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MINISTÈRE DE L'AGRICULTURE
ET DU DÉVELOPPEMENT RURAL

SECRÉTARIAT GÉNÉRAL

DIRECTION DES ORGANISATIONS
PROFESSIONNELLES AGRICOLES ET
DE L'APPUI AUX EXPLOITATIONS AGRICOLES

SOUS-DIRECTION DE LA VULGARISATION
AGRICOLE



REPUBLIC OF CAMEROON
Peace-Work-Fatherland

MINISTRY OF AGRICULTURE
AND RURAL DEVELOPMENT

SECRETARIAT GENERAL

DEPARTMENT OF PROFESSIONAL
AGRICULTURAL ORGANISATIONS
AND SUPPORT TO FARM ENTERPRISES

SUB-DEPARTMENT OF AGRICULTURAL
EXTENSION

Palm plantation management technical and economic data sheet



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OBJECTIVE

The aim of this data sheet is to provide rural stakeholders involved in palm oil production with a compendium of good practices, whose implementation will help increase the productivity and production of palm oil in Cameroon.

I. GENERAL INFORMATION

Oil palm (*Elæis guineensis*) is a perennial plant cultivated mainly for its fruit, from which fats are extracted (palm oil from the pulp and palm kernel oil from the kernel). It is very sensitive to the prevailing site agroecological conditions (soil, rainfall, humidity, temperature, sunshine, wind, etc.).

Oil palm yields are optimised when grown under the best agroecological conditions, that is:

- high temperatures throughout the year, between 25 and 28° C;
- at least 5 hours of sunshine per day;
- 1,800 - 2,400 mm rainfall per year and no continuing drought for more than 90 days. Excess rainfall is well tolerated as long as soils are well drained;
- Oil palms prefer rich, well-drained soils, but tolerate poor soils if fertilisation is provided;
- Low altitude, ideally below 500 m: It grows well in areas with a minimum annual rainfall of 1,800 mm, which must be well distributed throughout the year.

Do not plant oil palm where drought can cause an average annual water deficit of 500 mm, unless an irrigation system has been provided or unless the site groundwater table is close to the surface.

Generally, oil palm grows best in slightly acidic, well-drained, loose soils with a high-water retention capacity (sandy-clay), and where there are no major gradient or incline (slight or no slopes and altitudes of less than 800 m).

Palm tree production basins are located in forest agroecological zones with monomodal and bimodal rainfall, forming part of the highlands and the Guinea savannah. The economic life of an oil palm varies between 25 and 30 years.

II. TECHNICAL ITINERARY

II.1. Choosing a planting site

The suitable site for planting palms must be free of any land disputes, because a palm grove requires a permanent site over a fairly long period of time. Gentle-slope sites are

recommended (slopes less than 15%). Soils must be loose and deep. If hydromorphic soils are not permanently flooded, they can be developed for oil palm cultivation.

NB: Avoid:

- soils that are too sandy or too clayey;
- gravelly or lateritic soils;
- marshy soils with permanent water.

The site must be accessible to people.

II.2. Soil preparation

The most suitable areas for growing oil palm are forest areas. The creation of a palm plantation in forest areas require:

a) Land clearing and felling

Clear the undergrowth with a machete and selectively fell large trees. Cut down fallen vegetation and make windrows.

b) Planting cover crops

When planting palms, cover crops limit the leaching of mineral elements, help control weeds and provide more organic matter to the soil.

The most recommended cover crop is *Pueraria phaseoloides*, a creeping legume. *Pueraria* seeds are sown in hills or broadcast. For hill sowing, the recommended spacing is one metre apart and emergence is around 2 to 3 weeks after planting. One hectare will require 5 to 12 kg of seeds.

c) Staking out

Staking consists in specifying the locations of palm seedlings using stakes.

This involves:

- determining the base line from the west to the east;
- placing the stakes in an equilateral triangle of side 9 m (7.8 metres between 2 rows and 9 metres along the row).

This technique produces 143 seedlings per hectare.

d) Hole digging

From the first rains:

- dig holes where the stakes are placed;
- clean around the stake, manually or chemically, over a radius of 1.5 m;
- dig a cubic hole in the exact location of the stake: Average hole size slightly larger than that of nursery bags (40 cm x 40 cm x 40 cm);
- Once the hole has been dug, put the stake back by driving it firmly into the middle of the hole.

