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Adaptation for Smallholder Agriculture Programme
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PRELNOR

Sesame

Curriculum and Technical Guide for Farmer Field and Business School Facilitators





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SESAME

INTRODUCTION

Sesame is normally called 'Simsim' in Eastern Africa and it is a traditional and important oilseed crop in Uganda . It is regarded as a self pollinated crop with 50-60% of out-crossing. It is one of the most important ancient oilseed crops grown throughout the tropical and subtropical regions of the world. Most of the world's sesame growing area is found in India, Myanmar, China, Sudan, Nigeria, with 68% of the total world production. It is often referred to by the epithet "the queen of oil seeds" because of its nutritive value, quality and quantity of its oil which is rich in vitamin E and a significant amount of linoleic acid that can control blood cholestrol levels. Despite all these qualities, Its not among the key priority crops supported by Government nor the donor community.

Uganda (124,300 MT) ranks seventh in sesame production in the world and fourth in Africa. Sesame is cultivated both at smallholder and large commercial scales. It is mainly broadcasted by the smallholder farmers. The seeds are often mixed with sand, soil or ash and then broadcast or drilled by hand in small furrows. Under large scale production, the crop can be planted mechanically, with the equipment varying from small hand operated seeder units or animal-drawn drills to tractor-operated electronically controlled air seeders.

Sesame seeds have both nutritional and medical value. It is used in sweets such as sesame bars and halva (dessert), and in bakery products or milled to get high-grade edible products. Sesame seed is also used for decorating bread and

cakes as an extra-rich source of protein in many developing countries. The seed has been shown to impart a unique taste and textural features when included with baked products. Seeds are chemically composed of 44-57% oil, 18-25% protein, 13-14% carbohydrates. Sesame oil is famous for its stability as a result of its resistance to oxidative rancidity after long exposure to air and contains 35% monounsaturated fatty acids and 44% polyunsaturated fatty acids. The sesame oil contains sesamin and sesamolin. Sesamolin is converted to sesamol after roasting. The seeds also are very rich in iron, magnesium, manganese, copper, and calcium and contain vitamin B1 (thiamine), vitamin E (tocopherol), lignans. The seed also has ingredients for antiseptics, bactericides, viricides and disinfectants. After oil extraction, the remaining meal which contains high amount of proteins and calcium is used in the animal feed industry. These qualities make sesame a prime commodity in the global market and therefore one with great potential for poverty alleviation, food and nutrition security, household income generation and an important earner of foreign exchange in Uganda.

Contents of the curriculum

The curriculum consists of training modules divided into units indicating the topics, objectives, contents, methods of delivery and training materials required. A time schedule is allocated for each topic to enable the facilitator to plan appropriately for each session.

Sesame Production Technology:

Course content

TIME (HOURS)		TOPIC	OBJECTIVE	CONTENT	METHOD	MATERIAL
THEORY	PRACTICAL					
30 min	1hr	Introduction	To appreciate sesame production	The Economic importance of sesame	• Sharing • Group discussion • Practical • Demonstration	• Flip chart • Print out • Brochures
30 mins	45 mins	Record keeping	To be able to keep proper records	Importance of record keeping	• Brainstorming • Group discussion • Demonstration	• Samples of records
15 mins	45 mins	Constraints in sesame production	To identify constraints in sesame production	Constraints in sesame production	• Brain storming • Sharing • Group discussion	• Flip chart • Markers • Pens • Notebooks

15min	15 min	Varieties of sesame	To be able to identify different sesame varieties with their attributes	Identification of sesame varieties and their attributes	• Brainstorming • Group discussion • Practical • Demonstration	• Variety samples • Note books • Pens
15 mins	20 mins	Seed selection	To be able to select good quality sesame seeds for planting.	Attributes of good sesame seeds for plantings	• Discovery • Group discussion • Practical • Demonstration	• Demo plot • Different sesame seed sample
20 min	30 mins	Seed rates	To be able to determine appropriate seed rates and spacing for sesame.	Determining the quantity of seed required per plot size	• Discovery • Practical • Demonstration	• Demo plot • Sesame seeds • Note books • Strings • Measuring tape • Farm tools
30 min	15min	Site selection	To be able to select suitable sites for planting sesame	Selection of suitable sites for sesame production	• Brainstorming • Practical • Demonstration	• Demo plot • Farm tools • Note books • Pens

30 min	1hr	Land preparation	To be able to prepare land suitable for planting sesame	Different methods of land preparation for sesame	• Brainstorming • Practical • Group discussion • Demonstration • Group discussion • Sharing	• Hand tools, • Ox plough • Tractors • Demo plot • Note books • Pens
15 min	40 mins	Crop rotation	To be able to design a crop rotation program for sesame	Planning crop rotation for sesame	• Discovery • Practical • Demonstration • Group discussion	• Demo plot • Note books • Pens • Flip chart • Markers
15 mins	30 mins	Planting sesame	To be able to plant sesame using different methods.	Different methods of planting sesame.	• Discovery • Practical • Demonstration	• Demo plot • Sesame seeds • Strings

