



## Effect of Hours of Priming in Coconut Water and Seed Weight on the Juvenile Growth Phase of Soursop (*Annona Muricata*) in the Nursery

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**ABSTRACT:** Priming in coconut water and seed weight are important nursery techniques for seedling emergence and vigorous juvenile growth phase in the nursery. Two hundred and ten (210) observational stands of soursop seedlings were gotten from five (5) seeds of 0.6 - 0.8 g and 0.3 - 0.5 g weights which were primed in coconut water at 0, 12, 24, 36, 48, 60 and 72 hours and replicated three times. Findings showed that heavy seed had higher percentage emergence (92.90 %) than light seed (78.60 %). Priming in coconut water at 60 hours (83.30 %) increased percentage emergence while unprimed seed had low percentage emergence (75.00 %). Juvenile growth phase showed a linear increase as hours of priming in coconut water increased, peaked at 60 hours of priming and dropped at 72 hours of priming. Dry matter content of heavy seed primed at 60 hours (4.20 g) was higher than dry matter content of light seed primed at 72 hours (1.55 g). Dry matter content correlates positively ( $p < 0.05$ ) with growth parameters measured. These results showed that hours of priming in coconut water and seed weight played crucial roles in juvenile growth phase of soursop in the nursery.

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Soursop (*Annona muricata*) is a fruit of the Annonaceae family. Soursop is eaten fresh or processed into juice, pulp and ice cream. Soursop is currently a household fruit in Nigeria and is very expensive because of its anticancer properties (Rady *et al.*, 2018). Soursop is commonly propagated by seeds. Seeds of soursop contain thick black coat which hinders germination and emergence (Okoli *et al.*, 2016; Singh and Maheswari, 2017). According to Baskin and Baskin (2001), seed coats impose dormancy because they may contain growth inhibitors or may prevent the leaching of inhibitors from the embryo. Seed priming promote early germination, increases the percentage germination and reduce time of seedling emergence, seedling growth and development as well as increase crop yield (Khalid *et al.*, 2019; Joseph-Adekunle, 2014). Hydropriming has been a common technique to start the germination of seeds without the emergence of radicle (Undie and Agba, 2018; Khalid *et al.*, 2019). The use of coconut

water which contains growth regulators such as amino acids, nitrogenous compounds, organic acids, enzymes, indole acetic acid, sugars and lipids has been established a better alternative for synthetic growth hormones which encourages vigorous root and shoot growth and development in plants (Yong *et al.*, 2009; Agampodia and Jayawardena, 2009). Time of priming also plays an important role in efficiency of priming in coconut water. Dada *et al.*, (2019) reported high percentage emergence of *Annona muricata* seeds with increase in the time of soaking in coconut water. Seed weight influences germination, growth and survival of seedlings (Okoli *et al.*, 2020). Seed weight is influenced largely by the food reserve in seeds (Khan and Shankar, 2001). Heavy seeds have higher percent germination and emergence than light seeds (Hendrix, 1984; Okoli *et al.*, 2020). There is a greater germination capacity in heavy seeds than in light seeds because cotyledons are well formed and less damaged (Foster, 1986). The nutrient reserves of seeds

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influence germination, growth and seedling survival (Khan and Shankar, 2001) and consequently result in a higher seedling competitiveness of heavy seeds and increase in the probability of successful seedling establishment (Khan, 2004). Soursop has two general phases of development, a vegetative phase and a flowering phase. The vegetative phase is sometimes referred to as the juvenile phase, which is a period of time when plants are not capable of flowering. Plants propagated by seed have a juvenile phase and they must develop to a certain maturity before they attain the capacity to flower. Juvenile growth starts in the nursery and continues after transplanting and is influenced greatly by pre-germination treatments and seed weight (Okoli *et al.*, 2020; Okoli *et al.*, 2016). The use of coconut water in priming of seeds have limited information on hours of priming and most researchers limited their work to emergence of the seedlings without determining the influence of the hours of priming on growth parameters and dry matter content of the seedlings. This paucity of information necessitated this research work. Therefore, the objective of the study is to determine the effect of hours of priming in coconut water and seed weight on emergence and juvenile growth phase of soursop seedlings.

