



Grow more soybean:

Produce 1 tonne of soybean from an acre

Invest in improved seed, fertilizer and inoculant and good agricultural practices

- **Invest in seed varieties:** Afayak or Jengum
- **Invest in the right fertilizer:** TSP
- **Invest in inoculant:** Legumefix
- **Remember your agro-dealer and extension team can offer advice**

Soybean markets and uses

- Families and commercial processors make soybean into soy-milk, cooking oil, weaning food, kebabs and many other foods. Soybean cake and crop residues also provide protein-rich livestock fodder
- Soybean has high levels of demand, but price can vary from year to year depending on world market prices. Prices paid in previous seasons give you an indication of the income you might expect
- Before you commit to growing more soybean - make sure you have a plan to sell your surplus



Soybean and soil improvement

- Soybean can improve your soil – equivalent to about 2 bags of urea per acre for next season or intercrops like maize
- Soybean helps control Striga – due, in part, to improved soil fertility
- Soybean requires deep fertile soil that holds water – avoid very sandy or gravelly soils. It is not drought resistant and it struggles to emerge from a hard soil crust
- It grows best in loamy soil that has been feed with manure or plant residues over time
- Remember the nitrogen produced by soybeans can help intercropping or can be utilized by cereal crops next season

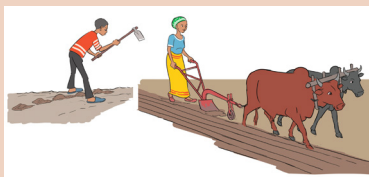


Loamy soil



Preparing the field for planting soybean

- Clear the large vegetation. You can plough in small seedless weeds – they will improve the soil
- Clear weeds/bush surrounding the fields – to reduce pest and rodent damage
- Break up the soil with a hoe, animal power or a tractor – plough and harrow before the rainy season, to obtain a good tilth of fine soil
- If the land gets waterlogged you can plant the soybean on ridges



Using quality seed

- Buy soybean seed from a trusted dealer
- If you cannot buy seeds, save your best grain to plant next season - store it in a dry and cool place
- Do not plant damaged or diseased seed
- Buy new seed every 3 years to keep up your yields



Bad seed

Comparing available improved varieties of soybean:

There are two major varieties of improved soybean seed available in Northern Ghana: **Afayak** and **Jenguma**. Both varieties:

- Require 20 kg of seed / acre
- Mature in 110-115 days
- Should produce 800 kg of grain / acre in the right conditions
- Are low shattering varieties

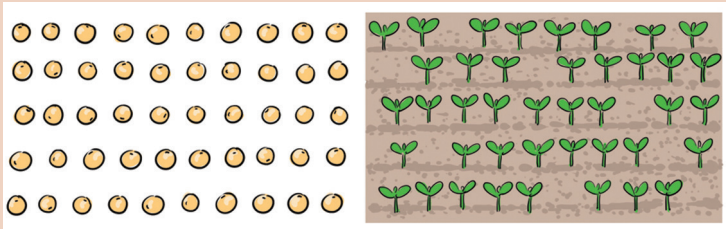


Good seed

Afayak	Jenguma
Yellow	Cream
Tolerant to cercospora leaf spots and bacterial pustule	Tolerant to bacterial pustule
Striga resistant	Striga resistant

10 days before planting - test your seed

Plant 100 seeds. If over 80 grow, the seed is good. If 60–80 grow, plant more seeds than recommended and thin if necessary. If less than 60 seeds grow, consider getting new seed.



