Chickpea Production Technology

सत्यमेव जयते

Government of India
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Department of Agriculture Cooperation & Farmers Welfare
Directorate of Pulses Development, Bhopal (M.P.)

SOIL HEALTH CARD
Swasth Dhara, Khet Haraa

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CHICKPEA

Botanical Name – *Cicer arietinum* (L.)
Synonym – Chickpea, Bengalgram, Chana
Origin – South West Asia–Afganisthan /Persia.

Introduction

Chickpea is the largest produced food legume in South Asia and the third largest globally, after common bean (*Phaseolus vulgaris* L.) and field pea (*Pisum sativum* L.). Bengal gram is widely appreciated as health food. It is a protein-rich supplement to cereal-based diets, especially to the poor in developing countries.

Nutritive Value

Protein	- 18-22%	Calcium	- 280 mg/100 gm
Carbohydrate	- 61-62%	Iron	- 12.3 mg/100 gm
Fat	- 4.5 %	Phosphorus	- 301 mg/100 gm
Calorific value	- 396 Kcal/100 gm		

Crop Status

Globally, India ranked first in area and production, followed by Pakistan, Iran and Australia with respect to area and Australia, Myanmar with respect to production. The highest productivity of 3759 kg/ha is observed in China followed by Israel, Republic of Moldovaand Bosnia & Herzegovina. India's productivity was 995 kg/ha *(FAO Stat., 2014).*

During Twelfth Plan (2012-15) the area and production of gram has been 87.62 lakh hectares and 82.15 lakh tonnes. More than 90% gram production comes from 7 states of MP, Rajasthan, MS, Karnataka, AP, UP & CG. MP ranked Ist in area (34.69%) and production (40.60%). Maharashtra rank at IInd in area (16.57%) & IIIrd in production (13.07%) Whereas, Rajasthan stands IInd position in production (14.09%). The highest yield was recorded in A.P. (1522 kg/ha) followed by Punjab (1216 kg/ha) and Gujarat (1193 kg/ha). The lowest yield was recorded in Tamilnadu (648 kg/ha) *(DES, 2015-16).*

State-wise recommended varieties

States	Recommended Varieties	
	Desi	Kabuli
Andhra Pradesh	Phule G-95311, ICCV-32, Kranti, MNK 1, JG-11	ICVV-2
Bihar	KPG-59 (Uday), Pusa-372, KWR-108, Pant G-186	Pusa 1053, Pusa 1003, HK-2, HK-3
Gujarat	GKG-809, GKG-207, GCP-105, GKP-107, Gujarat Chana-4	PKV-2, PKV-4, Raj Vijay Kabuli Chana 202 & 203
Haryana	HK-4, RSG-888 (Anubhav), RSG-931, RSG-963, DCP-92-3, Karnal Chana 1	Haryana Kabuli-1, G-1053
Karnataka	BDN-103, JG-63, MNK-1, ICCV-37	Phule G -0517
Madhya Pradesh	Raj Vijay-201, JG-14, JG-226, JG-63, JG-130, JG-322, JG-218, JG-13, JG-11	Raj Vijay 202 & 201, JGK-2, JGK-3, JGK-1, KAK-2
Maharashtra	AKJ-9303-13, JAKI-9218, BDNG-797 (Akash), Digvijay, WCG-10, JG-16	PKVK-4, Virat, Phule G-0517, Ujjwal
Punjab	GNG-1958, GLK-28127, PBG-5, Pusa-547, GNG-469, Uday, Pusa-362, Rajas	L-551,L550
Rajasthan	RSG-974, RSG-902 (Aruna), RSG-896 (Arpana), RSG-807 (Abha), GNG-1488, GNG 421, Pratap Chana 1	L-550, KAK-2
Uttar Pradesh	GNG-1969, CSJ-515, WCG-3 (Vallabh color Chana), GNG-1581, BDG-72	Pusa 1003, KAK-2, K-4, Haryana Kabuli Chana 2
Uttarakhand	RSG-963 (Adhar), CSG-8962, Phule G 9925-9 (Rajas)	Pant Kabuli-1
Jharkhand	KWR-108, KPG-59, Pant G114	HK-05-169
Chhattisgarh	Pusa 391, Pusa-372, JSC-55, JSC-56, RG 2918 (Vaibhav)	JGK-1, Phule G-0517
West Bengal	Anuradha, Gujrata Chana-4, Uday	Pusa-1003
Tamil Nadu	MNK-1, Phule G-95311, JG-11	Co.-4

Source: Seednet GOI, Min. of Agri. & FW, & ICAR-IIPR, Kanpur

Climate Requirement

It's a winter season crop. But Frost at the time of flowering results in the failure of the flowers to develop seeds. It is best suited to areas having moderate rainfall of 60-90 cm per annum.

