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PERCIEVED CLIMATIC CHANGE INDICATORS AND MITIGATION METHODS TOWARDS IMPROVED SNAIL FARMING IN KWARA STATE, NIGERIA: CHALLENGES TO EXTENSION SERVICE DELIVERY AND AGRICULTURAL DEVELOPMENT.

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ABSTRACT

The study assessed the perceived climate change indicators and mitigation methods on snail farming in Kwara state, Nigeria. A purposive sampling technique was used to select 80 respondents for the study. The findings revealed that most (62.5%) of the respondents were within the age range 41-50 years. Majority (75.0%) of the respondents were male, majority (87.5%) were married with an household size of 5-7 members. 43.75% of the respondents had post secondary education, significant percentage (56.25%) also had long years of snail farming experience with a monthly income of ₦11,00.00 to ₦15,000.00. 50% of the respondents had undergone informal training on snail farming and sourced their stocks from local breeders. Most (56.2%) of the respondents had low production pattern, 62.5% constrained by inadequate finance and 18.75% were affected by poor markets. Of the 80 respondents, 37.5% of the respondents perceived too much heat,25% perceived increasing air pollution as the climate change indicators in the study area. And the respondents perceived prevalent mitigation methods was planting of more trees at farm. The t-test analysis showed that there was a significant relationship between socio-economic characteristics of snail farmers and their perceived mitigation methods ($t=36.5, P< 0.05$). It is therefore recommended that adequate training on snail farming, provision of fund and relevant information on afforestation by the government be made available to snail farmers so as to enhance snail production level.

Keywords: Snail Farming, Mitigation, Indicators, Climate, Kwara, Climate Change, Extension Service.

INTRODUCTION

Climate change is the most serious environmental management threat facing mankind worldwide. It drastically affects agriculture and this happens in several ways for instance its direct impact on food and livestock production. Climatic change, according to Enete and Amusa (2010) is as a result of natural climate cycle and human activities in our environment which has adversely affected agricultural productivity in Africa. Climate change could also be observed when planet is warming and there is a shift in rainfall patterns, and these predispose the natural environment to frequent droughts, floods and forest fires. Farmers who constitute the bulk of the poor in Africa face prospects of tragic crop failures, reduced agricultural productivity, increased hunger, malnutrition and diseases in the course of climate change (Enete and Amusa, 2010).

Khanal (2009) classified the patterns of impact of climate change on agriculture into biophysical and socio economic impact. The biophysical impacts include: physiological effects on crop and livestock. change in land ,soil and water resources ,increased weed and pest challenges. The socio economic impacts result in decline in yield and production, increased number of people at risk of hunger and food insecurity According to Brussel (2009) the possible short to medium term adaptation practices to changes in climate by farmers include; adjusting the timing of farm operations such as planting or sowing dates and treatments, protecting overheads from frost damage or improving ventilation and cooling systems in animal shelters, choosing crops and varieties better adapted to the expected length of growing season and water availability and more resistant to new conditions of temperature and humidity, improving soil management by increasing water retention to conserve soil moisture and maintaining landscape features providing shelter to livestock and introducing more heat tolerant livestock breed and adapting diet patterns of animals under heat stress conditions. According to Woogeng *et al* (2013) in extreme drought, snail breeding sites could be eliminated due to the drying up of snail habitats and excess rainfall resulting in floods create turbulence in the snail habitat.

In Nigeria, snails constitute an important component of the food of numerous rural dwellers especially in the rain forest belt as well as other areas of the country where snail eating is not regarded as a taboo. The snails occur in the wild and are gathered by villagers and children for consumption and sale. Awesu (1980) identified snails as a good source of animal protein to the people of Nigeria and other Africa countries. Different species of snails are eaten both in urban and rural areas which include: *Archatina achatina, Archatina fulica, Archatina monochromatica and Archatina marginata.*.

