

# Pack 111, Item 8

# Type: Backgrounder

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**Backgrounder: Production and postharvest activities for sesame**

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**Introduction**

* Sesame (*Sesame indicum*) belongs to the Pedaliaceae family. Grown throughout the world, the size of the plant varies from 0.5 to 2 metres, depending on weather conditions, with a life cycle varying from 80 to 180 days. There are 17 varieties grown in Africa. Sesame is an income-generating crop in West Africa, which represents 15-20% of global production.
* Sesame is one of the oldest, most well-known and most commonly used oilseeds, and comes in a variety of colours (white, yellow, brown, and black).
* Global sesame production in 2016 was 5,631,443 tons, including 751,630 tons from West Africa.
* About one-third of global production is from Africa, with much exported to Asia.
* There are many species of sesame plants, with the greatest number in Africa and more specifically in Egypt. All species are edible.

***Why is this subject important to listeners?***

Because sesame farmers, traders, and processors should know:

* How to prepare land for sesame cultivation.
* The volume of sesame seeds to sow when planting, how to space sesame plants, and the practices required to reduce damages caused by sesame pests and diseases.
* How to manage sesame for maximum yields.
* How to dry harvested sesame.
* How to harvest, thresh, clean, and store sesame.
* How to use sesame in farming systems through, for example, intercropping or rotating sesame with other crops.

***What are some key facts?***

* It is recommended that farmers plant improved sesame varieties that have been treated, are disease- and pest-free, and were sourced from certified and authorized seed producers.
* Sesame does best in well-drained soils that are slightly acidic to alkaline, and in sandy or clay soils.
* Sesame seeds should be planted in moist soils after the rains begin.
* Sesame can be planted in rows, paying careful attention to appropriate spacing between seed holes and seed rows.
* Where sesame is planted in rows, the seeding rate per hectare is 1-2 kilograms.
* Where sesame is broadcast, the seeding rate should be 3-8 kilograms per hectare.
* Sesame should be rotated with crops like sorghum, teff, maize, soybean, green beans, cowpea, and finger millet to reduce the incidence of diseases such as bacterial wilt and fusarium wilt, and populations of sesame gall midge.
* Harvest sesame when two-thirds of the pods and plants turn from green to brown, which occurs 90-120 days after planting, depending on the variety.
* Bundle cut plant together and store in a clean, disinfected, and ventilated area.
* Mechanical damage of sesame pods or seeds during harvesting, weeding, or storage can result in aflatoxin contamination.

***What are the big challenges in sesame production?***

* Producers consider sesame as a secondary crop and sow it on marginalized land after they sow other crops.
* Farmers do not rotate sesame with other crops, but grow the crop on the same piece of land in successive farming seasons.
* In some countries, farmers lack access to certified and treated seeds of improved varieties.
* Farmers may not know how to prepare land for sesame farming.
* Lack of access to credit.
* The fluctuation of sesame prices on markets.
* The difficulty in storing sesame by-products such as biscuits and oil,
* Insufficient training of producers on best practices for production and post-harvest activities.
* Lack of equipment for the production of sesame by-products.
* Pests such as the sesame seed bug, sesame gall midge, plant bugs, locusts, defoliator caterpillars, sesame webworm, flies, termites, grasshoppers, crickets, and African bollworm attack sesame at all development stages.
* Attack by fungal, bacterial, and viral organisms.
* Diseases like bacterial blight, Fusarium wilt, Rhizoctonia wilt, seedling blight, root rot, fungal phyllosticta leaf spot, leaf spot or bacterial leaf blight, and phyllody in most cases reduces African farmers’ yield.
* Harvesting too early—which reduces yields by up to 20%.

***Gender aspects of reducing postharvest loss in sesame***

* Rural women who grow sesame manage some of their expenses with the revenue generated by this crop. This income also helps them pay schools fees, which reduces some of the expenses typically incurred by men.
* In Niger, some men who had abandoned sesame production more than 15 years ago are now using two-thirds of their lands for sesame because of high demand from Nigeria.
* In Sudan, sesame production provides a source of income for women when options for other crops are limited.
* In Mali and Senegal, women are actively involved in sesame production, though they own smaller farms than men.
* In Metema sub-region in northwestern Ethiopia, men control the earnings from sesame production, though the production workload is shared between men and women.
* In Mali, Chad, and Niger, women are the primary subsistence producers of sesame and market sesame by-products.
* In Mali, Chad, and Niger, women decide for their households if sesame is to be sold or not, and men cannot sell without women’s consent.

