The United Republic of Tanzania

Tanzania Investment Centre

Investment Opportunities in the Avocado Value Chain, Tanzania

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1 Overview of Avocado Producing Regions in Tanzania

Tanzania has been known as an agricultural country with leading exports like tea, coffee, tobacco, sisal, flowers, but there has recently been a new produce that is getting lots of attention - the avocado (*Persea americana*).

As avocados thrive in subtropical climates, and in areas suitable for coffee and tea – all making Tanzania an ideal location for avocado growth. Hass avocado is one of the improved high yield varieties of avocado, which matures and produces fruits within three years. The other improved high yield varieties in Tanzania are Fuerte (or Puebla) and Pinkerton[1].

During this study, the team visited avocado farmers and processors in Kilimanjaro, Mbeya and Njombe regions. Deskwork/literature review enabled us to draw data and information for other parts of Tanzania.

Kilimanjaro (Siha District), Mbeya (Rungwe District), Njombe, Iringa and Songwe are the main avocado exporting regions in Tanzania.

Kilimanjaro region (area: 13,250 km^2; population: 1,640,087) is one of Tanzania's 31 administrative regions. The regional capital is the municipality of Moshi.

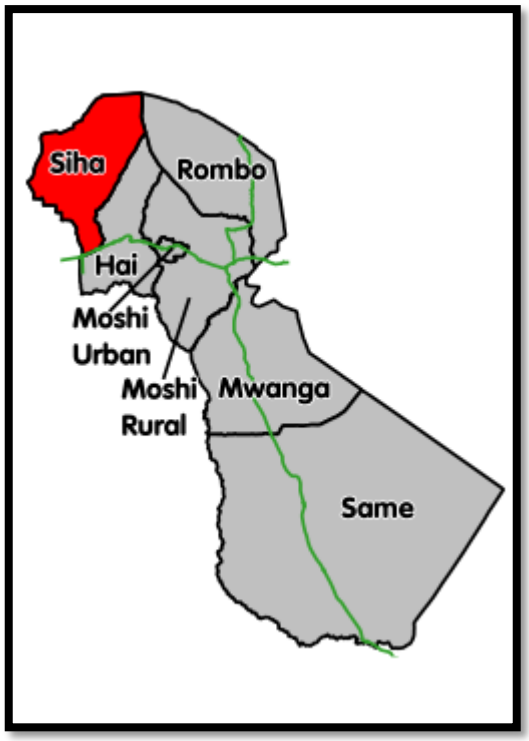

Figure 1 Map of Siha District, Kilimanjaro region

Kilimanjaro is administratively divided into six districts. Each district has one local government council except Moshi District which has two, one of which serves as the capital of the region.

[1] Africado Ltd (2019), Siha District, Kilimanjaro & Rungwe Avocado Company Ltd (2019), Mbeya

Table 1 Kilimanjaro Region's Districts and Population (2012 National Census & 2017 Estimates)

Local Government Council		Population (2012 Census)	Population (2017 Estimates)
1	Moshi MC	184,292	201,150
2	Moshi Dc	466,737	509,431
3	Hai DC	210,533	229,791
4	Siha DC	116,313	126,953
5	Rombo DC	260,963	284,834
6	Mwanga DC	131,442	143,466
7	Same DC	269,807	294,487
Total		**1,640,087**	**1,790,113**

Figures 2 shows the Njombe region (Area: 21,347 km^2; Population: 702,097 and density of 33/km^2), which is administratively divided into six districts as shown on Table 2:

Figure 2 Map of Mbeya, Njombe and Iringa regions

Table 2 Njombe Region's Districts and Population (2012 National Census & 2017 Estimates)

District		Population
1	Ludewa	133,218
2	Makambako Town Council	93,827
3	Makete	97,266
4	Njombe District Council	85,747
5	Njombe Town Council	130,223
6	Wanging'ombe	161,816
Total		**702,097**

Mbeya Region (total area: 35,954 km^2; population: 2,707,410 and density of 75/km^2) is divided into eight districts.

