

# Pineapple Growing and Farmer's Welfare in Maziba Sub-County, Kabale District, South Western Uganda

Friday Christopher<sup>1</sup>, Ntirandekura Moses<sup>2</sup>, Ogwal Harold<sup>3</sup>

1 Assistant Lecturer/Phd Student, Department Of Political And Administrative Studies, Kampala International University, Uganda

[Fridaychristopher@Rocketmail.Com](mailto:Fridaychristopher@Rocketmail.Com), +256781447337

2 Assistant Lecturer/Phd Student, Department Of Political And Administrative Studies, Kampala International University

[Ntimoses33@Gmail.Com](mailto:Ntimoses33@Gmail.Com), +256781491598

3 Assistant Lecturer/Phd Student, Department Of Environment And Applied Sciences, Kampala International University

[ogwalharold@yahoo.com](mailto:ogwalharold@yahoo.com), +256772004059

**Abstract:** This study was carried out to examine the contribution of pineapple growing on farmer's welfare in Maziba Sub-County, Kabale District. The study was guided by these objectives namely; i) to examine the different pineapple species grown in Maziba Sub-County, ii) to examine the contributions of pineapple growing on welfare of farmers in Maziba Sub-County and iii) to assess the challenges facing pineapple farmers in Maziba Sub-County. The study employed descriptive research design that helped in gathering data. The study used both purposive and simple random sampling to select the respondents. The study used a sample size of sixty-nine (69) respondents selected from six parishes within the sub county. The study was analyzed using simple quantitative techniques of frequencies, percentages and tables. Benefits and constraints were analyzed, findings are carried out and major conclusions are drawn from data analysis showing that pineapple growing still has contributed on the income of the pineapple growers in the study area. Poor means of transport in form of roads, is still a challenge. There should be improvement of roads connecting rural areas to urban centers. It was concluded that there are a lot of contributions of pineapple production in Maziba Sub County, Kabale District of which includes source of food, source of income, source of foreign exchange, source of medicine, helps in environmental protection in that it acts as a cover crop, pineapple peelings are used as animal feeds and source of employment opportunities to the people. Also from research question three, it was found out that there are many constraints faced by pineapple farmers in Maziba Sub County, Kabale District. These include low in put –out put technology, limited market prospects for food, marketing infrastructural constraints, financial problems, pests and diseases, poor means of transport in form of roads, land fragmentation, high degree of risks and uncertainties and un educated farmers. Agricultural programmes aiming at rural development should focus on uplifting the poor through encouraging them to actively participate in productive agricultural group formation. This can help farmer s to easily access agriculture loans from money lending institution such as bank and other microfinance institution. Land fragmentation should be solved by carrying out land consolidation that is combining small plots of land into a large farm land such way that cultivation using machine become possible. This can reduce time, cost of labor and increases total production per hectare. Farmers should be sensitized on the importance of record keeping so that they keep records to help them assess the profitability of pineapple growing compared to other growing crops. Agricultural programs aiming at rural development should focus on uplifting the poor through encouraging them to actively participate in productive agriculture through group formations. Farmers should be provided with new pineapple varieties which adoptive to harsh climatic conditions and resistant to pests and diseases. Farmers should be guided on how to form marketing cooperatives in order to overcome exploitation of middle men who buy pineapples from framers at relatively cheap price and sell them expensively to urban retailers and consumers. There should be improvement of extension services by providing extension centers with man power and enough facilities. There should be improvement of roads connecting rural areas to urban centers. Through this, transportation of the harvested pineapples to market centers becomes possible.

## SECTION ONE: INTRODUCTION

### 1.1 Background to the Study

Pineapple as an economic crop has encouraging potentials for foreign exchange earnings. It can increase national income through the expansion of local industries and higher incomes for farmers involved in its production (Fawole, 2008). It is one of the crops with the most potential in the international market and highly profitable, an activity that demands a large workforce (Quijandria, 2012). Pineapple production therefore can be used as a panacea for food security and job generation, help in rural development, launch the country on the path of self-sufficiency, increase food production and help in improving lives and health care delivery services (Mwebaze, 2000).

According to Khalid (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. More so, 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, 2011).

The word ‘‘pineapple’’ in English was first recorded in 1398, when it was originally used to describe the reproductive organs of conifer trees (now termed pine cone) the term ‘‘ pine cone’’ for the reproductive organ of conifer trees was first recorded in 1694. When European explorers discovered this tropical fruit in the America, they called them ‘‘pineapple’’ first so referenced in 1664 due to resemble lance to what is now known as the pine cone (Morton, 2008).

