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SHORT COMMUNICATION

Effect of Climate Change on Pineapple Production in Ejigbo Local Government Area of Osun State, Nigeria

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Abstract
This study examined the perception and mitigation/ coping strategies of climate change on pineapple production in Ejigbo Local Government Area, Osun State. Fluctuating rainfall pattern, declining agricultural productivity, and rising numbers of heat waves are the observed changes in the climate which poses a threat to food security in the country. One hundred pineapple farmers in the study area were purposively selected. Information on their demographic as well as production systems was collected with the aid of well-structured questionnaires. Descriptive analysis was done using percentages and frequencies. The result shows that drought is a major factor that affect matured suckers and fruit yield of pineapple. Only few farmers have irrigation facilities to augment water requirements of the crop. Most times, farmers have to wait till the onset of rains before they start selling suckers. Recommendations include increased investment in irrigation and research into the development of drought resistant pineapple varieties.

Key words: Climate change, Pineapple, Osun State.

Introduction
Agriculture is the lifeblood of the African economies and societies - more than half a billion Africans, or some 65 percent or more of the population depend on small-scale farming as primary livelihood source. In Nigeria, the agricultural sector provides 45 percent of the Gross Domestic Product (GDP), and 60 percent of employment in the country. Also, More than 70 percent of the poor reside in rural areas while 90 percent of people find livelihood in agriculture.

All over the world, and particularly in developing countries of the South, changes in climate pose serious threat to agricultural activities in several ways, with direct negative impact on food production. Climate change is said to exist when the level of climatic deviation from the normal is very significant over a long period of time (preferably centuries) and such deviations have clear and permanent impacts on the ecosystem (Odjugo, 2009). Climate change affect food and water resources that are critical for livelihood in Africa where much of the population especially the poor, rely on local supply system that are sensitive to climate variation. Disruption of existing food and water systems has devastating implication for development and livelihood. These are expected to add to the challenges climate change already poses for poverty eradication (De Wit and Stankiewicz, 2006). The socio-economic impacts therefore include decline in yield

and production output, reduced marginal GDP from agriculture, fluctuation in world market price, changes in geographical distribution of trade regime, increased number of people at risk of hunger and food insecurity, migration and sometimes, civil unrest.

In Nigeria, climate change is reflected through increasing incidences of pests and diseases, rising numbers of heat waves, floods, as well as declining agricultural productivity. In addition, agriculture is almost entirely rain-fed in Nigeria and this makes it particularly vulnerable to the impacts of climate change (FAO, 2008; Medugu, 2009 and IFAD, 2007). Even with the present irrigation efforts, Madu et al (2010) noted that Nigeria's irrigation system is still under developed irrigation compared with other developing nations, particularly in Asia. Only about a million hectare is currently irrigated in Nigeria. In contrast, India, with about 3.5 times the land mass of Nigeria, irrigates nearly forty-five (45) times as much land. The consequences of under developed irrigation system include increasing frequency and severity of droughts, crop failure, high and rising food prices, and increase in the number of people at risk of hunger and food insecurity.

Pineapple (Ananas comosus) is the third most imported tropical fruit in the world after banana (Musa spp) and Citrus spp (Esiobu et al., 2014). Countries that are ranked major producers include Brazil, Mexico, India, China, Columbia and Nigeria. With an annual production of 800,000 tonnes per hectare, Nigeria was ranked 6th on the list of world pineapple producers (IITA, 2010). Pineapple is a drought tolerant crop that is well adapted to the tropical acid sand with pH ranging from 4.5 to 6.5 (Ubi *et al.,* 2005, Esiobu et al., 2014). It is a delicious fruit with good flavour and high nutritive value. It is consumed as food in the fresh form or as fruit juice. It is also used in the confectionary industries for making sweets and other food additives. The observed changes in the climate poses a threat to food security in the country. The perception of impact of climate change on pineapple farmers in the study area is therefore critical, in view of the importance of the crop in the livelihood of Nigerian farmers. It is against this background that the study focused on farmers' perception of effect of climate change on pineapple production in the study area.

Methodology

The study was conducted in *Ejigbo* Local Government Area of *Osun* State, Nigeria. It is located 35 km north east of *Iwo*, 30 km from *Ogbomoso* in the north and 24 km from *Ede* in south east. It has an area of 373 square km and a population of 132,641 as at the 2006 census. Average annual rainfall is 52.35 inches (1,330mm) with great deviations value from year to year. The rainy season usually lasts from April to October. Farming is the main traditional source of economy in Ejigbo. Crops cultivated include tubers (potato), grains (maize, guinea corn) and fruits (pineapple, orange). Cash crops like cocoa, palm oil and kola nut are also cultivated. Ejigbo was selected as the study area because of the predominance of pineapple farmers in the area. Data were collected from six pineapple producing villages *(Igbo, Ilawo, Aato, Masifa, Isundurin, Idewure, Ejigbo*), in *Ejigbo* Local Government Area using structured questionnaire. Data were analysed using descriptive statistics.