The following housing units can be used for rearing snails: old tyres, earthen pots, baskets, raised wooden cage, concrete trench and snail pen (Ayodele and Ashimalowo, 1991). According to Imevbore and Ademosun (1998) the type of housing used depends on the volume of the snail enterprise. The first three types can be used for small scale backyard snail farming, the cage and trench for medium scale type of snail farming while the snail pen is specifically for large scale commercial snail rearing. In using the snail pen, a spacing of one square meter per adult laying snail is advocated. This spacing is to give allowance for the baby snails expected per adult. With each adult snail laying five to ten eggs up to four or eight times each growing season, the space will eventually hold 20-80 young snails together with the adult. However, when young snails are left together with the adult, the adults crawl over the fragile shells of the babies. In addition, the adults are more aggressive at feeding, thus, taking in more feed at the expense of the young ones. For this, young snails are to be reared separately to ensure they feed very well and grow well.

The food of snails varies. Elmshire (1992) opined that adult snails eat tender flowers and vegetable plants, decomposing plants parts and some fruits; he stated that snails of all ages can eat plants such as lettuce. cauli flower, cabbage, egg plant, taro, banana, pineapple and pawpaw. In other parts of the world, snails eat the

following plants: rape, horse-raddish, leaf beet and asparagus and many of these are also good shelter plants for snail pens.

Snail management system is of two types, they are intensive farming of snails in an open system as well as the extensive raising in the close system. The two systems involve the collection of sexually mature snails during the raining season, keeping them in an enclosure where they are fattened after reproduction, The gathered snails are then sold during the dry season after ovipositor, while the hatchlings are returned to the forest to be gathered after reaching sexual maturity. This system made it easy to find snails during the raining season while young snails are reared cheaply on the available natural forest food (Odiabo, 1997).

The general objective of this study is to access the perceived climate change indicators and mitigation methods on snail farming in Kwara state, Nigeria.

METHODOLOGY

The study was carried out in kwara state, Nigeria. The population of the study was selected snail farmers in the state. Out of 16 local government areas,4 LGAs were selected using a simple random sampling technique while 20 respondents were purposively selected from each of the 4 local government areas. A total of 80 respondents were sampled. An interview schedule and structured questionnaire was used to obtain information on the snail farmers concerning socio-economic characteristics. Climate change mitigation methods were measured using 3 points likert-scale type scale ranging from 1-Always used,2-Occassionally used 3-Never used. Frequency counts, percentages and rank score were employed to treat other specific objectives. Student t-test analysis was engaged to test the significant relationship between socio-economic characteristics and perceived climate change mitigation methods.

RESULTS AND DISCUSSION

The results in Table 1 show that significant percentage (62.5%) of the respondents were within the age range of 41-50.This is supported by the Erete *et al*. (2004) who noted that older farmers have more experience and are able to take healthier production decisions than younger ones. Majority (75%) of the respondents were male with an household size of 5-7.This is buttressed by Bukh (1979) who reported that men are most often the heads of households in Africa,43.75% of the respondents had post secondary education and 12.5% had no formal education, Benhin (2006) opined that educated farmers may better understand and process information provided by different sources regarding new technologies (farm) thereby, increasing their allocative and technical efficiency, Most (56.25%) of the respondents have been into snail farming for the period of 6-10 years, 50% undergone informed training on snail farming and their stocks were mainly from local breeder.

The results in Table 2 revealed that the pattern of respondents snail production was low as even confirmed by more than half of them (56.25%).

Table 1. Socio economic characteristics of the snail farmers

Variables	Frequency (n=80)	Percentage
Age (years)		
< 30	5	6.25
31-40	15	18.75
41-50	50	62.5
>50	10	12.5
Sex		
Male	60	75.0
Female	20	25.0
Marital Status		
Married	70	87.5
Single	10	12.5
Household size		
2-4	30	37.5
5-7	40	50.0
>8	10	12.5
Educational level		
No formal education	10	12.5
Primary education	15	18.75
Secondary education	20	25.0
Post secondary education	35	43.75
Years of experience		
1-5	30	37.5
6-10	45	56.25
>10	5	6.25
Income (monthly)		
₦5,000 - ₦ 10,000	10	12.5
₦ 11,000 - ₦ 15,000	45	56.25
>₦ 20,000	25	31.25
Training undergone		
Formal	30	37.5
Informal	40	50.0
No training at all	10	12.5
Source of stock		
Market	5	6.25
Local breeder	40	50.0
Exotic breeder	5	6.25
Other snail farmers	30	37.5