Pineapple (*Ananas comosus*) is the most economically important plant in the family Bromeliaceae, which is divided into three subfamilies: Pitcairniaceae, Tillandsiaceae, and Bromeliaceae (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. 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 (Joy, 2010).

Pineapple is the second most traded product after bananas in Phillipian. There exist several hundred varieties of pineapples, but the most widely grown are smooth cayenne, Queen and the recently introduced variety called MD2 which commands 80% of the global trade in pineapples. Pineapple production is concentrated in the tropical regions of the world. It is grown in over 82 countries with over 2.1 million acres under the crop according to FAO (2009), with a global production of 15,287MT (Metric Tonnes) per year.

Pineapple is a wonderful tropical fruit having exceptional juiciness, vibrant flavor and immense health benefits (Joy, 2010). In developing countries like Uganda, most of the fresh pineapples produced are sold in domestic markets and bought for domestic consumption (Spore Magazine, 2008). 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 (Bartholomew et al. 2003).

Total pineapple production worldwide is around 16 to 18 million tons (Acland, 2004), Uganda produces only 0.35% of total pineapple production for East Africa compared to 80% and over 19% produced in Kenya and 40% in Tanzania respectively (FAO, 2004)

In Uganda, it is mainly grown south of Lake Kyoga and western Uganda. In Kigezi region pineapple is predominantly grown by small scale farmers. Pineapple is one of the crops in the fruit range that is being grown in Uganda today. The fruit has been grown for the last decade but at subsistence level. Families engaged in the production of pineapple for consumption in their homes and the surplus taken to the market for sell. It is of recent that many farmers in the different parts of the country have started engaging in commercial pineapple farming for trade (Uganda Strategy Support Program, 2012).

With a high demand for pineapple worldwide, many people are engaged in pineapple farming for export. For example, in Luwero district so many farmers in different sub counties like Kikyusa, Kamira, Zirowe are engaged in large scale pineapple farming. They have been able to do this due to high demand for pineapples in Kenya, Rwanda and southern Sudan. Through pineapple production, many families have been able to acquire basic needs and educated their children (National Planning Authority, 2010).

## 1.2 Statement of the Problem

The farmer’s standards of living have remained lagging behind despite of the government’s intervention in strengthening and empowering pineapple farmers through provision of funds, construction of roads to ease transportation and marketing of pineapples COMTEX,(2004). Therefore, the study aimed at assessing the contributions and challenges facing pineapple farmers in Maziba Sub-County, Kabale District

## 1.3 Purpose of the Study

The study focused on assessing the contributions of pineapple growing on farmer’s welfare in Maziba Sub-County, Kabale District.

## 1.4. Specific Objectives

- i. To examine different pineapple species grown in Maziba Sub Country, Kabale district.
- ii. To assess the contributions of pineapple growing on welfare of farmers in Maziba Sub-County, Kabale district.
- iii. To examine the challenges facing pineapple farmers in Maziba Sub-County, Kabale district

## 1.5 Research Questions

- i. What are the different pineapple species grown in Maziba Sub Country, Kabale district?
- ii. What are the contributions of pineapple growing to the welfare of famers in Maziba Sub-County, Kabale District?
- iii. What are the challenges facing pineapple famers in Maziba Sub-County, Kabale District?

### 1.6 Significance of the Study

The findings of the study would be useful to the government in investing in pineapple production, the study would equip local people with knowledge and skills on pineapple production which will help them in increasing on their income.

Data from this study would be useful to Ministry of Agriculture, Animal Industry and Fisheries in provision of initiatives that would ensure transition of small-scale farmers from subsistence production to commercial production. This study targets to generate data on pineapple species, contributions and challenges facing pineapple farmers in Maziba Sub-County Kabale District.

## SECTION TWO: METHODOLOGY

### 2.1 Research Design

The study employed a descriptive research design that helped in gathering data. The descriptive design described phenomena as they exist. It issued to identify and obtain data on the characteristics of a particular problem or issue. Descriptive research design was selected because it had the advantage of producing good number of responses from a wide range of people. Also, this design provided a meaningful and accurate picture of events and sought to explain people's perception and behavior on the basis of the data collected.