Germination test

Planting

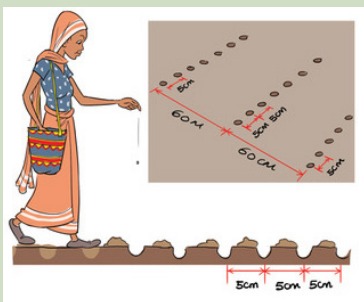
- Plant when rains are established – after planting too much or too little rain causes problem
- Morning or evening planting reduces exposure of seed and inoculant to heat and sunlight
- Planting in rows makes weeding and harvesting easier



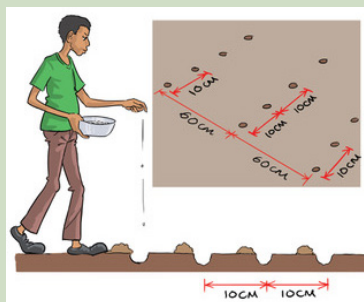
Spacing

Make planting holes:

- 2-5 cm depth (about a thumb length) – plant too deep and seed may not grow
- 60 cm between rows (twice the length of your foot)
- 2 seeds every 10 cm or 1 seed every 5 cm- this is the best spacing but is time consuming
- If using ridges remember to plant on both sides of them
- Soybean seedlings are delicate so the planting hole must be covered but not firmed too hard



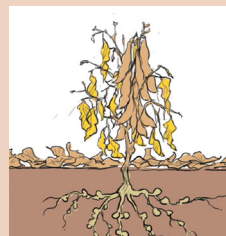
1 seed every 5 cm



2 seeds every 10 cm

Inoculation: improving the soil and the yield

- Soybean make nitrogen (it is like having free urea) by making nodules – these are formed by a reaction with rhizobia (good bacteria) in the soil
- The nitrogen will be in the soil the next season so it is good to grow cereals after maize. Inoculant is cheaper than buying urea the next season!
- Soils in Ghana naturally contain rhizobia – but often not the ones that support soybean – so you can buy inoculant of the right variety of rhizobia
- Inoculant is natural – harmless to soil and seed – and it improves your soybean yield
- Legumefix is most widely available. It comes in 250g packs – enough for 2.5 acres of soybean seed
- Buy inoculant from a trusted agrodealer. They will store it well – so buy as close to the planting season as possible
- Inoculant is a living product. Keep it in a cool dark place (fridge not freezer). Once open it will keep for just a few days
- Ensure you only use the inoculant selected for soybean – researchers are looking for the best inoculant for each legume



Applying Legumefix

Inoculant is added to the seed at planting – remember direct sunlight or heat will kill the inoculant

1. Place 15 kg of soybean in a plastic container with a cover or lid



2. Mix in 6 teaspoons or 6 soda bottle-tops of water to moisten the seed



3. Add 15 teaspoons (75 g) of inoculants and mix until seed are evenly covered



4. Cover the bucket and dry the inoculated seed in shade for 1 hour

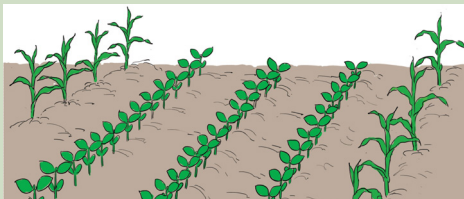


5. Plant treated seeds within 1-2 hours of inoculation

For more information
contact the Green Ef
Toll-free help line:
0800 200 300

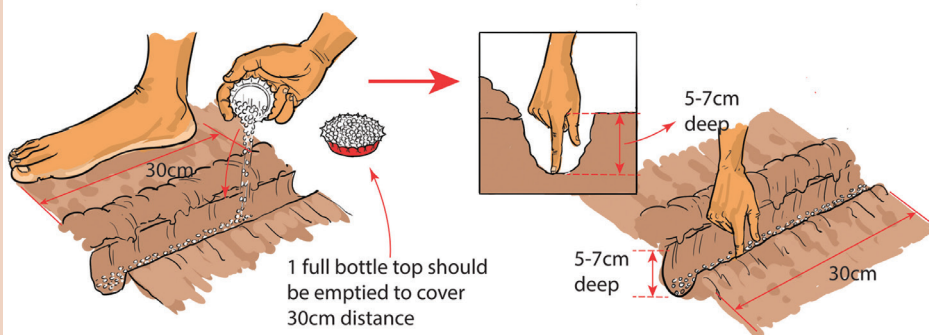
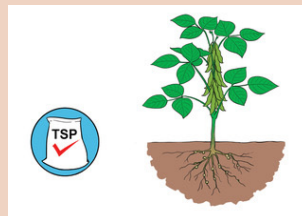
Intercropped soybean

Soybean does not grow well in shade, so plant 2-4 rows of soybean and rows of cereal. You can also intercrop soybean with rows of newly-established cassava.



