

## MOONG

Moong occupied 7.0 thousand hectares and the total production was 6.4 thousand tonnes during 2009-2010. Its average yield was 908 kg per hectare (364 kg per acre).

Climatic Requirements :

Moong is considered to be the hardiest of all pulse crops. It requires a hot climate and can tolerate drought also. It is also suitable as a summer crop.

Soil Type :

A well-drained loamy to sandy-loam soil is suitable. Saline-alkaline or waterlogged soils are unsuitable.

Rotations :

Moong - Raya/Wheat

Summer Moong-Kharif Moong-Raya/Wheat

Improved Varieties :

PAU 911 (2007) - Its plants are erect, compact, determinate and medium statured (about 70 cm). Podding is profuse and each pod contains 9-11 seeds. It is fairly resistant to mungbean yellow mosaic virus (MYMV), cercospora leaf spot (CLS) and bacterial leaf spot (BLS). It matures in about 75 days. Grains are shining green and medium bold with good cooking quality. The average grain yield is 4.9 q/acre.

ML 818 (2003) - Its plants are erect, determinate and medium statured (75 cm). Pod formation is profuse and each pod contains 10-11 seeds. It has moderate degree of resistance to mungbean yellow mosaic virus and good resistance to cercospora leaf spot and bacterial leaf spot diseases. It is also tolerant to whitefly. It matures in about 80 days. Its average grain yield is 4.9 q/acre. Its grains are medium bold, shining green with good cooking quality.

PBM 1 (2000) – Its plants are erect, determinate and medium statured (67 cm). Pod formation is profuse and each pod contains 11-12 seeds. It matures in about 75 days. It is tolerant to mungbean yellow mosaic virus and fairly resistant to bacterial leaf spot and anthracnose diseases. Its average grain yield is 4.2 q/acre. Grains are green with good cooking quality.

ML 613 (1995) – Its plants are determinate and medium statured (85 cm). Pod formation is profuse and each pod contains 11-12 seeds. It is tolerant to mungbean yellow mosaic virus, cercospora leaf spot and bacterial leaf spot diseases. It is fairly tolerant to whitefly and jassids. It matures in about 85 days. It yields 4.3 q/acre. It possesses bold green and shining grains with very good swelling capacity and cooking quality.

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ML 267 (1986) –Its plants are erect, determinate and medium statured (80 cm). The stem and branches are hairy with a slight tinge of purple colour. Pods are borne on top of all branches and each pod contains 11-12 seeds. It is fairly tolerant to mungbean yellow mosaic virus. It matures in about 85 days and yields 4.2 q/acre. Its grains are bold with good swelling capacity and cooking quality.

Note : Cultivation of kharif season moong varieties ML 267 and ML 613 can also be done under rainfed conditions in Gurdaspur, Hoshiarpur and Ropar Districts. The cultivation of variety PAU 911 is recommended for whole Punjab except south-western districts (Bathinda, Mansa, Faridkot, Mukatsar and Ferozepur). The variety PBM 1 should be grown only in Bathinda, Mansa, Faridkot, Mukatsar, Ferozepur and Sangrur districts.

Agronomic Practices :

Land Preparation–Give two or three ploughings to the land followed by planking to crush the clods and eradicate the weeds.

Seed Rate : Use 8 kg seed per acre.

Seed Inoculation : Inoculate the moong seed with recommended Rhizobium culture at the time of sowing. Wet the seed recommended for one acre with minimum amount of water. Mix thoroughly one packet of Rhizobium with it on a clean pucca floor and let it dry in shade. Sow the

seed immediately. The inoculation of seed with culture increases the grain yield by 12-16 per cent. The Rhizobium inoculation and fungicide can be applied simultaneously. The culture is available with the Department of Microbiology, Punjab Agricultural University, Ludhiana.

Seed Treatment : Treat the seed with Captan or Thiram @ 3 g per kg of seed against seed borne diseases.

Time and Method of Sowing: Sowing should be done in the first fortnight of July at a row spacing of 30 cm. The plant distance should be about 10 cm and sow 4 to 6 cm deep with seed drill/pora/kera. For getting higher yield, adopt bi-directional method of sowing i.e. sow the crop in both directions at 30 cm row spacing using half the seed rate in each direction. In bidirectional sowing, weeds should be controlled through chemicals as per recommendations given under weed control.

