



KENYA AGRICULTURAL AND LIVESTOCK RESEARCH ORGANIZATION

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FACTSHEET FOR TECHNOLOGY INNOVATORS WORKING WITH SMALL HOLDER FARMERS IN KENYA SUNFLOWER



INTRODUCTION

- The common sunflower (*Helianthus annuus*) is a herbaceous annual plant in the family *Asteraceae* with a rough hairy stem 1–4.5 metres (3–15 feet) high.
- It has broad, coarsely toothed, rough leaves measuring 7.5–30 cm (3–12 inches) long arranged in spirals.
- The flower head is a large disc reaching 10–30 cm (4–12 in) in diameter which is made up of 16–30 individual florets which are yellow-gold in color.
- The attractive heads of flowers are 7.5–15 cm wide in wild specimens and often 30 cm or more in cultivated types.
- The outer florets are sterile and produce the outer petals of the flower head, while the inner florets will mature into the seeds in the central disc.
- Sunflowers are annual plants, harvested after one growing season and can reach 1–3.5 m (3.3–11.5 ft) in height.
- Sunflower was first domesticated in the Americas.
- Sunflower is grown as a crop for its edible oil and seeds.
- Commonly grown sunflower varieties according to KALRO include H- 008, H-893, H – 894, H – 8938, H – 8998, H – 001, H – 898, KENSUN 22, KENSUN 33, SUPER 400K, Kenya Fedha, Kenya Shaba and Record.

SITE SELECTION

Altitude range

- Sunflower thrives well at 0m up to 2500m asl.

Soil type and condition

- The crop is also nutrient-intensive, so the soils should be rich in nutrients.
- Preferably, the soils could be light-rich alluvial or calcareous with a pH of 6.0 to 7.5.

Temperature

- Sunflower requires moderately Warm conditions.
- The amount of linoleic acid decreases with high temperatures at maturity.
- Extremes such as high temperatures and tropical lowlands inhibit proper maturity.

Rainfall requirement

- It thrives well in areas with sparse rainfall. You can get good yields with less than 250 mm of rains.
- The sufficient amount of rainfall is 500 to 750 mm.
- In an area that experiences short rains, the dwarf hybrid types are an excellent option.

Photo-period

- Sunflower is photo-insensitive crop, therefore, can be grown successfully in any season.

LAND PREPARATION

- Before planting till the soil into a fine tilth.
- Till the soil and then create narrow furrows to plant the seeds or broadcast the seeds.
- Ensure that the plants have sufficient room for growth.
- For dwarf varieties, the rows should be 30 inches apart Fertilizer.
- The soil should be fertile. You can use manure or rock phosphate as a fertilizer.

PRE-PLANTING

- Acquire sunflower seeds from registered institutions.
- Seeds can be obtained from KFA, Kenya Seed Company Ltd, Oil Crops Development Ltd, Western Seed Company Ltd and Hortitec.
- If you're saving the seeds to re-plant, store them in an airtight container in a cool, dry place until you are ready to plant.



An example of Commercial sunflower seed

PLANTING

Varieties

Sunflower varieties and their attributes

Variety	Maturity days	Attributes	Yield (50 kg bags/acre)	% oil content
Kenya Fedha	128	<ul style="list-style-type: none">• Best for medium to high temperatures• Even maturity• Open-pollinated• High oil content.	23	39
H8998	126	<ul style="list-style-type: none">• Hybrid Disease tolerant• Strong stem• Early and uniform Maturity• High oil content• Even Height.	22	43
H -008	104	<ul style="list-style-type: none">• Hybrid	18	43
H – 893	114	Hybrid	23	42
H- 894	110	Hybrid	21	38
H - 8938	101	Hybrid	21	44
H – 001	97	Hybrid	12	41
H – 898	107	Hybrid	14	39
KENSUN 22	96		14	37
KENSUN 33	107		19	39
SUPER 400	105		24	39
KENYA SHABA	110	<ul style="list-style-type: none">• Best for medium to high temperatures• Even maturity• Open-pollinated• High oil content.	19	38
REKORD	121	<ul style="list-style-type: none">• Best for medium to high temperatures• Even maturity	23	40

