EFFECT OF PLANT EXTRACT AS SEED TREATMENT ON THE GERMINATION OF MUCUNA FLAGELLIPES HOOK.F (UKPO) SEED

BY

OGBUEHI, H.C AND A. EJERENWA

Department of Cropscience and Biotechnology,
Faculty of Agriculture and Veterinary Medicine
Imo State University, P.M.B 2000, Owerri
Imo State, Nigeria
Email:ogbu_h@yahoo.com

ABSTRACT

This study aimed to investigate the effects of different treatments on seed germination of the *Mucuna flagillepes* Hook. F (ukpo) species was carried out at the Teaching and Research Farm of the Faculty of Agriculture and Veterinary Medicine, Imo State University, Owerri. This experiment consisted of seven(7) treatment levels and was replicated three times, the treatment were O,12, 24, 36, 48, 60, and 72hours, then untreated seeds serve as a control in a completely randomized design. During the germination stage, germination percentage, imbibitions period (IP), germination index(GI), germination speed (GS), and seed vigor index (SVI) were recorded. The result obtained from Plant extract, *Piper guineense* (uziza), and X*lopia aethiopica* (Uda), results showed that uziza extract at 12 and 48hours priming gave the highest germination percentage (99.33%) while 72hours gave the fastest imbibitions period of 7days which was significantly different ($P<0.05$) from the controls. Also, Uziza extract compared with Uda extract in 72 hours priming duration significantly improved the Germination index (0.4066), germination speed (0.2300), and seed vigor index (5.277). The use of plant extracts at an increased soaking period of 60 hours and 72 hours respectively will enhance germination parameters and seedling growth treatment of the seed of *Mucuna flagellipes.*

Keywords: Germination Percentage, Imbibitions Period, Germination Index, Germination Speed, *Mucuna flagellipes*

INTRODUCTION

Mucuna flagellipes, a *leguminosae* is a tropical forest climbing perennial herb. It is popularly known as “Ukpo” by the Igbo tribe of Nigeria. It is one of the lesser known, neglected and under-utilised legumes of Nigeria (Rosemary I. Uchegbu *et al.,* 2015). The plant is an annual crop and a climber

and can be cultivated more than once a year. It is high yielding; and bears pods which contain usually three to four seeds per pod (Okwu and Okoro, 2007)

Unconventional legumes are promising in terms of nutrition, providing food security, agricultural development and in crop rotation in developing countries. The wild legume, *Mucuna* consists of about 100 varieties/accessions and are in great demand as food, livestock feed and pharmaceutically valued products. *Mucuna* seeds consist of high protein, high carbohydrates, high fiber, low lipids, and adequate minerals and meet the requirement of essential amino acids. The seeds also possess good functional properties and *in vitro* protein digestibility **(Sridhar and Rajeev, 2007).**

Seeds are the primary means of dispersal and perpetuation of species of flowering plants (Bewley, 1997, Okowu and Eboh, 2017). Seed dormancy is a common condition found in many species. It is common among members of the *Fabaceae* family (Ramamoorthy *et al*., 2005; Al-menaie *et al.,* 2010; Demorais *et al*., 2014; Atif *et al.*, 2015; Mensah and Ekeke, 2016). It is an adaptation that allows a species to determine the timing of germination for seeds in a population (Moise *et al*., 2005; Wills *et al*., 2015). Some species use environmental signals to synchronize germination for most seeds at a particular time of the year. Other species are adapted for asynchronous germination over an extended time. This allows periodic germination and the establishment of a persistent seed bank.Domestication and mass production of crop plants has led to the reduction or elimination of seed dormancy to fit cropping schedules (Levetin and McMahoo, 2015). This is achieved through several seed treatment methods depending on the type of dormancy. Dormancy is an innate state of arrested growth that occurs across all life forms (Finch savage e*t al*.,2006).

