

Soybean: Package and Practices for higher Production

It is a potential oilseed crop of the country and contains about 20% oil and 40% high quality protein. A large number of Indian and western dishes such as bread, 'chapati', milk, sweet, pastries etc., can be prepared with soybean. It grows well in slopes as well as terraces. It is grown as a pure crop as well as intercrop with maize, ragi, arhar etc. Productivity of soybean has increased considerably following the improved production technology. Soybean oil is used for manufacturing vanaspati ghee and several other industrial products. Soybean is used for making high protein food for children. It is widely used in the industrial production of different antibiotics. Soybean builds up the soil fertility by fixing large amount of atmospheric nitrogen through the root nodules, and also through leaf fall on the ground at maturity. It can be used as fodder, forage can be made into hay, silage etc. its forage and cake are excellent nutritive foods for livestock and poultry. Soybean being the richest, cheapest and easiest source of best quality protein and fats and having a vast multiplicity of uses as food and industrial products is called a wonder crop.

National Research Centre for Soybean, Indore recommended the following varieties suitable for NEH Region:

- ▶ JS 80-21
- ▶ Ahiliya 1(NRC2)
- ▶ Bragg
- ▶ Hill
- ▶ RAUS 5
- ▶ MAUS 71
- ▶ Indira Soya 9

Soil

Well drained loamy and sandy loam soil are most suitable. Low lying areas where water stagnation during raining rainy season may occur should be avoided. Two cross ploughing are sufficient to get the soil well pulverized and weed free land. Apply lime @ 500kg/ha in furrows and incorporate to the soil at least 1-2 weeks before sowing the crop.

Sowing

June-July in summer and August-September for winter plantation. Sowing in mid June in the higher region is found to be most suitable. Seeds are sown at a depth of 3-5cm at a spacing of 45X10cm. Seed rate of 70-75kg/ha would be sufficient for pure stand. Spacing may be reduced in terraces where water retention is low. Seeds should be treated with Captan or Bavistin @2g/kg to prevent infestation of diseases.

Fertilizer management:

Soybean being a leguminous crop does not require high dose of nitrogen, however 20kg/ha is sufficient for healthy crop stand. A dose of 60 kg P₂O₅ (SSP) and 30kg K₂O (MOP) are recommended. FYM @ 5t/ha

Weed management :

The crop should be kept weed free up to 60DAS

Two hand weeding (20DAS and 40DAS) are sufficient for higher yield

Among weed control, pre emergence application of pendimethalin @ 0.75a.i/ha and one hand weeding at 40 DAS and Butachlor @1kg a.i/ha and one handweeding registered higher seed yield

Irrigation:

Soybean is grown during Kharif season and due to high rainfall no irrigation is needed. However water stress should be avoided during flowering and pod formation stage of the crop.

Cropping system:

- ▶ Intercropping of soybean with maize (2:1) and Rice (3:1) has been found promising.

Some of the common rotations followed in north India are as given below:

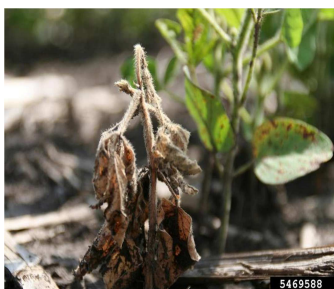
- ▶ Soybean – Wheat
- ▶ Soybean – Potato
- ▶ Soybean – Gram
- ▶ Soybean – tobacco
- ▶ Soybean – Potato – Wheat

Disease and Pest Management:**Diseases:**

Leaf Blight, Leaf Spot, Seedling Rot, Frog eye and Rust are major diseases of Soybean .

Seed Treatment with Thiram@3g/kg was found effective

Application of Dithane M-45@ 0.2% solution or Topsin M@2g/l water is recommended for effective control of diseases.

Seed, Seedling Rot:

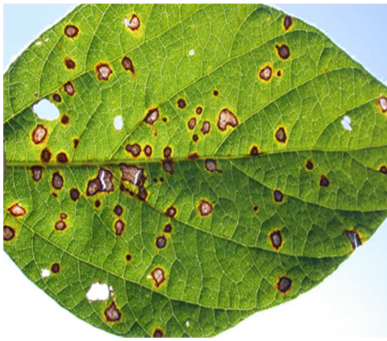
Poor emergence due to the seed rotting fungi is a very common problem with soybean. The seed may rot soon after planting before it germinates. The seedling may rot before or soon after emergence.

A number of fungi could be responsible for these rots. These are: *Aspergillus flavus*, *A. niger*, *Fusarium sp.* *F. semitectum*, *Macrophomina phaseoli* etc. All of these fungi are associated with soybean seed and some of these survive in soil.

Control Measures

Seed treatment with Thiram at the rate of 4.5g per kg of seed will control effectively these diseases.

Frogeye leaf spot:



This disease appears in the field about two month's after planting. It is caused by a fungus *Cercospora sojina*. The leaf spot has grey to light tan central area with a narrow reddish-brown margin. Heavily spotted leaves may fall pre-maturely.

Control Measures

Use certified seed

Use resistant varieties like Bragg.

