



Oil palm in Uganda:
A national and sub-regional analysis
of the industry

Industry & Market Analysis Report No.1, 2023

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Key report highlights



This report summarizes information about the oil palm industry in Uganda, based on the analysis of both primary and secondary data on the sub-sector at national and sub-national levels. At the sub-national level, the report presents a specific case of the oil palm industry in Mid-Western Uganda (Bundibugyo), to shed light on the potential of the industry in the sub-region. The key highlights of the report are;



Production is essentially clustered in one hub. Until now, Kalangala is the primary area where oil palm fruits – Fresh Fruits Bunch (FFB) are being produced and harvested. The oil palm introduced in Buvuma Island has not yet started to yield (pending maturity). Production is also not yet taking place in the newly identified areas of Masaka and Mayuge (awaiting Environmental and Social Impact Assessments). Therefore, Uganda currently relies primarily on yields from the Kalangala oil palm hub.



The level of domestic oil palm or Fresh Fruits Bunch (FFB) and crude palm oil production is low - cannot adequately meet the industrial needs of refineries, especially large-scale ones. This is exacerbated by sub-optimal oil palm productivity. Consequently, the need for crude palm oil is met majorly through importation.



The Self-Sufficiency Ratio (SSR) for vegetable oils including palm oil is very low, at only 24%, making domestic demand outstrip production (supply).



There is untapped market potential in the EAC region, however, if this potential is exploited without production boost, the local demand-supply gap aggravates. The export market potential notwithstanding, investment efforts can be directed towards oil palm, Crude Palm Oil (CPO) and/or palm oil production for import replacement purposes.



The key constraints to oil palm production and value addition include; difficulty accessing oil palm inputs, colossal land requirement, FFB perishability, and inadequacy of raw materials for industries among others.

Specifically in Bundibugyo, production takes place on a small-scale and in a rudimentary way, with farmers lacking access to improved seed. A total of 613 farmers are registered members of the Bundibugyo Palm Oil Producers Cooperative Society but operate production and marketing activities individually.



Local production volumes of FFB and CPO are very low, making CPO supply to be supplemented by erratic supplies (imports) from the Democratic Republic of Congo. Small-scale milling of oil palm into CPO is undertaken by artisanal millers characterized by severe inefficiency in milling oil palm into CPO.

The millers operate below capacity due to inadequate FFB supply and the rudimentary nature of their milling machines. Both FFB and CPO local production systems are very weak and require deliberate efforts to organize them and create an efficient system that can generate a reasonable amount of raw materials that can supply industries. The sub-region requires organizing oil palm farmers and boosting production, as well as establishment of a modern motorized oil palm milling facility.

1. Introduction

The commodity-specific industry and market analysis report compiles industry or market data, analyzes the data, and summarizes relevant information about a particular commodity in Uganda. These reports provide the context of the industry with emphasis on specific value chain stages relevant to projects in the pipeline; and generate insights relevant to industry-specific policy discourse, policy-decision making, and investments in the industry.

This version of the report is a digest of key facts about Uganda's oil palm industry at the national level, and a specific case of the industry in the mid-western sub-region.

The oil palm is a cash crop that forms a major component of vegetable oil in Uganda. Overall, vegetable oil is among the ten priority selected commodities in Uganda's current National Development Plan (NDPIII 2020/21 – 2024/25) that have been earmarked to foster the agro-industrialization agenda of the country.

This is mainly driven by the export earning potential of the commodity – it is among the top ten agricultural export products (Republic of Uganda, 2020) – Figure 1, although at the bottom end after bananas, in terms of its total export share (1.1%).

It is important to note that specifically for palm oil and related products (which are a subset of vegetable oil), they are largely consumed domestically, and are thus more of an import replacement commodity. The local demand is substantially larger than what is produced domestically.



Vegetable oil, including oil palm, has a high potential to drive agro-industrialization in the country. Specifically, the potential of oil palm to drive agro-industrialization is evident in the successes registered in the Vegetable Oil Development Project (VODP) in Uganda, and elsewhere, it is a major driver of agro-industries – for example, in Indonesia and Malaysia, it has played a primary role in supporting agro-industries and the economy at large (Cherie et al., 2021).

The economic impact of oil palm is evident too – for example, it is the primary agricultural export of Indonesia and Malaysia, generating 10% and 5% of their exports respectively (Russel, 2018).

It employs 0.721 and 4 million people in Indonesia and Malaysia respectively, and 11 million people in both countries indirectly depend on the sub-sector for their livelihood (ibid). Further, it is promoting rural development and poverty alleviation, given that it provides employment in remote rural areas with non-existent or very scare alternative employment.

An organized production arrangement in Uganda begun in 2002-2003 in Kalangala district, under the National Oil Palm Project (NOPP) – a partnership between the Government of Uganda, the International Fund for Agricultural Development (IFAD), and private sector players such as Oil Palm Uganda Limited (OPUL) and producers. Accordingly, the introduction and implementation of oil palm investments (from production to value addition) in Uganda is through a Public Private Partnership (PPP), spearheaded by the Vegetable Oil Development Project (VODP) housed at the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). The introduction of oil palm in Uganda was an attempt to increase Uganda's production of vegetable oil, in order to meet domestic demand.

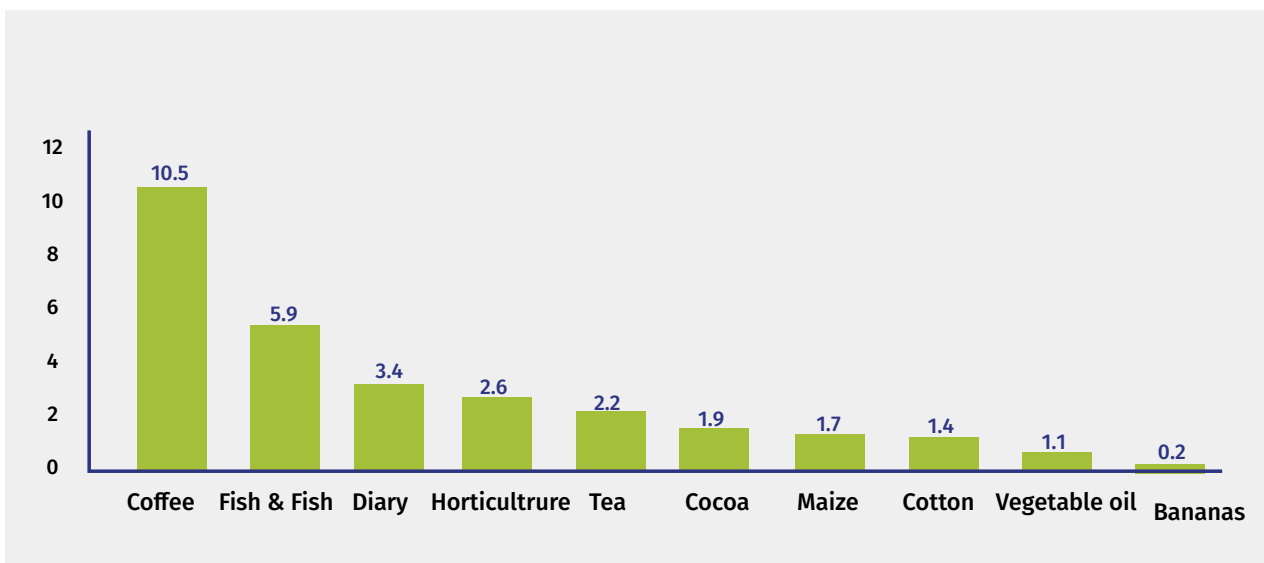
Beyond the PPP, the oil palm sub-sector is now attracting purely private investments given the economic potential associated with it. For example, although not well documented, some private production activities have been initiated in other parts of the country outside Kalangala – in parts of the northern and western regions. Investment ideas for establishing oil palm processing plants or refineries are also emerging, for example, this is observed through some of the applications to the Uganda Development Bank for financing support. Accordingly, generating industry and/or market information for the commodity is key for providing insights for investments or interventions in the sub-sector.



