



How to Grow Summer Greengram

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Summer mungbean is an important pulse crop. Inclusion of legume in a particular cropping system improves the soil health depending upon its duration, fertilization, nature and purpose for which that is grown. It has a great scope in crop diversification and can help in sustaining crop productivity.

Introduction

Greengram /Moong (*Vigna radiata* (L.)) is an excellent source of high quality protein (25%). It is consumed in different ways as *dal*, *halwa*, *snack* and so many other preparations. In India, it is mostly used as '*dal*'. It is easily digestible and prescribed to patients. The ascorbic acid (Vitamin-C) is synthesized in sprouted seed and the amount of riboflavin and thiamine are also increased. It is used as green manuring crop and provides excellent fodder to the animals. It has a capacity to fix atmospheric nitrogen through the process of symbiosis and enrich soil with nitrogen. It helps to control the erosion of soil. After picking of pods, it may be used as green fodder or as green manure. The husk of the seed can be used as cattle feed. Being short duration crop, it fits well in various multiple and intercropping system. It is taken as a catch crop in rice-wheat rotation for improving the soil fertility in northern India.

Climate and Soil

Greengram is primarily a crop of rainy season. But with the development of early maturing varieties, it has proved to be an ideal crop for spring and summer season. It is grown mainly as *Kharif* season crop but it is cultivated as second crop in *Rabi* seasons in Andhra Pradesh, Tamilnadu, Orissa and Madhya Pradesh. The plants need a well distributed rainfall of 62.5-87.5 cm. Heavy rains at flowering times causes heavy losses to the crop. It is considered to be the hardiest of all pulse crops. It requires a hot climate and it can tolerate drought to a great extent. It can be grown successfully upto an elevation of 2000 metres from mean sea level. The crop can tolerate mild frost and salinity. Temperature beyond 40°C is harmful to the crop, while 30-35°C is the optimum. It is a short day plant requiring 12-13 hours of photoperiod for flowering.

Greengram can be raised on a wide variety of soils ranging from red laterite soils of south India to heavy black cotton soils of Madhya Pradesh, and sandy soils of Rajasthan. In general, a well drained loamy to sandy loams are ideal for mungbean cultivation. Acidic and saline soils are not suitable. The crop performs best in soils with 6.5 – 7.5 pH.

Land Preparation

A thorough land levelling is must for quick drainage. The crop requires fine seedbed preparation. In *kharif*, the land preparation involves 2-3 cross ploughings or harrowing followed by planking. Summer greengram can be grown after harvesting of wheat crop with minimum preparatory tillage. However, in order to obtain a good crop, a very heavy presowing irrigation may be given and the field ploughed twice with harrow to give a good tilth.

Inter Cropping / Mixed Cropping

During spring, mungbean is grown in 2:1 ratio with sugarcane in U.P and northern Bihar as a tradition. In Bihar, Punjab and Haryana, mungbean/urdbean is grown with sunflower in the ratio of 2:6 during spring.

Seed Rate and Sowing Method

In summer seasons, the crop is sown in rows 25 cm apart with intra-row spacing of 5 cm. It requires 25-30 kg seed/ha. Broadcast sown crop in rice fallows requires still higher seed rate. The seeds are sown in furrows opened by plough or line sown using seed drill.

Seed Treatment

For the Prevention of soil and seed borne diseases and better yield, seeds should be treated with antifungal bioagents, Rhizobium and Phosphorus Solubilising Bacteria. Before sowing seed should be treated with Carbendazim (Bavistin) @ 2g or Captan @ 3g or Thiram 80% WP @ 4g per kg of seed before sowing for the prevention of soil borne diseases. After seed treatment, the seed should be Inoculate with *Rhizobium* culture to get a bumper crop. One packet of Rhizobium culture (250g) is sufficient for the seed required for one acre. Rhizobium treatment increases the nodule formation, 10-15% increase in yield, and also minimizes the use of nitrogenous fertilizers for the subsequent crop. The Rhizobium culture is more significant for the summer crop as the number of natural microbes decreases during this season.

Sowing Time

For the summer or spring crop, mungbean should be sown after the harvest of last crop (potato, sugarcane, mustard and cotton, etc). The most suitable time period for summer sowing of mungbean in the northern plains is whole month of March and this also enables the crop to be harvested safely before the onset of the monsoon. Sowing should be avoided after March in Punjab, Haryana and Rajasthan because of hot air affecting flowering leading to low yields. However, for optimum yields the sowing is to be advanced to the early part of March.

Varieties

The selection of variety of mungbean depends on the prevalent cropping system, time of sowing, and distribution pattern of rain in the area. Use of early variety in summer ensures empty field for the next crop, moreover, it also prevents the damage caused by the early summer monsoon.

