Problems and Prospects of Pineapple Production in Enugu State, Nigeria
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Abstract

The study identified problems and prospects of pineapple production in Enugu State of Nigeria. Purposive sampling technique was used to select eighty (80) pineapple farmers from two agricultural zones. Data were analyzed using percentage and mean score. Results showed that greater proportion of the farmers was male (56.2%), had no formal education (47.5%) and had their farm located far from their residence (68.8%) while many of the farmers cultivated improved pineapple variety (43.8%) and a greater proportion (55.0%) sourced planting materials from their farms. All the respondents (100%) harvested their produce manually. Respondents indicated that the major potentials of the area for pineapple production included: availability of fertile land for pineapple production ($\overline{x}$=2.78), ready market for the sale of the crop produce ($\overline{x}$=2.72), a good source of income ($\overline{x}$=2.62), and good health through consumption among farmers/inhabitants ($\overline{x}$=2.78). The major constraints of pineapple production identified by the respondents were poor access road for transportation of produce ($\overline{x}$=2.56), and lack of technical knowledge on the use of improved technology ($\overline{x}$=2.56). It was concluded that pineapple had good prospects for production in the area. However, issues of infrastructure and technical knowledge should be tackled in order to harness those potentials.

Key words: pineapple production in Enugu State

Introduction

Agriculture has been described as the lifeblood of Africa employing about 70 percent of the workforce and generates, on average, 30 percent of Africa's gross domestic product (GDP) (United Nations Economic Commission for Africa (ECA), 2007). In Nigeria, agriculture engages about 70% of the labour force and contributes about 40% of her GDP (The Central Intelligence Agency (CIA), 2013).

Pineapple (*Ananas comosus*) is the most economically important plant in the family Bromedioideae, which is divided into three subfamilies: Pitcarnioideae, Tillandsiolideae, and Bromedioideae (Bartholomew, Paul, and Rohrbach, 2003). It belongs to the order Bromeliales, genus Ananas, and species Comosus (Bartholomew et al. 2003). It is the second fruit harvest of importance, contributing over 20 percent of the world production of tropical fruits (Coveca, 2002). Pineapple is a wonderful tropical fruit having exceptional juiciness, vibrant flavor and immense health benefits (Joy, 2010). It is grown both for the fresh and processed products, which makes it an important food as it can be eaten fresh or in processed forms (FAO, 2009). In developing countries like Nigeria, most of the fresh pineapples produced are sold in domestic markets and bought for domestic consumption (Spore Magazine, 2008). Also the Fruit Juice market in Nigeria has witnessed a tremendous growth since 2002 (Manufacturing today, 2011).The popularity of pineapple is due to its sweet-sour taste containing 15% sugar, malic and citric fruit acids. It is also high in vitamin B1, B2, B6 and C. Its protein digesting enzyme, bromelain, seems to help digestion at the end of a heavy protein meal (Nwosu, 2011).

Pineapple is among the most popular and nutritious tropical fruits grown in most tropical and sub-tropical countries. It is one of the crops with the most potential in the international market and highly profitable (Quijandria *et al*, 1997). Its production could help to ensure food security, job creation, and launch the country on the path of self-sufficiency, and help in improving lives and health of the populace (All Africa, 2011). The Indian Horticulture Database (2006), estimated that the total area under pineapple cultivation in the world is 896 thousand hectare (ha) with production around 18,043 thousand tonnes (tons) and productivity of 304.1 tons/ha. Brazil, Thailand, Philippines and China are the main pineapple producers in the world supplying nearly 50 % of the total output (FAO, 2004). The other 50% is being produced by some other countries including Nigeria (Medina & Garcia, 2005). According to FAOSTAT (2011), Nigeria ranked 7th on the list of world producers, as well as the leading pineapple producer in Africa with a production capacity of 1,400,000 metric tons of fresh pineapple. In Nigeria estimated area under cultivation is 121 thousand hectares, with average production of 917 thousand tons, and productivity of 7.6 tons/ha (Mark, 2010). The statistics above reveal that Nigeria contributed about 13.5% ha of land cultivated and 5.1% tons of output of pineapple production in the world. This shows that the size of land allocated to pineapple production in Nigeria is not commensurate with the output. In other words, yield/productivity is low (Mark, 2010).

