

Ecological characteristics for locating snails in the wild

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Abstract

The survey of the ecological status of the snails was carried out within Federal University of Agriculture Abeokuta, and its environs. The study covers four areas: forested, cultivated, swampy and rocky areas. A transect of 2 Km was laid in each study area. Each transect was later divided into eight equal quadrats. Three species of snails were encountered namely: *Archatina archatina*, *Archachatina marginata*, *Cepacea nemoralis*. The results show that the best site for collection of snails is the forested areas with a record of seventy snails, followed by 43 snails in the cultivated area, 50 snails in swampy areas while 18 snails were found in the rocky areas. Forested areas also have the best sites for collection of small size snails (33) and medium size snails (32) respectively. At the end of the seasons, *Archatina archatina* was the species with the highest number of 48 snails *Cepacea nemoralis* was found abundantly in swampy areas (19 snails). The collection of *Cepacea nemoralis* was rare in other areas except rocky area which recorded only one snail. It was also observed that snails are abundant and likely to be found in the forested area due to the conducive ecological parameters prevalent within the area such as high volume of leaf litters, loamy soil, dense vegetation tree of different kinds and also cool environment that provides physiological comfort for the animals. The occurrence of snails in cultivated areas was also very minimal. This may be due to human disturbance through agricultural activities while rocky area recorded the lowest number of snails.

Key words: Ecology; Agriculture; Snails; Forest areas.

Introduction

Snails are invertebrate gastropods with unsegmented soft body without limbs and enclosed in a calcareous shell (Akinyemi et al. 2007; Toye 2008; Ramzy 2009). They belong to phylum Mollusca and often classified under Micro-livestock because of their size. The different ecotypes of snails inhabit high forest and derived savannah ecological zones in Nigeria.

In West Africa, meat of the snail has traditionally been a major ingredient in the diet of people living in the high forest belt (the forested area other than the savannah forest) (Cobbinah et al. 2008). Snail gathering and or rearing is an important source of livelihood for rural dwellers in the humid forest and derived savanna zones of West and Central Africa (Ngenwi et al. 2010). It is known that in the past land snails were handpicked from the wild where nature takes care of them in their natural habitat, and everything plays its role in its niche.

Out of all the animal protein food produced and consumed in Nigeria, snail is of importance as it has remained a source of protein in the diet of rural and urban poor households in southern, eastern and western Nigeria which is rich in iron and essential amino acids (Adedoyin 2013; Ojelade et al. 2013). The importance of snail meat cannot be over-emphasized; it is a good source of animal protein, containing about 18% crude protein of high

biological value (Kehinde 2009). The meat contains all essential amino-acids such as lysine, methionine, highly priced, and contains low fat content and low cholesterol levels which makes it a good antidote for fat related diseases such as hypertension etc (Popoola et al. 2015). Recently snails are being reared at both institutional and local levels by some farmers. The amount of supply gotten from the wild is gradually reducing due to bush burning activities, excessive hunting and deforestation (Awosanya et al. 2013).

Archachatina marginata is herbivorous and consuming most of plant material at its disposal within its territory. It is common knowledge that most of the animals in the wild are getting extinct while some are endangered. Information on the species of the snails that are available, population, dry season and wet season distribution are very important. The study of the ecological characteristic for locating snails in the wild was carried out at the permanent site of the Federal University of Agriculture Abeokuta and its environs. The scope of the study is restricted to the study area and the findings of the study are therefore relevant to the Federal University of Agriculture, Abeokuta. But could also be adapted applied or implied for any other similar areas. The objective of the study is to describe the seasonal locations of snail species in the study area and to determine the type of snail species common in each habitat of the study area.