***Predicted impact of climate change on sesame production***

* Climatic variations because of climate change could increase losses in crop production because of recurrent pest emergence.
* Though sesame is a climate-resilient crop, flooding during the growing season—as happens in places like Mozambique—can interfere with growth.
* Temperatures below 18oC can result in pollen sterility and prevent capsules from developing. Above 40oC, flower fertilization is impacted, reducing the number of capsules on plants.
* Having information on changes in climate has helped sesame farmers in West Africa to change their farm practices and nearly double their yields.
* In the Metekel and Assosa regions of Ethiopia, quick-maturing sesame varieties that are harvested in three rather than five months have been tested to protect farmers against unpredictable weather.
* In southeastern Ethiopia, farmers are switching to sesame from teff and maize because of sesame’s comparative resilience to drought and to minimize crop losses.

*For further information, please see documents 2, 4, 5, 6, 7, 12, 13, and 15.*

***Key information about production and postharvest management of sesame***

1. **Land preparation**
* Every 3-5 years, plough land where sesame is to be planted 20-30 centimetres deep to minimize weed infestation, improve soil fertility, disturb the breeding sites of seed bugs, termites, and ants, and bury diseased plants.
* Before planting sesame, remove remaining crop residues and weeds, then deep plough when soil is moist to kill early weeds.
* Reduce the impact of variable rainfall by using bunds, “half-moon” ditches, or *zaï* to store water in fields. These practices also help maintain soil fertility.
* Plough with a disk harrow or oxen plough.
* Plough again when sowing with a row planter or broadcaster.
1. **Seed selection**
* Choose seeds that are certified, treated, and improved to ensure they are free from pests and diseases and can achieve over 90% germination.
* Plant varieties that are adapted to the local climate.
* To ensure even maturity and ease of harvesting, plant seeds of the same variety.
* Obtain seeds from credible sources such as research institutions, seed companies, and seed co-operatives.
* In the absence of financial resources, farmers can sow seeds from the previous harvest for three years, while selecting vigorous plants in the field.
1. **Sowing**

Farmers can plant sesame seeds by broadcasting or in rows. Broadcasting uses more seeds than planting in rows. Farmers should sow as soon as the soil is moist at the beginning of the rainy season.

* When broadcasting, use 3-8 kilograms or 5-10 kilograms of seeds per hectare. When sowing in rows, use 1.5-2 kilograms of seeds per hectare, using a mix of one-third sesame seeds and two-thirds sand. Farmers can also plant with one way ploughing or on ridges.
* To facilitate tillage, weeding, and harvesting, when planting in rows, leave 60 centimetres between rows and 15 centimetres between seed holes and use 1-2 kilograms of seeds per hectare or three kilograms per hectare. Spacing may vary from 40 to 100 centimetres, with 10 centimetres between seed holes, depending on the farming system.
* To avoid waste, when broadcasting or sowing in rows, use a mix of one-third sesame seeds and two-thirds sand. To achieve good ground cover and limit weed growth, row planting is recommended.
* Bury sesame seeds 3-5 centimetres deep in light soil.
1. **Weed management**

At early growth stages, sesame struggles with weeds due to its slow growth. This can result in continued slow growth and low yields due to competition between the host plant and weeds for nutrients, water, and sunlight. Thus, it’s vital to control weeds at early stages of growth.

* Do the first weeding 7-14 days after sesame seedlings emerge from the soil.
* Do the second weeding 30-35 days after seedlings emerge.
* Do the third weeding 55-65 days after seedlings emerge.
* Do the fourth weeding to remove weeds that interfere with harvesting.
* At each weeding, remove weeds from the plot. With repeated weeding, this could lead to disappearance of problematic weeds.
1. **Thinning**

After sesame seedlings emerge, thin to ensure correct spacing and ensure that plant density is not too high. Thinning also removes weak plants.

* Thin sesame when the plants have two or three leaves and are 10-15 centimetres high, along with the first weeding.
* Thinning ensures that spacing is 10 centimetres between individual plants.
1. **Gap filling**

If there are gaps because of non-germinated plants after sesame plants emerge in 5-7 days, farmers should sow new seeds to replace them. This will help minimize the emergence and impact of weeds.

1. **Soil fertility**

Conduct soil tests first to test soil for nutritional deficiencies. The following are general guidelines for fertilizer application per hectare in order for sesame to thrive.

* At planting, add 100 kilograms of DAP, 25 kilograms of urea per hectare, and 25 kilograms of potassium biphosphate. Cover fertilizer with soil after applying. Twenty-one days after planting, add 50 kilograms of DAP and add 50 kilograms of urea 60 days after planting.
* When sesame starts to flower about 35-45 days after planting, add another 25 kilograms of urea per hectare.
* As an alternative to chemical fertilizers, farmers can add five tonnes of compost at planting.