According to Khalid *et al*, (2007), in the past, more emphasis was relatively placed on enhancing production and productivity of major crops by ignoring that of horticultural crops, fruits inclusive. Moreover, the majority of the harvested produce in the country is wasted and this may be due to production inefficiencies, post-harvest losses, low level of technology to facilitate processing of quality pineapple products and inefficient marketing system (Ivan *et al*, 2011). Although Nigeria occupies a notable position in pineapple production in Africa and the world at large, its inability to fully tap into the economic potentials of the crop might be a reflection of the inefficiency in pineapple production which otherwise, would have served as an

important tool in achieving some of the objectives of the transformation agenda in Nigeria. This uncertainty prompted the study to identify the problems and prospects of pineapple production in Enugu State amidst the potentials of pineapple as a fruit as well as the potentials of the area for production of the crop.

Purpose of the study
The overall purpose of the study was to identify problems and prospects of pineapple production in Enugu State of Nigeria. Specifically, the study sought to:

i.   Identify socio-economic characteristics of pineapple farmers in the area
ii.   Identify the pineapple production practices
iii. Ascertain the potentials for pineapple production
iv.   Ascertain the constraints to pineapple production in the area

Methodology
The study was carried out in Enugu State of Nigeria. The State has seventeen Local Government Areas and six agricultural zones. All pineapple farmers in the State constituted the population for the study. Multistage sampling technique was used in the selection of respondents. First two zones (Awgu and Nsukka) were purposefully selected out of the six agricultural zones in the State based on popularity in pineapple production. At the second stage, two blocks were randomly selected from each zone and two circles were selected from each of the four blocks at the third stage giving a total of eight (8) circles. Snowball sampling technique was used in selecting ten pineapple farmers from each circle based on involvement in pineapple farming giving a total eighty (80) respondents used for the study. Data were collected using structured interview schedule. Age of respondents and farming experience were collected in years. Sex was collected at nominal level as male or female and marital status was collected as single (1), married (2), widowed (3), divorced (4), and separated (5).Household size was collected as number of people in the same house eating at least one square meal per day together.

The respondents were requested to provide and also indicate from the list provided the pineapple production practices they employ e.g. variety grown, source of planting material, cropping pattern used, method of land preparation, fertilizer application, weeding, harvesting, type of tools used etc. The potentials of the area for pineapple production, potentials of pineapple, and constraints militating against pineapple production were ascertained using a 3 point Likert-type scale with responses as "to a great extent (3), to a little extent (2), and to no extent (1) with a mean of 2.0. Any variable with a mean score greater than or equal to 2.0 was regarded as a potential. Also, response option with a mean greater than or equal to 2.0 was regarded as a potential of pineapple in the area. In the same vein any variable with a mean score greater or equal to 2.0 was regarded as a constraint to pineapple production in the area. The data on constraints were further subjected to factor analysis in order to group the constraints. Data on socio-economic characteristics were analyzed with percentage, and mean score, data on production practices were also analyzed with percentage while data on potentials of the area for pineapple production and potentials of pineapple were analyzed with mean score. Data on constraints to

pineapple production were analyzed using component factor analysis (varimax rotation and Kaiser normalization where a variable with a loading of 0.4 and above is considered as having a high loading and was used in naming the factor). These analyses were executed with the help of Statistical Package for the Social Sciences (SPSS) version 16.

Results and discussions

Socio-economic characteristics of respondents

Table 1 show that greater percentage 56.2% of the respondents were male. The majority were aged 31-60 years with a mean age of 50.31 years implying that respondents were ageing. The implies that efforts need to be made to attract youths into pineapple production. This is because aged farmers are often not amenable to changes and are neither likely to adopt improved technologies nor have the physical strength to do manual work as the youth (Nwaru (2004); Ajibefun and Aderiole 2003). Results reveal that the majority (73.8%) of the respondents were married, the mean household size was 8 persons. Nwaru (2004) noted that the household size is expected to enhance labour availability. On contrary Okike (2000) opined that the use of available family labour on small sized farms will result in over utilization and hence inefficiency. The lager the household size, the more likely the farm labour will be available to enhance the practice of various improved pineapple technologies. Greater proportion (47.5%) of the respondents had no formal education, 23.8% attended primary school, and 16.2% attended secondary school while 12.5% attended tertiary institution. Thus on the aggregate resolution, the majority (52.5%) of the respondents were literate. This implies that these pineapple farmers could be open to readily adopt innovations because education enhances acquisition and utilization of information on improved technologies by farmers as well as improves their innovativeness (Dey, 2001; Nwaru, 2004; Effiong, 2005; Onyenweaku et al 2005).