Pod blight or Anthracnose :



This disease is caused by a fungus *Colletotrichum truncatum*. The pods first become yellowish-green and soon dry out. Consequently, seed formation is seriously affected. The seeds in diseased pods may be shriveled and mouldy.

Control Measures

Spray Zineb at the rate of 2.5 kg per hectare in 1000 litres of water.

Plant resistant varieties like Bragg.

Rust :



The leaves show brownish pustules, covering almost the entire leaf surface. Loose brown powder, characteristic of rust may be present on the leaves. Leaves turn brown within a period of time.

Control Measures

Grown resistant varieties like Ankur.

Spray Dithane M-45 or Difolitan at the rate of 2.5 kg per hectare in 1000 litre of water.

Yellow Mosaic :



This is the most damaging and wide spread disease of soybean in India. The leaves show bright yellow, somewhat diffused patches which increase in size and then coalesce, making the leaf almost completed yellow. The newer leaves show yellow mosaic. The casual organism is a virus which is transmitted by whitefly (*Bemisia tabaci*). The same virus affects many other pulses crops. Whitefly can breed on a large number of plants. If the plants are infected within 75 days after planting, the yield reductions are significant but infection after 75 days result into non-significant yield losses.

Control Measures

Grow resistant varieties like Alankar, Shilajit etc.

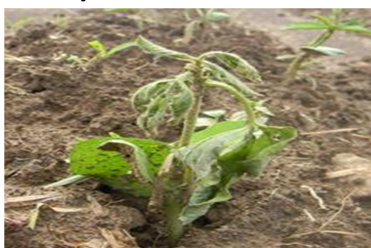
Use of regular insecticidal sprays e.g., Metasystox 25 EC at the rate of 1kg per hectare in 1000 litres of water at 10 days intervals followed by rouging till crop is 75 days old is recommended.

Pests :

Major pests of soybean include Leaf folder, Semilooper, Stem fly etc. They can be controlled by spraying Nuvacron 1.25ml/lit or Dimethoate (0.04%)

Seed treatment with Imidachloprid @7g/kg of seed reduces the problem of Leaf folder

Stemfly :



► It is a serious pest of soybean in northern region of India. Adults feed by making multiple punctures which appear as white spots on leaves. Eggs are laid in the soft tissues of the leaf and hatch in two to seven days. Larvae start feeding on the leaf and move towards the center of the stem, penetrating through the petiole. In two to three days maggots reach the stem and undergo three to four molts. When an infested stem is split open a distinct tunnel can be seen corresponding to the area eaten by the maggot. The infected plants show partly dries and drooping leaves.

Control Measures

Apply Thimet 10% granules at the rate of 10kg per hectare or Disystone 5% granules at the rate of 20kg per hectare in soil before sowing.

Semilooper:

Adults are medium sized moths with a metallic yellow patch in the fore wing. Eggs are laid singly on both sides of leaves. In three to four days, the pale greenish-white larvae emerge and feed singly on the soft tissues, leaving the veins. Fully developed larvae are green with the distinct black and deep green longitudinal lines along the body. A severe infestation will leave the plant with only its main branches.

Control Measures

Spray crop either with phosphamidon at the rate of 250 millilitres per hectare in 1000 litres of water or Endosulfan 35EC at the rate of 1 litre per hectare dissolve in 800 litres of water.

Leaf folder :

The larva is whitish green (Fig.1) remain within folded leaflet and scrap chlorophyll (Fig. 2) leading to the complete dry-up of leaves, causing upto 9.3 % yield loss. The economic injury level (EIL) for leaf folders is 8-9 larvae /plant. The larvae feed on the leaves by folding them either from the tip inwards or along the mid-rib and webbing the folds with the help of white resinous substance exuded by the larvae. Webbing of several leaves especially at the apical end of the braches is very common.

The adult moth of *N. vulgalis* is creamy yellow to light brown with oblique black wavy lines on both pairs of wings and the adult of *N. diemenalis* is yellowish brown covered with black blotch on both the pairs of wings. The pest is found active in second fortnight of July to last week of September.

Control Measures

Spray Thiodan 35EC at the rate of 1 litre per hectare in 1000 litres of water or Ekalux 25EC at the rate of 1.25 litres per hectare in 1000 litres of water

Harvesting and Yield :

When soybean plants mature they start dropping their leaves. The maturity period ranges from 90 to 140 days depending on the varieties. When the plants reach maturity, the leaves turn yellow and drop and soybean pods dry out quickly. There is a rapid loss of moisture from the seed. At harvest the moisture content of the seeds should be 15 per cent.

Harvesting can be done by hand, breaking the stalks on the ground level or with sickle. Threshing can be done either with the mechanical soybean thresher or some conventional methods used in other legumes. Threshing should be done carefully and any kind of severe beating or trampling may damage the seed coat and thus reduce the seed quality and viability. Soybean can also be threshed by wheat thresher after a little modification. This would involve change of sieve, reduction of the cylinder speed and increase in fan speed. A moisture content of 13 to 14 per cent is ideal for threshing with thresher

By adopting above mentioned improved technology, improved varieties of soybean yield 30-35 quintals of grain per hectare.