Despite the great importance and characteristics, establishment of forage legumes is difficult. One of the major constraints in successful stand establishment of some legumes is hard seed. High hard seed content in a seed lot can cause delayed or decreased seedling emergence. As a result, stands become thin, sporadic and less competitive with weeds or undesirable species

As a result, stands become thin, sporadic and less competitive with weeds or undesirable species. Such legume stands reduce not only N fixation but also lower yield and quality. Livestock production, animal husbandry and maintenance of soil fertility play important role in rural development and in turn the economy of developing countries. Therefore, reduction of hard seed content in a seed lot of legumes is important before planting. Seed scarification, a physical damage to break the hard seed coat without lowering the quality of seeds, has been studied for more than a century (Rutar *et al*., 2001; Zeng *et al*., 2005; Dittus and Muir, 2010). In spite of the various uses of this plant in food and as medicine, much work has not been done on the plant. The propagation of the seeds has not been fully documented. Thus this present study was undertaken to evaluate seed treatment on seedling emergence of *Mucuna flagellipes* seeds.

MATERIALS AND METHODS

This study was carried out in the Teaching and Research Farm of the Faculty of Agriculture, Imo State University, Owerri. Owerri lies between the latitudes 5°10'N and 6°0'N and longitudes 6°35'E and 7°0'E with an altitude of 91.0m within the Southeast rain forest agricultural zone of Nigeria. The area maintains an average annual rainfall of 2,500 mm, mean minimum and maximum temperature of 23.5°C and 32.1°C respectively, with relative humidity ranging from 70-85% and the annual evapotranspiration is 1450 mm (NIMET, 2010).

Source of Materials

Plant materials that were used in this study were collected from Imo State University Teaching and Research .*Mucuna flagellepes* (ukpo) plant seeds were source from Imo ADP.

Experimental design and scarification treatments

Seed Sterilization: All the *Mucuna flagellepies* collected for these experiments was surface-sterilized by soaking in 70% alcohol for 1 min and were immediately soaked in 2.5% Sodium hypochlorite (NaOCl) for 3 min according to the method of Ashtari *et al.* (2013). The seeds will be thoroughly rinsed in several rounds of distilled water before applying the various seed treatments.

Dormancy-breaking Treatments Before germination experiments, the seeds were subjected to the following pre-sowing treatments;

Plant Extraction

Immediately after treatment, the treated seeds and those of control were planted in 16cm-diametre plastic pots filled with about 1.5kg of soil.

The pots were arranged under shade in a completely randomized design (Mead *et al.,* 1993, Shahin *et al.,* 2015). With 3 replicated as each pot containing 5 seeds represents one replicate.

Note: clearly visible epicotyl protrusion was used as a criterion for germination. All the agricultural practices needed for care of the seeds was done. Number of germination seeds were counted daily and length of epicotyl (cm) was measured as the emerged to calculate germination characteristics as follows:

Data Collection:

Overall, some characteristics were measured as follows;

1. Length of seedling (shoot);
2. Seedling girth was measured for the total number of germinated seeds;
3. Germination percentage and germination speed was calculated according to following equation: GP=

$$GP = \frac{G}{N} \times 100$$

$$GS = \sum_{\square}^{\square} \left(\frac{n}{t}\right) \qquad (2)$$

GS = Germination speed

n = The number of germinated seeds in certain day

t = Day the seeds germinate are counted

The following formula was used to determine the seed vigor index:

$$VI = LS \times PG \qquad (3)$$

VI = Vigour index

LS = Length of seedling

PG = Percent of germination

Statistical Analysis: After obtaining raw data in the present experiment, data was according to CRD **experimental design** and ANOVA test was performed using the Duncan method for grouping treatments, using SPSS software (17.0 version).

Result

Effect Plant Extracts on Germination Parameters

The result in Table 1 indicated that plant extracts significantly influence the germination parameters measured under various soaking hours. However, interaction of soaking hours and two plants extracts exhibited significant influence on germination parameters differently.