Table 1 reveals that a greater proportion (48.8%) of the respondents has farming experience between 1-10 years; 23.8% has experience between 11-20 year; 22.5% has experience between 21-30 years; 3.8% has farming experience between 31-40 years; and 1.2% has experience between 41-50 years. The mean farming experience of the respondents was 15.69. This suggests relatively high experience in pineapple production. The mean monthly households income was ₦45,105.31 while mean monthly income from pineapple production was ₦19627.5. This suggests that pineapple production contributes about 43.5% of the household income which is a significant part of monthly income available to the household.

Table 1: Distribution of the respondents according to their social economic characteristics

Socio-economic characteristics	Percentage (%)	Mean (M)
Age (years):		
21-30	10.0	
31-60	67.5	
61-90	22.5	**50.31**
Sex:		
Male	56.2	
Female	43.8	
Marital status:		
Single	15.0	
Married	73.8	
Widowed	11.2	
Educational level:		
No formal education	47.5	
Primary school	23.8	
Secondary school	16.2	
Tertiary education	12.5	
Farming experience (years):		
1-10	48.8	
11-20	23.8	
21-30	22.5	
31-40	3.8	
41-50	1.2	**15.69**
Household size		
1-5	20	
6-10	60	
11-15	15.0	
16-20	3.8	
21.25	1.2	**8**
Monthly income (₦)		
1,000-10,000	16.2	
11,000-20,000	18.8	
21,000-30,000	13.8	
31,000-40,000	22.5	
41,000-50,000	5.0	
>50,000	23.8	**45,105.31**
Annual income from pineapple (₦)		
No response	5.0	
1,000-50,000	21.2	
51,000-100,000	20.0	
101,000-150,000	17.55,	**235,530**
151,000-200,000	3.8	
201,000-250,000	5.0	
>250,000	27.5	

Pineapple Production Practices

Production site

Table 2 reveals that the majority (68.8%) of respondents had their pineapple production site (farm) located far from residences, 18.8% cultivated in nearby farms; 15% cultivated within their residence, and 2.5% cultivate in refuse dumps. Since the majority of the respondent's production sites are located far from their residence; there will probably be an increase in the cost of transporting pineapple from the point of production to the market, thus increasing the cost of purchasing pineapple. It could also lead to poor maintenance of the farm in terms of weeding as well as rodent control. There could also be losses and damage of produce during the course of transportation as a result of poor access road.

Variety of pineapple grown

Entries in Table 2 show that higher proportion (43.8%) of the respondents cultivated improved variety; 28.8% cultivated indigenous variety while 27.5% cultivate both improved and indigenous variety of pineapple. Since the majority of the respondents cultivate improved variety of pineapple; there is high production of pineapple thus serving as a major source of income for the farmers. This also encourages farmers in the area to go into pineapple production.

Cropping pattern

Tables 2 also shows that the majority (73.8%) of the respondents practiced mixed cropping while the remaining 26.2% practiced sole cropping. (Ikeorgu et al, 1989) opined that mixed cropping offers the farmers insurance against total crop failure. It helps to control soil erosion and weeds, and it brings about a more even distribution of farm labour than in sole cropping. Traditionally, it is used by subsistence farmers primarily to increase the diversity of their products (Gomez and Gomez, 1983).

Type of fertilizer used:

Entries in Table 2 reveal that the majority (61.2%) of the respondents did not use fertilizer in pineapple production; 15.0% used organic fertilizer; 11.2% used inorganic fertilizer while 12.5% used both organic and inorganic fertilizer. This implies that the production sites of the respondents were fertile. This in turn could lead to massive production of pineapple for the entire populace thereby promoting good health and also boosting the income of the farmers.

Method of weed control:

Entries in Table 3 reveal that the majority (92.5%) of the respondents controlled weed using hand tools; 46.3% weeded by hand picking, while 15% used chemicals. The finding reveals that farmers mainly adopted manual weeding which could constitute some drudgery. However, the it also shows that since the majority do not use chemicals to control weed, their production system could be more environmentally friendly and their produce more organic and healthy for

consumption. Also, the acid concentration of the production site will be reduced to the barest minimum. Ndugu (2014) also found that weeding of pineapple farms in Kenya is done manually in most cases.

Number of weeding per growing period:

Table 2 shows the number of weeding done by the respondents in a season. The majority (42.5%) weeded four (4) times in a season; 30% weeded thrice; 10% weeded eight times; 7.5% each of the respondents weeded both once and five times respectively in a season; while the remaining 2.5% weed six times. This is an indication that pineapple production is very laborious and also farmers find it difficult transporting themselves to the site. This in turn leads to low production of pineapple as a result of weed infestation. The National Agriculture Research Institute (1999) stated that if chemical control .is preferred, they are usually applied three different stages of the plant cycle.

