

Better groundnut

through good agricultural practices



For farmers in Tanzania



Groundnut is a nutritious grain legume. The grains contain much protein (23-25%) and oil (45-52%). The grains can be used directly for food, or processed for cooking oil and a range of other products. Groundnut grain has a good market demand. The crop residues are also rich in protein and are good feed for livestock or form a good basis for compost manure.

Together with bacteria from the soil, groundnut forms root nodules. The bacteria are called rhizobia and can fix nitrogen from the air into a form that groundnut can use for growth. This explains why groundnut can grow and yield well in soils poor in nitrogen. Part of the fixed nitrogen is used to make protein in the grain, but some of the nitrogen is also left behind in the field and improves soil fertility. This makes groundnut a good crop to grow as intercrop or in rotation with other crops, because these other crops then also benefit from the nitrogen.

Step 1: Land selection and preparation



- All soils, other than very heavy soils, are suitable for groundnut production. Groundnut grows best in sandy loam soil. Groundnut does not grow well and is difficult to harvest on very clayey soils.
- The pH of the soils should be between 5.3 and 7.3. If soil is acidic, you can incorporate lime into the soil during land preparation to increase the pH.
- Think about the rotation scheme for the field you want to plant. After growing groundnuts, grow other crops for at least one season before growing groundnut again on the same field to reduce the chance of diseases, pests and weed problems. Avoid growing other legumes, tobacco and tomatoes in rotation with groundnut, because this may cause build-up of root knot nematodes.
- Well-prepared land ensures good germination and reduces weed infestation. Prepare the field with a hoe, or use animal power or a tractor. In wet, low lying areas, groundnut can be planted on ridges to prevent waterlogging. Waterlogging damages the groundnut plants. When planting groundnut on ridges make ridges 90 cm apart.

Step 2: Variety and seed selection



Pay attention to a few things when you select your groundnut variety. Varieties differ in maturity period, growth habits and size and oil content of the seed. Also keep in mind that groundnut buyers may have a preference for a certain variety. You can grow groundnut in areas up to an altitude of 1500 m. The improved groundnut varieties below are highly recommended for the central and southern parts of Tanzania.

Variety	Grain characteristics	Attainable grain yield (t/ha)	Maturity period	Growth habits	Dormancy period	Seed rate (kg/ha)
Pendo	Tan in colour medium size, 54% oil	1.5-2.5 (unshelled)	3 months	Erect	No dormancy	70-80
Mnanje	Red colour, large size, 58% oil	1.5-2.5 (unshelled)	4 months	Bunch	1 month	80-100

Use only high quality seed for planting. Do not plant damaged, small or shrivelled seeds.

- Shell pods 1-2 weeks before sowing.
- Do not plant damaged, small or shrivelled seeds.
- Some varieties require a period of dormancy between harvesting and sowing. Check the table above.
- To control seedling blights caused by soil bacteria and fungi, you can treat the seeds with fungicide. *Thiram* can be applied as a dust at 120 g Thiram/100 kg seed and mixed uniformly.
- Do a germination test at least 10 days before time of planting. Plant 50 seeds. If at least 40 germinate, the seed is good for planting. If only 30-40 seeds germinate, plant more seeds than recommended below. Get new seed if less than 30 seedlings come up.

Step 3: Applying fertilizer



Groundnut can take nitrogen from the air, and therefore does not need to be fertilized with nitrogen fertilizers such as ammonium nitrate or urea. Groundnut needs other nutrients such as phosphorus and calcium.

- Good types of phosphorus fertilizer are DAP and Minjingu Phosphate. Minjingu Phosphate works better when the pH of the soil is below 5.6. SSP and TSP are also good phosphorus fertilizers, but they are not readily available in Tanzania.
- Make a furrow of 5 cm deep next to the row of groundnut and place the fertilizer in the furrow and cover with soil. Use the fertilizer rates given in the table below for mono-cropped bean. Spread the recommended amount of fertilizer equally over the furrows. If you want to do this very precisely, you can use a teaspoon or soda bottle-cap.
- In sandy soils, groundnut often fails to fill its pods, and will make 'pops' (empty pods). Calcium will ensure good pod filling and the chance of 'pops' will be smaller. Gypsum is a good source of calcium. Apply gypsum to the soil just before flowering. Use a rate of 200-400 kg gypsum/ha. Do not incorporate the gypsum to avoid damaging developing pods!
- When manure has been applied recently, rates can be reduced.

Fertilizer type	Rate (kg/ha)	In the furrow, spread 1	
		Teaspoon	Soda bottle-cap
TSP, DAP	100	Every 1 meter	Every 60 cm
SSP	225	Every 40 cm	Every 30 cm
Minjingu	250	Every 40 cm	Every 25 cm

Step 4: Planting



Plant groundnut in rows and when the soil is moist. Planting groundnut in rows has many advantages. When you plant in rows you use the correct plant density and weeding is easier. In addition, pods will mature more uniformly, which makes it easier to decide when to harvest.