Zero Tillage : Moong can be grown without seed bed preparation with zero till drill after conventional or zero till sown wheat without any adverse effect on yield. If field is infested with weeds, these can be controlled by spraying half litre of Gramoxone (paraquat) in 200 litres of water before sowing.

Weed Control : One or two hoeings are recommended to keep the weeds under check.

Give the first hoeing four weeks after sowing of the crop and second hoeing, if needed, about two weeks thereafter.

Weeds can also be controlled by applying Basalin 45 EC (fluchloralin) @ 600 ml per acre or Treflan 48 EC (trifluralin) @ 800 ml per acre on well-prepared seed-bed and then sow crop on the same day. Alternatively, spray 1.0 litre Stomp 30 EC (pendimethalin) or apply 600 ml Stomp 30 EC and one hoeing about four weeks after sowing. Stomp should be sprayed within two days of sowing of the crop. For spraying herbicides, use 150-200 litres of water per acre. These herbicides provide good control of many annual grasses and broad-leaf weeds in early growth stages but do not control perennial weeds.

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Irrigation : Irrigation is required for the kharif season crop if the rain fails.

Fertilizer Application

Drill at sowing 5 kg of N (11 kg of Urea 46% N) alongwith 16 kg of P<sub>2</sub>O<sub>5</sub> (100 kg of single superphosphate 16% P<sub>2</sub>O<sub>5</sub>) per acre to moong. (See chapter on Soil Testing). A small dose of nitrogen is useful to give a good start to the crop.

Harvesting and threshing

The crop should be harvested when 80% of the pods mature. Harvest the crop with sickle. Do not uproot the plants. Spike tooth type power thresher for wheat can be used to thresh moong after proper modifications (See Appendix-III). When about 80% of the pods mature, Gramoxone (paraquat) @ 800 ml per acre can be sprayed using 150-200 litres of water for drying of crop foliage for combine harvesting of the crop.

Plant-Protection Measures (Moong and Mash)

The kharif season mash and moong crops are attacked by green jassid, whitefly, flea-beetle, grey-weevil, semi-looper and hairy caterpillar. They damage the leaves occasionally. The black aphid attacks the flowers and pods.

Jassid, Aphid, Whitefly and the Flea-beetle :- These insects can be controlled by spraying the crop with any of the following insecticides, using 80 litres of water per acre with a manually operated sprayer.

375 ml of Malathion 50 EC (malathion)

250 ml of Rogor 30 EC (dimethoate)

250 ml of Metasystox 25 EC (oxydemeton methyl)

Whitefly can also be controlled by spraying 40 g thiamethoxam 25 WG or 600 ml triazophos 40 EC using 80-100 litres of water per acre. Repeat the spray at 10 days interval if necessary.

Hairy Caterpillar : The body of the caterpillar is covered with hair. The caterpillar eats the green matter of leaves, leaving behind only the midribs. The crop may be totally denuded due to

severe attack. When young, they feed gregariously but on few plants in scattered spots. Adopt the following control measures.

(i) Young larvae are gregarious. They can be destroyed by pulling out the infested plants and burying them underground.

(ii) The grown-up caterpillars can be destroyed by crushing them under feet or by picking and putting them into kerosenized water. If the population is high, control it by spraying 500 ml of Thiodan 35 EC (endosulfan) or Ekalux 25 EC (quinalphos) or 200 ml of Nuvan 100 (dichlorvos) in 80-100 litres of water with a manually operated knapsack sprayer per acre.

Semi-looper : The larvae are green in colour measuring 2-4 cm in length. When touched, they form a loop. The larvae feed extensively on the leaves of mash and moong. In case of severe damage, the plants are totally defoliated within a few days. It can be controlled by spraying 500 ml of Thiodan 35 EC (endosulfan) or 200 ml of Nuvan 100 (dichlorvos) in 80-100 litres of water per acre.