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|--|--|---|--|--|--|
| | | <ul style="list-style-type: none"> • Open-pollinated
High oil content. | | | |
|--|--|---|--|--|--|

- Plant after the onset of the rains.
- Plant seeds manually or use a maize planter.
- Sow 3 seeds per hole at a spacing of 75cm by 30cm.
- Seed rate varies from 2 to 4 kg/acre.
- Plant 3 to 5 seeds per hole at a depth of 1 to 2 inches.
- Use the lower seed rate for certified hybrids when water is sufficient.
- Use a higher seed rate when using your own seeds.
- Farmers using their own seeds should plant medium to big seeds.



Planting of sunflower using maize planter

SOIL AND WATER CONSERVATION MEASURES

- Sunflower thrives well in hot weather with full, all day sunlight, but they require 34 inches of water annually for best growth.
- Some of the water comes from rain and natural water in the soil.
- Prepare land early in mid-February for early planting between mid-March and April long rains and in mid-July for planting between Mid-August and September.

SOIL FERTILITY REQUIREMENTS AND MANAGEMENT

- Sunflower needs good fertilization.
- Apply farmyard manure FYM (two handful per hole) plus (DAP) two bottle tops at planting.
- During planting apply 150kg DAP or TSP per hectare or 3 tonnes per acre of well-rotted farmyard manure or compost, applied 2 to 3 weeks before sowing.
- Mix fertilizer properly with soil before planting to avoid damaging the seeds, which leads to poor emergence.
- For top dressing, apply 2 bottle tops of Calcium Ammonium Nitrate (CAN) fertilizer around the stems of maize and sunflower when they are 40 cm tall (avoid contact with the plant).
- Under the recommended management practices a farmer can obtain 8 - 10 (50 kg bags) of sunflower per acre.

ROUTINE CROP MANAGEMENT PRACTICES

- One month after planting, after weeding and when the soil is wet.
- Keep the crop weed free 4 to 6 weeks after planting.
- Thin to one plant per hole when the crop reaches 10-20cm height.

- If labour is a constraint you can use herbicides before planting such as Eptam, Lasso and Stomp for weed control.
- Intercrop sunflower with cowpeas, maize, beans, peas, soya beans or any other legume.

DISEASE AND PEST MANAGEMENT

Pest management

Check for pest like cutworm, semiloopers and African ball worm.

Cutworm

- Cuts young plants at ground level and kill them.



Cutworm

Control

- Control by use of Thiodan 35% EC 1.51/ha.

Semiloopers

- Are caterpillars that eat leaves.



Leaf feeding



Larva feeding in seed



Caterpillar bore into head



Larva



Pupa



Adult

Different stages of Semiloopers

Control

- Use permethrin Cypermethrin, Thiodan or Diptrex.

African ball worm

- Eat leaves and attack the head.



African ball worm

Control

- Use Diptrex 95% SP 1.3 Kg/ha or Cypermethrin 11/ha.

Birds

- Birds also are known to attack sunflower eating seeds and causing big loses.



Bird on sunflower head



Control

- Can be controlled using bird scaring devices like scarecrows and people.
- Bird scaring like tying of bright reflector ribbons above the crop should be used particularly in the morning and evening hours.
- Try and plant your sunflower the same time as other farmers to minimize bird damage.



Birds scarecrow on Sunflower

Disease management

Sclerotinia wilt (*Sclerotinia sclerotiorum*)

- It is a fungal pathogen, causing disease on a range of crops.

- Attacks roots, stem and head.
- Infected parts shrink and rot.



Sclerotinia infection extending into a developing sunflower head

Control

- Crop rotation.
- Use certified seeds.
- Burn infected plants.
- Control broadleaf weeds and volunteer sunflowers to reduce possible inoculum increase.
- Plant sunflowers early to avoid wet, cool conditions during flowering.

