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EFFECTS OF TWO EDIBLE FRUITS ON THE GROWTH PERFORMANCE OF AFRICAN GIANT LAND SNAIL (*Archachatina marginata Swainson*)

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ABSTRACT

This study evaluated the effects of two edible fruits: banana and pawpaw fruits on the growth performance of the African giant land snail (*Archachatina marginata).* The study was conducted in Asaba, Delta State, Nigeria in 2007. The snails were fed on both the unripe and ripe banana and pawpaw fruits, which served as the treatments over a period of 12 weeks. Results showed that significant differences ($P \leq 0.05$) existed in the snails (in terms of weight, length and width of the snail shell as well as the dry matter intake) fed on both the unripe and ripe fruits. On the whole, *Archachatina marginata* fed on ripe banana fruits performed significantly ($P \leq 0.05$) better when compared with those fed on the unripe banana, and the unripe and ripe pawpaw. This study has demonstrated that different edible fruits have significant effects on the growth performance of *Archachatina marginata* with the snails performing better when fed on ripe banana fruits. Ripe banana fruits are therefore, recommended to snail farmers in the rural areas of Nigeria for optimum growth of *A. marginata.*

Keywords: fruits, banana, pawpaw, *Archachatina marginata,* snail, growth performance.

INTRODUCTION

The African giant land snail *Archachatina marginata* constitutes a vital aspect of the diet of many people in Nigeria as well as other areas of the country. Domesticated snails provide a cheap source of animal protein required for healthy living thus preventing some nutritional diseases. Snail's meat is tasty, tender and highly nutritional (Eruvbetine *et al.*, 1997). Eruvbetine *et al*. (1997) maintained that snail meat is particularly rich in protein and iron. Imevbore and Ademosum (1988) stated that the protein in snails is of good quality with high levels of lysine, leucine, isoleucine and phenylalacine. The meat content of snails has been reported to cause reduction in the labour pain and loss of blood during labour, restoration of virility and fertility in human beings. It is used in the treatment of small pox and heart-related diseases (Imevbore and Ademosun, 1988). Imevbore and Ademosun (1988) also maintained that the serotonin secreted in the snails' body is effective in the maintenance of normal behaviour after mental depression. The iron content of the snail meat is about 50% hence recommended for the treatment of anemia (Hodasi, 1986; Okafor, 2001). Other minerals including calcium, potassium, copper, phosphorus is also found in appreciable quantities in the snail. Snails are also low in cholesterol hence recommended for the treatment of arteriosclerosis and have hypertension-reducing effects (Ejidike, 2002). The relatively low lipid content of the snail makes it important and beneficial to patients with fat related ailments (FAO, 1986).

Snails are invertebrates, nocturnal animals with soft bodies that are covered with shell (exoskeleton) (Ayodele and Asimalou, 1999; Wosu, 2003). Eruvbetine *et al.* (1997) noted that snails eat predominatntly vegetables and can utilize a number of feeds for growth. General observations have shown that snails can survive on most food taken by man and can also be fed on compounded and supplemented ration. Adult snails according to Akinnusi (1997) can eat tender flower, vegetable plants including lettuce, cabbage, egg plant, banana, pawpaw, pineapple, cooked potatoes, cocoyam, oranges etc.

In search of a cheap source to conventional protein sources, domestication and intensive management of the edible land snail is inevitable. Snail farming could go a long way to solving some health and unemployment problems thereby increasing the protein intake of an average Nigerian. To this end, the need to have baseline information on the effect of readily available edible fruits on the growth performance and development of land snail with a view to enabling farmers to have the knowledge on the available and cheap feeds for raising snails cannot be overemphasized. This study was therefore, undertaken to evaluate the effects of two edible fruits (ripe and unripe banana and pawpaw) on the growth performance of *Archachatina marginata.*

MATERIALS AND METHODS

The experiment was carried out at the Department of Forest and Wildlife, Delta State University, Asaba Campus (Latitude; 6^0 14^1N; Longitude 6^0 49^1 E ; temperature 28 ± 6^0C; rainfall 1,505-1, 849.3mm; relative humidity 69-80% and sunshine 4.8 bars), which is located in the rainforest agro-ecological zone (Asaba Meteorological Station, 2007).