## MATERIALS AND METHODS

*Study area:* The experiment was carried out in the nursery at the Teaching and Research Farm of Nnamdi Azikiwe University, Awka, which is located in the humid tropics of Nigeria (Lat. 7° 29' N and Long. 7° 1' E). The mean annual rainfall is 1808 mm per annum. The temperature shows some variation throughout the year with average monthly temperature of 17° C to 36.2° C. Relative humidity is moderately high and varies from an average of 65 - 85 % throughout the year.

*Seed preparation and sowing:* Fresh fruits were harvested from healthy stands of soursop trees in the Genetic Resource Unit, Nnamdi Azikiwe University, Awka. Seeds were extracted from healthy ripen soursop fruits, washed under running tap water and air-dried under shade for 24 hours. Seeds were separated into two categories by weight; heavy (0.6 - 0.8 g) and light weight (0.3 - 0.5 g). Each treatment combinations had five (5) samples containing one seed in each individual poly bags, arranged in rows on per treatment basis, giving a total of 210 stands of soursop in the nursery. Observations were made on all five (5) soursop stands in each treatment combinations.

*Experimental design:* Treatments consisted of two factors: hours of priming in coconut water (0, 12, 24, 36, 48, 60 and 72 hours) and seed weights {heavy weight (0.6 - 0.8 g) and light weight (0.3 - 0.5 g)}. The experiment was a 7 × 2 factorial laid out in completely randomized design with three replications.

*Nursery establishment:* The experiment was carried out in a nursery made of nets and transparent roof top. The perforated Nigerian Agro polybags of 39.00 × 52.50 cm dimensions were filled with standard nursery media (3 parts of poultry manure, 2 parts of topsoil and 1 part of river sand). Cured poultry manure was procured from a commercial broiler production unit of the University Teaching and Research Farm. River sand was collected in the river within the university. Two hundred and ten filled polybags were lined up in the nursery with labeled five polybags assigned to each treatment combinations. Fresh coconut water was obtained from fully matured coconut fruits in the Genetic Unit of the University. All seed weights were soaked, according to treatments before planting into polybags.

*Physical and chemical analysis of nursery media:* The particle size fractions were determined by the hydrometer method of Bouyoucos (1951) using sodium hexa metaphosphate as a dispersant. Samples of the cured poultry manure and topsoil were collected randomly from the bulk, air-dried in the laboratory under room temperature for 14 days. Soil pH was determined by the use of a pH meter (Hendershot *et al.*, 1993), organic matter values were obtained by multiplying total carbon with 1.724 (Van Bemmelen's correlation factor) (Nelson and Sommers, 1982), available phosphorus according to the procedure of Olsen and Sommers (1990), total nitrogen was by microkjeldahl digestion technique (Bremner and Mulvaney, 1982), calcium and magnesium by Versnate titration method and potassium by flame photometer method.

*Data collection and statistical analysis:* The following data were collected on five soursop seedlings; seedling emergence (days to first emergence, days to 50% emergence and percentage emergence), growth parameters (plant height, number of leaves, leaf length, leaf width) were measured at 3, 6 and 9 months after sowing (MAS), dry matter and root length were measured at 9 MAS. All data collected were subjected to analysis of variance (ANOVA) using Genstat 2011 and means were separated using the Fisher's least significant difference (LSD) at 5% level of significance.

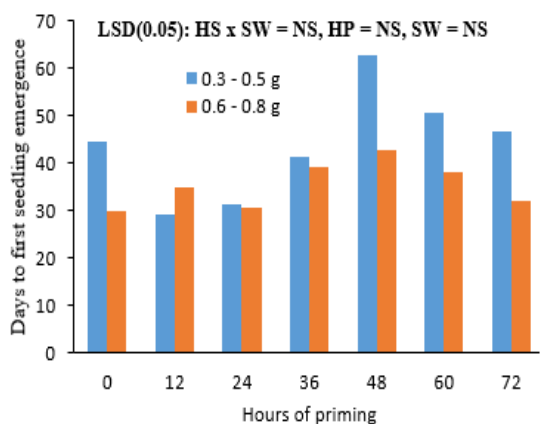
## RESULTS AND DISCUSSION

**Physical and chemical properties of standard nursery mixture:** Standard nursery mixture had high porosity and good water holding capacity. Result showed that standard nursery mixture had high organic matter content which was rich in nitrogen, phosphorus and potassium (Table 1).

