
The Reality of Citrus Production and Marketing in Sudan

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Abstract

Citrus fruits are very important in human life due to vitamins and acids they contain, in addition to increase the gross domestic product and national income, the objective of this study is to find out the causes of the decline in citrus production besides knowing the problems facing production and marketing, a descriptive method was used to analyze the data collected from secondary sources. The most important results are: a positive relationship between cultivated areas and citrus production, fluctuation in citrus production from year to year and citrus production suffers from many problems and obstacles. The most important recommendations are: Establishing centers for cleaning, sorting and providing refrigerated stores to extend the life of citrus crops and development of citrus production and harvest technologies.

Keywords: citrus production, citrus marketing, Sudan

INTRODUCTION:

Our country to advance economic development depends on agricultural development given that a large part of the population works in agriculture, as agricultural products constitute most of our

exports, so agricultural development requires the intertwining of human resources with material resources. The area cultivated with major fruit crops is more than (64.4) thousand feddans, and there are millions of feddans available for horticultural investment in general, and fruit crops in particular. Some areas of north, east, west and central Sudan are characterized by the production of certain types of fruits, including lemons, which find a profitable market in the Gulf State. Citrus fruits can be grown successfully in all types of black sandy and heavy clay lands, provided they have the necessary nutrition and are free of salt.

Study Problem:

Represented by the fluctuation of citrus productivity from year to year.

Study Importance:

Citrus fruits have economic and nutritional importance: the economic importance is represented in increasing the national income and GDP or revenues and returns for farmers, while the nutritional importance is represented in the citrus fruits containing a number of other nutrients, especially vitamins.

Study Objectives:

- Knowing the relationship between the quantities produced of citrus and the area cultivated with it in Sudan.
- Knowing the problems and obstacles facing citrus production and marketing in Sudan.

Study Hypotheses:

- There is a positive relationship between cultivated areas and citrus production.
- Citrus production increases from year to year.

Study Methodology:

The descriptive and analytical method was used for data collected from secondary sources.

Factors affecting citrus production in Sudan:

Citrus fruits are grown in the tropics, and are well cultivated in porous yellow soils with good drainage, citrus fruits from evergreen trees and need continuous grazing, because periods of drought that lead to less moisture in the soil change the growth of trees, so irrigation water must be available in the period when there is no rainwater. The appropriate temperature for citrus growth is not less than an average of 40 degrees Fahrenheit in winter and 70 degrees Fahrenheit in summer (Abbas 2011).

Cultivation and production of citrus fruits:

Citrus fruits are types of fruit plants, ranging in growth between trees and shrubs, originated in the tropical region in Southeast Asia and China, and then spread widely throughout the tropics and subtropics and parts of the temperate zone when the appropriate environment was provided for their growth and fruits on a commercial scale. Citrus fruits are considered one of the most important fruit crops, production and consumption in the world (Elhamadi).

1. Lemon:

It is one of the most important evergreen fruit trees and it is considered the most common citrus fruit and it tolerates different environmental conditions. In terms of its spread in the world, it is considered a tropical fruit in origin, but it is now spread in non-tropical climatic areas that are characterized by a climate free from harmful biological phenomena. Lemon cultivation is concentrated between steps of 40 south, and these include warm temperate regions, dry subtropical areas and subtropical regions. Its original home is the East Indies and it is believed that its cultivation moved to the world through India and Persia, and then moved to the West Indies, Sudan and some other tropical countries. As for its spread in Sudan, it is cultivated in many areas, as there are North Kordofan (Bara), South Kordofan (Abu Jbailha), Blue Nile and Hawatah, and it is also cultivated in Darfur (Saadalla, 2007).

Varieties of lemon: Lemon includes many varieties according to the areas of its cultivation, and these are the most important common lemon varieties used in agriculture in most areas of its production. These varieties are:

Sour lemon variety (adahlia - borica - Lisbona - cindy - villafranca), scratched lemon variety - salty lemon variety (Banzhair) - lemon variety entronater - lemon variety Kello - sweet lemon variety - Lemon Teresa variety - Vimnilo lemon variety - Lisbona variety (Abbas 2011).