Table 3 Mbeya Region's Districts and Population (2012 National Census & 2017 Estimates)

	District	Population
1	Chunya	290,478
2	Ileje	124,451
3	Kyela	221,490
4	Mbarali	300,517
5	Mbeya	690,598
6	Mbozi	446,339
7	Momba	294,380
8	Rungwe	339,157
Total		**2,707,410**

1.1 Data Collection

This study was conducted in partnership between the Tanzania Investment Centre (TIC) and East Africa Trade & Investment Hub (EATIH) during June 2019. Officials from the Kilimanjaro, Mbeya and Njombe Regional Authorities took the lead to guide the team throughout the exercise.

The team visited small-scale and large-scale avocado producers and processors at Siha, Rungwe and Njombe districts. Table 4 shows our travel schedule – with respective dates.

Table 4 Avocado Value Chain Study Schedule

	Location	Names of institutions	Date
1	Kilimanjaro, Siha Distruct	Africado Ltd – Avocado Plantation and Processing Factory	June 4, 2019
2	Mbeya, Rungwe District	Rungwe Avocado Company – Avocado Plantation and Processing Factory	June 24, 2019
3	Njombe	TanzaNice – Avocado Plantation and Processing Factory	June 25, 2019

The following methods were used to generate required data or information: -

i. Desk work/Literature review
ii. Physical site visits - observation
iii. One-to-one or group interviews
iv. Questionnaires
v. Focus Group Discussions

2 Avocado as Edible Oils' Source and Forex Earner for Tanzania

The major sources of edible oil in Tanzania include sunflower, oil palm, groundnuts, sesame, soya beans and cotton. However, experts report that oil palm, coconut and avocado as as being the leading edible oil producing value chains per unit area, worldwide[2]. Hence, an investment opportunity avails itself in tapping avocado's potential in filling the edible oils' gap in Tanzania.

Tanzania`s edible oil sub-sector stands at Tshs 676.2 billion (US$294 million) with players like Bidco Oil and Soap Ltd, Murzah Oil Mills and Alaska Tanzania[3].

The sub-sector is highly in need of investors to fill the supply gap that currently stands at 320,000 tons to slash the import bill that amounted to Tshs.191.3 billion (US$83.19 million) in 2018. The country`s annual demand for edible oil is 570,000 Tons (50,000 m^3 per year) and annual supply is 180,000 Tons (or 40,000 m^3 per year) leaving the country with no choice but to import the remaining 320,000 Tons.

The demand forecast shows an increase from 570,000 tons to 700,000 tons of edible oil by 2030; and, Tanzania guarantees the market growth for investors in the foreseeable future.

As for forex earning, apart from the European market, there has been an increase in demand of the produce in Asia, specifically China, which Tanzania is set to expand its market into[4].

According to data from China Customs, Beijing imports an average of 32,100 Tons of avocados valued at US$105 million per annum.

However, given the stringent phytosanitary issues that restrict imports of local avocados into the multi-million-dollar Chinese market, Tanzanian producers have never been able to access this lucrative market.

Access to the lucrative market will require the government to declare existing quarantine pests for assessment by Chinese authorities before they open the market for local avocados.

In a bid to unlock the market, Tanzania Horticultural Association (TAHA) has partnered with various government bodies as it seeks to comply with the standards and conditions for locally produced avocados to be granted access to the Chinese market.

TAHA in collaboration with Ministry of Agriculture, through Plant Health Services (PHS) have initiated the formal process to enable Tanzanian exporters to access the Chinese market and some of them have already started communication with potential buyers.

The avocado industry is among the fastest growing sub sectors in the horticultural industry in the country presented by growing demand in the international market with the commodity's main export market being in European.

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[2] Dr Hamimu Hongo, FELISA Company Ltd Managing Director & Founder (June 2019)

[3] Tanzania Ministry of Agriculture, Food Security and Cooperatives (May 2019)

[4] Jacqueline Mkindi, chief executive, Tanzania Horticultural Association (TAHA) – June 2019

3 Avocado Production

3.1 Avocado Production in Tanzania

There is data inconsistency among different sources, data from the districts that were visited do not add up to the data reported by the Ministry of Agriculture, Food Security and Cooperative (MAFC) of Tanzania.