**Table 1.** Physical and chemical properties of standard nursery mixture

Standard nursery mixture	
<b>Physical properties</b>	
Water holding capacity (%)	35.39
Bulk density (gcm <sup>-3</sup> )	1.38
Total porosity (%)	47.13
<b>Chemical properties</b>	
Organic matter (%)	3.82
Organic Carbon (%)	2.18
Total nitrogen (%)	0.07
Potassium (%)	0.09
Phosphorus (%)	0.03
pH (H <sub>2</sub> O) (%)	6.60

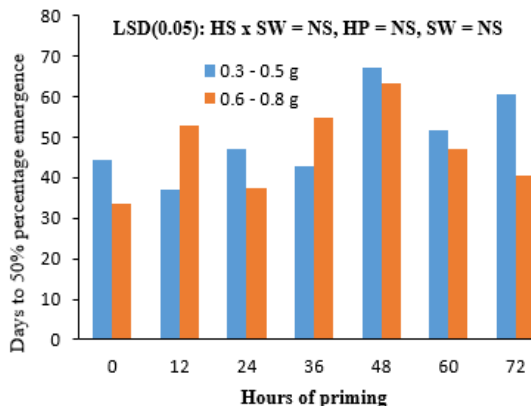
**Days to first seedling emergence:** Hours of priming of soursop seeds in coconut water did not significantly ( $P < 0.05$ ) affect days to first emergence (Fig. 1). On mean value basis, priming for 48 hours delayed emergence of soursop seedling (52.70 days) while soursop seeds primed in coconut water for 24 hours emerged earliest (31.00 days). Seed weight significantly affected days to first emergence. Emergence of soursop seedling was delayed in light seeds (43.80 days) while heavy seeds enhanced early emergence of soursop seedling (35.40 days).



**Fig. 1:** Effect of hours of priming in mature coconut water and seed weight on days to first emergence. HS = Hours of priming, SW = Seed weight, NS = Non-significant

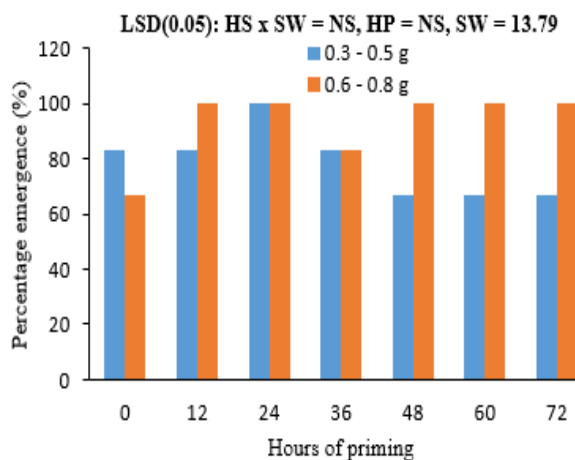
**Days to 50 percent emergence:** The results of days to 50 percent emergence of soursop seedling are presented in figure 2. Soursop seeds primed in coconut water did not significantly ( $P < 0.05$ ) vary in

their days to 50 % emergence. On mean value basis, priming for 48 hours delayed days to 50% emergence of soursop seedling (65.20 days) while soursop seeds sowed without priming in coconut water emerged earliest (39.00 days). Seed weight did not significantly affect days to 50 percent emergence. On mean basis, 50 percent of light seed emerged in 50.10 days while 50 percent of heavy seeds emerged in 47.10 days. Days to 50 percent emergence was not significantly affected by the interaction of seed weight and hours of priming in coconut water.



**Fig. 2:** Effect of hours of priming in mature coconut water and seed weight on days to 50 percent emergence. HS = Hours of priming, SW = Seed weight, NS = Non-significant

**Percentage emergence (%):** Percentage emergence was significantly affected by seed size (Fig. 3). Heavy seed promoted high percentage emergence (92.90 %) while light seed reduced percentage emergence (78.60 %). Percentage emergence was not significantly affected by hours of priming and interaction of hours of priming and seed weight.