2. Orange:

The orange tree is a fruitful tree, with a productive age between 50-60 years and a height between (5-15 meters) and the best areas for its growth are subtropical and warm temperate regions such as the countries of the Mediterranean basin in Sudan. Oranges are grown in the Northern State and Kassala State.

Varieties of oranges grown in Sudan:

Varieties of sweet oranges: The production of oranges in the world constitutes 44% of the citrus varieties, and there are 200 varieties of oranges belonging to four groups:

1. Sugar oranges (no acidity).
2. Sweet oranges.
3. Orange abodoma.
4. Summer orange (Daraj, 2020).

The most important contents of the orange fruit: the pulp of the fruit is about 60-84% of its total weight, and every 100 grams of the pulp contains the following:

1. 80%-90% water.
2. 3%-7% ash, mostly in the form of potassium.
3. Carbohydritic materials, at a rate of 5.5 -11% in the form of sucrose and glucose.
4. Fats with a degree of 0.1% - 0.4%.
5. Protein 0.5%-1.5%.
6. Organic acids 1%.
7. Vitamin C is found in fruits at a rate of about 45% mg per 100 gm of pulp, and there is little vitamin B2 - B1 and niacin (Elhamady).

3. Grapefruit:

Sir Herbert Jackson Pasha, the governor of Dongola, was considered the first to use seedlings of a fruit relative (24 seedlings) from

America in 1904 and planted it in the government nursery of Marwa. He did not specify the variety except that he believed that it was my white. Generally, the fruit of the relative fruit is a large, heavy fruit with a thick crust, a mixture of sourness, bitterness and sweetness.

Varieties grown in Sudan: Commercially cultivated varieties, some with fruits, pulp, and white honey juice, such as Marsh and Fruits, Marsh Seedless, and some of them are colored crimson or red such as riddlesh, and some are creamy, such as Miami. As for the Foster variety, its pulp and its crimson juice, and it have many seeds.

Benefits of grapefruit:

- Eating a fruit or two from a relative fruit every day, in addition to the appropriate diet, will reduce obesity.
- The relative fruit also reduces the quantities of carcinogens present in smoke for smokers.

Economic importance of citrus crops:

The total global production of citrus crops is 958072 thousand tons, where the proportion of oranges is 66% of the total production, lemon 15.4% and grapefruit 6%. 9728.0 thousand tons are exported, (10.15% of global production), while 28883.3 thousand tons, (30% of the total global production), are manufactured.

According to what was mentioned in the United Nations Conference on trade and development, the increase in production of citrus fruits is due to the increase in agricultural areas, the development of transportation and packaging, the increase in income and the consumer preference for healthy food. Citrus fruits are produced all over the world, according to the above conference found 140 countries producing citrus fruits (citrus) approximately 70% of the global production of citrus fruits is produced in the northern hemisphere, specifically in the country surrounding the Mediterranean and United States. Citrus fruits are considered one of the most important fruits of high medicinal value. The juice of their fruits is used to treat scurvy disease and tooth decay, especially in children. In addition, citrus fruits are one of the sources of extracting pectin, which is used in many food industries, modern leaves, flowers and fruit peel contain essential oils that are used in the manufacture of perfumes and cosmetics (Daoud, 2017).