Downy mildew

- Downy mildew is an umbrella term for a large number of plant diseases.
- It was once considered a fungal disease, it is now classified in the family *Peronosporaceae*.
- Downy mildews are air and water-borne pathogens.
- The symptoms of this pathogen differ somewhat on different hosts.
- It causes yellow spots on the upper leaf surface between the leaf veins.
- The yellow spots spread everywhere but the veins and eventually turn brown.
- The affected plant cannot photosynthesize on these yellow or brown spots.
- Loose white parts appear on the lower surface of leaves.
- It causes significant crop damage by killing or stunting of infected plants, reducing crop stands and causing yield loss.

Control

- Use crop rotation.
- It is important to scout your plants often.
- Plant resistant varieties.
- Use certified seeds.
- Apply Copper fungicides are often used to control downy mildew
- Apply Ridomil to young plants.

Charcoal rot (*Macrophomina phaseolina*)

- Charcoal is caused by the widespread fungus *Macrophomina phaseolina* which can attack over 500 plants.
- Charcoal rot can be considered to be a stress-related pathogen.
- The symptoms of charcoal rot commonly occur after flowering and during dry weather.
- Stems appear black at the bottom and inside part of the stem is torn.

- Affected plants rapidly wilt and die, a silver-gray lesion at the base of the stem and minute, black, pepper-like structures.



Wilting and dead charcoal rot-infected sunflower

Control

- Crop rotation.
- Use certified seeds
- Use varieties capable of tolerating stress such as drought.
- Methods to minimize stress on plants, such as using optimum nutrition, planting times and planting densities can sometimes be effective.

HARVESTING

Maturity

- After 30 to 45 days after the flower bloom, or when the back of the sunflower head turns brown it is time to reap.
- At maturity the sunflower seeds moisture level should be about 35%.



How to tell when sunflower is mature

- Sunflower matures within three to four months depending on the variety.
- Hand harvesting is done when the heads turn deep yellow.
- Sunflowers are harvested either by using a combine that's been adapted to separate the seeds from the sunflower head and straw or by hand.
- Hand harvesting involve cutting the head, spiking it upside down on the stalk or thresh and sun-dry.
- Don't wait until the leaves dry up to reduce bird damage.
- When the season is good, an acre of land can yield up to 1200 kilograms of sunflower or 10 bags.



Harvesting of sunflower using a combine



Cutting sunflower during hand harvesting

POST-HARVEST HANDLING

Drying

- Once the seeds are harvested, they are dried and run through sifting tables to remove any rocks or excess dirt.
- Spread the seeds on a clean canvas and leave to dry for 3-5 days or until the seeds become light.

Storage

- Keep dried seed in well-aerated stores. Sell seeds to milling merchants to minimize post-harvest damage losses (insects and fungal attack).
- Dry in the sun to reduce incidence of decaying during storage.

Utilization

- Sunflower oil is one of the major edible vegetable oil used to cook.
- They give end products like sunflower oil when processed in value addition.
- Sunflower seeds are a versatile product used to produce monounsaturated edible oils.
- The seeds must be properly dried and cleaned thoroughly before value-adding by milling which removes the husks and as a thick paste put in an oil extractor which does final extraction by crushing the seeds letting the oil seeps through taps.
- The oil is also used as a major component in the manufacture of animal feeds such as sunflower cake, soaps, and cosmetics.
- Sunflower seeds can also be used to produce carrier oils, snacks and food ingredients, in stock, horse, poultry rations and in bird and pet feeds.

MARKETS

- Different markets have a preference for either black or grey stripe types, however there is significant substitution between the two, particularly in the feed markets depending on price, availability and the strength of consumer preference.
- The sunflower market in Kenya is vast and diverse.
- Immediate customers include local farmers and groups that use sunflower.
- Big companies such as Bidco also contract farmers to plant sunflowers which is a raw material for their products.
- The secondary sunflower market in Kenya is finished goods consumers.

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