Soil Type & Field Preparation

It can be grown in coarse-textured sandy to fine-textured deep black soils (vertisols). However, the best suited soils are well drained, deep loams or silty clay loams with a pH ranging from 6.0 to 8.0. The field should have loose tilth and good drainage. The stubble and debris from the previous crop should be removed as these can harbor the pathogens that cause root diseases, such as collar rot.

Field preparation for sowing chickpea is based on the soil type and cropping system. In case of a heavy soil, a rough seedbed is prepared to avoid packing of the cloddy surface due to winter rains and to facilitate soil aeration and easy seedling emergence.

Sowing Time

North India – *Rainfed* : Second fortnight of October, ***Irrigated***: first fortnight of November.

Central & South India - First fortnight of October to first fortnight of November; **Late sowing** (December-January) should be avoided as the late-sown crop may experience moisture stress and high temperatures at the critical stage of pod-filling, leading to reduced yield and seed quality.

Method of Sowing & Seed Rate

Adopt line sowing by double box seed drill or local plough. Also BBF and Ridge & Furrow method in low lying or shallow lands at 8-10 cm depth as the shallow crop is much prone to wilt.

Seed size (100-seed weight)	Seed rate (kg/ha)	Spacing
Small (less than 20 g)	60 kg	Timely Sown: 30 cm X 10 cm
Medium (20 – 30 g)	90 kg	Late Sown-: 25 cm X 10 cm
Large (30 – 40 g)	120 kg	Irrigated areas-:45 cm X 10 cm
Extra-large (more than 40 g)	150 kg	

Seed Treatment

Disease Control: Strictly follow FIR seed treatment with (fungicide, insecticide and *rhizobium*) Seed treated with 2 g Thiram + 1 g Carbendazim or Carboxin(vitavex) 2 g/ kg to control wilt & root rot; *Insect-Pest:* Thiamethoxam 70 WP @ 3 g/kg seed; *Culture & Micronutrient: Rhizobium* 5 g + PSB 5 g/kg of seed & after that apply Molybdenum 1 g/kg of seed.

*If the seed is to be treated with pesticides, always apply fungicides first, followed by insecticides, and finally *Rhizobium* culture/Phosphate Solubilizing Bacteria (PSB) or follow instructions on the packets.

Water Management

Chickpea is mostly sown as a rainfed crop. However, where irrigation facilities are available, give a pre-sowing irrigation. One irrigation at branching and one at pod formation stage. Excess of irrigation enhances vegetative growth and depresses yield.

Fertilizer and Manure

Fertilizer requirements depend on the nutrient status of the field, and thus, vary from field to field. Therefore, the doses of fertilizers should be determined based on the results of soil test. It is better if all the fertilizers are drilled in furrows at a depth of 2 cm and at the side of 5 cm from seed.The generally recommended doses for chickpea include15- 20 kg nitrogen (N) and 50–60 kg phosphorus (P) per ha. If soils are low in potassium (K) an application of 17 to 20 kg/ ha K_2O is recommended. Total quantities of N, P and K should be given as a basal dose. Foliar spray of 2% urea at flowering has been found beneficial in rainfed crops.

Weed Control

Chickpea is a poor competitor with weeds at all stages of growth. Pre-emergence herbicides Pendimethalin 30% EC @ 0.75 to 1 kg a.i./ha was found effective in controlling early flush of weeds (use within 48 hrs. after sowing). Mechanical and/or manual weeding can be done where wide row spacing is used. One hand weeding or inter-culture with hand hoe or wheel hoe at 25-30 days after sowing.

Plant Protection Measures

Disease

The important disease of Chickpea are Collar rot, Wilt, Dry root rot. Symptoms of these disease and their suitable control measures are given below:

1. Collor Rot

Symptoms: The collar region of plant is constricted and begins to rot. White mycelial strands with minute mustard seed-sized sclerotial bodies are seen over the affected tissue. The affected seedlings turn yellow and wilt. It may be seen in seedling & vegetative growth stage.

Control Measures

i) Application of calcium fertilizer; ii) Seed treatment with fungicide carboxin @ 3 g /kg of seed; iii) Crop rotations with cereals such as wheat, sorghum and millets, and remove undecomposed debris from the field before sowing.

2. Dry Root Rot

Symptoms: The whole plant dries up and turns straw-colored. Roots become black and brittle and have only a few lateral roots or none at all. It may be seen in flowering & podding stage.

