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# THE EFFECTS OF GROWTH HORMONES ON THE PROPAGATION OF QUEEN OF THE NIGHT (*Mussaenda philippica*)

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## ABSTRACT

An experiment work was carried out in the horticultural nursery of the Crop Production Department federal University of Technology Gidan-Kwano campus Minna on a on a Latitude 6°30'E and Longitude 9°40'N and between the period of April to August, 2018.

The study was carried to determine the effect of Coconut water and Apple vinegar on growth and flower yield of the plant Queen of Philippine (*Mussaenda philippica*). The plant was cut to sizes of 15cm each using a secateurs and was propagated in a poly pot. The experiment was laid down in a complete randomize design, replicated five (5) times. Two different growth hormones: Coconut water and Apple Vinegar were used at different dipping duration while a replicate of the plant were planted without immersing in any growth hormone, this serve as the control. The result indicates that there was a significant different at ( $P \leq 0.05$ ) on the number of leaves, leaf area and Shoot length with Stem treated with coconut water and apple vinegar when compare to the control at 5, 8, and 9 weeks after planting showed that stem dipped in coconut water had good performance in growth parameters than those dipped in Apple Vinegar. Dipping duration was also significantly different from each other such that stem cutting dipped in coconut water for three hours performed better than any other dipping duration. While there was also a significant different ( $P \leq 0.05$ ) dipping duration between Coconut water and that of the Apple Vinegar. It therefore indicates that coconut water and Apple Vinegar can be explored as a potential growth hormone in plant breeding.

**Keywords:** Queen of Philippine (*Mussaenda philippica*), Coconut water, Apple Vinegar, and Dipping duration.

## INTRODUCTION

Flowers have always remained an integral part of mankind; love for natural flowers is an inherent instinct. Fresh flower are quite attractive, but very expensive and short lived as well as available only during a particular season. Apart from their uses for beautification and landscaping, flowers are also known to contain some phytochemicals which are of benefits for medicinal purposes.

*Mussaenda* species are member of the Rubiaceae (madder or Coffee family) and are native to old world tropics from West African through the Indians Sub-continent, South East Asia and into the southern China. Some species of *Mussaenda* have been used in Chinese and Fisian traditional

medicines (Roberts, 1991). It is an important focal spot plant, useful as medicine for curing various ailments (Kamurthy, *et al.*, 2014), thus it becomes the favourite of gardeners and customers and are therefore grown in almost every garden in cities and towns in Nigeria. (Bose, 1986),

Plant growth regulators (PGRs) are chemicals that are designed to affect plant growth and/or development and applied for specific purposes to elicit specific plant responses (Joyce, 2012). Controlling plant size is one of the most important aspects in floricultural crops which can be achieved genetically, environmentally, culturally or chemically. However, effective strategy for controlling plant height is to use plant growth retardants. These PGRs reduce plant height by inhibiting the production of gibberellins (hormones responsible for cell elongation) by interfering gibberellin biosynthesis pathway in treated plants (Latimer, 2009). Therefore it is on this basis that this research is aimed at finding out the effect of growth hormones on *Mussaenda philippica*

Plant growth substances have key role in different physiological processes related to growth and development of crops. It is obvious that changes in the level of endogenous hormones due to biotic and abiotic stress alter the crop growth and any sort of manipulation including exogenous application of growth substances would help for yield improvement or at least sustenance of the plants. Hormones usually move within plant from a site of production to site of action. Phytohormones are physiological intercellular messengers that are needed to control the complete plant lifecycle, including germination, rooting, growth, flowering, fruit ripening, foliage and death. Therefore this study seeks to evaluate the effect of growth hormones (Coconut water and Apple Vinegar on *Mussaenda Philippines* becomes necessary.

## **MATERIALS AND METHODS**

The experiment was carried in the horticultural nursery of Crop Production department school of Agriculture and Agricultural technology, Federal University of Technology Minna, Niger State, Nigeria on a Latitude 6<sup>o</sup>30'E and Longitude 9<sup>o</sup>40'N

The materials used for the implementation of this research work includes the followings *Mussaenda philippica* stem, Coconut water & Apple Vinegar, Beaker, Scateur, Wooden pole for shading, Measuring tape and rule, Polythene container, Top soil, Rope for security.

The cutting of the plant material for the experiment were collected from established parent plant from Danjuma's garden beside Union bank Tunga Minna Niger State. The natural growth hormones was derived from a matured coconut fruit and apple vinegar purchased from Kure Ultra Modern Market

The plant cutting were obtained from Danjuma's garden beside Union bank Tunga, Minna the length was 15 cm. Secateurs was used in cutting the plant and the leaves were removed gently to avoid injuries, thereby inhibiting its exposure to pest and insect attacks. The cuttings were planted by inserting each single plant into an already prepared soil. Planting was done immediately the cutting was obtained and dipped in coconut water why the planting process was also done by gently inserting the moist cutting into the media therein.