Results and Discussions

Results of socio-economic characteristics of the pineapple farmers are presented in Table 1. The results show that 81.7% of pineapple farmers were male with only 18.3% female. This indicates that pineapple production in the study area is dominated by males who have more physical strength or energy to handle the strenuous work associated with pineapple cultivation. The age of farmers is an important variable as it affects agricultural productivity. Majority (69.9%) of pineapple farmers in the study area fell within the productive and economic active age groups of less than 50 years. This is expected to impact on pineapple production. Also, majority (96.8%) of the farmers were married. This may imply more available family labour for pineapple production activities. Educational background is a key socio-economic variable that influences critical farming decisions. From Table 1, majority (94.6%) of pineapple farmers had primary education while 5.4% had secondary school education and above. This implies low level of education among the farmers. The result also reveals that pineapple production was the primary occupation of majority (79.6%) of pineapple farmers in the study area. This is expected to influence their level of commitment to pineapple production. Besides pineapple production, majority (83.9%) of the farmers also derived income from the production and sale of other agricultural crops.

Table 1: Socio-economic characteristics of farmers

	Frequency	Percentage
Sex		
Male	76	81.7
Female	17	18.3
Total	93	100.0
Age		
40-44 years	18	19.4
45-49 years	47	50.5
Above 50 years	28	30.1
Total	93	100.0
Marital status		
Married	90	96.8
Widowed	3	3.2
Total	93	100.0
Years of formal education		
1-5 years	88	94.6
6 years and above	5	5.4
Total	93	100.0
Primary occupation		
Pineapple farming	74	79.5
Animal husbandry	2	2.2
Trading	10	10.8
Craftsman	3	3.2
Civil/Public Service	4	4.3
Total	93	100.0
Other sources of income apart from pineapple production		
Other agriculture crops	78	83.9
Non agriculture activities	15	16.1
Total	93	100.0

Source: Field Survey, 2014

Perceived changes of Climate on Pineapple Production

Results on farmers' perception of observed changes in climate and the effect on pineapple production activities are presented in Tables 2 & 3. From the results, majority (81%) of the farmers reported that there has been increase in temperature in the study area in the last 5 years. The effect of this on pineapple production is that heat stress resulting from high temperature causes delay in fruiting and reduction in pineapple size. The average weight of pineapple fruit during the raining season is 2.5kg, and this is sold at ? 80/kg. However when heat stress is experienced, average size of pineapple fruit reduces to 1.5kg, and is sold at ? 40/kg. Thus, an unfavourable change in climate lowers the income of

Table 2: Observed changes in climatic condition

Climatic condition	Response	Frequency	Percentage (%)
Temperature	Increase	75	81
	Decrease	15	16
	No response	3	3
	Total	**93**	**100**
Rainfall	Increase	70	75.26
	Decrease	22	23.65
	No response	1	1.07
	Total	**93**	**100**

Source: Field Survey, 2014

Table 3: Respondents' perception of effect of climate change on pineapple production

S/No		Agree	Undecided	Disagree
1.	Increased in temperature has resulted in delayed fruiting of pineapple	83	8	2
2.	Heat stress has not reduced size of pineapple fruits	79	11	3
3.	High temperature has reduced soil moisture for good fruiting	87	6	0
4.	Heat stress has resulted in loss of production by at least 50%	76	11	6
5.	Prices of pineapple fruits have come down due to effect of climate change on fruit size.	83	0	10
6.	Increased temperature has reduced number of suckers from growing pineapple	88	1	5

Source: Field Survey, 2014

Table 4: **Coping strategies employed by farmers on the observed climate change**

Coping Strategies	Frequency	Percentage (%)
Manual watering	59	63.4
Use of motorized machines	21	22.6
Use of saw dust	6	6.5
Inter-cropping	4	4.3
Digging of well	3	3.2
Total	93	100%

Source: Field Survey, 2014

pineapple farmers. Similarly, when the weather is hot, there is a reduction in the number of suckers produced from 8 to 3 suckers/parent stock. Thus both size and quantity of pineapple fruit/suckers are affected by high temperature. Poor yield and reduced income is a dis-incentive to pineapple production, which may impact negatively on livelihood of the farmers.

Adaptation strategies to observed changes in climate

Table 4 presents results on adaptation strategies to climate change employed by pineapple farmers. During the dry season or when the rains are no longer enough, majority (63.4%) of the farmers relied on manual watering using watering can in order to augment water requirement of pineapple. The use of motorized pumping machine was employed by a few (22.6%) farmers who could afford it. There is a limit to which manual application of water to crop plants can go. Manual watering is not a sustainable practice in large scale pineapple production. Other measures taken by farmers include the use of sawdust as soil cover (6.5%) so as to conserve water; intercropping of pineapple with plantain is also done to avoid direct sunrays from evaporating soil water (4.3%). Some farmers dig well (3.2%) for watering purposes while some lay pipes from the river to their farmland. Some farmers also use large water reservoirs for storing water during raining season and then make use of this when the dry season sets in.

Conclusion

The study confirms that Nigeria, like most parts of the world, is experiencing the basic features of climate change. The changes also affect agricultural productivity and income of pineapple farmers. Heat stress is a climate change issue being experienced by pineapple farmers. The need for regular water supply to minimise heat stress necessitates the need for improved irrigation development and increased investment in research to develop pineapple varieties that are resistant to drought, major pests and diseases and other climate change-induced shocks. Also extension support service delivery to pineapple farmers should incorporate climate change issues and adaptation strategies.

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