Control Measures

i) Seed treatment with *Tricoderma viride* @ 4g /kg seed or Thiram (2g) + Carbendazim (1g) @ 3 g per kg of seed or Carbendazim @ 2g/kg of seed; ii) Follow crop rotation; iii) Timely sowing to avoid post-flowering drought and heat stresses, which aggravate the disease.

3. Wilt

Symptoms: The main cause of this disease is a fungus (*Fusarium oxysporum*). Plant become yellowish and finally dry out. Roots turn black and ultimately decompose. It may be seen in seedling stage & advance stage of plant growth.

Control Measures

i) Seed treatment with *Tricoderma viride* @ 4g /kg seed or Thiram (2g) + Carbandizm (1g) @ 3 g per kg of seed or Carbendazim @ 2 g/kg of seed; ii) Sowing should be during third week

of October; iii) Deep Planting (8-10 cm) in light soil; iv) In case of heavy incidence avoid cultivation for 03 to 04 years; v) Grow resistant varieties: *Desi*- JG 315, JG 322, JG 16, JG 11, JG 12, JSC 37, JSC 55, JAKI 9218; *Kabuli*- JGK 1, JGK 2, JGK 3 (Gulabi)- JGG 1.

Insect-Pest Management

1. Cutworm

Nature of Damage Serious pest in low lying areas where fields are cloddy. The larvae remains hidden under these clods during the day time & cause damage during night. It may be seen in Seedling, vegetative growth stage & reproductive stage.The caterpillar cut the plants at ground level. Larvae feed on leaves, stems and roots.

Control Measures

i) Summer deep ploughing; ii) Crop rotation; iii) Intercropping with wheat or linseed or mustard; iv) Grow marigold on bunds; v) Apply Phorate 10 G @ 10 kg/ ha before sowing; vi) Spray insecticides like Quinalphos 25 EC @ 2 ml /liter or Profenofos 50 EC @ 2 ml /liter.

2. Gram Pod Borer

Nature of Damage

I) Larvae feed on leaves during the vegetative phase and on flowers and pods during the reproductive phase; ii) Large larvae cut round holes in the pod wall and devour the seed inside.

Control Measures

i) Early sowing, grow short duration varieties; ii) Intercropping with coriander, linseed, marigold, mustard, sunflower or wheat; iii) Use moderate resistant cultivars like ICCV10, Vijay, ICCV 7 and ICCL 86103, PBG-3; iv) Install bird perches @ 40-50 /ha; v) Spray neem seed extract (5%); vi) Apply HaNPV @ 250 LE/ha or Spray indoxacarb @1 ml/lit or Emamectin benzoate 5 SG @ 0.2 g /lit of water at 10-15 days interval if needed

Harvesting, Threshing & Storage

Crop become ready for harvest when leaves begin to fall, stem and pod turn brown or straw in colour and seeds are hard and rattle (most important) with 15% moisture inside them. Over ripening may lead to fall of pods as well as shattering and seed cracking if seed moisture falls below 10% due to delay in harvesting. The crop is allowed to dry for 2-4 days on threshing floor (depending on situation) and threshed by manually or bullock/power drawn thresher followed by winnowing. The clean seed should be sun dried for 3-4 days to bring their moisture content at 9-10%. Now they should be safely stored in appropriate bins and fumigated to protect them from bruchids.

Yield

By adopting good management practices, an average yield of 15-20 q/ha can easily be obtained.

Recommendation to achieved higher production

i) Deep summer ploughing once in 3 years to eliminate dormant pupae.

ii) Application of fertilizer based on soil test value.

iii) Seed treatment with *Trichoderma* (6 g/kg) and Carboxin (Vitavax) (1g/kg).

iv) Grow wilt resistant/ tolerant varieties of the region: JG 315, JG 12, JG 11, JAKI 9218, JGK 1, JGK 2, JGK 3, KAK2 etc.

v) Install bird perches @ 50/ha at flowering stage and remove the perches at grain ripening stage.

vi) Nipping should be done when crop is at 15-20 cm height.

vii) Two irrigations first at branching and second at pod initiation stage.

viii) Weed control should be done at right time.

ix) Seed treatment with Ammonium Molybdate @ 1g/kg of seed in the areas of chickpea- soybean cropping system.

x) Spray of crude NSKE 5 % or Azadirachtin 0.03 % (300 ppm), Neem oil based WSP 2500-5000 ml/ ha at pre-flowering stage at 15 days interval.

- For technical information of crop production please contact to district KVK/SAUs/RARS.
- To avail benefit from Central and State Run-Schemes on crop development (ploughing, fertilizers, micronutrient, pesticide, irrigation equipment), agricultural implements, storage infrastructure etc., please contact your DDA/SADO office.

- For more information also visit -

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