This report is an industry and/or market information generation effort aimed at providing some of the key insights relevant for investment decision making. The report addresses three specific objectives. First is to generate industry including market information on the NDP identified commodities (in particular oil palm) to support the bank's financial and non-financial interventions. Second is to respond to industry-specific information needs of the investment arm of the bank. Third is to ascertain the potential of oil palm processing investment in south-western Uganda.

The rest of the report is organized as follow. Section two has the methods that were used to collate and analyze data. Sections three to seven have the results from the data collated and analyzed, which capture – oil palm growing areas and production and productivity at national level, oil palm processing activities and outputs, the market for oil palm products, and general constraints in the industry. The last set of results in section seven is the case of oil palm industry in mid-western Uganda, Bundibugyo district. Lastly, section eight contains the conclusion and recommendations.

Figure 1: Uganda’s top ten agricultural export products - share of total exports, %



Source: Author’s computation using 2018 export share data from UBOS, BoU, and NPA.

2.0 Methodology

The report utilizes both secondary and primary data. The secondary data were compiled and analyzed to shed light on the industry including oil palm market at the national level. The primary data were specifically meant to capture sub-region specific oil palm industry and market data to generate information on oil palm production and related activities in the Mid-Western sub-region with focus on Bundibugyo district – the district where production is taking place.

Accordingly, the data were analyzed and presented at two levels. The first is national level analysis which is entirely addressed using secondary data and desk review. The secondary data sources and reports reviewed include; IFAD and the national Oil Palm project (NOPP); Trade Map data, NDPIII, and the Food Balance Sheet data extracted from the Uganda Bureau of Statistics (UBOS). The secondary data were compiled, analyzed and presented using; a desk review approach, summary statistics including trends, and Trade Map Market Analysis Tool.

The data captured from the field were transcribed and the information was summarized under the main sub-themes of focus – i.e., oil palm production, market, processing, constraints, and suggested solutions. The data obtained from BUPCO's records are presented quantitatively – particularly FFB and CPO production and the trend, palm kernel nuts and CPO imports, and potential income generated by oil palm farmers and millers.

The second level of analysis provides sub-region specific information on the oil palm industry in Mid-Western Uganda using the case of oil palm in Bundibugyo district. The selection of Bundibugyo is guided by the need to assess the industry and/or market in the sub-region due to a potential oil palm investment or business case proposed to the Uganda Development Bank, which requires sub region-specific information on the industry.

Here, data were collected through Key Informant Interviews (KIIs) based on a KII checklist. The key informants were from; district leadership, the district production unit, oil palm farmers, oil palm millers, and Bundibugyo Palm Oil Producers Cooperative Society Limited (BUPCO). Two Focus Group Discussions (FGDs) were also carried out – one with oil palm farmers, and another with oil palm millers in Bundibugyo. Available farmer and production records were obtained from BUPCO.

3.0 Main oil palm commodity growing areas in Uganda



Oil palm became popular in Uganda through the oil palm production project that started in 2002 through a tripartite Public Private Partnership (PPP) with Oil Palm Uganda Limited (OPUL), Kalangala Oil Palm Grower's Trust (KOPGT), and the Government of Uganda through the Vegetable Oil Development Project (VODP) with funding from IFAD. Kalangala is therefore the first district where oil palm growing was launched under this arrangement.

Until now, Kalangala is the primary area where oil palm fruits – Fresh Fruits Bunch (FFB) are being harvested. Because the FFB requires immediate processing for crude palm oil, two oil palm milling facilities were established in Kalangala by OPUL. Beyond Kalangala, oil palm growing was later introduced on Buvuma Island. The oil palm planted in Buvuma is not yet yielding FFB, pending maturity.

Therefore, the country currently relies primarily on yields or production from the Kalangala oil palm hub, since oil palms in Buvuma have not yet started to yield (oil palm takes 3-4 years before harvest). In addition to Buvuma, there are two new areas that were identified by the government under the National Oil Palm Project (NOPP) – i.e., Masaka and Mayuge.

These two are newly identified areas, with no production yet taking place – they are pending Environmental and Social Impact Assessments.

There is also some undocumented spontaneous small-scale production activities that take place by some farmers in Rakai and Mukono districts, whereby the oil palm fruits are transported to Kalangala for milling. Lastly, production is also expected from Maruzi in Apac district, where oil palm has been recently planted (pending harvest after maturity) through private sector investment.

The number of smallholder growers or out-growers and institutional growers in the major oil palm hubs is shown in Table 1. Expectedly, Kalangala has the largest proportion of oil palm growers (more than 80%) – both smallholders and institutional growers.

By gender, female smallholders comprise about 40% of the smallholders in Kalangala. The total number of smallholder oil palm growers in Kalangala may be higher than what is reported by NOPP, because it is likely that some of the farmers are registered by the Kalangala Oil Palm Grower’s Trust (KOPGT) but not recorded in the NOPP report as registered farmers under NOPP. This is possible due to local arrangements to grow oil palm between KOPGT and the local farmers who are not registered under the NOPP.

Table 1: Oil palm growers in Uganda – i.e. registered growers under the NOPP.

Number of oil palm growers						
Oil palm growing area	Male	Female	Institutional	Total	Target	-
Kalangala	1,205	811	47	2,063		-
Buvuma	271	122	3	396	-	-
Mayuge	-	-	-	-	-	Newly identified/proposed area, production yet to commence – pending Environmental and Social Impact Assessment (ESIA).
Masaka						Newly identified/proposed area, production yet to commence – pending Environmental and Social Impact Assessment (ESIA).
Total				2,459	11,357	-

Source: Compiled using NOPP data from IFAD (2023).

3.1 Oil palm production and productivity in the major hubs



Oil palm production in the major hub is undertaken under an integrated production system that is majorly comprised of an outgrower (stallholder) scheme and a nucleus production model. The integrated system is aimed at ensuring a sustainable supply of fresh fruits to the milling plant. By October 2022, the cumulative total land under oil palm production for out-growers (smallholders) was 1,012 Ha (IFAD, 2023).

In 2022 alone, smallholders planted 511 Ha of oil palm (ibid). The cumulative total land under nucleus production is higher than that under out-grower or smallholder scheme (i.e., 1,694 Ha under nucleus production), and in 2022 alone, the nucleus production system planted 630 Ha of oil palm. Oil palm plantations are therefore driven majorly by the nucleus production system.

This shows that institutional support at production level still plays a vital role in the production of oil palm or FFBs in the country, and smallholders alone may not be in position to produce the expected volume due to their weak capacity. To develop a sustainable supply chain in the oil palm value chain, a sustainable supply chain of oil palm growers is required.

The target under the NOPP is to establish out-growers that can allow achievement of a total acreage of 17,147 Ha, with an annual plantation target of 1,000 Ha. This requires taking bold steps and undertaking interventions that can effectively realize the set target of oil palm production.

3.2 Smallholder production in the major oil palm hub

As indicated, Kalangala is currently the primary oil palm producing hub in the country. There is a combination of smallholder and nucleus farm production. The smallholders are out-growers with fewer acreage, while the nucleus are relatively larger growers that are mainly institutional in nature, for example, the OPUL nucleus farms and any other institutional oil palm farmers.

The production of FFB under smallholders has been increasing in Kalangala over the years, from about 27,000 MT in 2017 to 62,300 MT in 2021 (Table 2). This is largely driven by the expansion of acreage for oil palm.

The increase in FFB production signals improved potential to supply raw materials for the refineries, however, this level of production is still very low to keep refineries operating at near or full capacity.

Indeed the outputs from Kalangala that are milled by OPUL are consumed by only one refinery in Jinja (BIDCO Uganda Ltd), and OPUL

supplements outputs from the smallholders with outputs from nucleus production – these combined are still insufficient to meet the crude palm oil requirement of the refinery, so the refinery majorly relies on imported crude palm oil.

Specifically, the refinery in Jinja imports between 75-80 percent of its crude palm oil requirement from Indonesia and Malaysia.