**Fig. 3:** Effect of hours of priming in mature coconut water and seed weight on percent emergence. HS = Hours of priming, SW = Seed weight, NS = Non-significant

**Number of leaves:** The results of number of leaves at 3, 6 and 9 MAS are presented in Table 2. Priming in coconut water, seed weight and interaction of seed weight and hours of soaking in coconut water did not significantly ( $P < 0.05$ ) affect number of leaves at 3 MAS. At 6 MAS, soursop seed primed in coconut water did not significantly vary in their number of leaves. Seed weight significantly affected number of leaves. Heavy seed produced highest number of seeds (13.95) while light seed produced smallest number of leaves (12.67). Heavy seeds primed at 60 and 72 hours produced highest number of leaves (15.67) while light seed primed in coconut water for 24 hours produced least number of leaves (10.00). Seed primed for 48 hours in coconut water produced highest number of leaves (23.83) while seed primed for 24 hours in coconut water produced lowest number of leaves (12.33) at 9 MAS. Seed weight did not significantly affected number of leaves. Heavy seeds primed in coconut water for 48 hours produced highest number of leaves (25.67) while heavy seeds primed in coconut water for 24 hours produced smallest number of leaves (12.00).

hours of priming of soursop seed in coconut water did not significantly ( $p < 0.05$ ) affect soursop seedling height. Heavy seed produced tall seedling (13.91 cm) while light seed produced short seedling (11.39 cm). Heavy seed primed in coconut water for 72 hours produced tall seedling (16.03 cm) while heavy seed primed for 48 hours produced dwarf seedling (8.77 cm). At six MAS, hours of priming of soursop seeds in coconut water did not significantly affect plant height. Heavy seeds produced significantly tall seedling (22.95 cm) while light seed produced short seedling (18.45 cm). Priming of heavy seeds in coconut water for 60 and 72 hours produced tall soursop seedling (22.50 cm) while priming of heavy seed for 48 hours produced dwarf seedling (18.50 cm). At 9 MAS, hours of priming of soursop seeds in coconut water, seed weight and interaction of hours of priming and seed weight significantly ( $p < 0.05$ ) affected soursop seedling height. Heavy seeds produced tall seedling (28.40 cm) while light seed produced short seedling (26.32 cm). Priming of heavy seed in coconut water for 72 hours produced tall soursop seedling (34.67 cm) while priming of heavy seeds for 48 hours produced dwarf seedling (26.32 cm).

**Plant height (cm):** The results of soursop height at 3, 6 and 9 MAS are presented in table 3. At 3 MAS,

**Table 2:** Effect of hours of priming and seed weight on number of leaves at 3, 6 and 9 MAS

Hours of priming	Number of leaves 3 MAS			Number of leaves 6 MAS			Number of leaves 9 MAS		
	0.3 - 0.5 g	0.6-0.8 g	Mean	0.3 - 0.5 g	0.6 - 0.8 g	Mean	0.3 - 0.5 g	0.6 - 0.8 g	Mean
0	8.16	12.48	10.32	16.50	19.44	17.97	24.10	22.39	23.25
12	8.43	10.77	9.60	18.07	19.75	18.91	23.01	20.42	21.72
24	8.22	12.30	10.26	18.54	23.48	21.01	20.30	16.13	18.22
36	8.69	13.89	11.29	19.04	24.12	21.58	22.61	30.57	26.59
48	9.82	10.27	10.04	21.19	22.97	22.08	22.15	24.58	23.36
60	13.04	14.02	13.53	22.63	24.93	23.78	23.02	38.97	30.99
72	9.30	14.83	12.06	18.19	26.48	22.34	24.96	31.51	28.24
Mean	9.38	12.65		19.17	23.03		22.88	26.37	
LSD <sub>(0.05)</sub> Hours of priming	NS			NS			6.37		
LSD <sub>(0.05)</sub> Seed weight	1.43			2.24			3.40		
LSD <sub>(0.05)</sub> Hours of priming x seed weight	NS			NS			9.01		