During 2018, avocados earned the country some $8.6 million.

Avocados are increasingly becoming Tanzania's green gold, with Tanzania Horticultural Association (TAHA) figures showing that the country produces about 7,000 tonnes of the fruit annually. Commercial production/export of avocados is dominated by Rungwe Avocado Company Ltd and Africado Ltd, which is based in Siha District, Kilimanjaro region. The two companies jointly produce more than 5,000 Tons per year.

3.2 Overview of Avocado Trade in Tanzania

Tables 5 and 6 explore detailed information about the exports and imports of Avocado for Tanzania. It also illustrates details including export/import trends and top partner countries.

3.2.1 Top Export Destinations from Tanzania

Table 5 Top Export Destinations from Tanzania

Rank	Country	Export Value in 2018 (US$)	Shares in Export (%age)
1	France	4.55 M	50.4
2	Netherlands	2.11 M	23.4
3	United Kingdom	914.09 K	10.1
4	Spain	633.47 K	7.1
5	Switzerland	337.73 K	3.7
6	Germany	200.09 K	2.2
7	Norway	72.85 K	0.8
8	Morocco	50.87 K	0.6
9	United Arab Emirates	50.17 K	0.6
10	Kenya	24.35 K	0.3%
11	Bahrain	23.99 K	0.3%
12	United States	21.86 K	0.2%
13	Hong Kong	14.11 K	0.1%
14	Qatar	13.16 K	0.0%
15	Czechia	4.09 K	0.0%
16	Finland	2.31 K	0.0%
17	Turkey	1.80 K	0.0%
18	Kuwait	1.53 K	0.0%
19	Oman	614.00	0.0%

3.2.2 Top Import Origins of Tanzania

Avocado imports are indicated on Table 6.

Table 6 Top Import Origins of Tanzania

Rank	Country	Import Value in 2018 (US$)	Shares in Import (%age)
1	South Africa	910.00	99.9
2	Netherlands	1.00	0.1

3.2.3 World Avocados Production

In 2017, world production of avocados was 5.9 million Tons, led by Mexico with 34% (2.01 million Tons) of the total (Fig. 3). Other major producers were Dominican Republic, Peru, Indonesia, and Colombia, together producing 30% of the world total. In 2018, the US Department of Agriculture estimated that 231,028 hectares (570,880 acres) in total were under cultivation for avocado production in Mexico, a 6% increase over the previous year, and that 2 million Tons would be exported. The Mexican state of Michoacán is the world leader in avocado production, accounting for 80% of all Mexican output[5]. Most Mexican growers produce the Hass variety due to its high demand worldwide and longer shelf life.

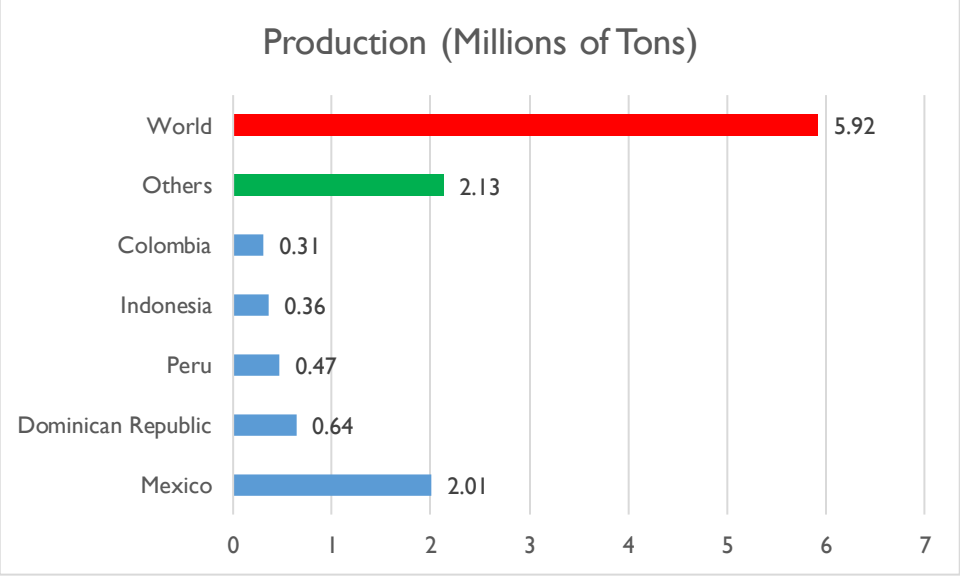

Figure 3 World Avocado Production (Source: FAOSTAT of the United Nations)