- When you plant groundnut on flat, plant in rows which are 50 cm apart. Within rows plant seeds at 15 cm apart for bunch types and 10 cm apart for the semi-erect types.
- When you plant groundnut on ridges, make the ridges 90 cm apart. Plant on both sides of the ridges. Within rows plant seeds at 10 cm apart.
- Plant seeds at a depth of 5 cm.
- Fill plant gaps one to two weeks after sowing when plants have emerged.

Step 5: Field management



Weeds

Control weeds to minimize competition for nutrients, water, sunlight and space. Weed control can be manual or chemical, or both.

Manual weed control:

Weed 2 or 3 times. The first two weedings should be before flowering. Earth up (banking) can be done at the second weeding. Once flowering and pegging begins, it is advisable to weed by hand pulling instead of using a hoe. Hoe weeding might damage developing pods.

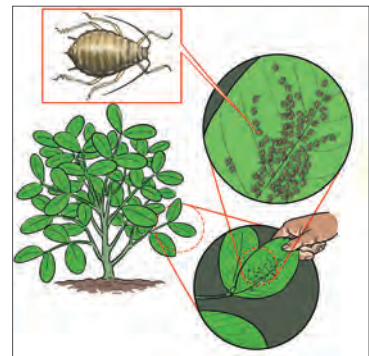
Chemical weed control:

Herbicides, if used properly, are safe and effective in controlling weeds. There are different types of herbicides. Which type to use depends on the predominant weed species and the availability of the herbicide. Herbicides are available for pre-emergence or post-emergence weed control. If pre-emergence herbicide is applied at planting, one weeding may be required at 5-6 weeks after planting. Available herbicides in Tanzania are *Stomp 500EC*, *Galex 500EC*, *Pursuit plus* or *Fusilade*. Follow the instructions from the manufacturer or seek advice from an extension agent.

Pests and diseases

Pests

Aphids transmit the rosette virus and damage groundnut plants by feeding on it. You can spray with *Karate 5EC (Lambda-cyhalothrin)* to control aphids. Follow instructions from the manufacturer or seek advice from an extension worker on how to use *Karate*.



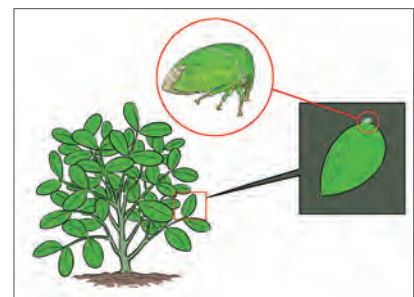
Aphids

Groundnut leaf miner is the larvae of a small moth which burrows and mines into the leaves of the plant. When the larvae come out of their mines, they pull the leaves together with threads. In severe cases it looks like the crop has been burnt and major crop losses can occur. As soon as mines are observed, spray with same insecticides as for aphids.



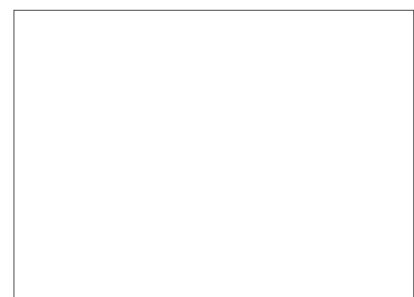
Groundnut leaf miner

Groundnut hopper (Hilda patreulis) is a 5 mm long brown or green hopper with white marks and stripes on the wings. Groundnut hoppers attack the plants at the base of the stem, usually below ground level. Their toxic saliva causes plants to wither, turn yellow and die. The first sign of infestation is the presence of black ants, which feed on the honeydew excreted by the hoppers.



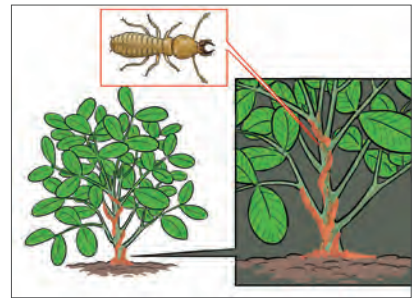
Groundnut hopper

White flies suck plant sap and remove plant nutrients. White flies also produce honeydew, which leads to the growth of mould on the lower leaves. Infested plants may wilt, turn yellow in colour and become stunted. When whitefly infestations are severe or of long duration, plants may die.



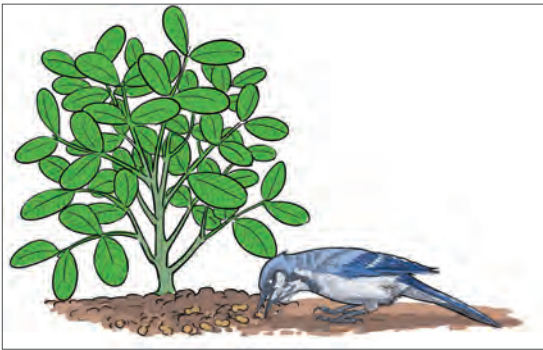
White flies

Termites can cause groundnut plants to wither and die. To control termites, remove residues of previous cereal crops and destruct termite mounds and remove queen termites, or grow groundnut in fields which have no previous history of termites.