**Table 3:** Effect of hours of priming and seed weight on plant height (cm) at 3, 6 and 9 MAS

Hours of priming	Plant height (cm) 3 MAS			Plant height (cm) 6 MAS			Plant height (cm) 9 MAS		
	0.3 - 0.5 g	0.6-0.8 g	Mean	0.3 - 0.5 g	0.6 - 0.8 g	Mean	0.3 - 0.5 g	0.6 - 0.8 g	Mean
0	10.83	15.17	13.00	19.83	27.17	23.50	24.67	30.17	27.42
12	11.67	14.80	13.23	20.83	22.50	21.67	28.00	22.00	25.00
24	11.67	15.17	13.42	18.00	22.83	20.42	25.00	22.67	23.83
36	11.00	13.83	12.42	16.83	24.67	20.75	26.27	28.83	27.55
48	11.60	8.77	10.18	20.83	18.50	19.67	29.17	26.17	27.67
60	11.93	13.60	12.77	18.17	22.50	20.33	26.83	34.33	30.58
72	11.00	16.03	13.52	14.67	22.50	18.58	24.33	34.67	29.50
Mean	11.39	13.91		18.45	22.95		26.32	28.40	
LSD <sub>(0.05)</sub> Hours of priming	NS			NS			3.73		
LSD <sub>(0.05)</sub> Seed weight	1.19			1.88			1.99		
LSD <sub>(0.05)</sub> Hours of priming x seed weight	3.24			4.96			5.28		

**Leaf length (cm):** The results of leaf length at 3, 6 and 9 MAS are presented in table 4. Hours of priming in coconut water and seed weight significantly ( $P < 0.05$ ) affected leaf length at 3 MAS. Seed primed in coconut water for 60 hours produced longest leaf (5.48 cm) while seed primed in coconut water for 12 hours produced shortest leaf (4.28 cm). Heavy seed produced longest leaf (5.08 cm) while light seed produced shortest leaf (4.29 cm). Interaction of seed weight and hours of soaking in coconut water did not significantly affect leaf length. Seed primed in coconut water for 48 hours produced longest leaf (7.23 cm) while seed primed in coconut water for 12 hours produced shortest leaf (6.20 cm) at 6 MAS. Heavy seed produced longest leaf (7.07 cm) while light seed produced shortest leaf (6.60 cm). Interaction of seed weight and hours of priming in coconut water did not significantly affect leaf length. Hours of priming in coconut water significantly affected leaf length at 9 MAS. Seed primed in coconut water for 48 hours produced longest leaf (8.03 cm) while seed primed in coconut water for 24 hours produced shortest leaf (5.73 cm). Seed weight did not significantly affect leaf length. Heavy seed primed at 60 hours produced

longest leaf length (8.93 cm) while heavy seed primed at 24 hours produced shortest leaf length (5.20 cm).

**Leaf width (cm):** The results of leaf width at 3, 6 and 9 MAS are presented in table 5. Hours of priming in coconut water did not significantly ( $P < 0.05$ ) affect leaf width at 3 MAS. Heavy seed produced broad leaf (2.48 cm) while light seed produced narrow leaf (2.18 cm). The interaction of seed weight and hours of priming in coconut water did not significantly affect leaf width. Hours of priming in coconut water did not significantly ( $P < 0.05$ ) affect leaf width. Heavy seed produced broad leaf (3.23 cm) while light seed produced narrow leaf (2.90 cm) at 6 MAS. The interaction of seed weight and hours of priming in coconut water did not significantly affect leaf width. At 9 MAS, hour of priming significantly affected leaf width. Soursop seed primed in coconut water for 60 hours produced broad leaf while soursop seed primed in coconut water for 24 hours produced narrow leaf. Seed weight and the interaction of seed weight and hours of priming in coconut water did not significantly affect leaf width.