Nutritional value of citrus fruits:

In addition to the fact that some varieties of citrus are widely used in homes, such as the local lemon, the citrus fruits have another importance in terms of their taste as a fruit and their help to improve health among the different members of the people. With the fruits containing a small percentage of the main foodstuffs, their health and medicinal value is very high, and their juice and peel are rich with different vitamins. In some other countries, citrus juice is considered one of the basic components of children's and sick food, and it helps members of the people in general to increase resistance to various cold diseases. Citrus fruits are rich in some mineral salts such as potassium, calcium and magnesium, and there are also small amounts of other minerals such as phosphorous, bromine, iodine, iron and sodium. Citrus fruits contain acids such as shanic, benzoic, succinic and formic acid, and citrus fruits are considered among the fruits of the highest nutritional value. The fruits contain many organic acids, the most important of which is citric acid, which is the predominant one in them. Lemon and orange juice helps to open the appetite and digestion and prevents bleeding gums and gout, and the juice of a relative fruit low in sugar which is useful for diabetics. The child's body needs 100 milligrams of vitamin C, equivalent to squeezing two medium-sized orange fruits daily (Daoud 2017).

Table (1) Shows the distances and cultivation intensity of citrus trees in Sudan

Item	Dimensions	Trees (Hectare)
Oranges	8X8	156
Lemon	8X8	156
Grapefruit	8X8	156
Tangerine	7X8	156

Source: Arab Organization, national project document for development of planting and protecting fruit trees.

It is clear from table (1) that the distances and density of citrus trees (orange - lemon - grapefruit - tangerine) were as follows: Dimensions (meters) for oranges, lemons and grapefruits were 8 x 8 as for tangerines, they were 7x8. It was equal or similar and is 156 trees (hectare).

Table (2) Shows the production and area of citrus fruits (lemon - grapefruit - oranges) in Sudan, area (thousands feddan), production (thousands tons)

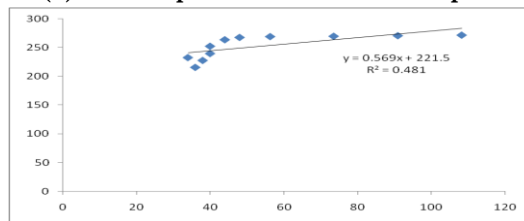
Year	Limon		Grapefruit		Orange	
	Area	Production	Area	Production	Area	Production
2008	34	233	27.5	105	24.9	124
2009	36	216	29	167.4	25.8	124
2010	38	226	30.5	183	26.7	133.5
2011	40	240	32	196	27.6	138
2012	40	252.7	33.6	210.6	28.5	142.5
2013	44	264	35.3	211.8	29.4	147
2014	48	268	39.5	216.8	32.9	150
2015	56.3	269.5	50.1	219.1	43.5	152
2016	73.5	270.1	52.2	220.2	44.7	152.3
2017	90.9	271.05	102.8	225.2	107.9	155
2018	108.2	272	128	229.9	140.1	166.1

Source: General Administration of Horticultural Production - Ministry of Agriculture and Forestry.

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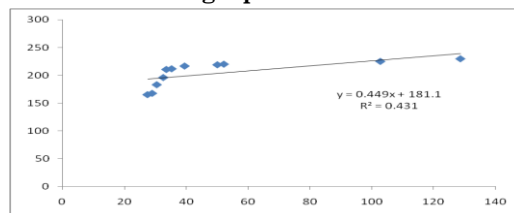
We find that production is increasing from year to year.

Figure (1): The impact of area on lemon production



It is clear from figure (1): that there is a positive relationship between cultivation area and lemons production, as correlation coefficient reached (0.569), and coefficient of determination (R^2) indicates that 48.1% of change in lemons production is due to increase in area.

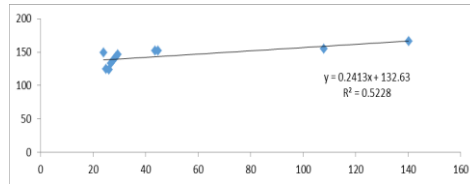
Figure (2): The impact of the area on the production of near grapefruit



It is clear from figure (2): that there is a positive relationship between cultivation area and grapefruit production, where correlation coefficient reached (0.449), and determination coefficient (R^2)

indicates that 43.1% of change in grapefruit production is due to increase in area.