Materials and methods

Study area

The study area is Federal University of Agriculture, Abeokuta Ogun State, it lies within the humid to lowland tropical region with two distinct seasons: the wet and the dry season. The wet season extend from March to October while the dry season extends from November to February. The mean annual rainfall is 1,113.1 mm, generally the rainfall could be heavy and erosive and sometimes accompanied by lightning and thunderstorm at the beginning and end of the raining season (Salami 2008). The mean monthly temperature varies from 23°C in August to 36°C in March. The relative humidity is high ranging from 15.52% in February to 88.15% in October. Federal University of Agriculture, Abeokuta overlies the Precambrian metamorphic rocks of the basement complex with bedrock consisting predominantly of granitic gneiss, quartzite and quartz schist. The landscape is undulating. This citadel of learning consists of different kinds of vegetation such as derived savannah, forested area swampy area, rocky and also administrative core (Salami 2008).

Data collection

There were four study sites traversed at a distance of two Kilometres. Each study site was divided into eight equal quadrat for thorough searching of hiding snails. The site consisted of four different areas namely: swampy area, open area, rocky area and forested area was used for data collection. In every designated area of 250 m, thorough search was done in order to pick the snail discovered around

this place. Each sample collected was properly observed to determine size of species and the relevant data were recorded in the field book. The snails collected from field were properly handled, given proper housing, feeding and watered for maintenance. The study period covered 27 weeks. Data were collected for four days in a week in the four sites. Data was collected for the following parameters; the number of snails, the size of snails and the species of snails.

Results

Table 1 shows the number of snails collected on the field. The result shows that the number of snails collected varied with different areas. Seventy snails (70) were collected in forested area, 43 snails from cultivated area, 50 snails from swampy area while 18 snails were collected in rocky area. During the wet season, 52 snails were collected in the forested area, followed by cultivated and swampy areas which were 30 snails each. Collection of snails in the rocky area was the least with 14 snails during wet season.

Table 1. Number of snails collected on the field.

Season	FA	CA	SA	RA	Total
Dry season	18	13	20	4	55
Wet season	52	30	30	14	126
Total	70	43	50	18	181

Where: FA - Forested area, CA - Cultivated area, SA - Swampy area, RA - Rocky area.

During the dry season more snails (20) were found in swampy area when compared with forested, cultivated and rocky area with 18, 13, and 4 snails respectively. There was a sharp decrease in the number of snails collected in dry season when compared with the wet season; due to the reduction in precipitation and consequent reduction in the moisture content during this period. And most of the snails usually go on aestivation during the dry season. At the end of collection for both seasons, forested area recorded the highest number of snails (70) which may be due to the high volume of leave litter, high moisture content and good

vegetation covered. This was closely followed by swampy area with 50 snails. The least area was rocky area, which may be as a result of the high volume of stone and the gravels which made it unsuitable for snails.

Table 2 shows the species of snails collected from the field. The result shows that at the end of the twelve weeks of dry season collection, highest number of species collected was *Archatina archatina* at forested area and swampy area with 14 and 12 snails respectively. While rocky area had least number of *Archatina archatina* and *Archachatina marginata* with 2 snails each. None of these sites recorded *Cepacea nemoralis* except swampy area with 4 snails. During the raining season, the highest number of *Archatina archatina* was obtained from both Forested area and cultivated area with 34 and 26 snails respectively. Highest number of *Cepacea nemoralis* (15) was obtained from swampy area followed by rocky area with one snail of *Cepacea nemoralis*.

At the end of the whole season the highest species of snails collected was *Archatina archatina* with 48 snails and 36 snails, respectively from both forested and cultivated sites closely followed by 23 species of the *Archatina* at swampy area. Also, the highest *Cepacea nemoralis* was collected from swampy area, followed by rocky area which recorded one species of such snail.

Table 3 shows the Analysis of variance for the size of snails collected during dry and wet seasons. The result shows that there are significant differences in areas and sizes of snails recorded over weeks for the whole seasons. There are significant differences at both areas and the sizes of snails collected over weeks for the whole seasons.

Table 4 shows the Analysis of variance for the species of snails collected during wet and dry seasons. The result shows that there is significant difference in areas and sizes of snails recorded over weeks during wet and dry seasons. There are significant differences at both the areas and sizes of snails collected over week for the whole season. Table 4 shows that there is no significant differences in the areas where snails are collected over weeks for the entire seasons.

Table 2. Species of Snails collected from the field.