In percentage germination, 12hrs and 48hrs of soaking period of *Piper guinness* extract recorded the highest (99.33%) of percentage germination which was significantly different from the lowest (67%) recorded from control and 24hours soaking period respectively as shown in Table 1.

While Negro pepper recorded the highest percentage germination (97%) in 72hrs soaking period which was significantly different ($P<0.05$) from the lowest (42%) obtained from 36hrs soaking hours. Among the treated seeds, 48hrs and 12hrs enhanced germination with *Piper guinensis* extract followed by 36hrs, 60hrs, 73hrs and 24hrs as shown in Table 16. Whereas, in *Negro pepper* extract, 72hrs enhanced germination, followed by 12hrs and 60hrs, 24hrs, 48hrs and 36hrs in that order.

The result of imbibition period showed that the least imbibition period (9 days) was obtained from 72hrs soaking period respectively from both plant extracts which was significantly different from 17 days recorded from control. However, among the treated seeds, 36hrs recorded highest imbibition period 11.667 days for *Piper guinensis* extract which was not significantly different ($P<0.05$) from imbibition periods (10.333days, and 10.6667 respectively) obtained from 12hrs and 48hrs but significantly different ($P<0.05$) from 9.667 days recorded for 60hrs soaking period. While the Negro pepper extract obtained the highest imbibition period (12days) which was significantly different ($P<0.05$) from the least (7 days) recorded from 72hrs. Comparatively *Piper guinensis (Uziza)* extract reduced imbibition period than *Negro pepper.*

The result on germination index as shown in Table 1 indicated that *Piper guinensis (Uziza)* extract and *Xylopia aethiopica (*Uda*)* significantly influence germination index.

The extract of *Piper guinensis (Uziza)* recorded the highest germination index (0.40667) from 72hrs soaking period which was significantly different (P<0.05) from the least (0.12333) obtained from 24hrs soaking period. Likewise *Xylopia aethiopica* (Uda) extract obtained highest (0.2133) in 72hrs soaking period which was significantly different from the least (0.0600) recorded from 36hrs as shown in Table 16. However, 60hrs of soaking for *Piper guinensis* extract had higher germination index of 0.37000 which was significantly (P<0.05) from germination index (0.1600) recorded from control, 0.12333 from 24hrs, 0.5667 recorded from 36hrs of soaking periods. Whereas 12hrs and 48hrs soaking periods have equal value (0.18667) of germination index which was not significantly different from control (0.16000).

Result of plant extracts on speed of germination (Table 1) showed that *Piper guinensis* recorded the highest speed of germination (0.23000) from 72hrs soaking period which was significantly different from the lowest (0.11000) obtained in control. Also 60hrs of soaking period for *Piper guinensis* had higher speed of germination than control (0.11000), this was followed by 48hrs (0.19000), 12hrs with 0.18667 and 36hrs with 0.17333. Among the treated seeds 24hrs recorded the least speed of germination (0.12000) which was significantly different from the highest (0.23000) obtained from 72hrs of soaking period for *Piper guinensis* (Uziza) extract.

However, the result on the *Xylopia aethiopica (Negro peper)* extract on the speed of germination showed that the highest speed of germination (0.19667) was obtained from 60hrs soaking period which was not significantly different (P<0.05) from the lowest (0.06667) obtained from 36hrs. This was followed by 72hrs (0.18667), 12hrs with 0.17333 and 24hrs with 0.13333 of speed of germination.

Concerning seed vigour, the *Piper guinensis* (Uziza) extract under 72hrs soaking period, obtained highest seed vigour index of 5.277 which was significantly different. The lowest (1188) recorded from 24hrs soaking duration control and seed vigour index of 4092 which was higher than seedling vigour index of 3033, 2393, 2023 and 1903 respectively recorded in

12hrs, 36hrs, 48hrs and 60hrs soaking durations for *Piper guinensis* (Uziza). However, there was no significant different (P<0.05) among the control and other treatments as shown in Table 1.