Applying the right fertilizer

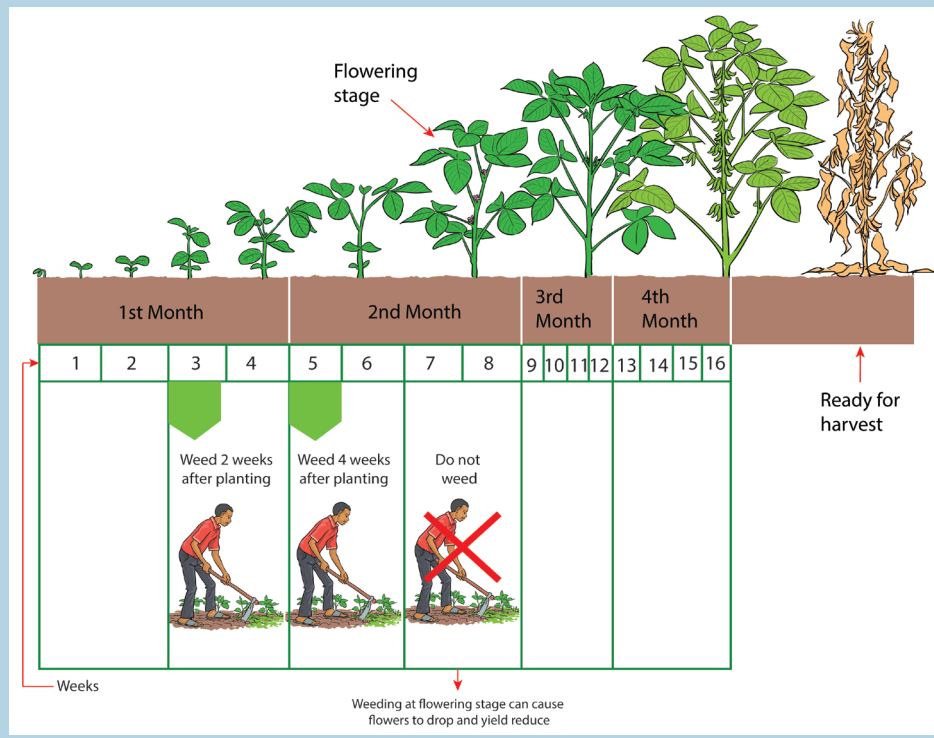
- Phosphorus (P) fertilizer increases your soybean crop
- If NPK was added to the soil the previous year it should provide enough P this year for soybean. Soybean then boosts the nitrogen for next year's soybean
- Applying P fertilizer like TSP boosts root development and nodulation
- Without P fertilizer, soybean may not grow well or be yellow or purple instead of green
- Adding too much nitrogen fertilizer stops the soybean making its own nitrogen – it will also produce more leaves and less grain
- Make a furrow about 5 cm deep along about 5 cm from the seed you have planted. Apply a soda top of fertilizer every 30 cm (the length of your foot). Cover the fertilizer to make sure it is not lost
- A soil test can help you understand the condition of your soil and will indicate the fertilizers and nutrients the soil needs



Weeding

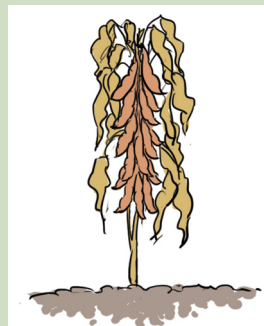
Weeds compete with soybean for nutrients, water, sunlight and space

- Weeding is very important in the first 6 weeks
 - Weed 2 weeks after planting and 4 weeks after planting
 - Do not weed when flowering starts – or flowers drop and yields reduced
- Herbicides can be safe and effective for controlling weeds – get the right one for the weeds and time of application.



