

RÉPUBLIQUE DU CAMEROUN
Paix – Travail – Patrie

MINISTÈRE DE L'AGRICULTURE
ET DU DÉVELOPPEMENT RURAL

SECRETARIAT GENERAL

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

TECHNICAL AND ECONOMIC DATA SHEET FOR TOMATO PRODUCTION AND POST-PRODUCTION



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OBJECTIVE

The aim of this technical data sheet is to disseminate appropriate cultivation practices to improve tomato productivity and production in Cameroon, to producers. The long-term impact will be to mitigate the effects of the food crisis and improve producers' income.

It is a support and reference tool for extension workers and rural advisers in the context of capacity building for producers.

I- GENERAL INFORMATION

The tomato (*Solanum lycopersicum L.*) is a branched annual plant whose stems require staking to improve yields. The production cycle for this crop varies from 120 to 150 days. In Cameroon, it is one of the staples most widely consumed by the population and is also increasingly used by farmers in peri-urban and forested areas. Tomatoes are grown all year round, but yields vary according to climate conditions and agro-ecological zones. Many producers throughout the country are involved in tomato production.

There is a wide range of tomato varieties classified into two main groups:

- The fresh consumption tomato group; indeterminate growth with round fruit;
- The canning tomato group; determinate growth with plum-shaped or elongated fruit.

Tomatoes are eaten fresh or processed. Rich in fibre, they also contain carotenoids, mainly lycopene, which is known to have antioxidant and anti-inflammatory properties.



Figure 1 : Tomato growth stages

II- TECHNICAL ITINERARY

Initiatives to adopt agro-ecological and sustainable farming practices are increasingly visible in the field, given the reality of climate change. The indications given in this fact sheet will therefore concern both conventional (intensive) and sustainable farming practices.

II.1. Site selection

As a general rule, an open plot of land with full access to sunlight is suitable for tomatoes. The site should not have had a solanaceous crop (chilli, potato, pepper, nightshade, etc.) as a previous crop for two or three years. This is to reduce the incidence of disease. It should be accessible, close to a good quality water source, and have soils suitable for tomato production. These soils must be fairly light, deep, loose and rich in nutrients and organic matter.

II.2. Sowing period

Outdoor tomatoes can be grown all year round, but the best commercial fruit yields are obtained during the dry season. These vary depending on the varieties and the farming system used (greenhouse, irrigated, etc.). Depending on the agro-ecological zone, sowing periods for the 2 farming seasons are: June-July in the northern regions (AD, NO and FN); March-April and September in the high plateau (NW, OU), bimodal forest (CE, ES, SU) and mono-modal forest (LT, SW) zones. The table below shows some local preferences in terms of varieties

Crops	Seeds requested	Comments
Tomato (<i>Solanum lycopersicum</i>)	Roma Savana	Hardy variety adapted to the savannah and grown mainly in the cool dry season.
	Rio Grande +	Improved standard variety, grown mainly in the cool dry season
	Roma VF	Suitable for hot areas, resistant to Verticilium and Fusarium fungi
	Cobra 26 F1	Early hybrid variety with very high yields, disease tolerant, grown in the hot dry season and cold season.

II.3. Nursery

Sow in the nursery on soil rich in organic matter and previously disinfected either with pesticides (soil disinfection products) or boiling water to reduce parasites. In the second case, water one square metre of nursery with a watering can containing 10 litres of boiling water and immediately cover the soil with a good mulch, old sacks or plastic sheets. Leave to rest for at least a week, then dig to aerate the soil and give it a fine structure.

Sowing can be done directly in the field or above ground (in trays, plastic bags, plastic buckets or tubs, germinators). It is sown in rows 20cm apart, with one seed every centimetre along the line, i.e. 100 seeds per linear metre and 500 seeds per m².

You need a 60m² nursery to obtain the plants needed to transplant one hectare of fresh consumption tomatoes and a nursery of 80m² to transplant one hectare of industrial tomatoes. Nursery time varies between 25 and 40 days, depending on the variety.

II.4. Site preparation

Site preparation consists of the following operations:

- Clearing and cleaning;
- Basic fertilisation: for 100 m² of crop, incorporate 200 to 300 kg of organic matter and 4 kg of mineral fertiliser (10-10-20) by digging;
- Creation of beds with double rows 50 cm apart for varieties with indeterminate growth.

Once the site has been cleared, avoid burning the biomass. It is advisable to spread it around the edges of the plot to facilitate decomposition on flat ground. Plant grass strips perpendicular to the slope on sloping ground. This is an anti-erosion device similar to cultivating in patches. The aim of all these agro-ecological practices is to collect run-off water and direct it around the plants on sloping ground.

When preparing the soil, it is advisable to plough deeply (30-50cm) without turning the soil over so as not to disturb the soil's biology. Flat ploughing, ridging or hollow beds are recommended.

For greenhouse cultivation, the soil is prepared by filling the bags and pots in which the crops will be grown.