[5] Mexico; Avocado Annual. US Department of Agriculture, Foreign Agricultural Service. 27 November 2018. Retrieved 23 April 2019.

3.2.3.1 Global Exports

Worldwide, avocados exports by country totaled US$5.7 billion in 2018[6]. That dollar value reflects an 86.4% increase for all avocados shippers over the five-year period starting in 2014. Year over year, the value of exported avocados slowed by -4.5% from 2017 to 2018.

Noted for their smooth texture, avocados have a distinct and subtle flavor used in savory and sweet dishes around the globe. These pear-shaped berries have a high fat content and are popular in vegetarian recipes as a meat-substitute in sandwiches and salads.

Among continents, North American countries generated the strongest international sales for avocados during 2018 with shipments valued at $2.6 billion or 44.9% of the worldwide total. In second place were European exporters at 25.8% while 20.7% of globally shipped avocados originated from Latin America excluding Mexico but including the Caribbean. Smaller percentages came from Africa (5.3%), Asia (1.8%) and Oceania (1.4%) dominated by New Zealand and Australia.

The following are the 15 countries that exported the highest dollar value worth of avocados during 2018: -

- Mexico: US$2.4 billion (41.8% of total exported avocados)
- Netherlands: $904.2 million (15.8%)
- Peru: $722.3 million (12.6%)
- Spain: $346.9 million (6.1%)
- Chile: $323.2 million (5.6%)
- United States: $179.6 million (3.1%)
- Kenya: $119.1 million (2.1%)
- South Africa: $116.7 million (2%)
- New Zealand: $71.4 million (1.2%)
- Colombia: $62.7 million (1.1%)
- France: $62.2 million (1.1%)
- Israel: $59.8 million (1%)
- Dominican Republic: $59 million (1%)
- Morocco: $56.7 million (1%)
- Germany: $53.2 million (0.9%)

By value, the listed 15 countries shipped 96.5% of all avocado's exports in 2018.

Among the top exporters, the fastest-growing avocados exporters since 2014 were: Colombia (up 1,656%), Morocco (up 324.5%), Kenya (up 221.1%) and Germany (up 203.5%).

Two top countries posted declines in their exported avocados sales namely Israel (down -29.6%) and New Zealand (down -27.9%).

[6] Daniel Workman (July 2, 2019). Avocados Export by Country. http://www.worldstopexports.com/avocados-exports-by-country/

4 Botany and Cultivation of Avocado

4.1 Botany

The avocado (*Persea americana*), a tree with probable origin in South Central Mexico[7], is classified as a member of the flowering plant family Lauraceae. The fruit of the plant, also called an avocado (or avocado pear or alligator pear), is botanically a large berry containing a single large seed.

Figure 4 Hass Avocado Tree in Siha, Kilimanjaro

Avocados are commercially valuable and are cultivated in tropical and Mediterranean climates throughout the world. They have a green-skinned, fleshy body that may be pear-shaped, egg-shaped, or spherical. Commercially, they ripen after harvesting. Avocado trees are partially self-pollinating and are often propagated through grafting to maintain predictable fruit quality and quantity. In 2017, Mexico produced 34% of the world supply of avocados[8].

Persea americana is a tree that grows to 20 m, with alternately arranged leaves 12 - 25 cm long. Panicles of flowers with deciduous bracts arise from new growth or the axils of leaves. The flowers are inconspicuous, greenish-yellow, 5 - 10 mm wide.

The species is variable because of selection pressure by humans to produce larger, fleshier fruits with a thinner exocarp. The avocado fruit is a climacteric, single-seeded berry, due to the imperceptible endocarp covering the seed, rather than a drupe. The pear-shaped fruit is 7 - 20 cm long, weighs between 100 and 1,000 g, and has a large central seed, 5 - 6.4 cm long.