II.3. Transportation of plant materials

Seedlings selected from the nursery must be transported to the field. When loading and unloading, avoid damaging the seedlings (one hand holds the seedling by the collar while the other supports the bottom). In the vehicle transporting the seedlings, these should be placed vertically and close together. The day before transportation, water the seedlings thoroughly to preserve the root ball and ensure that they take root properly; Place the seedlings close to the holes where they will be planted.

II.4. Planting of seedlings

24 hours before planting, mix the soil used to fill the planting hole with a base fertiliser (organic or chemical manure). For the planting per se, you need to:

- Cut/slit the base of the bag;
- Place the seedling vertically in the hole, holding it by the collar;
- Remove the bag once the seedling has been conveniently placed in the hole;
- Backfill the hole, starting with the topsoil;
- Pack the soil around the seedling, avoiding to trample on the clod of soil (the soil in the bag).

NB: The collar of the seedling must be just level with the ground, to ensure rooting and normal growth of the seedling.

Seedlings should be protected (from rodents) by a mesh sleeve, immediately after planting. The sleeve must be firmly fixed in the ground. It is advisable to use triple-twisted galvanised steel mesh with 13 mm hexagonal netting.

II.5. Maintenance of a palm plantation

a) Pre-production palm plantation (≤ 3 years old)

Carry out regular checks on the farm after planting to identify any seedlings that tilted or fell over;

Support the lying seedlings with stakes made of forked wood firmly fixed in the ground;

Identify dead seedlings and replace them, preferably with seedlings from new nurseries;

Weed the circles (1.5 to 2 m around the seedling) and clear the weeds inside the mesh by hand.

NB: Avoid cutting green palms and moving meshes.

b) Palm plantation in production (more than 3 years old)

- Stumping: this consists in destroying stubborn trees and shrubs after felling. This is recommended twice a year between 4 and 7 years old and once a year for farms over 8 years old;
- Circle weeding (cleaning 2 m radius around the palm tree with a hoe) twice a year;
- Weeding of collection bins (4 m diameter areas at the end of tracks) 3 times a year;
- Pruning of palm trees once a year in the off-season;
- Sanitary harvesting: this consists in systematically cleaning the palm trees to remove rotten bunches.

II.6. Fertilisation

After planting, seedlings must be given the nutrients they need to grow. Fertilisers should be applied twice a year in March and October. The fertiliser is applied evenly over the entire surface of the circle, right up to the base of the leaves.

a) Pre-production palm plantation (≤ 3 years old)

The growth fertiliser formula (1 to 3 years old) is as follows: $06(N) + 8(P) + 28(K+) + 10(S+) + 8(Mgo)$. However, it is possible to formulate your own specific fertiliser from straight fertilisers bought on the market, at the rate of: 1 bag of urea + 3 bags of potassium

chloride + 3 bags of kieserite (kieserite is a fertiliser rich in magnesium, a mineral much used by palm trees), with an average of 500 grammes per seedling per application for growing palm trees (1 kg/seedling/year).

b) Palm plantation in production (more than 3 years old)

The production fertiliser formula (3 years old and above) is: $0(N) + 0(P) + 36(k+) + 0(S+) +$
 11 (Mgo).

- Production fertiliser composition: mix 50 kg of potassium chloride + 25 kg of kieserite.

The amount of fertiliser required depends on the age of the palm plantation. Between the fourth and sixth years, use 4 to 5 bags of 50 kg per hectare per year, that is, 750 grammes per seedling for each application (1.5 kg/seedling/year).

Then, 6 to 7 bags of 50 kg per year from the seventh year of cultivation, that is, 1 kg per seedling per application per year (2 kg/seedling/year).

Fertilising with manure and plant waste is also possible. But it requires large quantities of manure to transport and spread..

NB: Unlike other perennial plants, oil palms renew their roots every year. Minerals are therefore needed each time to ensure the production of desired yields.

II.7. Harvesting of bunches

Oil palms start producing around 3 years after planting and will reach their full potential between 7 and 25 years old. The economic lifespan of a palm plantation is around 30 years, after which the height of the palm trees makes harvesting difficult and poor.