Season	FA			CA			SA			RA			Total		
	sp1	sp2	sp3	sp1	sp2	sp3	sp1	sp2	sp3	sp1	sp2	sp3	sp1	sp2	sp3
Dry season	14	4	0	10	3	0	12	4	4	2	2	0	38	13	4
Wet season	34	18	0	26	4	0	11	4	15	6	7	1	77	33	16
Total	48	22	0	36	7	0	23	8	19	8	9	1	115	46	20

Where: FA - Forested area, CA - Cultivated area, SA - Swampy area, RA - Rocky area, sp1 - *Archatina archatina*, sp2 - *Archachatina marginata*, sp3 - *Cepacea nemoralis*.

Table 3. Analysis of variance for the size of snail collected on field during wet and dry seasons.

SV	DF	SS	MS	F-cal	F-tab
Area	3	14.099	4.699	7.174*	2.60
Size	8	75.852	9.482	14.476*	1.94
Error	312	204.444	0.655	-	-
Total	323	294.394	-	-	-

Where: SV - Source of variance, DF - Degree of freedom, SS - Sum of square, MS - Mean of square. * Significant at 0.05 probability level.

Table 4. Analysis of variance for the species of snails collected on field during rainy and dry seasons.

SV	DF	SS	MS	F-cal	F-tab
Area	3	16.182	5.394	9.365*	2.60
Size	8	44.963	5.620	9.757*	1.94
Error	312	179.855	0.576	-	-
Total	323	241.886	-	-	-

Where: SV - Source of variance, DF - Degree of freedom, SS - Sum of square, MS - Mean of square. * Significant at 0.05 probability level.

Discussion

The result of the study show variation in the collection of the snails with respect to species, number of snails and size of the snails collected at different areas such as forested area, swampy area, rocky area, and cultivated area. At the end of the collections; forested area was the only area that has the highest total number of snails. Also, the highest species of *Archatina archatina* was collected in forested area. At the end of the collection, small sized snails recorded the highest from forested area. This was due to the conducive environment factors such as high relative humidity, high volume of leaves litter and precipitation culminating into cool environment which is highly conducive for the snails and quiet different from the other areas. Kehinde (2013) observed that Snails need damp, not wet environment, humidity and water availability are very important. Snails need water, though their environment must not be water logged. There are lots of environmental factors that affect snails' productivities. Some of the factors

according to Ejidike (2009; 2013), Kehinde (2013), Adinya et al. (2011), Adedoyin (2013) and Omole et al. (2013) are soil types, temperature, relative humidity, water, sunshine and rainfall. Hence the right place to gather snails is in forested area. Ngenwi et al. (2010) observed that Snail gathering is an important source of livelihood for rural dwellers in the humid forest and derived savanna zones of West and Central Africa.

It was observed that the highest number of *Cepacea nemoralis* was recorded from swampy area, while collection of species is uncommon in other area except the rocky area with one snail only. It was noted that the existence of this *Cepacea nemoralis* species in swampy area may be due to the fact that the species are aquatic snails. It was observed that food and shelter were important in determining distribution over habitats of the *Cepacea nemoralis*. Food was primarily responsible for snail distribution over habitats in the early summer.

Generally, the area that produced the least number of snails, species and size of snails was rocky area. This may be as a result of little or no vegetation cover around, location of the environment, dry soil, low level of soil moisture content, sandy soil, and low volume of leave litter fall. Ogunjinmi et al. (2009) observed that land snails prefer humid environments for their optimum performance. Temperature is one of the determinants of the amount of moisture in an environment and it is inversely proportional to relative humidity.

Conclusion

In conclusion, the study show that there are certain ecological factors that determines the distribution and abundant of snails in the wild. Wherever this characteristics or factors are available, snails will be located in such areas. It is therefore recommended that the rate of deforestation should be curtailed; this is because deforestation destroys the habitats needed for the reproduction and survival of snails. Efforts should therefore be made to conserve the forests and protect them from human activities that may likely destroy the habitat. More research should also be done on the ecology of snails.

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