### 2.2 Study Area

The study was carried out in Maziba Sub County Kabale District, in the parishes of Birambo, Kahondo, Karweru, Kavu, Nyanja and Rugarama. These are parishes where pineapple is grown by households in the area. Maziba Sub County is located in Ndorwa East Constituency, Kabale District South Western Uganda. It lies approximately 10 kilometers southeast of the town of Kabale. The altitude of Maziba Sub County ranges between 1,219 metres (3,999 ft) and 2,347 metres (7,700 ft.) above sea level. The average annual temperature is 17.2 °C. The average annual rainfall is 1368 mm. The soils of Maziba Sub County are ferritic and peat soils (Muhereza, and Mwesirwa, 2015)

### 2.3 Population Sampling

The population for this study focused pineapple technical staff at the sub-county and farmers from Maziba Sub County. Maziba Sub-County has a total population of 20280 people according to the Uganda National Bureau of Statistics, (2014). However, due to limited time, the researcher will not study the whole population and will have to select a sample of 69 respondents. The formula used had been proposed by Yamane (1967) which provides a simplified formula to calculate sample sizes. Researcher selected sample for research using the Yamane's formula as presented below.

$$n = \frac{N}{1 + N(e)^2}$$

N= Population size

n= Sample size

e= standard error

Confidence level 88%, p=0.12

The determination of the simple size was done as follows;

$$N= 20280 \text{ and } e=0.1 \text{ } n= 20280/1+20280(0.1)^2 = 69$$

Based on calculation, the formula gave the sample size of 69 respondents. This formula is very accurate to the population which is having a very little number of populations. Respondents were selected from all parishes of Maziba Sub County where by 67 would be farmers who were involved in pineapple growing and 02 technical staff at the sub county.

### 2.4 Data Collection

The decision regarding data collection methods will be guided by two important factors, namely: the material under study and type of data required. In this study, primary data will be collected using questionnaires and interview. The questionnaire will be the key

method for primary data collection. The questionnaire method is chosen because it has the advantage of eliciting a lot of data within a short time. The following instruments used during data collection.

#### 2.4.1 Semi-Structured Questionnaires

These were given to respondents. Questionnaires were used to minimize time wastage as they would be answered in the absence of the researcher, respondents answered questions on their own time and they would be free to give answers to the questions.

#### 2.4.2 Interview Guide

Interviews in oral form through conversation dialogues were used as a way of complementing the questionnaire approach. Structured interview was conducted to obtain information from farmers. This helped the researcher to get information from people with limited time and some farmers who didn't know how to read and write.

#### 2.5 Data Analysis

Data collected from the field was analyzed using quantitative method. It was categorized, grouped, and tabulated using tables, charts, frequencies and percentages. Data was edited and entered using a Statistical Package for Social Sciences (SPSS version 17) and Microsoft excel (version 2007) to draw conclusions.

### SECTION THREE: PRESENTATION, INTERPRETATION AND DISCUSSION OF RESULTS

#### 3.1 Different Pineapple Species

**Table 3. Different Pineapple Species**

Variables	Frequency	Percentage (%)
Smooth Cayenne	45	65.2
Red Spanish	11	15.9
Queen	03	4.3
Abacaxi	10	14.5
<b>Total</b>	<b>69</b>	<b>100</b>

##### Field survey, 2018

From, table 4 above 65.2% of the respondents reported smooth cayenne, 15.9% red Spanish, 4.3% queen and 14.5 Abacaxi. This implies that majority of the pineapple farmers in the study area grow smooth cayenne.

#### 3.2 Contributions of pineapple growing on welfare of farmers in Maziba Sub-County Kabale District

**Table 4. Contributions of pineapple growing on welfare of farmers**

Contributions of pineapple	Frequency	Percentage (%)
Source of food	17	24.6
Source of medicine	04	5.7
Animal feeds	10	14.4
Employment opportunities	15	21.7
Sources of income	20	28.9
Environmental protection	03	4.3
<b>Total</b>	<b>69</b>	<b>100</b>