4.1.1 Breeding and Cultivars

The species is only partially able to self-pollinate because of dichogamy in its flowering. This limitation, added to the long juvenile period, makes the species difficult to breed. Most cultivars are propagated by grafting, having originated from random seedling plants or minor

[7] Chen, H; Morrell, PL; Ashworth, V; de la Cruz, M; Clegg, MT (2008). "Tracing the Geographic Origins of Major Avocado Cultivars". Journal of Heredity. 100 (1): 56–65. doi:10.1093/jhered/esn068. PMID 18779226.

[8] Daniel Workman (July 2, 2019). Avocados Export by Country. http://www.worldstopexports.com/avocados-exports-by-country/

mutations derived from cultivars. Modern breeding programs tend to use isolation plots where the chances of cross-pollination are reduced.

The avocado is unusual in that the timing of the male and female flower phases differs among cultivars. The two flowering types are A and B[9]. A - cultivar flowers open as female on the morning of the first day and close in late morning or early afternoon. Then they open as male in the afternoon of the second day. B varieties open as female on the afternoon of the first day, close in late afternoon and reopen as male the following morning.

The most common cultivars in Tanzania are Hass, Pinkerton and Fuerte[10]. However, other varieties are grown in other countries: -

a) **A - cultivars**: 'Hass' and 'Pinkerton'. Other cultivars that are not found in Tanzania are: 'Gwen', 'Lamb Hass', 'Pinkerton', 'Reed'
b) **B - cultivars**: 'Fuerte'. Other cultivars that are not found in Tanzania are 'Sharwil', 'Zutano', 'Bacon', 'Ettinger', 'Sir Prize', 'Walter Hole'

Certain cultivars, such as the 'Hass', tend to bear well only in alternate years. After a season with a low yield, due to factors such as cold (which the avocado does not tolerate well), the trees tend to produce abundantly the next season. In addition, due to environmental circumstances during some years, seedless avocados may appear on the trees. Known in the avocado industry as "cukes", they are usually discarded commercially due to their small size.

4.1.1.1 The 'Hass' Cultivar

The 'Hass' is the most common cultivar of avocado. It produces fruit year-round and accounts for 80% of cultivated avocados in the world[11]. All 'Hass' trees are descended from a single

Figure 5 The 'Hass' cultivar, Njombe, Tanzania

[9] Agriculture Handbook. University of California. 2007. Archived from the original on 17 December 2007. Retrieved 2007-12-29.
[10] Africado Ltd (2019); TanzaNice (2019) and Rungwe Avocado Company Ltd (2019)
[11] Stradley, Linda (2004). "All About Avocados: History of the Hass Avocado". What'sCookingAmerica.net. Newberg, OR: self-published. Retrieved 2008-05-13.

"mother tree" raised by a mail carrier named Rudolph Hass, of La Habra Heights, California[12]. 'Hass' trees have medium-sized (150–250 g), ovate fruit with a black, pebbled skin. The flesh has a nutty, rich flavor with 19% oil. A hybrid Guatemalan type can withstand temperatures to −1 °C. They have a long shelf life – hence most preferred variety for export.

[12] "Avocado History". IndexFresh.com. Bloomington, CA: Index Fresh Avocado. 2007. Archived from the original on 2007-12-25. Retrieved 2007-12-29.

4.1.1.2 The ‘Pinkerton’ Cultivar

First grown on the Pinkerton Ranch in Saticoy, California, in the early 1970s, 'Pinkerton' is a seedling of 'Hass' x 'Rincon'. The large fruit has a small seed, and its green skin deepens in color as it ripens. The thick flesh has a smooth, creamy texture, pale green color, good flavor, and high oil content. It shows some cold tolerance, to −1 °C and bears consistently heavy crops. A hybrid Guatemalan type, it has excellent peeling characteristics.