Specific varieties for almost all greengram growing areas throughout the country are PDM 11, HUM 1, Pusa 9531, Meha, (whole India), HUM 2 (Malviya jagrati) HUM 6 (Malviya janchetna), PDM 139 (Samrat), (UP), G 65 (Panjab), RMG 344(Dhanu), RMG 492 (Rajasthan), GM 4 (Gujarat), Kopergaon, Pant Mung-I, PS-7, PS-16, K-8 51, Type-44 (Pusa baisakhi), Muskan (Haryana).

Fertilizer Management

Greengram is generally raised on the residual fertility of soil. In case of light soils of poor fertility, it needs addition of organic manures like FYM or compost @ 8-10 tonnes/ha. If organic manure is not available, fertilizer application is necessary, 10 kg nitrogen, 45 kg phosphorus and 20 kg of sulphur should be applied at sowing time. Mungbean fixes atmospheric nitrogen in association with *Rhizobium*. The N fixation starts from 2nd week after sowing with its peak at 40-50 DAS. To meet the requirement of N before start of N fixation, 15-20 kg N/ha is applied along with 40-60 kg P₂O₅/ha as basal at the last ploughing. The response of crop to K fertilization is rare. Application of 20 kg/ha each of zinc sulphate and elemental sulphur is essential for higher yields.

Water Management

Summer crop is generally grown under irrigated conditions. Pre-sowing irrigation is a must to ensure adequate soil moisture for germination. Besides a pre-sowing irrigation, 3 irrigations required, the first at pre-flowering stage (20-25 days), the second at flowering (25- 40 days) and the third at grain-filling stage, are necessary. In summer season (grown after wheat) the irrigation must be applied at 10-15 days interval depending upon situation, no irrigation should be given after 40-45 days of sowing. Water logging in the field should be avoided at all cost.

Weed Management

The major weeds of greengram are *Triantema monogyna* (Santhi), *Cyprus rotundus* (nut grass/motha), *Amaranthus viridi* (Cholai), *Phylanthus niruri* (Hazar dana), *Celosia argentia* (Chilmil) and *Sorghum helepense* (Baru). Initial 25 days after sowing is critical period of crop-weed competition. During this period, crop should be kept with minimum competition from weeds. Due to continuous rains in *kharif* mungbean suffers from intense weed competition. The crop requires 2 weedings, first at 20-25 DAS and the later at 40-45 DAS. In summer, one weeding is sufficient. However, whenever labour is in short supply or the rainfall pattern does not allow early hand-weeding, herbicides need to be used. Preemergence application of Pendimethalin @ 1-1.5 kg /ha in 500 litres of water ensures weed control. The herbicide should be applied just after sowing. If the soil moisture is not sufficient in the top soil then herbicide should not be applied.

Disease Management

Cercospora leaf spot: Angular, brown or red colour spots with grey or brown centre and radish purple border are formed on leaves, stalks and pods. Spray the crop with Blitox -50 or Indofil M-45 @ of 1.5 to 2.0 Kg/ha in 500 lts of water.

Anthracose (*Glomerella lindemuthianum.*): Tender circular black sunken spots with dark centres and bright red or orange margin appear on leaves and pods. Seedlings get blighted due to infection soon after the germination of seed. As the fungus survives on seed and plant debris, crop sanitation and seed treatment will help in eliminating plant debris and seed borne inoculum. Spraying the crop at fortnight interval with Copper oxychloride 50% WP @ 5.0 g or Mancozeb 75% WP (Dithane M-45) @ 2.5 g or Dithane M-45, Indofil M-45 etc. @ 2.5 g per litre of water.

Bacterial blight (*Xanthomonas phaseoli indicus*): Large, irregular, dry sunken areas often brick red or brownish in colour, usually covered with yellowish white crusts of exudates appear on pods, long reddish streak on stem and plants look wilted. In severe spotting, leaves turn yellow and fall off prematurely. Planting healthy seeds of resistant variety will helpful in controlling the disease. Seed should be treated with *Trichoderma viridi* @ 5.0 gm in litre of water immediately before sowing. The incidence of this disease can be reduced by spraying the crop with Streptomycin @ 0.3 gm or *Trichoderma viridi* @ 4 gm per litre of water when the disease appears in the field.

Bacterial leaf spot: Appear as water soaked dots on the under surface of the leaf which remain small in size and the surrounding tissues becomes necrotic. Spray the crop with copper oxychloride @ of 1.50 to 2.0 kg in 500 lts of water.

