

# Better groundnut

through good agricultural practices



For farmers in Nigeria





Groundnut is a legume with grains that are very nutritious and 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 very 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 2 seasons 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 nematodes.
- Well-prepared land ensures good germination and reduces weed infestation. Prepare the field manually 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.

## Step 2: Variety and seed selection

Select a good groundnut variety which suits your agro-ecological zone. Good regions for growing groundnut in Nigeria are Sahel, Sudan, Northern and Southern Guinea savannas. When selecting your variety, also pay attention to the 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. All the varieties mentioned in the table are dual purpose varieties, with high grain and high fodder yield.



<i>Variety</i>	<i>Outstanding characteristics</i>	<i>Maturity period (days)</i>	<i>Pest/diseases resistance</i>
SAMNUT-21	Dual purpose: high grain and forage yields. High oil content (51%).	Medium (100-110 days)	
SAMNUT-22	Dual purpose: high grain and forage yields.	Medium (100-110 days)	
SAMNUT-23	High oil content (53%).	Extra early	Rosette resistant
SAMNUT-24	High oil content.	Extra early	Rosette resistant
SAMNUT-25	High yield.	Early	High rosette resistance
SAMNUT-26	High yield (3.8 t/ha).	Early	High rosette resistance

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

- Pods should be shelled 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



### **Important points**

- Groundnut can fix its own nitrogen and therefore does not need to be fertilized with nitrogen fertilizers such as ammonium nitrate or urea.
- Groundnut cannot fix other nutrients and needs other nutrients such as Phosphorus (P) and Potassium (K) at planting.
- Good fertilizer types for groundnut that supply phosphorus are Single Super Phosphate (SSP) and Triple Super Phosphate (TSP). Both fertilizers also contain calcium (Ca), and SSP also contains sulphur (S). TSP contains more phosphorus than SSP.
- Diammonium Phosphate (DAP) contains both phosphorus and nitrogen. If SSP or TSP is not available you can use DAP. The nitrogen content of DAP is small compared to its phosphorus content.
- Muriate of Potash (MOP) supplies potassium. Use MOP in combination with one of the P-fertilizers mentioned above.
- 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.

### **Application**

- Make furrows along the rows of groundnut. The furrows should be 8 cm away from the groundnut plants and 5 cm deep.
- Place the fertilizer in the furrows and cover with soil. Do this at planting or right after planting.
- Groundnut needs about 20 kg P/ha (20 kg  $P_2O_5$ /ha) and about 25 kg K/ha (30 kg  $K_2O$ /ha). Use the fertilizer rates given in the table below for mono-cropped groundnut. You can use a teaspoon or soda bottle-cap to measure the amount of fertilizer.
- When manure has been applied recently, you can reduce the fertilizer rates.



Fertilizer type	Rate (kg/ha)	Row spacing: 60 cm	
		In the furrow, spread 1	
		teaspoon	soda bottle-cap
SSP	100	Every 90 cm	Every 60 cm
TSP	50	Every 330 cm	Every 220 cm
MOP	50	Every 300 cm	Every 200 cm
DAP	50	Every 240 cm	Every 160 cm

## Step 4: Planting

### Planting

- Plant when the soil is moist.
- Plant groundnut in rows. This has many advantages: you use the correct plant density, weeding is easier and pods will mature more uniformly, which makes it easier to decide when to harvest.
- Plant in rows which are 75 cm apart. Within rows, plant seeds at 20 cm apart (1 or 2 seeds per stand).
- 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. Use herbicides as presented in the table below or seek advice from an extension agent or agrodealer.