40 mins	1 hr	Soil fertility management and fertilizer requirements for sesame	To be able to manage soil fertility in sesame field. To be able to identify suitable fertilizers for planting sesame	Soil fertility requirements for sesame Types of fertilizers and rates required in sesame production	• Brainstorming • Group discussion • Practical • Demonstration	• Demo plot • Organic fertilizers • Inorganic fertilizer • AESA sheet • Pens • Notebooks • Flip charts • Markers
30 mins	1 hr	Weed management in sesame field	To be able to manage weed infestations in sesame.	Methods of weed management in sesame	• Brainstorming • Practical • Demonstration	• Demo plot • Weed specimens • AESA sheet • Pens • Notebooks

20 mins	1 hr	Disease management in sesame field	To be able to manage the different diseases in sesame	Methods of disease management in sesame	• Brainstorming • Practical • Demonstration	• Demo plot • Diseased samples in the field • Fungicides • AESA sheet • Pens • Notebooks
20 mins	1 hr	Pest management in sesame field	To be able to identify and control different pests of sesame.	Identification of different pests of sesame Methods of pest management in sesame	• Brainstorming • Practical • Demonstration	• Demo plot • Insect box • Spray pumps • Protective gear • Samples of chemicals for pest control • Pens • Note books • Flip charts • Attendance sheets

20 mins	1 hr	Harvesting sesame	To be able to determine time of harvesting sesame.	Time of harvesting sesame Harvesting methods for sesame	• Discovery • Sharing • Practical • Demonstration	• Demo plot • AESA sheet • Pens • Notebooks • Harvesting tools • Tarpaulins • Transport
15 mins	30 mins	Post-harvest handling	To be able to handle sesame after harvesting.	Post-harvest handling methods in sesame	• Discussion • Practical • Demonstration	• Demo plot • Tarpaulins • Transport
15 mins	45 mins	Threshing and cleaning sesame	To be able to thresh sesame appropriately.	Methods of threshing and cleaning sesame	• Discussion • Practical • Demonstration	• Sesame seeds • Tarpaulin • Mats • Packing bags • Winnowers/ blowers

20 mins	1 hr	Drying sesame	To be able to determine the appropriate moisture content for sesame.	Methods of drying sesame	• Brainstorming • Practical • Demonstration	• Drying rack • Tarpaulins • Strings • Moisture meter
25 mins	30 mins	Packaging	To be able to package sesame appropriately.	Suitable methods of packaging sesame	• Discussion • Practical • Demonstration	• Samples of packaging materials
30 mins	1 hr	Storage	To be able to store sesame appropriately.	Different methods of Storing sesame	• Discussion • Practical • Demonstration	• Stores • Silos • Sesame seeds • Pallets • Bags
30 mins	1 hr	Marketing sesame	To be able to market sesame profitably.	Marketing sesame Profitability analysis for sesame	• Discussion • Practical Demonstration	• Flip charts • Markers • Pens • Notebooks

SUMMARY INFORMATION ON SESAME PRODUCTION TECHNOLOGIES

Importance of Simsim

- Source of food and food security
- Income generation
- Confectionery, margarine, soap and perfume
- Pharmaceutical industry
- Blend salad oil
- Fodder; protein supplement in livestock and poultry feed (cake)
- Green manure and cover crop

Challenges in Simsim Production

- Pests and diseases like Fusarium, Gall midge
- Climatic changes
- Declining soil fertility
- Knowledge gaps in production
- Post -harvest losses
- Accessing quality seeds
- Poor weed management

SIMSIM VARIETY

Brief Attributes

Sesim 3

- Yield: up to 700 kg/ha
- Maturity: 80-90 days
- Tolerant to gall midge
- High oil content above 40%
- White seeded good for confectionery
- Hairy capsules and stem



Sesim 2:

- Plant height-100-200cm
- Yield = 300 - 400 kg/acre
- Maturity :100 - 110 days
- Stem color: purple



SITE SELECTION

- Sesame is adapted to various soils. The crop grows best on medium to light, well –drained soil with enough rainfall.

LAND PREPARATION

- Good land preparation is essential for a good stand since sesame seed is small. Having proper seedbed with Sesame is always critical. Fine seed bed that is at

least ploughed twice prior to rain onset.



First ploughing



Second ploughing with fine soil particles

ROTATION

- Sesame can be planted after cereals e.g. maize, sorghum and legumes like groundnuts without any problems. Like any oil crop it should not be planted after any other sesame crop

SEED SELECTION

- Improved varieties are higher yielding than local varieties e.g sesim 2 and sesim 3.



