

e-lecture on Gram

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Scientific Cultivation of Gram (Chickpea)

Botanical Name

a. *Desi* : *Cicer arietinum* L. (Chromosome No. = 14, 24, 32)

b. *Kabuli* : *Cicer kabulium* L. (Chromosome No. = 16)

Family

Leguminosae/Leguminaceae

Sub-Family

Papilionaceae

Other names

Chana, Bengal gram, Butmah, Chhole, Kadala, Harbara, Boot, Sangalu, Kadalai etc in India.

Importance

It is an important winter legume and is mostly consumed in the form of processed whole seed (boiled, roasted, parched, fried, steamed, sprouts, etc), or *dal* or as *besan*. Fresh green seeds are also consumed as green vegetable. It is used in preparing a variety of snacks, sweets and condiments. It is good source of **protein (18-22%)**, carbohydrate (52-70%), fat (4-10%), minerals (Calcium, phosphorous, iron) and vitamins. It is an excellent animal feed. Its straw also has good forage value. Green leaves are used as sag in villages.

Origin

Chickpea has been known in this country for ancient time. Its probable place of origin lies in south-western Asia, that is, in the countries lying to the north west of India such as Afghanistan and Persia. **According to De Candolle**, the fact

that gram has a Sanskrit name would indicate that the crop has been under cultivation in **India** longer than in any other country.

Improved varieties for Uttar Pradesh

K-850, Pusa-256, Pusa-372, Pusa-1003, Vardan, Uday, Alok, Vishwas, Samrat, Gaurav, Radhey, Awarodhi, , Sadabahar, Sadbhawna,, Pragati, Surya, KWR-108, Pant G-186, Pant G 10, WCG-3 Vallabh Kaller Chana, JG-14 etc.

Some Specific Varieties for India

A. Wilt Resistant Varieties

Awarodhi, KWR-108, Vijay, JG-74, Vishal, Pusa-212, Uday, Chamatkar, Pusa-391, Pusa-372, JG-315, JG-74, Alok etc.

B. Blight Resistant

Gaurav, Pusa-261, GNG-469, PBG-1, PBG-5

C. Green seeded Varieties

Hare chhole, Sadabahar

D. Pod Borer Tolerant/Resistant Varieties

Vijay, Vardan, Vishal, Dharwad Pragati, ICC_506, GL-645, PDG-84-10, RSG-888, ICC-10613, ICCL-79048, ICCL-84205 etc.

E. Nematode Tolerant/ Resistant Varieties

Pusa-362, Dharwad Pragati, N-31, N-59, ICC-42, ICC-5875, ICC-6371 etc.

F. Drought Resistant Varieties

Vijay, RSG-888

G. Root Rot Resistant Varieties

Alok, Vijay, Vardan, Pusa-362, 372, 391, GSH-469, ICCB-10, BGD-72

H. Tolerant to Salt Variety

Karnal chana-1

I. Non Lodging Variety

DCP-92-3

J. Kabuli Varieties

L-550, Pragati, Chamatkar, Pusa Kabuli, Jawahar chana, Pusa-267, Haryana chana-3 etc.

K. Late sown Varieties

Uday, Rajas, Pusa-372, Pusa-547, Pant G-186, RSG-963, JG-74

L. Varieties Suitable for All the Ecosystems

Pusa-256, Pusa-372

Gram based Prominent Cropping Systems in U. P.

Paddy-chickpea, Jowar/Maize-Chickpea, Chickpea+Mustard, Chickpea+Barley, Chickpea+Linseed.

Climatic Requirements

Gram is a winter season crop but severe cold and frosts are injurious to it. Frost at the time of flowering results in failure of the flowers to develop seed or in the killing of the seed inside the pod. It is generally grown in rainfed conditions. Excessive rains soon after sowing or at flowering and fruiting or hailstorms at ripening cause heavy loss. It is best suited to areas having moderate rainfall of 60-90 cm per annum.

Soil Conditions

It is grown in wide range of soils in India. The best type of soil for gram is one that is well drained and not too heavy. The **sandy loam to clay loam** is considered as most suitable having a pH less than 8.5

Seed Treatment

Seed of gram should be treated with systemic fungicides like **Carbendazim, Thiram, Captan etc @ 2-3g/kg seed**. Fungicidal treatment should be done at least 3 days before sowing.