Source: Field Survey, 2015

Table 2. Distribution of the respondents according to snail production pattern

Variable	Frequency	Percentage
High	15	18.75
Medium	20	25.0
Low	45	56.25
Total	**80**	**100**

Source: Field Survey, 2015

Table 3 indicated inadequate finance to be the major (62.5%) factor affecting productivity of the snail farmers and this was followed by the poor markets (18.75%).These factors were in line with the results of Deressa (2008) who reported that most of the problems or constraints encountered by the farmers in adaptation to climate change are associated with poverty.

Table 3. Factors affecting productivity of the snail farmers

Variable	Frequency	Percentages (%)
Inadequate finance	50	62.5
Unfavourable weather condition	10	12.5
Poor markets	15	18.75
Theft	5	6.25
Total	**80**	**100**

Source: Field Survey, 2015

Table 4. Respondents perceived climate change indicators

Indicators	Frequency	Percentages
Too much heat	30	37.5
Excessive rainfall	10	12.5
Decrease in number of vegetation	15	18.75
Increasing air pollution	20	25.0
Decreasing fauna population	5	6.25
Total	**80**	**100**

Source: Field Survey, 2015

Results in Table 4 show that 37.5% of the respondents perceived too much heat as indicator of climate change while 25.0% perceived increasing air pollution also to be climate change indicator respectively. Brussel (2009), noted that rising atmospheric carbon dioxide ($C0_2$) concentrated and higher temperature are usually features of climate change phenomenon.

Table 5. Respondents' perceived climate change mitigation methods

Mitigation methods	1	2	3	Rank
Reduction in the use of firewood	10(12.5)	10(12.5)	60(75.0)	5th
Drastic reduction in bush burning	20(25.0)	45(56.25)	15(18.75)	2nd
Planting of trees along water bodies	50(62.5)	20(25.0)	10(12.5)	3rd
Planting of more trees at farm	60(75.0)	15(18.75)	5(6.25)	1st
Avoidance of deforestation of vegetation	30(37.5)	45(56.25)	5(6.25)	4th

Source: Field Survey, 2015

From table 5, it is shown that snail farmers perceived various mitigation methods to be useful in their adaption to climate change. The rank score therefore indicated that planting of more trees at farm was the leading mitigation method in the study area. The second mitigation method in the ranking was drastic reduction in bush burning followed by other prevailing methods such as planting of trees along water bodies, avoiding of deforestation of vegetation and reduction in the use of fire wood. These mitigation methods were congruent with the findings of Hassan and Nhemachena (2008) who opined that one of the appropriate adaptation strategies by farmers is shading and shelter, which can only be provided through agroforestry and aforestation.

Table 6: T- test relationship between socio-economic characteristics of snail farmers and their perceived climate change mitigation methods

t- test	Value
Calculated	36.5
Tabulated	32.2

P<0.05, Source: Field Survey, 2015

The results in Table 6 showed that the calculated value of 36.5 is greater than the tabulated value of 32.2, therefore the null hypothesis stated that there is no significant difference between socio-economic characteristics of snail farmers and their perceived climate change mitigation methods is rejected. There is a significant relationship between socio-economic characteristics of snail farmers and their perceived climate change mitigation methods.

CONCLUSION AND RECOMMENDATIONS

The study could be concluded that production pattern of the snail farmers was low while they perceived inadequate finance and poor markets to be the factors affecting their productivities. Most of the respondents perceived too much heat and increasing air pollution as the prevailing climate indicators while planting of more trees at farm, drastic reduction in bush burning, planting of trees in water bodies, avoidance of deforestation of vegetation and reduction in use of fire wood were their perceived mitigation methods. The respondents' low level of training as thus affected their relatively low production pattern. This invariably means that there is a need to enhance their production pattern through adequate formal training and provision of fund by the appropriate authority. Also, a collaborative effort is required by the government and extension agents to make relevant information on afforestation available to snail farmers so as to improve their production level.

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