Figure 6 **The 'Pinkerton' Avocado Fruits**

4.1.1.3 The ‘Fuerte’ Cultivar

A Mexican-Guatemalan cross originating in Puebla, the 'Fuerte' earned its name, which means strong in Spanish, after it withstood a severe frost in California in 1913. Hardy to −3 °C, it has medium-sized, pear-shaped fruit with a green, leathery, easy-to-peel skin. The creamy flesh of mild and rich flavor has 18% oil. The skin ripens green. Tree size is 6 by 4 m. This is the most preferred, eaten raw by families in Tanzania as it is big in size, rich in oil with thick creamy flesh. It is not preferred by exporters as it spoils fast (short shelf life) during transport.

Figure 7 The 'Fuerte' Avocado Fruits

4.1.2 Nutritional value

4.1.2.1 Nutrients and fat composition

A typical serving of avocado (100 g) is moderate to rich in several B vitamins and vitamin K, with good content of vitamin C, vitamin E and potassium. Avocados also contain phytosterols and carotenoids, such as lutein and zeaxanthin[13].

Avocados have diverse fats[14]. For a typical avocado: -

a) About 75% of an avocado's energy comes from fat, most of which (67% of total fat) is monounsaturated fat as oleic acid.
b) Other predominant fats include palmitic acid and linoleic acid.
c) The saturated fat content amounts to 14% of the total fat.
d) Typical total fat composition is roughly: 1% ω-3, 14% ω-6, 71% ω-9 (65% oleic and 6% palmitoleic), and 14% saturated fat (palmitic acid).

Table 7 Raw avocado nutritional value per 100g[15]

Nutritional Area	Description	Quantity	%DV†
Energy		670 kJ (160 kcal)	
Carbohydrates		8.53 g	
	Sugars	0.66 g	
	Dietary fibre	6.7 g	
Fat		14.66 g	
	Saturated	2.13 g	
	Monosaturated	9.80 g	
	Polyunsaturated	1.82 g	
Protein		2 g	
Vitamins	Vitamin A equivalent	7 μg	1%
	Beta-Carotene	62 μg	1%
	Lutein zeaxanthin	271 μg	
	Thiamine (B_1)	0.067 mg	6%
	Riboflavin (B_2)	0.13 mg	11%
	Niacin (B_3)	1.738 mg	12%
	Pantothenic acid (B_5)	1.389 mg	28%
	Vitamin B_6	0.257 mg	20%
	Folate (B_9)	81 μg	20%
	Vitamin C	10 mg	12%
	Vitamin E	2.07 mg	14%
	Vitamin K	21 μg	20%
Minerals	Calcium	12 mg	1%
	Iron	0.55 mg	4%

[13] Dreher ML, Davenport AJ (2013). "Hass avocado composition and potential health effects". Crit Rev Food Sci Nutr. 53 (7): 738–50.
[14] "Avocados, raw, all commercial varieties, per 100 grams". NutritionData.com. 2013. Retrieved 2013-04-17.
[15] "Avocados, raw, all commercial varieties, per 100 grams". NutritionData.com. 2013. Retrieved 2013-04-17.

	Magnesium	29 mg	8%
	Manganese	0.142 mg	7%
	Phosphorus	52 mg	7%
	Potassium	485 mg	10%
	Sodium	7 mg	0%
	Zinc	0.64 mg	7%
Other Constituents	Water	73.23 g	
	Fluoride	9 μg	
	Beta-sitosterol	76 mg	

4.1.3 Uses of Avocado

Avocado has many culinary uses from sandwich toppings to guacamole dip. It has become increasingly popular around the world, particularly in the US where per capita consumption has increased from 2 pounds to 7 over the last year.

Additionally, although costly to produce, nutrient-rich avocado oil has diverse uses for salads or cooking oil, cosmetics and soap products. This fruit is high in potassium and vitamins K, B6, B5, B9, and E. It also has a high monounsaturated fat content, which makes it a good substitute for vegetarians or people without access to meat and dairy products.