**Table 4:** Effect of hours of priming and seed weight on leaf length (cm) at 3, 6 and 9 MAS

Hours of priming	Leaf length (cm) 3 MAS			Leaf length (cm) 6 MAS			Leaf length (cm) 9 MAS		
	0.3 - 0.5 g	0.6 - 0.8 g	Mean	0.3 - 0.5 g	0.6 - 0.8 g	Mean	0.3 - 0.5 g	0.6 - 0.8 g	Mean
0	3.767	5.00	4.38	6.03	6.37	6.20	6.77	6.87	6.82
12	3.867	4.70	4.28	6.33	6.80	6.57	6.63	5.90	6.27
24	3.833	5.00	4.42	6.53	7.17	6.85	6.27	5.20	5.73
36	3.933	5.23	4.58	6.57	7.30	6.93	6.33	7.73	7.03
48	4.833	4.17	4.50	7.33	7.13	7.23	7.30	7.37	7.33
60	5.300	5.67	5.48	7.13	7.13	7.13	6.60	8.93	7.77
72	4.500	5.80	5.15	6.27	7.57	6.92	7.57	8.50	8.03
Mean	4.29	5.08		6.60	7.07		6.78	7.21	
LSD <sub>(0.05)</sub> Hours of priming	0.70			0.65			1.09		
LSD <sub>(0.05)</sub> Seed weight	0.37			0.35			NS		
LSD <sub>(0.05)</sub> Hours of priming x seed weight	NS			NS			1.54		

**Table 5:** Effect of hours of priming and seed weight on leaf width (cm) at 3, 6 and 9 MAS

Hours of priming	Leaf width (cm) 3 MAS			Leaf width (cm) 6 MAS			Leaf width (cm) 9 MAS		
	0.3 - 0.5 g	0.6 - 0.8 g	Mean	0.3 - 0.5 g	0.6 - 0.8 g	Mean	0.3 - 0.5 g	0.6 - 0.8 g	Mean
0	2.17	2.50	2.33	2.73	3.03	2.88	3.57	3.27	3.42
12	2.17	2.30	2.23	2.83	2.90	2.87	3.37	3.43	3.40
24	2.10	2.47	2.28	2.83	3.27	3.05	3.20	3.07	3.13
36	2.23	2.63	2.43	2.90	3.30	3.10	3.43	3.93	3.68
48	2.03	2.47	2.25	2.87	3.20	3.03	3.10	3.40	3.25
60	2.47	2.43	2.45	3.17	3.43	3.30	3.57	4.43	4.00
72	2.10	2.53	2.32	2.97	3.50	3.23	3.40	3.63	3.52
Mean	2.18	2.48		2.90	3.23		3.38	3.60	
LSD <sub>(0.05)</sub> Hours of priming	NS			NS			0.46		
LSD <sub>(0.05)</sub> Seed weight	0.15			0.18			NS		
LSD <sub>(0.05)</sub> Hours of priming x seed weight	NS			NS			NS		

**Root length (cm):** Hours of priming in coconut water, seed weight and interaction of seed weight and hours

of priming in coconut water significantly ( $P < 0.05$ ) affected root length at 9 MAS. Seeds primed in

coconut water for 60 hours produced long root (21.33 cm) while unprimed seeds produced short root (10.33 cm) (Fig. 4). Heavy seed produced long root (15.78 cm) than light seed (14.88 cm) (Fig. 5). Heavy seed primed for 60 hours produced long root (22.00 cm) while heavy seed primed for 12 hours produced short root (9.77 cm) (Fig. 6).

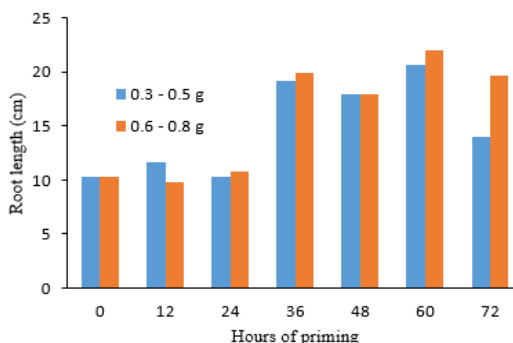


Fig. 4: Effect of hours of priming in mature coconut water and seed weight on root length (cm)  
HS = Hours of priming, SW = Seed weight

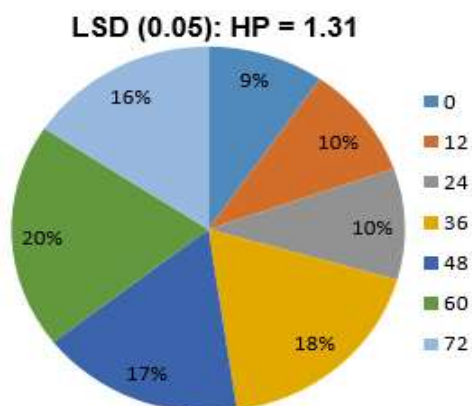


Fig. 5: Effect of hours of priming on root length (cm) LSD (0.05); HP = 1.31 HP = Hours of priming; SW = Seed weight