In treatment with *Xylopia aethiopica (*uda*)* extract there was no significant different (P<0.05) across the treatments although control recorded the highest (4092) seed vigour index compare to the lowest seed vigour index (440) recorded in 48hrs soaking duration. Whereas among the treated seeds, 72hrs soaking duration recorded higher seed vigour index (3221) than 3013 recorded from 60hrs this was followed by seed vigour index of 1384 obtained in 12hrs while the least performance in seed vigour index were recorded from 48hrs (440), 36hrs (451) and 24hrs (704) as shown in Table 1.

Table 1: Effect of Plant Extracts on Germination Parameters

	Germination Percentage (%)		Imbibition Period (Days)		Germination Index		Speed of Germination		Seed Vigour Index	
Treatments	***Piper guiness* (Uziza)**	***Xylopia aethiopica* (Uda) extract**	***Piper guiness* extract (Uziza)**	***Xylopia aethiopica* (Uda) extracts**	***Piper guiness* extract (Uziza)**	***Negro peper* (Uda) extracts**	***Piper guiness* extract (Uziza)**	***Xylopia aethiopica* (Uda) extracts**	***Piper guiness* extract (Uziza)**	***Negro peper* (Uda) extracts**
Control	67^{b}	66	17.000^{a}	17.000^{a}	0.1600^{b}	0.1600^{ab}	0.1100^{b}	0.1100^{a}	4092^{ab}	4092^{a}
12hrs	99.33^{a}	96.66^{a}	10.333^{bcd}	11.666^{bc}	0.1866^{b}	0.1700^{ab}	0.1866^{ab}	0.1733^{a}	3033^{ab}	1384^{a}
24hrs	67b	68^{b}	10.666^{bc}	10.666^{cd}	0.1233^{b}	1.3333^{ab}	0.1200^{b}	0.1333^{a}	1188^{b}	704^{a}
36hrs	98.33^{a}	42^{c}	11.666^{b}	10.333^{d}	0.1566^{b}	0.0600^{b}	0.1733^{ab}	0.666^{b}	2393^{ab}	451^{a}
48hrs	99.33^{a}	66.33^{b}	10.333^{bcd}	12.000^{b}	0.1866^{b}	0.1166^{a}	0.1900^{a}	0.1166^{a}	2023^{ab}	440^{a}
60hrs	96.66^{a}	96.66^{a}	9.666^{cd}	9.666^{d}	0.3700^{a}	0.2033^{a}	0.2066^{a}	0.1966^{a}	1903^{ab}	3013^{a}
72hrs	73.66^{b}	97^{a}	7.000^{c}	9.000^{e}	0.4066^{a}	0.2133^{a}	0.2300^{a}	0.1866^{a}	5277^{a}	3221^{a}

Means in the same column with the same letters are not significantly different ($P<0.05$)

Effect of Plant Extracts on Seedling Lengths (cm)

Effect of Piper *guineense* (Uziza) extract on Seedling lengths (cm)

The data on seedling length indicated that *Piper guinensis* extract influenced growth more 72hrs duration than other soaking periods as shown in Table 2. There was no significant different (P<0.05) on the seedling length at DAY 1, 2 and 3 among the treated seeds and control. Control seedling lengths (4.833cm, 12.067cm, 48.33cm, 51.33cm 58cm and 62cm respectively) which was significantly different from the lowest (0.00, 0.2cm, 0.33cm, 2.43cm, 5.83cm and 10.33cm) recorded from 24hrs soaking period.

Also among the treated seed 72hrs soaking duration influenced the lengths more than others. Throughout that period of observation. At the end experiment 72hrs recorded the highest length (52.77cm) among the treated seeds which was significantly different (P<0.05) from the lowest length (10.33cm) recorded from 24hrs soaking period of *Piper guinensis* extract.

