

TOOLKIT: ORGANIC SESAME PRODUCTION

NATIONAL ORGANIC AGRICULTURAL MOVEMENT OF UGANDA
(NOGAMU)



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UNOPS



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CHAPTER ONE

INTRODUCTION

1.0 Organic Agriculture

Ecological Organic Agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects.

The major objective of organic agriculture is to optimize the health and productivity of soil life, plant, animals and people. The aim of organic agriculture is to establish and maintain soil-plant, plant- animal and animal soil interdependence and to create a sustainable agro- ecological system based on local resources. Organic farming uses environmentally friendly methods of crop and livestock production, without use of synthetic fertilizers, growth hormones, growth enhancing antibiotics, synthetic pesticides or gene manipulation.

1.1 Organic sesame production

Organic sesame production relies on using cultural practices, natural fertilizers, and biological controls to maintain soil productivity and health, support plant nutrients and control insects, weeds and other pests. This ensures a sustainable farming system that protects the environment and at the same time enhances, improves and conserves soil fertility for future generations as well as promoting good health for all.

The organic sesame production training guide is divided into five major chapters:

- I. INTRODUCTION
- II. AGRONOMIC PRACTICES
- III. PEST MANAGEMENT
- IV. SOIL FERTILITY MANAGEMENT
- V. SOIL EROSION MANAGEMENT

These four chapters are intended to answer common questions asked by organic farmers so that they can implement a management system that increases farm productivity and improves organic farmers' livelihoods, while conserving resources for use by future generation.

Each of the four chapters are based on recommended activities with a main message for the farmer, followed by actions that would assist him/ her to make relevant decisions for successful sesame production.

CHAPTER TWO

AGRONOMIC PRACTICES

2.0 Organic Sesame Agronomic Practices

Production of organic sesame requires good initial planning so that crucial activities are not compromised at the expense of good quality sesame. It involves careful site selection and stepwise land preparation as well as organized crop establishment and management so as to ensure sustainable organic sesame production. In addition, timely cultural practices play a very important role in sesame production by augmenting plant vigor and enhancing prevention of pests and diseases.

2.1 Site Selection

Sesame is suitably grown in loam soils with high organic matter content which can supply nutrients and improve the water holding capacity of the soil. Preferably it should be the first crop grown after fallowing. This therefore calls for:

- Do not cut down natural forests and protected areas for planting sesame
- Select deep (at least 30cm), well drained fertile soil to provide a favorable medium for rapid root proliferation.

2.1.1 Land Preparation

- Prepare the field early for timely farm operations
- Plough deep enough so that the nutrients in the top soil can be exploited but do not expose subsoil. This will allow rapid and uniform germination and good root penetration.
- Where possible ox ploughs can be used and the ploughing should be along the contours to prevent erosion.
- Avoiding practices of burning ploughed down grass during land preparation.
- Leaving the grass ploughed down to decompose before the second ploughing.
- Incorporating the crop residues of the threshed sesame into the soil during subsequent land preparation.
- Plant green manure (e.g. Mucuna 60cm x60cm) four months before the expected date of planting sesame
- Plough down green manure one month before planting sesame to enable decomposition to take place. OR Apply 2tons/ acre (5 tons per hectare) of compost or animal manure i.e. 20 wheelbarrows one month before planting.

2.2 Crop establishment

2.2.1 Seed selection

It is important to plant sound, mature, disease free seeds from a known source. If possible the farmer should do his/her selection from plants in his/ her field which show high superiority for seeds.

- Select the proper variety that is well adapted to your local conditions
- Always choose seeds of the same type and variety. Mixing different varieties will result to uneven height, maturity, and seed quality.
- Always select good and diseased-free seeds.
- When storing the seeds for future usage, make sure that they are properly dried and are store in an airy container (never use plastic container), away from direct sunlight and moisture. Make sure that they are free from molds before using them.

2.2.2 Planting

Sesame is normally broadcasted because of the labor implication of planting in rows. The seed rate is 2kg per acre. Planting is normally done at the onset of the rain to enable the crop use effectively the first and second rains.