Ideally, a plot of palm trees should be harvested every 7 to 10 days. It is done manually using a dibble/machete or a sickle, depending on the age and height of palm trees. Before the fourth year, avoid damaging or cutting palm leaves during harvesting (only dry palm leaves are cut). Cut bunches are brought to the edge of the plantation, notably to the collection area set up for this purpose, using a wheelbarrow, and then transported to the extraction plant by tractor or lorry, depending on the distance to be covered. As palm bunches are perishable, ideally there should be no more than 48 hours between cutting and processing.

Production peaks between December and May, when more than $\frac{3}{4}$ of annual production is recorded.

II.8. Post-harvest activities

- Palm oil production (CPO)

It is advisable to use modern automatic or semi-automatic presses, and to take bunches to the place where oil is extracted, preferably between 24 and 48 hours after cutting.

1. Sterilising the bunches using saturated steam at 3 bars will help detach the fruits from the stalk and also interrupt the enzymatic activity of lipases, the main cause of the oil's acidity;

2. De-stemming in the de-stemmer drums to remove the fruits from the stalk;

3. Blending: mechanical and thermal operation to condition the fruits for pressing;

4. During pressing, the oil from the mesocarp is extracted and the remaining fibres and nuts are separated after pressing;

5. Clarification: an operation that involves separating pure oil from the remaining liquid through static and dynamic decantation. Oil is then dehydrated and stored.

II.9. Packaging and storage

- Use plastic or glass gallons; - Be sure to fill to the maximum and close tightly;
- Store in a dark place at room temperature;
- Storage time depends on product quality (acidity < 5%, moisture < 0.1%). This is an important parameter, as production is subject to wide variations throughout the year due to climate conditions.

II.10. Various products and by-products

- Palm oil;
- Palm kernel oil;
- Refined oil, margarine;
- Palm kernel cakes;
- Palm kernel shell;
- Organic fertilisers (oil mill waste);
- Palm wine;
- Twig brooms.

III. PROVISIONAL OPERATING ACCOUNT (01 HA)

BUDGET

Items	Units	Quantity	Unit cost	Total	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Small equipment													
Sprayer	Units	1	45,000	45,000	45,000	0		45,000			45,000		
Machete	Units	2	2,500	5,000	5,000	0	5,000		5,000		5,000		5,000
Wheelbarrow	Units	1	30,000	30,000	30,000	0			30,000				30,000
Hoe	Units	2	3,500	7,000	7,000	0	7,000		7,000		7,000		7,000
Three-pronged fork	Units	1	6,000	6,000	6,000	0	6,000						48,000
Pickaxe	Units	2	5,000	10,000	10,000	0	10,000						
All-purpose carrier	Units	2	85,000	170,000	170,000	0	0	0	170,000	0	0	0	170,000
Triple decametre	Units	1	10,000	10,000	10,000	0	10,000				0		0
Mesh	Roll (1.20 m)	2	17,000	34,000	34,000	0	0	0	0	0	0	0	0
Aluminium bowl	Units	5	8,000	40,000	40,000	0	40,000				40,000		
Overalls	Units	2	15,000	30,000	30,000	0	30,000		30,000		30,000		30,000
Bucket	Units	3	1,500	4,500	4,500	0	4,500		4,500		4,500		4,500
Farm boots	Units	2	5,000	10,000	10,000	0	10,000		10,000		10,000		
File	Units	2	1,000	2,000	2,000	2,000					2,000		2,000
Twine	Roll	1	3,000	3,000	3,000	3,000					3,000		3,000
Sickle and parang	Units	2	3,000	6,000	6,000	0			6,000		0		6,000
Gloves	Units	3	2,500	7,500	7,500	0	7,500		7,500		7,500		7,500
Face mask	Pack	1	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Sub-total of small equipment				421,000	421,000	6,000	131,000	46,000	271,000	1,000	155,000	1,000	314,000