According to estimates from Kalangala, all the crude oil produced by the two mills in Kalangala can be utilized for a period of only one week by the Jinja-based refinery. For the refinery to remain operational during the rest of the days in a month (three weeks), they have to import crude palm oil for all those days.

It is therefore highly probable that any other potential refinery when established will struggle to obtain raw materials in the short run, and so will heavily rely on importation of crude palm oil. This calls for massive efforts to organize and improve domestic production of palm oil.

Table 2: Smallholder FFB production in kalangala

Year	FFB production (MT)
2017	26892.88
2018	43198.92
2019	47972.81
2020	49086.43
2021	62302.41

Source: Compiled using NOPP data from IFAD (2021).

As highlighted earlier, in Buvuma, oil palm is not yet yielding because what has been planted is still pending maturity. In terms of plantation in the oil palm farms, the total acreage for smallholders (as of 2021) is 247 Ha against the NOPP target of 500. In a bid to increase oil palm plantation, a total of 708,000 seedlings were planted in the nursery by end of 2021 – this is planned to serve both nucleus and smallholder farmers under the NOPP.

3.3 Oil palm productivity

Although there is some slight improvement over the years, the statistics on oil palm yields show that low productivity in smallholder farms remains a challenge. Also at the national level, the level of productivity is a challenge that needs to be addressed because it is at sub-optimal level.

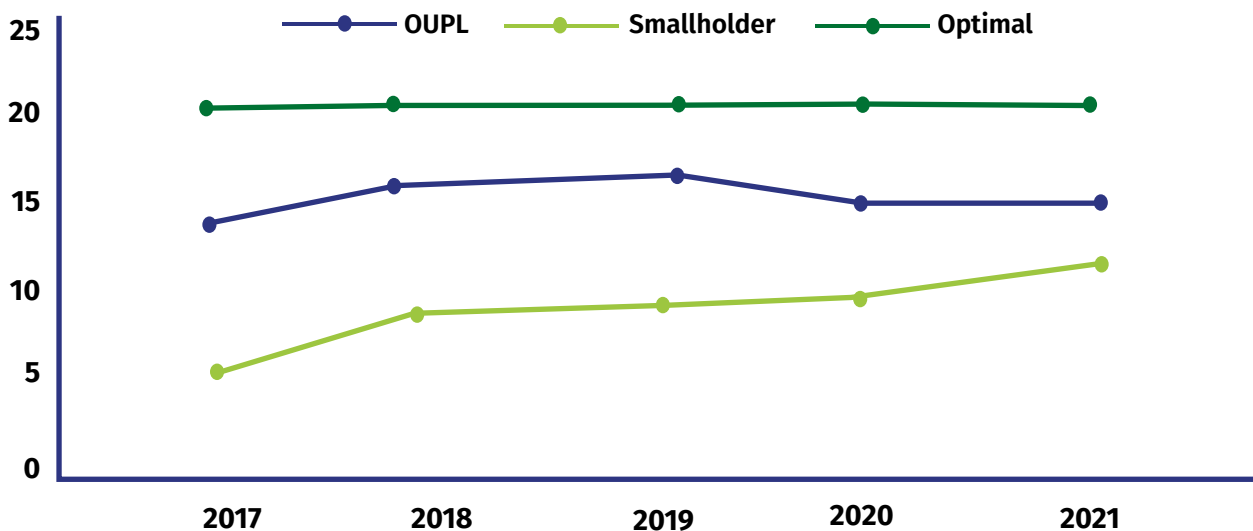
Nationally, the level of productivity is 18 MT/Ha, compared to the optimal level of 20 MT/Ha. The optimal yield is based on the potential yield at the research station (National Agricultural Research Organization - NARO). The low level of productivity affects production outputs negatively. As shown in Figure 2, the productivity challenge affects smallholder farmers the most, compared to OPUL's nucleus farmers.

This is likely because of potential variation in the level of agronomic best practices and farm technology support that the nucleus farms and smallholders may have, since the nuclease farms

are directly managed by OPUL. This has been the same trend over the years, as shown in Figure 2. The statistics show that productivity is at 13.94 and 18.07 MT/Ha for smallholder farmers and nucleus farms respectively (Figure 2) – both are below the optimal productivity level. Investments in oil palm production should therefore take productivity enhancement among smallholders into account, as an area for improvement

The productivity challenge may persist for a long time because the inputs used in oil palm production (e.g., seedlings and fertilizer) are all being imported – farmers do not have easy access to the productivity enhancing inputs. To address this, the intervention of the National Agricultural Organization (NARO) may be required - for example, through improved oil palm seed multiplication to ensure easy access including cost cutting for the local farmers.

Figure 2: Oil palm productivity by smallholder and OPUL farmers – Kalangala (MT/Ha)



Source: Author’s computation using NOPP data from IFAD (2021) and NDPIII.

It is important to note that out-grower farmers are majorly comprised of smallholders. This is aimed at scaling up smallholder oil palm development in order to have increased development impact in the community. The achievement of only 2,459 out of the target of 11,357 smallholders (shown in Table 1), and 1,012 out of the target smallholder acreage of 17,147 Ha signals that more efforts are needed towards scaling up smallholder oil palm development. The key inputs required to achieve the target are land for acreage expansion, and use of fertilizer as well as other recommended technologies for increasing productivity. Organizing farmers to improve production is also key.

One of the lessons learnt from oil palm production in Kalangala under the VODP and NOPP is the need to draw a special attention to alternative livelihood strategies by interventions. In addition to oil palm growing, beneficiary farmers supported under out-grower scheme are provided with alternative livelihood interventions such as vegetable growing for food and nutrition security, apiculture (apiary value chain), and training and deployment of labour gangs among others. The alternative livelihood interventions are key for addressing food and nutrition security and other challenges that may arise due to farmer's concentration on oil palm production.

4. Oil palm processing activities and outputs

In the oil palm value chain, the first processing activity after harvesting the fruits is the primary processing using palm mill, which processes the FFB into crude palm oil. It is paramount that the immediate processing facility (palm mill), for processing (milling) Fresh Fruits Bunch (FFB) in order to produce crude palm oil is located in the vicinity of FFB producing areas (i.e., oil palm farms). This is to address or manage the perishability of the FFBs. Overall, it helps in ensuring that there is a steady flow or source of quality (fresh) raw material.

After oil palm harvest, the Fresh Fruits Bunch (FFB) should immediately be processed to extract the oil. The freshness of the FFB should be maintained, hence the need for immediate fruit processing after harvest. This is because FFB milling in fresh condition (less than 22 hours) is critical in preventing the deterioration of the oil (Cherie et al., 2021). If delayed, it leads to a significant reduction in the oil quality. In circumstances of poor road conditions, decline in freshness is addressed using application of cold storage technology.

The Crude Palm Oil (CPO) or by-product produced by fruit milling at the palm mill is primarily utilized

by industries that are involved in the production of oil or food related products, and soap among others. For better oil quality, proper post harvest handling of the FFB and fruit ripeness upon harvest are key. In the case of Uganda, all the CPO produced in Kalangala is utilized by only one refinery in Jinja (i.e., BIDCO Uganda).

Other products from oil palm are kernel nuts (also sold to BIDCO-Uganda) and empty bunches which are used as fertilizers. Furthermore, BIDCO-Uganda uses crude palm oil by further refining it to manufacture a wide range of products such as; cooking oil (e.g., Fortune cooking oil and Golden fry cooking oil), fats (e.g., Kimbo and Cowboy), soap and detergent, and margarine.

In addition, there are more industry opportunities for additional products to be produced and marketed. According to a market study information gathered by the Economic Policy Research Center, this is because of increasing demand for low fat oils, and increased adoption of palm oil in bakery products such as biscuits, margarine, bread, ice-cream. Lastly, there are also opportunities for increased use of palm oil in the cosmetics industry.

5.0 The market for oil palm and related products

This section employs a market analysis tool or approach to examine the market potential of the commodity, based on market trend, current and future market potential.