Termites

Birds, rats and squirrels feed on improperly buried seeds or can easily dig up seeds. Scare birds away and fence the field to control rodents.



Nut-eating birds



Squirrel

** If unsure about how to manage pests, seek advice from an extension worker or agrodealer.*

Diseases

Groundnut rosette is caused by viruses, which are transmitted by aphids. Infected plants can show 2 types of symptoms: 'chlorotic' (yellow and stunted) and 'green' (green and stunted). Late planted crops and wide spacing can increase the incidence of rosette disease. Rosette disease can be controlled by planting a resistant variety or by spraying insecticides to control the aphids that spread the disease. Remove infected plants and bury.



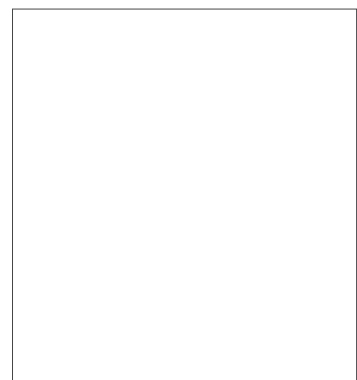
Groundnut rosette

Leaf spot is a fungal disease. Early leaf spot can occur two weeks after crop emergence. Symptoms include roughly circular lesions with yellow (chlorotic) halos surrounding the darker lesions and a lighter shade of brown on the lower surface of the leaves. Late leaf spot occurs late in the season and shows almost round lesions which are darker in colour than those of early leaf spot. Early leaf spot often reduces yield more than late leaf spot. Leaf spot pathogens survive mainly in crop debris. Crop rotation, burying crop debris during land preparation and early planting help reduce the incidence of this disease. Remove infected plants and bury.



Leaf spot

Rust is a fungal disease where plants develop orange coloured pustules. The pustules start to appear on the lower surface of the leaves and may later also appear on the upper surface of leaves. Elongated and elevated pustules can also appear on the stem. High humidity and cloudy weather can increase the incidence of rust. When mature, the pustules release reddish-brown spores, which spread the disease. Planting of resistant varieties and practicing crop rotation can help to control rust infection.



Rust

Aflatoxin

Aflatoxin is a toxic substance causing sickness, hepatitis and/or liver cancer. Aflatoxin is produced by fungi which can grow on groundnut. Aflatoxin contamination can take place before and after harvest. If groundnuts are to be sold for export, aflatoxin levels must be very low.

You can avoid aflatoxin contamination with good management, before and after harvest. Planting groundnut on time is the first step. When the crop is in the field, make sure that you do not damage pods, for example during weeding. The aflatoxin producing fungus can easily enter damaged pods. Also ensure that pods are well covered with soil. Earth up if needed. Other measures to prevent aflatoxin contamination are given below under harvest and storage.

Safe use of chemicals

- Use only herbicides, pesticides and fungicides that are recommended to groundnut to avoid damage to the plant.
- Chemicals can be toxic, so always follow instructions on the product package or from the agro-dealer for safe use. Also follow the instructions about the time needed between spraying and safe consumption of fresh pods.
- Do not store chemicals in the same place as food.
- Do not eat from the same spoon you used to measure chemicals.

Step 7: Harvesting



Harvest at the right time. Harvesting too early causes yield losses and harvesting too late encourages aflatoxin contamination. Groundnut is mature when the inside of the pods darken in colour. Select about five plants from different parts of the field, dig up the plants, remove all pods and count, then open the pods. If three quarters of the pods open easily and have dark markings on the inside, you should start harvesting.

1. Preferably, harvest during a dry period. If the soil is too moist, part of the pods might remain in the soil.
2. Dig up the plants, either remove the pods immediately or dry the plants in the sun for up to 2 weeks, then pull off the pods. To prevent aflatoxin contamination, remove the soil from the pods before leaving to dry.
3. Strip the pods from the vines and remove all foreign material.
4. Grade the pods. To prevent aflatoxin contamination, remove shrivelled, diseased, broken and immature pods.
5. Dry the pods in the sun on a clean surface.
6. Do not shell groundnuts if you want to store them.
7. Place groundnuts in clean bags; if re-using bags in which grain was previously stored, the bags must first be washed and then disinfected by boiling them in water for 5 minutes. If the bag is polyethylene, make sure it doesn't touch the outside of the pot or it will melt. Completely dry the container/bag.
8. Clean the storage room; remove all old grains and insects. Do not store grain which is to be eaten in the same place as pesticides or other dangerous chemicals.



9. Stack the bags with pods on a raised platform or wooden pallet away from the wall. Avoid direct contact of storage bags with the ground.
10. To prevent aflatoxin contamination, inspect and remove infested or rotting grains on a regular basis. Also control insects and animals that can damage the pods.

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