Effect of *Xylopia aethiopica* (Uda) extract on Seedling lengths(cm)

On the result of Uda (Negro pepper) extract on seedling length. The lowest lengths (0.00cm, 0.47cm, 2.13cm, 4.10cm and 6.67cm respectively) which was significantly different (P<0.05) from the highest lengths (4.833cm, 12.067cm, 18.767cm, 48.33cm, 50.50cm, 58cm and 62cm respectively) at DAY 2, 3, 4, 5, 6, 7 and 8. However, among the treated seeds, 72hrs soaking period recorded highest length (32.27cm) at the experiment which was not significantly different (P<0.05) from 6.67cm obtained from 48hrs soaking period as shown Table 3.

Table 2: Effect of Uziza Extract Treatment on Seedling Length (cm)

Treatment	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Control	1.500^{a}	4.833^{a}	12.067^{a}	18.767^{ab}	48.33^{a}	51.33^{a}	58.00^{a}	62.00^{a}
12hrs	0.000^{a}	0.000^{a}	0.333^{b}	1.200^{ab}	3.80^{b}	9.87^{b}	20.60^{ab}	30.33^{abc}
24hrs	0.000^{a}	0.000^{a}	0.000^{b}	0.200^{b}	0.33^{b}	2.43^{b}	5.83^{b}	10.33^{c}
36hrs	0.000^{a}	0.000^{a}	0.000^{b}	1.200^{ab}	2.40^{b}	7.23^{b}	14.67^{b}	23.93^{abc}
48hrs	0.000^{a}	0.000^{a}	0.000^{b}	0.433^{b}	1.60^{b}	4.70^{b}	12.00^{b}	20.23^{bc}
60hrs	0.000^{a}	0.000^{a}	0.333^{b}	2.100^{ab}	4.30^{b}	9.57^{b}	19.20^{b}	28.83^{abc}
72hrs	3.007^{a}	4.033^{a}	5.567^{ab}	12.367^{a}	17.87b	29.87^{ab}	43.23^{ab}	52.77^{ab}

Means in the same column with the same letters are not significantly different (P<0.05)

Table 3: Effect of UDA Extract Treatment on Mean Seedling Length(cm)

Treatment	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Control	4.833[a]	12.067[a]	18.767[a]	48.33[a]	50.50[a]	58.00[a]	62.00[a]
12hrs	0.000[a]	0.000[b]	0.000[b]	0.53[b]	3.87[b]	8.27[b]	13.90[ab]
24hrs	0.000[a]	0.000[b]	0.633[ab]	1.67[b]	3.33[b]	7.00[b]	10.67[b]
36hrs	0.000[a]	0.000[b]	1.200[ab]	1.87[b]	4.33[b]	9.30[b]	13.67[b]
48hrs	0.000[a]	0.000[b]	0.000[b]	0.47[b]	2.13[b]	4.10[b]	6.67[b]
60hrs	1.700[a]	2.267[ab]	5.633[ab]	9.23[b]	17.00[ab]	23.67[ab]	30.13[ab]
72hrs	3.133[a]	4.167[ab]	9.267[ab]	12.90[b]	19.97[ab]	26.80[ab]	32.27[ab]

Means in the same column with the same letters are not significantly different (P<0.05)

Effect of Plant Extracts on Seedling Girth (cm)

Effect of Piper *guineense* (Uziza) extract on Seedling girth (cm)

Result in Table 4, showed that there was no significant difference (P<0.05) on the effect of *Piper guinensis* on seedling girth. At the end of experiment, it was observed that 60hrs soaking period had highest girth (2.1667cm) which was not significantly different (P<0.05) from the lowest girth (1.300cm) obtained from 24hrs soaking period. This was followed by 48hrs and 12hrs who have seedling girth of 2.0333cm and 1.8667cm respectively. However, control and 72hrs soaking duration had the same girth (1.8333) at DAY 8 as shown in Table 4.