##### Field survey, 2018

From table 5, 24.6% of respondents reported that pineapple are sources of food to most families in the sub county and the whole country in general. This is in agreement with Samson (1986) who stated that, Pineapple are largely consumed around the world as canned pineapple slices, chunk and dice, pineapple juice, salads, sugar syrup, alcohol citric acid and pineapple chips. It is also exported to other countries as a fresh product where 60% of fresh pineapple is edible. 5.7% of the respondents reported that pineapple is source of medicine. This confirms the idea of Tochi et al; (2008) who noted that, Pineapple is grown and used as a medicinal plant. Pineapple contains the enzyme bromelain which has several therapeutic properties including malignant cell growth, control of diarrhea and skin debridement. 14.4% of the respondent reported that pineapple leftovers are used as animal feeds. This agrees with the idea of Morton, (1987) who noted that, pineapple crowns are sometimes fed to horses if not needed for planting, final pineapple waste from the processing factories may be dehydrated as bran and fed to cattle, pigs and chickens. 21.7% of the respondent reported that pineapple production provides employment opportunities to the people. This confirms the idea of FAO (2004) which noted that, pineapple production has provided employment and increase in the pineapple growing regions. 28.9% of the respondent reported that pineapple are sources of income to the farmers. This confirms the idea of FAO (1998) which stated that agriculture is the leading provider of income, employment, raw material and food in many African countries. 4.3% of the respondents reported that pineapple helps in the conservation and protection of the environment. This agrees with the idea of Thomson Reuters Foundation (May 2014)

which stated that, pineapple as a cover crop help to protect the soil from erosion, cover crops are grown to conserve biodiversity, soil fertility and water.

### 3.3 The challenges faced by pineapple farmers in Maziba Sub County Kabale District

**Table 5. Challenges facing pineapple farmers in Maziba Sub-County**

Challenges facing pineapple farmers	Frequency	Percentage %
Low technology.	02	2.9
Low market	13	18.8
Financial problems	05	7.2
Pests and diseases	10	14.4
Poor transport	12	17.3
Limited land	11	15.9
Land fragmentation	05	7.2
Risks and Uncertainties	08	11.5
Low level of education	03	4.3
<b>Total</b>	<b>69</b>	<b>100</b>

#### Field survey, 2018

From table 2.9% of the respondents reported that, pineapple farmers constraints of low technology when cultivating pineapples. This is in agreement with State of the environment Report for Uganda (1998) which stated that, Uganda's agriculture is a low chemical in put user, but the same is true of other types of technology such as high yielding varieties, irrigation and soil and water conservation technology. 18.8% of the respondents reported that, low market. This confirms the idea of P.S.DP, (1996) which noted that, Under the Marketing infrastructure constraints, it is estimated that about 25% of feeder roads are impassable during rainy season, 40% require full rehabilitation and 20% culvert and drainage repairs. 7.2% of the respondents reported that pineapple farmers faced financial constraints due to limited agricultural banks. This in agreement with the idea of P.S.DP (1996) which stated that, Farmers own savings is very low and informal credit is not available most especially in rural areas, farmers need production (short term) loans and medium term investment loan to purchase farm inputs meet working capital cash expenditures for land improvement in order to expand productive capacity and improve efficiency of the farm, it was found out. 14.4% of the respondents revealed that pineapple farmers face the problem of Pests and diseases. This is in an agreement with the idea of National Development plan, 2010-1014/15 which stated that, pest and diseases have remained a big threat for increasing agriculture output and productivity. The rural economies have been severely affected and a number of farmers receded into poverty due to disease infections. 17.3% of the respondents reported that farmers face a problem of poor means of transport inform of roads. This is in agreement with the idea of All Africa Global media, (2004) which noted that, Poor Road network and poor carriage facilities to the market areas are still the outstanding problems faced by the farmers. 15.9% of the respondents reported that, Farmers face the shortage of enough land. This is agreement with National Development plan, (2010-2014/15) which stated that, Uganda's diver get systems of land tenure and overlapping land rights have impacted negatively on long term investments in agriculture. Furthermore, many landless potential farmers (especially women) cannot easily access land because of costs, cultural norms and threats imposed by the existing overlapping land rights. 7.2% of the respondents reported that, pineapple farmers face a constraint of land fragmentation and soil exhaustion due to high population growth within the sub county hence poor / low harvests of pineapple. This confirms the idea of Nzabona (2007) who asserted that, due to high population growth in most countries, many people do lack enough land for cultivation, and even the small plots people own are sub divided into many plots of land especially among the family members. This has left many scattered in different areas and has limited commercial growing of pineapple. 11.3% of the respondents revealed that, pineapple farmers face a challenge of high degree of risks and un certainties such as drought and heavy rainfall .This is in an agreement with the idea of IPCC (Solomon et al; 2007) who noted that, potential effects of climate change on agriculture, include, reduced yields in warmer regions as a result of heat stress ; damage to crop, soil erosion and inability to cultivate the land caused by precipitation event; and land degradation resulting from increasing drought. 4.3% of the respondents reported that, farmers face a challenge of not being educated hence practice poor farming methods such as over cultivation and monoculture. This confirms the idea of state of the environment Report for Uganda (1998) which noted that, there is a general lack of recent soil information and recommended rate of fertilizer application consequently agricultural productivity and income have remained low perpetuating poverty because of dependence on rudimentary technology.