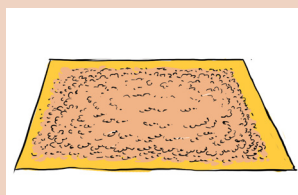
Harvest time

- Harvest when pods turn brown and the seeds rattle in the pod
- Delaying your harvest means more pods will shattering and less soybean will be harvested
- Harvest early in the morning to avoid shatter



Harvesting

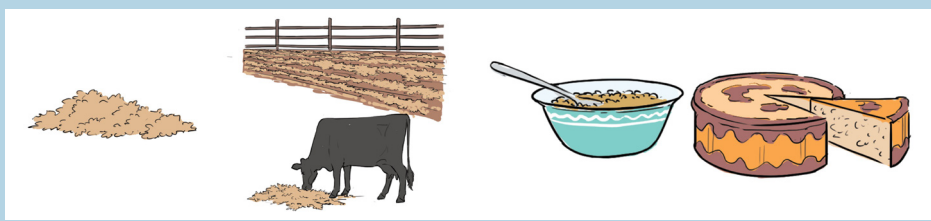
- Remove any diseased plants before harvesting
- Cutting the bean – leaving the roots behind improves the soil – but don't do if shattering occurs
- Dry the soybean plants in the sun on a tarpaulin
- When dry, thresh the soybean gently on the tarpaulin and dry grain for 2 days
- When the grain is dry it should crack between your teeth
- Winnow to remove chaff and dust, also remove damaged grains – dry for a further 3 days before packing
- Buyers will be looking for clean, undamaged soybean grain – so this is a critical step
- Place grain in clean bags or other containers – the grain has a tough shell and is less susceptible to post harvest pests than other beans
- If you get the timing of your harvest right your grain will make good seed next year – provided you store it well



Post-harvest

- Do not burn the residues or stubble in the field – it damages the soil
- Soybean residues are rich in nitrogen and improve your soil – plough them directly back into the soil or let livestock graze in the field and leave behind manure!

The first step in making delicious soybean dishes is to put the dried grain in boiling water and quickly cook for around 45 minutes. This reduces anti-nutritional factors - these factors can interfere with absorption of nutrients. Then remove the skin and dry. Soybean develops a bad flavour if the cooking step is left out. Soybean can make different products like soybean flours, cakes, milk, tofu, among others. Ask an extension agent for more soybean recipe.



Budget

Recommended inputs for 1 acre: 20 kg seed, 50 kg TSP, 1/3 of a pack of Legumefix

What size is your plot? An acre is about 70 x 70 paces. Then work out what the inputs will cost based on the estimates above.

Costs of inputs: Investment		Value of the crop: Your estimate based on 800 kg of soybean/ acre	
Seed cost		Cash sales	
Inoculant cost		Value of crop consumed/ processed by your household	
TSP fertilizer cost		Total return	
Labour			
Herbicides			
Storage sacks			
Other costs (e.g.transport, interest on loans)			
Total costs/ investment			

Risks

There are some risks associated with growing soybean because it requires regular rainfall and too much rain, or rain at the wrong time can cause smaller yields. There are also pests and diseases that can affect your soybean - check with your agro-dealer or extension team if you spot pests or diseases.

Return

Currently most farmers in Northern Ghana are experiencing yields of 300 kg an acre. With investment in seed, inoculant and fertilizer and good agronomic practices it is possible to grow 800 kg of grain or more.

For every Cedis you invest in soybean you will want to see a return on investment of 2 or even 3 Cedis – or what you think is an acceptable return on your investment.



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