Effect of *Xylopia aethiopica* (Uda) extract on Seedling girth (cm)

On the other hand, the result on effect of *Xylopia aethiopica* (Uda) extract (Table 5) indicated that there was no significant different (P<0.05) between the girth (0.667) in control and that of 60hrs (0.3333cm and 0.3333cm respectively). 72hrs soaking period at Day 3, 4 and 5, recorded the highest seedling girth (0.9cm, 0.9333cm and 1.3000cm) which was significant at DAY 3 but was not significantly difference at DAY 4 and DAY 5, from the girths (0.00cm, and 0.333cm respectively) obtained from 36hrs, 24hrs and 48hrs respectively.

However, at the end of experiment (DAY 8). 72hrs soaking period recorded the highest seeding girth (2.0333cm) which was significantly different

(P<0.05) from the 0.5667cm recorded against 36hrs but not significantly different (P<0.05) from seedling girth (1.8333cm) recorded in control.

Table 4: Effect of Uziza Extract Treatment on Seedling Girth (cm)

Treatment	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Control	0.34^{a}	0.6667^{a}	1.0000^{a}	0.9000^{ab}	1.0000^{a}	1.1667^{a}	1.1667^{a}	1.8333^{a}
12hrs	0.0^{a}	0.0000^{b}	0.0667^{b}	0.3000^{b}	1.3667^{a}	1.5333^{a}	1.6000^{a}	1.8667^{a}
24hrs	0.0^{a}	0.0000^{b}	0.0000^{b}	0.1333^{b}	0.0000^{a}	0.9667^{a}	1.667^{a}	1.3000^{a}
36hrs	0.0^{a}	0.0000^{b}	0.0000^{b}	0.3000^{b}	0.6333^{a}	1.1333^{a}	1.0667^{a}	1.8333^{a}
48hrs	0.0^{a}	0.0000^{b}	0.0000^{b}	0.2000^{b}	0.2000^{a}	1.0333^{a}	1.3000^{a}	2.0333^{a}
60hrs	0.0^{a}	0.0000^{b}	0.3333^{ab}	0.8333^{ab}	1.0000^{a}	1.8333^{a}	1.5667^{a}	2.1667^{a}
72hrs	0.400^{a}	0.4667^{ab}	0.9667^{a}	1.3667^{a}	1.2667^{a}	1.1333^{a}	1.3667^{a}	1.333^{a}

Means in the same column with the same letters are not significantly different (P<0.05)

Table 5: Effect of UDA Extract Treatment on Mean Seedling Girth

Treatment	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Control	0.6667^{a}	0.6667^{ab}	0.9000^{a}	1.0000^{a}	1.1667^{a}	1.6667^{a}	1.8333^{ab}
12hrs	0.0000^{b}	0.0000^{b}	0.0000^{a}	0.5667^{a}	1.7667^{a}	1.6000^{a}	1.6667^{ab}
24hrs	0.0000^{b}	0.0000^{b}	0.0000^{a}	0.8667^{a}	1.2333^{a}	1.1333^{a}	1.2667^{ab}
36hrs	0.0000^{b}	0.0000^{b}	0.2667^{a}	0.5333^{a}	0.5333^{a}	0.5333^{a}	0.5667^{b}
48hrs	0.0000^{ab}	0.0000^{ab}	0.5000^{a}	0.3333^{a}	0.9667^{a}	0.9333^{a}	1.3000^{ab}
60hrs	0.3333^{ab}	0.4333^{ab}	0.6333^{a}	0.9667^{a}	1.5000^{a}	1.3667^{a}	1.7667^{ab}
72hrs	0.3333^{ab}	0.9000^{a}	0.9333^{a}	1.3000^{a}	1.5000^{a}	1.4000^{a}	2.0333^{a}

Means in the same column with the same letters are not significantly different (P<0.05)