4.1.3.1 Culinary - Avocados-based Foods and Drinks

Unlike in Tanzania, avocados are not typically eaten raw in other countries. Rather, avocados are used as supplementary ingredients in many dishes, condiments, sauces and beverages. The following, are examples of avocado-based culinary foods and drinks: -

- Avocado bread
- Avocado cake
- Avocado cooking oil
- Avocado cream sauce
- Avocado fries
- Avocado margarita
- Avocado milk coffee drink
- Avocado soup
- Deep-fried avocado
- Féroce d'avocat tangy spread
- Guacamole dip or salad dressing
- Guasacaca avocado-based sauce
- Mashed avocado on toast, etc

4.2 Cultivation of Avocado

The avocado tree grows best in humid, tropical weather with well-draining soil. It is commercially cultivated around the world and produces 7 metric tons for every 2.5 acres on average. The fruit is cultivated while still hard and only ripens when off the tree. This tree species is difficult to propagate via pollination. To ease the process, most cultivators graft

onto producing trees. When cultivated by seed, the plant takes between 4 and 6 years to produce fruit. These trees are particularly susceptible to viral, bacterial, and nutritional diseases.

4.2.1 Planting

- Spacing: 7 x 7 meters (i.e. distance from plant to plant; and, row to row)
- However, spacing varies based on soil type. For example, for soils rich in Phosphorus (P), this spacing is not recommended as avocado tree canopies will have overgrown to the point of overlapping trees on the next row – just within 3 – 5 years.
- Therefore, in one acre, if spacing is 8 by 8 m – then there will be 63 trees of avocado. Similarly, for 9 by 9 m = 49 trees/acre; and, for 10 by 10 m = 40 trees/acre.
- Planting hole: 75 cm x 75 cm x 75 cm (i.e. depth x height x width)
- Planting fertilizers: cow dung, humus, DAP, TSP, Minjingu fertilizers, NPK etc – but sometimes DAP + TSP are mixed and applied together.

4.2.2 Harvest and postharvest

Commercial orchards produce an average of seven tons per hectare each year, with some orchards achieving 20 tons per hectare[16]. Biennial bearing can be a problem, with heavy crops in one year being followed by poor yields the next.

Like the banana, the avocado is a climacteric fruit, which matures on the tree, but ripens off the tree. Avocados used in commerce are picked hard and green and kept in coolers at 3.3 to 5.6 °C until they reach their destination. Avocados must be mature to ripen properly. Avocados that fall off the tree ripen on the ground. Generally, the fruit is picked once it reaches maturity; avocado growers pick 'Hass' avocados when they have more than 23% dry matter. Once picked, avocados ripen in one to two weeks (depending on the cultivar) at room temperature (faster if stored with other fruits such as apples or bananas, because of the influence of ethylene gas). In other countries, supermarkets sell ripened avocados which have been treated with synthetic ethylene to hasten ripening. The use of an ethylene gas "ripening room", is now an industry standard.

4.2.2.1 Productivity

- Most avocado hybrids mature between 18 – 24 months.
- During the first year of harvest, an avocado tree can produce between 50 – 100 fruits; and harvests increase as the tree continues to mature.
- An avocado tree reaches full maturity between 4 – 5 years after planting; and, at this age, one tree produces up to 1,200 fruits.

4.2.2.2 Calculating Incomes from Avocados Fruits

Assumptions: -

- Spacing: 10 x 10 m – whereby there will be 40 trees/acre

[16] Whiley, A (2000). "Avocado Production in Australia". Food and Agriculture Organization of the United Nations. Archived from the original on 12 January 2008. Retrieved 2007-12-29.

- One harvest 1,000 fruits/tree once the trees reach full maturity (i.e. normally after 5 years)
- Therefore, there will be 40,000 avocado fruits/acre (i.e. 40 x 1000 = 40,000)
- Each avocado fruit sells at TZS 250/-
- Therefore, a farmer earns TZS 10 million/acre (i.e. TZS 250 x 40,000 fruits/acre = 10 million).

4.2.3 Avocado Tree and Fruit Diseases

Avocado trees are vulnerable to bacterial, viral, fungal, and nutritional diseases (excesses and deficiencies of key minerals).

Disease can affect all parts of the plant, causing spotting, rotting, cankers, pitting, and discoloration[17].