5.1 Domestic market

At the domestic level, there is enormous demand, which provides the market for vegetable oil and related products, due to growing population which presents increased demand for oil and related products, and detergents. Urbanization as well as growth of the middle class is also providing opportunity for increased consumption of oil palm related products.

Besides, population and urbanization, domestically there is also a thriving food industry which is boosting the demand for oil palm related products – for example, large-scale use of cooking oil for frying and ingredients for making healthy food recipes.

High Dietary Energy Supply from vegetable oils: Statistics from Uganda's food balance sheet reveals that domestically, vegetable contributes substantially to the Dietary Energy Supply (DES) per capita per day (Kcal). The DES measures the amount of calories from foods available for human consumption. Over the period 2013-2018, vegetal products contributed the largest share of DES (Kcal/cap/day) i.e. 93% compared to animal products (including fisheries) whose share is only 7%. Of the vegetal products, vegetable oils have the third largest contribution to DES (12.7%) after cereals (30.2%) and starchy roots (16.4%).

Domestic demand is higher than supply. Uganda's vegetable oil self-sufficiency is low. This is reflected in the food Self-Sufficiency Ratio (SSR), which measures the country's ability (in percentage terms) of food produced to meet current food demand and related food requirements. The SSR for vegetable oils is very low, at only 24.2%, implying that production does not meet the local demand – a gap of 76%. According to the food balance sheet report (2013 – 2018), it is evident that vegetable oils have the lowest self-sufficiency for the entire period because of the low production of palm oil and olive oil, hence the inability to meet local demand (UBOS, 2020).

Therefore, the local demand outstrips supply. A major factor behind the low production of palm oil is insufficient oil palm production in the country.

5.2 The foreign market

This sub-section presents information on palm oil import value or bill for Uganda, the major sources of imports, and the export as well as potential export market within the region and beyond.

5.2.1 Crude palm oil import and supplying markets

Uganda imports a substantial amount of crude palm oil for processing palm oil and other related products. The import bill is over 259.8 million US dollars, with a negative trade balance over the years. The major supplier of crude palm oil to Uganda (i.e., supplying market) is Malaysia (almost 60% of the import value), followed by Indonesia (34% of the import value) – Table 3. Within the region, it is only the Democratic Republic of Congo (DRC) that supplies crude palm oil to Uganda, although the import value is the least compared to the rest of the suppliers. This substantial import bill suggests low domestic capacity pertaining to oil palm production for generating an adequate amount of crude palm oil to supply the local agro-industrial raw material needs.

Given that oil palm production is still low in Uganda, importation of crude palm oil is highly likely to continue in the medium to long term. Uganda can only produce 20% of the crude palm oil required by refineries – using the case of OPUL and BIDCO Uganda Ltd². This implies that an investment in a refinery must have clear strategies for sourcing raw materials (FFBs or crude palm oil) for processing or refining. Establishment of nucleus farms that are ready to supply the refinery and engagement of out-growers is key in this, in addition to importation.

Table 3: Uganda's supplying markets for crude palm oil – import value ('000 USD)

Supplying markets (exporters)	Import value ('000 USD)				
	2017	2018	2019	2020	2021
All (World)	194,059	175,668	161,189	233,974	259,826
Malaysia	13,649	24,977	26,267	80,908	155,405
Indonesia	170,144	140,118	126,737	143,738	88,144
Thailand	0	6,913	3,557	5,164	12,720
Singapore	10,083	1,858	284	0	2,141
Philippines	0	0	0	0	1,247
Democratic Republic of the Congo	184	460	525	548	169
Cambodia	0	1,342	3,819	1,148	-
Colombia	0	0	0	1,549	-
Peru	0	0	0	918	-

Source: Author's compilation using market analysis data from Trade Map (2017-2021). Product code 151110.

²Based on information from OPUL (2018/2019).

Table 4: Palm oil³ export and destination market

Export destination (market)	Export value ('000 USD)				
	2017	2018	2019	2020	2021
World	-	49.11	47.67	45.51	59.77
Kenya	-	0	0.25	2.56	0.16
Tanzania	-	1.02	0	0	0.12
South Sudan	-	25.49	23.17	18.84	32.35
DRC (Dem. Republic of Congo)	-	19.90	23.85	24.00	26.58
Burundi	-	-	0.02	0.07	1.73
Rwanda	-	-	0.27	0	0

Source: Author's compilation using market analysis data from Trade Map (2017-2021). Product code 151190.

Pertaining to the external market, Uganda exports palm oil primarily within the East African Community (EAC) region. The largest export destination in the region is South Sudan (more than 50% of export in terms of value amounting to 32,000 USD), followed by the DRC (Table 4).

The import value for all the EAC countries in Table 4 exceed the value of Uganda's exports to these countries. However, Uganda is limited to export majorly due to low palm oil production capacity. Most of the palm oil produced is used to satisfy domestic palm oil need.

Accordingly, there is scope to exploit existing export markets within the region. The markets with the greatest export potential for Uganda's palm oil in the region are; South Sudan, the Democratic Republic of the Congo (DRC), and Rwanda. Using the Trade Map market analysis tool, the potential for export is to the tune of 7.5 million USD, 5.2 million USD, and 4.3 million USD in DRC, Rwanda, and South Sudan respectively (Appendix 1). In addition to these markets, the rest of the EAC countries also present opportunities for expanding the market for palm oil within the region.

Although the export potential exists, the emphasis for Uganda may not be export market expansion or increasing export market penetration for now. This is because of the low CPO and palm oil production capacity in the country. In the short to medium term, more investment efforts can be directed towards oil palm and CPO production, and the production of palm oil, with a major aim of import replacement.

³Palm oil: This is palm oil and its fractions, whether or not refined (excluding chemically modified and crude).

6. General constraints to oil palm production and value addition at national level

Generally, the key factors that affect the oil palm industry and are thus potential hindrances, which have to be taken into consideration by oil palm interventions include the following;

a. Processing challenge due to inadequacy of raw materials (crude palm oil). Most of the crude palm oil used in refineries in Uganda is imported – to the tune of about 80%. This implies that any new processing plant is highly likely going to encounter shortages of raw materials. A well thought out strategy for raw material sourcing is therefore a requisite.

b. Large land requirement. Oil palm production requires vast land. Any oil palm intervention should have readiness in terms of adequate availability of land.

c. Perishability: High perishability of FFBs requires establishment of a processing plant (especially for milling oil palm or FFBs into crude palm oil) in the vicinity of oil palm growing areas or farms. This kind of set up or design of intervention is presently being undertaken in the industry by arrangements such as that of Kalangala - by farmers, KOPGT, and OPUL. The Kalangala arrangement provides a good lesson for any other oil palm investment that may be undertaken in other parts of the country.

d. Perennial nature of the crop: Oil palm is a perennial crop, and it displaces food production. So alternative livelihood strategies become imperative. However, the provision of alternative livelihoods can be costly from a private investor's perspective. The lessons learnt (e.g., Kalangala and elsewhere) show that investment in alternative livelihood is key, especially for food security. This is because a farmer may have the money from oil palm but if food is not produced from the vicinity, sourcing it from distant places may be very costly hence compromising his/her livelihood.

7.0 The case of oil palm industry in Mid-Western sub-region (Bundibugyo district)

7.1.0 Oil palm production in Bundibugyo



Oil palm growing was introduced by small-scale individual farmers in Bundibugyo district in 1971, and is taking place up to now. It was first introduced in Bubukwanga sub-county, and the sub-county remains the major oil palm growing area in the district to date, having the majority of the oil palm farmers (24%) – see Figure 3. It grows well in the lowland areas, compared to the mountainous parts of the district. More farmers are joining oil palm growing (Table 4), although on a very small scale in terms of production. The production of oil palm in the district is an unfamous and/or dormant activity in Uganda.