DISCUSSION

The extract of *piper guineense* (Uziza) and *Xylopia aethiopica* (Uda) were found to be significantly improved the germination percentage, imbibition period, speed of germination, germination index and seedling vigor index compare to the control. However, it was found that *Piper guinense (Uziza)* extract at 12, 36, 48hrs, and 60hrs recorded germination percentages of 99.33%, 98.33%, 99.33%, and 96.66%. Compare to control. This result is contrary to the inhibitory effect of some plant extracts as reported by researchers. For example, Fugihara and Shimizu (2003) reported that the peel extract of *Citrus junos* has shown a growth inhibitory effect on tested 38 crop species and another citrus fruit peel has inhibited the growth of the roots of lettuce seedlings (kato-Noguchi and Tamaka, 2003). Also, Sahoo *et al.* 2015 reported that *Citrus reticulate* extract has allelopathic potential which reduces the germination as well suppresses the growth and development of the test crops.

The high seed vigor index (5277), and seedling length of 52.77cm recorded from 72hrs soaking duration of *Piper guineense* (Uziza) extract could be attributed to enhanced germination process in the seed of *Mucuna flagellipes* by activating enzymes and breakdown of stored starch for the growth process to start. It could be affirmed that these two plant (spices) extracts contain phytochemicals that can trigger a rapid germination process and subsequently faster emergence and seedling growth. This is also contrary to the work of Phiri, (2010), who reported that application of *Moringa oleifera* leaf extract reduced the radicle length of rice, hypocotyls of sorghum, seedling survival of sorghum, germination percentage of rice and delayed the germination of rice. Phiri and Mbewe (2009) conducted another series of experiments in which *Moringa oleifera* leaf extracts were applied to seeds of three legumes including beans, groundnut, and cowpea, and found that *Moringa* extract delayed crop emergence and reduced root length and field survival of leguminous crops.

The enhanced seedling length and seedling vigor index observed in the use of *Piper guineense* (Uziza) extract could be due to the presence of both nutritional and non-nutritional compounds. The spice contains proteins, carbohydrates, alkaloids, steroids, glycosides, saponins, flavonoids, tannins, and phenolic compounds. It also contains vitamins, minerals, and fat. (Morufu .E. Balogun *et al.* 2016). Also, *Xylopia aethiopica (Negro pepper)* contains similar nutritional and anti-nutritional compounds.

CONCLUSIONS

Differences in the germination parameters between treated and untreated (control) seeds were enhanced when the *Mucuna flagellipes* seeds were exposed to 60 to 72-hour soaking duration in plant extracts. However, we discovered that the high seed vigor index in the control could be due to the growth habit of this plant under an ideal environment. In addition to this, the treatments were able to reduce the time it took the plant to germinate in a natural environment. We recommend that further work be done on the effect of the above seed treatments on the growth, yield, and biochemical content of the seed of *Mucuna flagillepes*, especially using plant extracts and distilled water.

REFRENCES

Al-Menaie H.S., Al-Ragam O., Al-Shatti A., Matthew M., Suresh N. (2010). The effects of different treatments on seed germination ofthe *Cassia fistula* L. and *Cassia nodosa* Buch-Ham. ex Roxb. in Kuwait. *African Journal of Agricultural Research. 5(3):230–235.*

Atif HN, Abdalhalim H.E., Faisal E.A. (2015). Evaluation of different pre-sowing seed treatments to break dormancy of *Crotalaria senegalensis*, a famous rangeland forage in Sudan. *Asian Journal of Plant Science and Research*. 5(10):16–21.

De Morais LF, Almeida JCC, Demincis BB, de Padua FT, Morenz MJF and de Abreu JBR(2014) *.* Methods for breaking seed dormancy of seeds of tropical forage legumes. *American Journal of Plant Sciences,* 5:1831–1835.

Dittus, D.A. and J.P. Muir, (2010). Breaking germination dormancy of texas native perennial herbaceous legumes. *Native Plants*, 11: 5-10.

Finch-Savage WE, Leubner-Metzger G. (2006). Seed dormancy and the control of germination. *New Phytologist*. ;171:501–523.