Sow the seeds after rain or wet the soil prior to sowing. The seeds to germinate need adequate moisture in the soil for around 3 days. Never sow the seeds on dry soil, always wait for rain or irrigation water.

2.2.3 Crop Thinning

Avoid competition among sesame plants

- When the plants attain height of 10-15 cm, remove the damaged, weak and diseased plants.
- It is important to achieve 22plants/meter in order to attain a high yield.
- Try to maintain the plant population of 222,000 plants/ha to attain the maximum yield.

2.2.4 Weeding

Timely weeding has higher impact on increasing production than fertilizers or pest control

Weeds are the unwanted plants found in your fields and gardens. They compete with your crops for nutrients, moisture, and sunlight which can decrease the crop quality, increase the production costs due to increase cultivation and hand weeding, and considerably reduce the crop yields. They also serve as the alternate hosts of insect/mite pests and diseases.

Prevention measures

- Thorough land preparation, by plowing and harrowing
- Keep the surroundings of your farm free of weeds, unless they are maintained and intended as habitat for natural enemies

Mechanical and physical methods

Do weeding 4-5 weeks after sowing. The weeds are easier to control on their earlier growing period. If possible, do not let the weeds to flower. Remove them from the field before they start to flower. The weed-bearing seeds that are removed should not be placed in compost pile for the seeds may not be killed in the process of decomposition. The compost might be the source of the reintroduction of weeds into your fields. The weeds can be removed through hilling-up the furrows with a plow, hoeing, mowing, or cutting.

- Use selective hand weeding, hand hoes to manage weeds.
- Remove weeds regularly (at least 3 times per season whenever weeds appear) so that they do not suppress the sesame crop.

CHAPTER THREE

3.0 PEST MANAGEMENT

Organic management practices target to modify the environment so that it is less favorable for pest invasion and mainly focus on crop management rather than pest management. In case of pest eruption, natural pesticides should be used to eliminate serious effects on sesame production.

3.1 Common sesame pests and their management

Growth stages	Insect/mite Pests	Explanation on growth stages
0 stage Seeds	<i>Ants</i>	
Seedling stage Leaves	<i>Aphids / Whiteflies</i>	Seedlings start to emerge 3 - 5 days after sowing. Critical stage is about 3 weeks after sowing.
Vegetative stage Foliage	<i>Aphids / Whiteflies</i>	When the seedlings have developed 4 - 7 true leaves.
Reproductive stage Flowers, Foliage	<i>Aphids / Whiteflies</i>	Flowers start about 36-45 days after planting and stop 70-90 days after planting
Maturation stage Fruit capsules	<i>Aphids</i>	Physiological maturity normally occurs 90 - 110 days after planting depending on varieties, moisture, fertility, and temperatures. Sesame normally dries down in 130-160 days.

3.1.1 *Ants*

Damage

Ants take the sown seeds back to their colony and feed on germinating seeds and on young seedlings. They tend insect pests like aphids, scales, whiteflies, mealy bugs, and other honeydew producing insects. These actions result in missing hills, thus loss of plant stand, uneven growth distribution in the field, and an increased incidence of diseases caused by the mentioned insect pests.

Management Measure

Cultural practices

1. Increase the seeding/seedling rate. This practice turns out cheaper than with the use of insecticide.
2. Control aphid, whitefly, and other insects that excrete honeydew. The ants are likely to be found in plants infested by these insects because they protect them for their food.

Spray solutions

Ant oil spray

- Mix 2 table spoons of dish washing soap,
- 2 tea spoons of vegetable oil,
- 2 table spoons of salt, and
- Few drops of vinegar into 4 liters of water.

3.1.2 Aphids

Damage

Both the nymphs and the adults pierce the plant tissues to feed on plant sap. The infected leaves become severely distorted when the saliva of aphids are injected into them. Heavily infested ones will turn yellow and eventually wilt because of excessive sap removal. The aphids' feeding on the plant causes crinkling and cupping of leaves, defoliation, and stunted growth. Aphids produce large amounts of a sugary liquid waste called honeydew. A fungus, called sooty mold, grows on honeydew deposits that accumulate on leaves and branches, turning leaves and branches black. The appearance of a sooty mold on plants is an indication of an aphid infestation.