The oil palm production taking place in the district can only support a refinery to a lesser extent if established in the sub-region, because the production activities are not well organized, and outputs are still very low compared to what industries may require. For example in 2022, FFB and CPO production volumes were only 142 MT and 54,720 MT respectively (Figure 4). Although the FFB and CPO production has been gradually increasing (Figure 4), it is still insufficient. The observed increase in both FFB and CPO is likely explained by the rise in the number of farmers who are joining oil palm production. However, it is also possible that production data was not being captured in the past from most farmers, given that BUPCO has increased efforts towards farmer registration and

data capture just recently. The majority of the farmers are growing oil palm on small scale, without extension and other forms of support. Local production volumes are still low, and setting up a refinery will require a strategy to obtain a substantial amount of raw material (crude palm oil) through import in the short to medium term. KII information from the district reveals that there was an attempt to increase production in recent years by BIDCO Uganda Ltd. However, the attempt failed. BIDCO expressed interest in the district to produce oil palm through an out-grower arrangement. Their requirement was 5 square miles of land. However, they could not have access to the amount of land they required, because the land was not readily available.

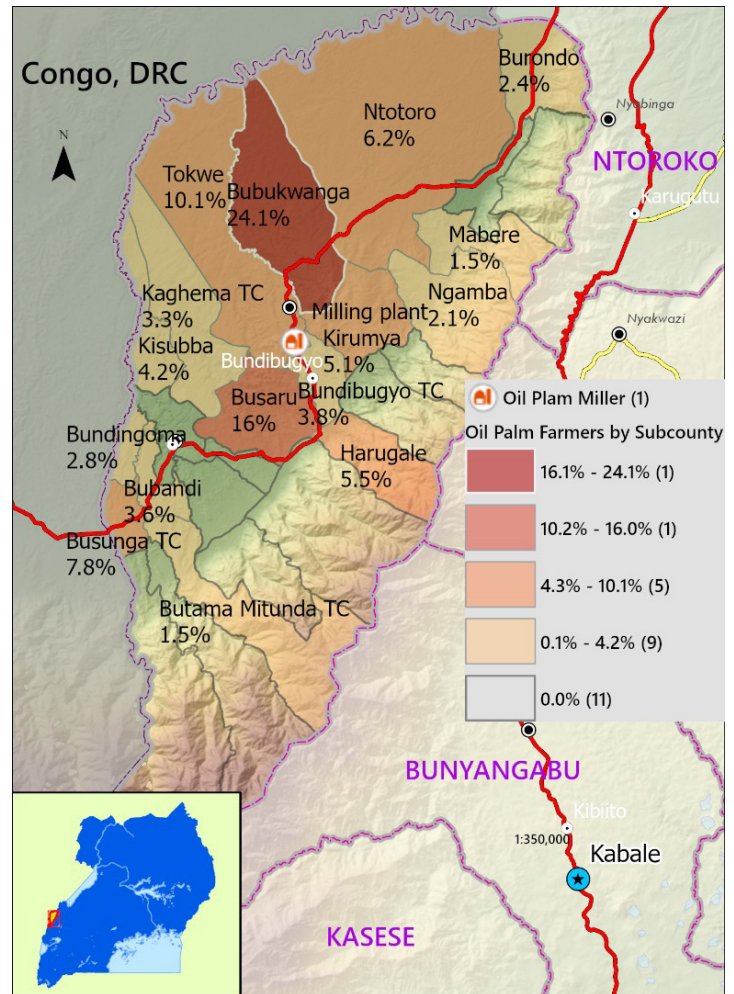
According to KII information at the district production unit, the overall farmer's average landholding in the district is 3.5 acres - a greater portion of the holding is used for cocoa growing, and less for oil palm. Oil palm production is carried out in a primitive way, and farmers do not have access to improved seeds. Most farmers pick seeds from the wild and do not as well have access to other inputs required for improving production and productivity.

Unlike cocoa, the majority of the farmers have not yet taken oil palm growing as a serious commercial activity in the district. The District Local Government has also not yet prioritized oil palm as a commercial crop but has over time realized that it has a high potential for improving livelihood in the district as a commercial crop – with a high potential to generate and increase household income.

Following this, the district production office advises farmers to plant at least 5 acres of oil palm to break even. The priority district enterprises are cocoa, vanilla, and coffee. For the case of oil palm, the district has not yet prioritized it and it is lacking resources to support the crop enterprise - that is why the oil palm production system is weak in the entire district or sub-region. Although it is not yet a top priority crop; KII information from local district leaders reveals that the district leadership is in support of the oil palm industry - they pledge to continue supporting initiatives aimed at developing the industry.

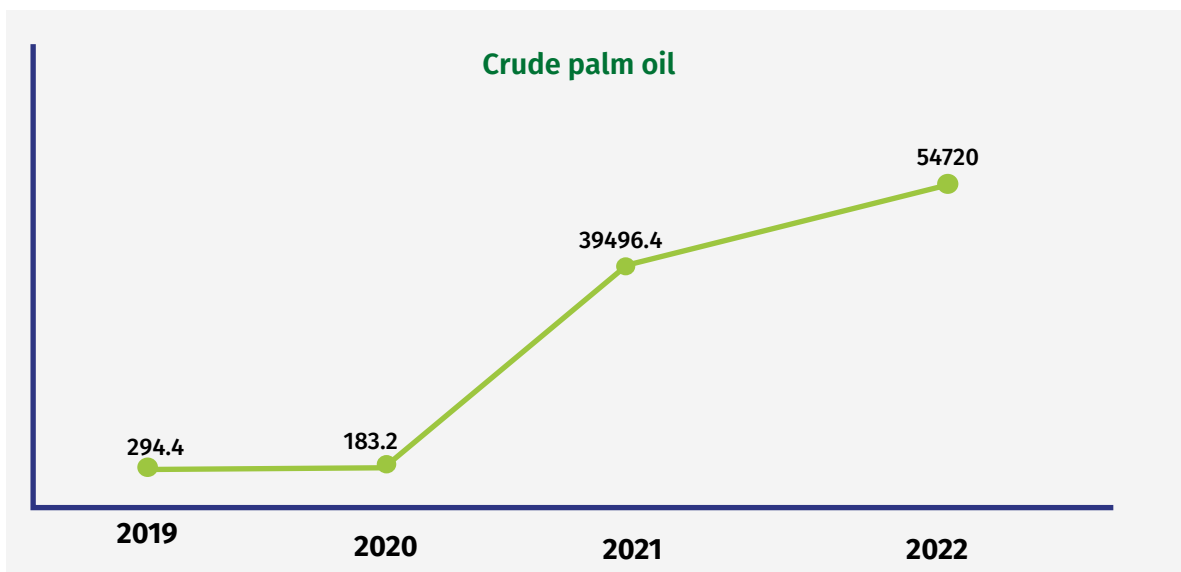
Currently, farmers are carrying out oil palm production on their own at the individual level, without any form of extension support provided. The District Local Government does not provide extension services for oil palm presently. This is negatively affecting oil palm production and productivity in the district.

Figure 3: Distribution of oil palm farmers in Bundibugyo by sub-county (N=613).