Ways of trapping rodents

Table 2 shows that the majority (88.6%) of the respondents trapped rodents by hand picking; 35.0% used scare crow while 15% used chemicals. The findings show that the farmers usually had losses via rodent attacks since the production sites were located far from their residences and there were poor access roads.

Method of harvesting

Entries in Table 2 also show that all (100%) of the respondents harvested their produce manually. This implies that the farmers did not have access to basic farm equipment and implements such as harvesters in order to ease production. Thus, farmers were restricted from cultivating large hectares of land.

Sales and storage of pineapple

Entries in Table 2 reveal that all (100%) of the respondents sold their produce immediately after harvesting. This is an indication that the respondents did not have processing and storage facilities; thus leading to losses due to rotting of produce. However, there was also unavailability of produce during off season.

Target buyers

Entries in Table 2 also show that the majority (85%) of the respondents sold their produce to consumers, 85% retailers, and 45% wholesalers. The implies that the majority of the farmers were subsistence farmers, who usually have less left over after family consumption so therefore left-overs were usually sold to consumers directly or to retailers.

Table 2: Distribution of the respondent's based on production practices

Variables	percentage
Production site	
Farm located far from residence	68.8
Nearby farm	18.8
Within the residence	15.0
Refuse dump	2.5
Variety of pineapple grown	
Improved	43.8
Indigenous	28.8
Both improved and indigenous	27.5
Cropping pattern	
Sole	26.2
Mixed	73.2
Type of fertilizer used	
Organic	15.0
Inorganic	11.2
Both organic and inorganic	12.5
None	61.2
***Method of weed control**	
Use of chemicals	15.0
Hand tools	92.5
Hand picking	46.3
Number of weeding per growing period	
Once	7.5
Twice	10.0
Thrice	30.0
Four times	42.5
Five times	7.5
Six times	2.5
Method of trapping rodents	
Hand picking	88.6
Use of chemicals	15.0
Use of scare crows	35.0
Method of harvesting	
Manually	100
Product handling	
Sale immediately after harvest	100
Target buyers	
Wholesalers	45.0
Retailers	85.0
Consumers	85.0

*****Multiple responses**

Potentials of Area for Pineapple Production

Table 3 shows the potentials of the study area for pineapple production. The major potentials of the area include: fertile land for pineapple production ($\overline{x}$=2.78), ready market ($\overline{x}$= 2.72), bumper harvest helps farmers boost their pineapple farm ($\overline{x}$= 2.05), and farmers in the area are moving into pineapple production ($\overline{x}$=2.25). This implies that the fertility of the soil brought about higher yield and also improved productivity following the availability and readiness of market which invariably made demand to be higher than supply, thereby stimulating increased in scale of production and attraction of other farmers to engage in pineapple production.

Table 3: mean score of perceived potentials of the area for pineapple production

Potentials of the area	Mean	Std. Deviation
Fertile land for pineapple production	2.78*	0.420
Ready market	2.72*	0.551
Pineapple processing industry in the area	1.00	0.00
Availability of preservation and storage techniques	1.04	0.191
Good road for transportation of pineapple	1.80	0.604
Its production is mainly in the hand of young farmers	1.75	0.516
Exportation /international trade on pineapple	1.11	0421
Bumper harvest helps farmers boost their pineapple farm	2.05*	0.692
Farmers in the area are moving into pineapple production	2.25*	0.755
Research into improved varieties help farmers increase yield	1.24	0.79

Source: Field survey July, 2012

Potentials of Pineapple Production

Entries in Table 4 reveal the potentials/importance of pineapple production. The major potentials include: as a source of income ($\bar{x}$=2.62), and promoting good health through consumption among farmers/inhabitants ($\bar{x}$=2.78). This is an indication of the maximum potentials of the area for pineapple production; thus boosting production in order to meet the market demand thereby promoting good health.

