height stem girth, internode length, number of leaves and branches. Owing to excellent growth performance, 20g of poultry manure could be referred to as appropriate for planting *T. indica.* Investigatorsas Ojo *et al.* (2013) (*Tagetespatula*,) and Aderounmu *et al.* (2020) (*Thaumatococcus danielli*) have reported different appropriate fertilizer ratefor plant species.

The excellent performance of poultry droppings to enhance the growth of *T. indica*

is traceable to highest phosphorus and potassium composition. Poultry manure has been reported to be an excellent source of nutrients when added to soil (Telkamp, 2015).In this study, it could be inferred that the phosphorus and potassium content of poultry manure influence photosynthesis as well as growth and development of plant species better than other fertilizer investigated. This is in conformity with the findings of Ahmad *et al.* (2011) and Atiyeh *et al.* (2001) who stated that poultry manure treatments helped plants to produce more photosynthates, which were used by plants for producing higher flower yield of good quality along with early production. Poultry manure improves the physical, chemical and biological properties of the soil (Bello *et al.*, 2017) as well as enhances the plant growth (Adekiya and Agbede, 2016).

Conclusion

Investigation conducted into periods of hydro-priming, organo-priming, and hormo-priming revealed that organo-priming of *Vitex doniana* for 18hours, hydro-priming of *V. doniana* for 24 hours, organo-priming of *C. schweinfurthii* for 6 and 12 hours and hormo-priming *C. schweinfurthii* of for 12hours enhanced the germination percentages of the seeds. Appropriate periods of priming methods prevent under and over priming of seeds of agro-forestry tree species. Planting of *T. indica* in a soil enhanced with poultry droppings improves its growth.

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