## SECTION FOUR: CONCLUSIONS AND RECOMMENDATIONS

### 4.1 Conclusions

Conclusions are made basing on the research questions stated.

From research question two, it was concluded that there are a lot of contributions of pineapple production in Maziba Sub County, Kabale District of which includes source of food, source of income, source of foreign exchange, source of medicine, helps in environmental protection in that it acts as a cover crop, pineapple peelings are used as animal feeds and source of employment opportunities to the people.

Also from research question three, it was found out that there are many constraints faced by pineapple farmers in Maziba Sub County, Kabale District. These include low input –output technology, limited market prospects for food, marketing infrastructural constraints, financial problems, pests and diseases, poor means of transport in form of roads, land fragmentation, high degree of risks and uncertainties and uneducated farmers

### 4.2 Recommendations

Agricultural programmes aiming at rural development should focus on uplifting the poor through encouraging them to actively participate in productive agricultural group formation. This can help farmer s to easily access agriculture loans from money lending institution such as bank and other microfinance institution.

Land fragmentation should be solved by carrying out land consolidation that is combining small plots of land into a large farm land such way that cultivation using machine become possible. This can reduce time, cost of labor and increases total production per hectare.

Farmers should be sensitized on the importance of record keeping so that they keep records to help them assess the profitability of pineapple growing compared to other growing crops.

Agricultural programs aiming at rural development should focus on uplifting the poor through encouraging them to actively participate in productive agriculture through group formations.

Farmers should be provided with new pineapple varieties which adoptive to harsh climatic conditions and resistant to pests and diseases.

Farmers should be guided on how to form marketing cooperatives in order to overcome exploitation of middle men who buy pineapples from framers at relatively cheap price and sell them expensively to urban retailers and consumers.

There should be improvement of extension services by providing extension centers with man power and enough facilities.

There should be improvement of roads connecting rural areas to urban centers. Through this, transportation of the harvested pineapples to market centers becomes possible.

## REFERENCES

- Acland J.D (2000). East African crops, an introduction to the production of field and plantation Crops in Kenya, Tanzania and Uganda, FAO/Longman ISBN: 0852603013.
- Agricultural Policy Secretariat (APSEC), 2000. *Report on Economic of crops and livestock production, processing and marketing, 2000/01*. Mimeo, APSEC, Kampala Uganda: 63- 148.
- Agriculture policy secretariat lead Agency for the Agricultural sector (2006). Private Sector Development project (UNDP UGA/95/002), National strategy and program in action for private sector Development in rural areas, Vol.1: main Report pp.44-45; 47-48-59.
- Amao, J. O. and Awoyemi, T. T. (2008). Adoption of improved cassava varieties and its welfare effect on producing households in Osogbo ADP zone of Osun state. Accessed on 25th June 2016 from [www.geneconserve.pro.br/artigo045.pdf](http://www.geneconserve.pro.br/artigo045.pdf)
- Ariga, J., Jayne, T.S., Kibaara, B., and Nyoro, J.K. (2009). Trends and patterns in fertilizer use by smallholder farmers in Kenya, 1997-2007. Tegemeo Institute of Agricultural Policy and Development, Egerton University
- Bartholomew, D.P., Paul, R. E. and Rorbach, K.G. (2003). The pineapple “Botany, Production and Uses”, University of Hawaii Manoa Honolulu, USA. CABI Publishing, CABI
- Chemonics International (2003), "Nigeria Food Security Assessment", Final Report USAID, Nigeria
- Collins, J. L. (2006). *The Pineapple Botany, Cultivation and Utilization*. Aberdeen University Press Ltd, Aberdeen, Scotland
-

Committee on Commodity Problems”, Joint Meeting of the Fourth Session of The Sub-group on Bananas and The Fifth Session of The Sub-group on Tropical Fruits, Rome, 9 – 11 December 2009.

