

PRODUCTION PACKAGE FOR SOYBEAN

Introduction

Soybean (*Glycine max*) is an important crop all over the world. There is some confusion regarding the origin of soybean although North-eastern China is generally considered as the original home. In Chinese records it is considered to be the most important legume and also one of the five sacred grains - rice, soybean, wheat, barley and millet essential for existence of Chinese civilization.



Uses and Composition

Soybean is the richest source of protein (43%) among the pulses or leguminous crops. Apart from high yield potential, soybean possesses a very high nutritional value. It contains about 20% good quality edible oil and 43% high quality protein. Soybean protein is rich in the valuable amino acid lysine (5%) in which most of the cereals are deficient. In addition, it contains good amount of minerals, salts and vitamins. Its sprouting grain contains a considerable amount of vitamin C. The only drawback with soybean is that it contains trypsin inhibitors, which reduce protein digestibility.

Soybean can be put to a number of uses. A large number of Indian and western dishes such as bread, milk, sweets, pastries, etc. can be prepared with soybean. Soybean oil is used for manufacturing vanaspati ghee and several other industrial products. Soybean is used for making protein food for children. Soybean product such as "Nutri-nugate" is used as vegetable. Soybean can also be used as fodder and forage which can be made into hay, silage, etc. To sum it, soybean is one of the richest, cheapest and easiest source of quality proteins having many uses as food and industrial products is called a wonder crop.

Climate

Soybean is a summer season crop. It grows well at 26 to 30°C temperature. Climate should be warm and moist. At the time of germination the temperature should be about 15°C. It is a short day plant. It is observed that the crop does not grow well if the temperature falls below 10°C or goes above 40°C. Soybean requires about 60-65 cm annual rainfall. It needs irrigation if the rainfall is lower than 60 cm. Water logging in soybean field at later stages of growth causes anaerobic conditions, poor nodulation and poor yield of the crop.

Soil

Soybean can grow on all types of soils. The soil should be well drained and fertile. It grows best on sandy loams as well as clay loams. The soil pH ranging from 6.0 to 7.5 is the most suitable for its

cultivation. The crop requires moist soil for germination. However, the field should have an efficient drainage during growing period.

Seedbed Preparation

A well prepared seedbed will help the seeds to germinate quickly and uniformly. It requires leveled field free from clods, weeds, stones, stubbles, etc. The field should be ploughed 30 to 35 cm deep, 3-4 ploughings followed by planking. Farmyard manure or compost can be applied at the time of last ploughing.

Sowing

Seed rate

Seed rate is governed by numerous factors such as seed size, seed weight, spacing, cropping season, germination and purity percentage of the seed. Soybean grown for grain purpose needs about 20-30 kg seed per hectare.

Spacing and sowing depth

If sown in line, row to row distance should be kept 30 to 45 cm and plant to plant 4 to 5 cm. Sow the seeds about 4-5 cm deep. Spacing is maintained by thinning or gap filling which is done 5 to 10 days after germination. There should be about 500,000 plants per hectare.

Seed treatment

Treating the seeds with Thiram will protect the seed and seedlings from different diseases. Soybean is a leguminous crop which has Rhizobium bacteria in its roots. For better nodulation and good growth of the crop, it is important to treat the seed before sowing. There are two ways to treat the seed. The first way is to bring some soil from the field where it was grown earlier and mix the soil with seed before sowing. The second way is to use the Rhizobium culture and treat the seed with it.

Time of sowing

Depending on the altitude, sowing can be done from May to July as a sole crop. In higher altitudes, sowing should be done early. As an intercrop with maize, which is commonly practiced in the eastern part of the country, sowing of both maize and soybean is done in March between altitudes ranging from 1200-1800 m. In the wetland system in the southern part of the country, soybean is grown on rice bunds and terrace walls after the rice is transplanted.

Manures and Fertilizers

Apply FYM or compost at the time of land preparation. Soybean is a legume crop and it can meet the major part of its nitrogen requirement through the nitrogen fixation. However, to ensure this source, the seed is inoculated with the bacteria.

Irrigation

Dry spell adversely affects the crop, hence irrigation, if available, should be used as per requirement. Since this crop is mostly grown in summer season it does not need irrigation in normal condition but one or two protective irrigations during the prolonged dry spell at the critical stages of plant growth (flowering and pod formation stages) will be beneficial.

Weed Control

The timely control of weeds is necessary to avoid competition with the crop for water, light and nutrients. This can adversely affect the total yield. During rainy season the infestation of weeds is high. One or two weedings are generally needed by the crop. Hand weeding at 15 days and 35 days after sowing are recommended.

Varieties

There are three released and recommended varieties of soybean. These are: One Daughter and Bragg released by DSC in the 1990s and GC 86018-427-3 (Khangma Libi-2) released by RDC Wengkhhar in 2002. Khangma Libi-2 is intended as an intercrop with maize. Farmers also cultivate a number of local varieties.

Diseases

Soybean is affected by many fungi and bacteria resulting in yield loss. These are common in the early growth stage and at maturity stage. Important diseases are discussed below.

Bacterial pustules

Lesions appear on leaves as yellow and pustular outgrowth. Later on these spots turn reddish brown in colour with margins yellow. On the pods also small reddish brown spots appear.

Control: Spray Carboxin (1.5 g in 1 litre of water); grow disease resistant varieties; seed treatment with Ceresan (0.2 %) effectively reduces the seed-borne inoculum of the pathogen.



Leaf spot

The disease is caused by *Cercospora sojina*. In this disease gray spots with purplish brown margins appear on the leaves. The lesions are never observed on pods and rarely on stem.

Control

Seed treatment with fungicides like Thiram (3 g per kg seed) or Carbendazin (2 g per kg seed) fairly reduces the seed-borne inoculum. Spraying with Mancozeb (0.3 %), Carbendazin (0.1 %) or Benomyl (0.1 %) minimises the disease severity.



Pod blight

It is caused by *Colletotrichum* spp. In this disease the pods at first become yellowish green and soon dry out. Consequently, the seed formation is severely affected. The seeds in diseased pods may be shrivelled and mouldy.

Control

1. Spray Zineb @ 2-5 kg/ha in 1000 litres of water.
2. Grow disease resistant varieties.



Mosaic

It is a viral disease. In this disease mottling of leaves accompanied with a light crinkling and reduction in size of pods occurs. Plants produce only a few pods and remain stunted in growth.



Dry root rot

The disease is caused by *Macrophomina phaseolina*. Small irregular or round black spots appear below the epidermis on the affected roots and stems.

Control

1. Adopt crop rotations.
2. Sow disease resistant varieties.
3. Seed dressing with Thiram or Captan.



Harvesting

Harvest the crop when 95% pods are brown and most of the leaves have dropped off. Then dry the plants in the sun for some days. When it is completely dry, thresh carefully. While threshing grains should not be beaten hard as it would result into breaking and spoilage of grains. Harvesting can be done either by cutting the plants with sickle or by breaking them from the base. Dry the seeds in the sun and reduce the moisture content to about 10% before storage.