Agri Articles
(e-Magazine for Agricultural Articles)
Volume: 02, Issue: 06 (NOV-DEC, 2022)
Available online at http://www.agriarticles.com
©Agri Articles, ISSN: 2582-9882

Quality Seed Production of Chickpea *(Cicer arietinum L.)*

(*Srishti)
Department of Genetics and Plant Breeding, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, Utter Pradesh- 224229
*Corresponding Author's email: srishtivishwakarma241998@gmail.com

Abstract
Chickpea (*Cicer arietinum*) is the largest produced legume in South Asia. It is a winter crop in the tropics and a summer crop in the temperate regions of the world. It is cultivated in about 50 countries around the globe. Being a legume, it plays an important role in improving the soil conditions by increasing its fertility through the much known phenomenon of nitrogen fixation. It is desired for its high protein content, especially in the developing countries. Despite the introduction of numerous cultivars, fewer than one ton of chickpeas are produced globally and in India per hectare on average. This is primarily due to the substantial difference between achieved and prospective yields. In addition, significant pests and disease losses have led to an increased need for opting quality seed production for chickpea by the breeders.

Keywords: Legume, nitrogen fixation, developing, quality

Introduction
Chickpea, scientifically known as *Cicer arietinum*, is the third most important pulse crop worldwide after common bean and field pea. It is known by various names such as, gram, Bengal gram, garbanzo bean, and Indian pea. It is a self pollinating species having an outcrossing percentage of less than 1%. The chickpea is a diploid (2n=16) crop belonging to the legume family, i.e., Fabaceae. India tops in the production of chickpea globally contributing to nearly 70% of the total production. Mediterranean and Southwest Asia was described as the primary and Ethiopia as the secondary center of origin for chickpea, by N. I. Vavilov (1926). The crop is known for its high protein content (25.3-28.9%). It's also a good source of dietary fiber, polyunsaturated fatty acids, vitamin A, vitamin E, vitamin C, Folate. Magnesium, potassium, and iron. It is used in culinary to prepare many dishes, and also as animal feed.

Botanical Description
Plant morphology: Chickpea is an annual herbaceous plant with a vast tap root system that enables it to survive to dry conditions. The roots have Rhizobium bacteria that are capable of fixing Atmospheric nitrogen in the nodules. The leaves arise from the nodes and are pinnately compound that are arranged alternately. Rachis (25cm-30cm) ends in a terminal leaflet. The leaflets (11-19 in number) are sub- sessile and arranged opposite or alternately. Leaf size and forms differ in different varieties. Trichomes cover the surface of the whole plant body except, the corolla. These paly a significant role in defense against insect pests. Stems may usually be straight or flexuous with prominent ribs. The height of the plant may vary from 20cm to 100cm and reach upto 150cm depending upon the environmental conditions. The

chickpea plant produces three distinct branches, viz., primary (1-8 in number), which are responsible for determining the plant habit, secondary, that determines the net photosynthetic area thereby yield of the crop, and tertiary, which may or may not be present and carry fewer pods. The pod is inflated and lengthens from 15mm to 30mm. It is 7mm to 14mm thick and 8mm to 15mm wide. Generally, the number pods ranges from 20 to 150 and the number of seeds vary from one to three. Seeds are beaked and wrinkled or sometimes spherical. Cotyledons may or may not be separated by a groove. Both seed coat and cotyledon vary greatly in color from whitish to creamy deep black andmay be red, orange, green and brown. Length and width of the seed ranges from 4mm to 12mm and from 4mm to 8mm respectively. The seed weighs about 0.1g to 0.75g.

Floral biology: Flowers are solitary pappilionaceous arranged in the form of axillary raceme. They are bracted and the bracts are triangular and small. Calyx is glabrous havinf 5 patly joiines sepals. Corolla has veins and may possess various colors like pink, purple, red, white, blue, etc. Petals are arranged in a vexillary aestivation, having a standard petal, two winged petals and a keel petal. Stamens (9+1) are diadelphous and pollen is orange in color. Ovary is ovate, 2mm to 3mm long, 1mm to 1.5mm wide, containing 2 or 4 ovules. The stigma is globose and the style is linear,upturned, and 3mm to 4mm long.

Types

Desi chickpea: Desi type chickpeas are distinguished by their colourful and thick seed coat. Various tints and mixtures of brown, yellow, green, and black are among the prevalent seed colours. In general, the seeds have a rough surface, are tiny, and angular. Although certain desi varieties have white flowers and no anthocyanin colour on the stem, the plants often exhibit varying degrees of anthocyanin pigmentation and the blossoms are typically pink. 80–85% of the chickpea area is made up of the desi kinds. Both the flour (besan) and the splits (dal) are typically produced of desi kind.

Kabuli chickpea: The kabuli chickpeas are distinguished by white or beige-colored, ram's-head-shaped seeds, thin seed coats, smooth seed surfaces, white blooms, and a stem devoid of anthocyanin coloration.The kabuli kinds have lesser levels of fibre and more sugar than the desi types. The market value of kabuli varieties is higher than that of desi varieties because they often have large-sized seeds. With larger seeds, the price premium for kabuli varieties typically rises.