Description

Their body color varies from yellow, green, brown, to purple. Females can give birth to live nymphs as well as can lay eggs. However, the primary means of reproduction for most aphid species is asexual, with eggs hatching inside their bodies, and then giving birth to living young. Winged adults, black in color, are produced only when it is necessary for the colony to migrate, or there is either overcrowding in colonies, or unfavorable climatic conditions.

Management Measures

- Avoid plant stress by giving neither too little nor too much manure
- Avoid water stress and water logging
- Where there is high infestation spray with Neem extract
- In extreme cases spray with chili, lantana camara or maize flour spray

3.1.3 White flies

Description

Both the larvae and adults pierce and suck the sap of the leaves. This causes the weakening and early wilting of the plant resulting in reduced plant growth. Their feeding may also cause yellowing, drying, premature dropping of leaves that result in plant death. Whiteflies produce honeydews that serve as the substrates for the growth of black sooty molds on leaves and fruit. The mold reduces photosynthesis causing the poor plant growth of the plant. They are the most

important carriers of plant viruses that cause diseases of fiber crops, vegetables, fruit trees, and ornamentals.

The eggs are tiny, oval-shaped, about 0.25 mm in diameter, and stand vertically on the leaf surface. Newly laid eggs are white then turn brownish. They are deposited on the underside of leaves, sometimes in a circle or oval-shaped patterns. The larvae are transparent, ovate, and about 0.3-0.7 mm in size and they move around on the plants

looking for a feeding site upon hatching. The pupae are dirty-white and surrounded by wax and honeydews. During this stage, the red eyes of the emerging adults are visible. The adults are about 1mm long with two pairs of white wings and light yellow bodies. Their bodies are covered with waxy powdery materials. They are found feeding on top of the plants. A female can produce as many as 200 eggs in her lifetime and mating is not necessary. It takes about 40 days to develop from egg to adult

Management measures

- Spray with Neem oil extract

3.1.4 Webworm caterpillar

Description

They feed on terminal leaves and pods and produce silken web.

Management measure

Plant at the onset of the rain so that the sesame grows to harvesting stage when the moth population is still very low.

3.1.5 Sesame gall midge

Description

The insect lays its eggs in the ovary of the sesame during flowering. When the larvae hatch, they devour the inside of the ovary and barren galls are produced instead of the pods.

It is very common in late planted sesame.

Management measure

Plant at the onset of the rain so that the flowering stage does not collide with the high population of the insect at 10 weeks after emergency.

Beneficial insects

The following are some beneficial insects that are indigenous on your fields and gardens or can be introduced for the control of pests.

- Braconid
- Damsel bugs
- Diadegma
- Gourd beetles
- Hoverflies
- Lacewings
- Ladybird beetles

3.2. Practical session making organic pesticides (any of the concoctions listed below)

Herbal Preparation and Pests Controlled

3.2.1 Maize flour

Mix one soup spoonful (10g) of maize flour per litre of water and spray

Pests controlled

Aphids

3.2.2 Hot Chili

- Grind two handfuls of ripe chilies
- Soak in a litre of warm water for a day
- Shake well. Filter and add 5 litres of water and little soap, then spray.

Pests controlled

Aphids, leaf eating insects

3.2.3 Pawpaw

Use fruit, fresh leaves and roots

- Add 1 kg of finely ground plant parts into a litre of warm water
- Shake vigorously and filter
- Add four liters of water
- Add match box size or bar soap (well soaked)
- Mix well then spray.

Pest controlled

Aphids, leaf eaters, cut worms, termites

Other extracts;

- Lantana leaf extract
- Chili cow urine mixture
- Chili, lantana, pawpaw leaves extract
- Tephrosia
- Black jack
- Neem leaf extract

CHAPTER FOUR

4.0 Soil fertility management`

Improving and maintaining the fertility of the soil is the central focus in organic farming. For the organic farmer, feeding the crop means feeding the soil. Only a fertile soil can yield healthy crops, resistance or tolerance to pests and diseases and it is the most important resource of every farm.