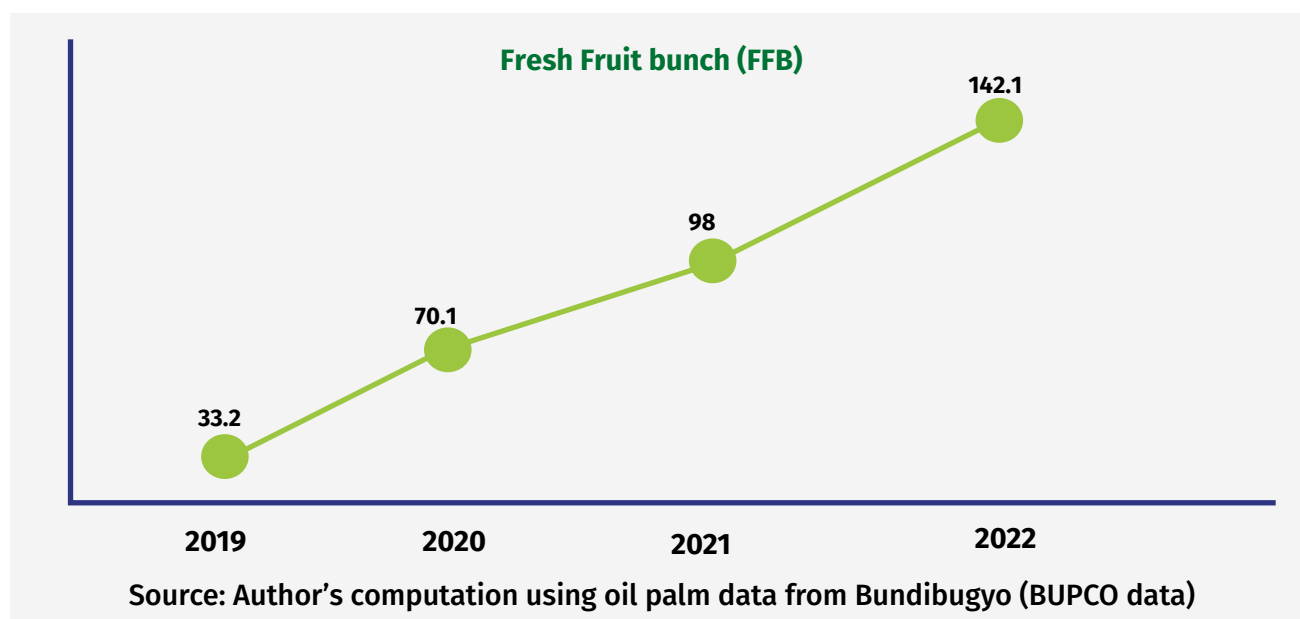


Source: Computed using oil palm farmer’s data from Bundibugyo district (BUPCO data).

Figure 4: Fresh Fruit Bunch and Crude Palm Oil production in Bundibugyo (MT)



Source: Author’s computation using oil palm data from Bundibugyo (BUPCO data)



Although most of the oil palm farmers operate under Bundibugyo Palm Oil Producers Cooperative Society Limited (BUPCO) – a registered cooperative under the Ministry of Trade, Industries and Cooperatives, operationally they carry out both production and post-production activities including marketing as individuals. The oldest and youngest farmers registered with BUPCO started oil palm growing in 2000 and 2017 respectively. Almost all the farmers are smallholders, with acreage ranging between $\frac{1}{4}$ to 10 acres. On average, one acre has about 60 oil palm trees. They are characterized by a low level of productivity due to lack of application of best agronomic practices, primarily because they do not have access to extension services. Although productivity data is not well documented due to lack of farm records, FGD and KII information estimates that an acre of oil palm produces about 10-15 FFBs which yield about 40-70 liters of Crude Palm Oil (each FFB can yield between 4 and 7 liters of Crude Palm Oil depending on farm management practices).

The total number of farmers registered under BUPCO is currently 613, comprising 362 female and 251 male farmers (Table 4). Of these, there are only 12 registered oil palm farms under BUPCO that are relatively large commercial farms, with farm size of 5 – 10 acres. The total acreage is estimated at 247 acres of oil palm, and the acreage has been gradually expanding as shown in Table 4. The annual membership subscription fee is 20,000 shillings per farmer. There are also two nursery operators registered under the cooperative. All the farmers in the district take their Fresh Fruits Bunches (FFBs) for milling, and their main outputs are Crude Palm Oil (CPO) and palm kernel nuts. Some of the farmers have their own milling machines that they use for milling, while others send the FFBs to millers (most are fellow farmers) within Bundibugyo town. The outputs are produced using artisanal milling activities in the district.

Table 4: Number of registered farmers and acreage

	2019	2020	2021	2022
Total - Farmers	62	130	280	613
Male	29	57	128	251
Female	33	73	152	362
Acreage (acres)	57	122	170	247

Source: Author's computation using oil palm data from Bundibugyo (BUPCO data).

7.1.1 Production related challenges in Bundibugyo and suggested measures

The findings from the KIIs and FGDs revealed key challenges at oil palm production level. After identification of the production challenges, some priority intervention areas were suggested as ways through which the challenges need to be addressed. The production related challenges and suggested measures are captured in information boxes 1 and 2 respectively.

Information Box 1: Identified challenges at production level

- Lack of extension support for farmers, and use of rudimentary farming methods and tools – e.g., use of hand hoes.
- Lack of access to improved oil palm seed variety. The entire district does not have improved seed, and the existing two nursery operators do not have capacity to access and produce improved seedlings. The district lacks certified supplier or producer of oil palm seed. This makes farmer's demand for improved oil palm seed to be higher than the supply at all times.
- Low level of FFB production. The demand for FFBs is constantly higher than FFB supply, due to weak production system.
- Lack of financing for production. The majority of the farmers are not in a position to engage in large-scale commercial farming due to lack of access to financing.
- Lack of access to better production technologies.
- Farmer exploitation by middlemen. These offer low prices for the kernel nuts due to lack of competition in the market.
- Inadequate market for CPO and palm kernel nuts.
- Old trees. Most farmers are using old trees to produce FFBs. There are no aggressive efforts towards expansion by planting new oil palm trees due to weak farmer's capacity, and lack of access to improved seed. Very few farmers are planting new trees. This leads to low production and supply of FFBs and nuts, hence a lot is imported from DRC.

Source: Author's compilation using KII and farmer's FGD data in Bundibugyo, March 2023.

Information Box 2: Farmer's suggestions to address production challenges

- Provide credit to farmers to finance oil palm production.
- Provide improved seeds and seedlings to farmers
- Support investment in CPO and palm kernel nut processing plants
- Link farmers to market for palm kernel nuts and CPO.
- Improve FFB and CPO production. The millers or processors need more FFBs and CPOs to survive. The largest miller in the district (Dodis) imports a large amount of nuts from DRC due to inadequate production in the district.
- A refinery should support farmers in the following areas: obtaining and planting the right or improved variety; ensuring best agronomic practices are carried out; Extension support; and better post-harvest handling.

Source: Author's compilation using KII and farmer's FGD data in Bundibugyo, March 2023.

7.2.0 Oil palm processing in Bundibugyo

Currently, there is no refinery plant in the sub-region, and Bundibugyo in particular. There is only one relatively large miller in the district - i.e., Dodis. The company (Dodis) is supporting farmers by providing milling machines (although in rudimentary form). So far, in Bundibugyo, Dodis has supplied 35 milling machines to farmers. Dodis plans to provide a total of 100 rudimentary milling machines to the farmers by the end of 2023. The company also has a future plan of setting up a refinery for processing palm oil. Figure 3 shows the location of the milling plant - Dodis (i.e., oil palm miller) in Bundibugyo district.

Accordingly, the main processing activity taking place in the district is small-scale milling of oil palm into Crude palm Oil (CPO). According to data from BUPCO, there are 134 registered oil palm millers, who are oil palm farmers at the same time. All the millers are artisanal in nature, characterized by severe inefficiency in milling oil palm. All the millers utilize FFBs as raw material for milling locally, from the FFBs produced by the local farmers. Overall, the artisanal millers produce two major products annually. The first is kernel nuts - about 29,400 sacks (of 100-120 kilograms each) of palm kernel nuts, representing about 2,940 – 3,500 MT of palm kernel nuts in 2022 (Table 5). The second is Crude Palm Oil (CPO) – about 54,720 MT⁵ of CPO was produced in 2022 (Table 5).

⁵NOTE: Farmers in Bundibugyo usually capture CPO production in liters. Otherwise the reported production in MT is based on conversion by BUPCO.

As highlighted earlier, the CPO production volume is still very low compared to the demand, so it is supplemented by imports from the Democratic Republic of Congo (DRC). According to data from the cooperative (BUPCO), about 4,440 MT of CPO was imported from the DRC in 2022 via the Busunga border entry post. However, this is also way below the local CPO production, and the KII information revealed that supplies (imports) from the DRC is erratic and hence unreliable due to security concerns at the border and in DRC, as well as the unpredictability of the suppliers. We also observe that the trend in kernel nuts and CPO production was inconsistent between 2020 and 2022. Just like the case of FFBs, this may be explained by increase in the number of farmers joining oil palm growing, or the recently intensified data capture efforts by BUPCO.