SEED RATE

- Use a seed rate of 3-4 kg/acre depending on row spacing and planting conditions.

PLANTING

Step 1:

- Mix the simsim seed with sand in a ratio of 3:1 cups. This prevents very close spacing.





Step 2:

- Mix thoroughly before planting



Step 3:

- Drill planting



- Calibration: Sowing the seed in line is preferred. Mix the seed with dry sand and spread the mixture along the furrows to ensure even distribution.
- Place seeds in a drill using recommended spacing of 30 x 10 cm or 30 x 15 cm depending on soil fertility.



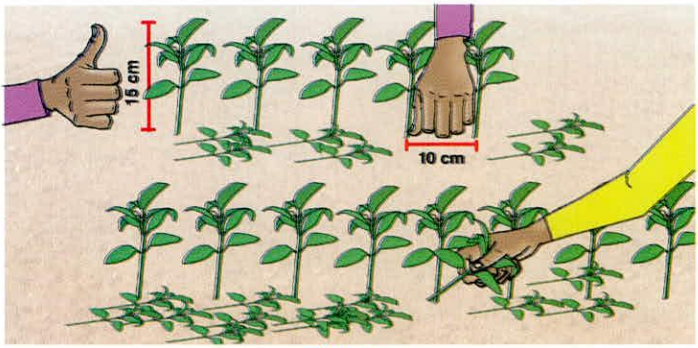
- Broadcasting is not recommended.



- Placement must minimize seed depth to reduce the amount of time for emergence
- Place the seed deep enough to ensure the seed will not dry out before emergence
- The seed needs to have moisture around it for 3 days(late planting) to 5 days (early planting)

SPACING

- Thin to one plant per hill when the crop is 10-15 cm, 15 cm high. Thinning can be done immediately after 1st weeding.



Thinning



SOIL NUTRIENT MANAGEMENT

Fertilizers

- Single Super Phosphate(SSP) can be applied and incorporated in the seedbed during final land preparation at a rate of 100-200 kg/ha just before planting.
- 40- kg/acre of Urea can be applied after first weeding (2-3 weeks after planting).



Fertilizer Application

- Muriate of Potash (24 kg/acre) is applied just before flowering.

WEED MANAGEMENT

- Keep sesame fields weed free as much as possible.



A farmer Weeding in a sesame garden

- Too much weed is difficult to clean out of sesame.
- 2-3 weeding are sufficient.

PEST MANAGEMENT

Major pests are web-worm and gall midge



Gall midge in flowers



Gall midge in capsules

How to control pests of Sesame

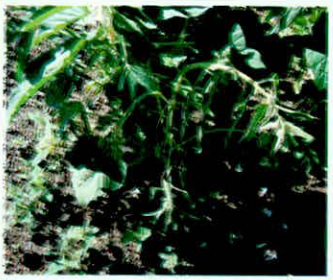
- Spray against pests using Polytrin , Dimethoate (Rogor), Cypercal, Fenkill, Ambush Superinsecticide and Dithane M45 is used to control fungal diseases.

DISEASE MANAGEMENT

Disease



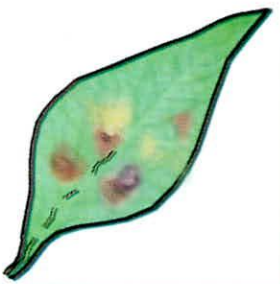
Roots attacked by Fusarium



Wilting plant due to Fusarium



Alternaria leaf spot on Sesame



Cercospora leaf spot

- Cause leaf fall/defoliation
- Control: spray with Dithane M45 and Benlate

HARVESTING AND POST-HARVEST

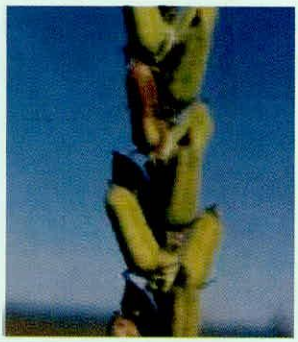
- Timely harvest will always maximize yields
- Harvest when the capsules mature, this is realized when the leaves have dropped or shed off.
- Drying on a slanting or upright rack. The seed should crack with sharp sound.
- Threshing should be done immediately by beating on a clean tarpaulin or ground.



- Storage should be done in clean, dry, aerated place on pallets. When threshed, the seed is dressed using Actellic dust for seed preservation for the next planting season.

Post harvest handling of sesame

- **Harvesting:** done when about 10% of the plants have dry brown capsules and leaves have dropped.
- **Transportation:** bundled plants are transported on head, bicycles, carts or vehicle.



Drying and threshing sesame

- Sesame is tied in bundles and dried on racks.
- Dried bundles are threshed by beating and the grain collects on the tarpaulin put below the racks.
- Threshed sesame grain is put in bags and stored on pallets in water-proof rooms.