II.5. Transplanting

For transplanting, only vigorous plants, about 15 cm high, with 5 to 6 leaves and a stem 5 mm in diameter, should be transplanted. The density is around 25,000 plants/hectare, with 80 cm between rows and 50 cm within rows. Plants must be 40 to 50 cm apart on the row for staggered planting.

II.6. Staking

It is necessary to support tomato plants with indeterminate growth and useful to support those with determinate growth. Use 2 m stakes (1.6 m above the ground) in the first case and 1.1 m stakes (0.8 m above the ground) in the second case.

Stakes should be placed next to the plant to be supported. Stems should be attached loosely to the stakes as they grow.

NB: Approximately 25,000 stakes are needed per hectare.

II.7. Pruning

Given problems such as virus infections, sunburn, bird damage, etc., pruning tomatoes is not recommended. However, for indeterminate-growth varieties, it is advisable to remove some of the foliage at the bottom of the plants to improve ventilation between the plants and stakes.

II.8. Maintenance fertiliser

For every 100 m² of planted area, add 2 kg of mineral fertiliser (20-10-10) into the soil after 15, 30, 50 and 80 days after planting (approximately 8 g per plant, i.e. one tablespoon per plant). This may be followed by light ridging to encourage rooting.

Instead of mineral fertiliser, you may choose to use organic matter (plant/animal debris) enriched with fish meal and bone meal at a rate of 10%, ensuring it is well watered to promote good mineralisation.

NB: You need 800 kg of mineral fertiliser or between 30 and 50 tonnes of organic matter per hectare.

II.9. Watering

Plants should be watered daily at cool times throughout the cycle. The frequency of watering could be reduced towards the end of the crop cycle. Water requirements are 0.5 litres/day/plant before fruiting and 1 litre/day/plant after fruiting.

It is recommended to irrigate with an appropriate system (drip irrigation is recommended) to reduce the workload, improve water supply and disease management.

II.10. Disease and pest management

Tomatoes are susceptible to physiological disturbances, diseases and pests. Tomato protection is based on the principle of integrated pest management; that is:

- Choosing a healthy site;
- Use of tolerant varieties;
- Use of good growing practices;
- rational use of pesticides (nematicides, fungicides, insecticides).

The main tomato diseases in the field are downy mildew, bacterial wilt, alternaria, verticium and fusariosis.

The main tomato pests are fruit flies, white flies, mites, nematodes and caterpillars.

Controlling these pests requires bio-monitoring using pheromones and food baits, followed by a natural protection protocol (4L/ha of neem oil, chilli pepper, garlic, ginger).

In the event of proven resistance, fungicides should be used (2kg/ha of Maneb) and insecticides (1L/ha of Decis).

II.11. Harvesting

The first harvest takes place after 60 to 80 days and is spread over two to three months.

It takes place when the colour of the fruit begins to change:

- Yellow-pink if sale or consumption is postponed;
- Orange-red for direct sale or consumption;
- Bright red for processing.

To harvest the fruit, hold it between your fingers and turn it gently twist it to detach the stalk easily.

II.12. Yield

This fluctuates between 200 and 500 kg of fruits per 100 m² of cultivation in the dry season, 100 to 250 kg in the rainy season.

NB: Average yield: 20 to 50 tonnes per hectare depending on the variety. However, the average tomato yield in Cameroon is around 11 tonnes/hectare, varying from 2 to 22 tonnes/hectare (FAO STAT, 2021).

II.13. Preservation, processing and packaging

After harvesting, fruits are transported in rigid packaging (crates, boxes, cartons, etc.). Fresh fruits are preserved in a cool, dry place; their shelf life can be increased by applying ash to the fruits. However, processing remains the best option for long-term preservation (drying sliced fruits in the sun, tomato concentrates and juice, tomato jam).

III- PROVISIONAL OPERATING BUDGET

BUDGET:

Operations	Units	Quantity	Unit cost	Total	Year 1
I.INVESTMENT COSTS					
1.1 Land and infrastructure					
Sub-total land and infrastructure				0	0
1.2 Material and equipment					
Motor pump	U	1	200000	200000	200000
Development of watering reserve points	FR	1	300000	300000	300000
Sub-total material and equipment				500000	500000
1.2.1 Small equipment					
Sprayer	U	2	45000	90000	90000
Machete	U	4	4500	18000	18000
Wheelbarrow	U	1	30000	30000	30000
Hoe	U	4	3500	14000	14000
Watering can	U	8	6000	48000	48000
Shovel spade	U	2	5000	10000	10000
Push truck	U	1	85000	85000	85000
Triple decametre	U	1	10000	10000	10000
Rack	U	1	2000	2000	2000
Bucket	U	3	1500	4500	4500
File	U	4	1000	4000	4000
Twine	Roll	1	3000	3000	3000
Basket	U	800	300	240000	240000
Shade for nursery	FR	1	20000	20000	20000
Subtotal Small equipment				588500	588500
TOTAL INVESTMENTS				1088500	1088500
2. OPERATING EXPENSES					
Land rental	Ha	1	50000	50000	50000
2.1 Inputs					
Seeds	100g bags	3	20000	60000	60000
Insecticides (decis)	5 litre	4	16000	64000	64000
Herbicide (Round up)	Litre	4	6500	26000	26000
Mancozeb	Kg	80	2500	200000	200000
Ridomil	100g bags	200	1000	200000	200000
N-P-K 20-10-10	50Kg bag	24	26000	624000	624000
Potassium sulphate	50Kg bag	10	32500	325000	325000
Calcium nitrate	50Kg bag	5	13500	67500	67500
Sub-total inputs				1616500	1616500
2.2 Work					
Nursery					
Nursery soil preparation	M ²	80	500	40000	40000
Disinfection of nursery soil	M ²	80	1000	80000	80000