Notwithstanding the weak capacity to produce FFBs and CPO in Bundibugyo district, the small-scale oil palm production and milling activities taking place are making some noteworthy contribution to the local economy. Each sack and liter of palm kernel nuts and CPO is currently sold at 10,000 shillings and 5,000 shillings respectively. Considering current production outputs, the farmers potentially generate at least 8.5 billion shillings annually - about 294 million shillings and 8.21 billion shillings annually from palm kernel nuts and CPO respectively into the local economy. Therefore, if the oil palm industry is streamlined with well-organized production, it is capable of generating substantial economic gains with backward and forward linkages in the sub-region.

Just like the CPO, the extraction of kernel oil from the nuts is done with a low level of efficiency. There is a need to invest in modern technology to crush the nuts to produce kernel nut oil in a more efficient way. This can be investment in a cottage plant with a relatively small capacity appropriate for the current supply volumes – either a new plant or improving existing milling plants. Currently, there are two kernel nuts crushing facilities. The first is Dodis milling plant which is the major milling enterprise that is crushing the nuts in Bundibugyo district. Dodis also makes soap as a by-product from oil palm. The second operates outside the district – i.e., Hima, which is currently purchasing the nuts for crushing done at Hima in Kasese district.

Table 5: Palm kernel nuts and CPO production (MT)

	2019	2020	2021	2022
Palm kernel nuts	1135	976	2168.9	2940
Crude palm oil	294.4	183.2	39496.4	54720

Source: Author's computation using oil palm data from Bundibugyo (BUPCO data).

With the exception of the relatively big miller (Dodis), the rest of the millers in Bundibugyo are typically artisanal in nature, and all of them are small-scale farmers as well. The main source of raw material for the millers is their own oil palm garden and/or locally produced FFBs. Only one miller reported that they obtain some FFBs from DRC, but the larger part of the FFBs is from local production.

The major products produced by the millers are; Crude Palm Oil (CPO) and kernel nuts. The CPO is consumed locally as cooking oil, and most of it is sold to buyers who come from other districts (e.g., Kampala and Kasese) for soap making (i.e.,

about 70% sold outside Bundibugyo as per KII information). Similarly, the palm kernel nuts are sold primarily to areas outside Bundibugyo district.

The capacity utilization rate of the millers is very low. For example, millers' FGD information reveals that the milling machines with installed capacity of 600 liters of CPO per day process only between 7 to 30 liters of CPO per day. The main reason for operating below capacity is inadequate FFB supply (miller's demand for FFBs is substantially higher than FFB supply), and the manual nature of the milling machines exacerbates the capacity utilization problem.

A major challenge is low capacity to produce Crude Palm Oil (CPO) that can adequately supply a refinery – i.e., low supply of CPO. If a refinery is established in the district, it risks being redundant a number of times every year. Even the existing small rudimentary millers can spend between 1 to 3 days in a week without milling business due to inadequacy of FFBS.

To address this, boosting FFB production is key, and also, what is crucial is the improvement of the capacity of the millers by investing in modern motorized milling machines of high efficiency. In the meantime, a refinery can survive by relying on a combination of the little locally available raw materials (CPO), and the importation of CPO from DRC. Any refinery setup must therefore organize the millers and farmers, and improve their capacity in order to succeed.

Pertaining to the market for CPO, there are two forms of markets. The first is the local market, where CPO is locally consumed as cooking oil without refining it. The second is buyers of CPO from other districts (e.g., Kampala and Kasese among others). A bigger proportion of the CPO is sold to buyers from other districts compared to what is consumed locally (i.e., about 70% sold outside Bundibugyo as per KII information). The buyers from other districts use the CPO to produce soap, among other products. Similarly, the palm kernel nuts are sold primarily to areas outside Bundibugyo district.



7.2.1 Processing related challenges in Bundibugyo and suggested measures

Like at the production level, challenges were also identified at the processing (i.e., milling) level. The identified processing challenges and suggested measures are in information boxes 3 and 4 respectively.

Information Box 3: Identified challenges at processing level

- Weak capacity of milling machines. The milling machines are rudimentary and of very low quality, hence weak processing capacity. The milling machines are too manual and are of poor quality, which cannot last long. In addition, almost all the millers lack shelter – they are installed and operate in open space.
- Limited supply of raw materials (i.e., FFBs) for milling. The local supply of FFBs is inadequate, and cannot meet the demand from millers. This, in addition to use of poor-quality milling machines, makes the millers to operate below capacity most of the time.
- Transport difficulties. Transporting FFBs and kernel nuts is very challenging along the mountainous areas in the district.
- Price fluctuation. The price of CPO is seasonal, depending on the FFB season, which can be a peak or low. The millers revealed that during a peak season, the price could decline by almost 50%. The fluctuating prices present a high risk to investors in milling plants, and this can inhibit investments in milling plants. However, since prices in Bundibugyo are determined by market forces, they may also be heavily influenced by the few buyers of CPO. This is different from the arrangement in Kalangala where prices are nearly pre-determined based on established pricing formula.
- Environmental degradation. Currently, there is no proper waste management for the waste generated by oil palm millers. There is a need for better waste management, given that the wastes or residues generated are being dumped into the river or surrounding open places.
- Millers are weak, and artisanal in nature. They use rudimentary and/or manual milling machines. They are characterized by low level of efficiency, and lack capacity to optimally extract palm oil from the FFBs due to rudimentary machinery.

Source: Author's compilation using KII and farmer's FGD data in Bundibugyo, March 2023.

Information Box 4: Suggestions to address processing challenges

- Boost oil palm production. Organize oil palm farmers to improve production and supply of FFBs to millers. Farmer organization can be effected through the cooperative.

Both millers and farmers should be supported to collect FFBs and palm kernel nuts as a group under the cooperative. Boosting production also requires a reliable supply of key inputs required in FFB production, for example – improved oil palm seed variety or seedlings. More farmers still need to be encouraged to engage in oil palm production (e.g., through community sensitization) – this is because most farmers in the district or the community perceive cocoa as the only crop that can transform their lives. The community has little knowledge about oil palm and its potential to transform the livelihood of the community.

- Support millers to invest in motorized milling plants, to avoid milling inefficiencies including under-capacity utilization. Training millers in modern milling skills and technology and financing the technology (e.g., through asset financing) is key here. This can be organized or supported through the cooperative.

Source: Author's compilation using KII and farmer's FGD data in Bundibugyo, March 2023.

8. Conclusion and recommendations

Drawing from the current industry and market information and realities, oil palm investments should be keen on the following:

- Location of production site: Due to the freshness and perishability of oil palm fruits (FFB), a processing plant (i.e., oil palm milling plant) needs to be strategically located in proximity to raw materials (FFB).
- Access to seedlings for production. To execute nucleus production or engage smallholders, availability of seedlings is paramount.
- Productivity enhancement. Potential projects should devise strategies of increasing productivity to optimal level, or operating at optimal productivity. This is particularly important when smallholder farmers will be engaged, due to the fact that smallholders operate way below optimal productivity level. Specifically, provision of extension services and training oil palm farmers on the utilization of better oil palm agronomic practices so as to enhance productivity is paramount.
- Availability of adequate land for commercial production is key. This applies to both nucleus and out-grower oil palm production arrangements. Oil palm production requires a large amount of land. Any investment in the oil palm industry should ensure that resources are set aside for ensuring access to adequate land for undertaking commercial production activities.