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Tobacco caterpillar (*Spodoptera litura*) : It is a polyphagous pest. The small larvae are black whereas grown up larvae are dark green with black triangular spots on body. Its moth lays eggs in masses covered with brown hairs on the lower side of leaves. After hatching, first and second instar larvae feed gregariously and skeletonize the foliage. Later on the grown up larvae disperse and feed singly. Besides leaves they also damage buds, flowers and pods.

Cultural control : Egg masses and young larvae of tobacco caterpillar feeding gregariously should be collected along with leaves and destroyed.

Chemical control : It can be controlled by spraying any of the following insecticides using 100 litres of water per acre with manually operated knapsack sprayer.

150 ml of novaluron 10 EC

800 g of acephate 75 SP

1.5 litres of chlorpyrifos 20 EC

Spray the crop as soon as the pest appears in the field and repeat after 10 days, if necessary.

Pod borer (*Helicoverpa armigera*) : The larvae damage the crop by feeding on leaves, flower buds, flowers, pods and seeds in the pods thus causing heavy loss in yield. The larvae may be pale green, yellow, brown or black in colour measuring about 3-5 cm in length when full grown.

Larval presence can be observed from damage to plant and from dark green faeces below the plants on the soil. The larvae fall on the ground when plants are shaken vigorously. Spray the crop at the appearance of larvae with 1 litre Thiodan 35 EC (endosulfan) in 100 litres of water per acre using a knapsack sprayer at the start of pod formation and repeat after 10 days, if necessary.

Mite : The mite causes webbing on the underside of the leaves which turn pale. Such infected leaves turn light-brown to dark reddish-brown. It can be controlled by spraying the crop with 150 ml of Rogor 30 EC (dimethoate) in 80-100 litres of water per acre.

Dhara (*Callosobruchus* spp.) : For its control see Appendix II.

Diseases

Yellow mosaic virus : It is a virus disease transmitted by whitefly and is more severe on moong. The leaves of the diseased plants develop irregular yellow and green patches. Infected plants bear no or only a few pale pods.

Control

1. Rogue out the affected plants early in the season.

2. Grow yellow mosaic virus tolerant varieties of moong PAU 911, ML 818, PBM 1, ML 613, ML 267 and Mash varieties, Mash 114, Mash 1-1 and Mash 338.

3. Control whitefly as recommended under "Insect Pests".

Cercospora leaf spot : These are caused by *Cercospora cruenta* and *C. canescens*. The disease spots are circular, brown and necrotic which coalesce to cover bigger area and cause defoliation.

Control

1. Treat the seed with 3 g of Captan or Thiram per kg of seed.

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2. Grow disease resistant varieties of moong, PAU 911, ML 818, ML 613, ML 267, and Mash varieties, Mash 114, Mash 1-1 and Mash 338.

3. Spray the crop with (zineb) Dithane Z-78 (zineb) @ 400 g in 100 litres of water per acre at 10 days interval twice or thrice at disease appearance.

Root rot : Root rot caused by *Macrophomina phaseolina* produces dark lesions on leaves, branches, stems and roots. The tissues of the affected portion become weak and easily shred.

Pycnidia can be seen on the affected portion. For control, treat the seed before sowing with Captan or Thiram @ 3 g/kg seed.

Anthraxnose : It is caused by *Colletotrichum lindemuthianum*. The spots are slightly depressed with dark centre. Lesions rapidly coalesce to girdle stems, branches, peduncles and petioles. Adopt control measures given under *Cercospora* leaf spot.

Bacterial leaf spot : Bacterial leaf spots caused by *Xanthomonas campestris* pv. *phaseoli* are circular to irregular and brown. Use disease free seed. Moong varieties PAU 911, ML 818, PBM 1, ML 613 and mash varieties Mash 114, Mash 338 and Mash 1-1 are fairly resistant/tolerant to this disease.

Rhizoctonia blight : It is caused by *Rhizoctonia solani*. It starts from leaf laminae or petioles or the young branches. Eventually, the top of plants become blighted and patches of such plants are conspicuously seen in the field. Whitish web-like growth develops on leaves in humid weather. Dark brown sclerotia develop on infected tissue. Infection on crop comes from the weeds in the field.

Keeping the field weed-free helps to check the disease.