*For further information, please see documents 2, 4, 7, 9, 10, 12, and 14.*

1. **Pest management**
* Farmers should inspect their sesame crop for pests and diseases every week or fortnight by moving diagonally or in a zigzag motion in the field.
* Inspect a minimum of 100 plants per hectare at about 20 check points.
* Inspect plants in the early morning or evening when pests are most active.
* Pests that affect sesame include sesame webworm, African bollworm, sesame seed bug, sesame gall midge, aphid, whitefly, and mealy bug. Approximately 30 pest species attack sesame, causing losses from 25-100%
* Mark sections where you see pests and diseases for more regular inspections. Control with chemical pesticides or non-chemical measures.
* Non-chemical control measures include practicing field hygiene, crop rotation, and spraying with biochemicals that contain neem mixed with soap, vegetable oil, salt, and a few drops of vinegar in four litres of water. Also, a mixture of 50 grams of ginger in three litres of water with 12 millilitres of soapy water and 10 kilograms of ginger can be applied for one hectare.
* Cultural techniques such as increasing plant density reduces populations of aphids, flies, and other sesame insect pests.
* Pests such as grasshoppers, field crickets, and thrips can be controlled by neem products.
* When sesame stacks are drying after harvest, check frequently for infestations of termites and crickets.
1. **Disease management**

The main diseases that affect sesame are:

* *Bacterial blight* and *bacterial leaf spot*: Both these diseases cause total crop failure and thrive when soil is waterlogged. Control with crop rotation, using clean seed, removing or burning crop residues, and deep ploughing.
* *Phyllody*: This disease affects sesame cultivated in dry regions. It’s transmitted by whiteflies and aphids, and causes leaves and flowers to be deformed. Do not use seeds harvested from fields infected with phyllody. Burn sesame plants infected with phyllody and destroy nearby plants that harbour aphids, including wild grasses and other small plants.
* *Fusarium wilt*: This causes sesame leaves to turn yellow, wither, and droop as the infection progresses from the leaves towards the stem. Prevent by practicing farm sanitation, crop rotation, and ensuring that soil is not waterlogged.
* Foliage diseases caused by various bacteria destroy the leaves, stems, and capsules. Mildew, charcoal rot, and Fusariumare other serious diseases of sesame.

*For further information, please see document 14.*

1. **Harvesting**

The best time to harvest sesame is when two-thirds of the plants and pods turn from green to yellow or brown, about 90-120 days after planting. At that stage, the leaves begin falling off and the stem changes from green to yellow and then red. Timely harvesting of sesame grains reduces the chance of aflatoxin contamination.

* Before harvesting, spread a tarpaulin on the ground where the cut and un-threshed sesame stacks can be placed to dry.
* Harvest with a sickle or cutlass, bind sesame plants together to make bunches, then bind bunches into stacks and place vertically upright on the tarpaulin.
* Sun dry the stacks on the tarpaulin for one or two weeks.
* After threshing, winnow and sift the sesame. The grains should be dried for 6 or 7 days until sesame grains have 10% moisture content to help prevent aflatoxin contamination. (If individual farmers do not have moisture meters, it may be possible to share one in a group.)
* Exposure of sesame grains to sun for too long can cause them to lose germination viability and quality. This is important for farmers who want to plant saved seeds next season.
1. **Postharvest practices**
* *Threshing*: On a tarpaulin or clean concrete floor, or mixed with cow dung blended with oil, step on or gently beat the dried stacks to separate the sesame seeds from the pods.
* *Winnowing*: Winnow the threshed sesame seeds in the wind or use a sieve to remove small pieces of stalk, chaff, impurities, and pests in sesame seeds. Repeated winnowing removes more and more impurities, resulting in clean sesame grains.
1. **Storage**

Store dried sesame grains in moisture-free conditions in a well-ventilated room with a concrete floor. The room should be constructed in a way that protects sesame grains from insects and other pests like rodents.

* Sesame storage facilities should not contain chemicals because of possible contamination.
* To prevent contamination, sesame storage bags should preferably be new, clean, and undamaged.
* Place sesame bags on pallets to reduce the impact of moisture, which favours attacks by fungi and bacteria.
* Typical sesame storage bags hold up to 100 kilograms of grains.
* Before placing in long-term storage, ensure that sesame grains have a moisture content of 6-7%.
* If pests are detected in the storage area, fumigate with chemicals such as phosphine.
* Make sure to leave spaces between stacked storage bags to ensure aeration and stop spoilage.
* Use only those insecticides which are registered in your country for storing seeds.

*For further information, please see documents 3, 5, 9, 10, 12, and 14.*

**Documents for further information:**

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## Acknowledgements

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