- Financial support to farmers under out-grower scheme: This is instrumental for success of out-grower schemes. Using the case of Kalangala out-grower scheme, farmers under out-grower schemes succeed with support provided for them to access finances and production inputs. This is because oil palm is a perennial crop – once planted, farmers, especially smallholders, require support for the oil palm management in the farms until harvest time – the Fresh Fruits Bunch (FFB) become typically ready for harvest when the oil palms are at least three years old (i.e., 3-4 years).
- Domestic demand for vegetable oil, and palm oil in particular, outstrips production (supply). Addressing oil palm production or output deficiency is necessary for efforts aimed at closing the demand-supply gap. In addition, the demand-supply gap will be aggravated if the untapped market potential in the EAC region is to be exploited without a boost in production.
- The export market potential notwithstanding, the emphasis for Uganda may not be export market expansion in the short run due to low CPO and palm oil production capacity in the country. Therefore, investment efforts can be directed towards oil palm and CPO and/or palm oil production, with a major aim of import replacement.
- Alternative livelihood strategy is key for farmers. For an identified oil palm production area, it is important to establish a strategy for identifying the communities or villages in the respective area(s) that may face food production challenges as a result of development of parts of the village for oil palm nucleus estate and out-growers. In addition, it is important that oil palm growing investments take into account land allocation for protection of forests, Lake Buffer, and wetlands. This requires working together with or consulting the respective Local Government for such important considerations to be appropriately made in order to abate local food shortage.

Specifically in Bundibugyo;

- The majority of the farmers in the district grow oil palm on small scale, without extension services and other forms of support. Production takes place in a primitive way, and farmers lack access to improved seed. A total of 613 farmers are registered under the Bundibugyo Palm Oil Producers Cooperative Society but operationally, they carry out both production and post-production activities including marketing as individuals.

Local production volumes of FFB and CPO are very low, and CPO supply is supplemented by imports from the Democratic Republic of Congo. However, the supplies or imports from the DRC are erratic and may not be reliable to adequately meet domestic industrial needs.

- The main processing activity taking place in the district is small-scale milling of oil palm, and all the millers are artisanal in nature, characterized by severe inefficiency in milling oil palm into CPO. The millers operate below capacity due to inadequate FFB supply and the rudimentary nature of the milling machines.

Overall, both the FFB and CPO local production systems are very weak and incapable of generating adequate raw materials hence necessitating importation from DRC. However, the supplies (imports) from DRC are associated with challenges related to unreliability. Deliberate efforts are required to organize and/or support local production in order to create an efficient system that can generate a reasonable amount of raw materials that can supply industries.

There are three key intervention areas particularly for the case of Bundibugyo.

1.Improve oil palm production by organizing farmers: Deliberate efforts towards organizing farmers or the entire oil palm production system is paramount for increasing production. The capacity of smallholders can be built through provision of oil palm extension services including adoption of best agronomic practices. Farmers should be supported not to operate individually, by increasing efforts towards organizing them under the cooperative (BUPCO). Better organization of the farmers under BUPCO is crucial for their bankability.

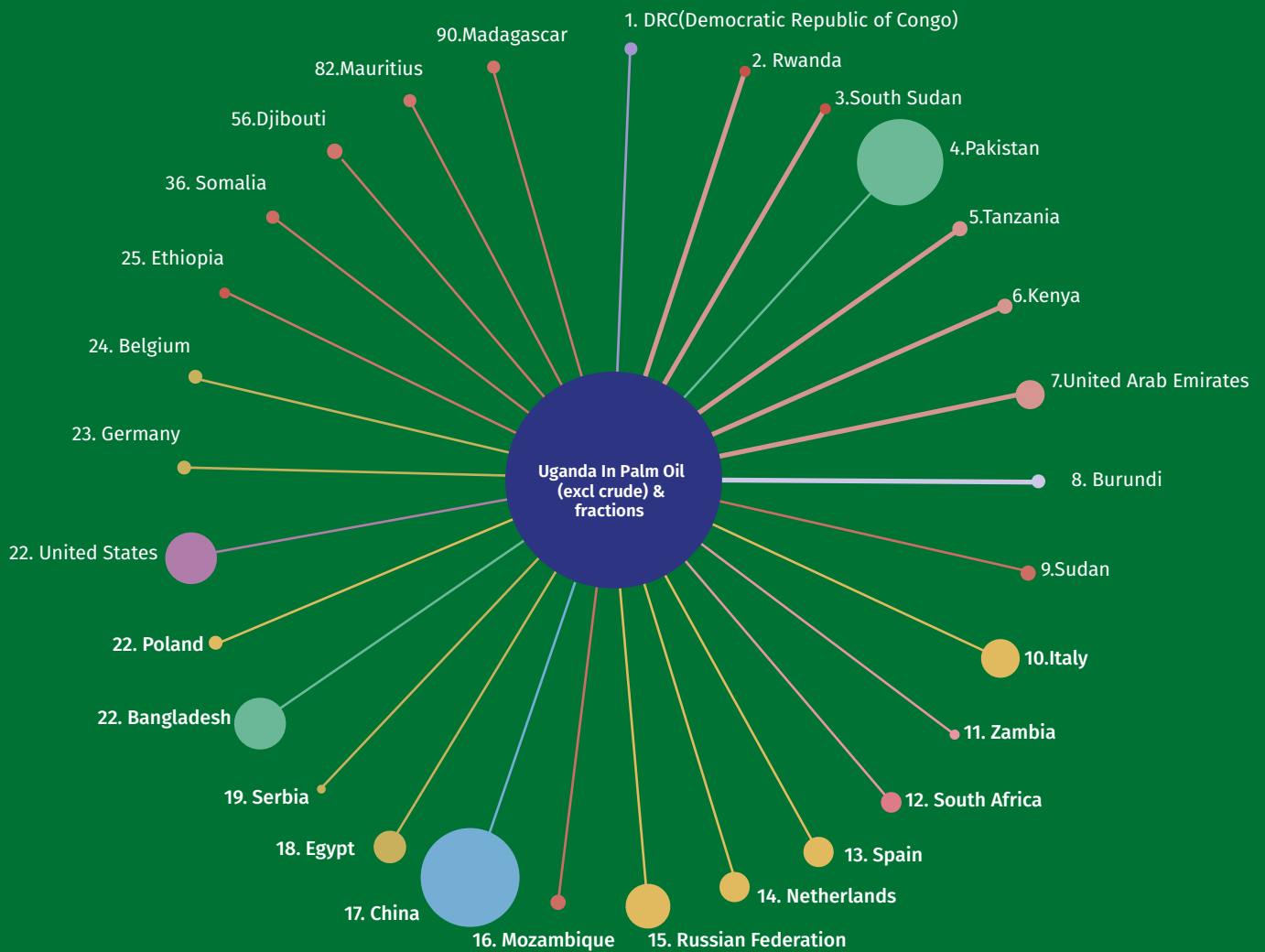
In addition, given that most farmers rely on old palm trees, aggressive efforts towards expansion by planting new oil palm trees are important. Further, investments in oil palm in the sub-region can also consider implementing a nucleus production system, alongside supporting the smallholders, for significant increase in production volumes to be realized.

2.Improve access to oil palm inputs: Investing in access to inputs – especially oil palm seedling production is critical, given the huge gaps in the domestic supply of seedlings. For example, NARO can invest in research for oil palm planting materials to generate foundation seed. This can later be multiplied for farmers to have access to high yielding seed, hence boosting oil palm productivity. Improving access to inputs may not necessarily be an intervention that is specific to Bundibugyo, because even oil palm farmers in other parts of the country face the same challenge.

3.Strengthen oil palm milling capacity: In the short-medium term, interventions can support improvement of milling capacity by investing in non-rudimentary (e.g., motorized) milling facilities. This requires investing in modern technology, for example a modern cottage plant with a capacity appropriate for the current FFB supply volumes. This is also key for ensuring a stable market for the farmer's FFBs. It can be investment in a new plant or improvement in existing milling plants.

This applies to both CPO production (i.e., FFB processing - milling) and kernel nut crushing. Specifically, interventions can put into consideration; equipping millers with modern milling skills and financing modern milling technology (e.g., through asset financing). Establishing a refinery can be done in the next phase or stage of investment in the long term, after strengthening local milling capacity and addressing the challenge of raw material supply for a refinery.

Appendix 1: Uganda's export market potential for palm oil



Source: Author's computation using Trade Map Market Analysis Tool.

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