2.1 Inputs													
Seedlings	Units	160	2,000	320,000	320,000	0	0	0			0		0
Mucuna seeds	Kg	12	1,000	12,000	12,000	0	0						
Insecticides (decilitres)	3 litres	0	2,500		0	0	0	0	0	0	0	0	0
Herbicide (Round up)	Litre	1	6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500
Fungicide	Kg	0	8,500	0	0	0	0	0	0	0	0	0	0
SPS	Kg	0	700	0	14,700	140,000	140,000	70,000	70,000	70,000	70,000	70,000	70,000
Potassium chloride (KCl)	Kg	0	600	0	9,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000
Kieserite	Kg	0	700	0	9,800	80,500	80,500	60,200	60,200	60,200	60,200	60,200	60,200
Urea	Kg	0	600	0	6,600	0	0	0	0	0	0	0	0
SA	Kg	0	500	0	0	57,500	57,500	65,000	65,000	65,000	65,000	65,000	65,000
Sub-total of inputs				338,500	378,600	422,500	422,500	339,700	339,700	339,700	339,700	339,700	339,700
2.2 Works													
Land clearing/cleaning	HJ	20	2,500	50,000	50,000								
Felling	FF	1	100,000	100,000	100,000								
Sawing / Swathing	FF	1	150,000	150,000	150,000								
Burning	HJ	4	2,500	10000	10000								
Staking out	HJ	30	2,500	75,000	75,000	0					0		0
Hole digging	Units	160	200	32,000	32,000	0					0		0
Transportation of seedlings and plants	Units	160	300	48,000	48,000						0		0
Weeding	Units	1	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Circle weeding (X2)	Units	320	100	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000	32,000
Fertilisation	FF	1	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Pruning	Units	160	100	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000
Harvesting	HJ	0	0	0	0	0	0	20,000	25,000	30,000	35,000	50,000	50,000
Transportation of bunches to extraction units								40,000	60,000	80,000	130,000	130,000	130,000

Oil press service	0	0	0	0	0	0		50,000	75,000	100,000	162,500	162,500	162,500
TOTAL COST OF WORKS				578,000	578,000	113,000	113,000	223,000	273,000	323,000	440,500	455,500	455,500
TOTAL OPERATING EXPENSES				916,500	956,600	535,500	535,500	562,700	612,700	662,700	780,200	795,200	795,200
Bunches produced (tonnes)			0	0	0	0		4	6	8	13	13	13
Palm oil (25% of the weight of bunches)			0	0	0	0		1,000	1,500	2,000	3,250	3,250	3,250
Palm kernel oil (10% of the weight of bunches)			0	0	0	0		100	150	200	325	3,250	325

DEPRECIATION

Items		Quantity	Unit cost	Total cost	Lifespan	YEAR 1
Start-up costs	FF	1	40,000	40,000	5	8,000
Sprayer	Units	1	45,000	45,000	3	15,000
Machete	Units	2	2,500	5,000	2	2,500
Wheelbarrow	Units	1	30,000	30,000	4	7,500
Hoe	Units	2	3,500	7,000	2	3,500
Three-pronged fork	Units	1	6,000	6,000	4	1,500
Pickaxe	Units	2	5,000	10,000	4	2,500
All-purpose carrier	Units	2	85,000	170,000	4	42,500
Triple decametre	Units	1	10,000	10,000	5	2,000
Mesh	Roll (1.20 m)	2	17,000	34,000	2	17,000
Aluminium bowl	Units	5	8,000	40,000	2	20,000
Overalls	Units	2	15,000	30,000	2	15,000
Bucket	Units	3	1,500	4,500	1	4,500
Farm boots	Units	2	5,000	10,000	2	5,000
File	Units	2	1,000	2,000	1	2,000
Twine	Roll	1	3,000	3,000	1	3,000
Sickle and parang	Units	2	3,000	6,000	5	1,200
Gloves	Units	3	2,500	7,500	2	3,750
Face mask	Pack	1	1,000	1,000	1	1,000
TOTAL DEPRECIATION						157,450

Financial result

Items	Price	Quantity	Total	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9
Operating expenses				956,600	535,500	535,500	562,700	612,700	662,700	780,200	795,200	795,200
Depreciation				157,450	157,450	157,450	157,450	157,450	157,450	157,450	157,450	157,450
Turnover	650	0	0	0	0	0	650,000	975,000	1,300,000	2,112,500	2,112,500	2,112,500
Gross margin				-956,600	-535,500	-535,500	87,300	362,300	637,300	1,332,300	1,317,300	1,317,300
Net profit				-1,114,050	-692,950	-692,950	-70,150	204,850	479,850	1,174,850	1,159,850	1,159,850
Cumulative profits				-1,114,050	-1,807,000	-2,499,950	-2,570,100	-2,365,250	-1,885,400	-710,550	449,300	1,609,150

In the case of oil palm, financial profitability is achieved in the 8th year of farming.