Rust (*Uromyces appendiculatus*): The disease is exhibited by circular reddish brown stules which are more common on undersides of the leaf, less abundant on pods and sparingly on stems. Spraying the crop with Mancozeb 75% WP (Dithane M-45, Indofil M-45 etc.) @ 2.5 gm per litre of water to check the spread of the disease to great extent.

Powdery mildew (*Drysiphe polygoni*): White powdery patches appear on leaves and other green parts which later become dull coloured and studded with black dot like structure. Foliage becomes yellow and drop off. Severely affected plants get shriveled and distorted. Wettable Sulphur (Sulfex etc.) @ 3.0 g or Dinitrophenol 25 EC (Karathanc etc.) @ 1 ml per litre of water will help in controlling the disease.

Yellow mosaic (*Virus*): The disease attacks the crop within a month of sowing seed. This is more prevalent in *Kharif* season. Mild scattered yellow streaks appear on young leaves. Yellow areas go on increasing in the new grown leaves and some of the apical leaves turn completely yellow. The diseased plants usually mature later and bear relatively lesser number of flowers and pods. The pods are reduced in size and mostly remain immature. But when seeds are obtained, they are small in size. Growing resistant variety such as Satya, Muskan is the best method for controlling this disease. The disease is transmitted by insect vector (white fly). Remove the affected plants from the field. Control white fly by spraying 1000ml melathion 50 EC or 625 ml dimethoate (Rogor) 30EC or Metasystox by dissolving in 625 litre of water per hectare two times at an interval of 2 weeks.

Leaf curl (*Virus*): It causes great damage to this crop. Chlorosis around the lateral vein near the leaf margin in young leaf is first symptom of this disease. The affected leaves show curling downward and the veins on the under surface of leaf show reddish brown discoloration. The plant remained stunted by which the disease is recognized. Grow resistant varieties and control white fly.

Insect Management

Whitefly (*Bemisia tabaci*): Nymphs and adults suck sap from leaves. The infested plants become very weak showing downward cupping of the leaves giving a sickly look and the plant may die due to severe attack of the pest. The insect secretes honey dew on which growth of sooty mould takes place resulting in blackening of leaves, drastically reducing photosynthetic rate and drying of leaves leading to total failure of the crop. Whitefly is a vector of number of viral diseases especially mungbean yellow mosaic virus (MYMV). Spray Paecilomyces fairnosus (1×10^8 cfu/g) for the control of adult whitefly. Grow maize, sorghum or pearl millet as a barrier crop to minimize the incidence of whiteflies. Grow cotton as a trap crop one month earlier between the mungbean rows with a single spray of dimethoate 30EC @ 1.70 ml/l at 15 days after germination of mungbean for the control whiteflies and MYMV. Grow resistant varieties (ML 1256, ML 1260 and ML 1191)

Pod borer (*Helicoverpa obsoleta* Fab.): This is more destructive insect pest and the crop is damaged at the time of pod formation. It is polyphagous in nature. The caterpillar feeds on foliage and then bores the green pod and feeds on the ripening grains within the pods. Deep ploughing immediately after harvest of preceding crop helps to expose the pupae to hot sun and also they get killed by birds. Spraying the crop with insecticides at the fruiting stage has been found effective in control this insect pest Malathion 25 EC or Methyl Parathion 50 EC or Cypermethrin 10 EC @ 1.0 ml per litre of water.

Aphids: Aphids (*Aphis craccivora*) attack a large number of pulses and leguminous crops. The adults are black and shiny, upto 2 mm long and some are winged. Nymphs are covered with waxy coating that makes them grey and dull. Nymphs and adults are seen in large numbers on young plants, leaflets, stem and pods. Young leaves of seedlings become twisted. Excretion of honey dew attracts sooty mold. *A. craccivora* transmits cowpea banding mosaic virus and cucumber mosaic virus in cowpea and green gram.

Harvesting

When more than 80% pods are mature, the plants are cut close to the ground and bundled. These are taken to threshing floor and staked upright, dried for a few days and shaken vigorously to separate pods. The resultant material, i.e. pods and dry leaves, is beaten with sticks or is trampled by bullocks. The seeds and husk are separated by winnowing. Threshed and cleaned produce should be further sun dried to reduce the moisture content to 10-11%.

Conclusion

The real potential perhaps, to trigger pulse revolution lies in the cultivation of greengram in summer. Summer cultivation enables the farmers to profitably utilize their land and water resources, which otherwise remain mostly unused during this period. Further, due to high temperature the activity of insect pests is minimal, and as such the crop is almost free of damage owing to insects and yellow-mosaic virus together is the major causes of poor yields Short-duration, photo-insensitive varieties maturing in 60-70 days are now available for the summer season. The crop can be grown after wheat, potato, mustard and late aman rice.