David, G. and Adam, P. (2002). *Crops of the Drier Regions of the Tropics*. School of Development Studies, University of East Anglia, Longman Singapore Ltd

Development project (UNDP UGA/95/002), National strategy and program in action for private sector Development in rural areas, Vol.1: main Report pp.44-45; 47-48-59.

Edo Agricultural Development Programme [EADP] (2000). *Edo Agricultural Development Programme Brochure*. University of Benin Press Limited

ESMAP, (Energy Sector Management Assistance Program); 2002. *Uganda Energy Assessment Report NO. 193/96. World Bank Washington D.C. 11-12.*

FAO, (2009). “A Case Study of Tropical Fruits in Asia, with special reference to Mangoes and Pineapples.

Fawole, O. P. (2008). “Pineapple Farmers’ Information Sources and Usage in Nigeria. *Bulg. J.*

Forshaw, M., 2000. *Your Undergraduate Psychology Project: A BPS Guide* Blackwell Publishing.

International Fertilizer Development Center (IFDC) 2001. The fertilizer market in Uganda. An Assessment and strategy for Development unpublished report.

International Labor Rights Forum (2008) “The sour taste of pineapple: how an expanding export Industry undermines workers and their communities”

Ivan, M., Drago, C. and Gorica, C. (2011). “Quality of Agricultural-food products as a factor of the Republic of Serbia's Competitiveness in International Market”, *African Journal of Biotechnology* Vol. 10 (41):7949-7952

Joy, P. P. (2010). “Benefits and Uses of Pineapple”, Pineapple Research Station (Kerala Agricultural

Khalid, M. A., Abbas, M. and Saadullah, S. (2007). “Marketing System of Fruits, Margins and Export Potential in Pakistan”, *Pakistan Journal of Life and Social Sciences* 5(1-2): 34-39.

Kilonzi, S.M. (2011). Maize production and its implication on food security for small scale farmers in Bukhaya West-Busia Kenya. Van Hall Larenstein University of Applied Sciences, Wageningen.

Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and Ministry of Finance, Planning and Economic Development (MFEPD), 2000. *Plan for Modernization of Agriculture: Eradicating Poverty in Uganda. Final draft, April 2000.* Government of the Republic of Uganda: 32-40.

Morton, J.W 2008. Pineapple P. 18-28. In: Fruits of warm climates. Julia F. Morton Miami, FL.

Mwebaze, (2000). Country Pasture/ Forage Resource Profiles, (MAAIF).

NEMA (2008) State of Environment Report for Uganda.

Okoth, P. O and Mulwa, M.R. (2010). Factors influencing uptake of integrated soil fertility management knowledge among smallholder farmers in western Kenya. 12<sup>th</sup> KARI Scientific Conference Proceedings 2010.

Olukosi, J. O. and Erhabor, P.O. (2006). *Introduction to Farm Management Economics: Principles and Application*. AGITABS Publishers Limited, Zaria, Press

PMA (Plan for Modernization of Agriculture), 2004. Project Report Submitted to Ministry of Finance and Economic Planning, Government of Uganda, s

Purse glove, J.B. 1972. Tropical crops. Monocotyledons. Long man and John Wily, Harlow and New York.

Rice, R.P., Rice, L.W. and Tindall, H.O. (2001). *Fruit and Vegetable Production in Warm*

---

Richards, P. A. and D. J. McConnel. (2003) Budgeting, Gross margins and programming for4 farm planning, professional farm Management Guide book No. 3

Sampson, J. A. (2011). *Tropical fruits* (2nd edition). Longman Scientific and Technical Publishers. pp190 – 215

Samson J.A. (2000). Fruit. USA Longman Inc. New York.

Spore Magazine, (2008). [Online] Available: <http://spore.cta.int>. No. 138 December 2008.

TochiaB. N Wang Z, and Zhang W. (2008). Therapeutic Application of Pineapple University), Vazhakulam-686 670, Muvattupuzha, Ernakulam, Kerala, India. Ministry of Agriculture, Animal Industry and Fisheries [www.kau.edu/prsvkm](http://www.kau.edu/prsvkm)

Wiebe, K.D and Gollehon, N.R. (2007). Agricultural resources and environmental indicators (2006Edition). Retrievedfrom[www.ers.usda.gov/publications/arei/ah722/arei5\\_1/AREI5\\_1productivity.pdf](http://www.ers.usda.gov/publications/arei/ah722/arei5_1/AREI5_1productivity.pdf)