

## CROP : SOYBEAN (Glycine max)

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### PlantCharacteristics

Soybean is a member of the family Leguminosae , subfamily Papilionaceae. It is annual, erect bushy plant. The flowers are borne on short axillary or terminal racemes. The flowers are normally self-pollinated and completely self fertile.

Soybean is grown, mainly in areas where the summer is hot and humid. However, it does not withstand extreme summer and winter. The optimum temperature for growing soybean is 25-30 °C. Well-drained sandy or clay loams and alluviums with good fertility are generally suitable for the cultivation of the crop.

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### SelectionCriteriaForPlantingMaterials

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### Varieties

Bragg, JN-2750, EC-2661

These varieties have duration of about 4 months when sown in May-June. The duration will be less in other seasons.

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### SeedsAndCultivation

#### Seasons

The crop will perform best when sown by the onset of south-west monsoon. Sowing after the onset of heavy showers will result in poor germination and growth. Though it can be grown in other seasons under irrigation, its performance will be poor. If flowering coincides with rainy season, fruit set will be adversely affected.

#### Preparation of land

As water logging will affect germination and growth of the crop, it may be sown in raised beds during rainy season.

#### Seeds and sowing

When taking up cultivation in a new area, inoculation with the culture of Rhizobium is desirable.

Seeds may be sown at a depth of 2-5 cm depending on season. If the soil is sufficiently moist at the time of sowing, shallow sowing will be better. Seeds may be sown either in lines 45 cm apart at a distance of 10 cm between seeds in a row, or by giving a plant-to-plant distance of 20 cm.

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### WaterManagement

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### NutrientManagement

Apply fertilizers to provide N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O @ 20:30:10 kg/ha. The fertilizers may be applied basally. In soils of low fertility, application of organic manures is beneficial.

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### WeedManagement

Weed the plots once or twice depending on weed growth. As the crop smothers the

field after initial growth, weed control will be necessary only up to 30-40 days after sowing. Earthing up at the time of weeding is beneficial

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### **PestManagement**

The crop is free from infestation of major pests. The minor pests include stem fly (*Melanagromyza* sp.) and leaf roller (*Lamrosema* sp.). The stem fly mines into stem and the plant withers and dries up. Damage is more serious in young plants. The leaf miner causes pale brown patches along the lamina. The flower thrip feeds within flowers and prevents seed formation. For control of *Melanagromyza* sp. apply phosphamidon 0.05%. Leaf roller and flower thrip are controlled by dusting carbaryl 10% DP.

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### **DiseaseManagement**

The diseases include collar rot (*Rhizoctonia solani*) which causes water soaked lesions at the collar region which later spread along the whole stem. The plant succumbs in a few days. The disease occurs in patches under high soil moisture and high organic matter levels. To control the disease, provide good drainage. Anthracnose caused by *Colletotrichum lindemuthianum* is also common. The fungus causes dark brown elongate, more or less angular spots along the veins on the petioles, stem and lamina. When infection occurs on the hypocotyl, the plant collapses. Seeds when infected turn brown or black. To control the disease, select seeds from disease free plots. Spraying with ziram 0.2-0.3% is useful to check spread of the disease. The spread of mosaic disease, characterized by mottling, curling and distortion of leaves and malformations of the pod is checked by rouging out the infected plant and spraying dimethoate 0.05% to control the insect vectors. The pod blight (*Diaporthe phaseolorum*) causes irregular spots with discoloured border on the leaves and pods. Crop rotations, destruction of diseased plants and prophylactic foliar application of mancozeb 0.3% are recommended to control the disease.

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### **Harvesting**

The crop will be ready for harvest in about 4 months after sowing. Yellowing of leaves and their shedding are signs of maturity. If the period of maturity is rain free, the crop may be left in the field for about a week after complete leaf shedding. If the period is rainy, the crop may be harvested after leaf shedding and the produce may then be dried in shade for about 10 days. After drying, seeds may be separated by beating with stick. Soybean seeds lose viability after about a year. By drying the seeds to moisture content less than 10%, reasonable viability can be maintained up to one year. If it is not for sowing, the seed may be stored for up to three years after drying.

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### **Processing**

The bulk of the soybean is processed industrially into oil and protein. It may also be used as a pulse for direct consumption after cooking. It can be substituted for black gram and other pulses in the common household preparations. The soybean preparations will have the characteristic soyodour, which can be eliminated by treatment. Soybean may also be used for making soymilk, soymilk shake, etc.

#### **Preparation of soybean milk**

Mature dry beans are washed thoroughly and soaked in water for 8-10 hours. Remove the husk (testa) by gently pressing the soaked seeds. Wash thoroughly and grind to a thick paste. Alternatively, the beans may be steamed and ground. Add water 6-8 times the volume of seeds and bring to boil. Strain through muslin cloth. Boil once again under gentle stirring. This milk can be kept for 5 days in refrigerator. Periodic boiling will increase the storage life of soymilk.

Soybean has a characteristic "bean flavour" which is not relished by many. The acceptability of the soymilk can be improved by removal of the "bean flavour". For this, soak soybean in 5% starch solution preheated to 80°C for 8-12 hours. The starch solution drained from cooked rice (kanjivellam) can be used for this purpose. Soaking the beans for half an hour in hot starch water and then allowing a continuous stream of cold water to overflow the rim of vessels will also give desired

results.

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### **AverageYield**

Soybean crop yields 3-3.5 tons of grain per hectare