Table 4: Mean score of potentials of pineapple production

Perceived potentials	Mean	Sd. Deviation
Source/ boosting of income	2.62*	0.582
Keep environment clean	1.30	0.582
Minimize rural-urban migration	1.81	0.576
Check social vices as a result of idleness	1.84	0.625
Local industrialization	1.09	0.363
Creation and proliferation of new settlements	1.49	0.636
Promote good health through consumption among farmers	2.78*	0.477
Serve as foreign exchange earnings	1.25	0.626

Source: Field survey July, 2012

Constraints to Pineapple Production

Entries in Table 5 show the factor analysis result of the constraints to pineapple production in the area. The Principle Component Analysis with Varimax rotation was used in grouping factors. Variables with loadings of 0.4 and above were used in naming the factors. Factor 1 was named technological and institutional constraints, factor 2 was named financial and input constraints, while factor 3 was named production and biotic stress constraints. Variables that loaded under technical and institutional constraints (factor 1) were: lack of technology/innovation on pineapple production (0.708), wastages due to inability to process produce (0.695), lack of processing and storage facilities (0.690), poor access road for transportation (0.576), high cost/unavailability of other equipment (0.573), lack of collateral required to obtain loan (0.545), lack of technical knowledge on the use of improved technology (0.529), scarcity of farm input (0.470), and rodent attack (0.450), factors that loaded under financial and input constraints (factor 2) include: weeding problem (0.740), lack/insufficient organic manure (0.639), laborious nature of pineapple production (0.615), lack/high cost of fertilizer (0.588), lack/high cost of improved varieties (0.475), and high cost/unavailability of labour (0.423) while factors that loaded under production and biotic stress constraints (factor 3) were: pest and disease infestation (0.810), high interest rate on loan to boost production (0.789), and losses/no profit from pineapple production (0.541).

Technological and institutional constraints reflect a broader issue of poor agricultural extension support to farmers. When extension service is performing below expectations, farmers including pineapple producers find it difficult to make reasonable progress in their production activities. On the other hand, lack of or poor finance is the greatest limiting factor to agricultural development in Nigeria (Famogbiele, 2013). When pineapple farmers lack access to agricultural finances, it is almost impossible for them to operate in a commercial and cost effective manner.

According to Gumi and Aliero (2012), diseases and pests rob the world of more than 40% of the attainable yield of eight most important food crops. Biotic stress factors including weeds, diseases and pest infestations reduces yield of pineapple and quality of produce thereby greatly reducing the income achievable from pineapple production.

Table 5: Constraints to pineapple production

Perceived constraints	Technological and institutional constraints (Factor 1)	Financial and input constraints (Factor 2)	Production and biotic stress constraints (Factor 3)
Scarcity of land for planting	0.186	0.065	-0.099
Low soil fertility	0.174	-0.181	-0.022
Poor access road for transportation	0.576*	0.155	0.041
Lack of technical knowledge	0.529*	0.243	0.055
Scarcity of farm input	0.470*	0.269	0.281
Lack/high cost of improved varieties	0.317	0.475*	0.382
Lack/high cost of fertilizer	0.397	0.588*	0.262
Lack/insufficient organic manure	0.211	0.639*	0.245
High cost/unavailability of agro-chemical	0.489	0.210	0.425
High cost/unavailability of other equipment	0.573*	0.245	0.340
High cost/unavailability of labour	0.390	0.423*	-0.161
Laborious nature of pineapple production	-0.173	0.615*	0.023
Ineffective extension service	0.562*	0.334	-0.170
Wastage of produce due to lack of processing	0.695*	0.098	0.094
Lack of finance	0.393	0.385	0.209
Lack of collateral required to collect loan	0.545*	0.057	0.132
Rodents attack	0.450*	-0.300	0.127
Weeding problem	0.169	0.740*	0.065
Lack of technology/innovation	0.708*	-0.028	-0.045
Sickness	0.176	-0.065	0.099
High interest rate on loan to boost production	-0.043	0.004	0.789*
Climate change	0.002	-0.492	-0.590
Losses/no profit from pineapple production	-0.175	-0.399	-0.541*
Lack of processing and storage facilities	-0.690*	-0.101	0.041
Pest and disease infestation	-0.035	-0.063	0.810*

Extraction method: Principle Component Analysis
Rotation Method: Varimax with Kaiser Normalization

Conclusion and Recommendation

The prospects of pine apple production in the area included: fertile land for pineapple production, ready market, source of income to farmers, promotion of good health through consumption among others. Problems/constraints militating against pineapple production in the area included: technical and institutional constraints, financial and input constraints, and production and biotic stress constraints. Research to improve pineapple production should be promoted by government and non-governmental organizations (NGO). Also, government, NGOs, local leaders should help in the provision of basic infrastructural facilities such as construction of good road network for easy transportation of produce from the point of production to the market. This will minimize the losses and damages done to produce during the cause of transportation.

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