Sixty grower snails of the specie *Archachatina marginata* with weight ranging from 95-120g were procured from local market (Ugbolu) in Oshimili Local Government of Delta State Area were they quarantined for two weeks to get them adapt to the experimental diets. A local house was built with bamboo and palm fronts in such a way as to provide shade and protect the snails from the vagary of the weather especially against desiccation. Twelve (12) round perforated baskets made of raffia each with dimension 46cm in diameter and a height of 34cm were purchased from the local market plus an additional

twelve plastic baskets with covers. The plastic baskets were placed on top of the raffia baskets, which in turn were turned upside down. Topsoil was collected from the Gmelina plantation at the back of the Department of Forestry and Wildlife, sun dried and sieved before it was introduced to the plastic baskets. The experimental snails were weighed individually and randomly into the plastic baskets.

A total of sixty (60) grower snails (*A. marginata)* were used for the study and unripe pawpaw, ripe pawpaw, ripe banana and unripe banana served as the treatments. The set up was laid out in a complete randomized design (CRD) replicated three times. The diets were given to the snails every other day and during dusk since snails are nocturnal and so more active at night. The feeds were supplied in the plastic baskets properly labeled to avoid any mix up. Water was sprinkled on the snails twice a day to keep them moist and prevent dehydration. The plastic baskets, which contained five (5) snails each, were filled with rich topsoil. They were regularly cleaned to remove droppings and wastes in form of left over feeds from them before fresh feeds were supplied. The soil was replaced forth nightly and the surrounding kept weed free and sprinkled with spent engine oil to avoid ants invasion following the procedure of Eruvbetine *et al.* (1997).

The parameters measured were weights of snail, length and width of shell. Body weights were measured using balance in grams. The shell length was measured along the axis of the snails using the measuring tape to the nearest centimeter. The shell width was also measured around the largest position of the shell using also the measuring tape to the nearest centimeter. The data generated were subjected to a one-way analysis of variance (ANOVA). Significant treatment means were separated with the Duncan's multiple range tests (DMRT) using SAS (1996).

RESULTS AND DISCUSSIONS

The weight of *Archachatina marginata* (Table-1) shows that there was a progressive increase in weight gain over time in all groups. The results also indicated that the weight of *A. marginata* fed on the ripe fruits (paw paw and banana) was significantly higher ($P \leq 0.05$) compared with those fed on the unripe pawpaw and banana fruit (Table-1).

Significant differences ($P \leq 0.05$) were also observed in the length of snails shells fed on both the unripe and ripe banana fruits in weeks 2 and 4 when compared with those fed on the unripe and ripe pawpaw fruits (Table-2). For example, at weeks 2 and 4, the length values of snails shell fed with the unripe and ripe banana were 7.4; 7.83cm and 7.46; 7.88cm, respectively. These values differed significantly ($P \leq 0.05$) from those obtained for unripe (7.18 and 7.37cm) and ripe (7.26 and 7.44cm) pawpaw fruit respectively (Table-2).

The effect of different edible fruits on the performance (width) of *A. marginata* is presented in Table-3. Significant differences ($P \leq 0.05$) were noticed in the width of the snails' shell fed on both unripe and ripe banana fruits when compared to snails' shells fed on the unripe and ripe pawpaw fruits. Snails fed on both the unripe and ripe banana were also significantly different ($P \leq 0.05$) from those fed on unripe and ripe pawpaw in terms of dry matter intake (Table-4). Similar increased weight gain with time had been reported by Imevbore and Ajayi (1993) for the *A. marginata*. Imevbore and Ademosum (1988) demonstrated that snails have a potential of utilising some cheap feeding materials to attain appreciable weight increase over a period of time.