Routine weeding was carried out by hand picking and insect pest were also pick and destroyed all through the period of the experiment. The experiment was laid out in complete randomized block design. The treatments were two (2), with Five (5) replication. Two different growth hormones (Coconut water and Apple Vinegar) were used while a replicate of the plant was

planted without immersing in any growth hormone, this serve as the control. Five (5) stem of the plant of the same size were dipped in coconut water for One (1) hour before planting, another group of Five (5) stem were dipped for two (2) hours and the last group which serve as control were planted without dipping in any solution. Data was recorded at weekly interval as from four weeks after cuttings were planted, the data collected on growth parameter were; number of leaf, shoot length and leaf area. The data collected were subjected to analysis of variance (ANOVA) using SAS and means were separated using Least Significant Difference at 5% probability level.

## RESULTS AND DISCUSSION

The effect of growth hormones and dipping duration on propagation success of queen of Philippine on number of leaves is shown in Table 1.

**Table 1:** Effect of growth hormones and dipping duration on Number of leaves of Queen of the Philippines

TREATMENT	Weeks After Planting (WAP)						
	4	5	6	7	8	9	10
<b>Hormones(H)</b>							
<b>Coconut Water</b>	0.50 <sup>a</sup>	2.85 <sup>a</sup>	5.40 <sup>a</sup>	8.20 <sup>a</sup>	10.55 <sup>a</sup>	11.90 <sup>a</sup>	13.25 <sup>a</sup>
<b>Apple Vinegar</b>	0.30 <sup>a</sup>	0.50 <sup>b</sup>	1.75 <sup>b</sup>	4.35 <sup>a</sup>	6.45 <sup>b</sup>	8.55 <sup>b</sup>	9.70 <sup>b</sup>
<b>LSD (0.05)</b>	0.66	1.52	1.37	2.36	2.46	2.49	2.42
<b>DIPPING DURATION(D)</b>							
<b>1 Hour</b>	1.00 <sup>a</sup>	2.00 <sup>ab</sup>	5.20 <sup>ab</sup>	8.00 <sup>a</sup>	10.40 <sup>a</sup>	11.70 <sup>a</sup>	13.40 <sup>a</sup>
<b>2 Hour</b>	0.40 <sup>ab</sup>	1.90 <sup>ab</sup>	3.40 <sup>b</sup>	5.80 <sup>a</sup>	7.70 <sup>ab</sup>	9.80 <sup>ab</sup>	10.90 <sup>ab</sup>
<b>3 Hour</b>	0.20 <sup>ab</sup>	2.80 <sup>a</sup>	5.50 <sup>a</sup>	9.10 <sup>a</sup>	11.00 <sup>a</sup>	12.60 <sup>a</sup>	13.40 <sup>a</sup>
<b>Control</b>	0.00 <sup>b</sup>	0.00 <sup>b</sup>	0.20 <sup>c</sup>	2.20 <sup>b</sup>	4.90 <sup>b</sup>	6.80 <sup>b</sup>	8.20 <sup>b</sup>
<b>LSD (0.05)</b>	0.93	2.15	1.94	3.34	3.48	3.52	3.42
<b>Interaction</b>							
<b>HXD</b>	NS	NS	*	NS	NS	NS	NS

Mean with the same letter (s) under the same column are not significantly different at ( $P \leq 0.05$ ) by LSD

The result showed that use of hormones had a significant ( $p \leq 0.05$ ) effects on number of leaves at 5,8,9 and 10 WAP, with the use of coconut water which constantly produce higher number of leaves than the use of apple vinegar. Dipping duration also had significant ( $P \leq 0.05$ ) effects on

number of leaves. Dipping for 3 hours produces higher number of leaves though statistically similar with dipping for 1 and 2 hours. Control produces the least number of leaves. The interaction was significant at 6WAP only.

**Table 2:** Effect of growth hormones and dipping duration on Shoot Length (cm) of Queen of the Philippines

TREATMENT	Weeks After Planting (WAP)						
	4	5	6	7	8	9	10
<b>Hormones(H)</b>							
<b>Coconut Water</b>	0.0	1.36 <sup>a</sup>	2.42 <sup>a</sup>	4.15 <sup>a</sup>	5.72 <sup>b</sup>	7.57 <sup>a</sup>	8.84 <sup>a</sup>
<b>Apple Vinegar</b>	0.0	0.80 <sup>b</sup>	0.29 <sup>b</sup>	1.93 <sup>b</sup>	3.97 <sup>b</sup>	6.19	8.88 <sup>a</sup>
<b>LSD (0.05)</b>		0.79	1.23	1.13	1.35	1.58	1.98
<b>DIPPING DURATION</b>							
1 Hour	0	2.35 <sup>a</sup>	2.35 <sup>a</sup>	4.16 <sup>ab</sup>	5.51 <sup>ab</sup>	7.57 <sup>ab</sup>	10.29 <sup>a</sup>
2 Hours	0	0.64 <sup>a</sup>	1.09 <sup>ab</sup>	2.69 <sup>b</sup>	4.69 <sup>b</sup>	6.08 <sup>bc</sup>	7.35 <sup>b</sup>
3 Hours	0	1.31 <sup>a</sup>	1.96 <sup>a</sup>	4.25 <sup>a</sup>	7.12 <sup>b</sup>	9.09 <sup>a</sup>	10.23 <sup>a</sup>
Control	0	0.28 <sup>a</sup>	0.006	0.55 <sup>c</sup>	2.02 <sup>b</sup>	4.77 <sup>c</sup>	5.55 <sup>b</sup>
<b>LSD (0.05)</b>	0	1.12	1.80	1.60	1.91	2.24	2.31
<b>Interaction</b>							
<b>HXD</b>	NS	NS	NS	NS	NS	NS	NS