Seed Production

Selection of suitable area: During rabi, chickpeas are grown (post rainy season) immediately after a kharif crop or kharif fallow. The planting has concluded. An October or November month. (December–January) Late sowing should not be used as the late-planted crop may endure moisture stress and high temperatures at the crucial moment of pod filling, resulting in decreased yield and level of seed.

Climatic Requirements: The chickpea requires cool, dry and bright weather. Photoperiod, temperature and moisture availability are the major factors affecting flowering in chickpea.

Soil Requirements: Chickpeas can be cultivated well in a number of soil types, However, deep loams or silty clay loams with a pH range of 6.0 to 8.0 are the best options. Chickpea cannot grow in fields with high water tables or saline soil.

Figure 1 Plant of chick pea

Field preparation: The area intended for growing chickpea seeds must be free of weeds and undesirable plants. It is needed to be well-drained. Leveling and harrowing are done after thorough plowing to prepare the ground.

Isolation: For foundation seed class: 10m; For Certified seed class: 5m (In order to avoid natural crossing)

Sowing: Time: 3rd and 4th week of October

Methods: Line sowing, broad bed and furrow system, ridge and furrow system

Depth: 5cm - 8cm

Spacing: Row-to-row 30cm and plant-to-plant 10cm (For desi); Wider row spacing 45cm – 60cm (For large seeded kabuli chickpea and irrigated conditions)

Seed rate: 50 – 150 kg ha^{-1}

Nutritional requirement: Recommended dosage for application of NPK: 20kg – 30kg (N), 40kg – 60kg (P), 17kg – 25kg (K). The nutrients are provided as a basal application to the standing crop. Besides NPK, the crop requires micronutrients like Sulphur (S), Zinc (Zn), Iron (Fe), Boron (B), and Molybdenum (Mo).

Irrigation: Chickpea is usually cultivated as a rainfed crop, but atleast two irrigations may be needed, at the time of branching and then, pod filling.

Plant protection

Disease management:

DISEASE	CAUSED BY	MANAGEMENT
Vascular wilt or Fusarium wilt	*Fusarium oxysporum* f. sp. *ciceri*	Use resistant varieties: JG 11, JAKI 9218, KAK 2
Dry Root rot	*Rhizoctonia bataticola*;	Seed treatment with *Trichoderma viride* @ 4g kg^{-1}
Ascochyta blight	*Acsochyta rabiei*	Use Resistant varieties: PBG 1, BG 267, GNG 146 Seed treatment with carbendazim and thiram (1:1),
Botrytis grey mold	*Botrytis cinerea*	Use resistant varieties, intercropping with linseed, foliar spray of carbendazim, mancozeb, or captan at regular intervals

Insect management:

PESTS	SCIENTIFIC NAME	MANAGEMENT
Gram pod borer	*Helicoverpa armigera*	Use varieties like ICCV 10 and Vijay that suffer low damage, strategies like IPM
Cut worm	*Agrotis ipsilon*	Use broad spectrum insecticides
Termite	*Odontotermes obesus*	Apply Thimet 10 G or Carbofuran 3 G @ 1kg a.i. ha^{-1} during sowing or seed treatment with chlorpyriphos 20 EC @ 12.5 ml kg^{-1} seed, cultural practices like destroying termite mounds

Weed management:

WEED	BOTANICAL NAME	MANAGEMENT
Bathua	*Chenopodium album*	Practice IPM, use pre emergence herbicides like Fluchloralin @ 1kg a.i. ha^{-1} or Pendimethalin @ 1.0 to 1.5 kg a.i. ha^{-1}
Yellow pea	*Lathyrus aphaea*	
Common vetch	*Vicia sativa*	

Roguing: Roguing aids in maintaining varietal purity and removing seed-borne diseases. It is recommended to rogue off-type plants and other alien crop species (morphologically similar seeds), parasitic weeds like cuscuta spp.

Harvesting and Yield: Harvesting is done when leaves start shedding, plants become dry, pods become yellow and seeds rattle within the pods followed by drying the seeds under the sun for a few days. The average seed yield is 15q to 20q ha^{-1}.

References

1. Gaur PM, Tripathi S, Gowda CLL, Ranga Rao GV, Sharma HC, Pande S and Sharma M. 2010. Chickpea Seed Production Manual. Patancheru 502 324, Andhra Pradesh, India: *International Crops Research Institute for the Semi-Arid Tropics.* 28 pp.
2. K Chandrashekar, Mrs Om Gupta, Suhas Yelshetty, O P Sharma, Someshwar Bhagat, C Chattopadhyay, Mukesh Sehgal, Arpana Kumari, N Amaresan, S N Sushil, A K Sinha, Ram Asre, K S Kapoor, K Satyagopal and P Jeyakumar. 2014. Integrated Pest Management for Chickpea. pp. 43