The observed increase in both the length and width of the test animal is not out of place. As the body weight increased, there seemed to be a corresponding increase in size probably due to the expansion of the shell. This observation is consistent with the finding of Omole *et al.* (1999) who noted an increase in the length and diameter of land snails fed on fruits. The increased dry matter intake in the banana (unripe and ripe) could be seen as a physiological adaptation of *A. margina*ta to convert banana fruits to used forms than pawpaw.

This study has demonstrated that different edible fruits have a significant effect on the growth performance of *Archachatina marginata* with the snail performing better when fed on ripe banana fruits. Ripe banana fruits are therefore, recommended to snail farmers in the rural areas of Nigeria for optimum growth. Ripe pawpaw fruits could also used as a cheap source of feed to *Archachatina marginata.*

Table-1: Weight (g) of *A. marginata* as affected by different edible fruits.

	Weight over time (wks)						
Edible fruits	**2**	**4**	**6**	**8**	**10**	**12**	**Means**
Unripe pawpaw	100.6c	103.8b	105.8b	108.2c	112.06	115.3b	107.6
Ripe pawpaw	102.1b	105.25	109.7a	110.3b	113.9a	117.6a	109.8
Unripe banana	98.30c	101.4c	103.6c	108.4c	110.2b	114.5b	106.1
Ripe Banana	104.2a	106.8a	109.3a	112.1a	114.3a	116.7a	110.6
Means	101.3	104.3	107.1	109.8	112.6	116.0	

Means with same letter within the same week are not significantly different at 0.05 using the Duncan's multiple range tests.

Table-2: Length (cm) of *A. marginata* shell as influenced by different edible fruits.

	Length over time (wks)						
Edible fruits	**2**	**4**	**6**	**8**	**10**	**12**	**Means**
Unripe pawpaw	7.18b	7.37b	7.79a	8.20b	8.41c	8.48c	7.91
Ripe pawpaw	7.26b	7.44b	7.98a	8.31b	8.52b	8.92c	8.07
Unripe banana	7.41a	7.83a	8.32a	8.68a	8.96a	9.41	8.44
Ripe Banana	7.46a	7.88a	8.35a	8.78a	8.99a	9.69a	8.52
Means	7.33	7.63	8.11	8.48	8.72	9.13	

Means with letter within the same week are not significantly different at 0.05 using the Duncan's multiple range tests.

Table-3: Width (cm) of *A. marginata* shell as affected by different edible fruits.

	Width over time (wks)						
Edible fruits	**2**	**4**	**6**	**8**	**10**	**12**	**Means**
Unripe pawpaw	14.01b	14.56b	15.41b	15.89b	16.30b	17.07c	15.54
Ripe pawpaw	14.32b	14.81b	15.46b	15.96b	16.38b	17.92b	15.81
Unripe banana	15.02a	15.87a	16.71a	17.33a	17.82a	18.43a	16.86
Ripe Banana	15.34a	15.96a	16.87a	17.38a	17.92a	18.67a	17.02
Means	14.67	15.30	16.11	16.64	17.11	18.02	

Means with same letters within the same week are not significantly different at 0.05 using the Duncan's multiple range tests.

Table-4: Dry matter intake of *A. marginata* shell as affected by different edible fruits.

	Dry matter/week						
Edible fruits	**2**	**4**	**6**	**8**	**10**	**12**	**Means**
Unripe pawpaw	38.63b	40.84c	56.72c	38.41b	50.42c	54.74b	46.63
Ripe pawpaw	40.14b	48.62b	58.43b	40.73b	48.93d	55.70b	48.76
Unripe banana	48.60a	54.70a	60.71a	54.49a	52.46b	54.70b	54.28
Ripe Banana	49.62a	58.71a	58.62b	56.74a	58.70a	57.84a	56.71
Means	44.25	50.72	58.62	47.59	52.63	55.75	

Means with same letters within the same week are not significantly different at 0.05 using the Duncan's multiple range tests.

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