

Soybean: A versatile grain legume for smallholder farmers in Malawi



Photo: Jonathan Odhong/ IITA

The versatility of soybean

Soybean is a grain legume that can help to improve family nutrition and soil fertility. It is highly nutritious and ideal for combating malnutrition in children. It is also a special crop that produces 'nodules' on the roots which act like small factories making urea fertilizer for the crop. Therefore, urea on soybean should not be applied on the fields, as it should always be done for maize.

For some types of soybean, inoculants (Rhizobia) should be applied so that these small factories can be made on the roots. Varieties such as Magoye and Tikolole, will not require any inoculation, whereas many of the high yielding soybean varieties (Makwacha, Nasoko, Solitaire) will require inoculation for nodule formation to occur successfully. A well nodulated soybean crop is ideal to grow in rotation with maize, as maize grows better after soybean.

Growing soybean in six steps

1. Soybeans need moist soil for germination. They must not be dry planted and not planted until it is clear that the rainy season has begun (i.e. plant after a few days of rainfall!).
2. Make ridges which are 75cm apart, as for maize, so that the normal ridging system is not disrupted by the soybean production. Avoid ridges wider than 75cm, as this wastes precious land.

3. Plant soybean on two shallow furrows (3cm deep at most) which can be made with a stick on each side of the normal ridge. Two rows per ridge (instead of one) ensures high plant population > 250,000 plants per hectare. This results in good yields.
4. Within a row, drop (sprinkle) the soybean seeds at about 8cm apart. These seeds must be planted no more than 3cm deep, otherwise germination will not be good.
5. About 90kg of seed is required to plant one hectare (about 9kg per plot of 30 m x 40 m). For varieties with small seeds, less quantity of seed will be required.
6. Weeding should take place at least twice to keep fields weed-free, especially in the first month. Soybeans have the ability to shade out other plants, so a large soybean population is helpful to control weed growth.



'Urea factories' on the roots of a soybean plant. Certain soybean varieties require inoculation for these 'urea factories' to form successfully.
Photo: Regis Chikowo/ Michigan State University (MSU)

Fertilizer application

- When soybean is grown in rotation with a crop that had received NPK fertilizer the previous season, the crop can be grown successfully without any direct fertilization.
- On poor soils, apply a 50kg bag of NPK (23:21:0) fertilizer per hectare at planting. This will supply nutrients (especially phosphorus) for the small factories on the roots to work better.
- There is no need to apply urea on soybeans. This is a miracle crop. Save urea for maize which desperately needs it!

How to use Rhizobium inoculant

Some soybean types, such as Magoye and Tikolole, are special as they do not need inoculation with Rhizobium. However, these varieties are in short supply; most available varieties will require an inoculant.

The steps to inoculate soybean are as follows:

- For Chitedze produced rhizobia, a 50g packet is adequate for 10-15kg soybean seed.
- Open the packet of rhizobium inoculant and mix it with 200ml of water—add a match box full of sugar for 15kg of seed. Sugar helps the inoculant stick to the seed.

- Pour the mixture over the seed and mix it by hand in the shade. Always do this away from direct sunlight to avoid killing the rhizobia.

Soybean harvesting and residue management

Soybean should be harvested when the pods are mature and yellow-brown. Most of the soybean leaves will have fallen to the ground at this time, enriching soil fertility. A few seeds may be seen on the ground where the ripe pods have shattered. This is a clear sign to start harvesting!

- The crop should be cut at the ground surface or uproot early in the morning when they are still damp with dew.
- Immediately transport the harvested soybeans when still damp; if soybean is harvested and carried in the midday sun, many pods will shatter and the seeds will be lost.
- After a few days of further drying, the plants can be threshed with a stick and winnowed.
- The residues can be used to make good mulch or animal feed, or used to make compost for the fields the following season. **Never burn the residues**—this would burn a good source of soil enrichment.



The Africa Research In Sustainable Intensification for the Next Generation (Africa RISING) program comprises three research-for-development projects supported by the United States Agency for International Development as part of the U.S. government's Feed the Future initiative.

Through action research and development partnerships, Africa RISING will create opportunities for smallholder farm households to move out of hunger and poverty through sustainably intensified farming systems that improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base.

The three projects are led by the International Institute of Tropical Agriculture (in West Africa and East and Southern Africa) and the International Livestock Research Institute (in the Ethiopian Highlands). The International Food Policy Research Institute leads an associated project on monitoring, evaluation and impact assessment.

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