

Weed control

Young seedlings are unable to compete with many fast-growing weeds and their control at this stage is very important. Chemical control can be used but it needs special attention because there can be a toxic interaction between herbicides/insecticides used in the previous season and those applied to the current crop. Wide spectrum soy bean herbicides are registered for preplant, pre-emergence and post-emergence application.

Pest and disease control

Soy beans are susceptible to various viral and fungal diseases caused by different pathogens. Insects that may cause damage to soy beans are cutworms at emergence, soy bean loopers; various worms and green stinkbug during pod development. Integrated pests and disease management mechanisms can be used to control the pests and diseases.

Harvesting time and method

Harvesting should commence when most of the leaves have been shed, and the moisture content of the seed falls below 15% but while the stems are still pliable. When soy beans are ready for harvesting, 90% of the pods will turn brown and shatter easily and kernels will not yet be dry enough to break. Soy beans are not suited to hand harvesting, stacking or windrowing. The recommended harvesting method is to use a combine harvester fitted with either a soya bean or wheat table.

Crop utilisation

Human consumption: Seeds furnish one of the world's most important sources of oil and protein. Unripe seeds are eaten as a vegetable and dried seeds are eaten whole, split or sprouted. Processed, they give soy milk, a valuable protein supplement in infant feeding, which also provides curds and cheese. Soy sauce, made from the mature fermented beans, and soy are ingredients in other sauces. Roasted seeds are used as a coffee substitute or can be used to make soy flour.

Industrial uses: Oil is used industrially in the manufacturing of paints, linoleum, oilcloth, printing inks, soap, insecticides and disinfectants. Lecithin phospholipids are

obtained as a by-product of the oil industry and are used as a wetting and stabilising agent in the food, cosmetic, pharmaceutical, leather, paint, plastic and detergent industries. Soy bean meal is used in the manufacturing of synthetic fibre, adhesives, textile sizing; waterproofing, fire-fighting foam and for many other purposes. The straw can be used to make paper stiffer than that made from wheat straw.

Animal feed: The larger consumer of protein-rich meal in South Africa is represented by the poultry industry, especially the broiler industry, which has a high demand for quality protein. Soy meal is a very rich protein feed for livestock and there is an increasing demand for it. The vegetative portions of plants are used for silage, hay, pasture or fodder, or may be ploughed back into the soil as a green manure.

Acknowledgements

Agricultural Research Council-Grain Crops Institute and Protein Research Foundation.

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Soy Beans



agriculture,
forestry & fisheries

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

Soy Bean

Scientific name: *Glycine max*
Family name: Leguminoceae
South African common names: Greater bean, Sojaboon, Dinawa, Dzinawa, Amabonjisi

Background

soy beans are indigenous to Manchuria, China. The crop is considered one of the five oldest cultivated crops and was utilised by the Chinese as a source of food before 2500 BC. However, it was only discovered by the Western world as a source of oil and protein in the 19th century. In the past 35 years, world production of soy beans increased to more than 100 million metric tons. Of this, 51% is produced in the US, 20% in Brazil, 10% in Argentina and 10% in China. The first report of soy beans in South Africa is believed to be in the Cedara Memoirs of 1903.

South african production areas

Province District

Mpumalanga	Gert Sibande, Nkangala, Mankaligwa
Free State	Thabo Mofutsanyane, Fezile Dabi
KwaZulu-Natal	Mgungundlovu, Amajuba, Zululand, UMzinyathi, eThekweni
Limpopo	Waterberg, Sekhukhune
North West	Ngaka Modiri Malema, Dr Kenneth Kaunda, Bojanala
Gauteng	Metsweding, Sedibeng

Climatic requirements

Temperature

Temperature plays an important role in determining the rate at which soy beans grow. Yields are adversely affected as temperature rise above 30 °C, while temperatures below 13 °C for long periods during the flowering stage inhibit flower and seed formation. Although 25 °C can be considered the overall optimum temperature for all

growth stages, the response differs from various growth stages. At planting time, soil temperature must preferably be in the region of 15 °C in order to stimulate germination.

Rainfall

Rainfall of 500 to900 mm is required for better yields and seed quality, depending on growth conditions. Excessive rainfall prior to and during flowering can result in luxuriant growth and increased lodging. Waterlogged conditions have a negative effect on the crop yield.

Soil requirements

Deep, well-drained, highly-fertile soil with a fine but firm seedbed and has a good water-holding capacity that is needed for high soy bean yields. Soy beans are generally better adapted to heavier soils and better able to utilize water at lower soil depths than most other crops, including maize. Soy beans are better adapted to moist soils with a lower pH than other legume crops, but a pH lower than 5,2 impedes nitrogen fixation; optimum pH ranges from 6 and 6,5. Compacted soils should be avoided because the hypocotyl of the soy bean breaks easily during emergence if under pressure.

Cultivars

There are many registered cultivars in the seed companies; however, research on cultivar improvement is underway. It has to be noted that approximately 80% of South African soy beans are GMO cultivars. Below are some of the registered cultivars as they appear in the variety list:

Table 1: Soy bean cultivars

Conventional cultivars	GMO cultivars
SNK 500 (24)	PAN 538 RR (1412)
Dumela (305)	LS 6161 R (484)
Mukwa (489)	A 5409 RG (80)
LS 678 (484)	PAN 1666 R (1412)
PAN 854 (1412)	AS 4801 R (1076)
Stork (254)	PAN 421 RR (1412)

NB. Please note that the cultivars may change annually owing to ongoing research Therefore, farmers are advised to consider the latest registered cultivars before planting.

Production practices

Soil preparation

Soil preparation for soy beans must be done thoroughly to ensure a deep, loose seedbed. However, unnecessary tillage should be avoided because, apart from being costly in terms of labour and money, every time soil is loosened, there will be a loss of moisture and soil structure, hence the conservation tillage practices are highly recommended. Large clods, furrows or ridges must be avoided in order to ease planting operation and ensure a good plant stand.

Planting

Planting from early to mid-November is the most appropriate date for optimum soy bean production in South Africa. Seed should be planted at a soil depth of 3 to 5 cm, depending on the soil texture, and it emerges within five to seven days after planting. The spacing between the rows can range from 40 to 90 cm and from 5 to 15 cm between the plants. The spacing can also be determined by the method of irrigation or water availability. A population of 250 000 to 400 000 plants per hectare is recommended, depending on the yield potential of the area and its weather conditions. Good seed-to-soil contact must be ensured to enhance germination.

Irrigation

The method of irrigation will be determined by water availability, soil type, type of cultivar and the type of irrigation equipment available. The best methods used for soya bean irrigation are the sprinkler and drip irrigation systems. Most soy beans are rain-fed grown, the main factor limiting irrigation being profitability. Soy beans are sensitive to a water shortage during the pod set stage.

Fertilization

It is important that the correct soil sampling methods be used when submitting samples for laboratory analyses. The nutritional requirements of soy beans are moderate to high compared to other grains. Soy beans consume more phosphorus, potassium, magnesium and calcium than maize crops do. Fertilizer can be broadcasted and ploughed into the root zone.