soil preparation					
Land clearing/cleaning	MD	20	2500	50000	50000
Ploughing	MD	60	2500	150000	150000
Staking	MD	10	2500	25000	25000
Ridging	MD	30	2500	75000	75000
Transplanting	MD	30	2500	75000	75000
Watering	MD	25	2500	62500	62500
Staking	MD	20	2500	50000	50000
Fuel and lubricant	FR	1	30000	30000	30000
Motor pump maintenance	FR	1	15000	15000	15000
Re-sowing	MD	5	2500	12500	12500
Spreading of mineral fertiliser	MD	6	2500	15000	15000
Fungicide\ insecticide treatment	MD	6	2500	15000	15000
Herbicide treatment	MD	6	2500	15000	15000
Weeding / Earthing	MD	15	2500	37500	37500
Pruning	MD	15	2500	37500	37500
Sub-total works				665000	665000
2.3 Harvesting and post-harvest operations					
Tomato harvest	MD	40	2500	100000	100000
Transport and handling	FR	1	50000	50000	50000
Packaging	MD	2	2500	5000	5000
Subtotal harvesting and post-harvest operations				155000	155000
2.4 Provision of services					
Security	Months	0	10000	0	0
Follow up and Support	FR	1	50000	50000	50000
Communication	FR	0	5000	0	0
Sub Total Service provision				50000	50000
TOTAL OPERATING EXPENSES				2486500	2486500
TOTAL EXPENSES				3575000	3575000

DEPRECIATION

Description		Quantity	Unit cost	Total cost	Life span	year	1 Camp\ Year	2 Camp\ Year
Development of watering reserve points	FR	1	300000	300000	3	100000	33333.33333	66666.66667
Motor pump	U	1	200000	200000	5	40000	13333.33333	26666.66667
Sprayer	U	2	45000	90000	3	30000	10000	20000
Machete	U	4	4500	18000	2	9000	3000	6000
Wheelbarrow	U	1	30000	30000	2	15000	5000	10000
Hoe	U	4	3500	14000	2	7000	2333.333333	4666.666667
Watering can	U	8	6000	48000	3	16000	5333.333333	10666.66667
Shovel spade	U	2	5000	10000	2	5000	1666.666667	3333.333333
Push truck	U	1	85000	85000	5	17000	5666.666667	11333.33333
Triple decametre	U	1	10000	10000	2	5000	1666.666667	3333.333333
Rack	U	1	2000	2000	2	1000	333.3333333	666.6666667
Bucket	U	3	1500	4500	1	4500	1500	3000
File	U	4	1000	4000	1	4000	1333.333333	2666.666667
Twine	Roll	1	3000	3000	1	3000	1000	2000
Basket	U	800	300	240000	1	240000	80000	160000
Shade for nursery	FR	1	20000	20000	2	10000	3333.333333	6666.666667
TOTAL FOR DEPRECIATION						511500	170500	341000

FINANCIAL RESULTS

Description	Price	Quantity	Total	1 Camp\ Year	2 Camp\ Year
Operating costs				2486500	4973000
Depreciation				170500	341000
Turnover	4500	800 (crates)	3600000	3600000	7200000
Gross margin				1113500	2227000
Net Profit				943000	1886000

Appendix:

Natural pesticide formulations

Ingredients	Measuring Unit	Weight Or litre	Litre Concentration (L)	Litre Concentration Per hectare (L/ha)	Total Diluted
Bio pesticide 1					
Dried red pepper	G	0.1			
Garlic	G	24.4			
Ginger	G	48.8			
Water	L	1.0			
Black soap	G	2.4			
Total in litres			1	213.68	10
Bio pesticide 2					
Neem oil	L	0.135			
Water	L	9.2			
Black soap	L	0.0			
Total in litres			9.7	202.9	10
Bio pesticide 3					
Moringa leaves	G	487.5			
Basil leaves	G	97.5			
Water	L	2.0			
Black soap	G	2.4			
Total in litres			2	427.35	10

Source: CEFRA Centre d'Etude, de Formations et de Recherche en Agro écologie, 2023 (Centre for Study, Training and Research in Agroecology, 2023)