Mean with the same letter (s) under the same column are not significantly different at ( $P \leq 0.05$ ) by LSD

The effect of growth hormone and dipping duration on propagation success of Queen of Philippine on shoot length is shown in table 2. The use of hormones had a significant effect on shoot length at 5, 6, 7, and 8 WAP respectively. The use of coconut water produce longer shoot when compared with apple vinegar which consistently produce shorter shoot. Dipping duration also had a significant effect ( $p \leq 0.05$ ) on shoot length at 6, 7, 8, 9 and 10 WAP Dipping for 3 hours in coconut water consistently produced longer shoot length when compare with that of Apple vinegar and statistically similar with dipping for one hour while control produce shorter shoot length though statically similar with dipping for 2 hours, at 6, 9 and 10 WAP the interaction was not significant.

**Table 3:** Effect of growth hormones and dipping duration on Leaf Area (cm<sup>2</sup>) of queen of the Philippines

TREATMENT	Weeks After Planting (WAP)						
	4	5	6	7	8	9	10
<b>Hormones(H)</b>							
<b>Coconut Water</b>	2.43 <sup>a</sup>	2.73 <sup>a</sup>	3.28 <sup>a</sup>	4.09 <sup>a</sup>	5.36 <sup>a</sup>	8.21 <sup>a</sup>	16.41 <sup>a</sup>
<b>Apple Vinegar</b>	2.12 <sup>a</sup>	2.48 <sup>a</sup>	2.97 <sup>a</sup>	3.72 <sup>a</sup>	4.89 <sup>a</sup>	7.43 <sup>a</sup>	14.84 <sup>a</sup>
<b>LSD (0.05)</b>	0.58 <sup>a</sup>	0.67	0.81	1.01	1.22	2.02	4.03
<b>DIPPING DURATION(H)</b>							
<b>1 Hour</b>	2.51 <sup>a</sup>	2.93 <sup>a</sup>	3.52 <sup>a</sup>	4.04 <sup>a</sup>	5.87 <sup>a</sup>	8.81 <sup>a</sup>	17.58 <sup>a</sup>
<b>2 Hour</b>	2.45 <sup>a</sup>	2.86 <sup>a</sup>	3.43 <sup>a</sup>	4.28 <sup>a</sup>	5.62 <sup>a</sup>	8.60 <sup>a</sup>	17.18 <sup>a</sup>
<b>3 Hour</b>	2.37 <sup>ab</sup>	2.77 <sup>ab</sup>	3.33 <sup>ab</sup>	4.16 <sup>ab</sup>	5.54 <sup>a</sup>	8.31 <sup>ab</sup>	16.6 <sup>ab</sup>
<b>Control</b>		1.86 <sup>ab</sup>	2.23 <sup>b</sup>	2.79 <sup>b</sup>	3.48 <sup>b</sup>	5.57 <sup>b</sup>	11.14 <sup>b</sup>
<b>LSD (0.05)</b>	0.8	2.45	1.14	1.12	2.01	2.85	5.69
<b>Interaction</b>							
<b>HXD</b>	NS	NS	NS	NS	NS	NS	NS

Mean with the same letter (s) under the same column are not significantly different at (P≤0.05) by LSD

The effects of growth hormones and dipping duration on propagation success of Queen of Philippines on leaf area are shown in table 3. Leaf area was not significantly different between the two growth hormones used in the study. Dipping duration had a significant effect (p0.05) on leaf area throughout the sampling period, dipping duration of one and two hours consistently produce similar wider leaf area, while control produce smaller leaf area. The interaction was not significant.

### DISCUSSION

The highest number of leaves and long shoots length was produce with the use of coconut water this could be attributed to availability of phytohormones in the coconut water which helps in regulating and developing the process of growth of queen of the Philippine, this finding is in conformity with the report of Mukhtar (2008) and Jean *et al.*, 2004 which stated that 10% coconut milk produce higher number of leaves of queen of the Philippine

The highest number of leaves, longest shoots and widest leaves area was produced with dipping the cutting in the hormones for three hours, although it is statistical similar to one and two hours

dipping duration. This could be attributed to absorption of more phytohormones at the highest duration of dipping which enhance the growth process of queen of Philippines. This finding is in line with the result of Ghoname et al., 2011 who reported that higher germination percentage with 40 seconds dipping in growth hormones shows a significant difference when compared to that of control.

## CONCLUSION

Based on the result obtained from this study where dipping duration of 3 hours consistently showed better performance of parameters measured, it is therefore recommended that using coconut water for 3 hours for the propagation of Queen of the Philippines will enhance mass propagation of the ornamental plants.

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