Figure 8 Avocado leaves infested with algae

Figure 9 Fungal infected leaf

[17] Ohr, H. D.; Coffer, M. D.; McMillan, R. T. (April 8, 2003). "Diseases of Avocado (Persea americana Miller)". The American Phytopathological Society.

Figure 10 Fungal infected fruit

5 Challenges of the Avocado Sub-sector in Tanzania

It has been learned that, Tanzania resides in an ideal location for avocado growth, as avocados thrive in subtropical climates such as the Pacific Americas, South-east Asia, and Africa. Tanzanian avocados are rated/argued to be some of the greatest.

The popular varieties in Tanzania are Hass, Fuerte, Pinkerton and, to some extent, Puebla[18]. From the farms, the fruit is sent straight to pack houses where it is processed (professionally packed and prepared) ready to ship.

The main challenges are: -

a) Growth of the world demand and supply,

– 2018 Peru flooded the market with avocados, a 30% increase with 360,000 tons hence a price collapse.
– 2019, that is this year, we are expecting to see 500,000 tons from Peru.
- With this increased supply and the EU Market growth slowing, it's now important and urgent to find other markets to supplement EU which is becoming oversupplied.
- New market in China, India which will require trade agreement at a government level.

With this increased supply,

- It means more competition, therefore
  - ✓ Importance of quality is very paramount
  - ✓ Compliance to international standards,
  - ✓ Food safety standards – GlobalG.A.P, BRC

[18] Africado Ltd (2019). Siha District, Kilimanjaro; Rungwe Avocado Company Ltd, Mbeya, Tanzania

- ✓ Social standards – Sedex, GRASP
- ✓ Need to be careful of unregulated briefcase exporters, who fight for the same crop with little or no care on standards compliance, fruit quality and safety hence harvesting immature fruits in general a bad reputation which leads to lower prices.

  We need to draw examples from our neighbor's smallholder sector and see how this briefcase have damaged the reputation in the international market

b) No Certification body in the country.
c) No ISO 17025 Accredited laboratory in the country
d) UPOV – International Union for the protection of new varieties of plants.-
   - Tanzania need to be signatory of latest varieties of all crops e.g. blueberries.
e) Not all required Plant Protection Products are registered in the country
f) Translation of market standards to Swahili is required
g) Capacity Building Programs – prepare capacity building programs (for both farmers and extension officers) are in tandem/line with emerging market standards.
h) EPZ Status
   - National government to speak with the District /other agencies on the interpretation of the EPZ Act to avoid conflicting information /incorrect interpretation.
i) Taxes /Levies /Fees – Increases the trading cost /time to comply
   - Need to harmonize them (about 40 of them)
j) No quality packaging materials in the country specifically for avocados.

6 Investment Opportunities in the Avocado Sub-sector in Tanzania

The avocado sub-sector in Tanzania has the following opportunities: -

a) Opening large plantations for purposes of producing larger volumes of fruits for export (to capture Asian, European and American markets), without excluding other African countries that do not produce avocados. Such plantations can be in the Southern Highlands of Tanzania (Mbeya, Iringa, Njombe, Ruvuma, Rukwa and Katavi), Northern Zone (Arusha, Kilimanjaro and Tanga), Lake zone (Kagera and Mara) and Morogoro regions.
b) Investing into facilities that process avocados: sorting, cleaning, grading, packaging, production of assorted salads (foodstuffs), cooking oil, cosmetics, soap products etc.

Figure 11 **Africado Ltd's avocado processing factory at Siha District, Kilimanjaro**

c) Manufacture or supply of inputs required in the entire avocado value chain – seeds, pesticides, fungicides, fertilizers, farming equipment/implements (tractors, trailers, harvesting machines), processing & packaging machinery, avocado packaging materials (specialized boxes for transporting avocados), cold rooms etc. Now, all packaging materials are sourced from Kenya.

Figure 12 Some of avocado processed products

d) Skilled human resources/experts – internationally accredited to conduct audits from farms to processing factories. Similarly, an ISO 17025 Accredited laboratory needs to be available in the country. This is an open opportunity to interested crop/horticulture scientists from higher learning institutions as well as Vocational Education Centers of Tanzania.