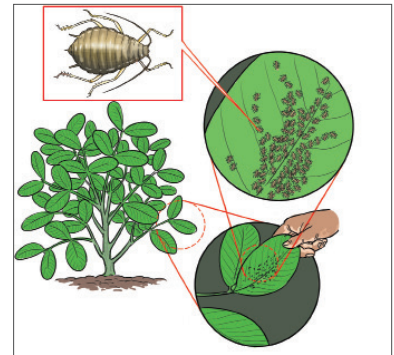
<b>Product name</b>	<b>Active ingredient</b>	<b>Use rate</b>	<b>Time of application</b>	<b>For which type of weeds</b>
Paraquat plus	Paraquat dichloride	3 l/ha	Pre emergence	Rottboellia
Paraquat +dual Gold	Paraquat dichloride			4 l/ha
ButaForce	Butachlor	4 l/ha	Pre emergence	
Round up	Glyphosate			



# Pests and diseases

## Pests

*Aphids* transmit the rosette virus and damage groundnut plants by feeding on it. You can spray with insecticides to control aphids.



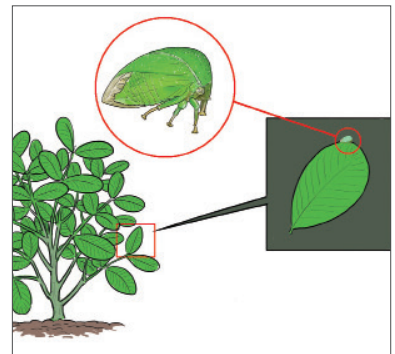
*Aphids*

*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.



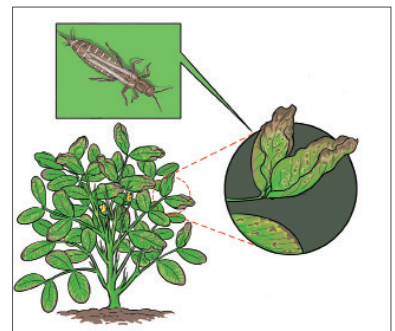
*Groundnut leaf miner*

*Groundnut hopper (Hilda patreulis)* is a 5 mm long brown or green hopper with white marks and strips 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*

*Thrips* can attack different parts of the groundnut plant. Flower thrips infest buds and flowers. Other species of thrips infest leaves. Infested flowers are discoloured and scarred. Infested leaves show yellowish-green patches on the upper surface and brown necrotic areas and silvery sheen on the lower surface of the leaf; leaves become thickened and some curling occurs.



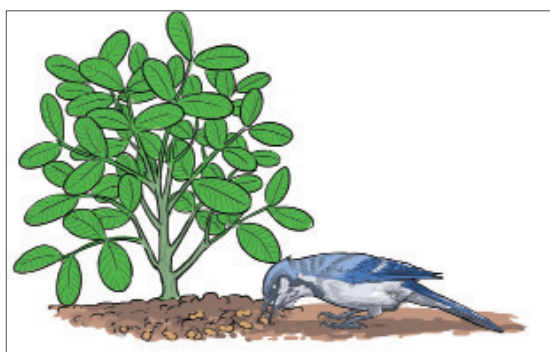
*Groundnut thrips*

*Caterpillars* feed on the leaves and cause losses because of defoliation.

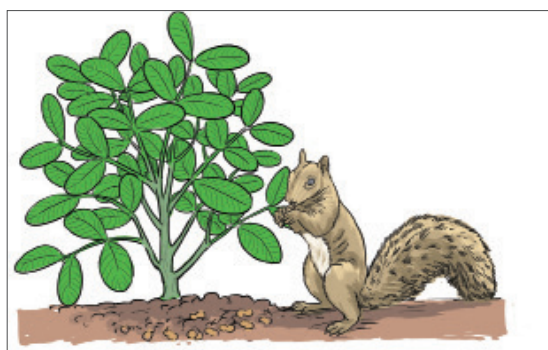
*Termites* can cause groundnut plants to wither and die. To control termites, remove residues of previous cereal crops and destroy termite mounds and remove queen termites, or grow groundnut in fields which have no previous history of termites.

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.

Moths and beetles attack stored groundnuts. Moths cause webbing, and their larvae bore into seeds. Adult beetles and grubs also bored into seeds. In West Africa, the bruchid beetle *Caryedon serratus* is the major pest of stored groundnut because this insect can bore into intact pods.