Fugihara, S., and Shimizu T. (2003). Growth inhibitory effect of peel extract from *Citrus junos. Plant Growth Regulation: 39:223-233. Doi: 10.1023/A: 1022899119374*

Levetin E, and McMahon K. (2015). *Plants and Society. 7th Ed. McGraw Hill Publishing Company;*

Kata-Noguchi H., and Tamaka Y. (2003). Allelopathic potential of citrus peel and abscisci acid-glucose ester. *Plant growth regulation 40:117-120 doi:1023/A:1024291428234*.

Khan, M.R. (2013). The effects of pre-treatments on seed germination of *Cassia auriculata L. and Cassia tora L. Advances in Plant Sciences,* 26(1): 253-256

Mensah S.I, and Ekeke C. (2016). Effects of different pretreatments and seed coat on dormancy germination of seeds of *Senna obtusifolia* (L.) H.S. Irwin & Barneby (*Fabaceae*). *International Journal of Biology*. 8(2): 77–841

Moise JA, Han S, Gudynaite-Savitch L, Johnson D.A, Miki B.L.A. (2005). Seed coats: Structure, development, composition, and biotechnology. *In vitro* Cellular and Developmental Biology – *Plant*.; 41(5):620–644

Morufu E. Balogun, Bebong Elizabeth E. Serges, F., A. Djobissie, Bebong Elizabeth Ogochukwu, S. Mbamalu and Jacinta N. Obimma (2016). A Review of *Piper guineense (African Black pepper). International Journal of Pharmacy and Pharmaceutical Research.* Vol. 6(1): 368-384.

Okonwu, K and Eboh, I.G. (2017). Effects of Seed Treatment on the Germination of *Crotalaria verrucosa* L**.** *JALSI, 10(2): 1-8, 2017;*

Okwu D.E and Okoro E (2007). Phytochemical Composition of Brachystegia Eurycoma and Mucuna flagellipes seeds. *Medicinal and Aromatic Plant Science and Biotechnology*. 104-105

Phiri C., (2010) Influence of Moringa oleifera leaf extracts on germination and early seedling development of major cereals. *Agriculture and Biology Journal of North America 1(5):774-777.*

Phiri C. and Mbewe D., (2009). Influence of *Moringa oleifera* leaf extracts on germination and seedling survival of three common legumes. *International Journal of Agriculture and Biology 12:315–317*

Ramamoorthy K, Rajendran C, and Sivasubramanian .S. (2005). Seed treatment for alleviation of hard seededness in senna (*Cassia angustifolia* L.) *Adv. Plant Sci.18*(1):429–430.

Rosemary I. Uchegbu, John Bull O. Echeme, Lynda C. Ngozi-Olehi, Peter C. Njoku, and Cliff N. Mbadiugha. (2015). Isolation and Characterization of 5, 7 – Dimethoxy, 4'– Propoxyflavone from the Seed of *Mucuna flagellipes*. *American Journal of Chemistry and Applications*. Vol. 2, No. 4, 2015, pp. 106-109.

Rutar, R., M. Stjepanovic, S. Popovic, Z. Bukvic and D. Pacek, (2001). Effect of temperature on germination and hard alfalfa seed. *CIHEAM*, 2: 137-139.

Sahoo, U.K., Jeeceelee, L., Lallinrawna, S. and Muthukumaran R. B. (2015). Effect of *Citrus reticulate* Blanco leaf extract on seed germination and initial seedling growth parameters of five Home Garden Food Crops. *Journal of Experimental Biology and Agricultural Sciences. 3(6): 517-528.*

Willis C.G, Baskin C.C, Baskin J.M, Auld J.R, Venable D.L, Cavender-Bares J, (2014). The evolution of seed dormancy: Environmental cues, evolutionary hubs, and diversification of the seed plants. *New Phytologist*. 203:300–309

Zeng, L.W., P.S. Cocks and S.G. Kailis, (2005). Softening of impermeable seeds of six Mediterranean annual legumes on the soil surface and buried beneath the soil surface. *Seed Sci. Technol*., 33: 551-561