Drying sesame racks

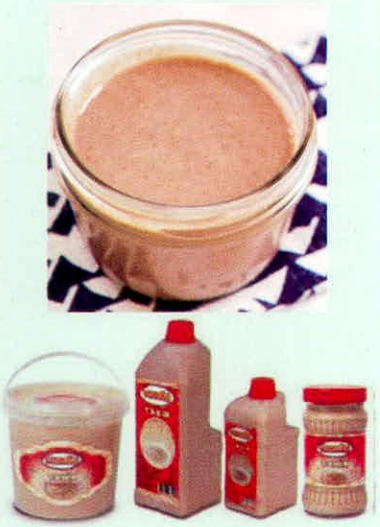


Drying sesame in west Nile

VALUE ADDED PRODUCTS FOR SESAME



Roasted sesame



Pasted sesame



Sesame on bread



Sesame oil

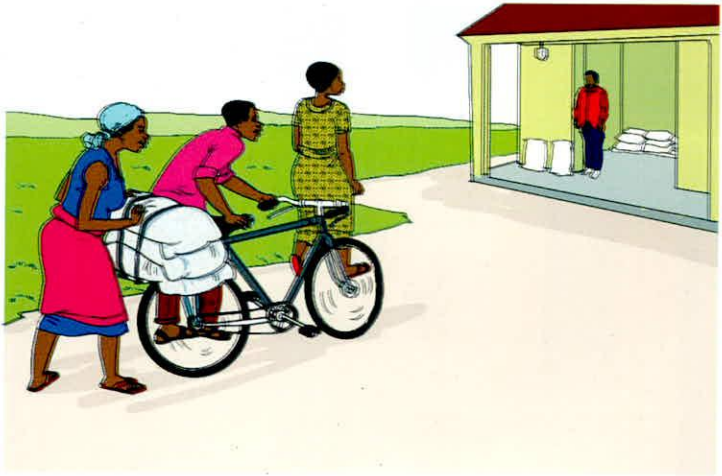




Sesame Rolls

MARKETING

- Conduct market survey to establish the market requirements in terms of quality, quantity, seasonality, price.
- Provide market information and linkages.
- Promote bulk marketing.



- Encourage contract farming
- Promote local seed business

PROFITABILITY ANALYSIS FOR SESAME

Gross – margin analysis for simsim

Example: Gross – margin analysis per acre of simsim

Assumptions: yield per acre = 400 kg/acre and market price = 2,500/- per kg

Item	Unit	Qty	Unit cost	Total
Cost of input				
Seeds	Kg	6	3,000	18,000
Tools (hoes)	Pieces	5	8,000	40,000
Tools (pangas)	Pieces	2	3,000	6,000
Pesticides	Litres	4	10,000	40,000
Bags	Pieces	3	1,000	3,000
Total input cost				107,000
Labour costs				
Land preparation x2	Man-day	2 x10	5,000	100,000
Planting	Man-day	5	8,000	40,000
Weeding	Man-day	2 x 10	5,000	100,000
Harvesting	Man -day	2 x 5	5,000	50,000
Drying (constructing racks)	Man-day	1	20,000	20,000
Threshing	Man-day	1 x 5	6,000	30,000
Packaging	Man -day	3	2,000	6,000
Total labour cost				346,000
Cost of labour and input				**453,000**
Gross Margin				**547,000**

Note: Production cost per unit (kg) = $\frac{\text{Total cost}}{\text{Total output (yield)}}$

Profit margin per kg = sale price per unit – production cost

$= \frac{453{,}000}{400}$

= 1,132.5/-

Profit margin per kg = sale per price unit-production cost per unit

= 2,500 – 1,132.5 = 1,884.3/-

Implication: A farmer is getting a profit of shs 1,367.5/- per kg produced

RISK AND SENSITIVITY ANALYSIS

Risk analysis for Sesame Enterprise

Scenario 1: A decrease in yield of sesame to 375 kg/acre and a rise in market price to shs 2600 /kg

Parameter	Product	Quantity (kg)	Marketing Price (Sh.)	Total (Sh.)
Expected Revenue	Sesame	1 acre × 350	2,600	975,000
Total Cost				453,000
Gross Margin				**522,000**

Scenario 2: An increase in yield of sesame to 420 kg/acre and a fall in price to shs 2300/kg

Parameter	Product	Quantity (kg)	Marketing Price (Sh.)	Total (Sh.)
Expected Revenue	Sesame	1 acre × 450	2,400	966,000
Total Cost				453,000
Gross Margin				**513,000**

Note: a) **In scenario 1** above, the decrease in yield accompanied by a rise in price will not significantly affect profitability of the enterprise

b) **Under scenario 2:** A fall in market price will drastically reduce profitability of the enterprise. A fall in market price has a far reaching effect on gross margin than a fall in yield.

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