4.1 How to improve and maintain soil fertility

Farmers can improve the fertility of their soil by various management practices. It is important to achieve:

- Protection of the soil from strong sunlight and heavy rain by means of plant cover: e.g. mulching with plant residues, green manure crops or cover crops, in order to prevent soil erosion and to preserve moisture
- A balanced crop rotation or mixed cropping: a suitable sequence of annual crops grown on a field for preventing a depletion of the soil
- An appropriate tillage method: suitable for getting a good soil structure without causing erosion and compaction
- A good nutrient management: application of manures and fertilizers according to the demands of the crops in their respective growth stages
- Balanced feeding and protection of soil organisms: enhancing the activity of beneficial soil microbes and organisms like earth worms by supplying organic material

4.2 Sources of organic soil amendments

- Well rotten animal manure i.e. cow dung and urine, goat, sheep or poultry droppings, pig dung and organic animal beddings.
- Compost manure. This is obtained by systematically collecting and piling crop residue, animal waste and other organic farm waste in a heap for at least 2months, to enable such waste to decompose completely and release plant nutrients.
- Liquid manure. This is made by soaking animal waste to produce a liquid that can readily provide nutrients to plants that require readily available nutrients, usually at a very active growth stage or when the plant has suffered from stress and requires immediate recovery.
- Plant tea prepared by soaking fresh plant leaves un water in a covered container for 10 to 14 days. Suitable leaves for making plant tea include soft leaves (tithonia, wandering jew, cassava), hairy leaves (pumpkin, lablab.) dark green leaves (acacia, albizia, moringa, calliandra). Soaking leave in

water causes faster decomposition, releasing nutrients that would be readily available within a short time.

- Wood ash is a source of potassium
- Legumes (nitrogen fixing plants) these include; beans, cowpeas, soya beans, pigeon peas, ground nuts and black gram, velvet bean, jack bean, sunn hemp, fish poison bean.
- Cover crop and green manure

4.3 Practical session

Making liquid manure

- Collect 50 kg of animal droppings
- Fill in a sack and tie with a rope
- Half fill a 400 litre container with 200 litres of water
- Suspend sack in water container for 15 days
- Stirring once daily
- After 15 days, dilute liquid manure with water in a ratio 1:1
- Apply at the base of the crop

CHAPTER FIVE

SOIL EROSION MANAGEMENT

4.0 Introduction

Soil erosion is one of the most serious and irreversible threats to soil fertility. It carries away the most fertile parts of the soil: the top soil and the finer clay fractions which are rich in humus and nutrients. Even low erosion rates which are almost invisible can over the years have a severe impact on soils. It is therefore of vital importance to protect the soil from erosion. Especially organic farming fully depends on the maintenance of the natural fertility of the soil

4.1 Signs for soil erosion

- Deep gullies show severe and obvious soil erosion
- Small grooves at the soil surface indicate significant losses of soil
- A compact soil crust after a heavy rain is an indicator of probable soil erosion
- Accumulation of fine soil material in trenches and depressions is an evidence of soil erosion in the immediate neighbourhood
- Brown colour of the drainage water or streamlets during and after heavy rains is a reliable indicator of soil erosion in the watershed
- Farmers say: „The stones are growing out of the soil!“
- Roots of trees are partially exposed

4.2 How to prevent soil erosion

- Reducing the erosive power of the rain drops by keeping the soil covered (with vegetation or mulch) .This could be by sowing of a green manure crop in the off-season, intercropping
- Improving the infiltration of the rain water into the soil
- Reducing the speed of the water flowing down the slopes with the help of constructions. To be effective, all constructions against soil erosion (bunds, stone walls, living barriers, trenches, terraces) must be arranged along the contour lines of a field.
- On sites that are highly prone to erosion, these three strategies ideally should be combined

4.3 Practical session

Construction of contours using “A” frame

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