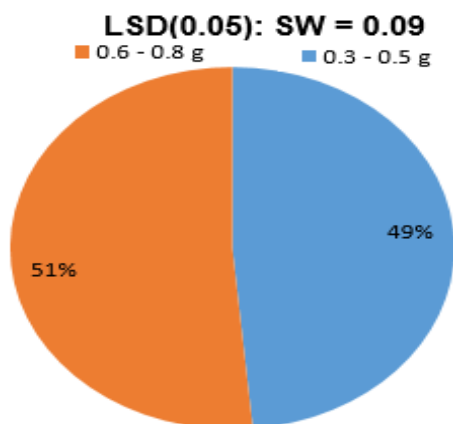


Fig. 6: Effect of seed weight on root length (cm) LSD (0.05); SW = 0.09 HP = Hours of priming; SW = Seed weight

Dry matter (g): Soursop dry matter was significantly ( $P < 0.05$ ) affected by hours of priming, seed weight and interaction of hours of priming and seed weight. Seed primed in coconut water for 60 hours produced highest dry matter (3.60 g) while seed primed in coconut water for 12 hours produced the least dry matter (1.80 g) (Fig. 7). Dry matter of soursop decreased as priming hours increased to 72 hours (2.69 g). Heavy seed produced highest dry matter (3.00 g) while light seeds produced least dry matter (2.32 g) (Fig. 8). Heavy seed primed at 60 hours produced highest dry matter (4.20 g) while light seed primed at 72 hours produced least dry matter (1.55 g) (Fig. 9).

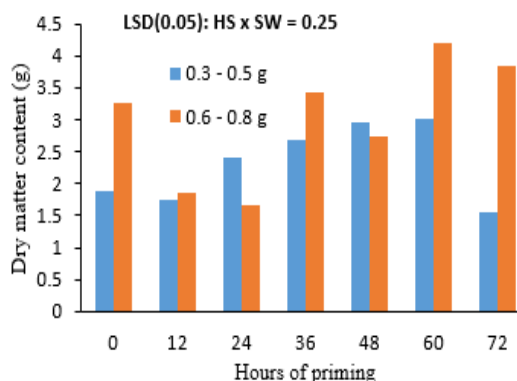


Fig. 7: Effect of hours of priming in mature coconut water and seed weight on dry matter content (g).  
HS = Hours of priming, SW = Seed weight

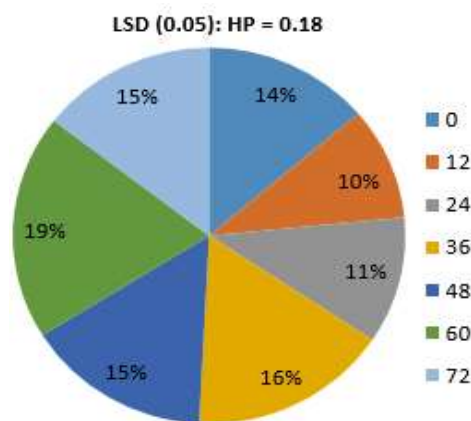
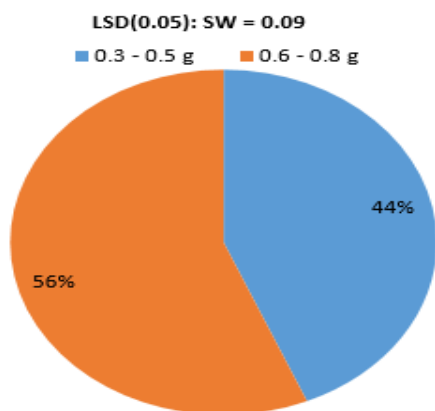


Fig. 8: Effect of hours of priming on dry matter content (g plant<sup>-1</sup>)  
HS = Hours of priming SW = Seed weight

Relationship between leaf width, leaf length and root length with soursop dry matter content at 9 MAS: There was a significant ( $p < 0.05$ ) positive correlation between dry matter content and leaf length, leaf width and root length (Table 6). Consequently, increase in dry matter content of soursop seedling could be associated with increase in root length, leaf length and leaf width.