To avoid incidence of **termites and cut worms** which generally posed serious threat on light textured soils of north India, soil application of **Carboryl dust @ 20-25kg/ha** should be done at last ploughing/ harrowing.

The seed treatment should also done with Rhizobium culture to capitalize on their intrinsic capability and potentiality to trap atmospheric nitrogen in the root nodules through BNF. About 100g gur or jagari is boiled in 1litre of water and make slurry. After cooling at normal temperature, Rhizobium culture of gram is mixed well in this slurry and now it is poured on the heap of seed and rubbing is done with the hands. It is assured that seed coat is covered with a thin layer of the slurry. This treated seed is spread over polythene or floor for air drying. After drying, this may be used for sowing. **One packet (200g) Rhizobium culture (*Rhizobium cicer*)** is sufficient for the treatment of **10 kg seed** or 4g culture/kg seed. Seed should also be treated with PSB culture for better utilization of soil Phosphorous. Seed treatment with ***Trichoderma* sps. @ 4g/kg seed** is also recommended for **termite or cutworm** affected fields.

For better growth and development of crop, seed may also be treated with Plant Health Promoting Rhizobacteria (**PHPR**) or Plant Growth Promoting Rhizobacteria (**PGPR**). These are the bacteria groups reside in rhizosphere of the legume crops. These microorganisms release hormones and vitamins which help in availability and absorption of nutrients by the crop plants.

Sowing Time

Rainfed condition: **First Fortnight of October**

Irrigated condition: **Last week of October to First Week of November**

Seed Rate

Depending upon seed size, moisture condition, sowing time, sowing method and soil fertility **80-100kg seed/ha** is required.

Spacing and Sowing Depth

Rainfed condition: 30 x 10 cm

Irrigated condition: 45 x 10 cm

Seed should be placed **8-10 cm deep** because the shallow shown crop is more liable to be suffered by wilt.

Nutrient Management

Crop	Eco-system	Sowing time	Dose (kg/ha) N- P ₂ O ₅ -K ₂ O-S

Gram	Rainfed	Normal	20-40-0-20
	Irrigated	Normal	20-60-20-20
		Late sown	40-40-0-20

Amongst micronutrients, the significant response to application of Zn, B, Mo, and Fe have been found at many locations (AICPIP,1990-93). All the fertilizers should apply as basal dressing in furrows below the seed.

Weed Management

Gram being a dwarf stature crop suffers severely (approximately 40-80% yield loss) by infestation of various weeds. *Chenopodium album*, *Melilotus alba*, *Anagalis arvensis*, *Asphodelus tenuifolius*, *Euphorbia denticularia*, *Convolvulus arvensis*, *Cyperus rotundus*, *Cynodon dactylon* etc. are the major weeds grow in gram fields.

Hand weeding

One hand pulling, hand weeding or inter culture with hand hoe or wheel hoe after 25-30 days after sowing and second if needed after 60 DAS.

Chemical weed Control

Fluchloralin (Basalin) @ 1.0 kg a.i./ha in 800-1000 litres of water as pre planting or pre-incorporation or **Pendimethalin @ 1.0 kg a.i./ha** in 800-1000 litres of water as pre-emergence application may control the majority of weeds.

Nipping

It is the process of **removal of top portion** of young plant. Nipping or removal of top portion (Apex bud with 2-3 leaves) stops the apical growth and promotes lateral branching, thus the plants become more vigorous and produce more flowers and pods and yield per plant is increased.

Water management

Gram is mostly grown as rainfed crop. However, where irrigation facilities are available, a pre-sowing irrigation is done if required. **Pre- flowering and pod development stages are most critical** from irrigation point of view. No irrigation should be given at flowering time of gram crop. Light irrigation is given because heavy irrigation enhances vegetative growth and depresses grain yield.

If winter rains occur excess water must drain out from the field immediately.

Harvesting and Threshing

Crop becomes ready for harvest when leaves turn reddish-brown and start shedding. Plants either plucked by hand or cut with the help of sickle. The crop is allowed to dry in sun on threshing floor for about five to six days. Thereafter, threshing is done either by beating the plants with sticks or by trampling under the feet of bullocks or by thresher.

Yield

A well managed crop of *Desi* gram varieties gave about **20-27 q/ha** while *Kabuli* varieties gave **15-20 q/ha** grain yield.