Figure (3): The impact of area on orange production



It is clear from figure (3): that there is a positive relationship between cultivation area and oranges production, with correlation coefficient (0.241), and determination coefficient (R^2) indicating that 52.2% of change in orange production is due to increase in area.

The problems and obstacles facing the production and marketing of citrus fruits in Sudan

In recent years, citrus cultivation represents an important role in economy of many countries; interest in knowing production obstacles of these important horticultural crops has increased. However, the production of developed countries far exceeds that of developing countries, and this is due to the enormous capabilities and technologies that these countries possess to help farmers in the permanent development of citrus cultivation and production. These problems and obstacles can be summarized as follows:

Firstly Natural factors: These factors have a direct effect on all the physiological processes related to the fruiting and production of citrus trees and include the following:

a. Temperatures: citrus trees exist at temperatures from minus (under zero) to 38 degrees above zero, and they can withstand 6 degrees below zero for one night. The varieties of citrus differ in their tolerance of high temperatures. Baladi lemons and ordinary grapefruit are more tolerant than oranges and lemons.

b. The effect of wind: wind is considered one of the important factors that affect the success of citrus cultivation, especially in subtropical and temperate regions, and winds with high humidity are less harmful than dry and hot winds, and such winds have two effects:

- Mechanical effect: It results in breaking branches and dropping fruits.

• Physiological effect: It increases the speed and loss of water from the parts of the tree and this helps to disturb the water balance of the trees.

c. Soil: In many desert, savannah and tropical areas, we find that alkalinity of soil and quality of salt limit the expansion of citrus cultivation. Such lands may need some high-cost repairs.

d. Water: In many countries that depend on rain for citrus irrigation, we find poor distribution in (seasonal) rains, in addition to the limited irrigation water.

e. Environmental pollution: In some areas the secretions of industrial density and movement of cars, harm and cause environmental pollution, which is the pollution of rain water.

Secondly Technical production factors: These factors are as follows:

1. The great shortage of the country's needs for improved citrus seedlings.
2. Not to benefit from agricultural mechanization in the various agricultural fields.
3. Difficulty obtaining agricultural inputs.
4. Weak horticultural extension in field of fruits in general.
5. Most countries differ in field of genetic engineering, which greatly helps in developing productive capabilities of citrus trees.
6. Weak use of modern technologies for all agricultural transactions that develop production.
7. Lack of familiarity with high-quality of production varieties.
8. Lack of qualified personnel in specializations closed in fruit production.

Thirdly Institutional factors: include the following:

1. Insufficient attention to establishing mothers' nurseries to provide nurseries with disease-free grafts.
2. The scarcity and absence of the technical bodies involved in adopting disease-free seedlings.
3. Lack of institutions to provide correct information.
4. Lack of interest in infrastructure.
5. The weakness of the basic infrastructure in transportation, storage and technical laboratories.
6. Weak or non-existent standard transportation facilities or quality control.

7. Poor horticultural extension capabilities.

Fourthly Economic and social factors:

1. The lack of necessary financing for farmers.
2. The high costs of agricultural inputs.
3. Poor marketing potential.
4. Migration of highly skilled and experienced workers in fruit production.
5. The fluctuation of economic policies, especially in field of horticultural production.

Fifthly Political factors: The absence of an effective commercial and economic system among developing countries that encourages commodity exchange and regulates other commercial activities in horticultural field, as in developed countries. (Daoud, 2017).

Results:

- There is a positive relationship between cultivated areas and citrus production.
- Citrus production increases from year to year.
- Citrus production in Sudan suffers from problems and obstacles, including natural, technical and institutional factors.
- Citrus fruits are of great economic and nutritional importance.

Recommendations:

- Developing citrus production and harvesting technologies.
- Organic citrus production.
- Investing in manufacture of juice concentrates that have a profitable global market.
- Establishing centers for cleaning, sorting and providing refrigerated stores to extend the life of citrus crops.

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