**Fig. 9:** Effect of seed weight on dry matter content ( $\text{g plant}^{-1}$ ) HS = Hours of priming SW = Seed weight

**Table 6:** Simple linear correlation between dry matter content and root length, leaf length and leaf width

	Root length	Leaf length	Leaf width	Number of leaves
Dry matter	0.90**	0.77*	0.78*	0.64 <sup>ns</sup>

\*Significant at 5% probability level, \*\*Significant at 1% probability level, ns = non-significant

**Effect of hours of priming in coconut water and seed weight on seedling emergence:** Non-significance of days to 50 percent emergence as a result of seed weight is in agreement with the observation of Okoli *et al.*, (2020) which reported non-significant effect of seed weight and nursery media on days to 50 percent emergence of soursop seedling. Seedling emergence was positively influenced by priming in mature coconut water. Priming in coconut water activates germination processes in the dormant soursop seeds (Origenes and Lapitan, 2020). Coconut water also contains growth regulators that favour plant improvement and regeneration (Dada *et al.*, 2019). Early emergence of heavy soursop seed was obtained by Okoli *et al.*, (2020) in their study of emergence of soursop as influenced by seed weight and nursery media. Early emergence of heavy seeds could be as a result of higher stored food in heavy seeds which influenced germination (Willie *et al.*, 2018).

**Effect of hours of priming in coconut water and seed weight on shoot growth:** Tall seedling, number of leaves, leaf length and leaf width were significantly improved in seeds primed in mature coconut water. This could be as a result of inducement of growth by coconut water which contains active growth regulators such as amino acids, nitrogenous compounds, organic acids, enzymes, sugars and lipids (Arditi, 2008; Yong *et al.*, 2009). Priming of soursop seed in mature coconut water produced seedlings that were active, bigger and more robust than those in the control

(Yong, 2009). Hormonal priming of soursop seeds consistently had longest leaf length, shoot length and number of leaves (Narjorda and Rosales, 2019; Singh and Maheswari 2017). Heavy seed showed early emergence and improved growth parameters which could be attributed a higher food reserve that affected emergence, vigorous growth and seedling establishment (Modupeola *et al.*, 2014; Okoli *et al.*, 2020).

**Effect of hours of priming in coconut water and seed weight on root length:** The improvement in root length in seed primed in coconut water could be as a result of high content of growth regulators in coconut water. Coconut water is a rich supplement that naturally contains plant growth regulators such as indole acetic acid (IAA) and has been reported to induce adventitious root development in *Dracaena purplecompacta* L (Agamopodi and Jayawardena, 2008). Singh and Maheswari (2017) reported improved soursop root length using 500 ppm GA3 than using water.

**Effect of hours of priming in coconut water and seed weight on seedling dry matter content:** Seed primed in coconut water had overall improved growth and consequently dry matter content. Priming of seeds in growth hormones improved soursop seedling dry weight (Najorda and Rosales, 2019). Higher dry matter content in heavy seeds is related to higher food reserves in the seeds which produced seedlings with thicker stems than those raised from light seeds (Willie *et al.*, 2018).

**Correlation between dry matter content, leaf length, leaf width, root length and number of leaves:** The significant positive correlation between dry matter content, leaf length, leaf width, and root length could be attributed the increase in the leaf size and root length. Roots absorb nutrients and water from the soil which are used by the leaves to produce photosynthates that are transported to the stem and roots and the leaves. A close association between dry matter content and growth parameters was reported (Mbah and Eke-Okoro, 2015).

**Conclusion:** In this study, we highlighted the roles of hours of priming in coconut water and seed weight as a pre-sowing treatment and important agronomic factor respectively. The results revealed that hours of priming in coconut water and seed weight can regulate seedling emergence and juvenile growth in soursop. Coconut water contains natural growth hormone that promoted active root and shoot development and high

dry matter content at juvenile growth phase. Heavy seed contains higher food reserve that encouraged early emergence of seedlings and sustained vigorous juvenile growth. The implication of the observed effect of priming of heavy seeds of soursop in coconut water is seen in the development of healthy and vigorous seedlings of soursop for plantation establishment.

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