**Nut-eating birds**



**Squirrel**

If you want to use insecticides, see the table below and consult an agro-dealer or extension worker.

<b>Product name</b>	<b>Active ingredient</b>	<b>Use rate (per ha)</b>	<b>Amount for one sprayer load of 20 l</b>	<b>For which pest</b>
MagicForce	Lambda-cyhalothrin +Dimethoate	0.4-0.8 l	35 – 70 ml in 15 l sprayer	Control of leaf, seed and soil dwelling insects and migratory insects.
CyperDiForce	Cypermethrin +Dimethoate	1 l	75 ml in 15 l sprayer or 100 ml in 20 l sprayer	
Perfekthion	Dimethoate	0.5 – 0.8 l	40 – 70 ml in 15 l sprayer or 50-80 ml in 20 l sprayer	Controls plant sucking insects.

## 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.



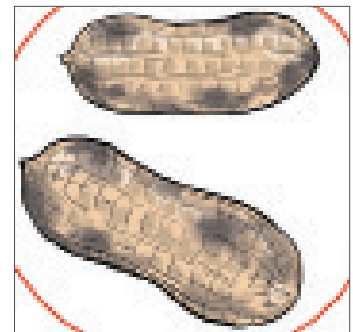
***Groundnut rosette***

*Bacterial wilt* is a bacterial disease. The symptoms can occur 2-3 weeks after planting. At first, one or more leaves start curling or drooping. In a later stage, plants may appear water stressed and bend over at the tip. Eventually, plants wither and die. Very typical is the dark-brown discoloration inside the stems. The bacterium which causes bacterial wilt is spread through infested soil and infected seeds. Rotate groundnut with cereals and use clean seed to avoid this disease.



***Bacterial wilt***

*Aspergillus crown rot* is a fungal disease which causes seed and seedling rot. Infected seeds have a black sooty cover. Infected seedlings have areas covered with black fungal spores. When mature plants are infected, branches or the whole plant may wilt and die. Infected pods also show patches with black sooty spores. The fungus produces the toxic substance aflatoxin in infected seeds. Aflatoxin is very toxic to humans and animals and can cause hepatitis and/or liver cancer. However, aflatoxin contamination is much less serious during growth of the crop than during subsequent storage of kernels.



***Aspergillus crown rot***

*Damping off* is caused by several fungal pathogens. Infected seeds may rot before germination, causing poor emergence of the crop. When seedlings are affected, the stem at soil level looks water-soaked, brownish and shrivelled. Affected seedlings may die. Damping-off diseases are favoured by waterlogged soils and low temperatures.



***Damping off***

# Aflatoxin

Aflatoxin contamination can take place before and after harvest. However, aflatoxin contamination is much less serious during growth of the crop than during subsequent storage of kernels. To control aflatoxin, it is very important to ensure good management of groundnut crops before and after harvest. When the crop is in the field, pods should not be damaged, as this increases the chance that the aflatoxin producing fungi will come in. Other measures to prevent aflatoxin contamination are given below under harvest and storage. If groundnuts are to be sold for export, aflatoxin levels must be very low.

## Proper chemical use

- Use only herbicides, insecticides 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 6: 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.
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. Grade the pods. To prevent aflatoxin contamination, remove shrivelled, diseased, broken and immature pods.
4. Dry the pods in the sun on a clean surface.
5. Do not shell groundnuts if you want to store them.
6. 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.
7. 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.
8. 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.
9. 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.





This leaflet was produced by N2Africa in July 2014 for farmers in Nigeria. It is available on the website of N2Africa and the Africa Soil Health Consortium (ASHC) - ([www.cabi.org/ashc](http://www.cabi.org/ashc)) as Creative Commons material which can be reproduced and re-used without permission - provided N2Africa and ASHC are credited. The content was developed by N2Africa. Photographs are courtesy of ASHC and International Plant Nutrition Institute (IPNI).

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