

**Indian Farmer**

Volume 12, Issue 09, 2025, Pp. 509-516

Available online at: www.indianfarmer.net

ISSN: 2394-1227 (Online)

Original article**Production Technology of Garlic****Sable P A., Vaghela K Z., Rathwa A D. and Piyush Verma***College of Horticulture, S. D. Agricultural University, Jagudan, Mehsana, Gujarat***Corresponding author: sable.pating@sdau.edu.in**Received: 24/08/2025**Published: 01/09/2025***ABSTRACT**

Garlic is one of the important bulb crop among all bulbous crops grown and used as a spice or a condiment. It can be grown in all types of soils, however, fertile loamy soils with pH 6.0 – 8.0, EC 3.9 dS /m, good drainage capacity, water holding capacity and containing organic matter in sufficient amount is the best. It can be grown under a wide range of climatic conditions, but it cannot tolerate too hot and too cold temperatures. Cool climate results in higher yield than warm climate. In garlic, subsequent bulbing hastens when young plants exposures to 20°C or lower temperature for 1-2 months, while, crops that are not exposed to such climatic conditions may fail to produce bulbs or produce smaller bulbs. The ideal growth temperature for garlic is 13 to 24°C, however, longer exposure to low temperature may produce bulbils in the axils of the leaves, which reduce the bulb yield. Short-day garlic requires 10-12 hrs critical day length for bulbing, while, 13-14 hrs for long-day garlic for bulbing. The article highlights the production technology of Garlic.

1. INTRODUCTION

Garlic is one of the important bulb crop among all bulbous crops grown and used as a spice or a condiment. The aroma in garlic is due to volatile organosulfur compound 'Allicin' that makes it popular in daily cooking in Indian household. The antibacterial action by virtue of allicin has been found to have potential even in organic farming for treatment of plant diseases (Malik *et al.*, 2017 and Sable *et al.*, 2025). Uninjured garlic bulbs contain *alliin*, a colourless, odourless and water-soluble amino acids. On crushing the garlic bulbs the enzyme allinase comes in contact with *alliin* and causes its breakdown into a sulphur containing product allicin which is the antibacterial substance of garlic and has typical odour of fresh garlic. The *alliin* of garlic contains an allyl radical from which allyl products observed. Garlic contains about 0.1- 0.4 per cent essential oil. The chief constituents of oil are diallyl disulfide (60%), diallyl trisulfide (20 %), allyl propyl disulfide (6%), a small quantity of diethyl disulfide and probably diallyle polysulfide. Diallyle disulfide possesses the true garlic odour (Singh and Pal, 2022 and Alekar *et al.*, 2020). In India, garlic is commercially cultivated throughout the country. But the long day garlic is cultivated only in temperate region especially in Jammu and Kashmir, Himachal Pradesh and Uttarakhand. This type requires long photoperiod (13+ hrs/ 13-14 hrs) with warm temperature (20-25°C) for bulbing (Malik *et al.*, 2017

and Khade *et al.*, 2017). In temperate India, the planting time for long day garlic falls around September-October. The increase in day length from around February following the decline in snowfall and rise in temperature till the month of May is congenial for bulbing and bulb development. During 2020-21, total area under garlic was 392 '000' ha with a total production of 3190 '000' t (Anonymous, 2022).

2. VARIETIES

Brief descriptions of varieties as below.

Variety	Orgnization	Colour	Recommended for area	Duration (Days)	Yield (t/ha)
Bhima Purple (SD)	ICAR-DOGR	Purple	AP, Bihar, Delhi, Haryana, KNT, M.S., Punjab & UP.	120-135	6-7
Bhima Omkar (SD)	ICAR-DOGR	White	Delhi, Gujarat, Haryana and Rajasthan.	120-135	8-14
Yamuna Purple-10	NHRDF, RRS., Karnal	Purple	Zone II (Jammu, Ludhiana, Delhi Haryana and Rajasthan) and zone IV (M.P., Chhattisgarh, Karnataka, M.S. and Rajasthan)	165-175	18-20
CITH-Garlic- 1 (LD)	ICAR-CITH	Purple	Agro climatic Zone I (J&K, Uttarakhand, HP).	210-245	47.43
Agrifound White/ G-41 (SD)	NHRDF	White	M.P. and M.S.	130-135	12-14
Yamuna Safed/ G-1 (SD)	NHRDF	White	All India	120-130	15-17
Yamuna Safed-2/ G-50 (SD)	NHRDF	White	Northern India	120-130	15-20
Yamuna Safed-3/ G-282 (SD)	NHRDF	Cream y white	Chhattisgarh, Gujarat, Haryana, MP., MS., Punjab, Rajasthan and UP	120-130	17-20
Yamuna Safed-4/ G-323 (SD)	NHRDF	White	North and central India	165-175	16-17
Agrifound Parvati (LD)	NHRDF	Purple	Hills of HP, Uttarakhand, J & Kand high altitudes of North eastern states like Sikkim <i>etc.</i>	165-175	17-18
Agrifound Parvati-2 (G-408) (LD)	NHRDF	White	Hills of HP, Uttarakhand, J & Kand high altitudes of North eastern states like Sikkim <i>etc.</i>	165-175	17-22
Godavari (SD)	MPKV	Purple	Maharashtra	140-145	10-11
Shweta (SD)	MPKV	White	Maharashtra	130-135	10-11
Phule Baswant (SD)	MPKV	White	Madhya Pradesh and Maharashtra	135-140	10-11

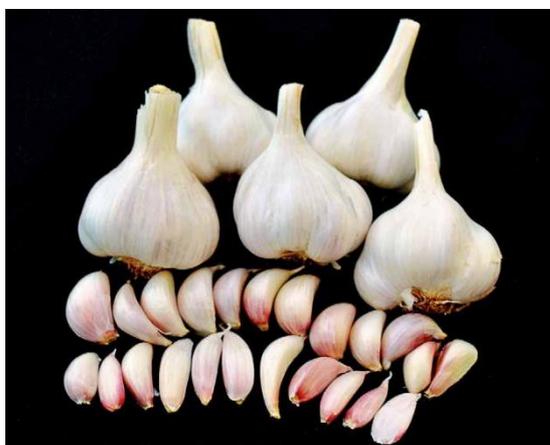
Phule Nilima (Sel-10-3)	MPKV	Purple	Maharashtra	-	-
PDKV-Purna (AKG-07)	Dr. PDKV, Akola (MS)	-	Maharashtra	-	-
Gujarat Junagadh Garlic-5	JAU, Junagadh	White	Gujarat	-	7.94

*SD= Short day type and LD= Long day type

Source: Singh et al., 2016, Khade et al., 2017, Dubey and Gupta, 2021, NHRDF, DOGR Portal



Cloves of Gujarat Junagadh Garlic- 5



Cloves of Bhima Purple



Cloves of Bhima Omkar

Source: Khade et al., 2017

3. CULTIVATION

Generally, planting time of Garlic is October November, varies region to region. Garlic can be grown in all types of soils. However, fertile loamy soils with pH 6.0 – 8.0, EC 3.9 dS /m, good drainage capacity, water holding capacity and containing organic matter in sufficient amount is the best. It can be grown under a wide range of climatic conditions, but it cannot tolerate too hot and too cold temperatures. It prefers cool and moist climate during vegetative growth and bulb

development stages, while, warm dry weather during maturity. In garlic, subsequent bulbing hastens when young plants exposures to 20°C or lower temperature for 1-2 months, while, plants that are not exposed to such climatic conditions may reflects into failure of bulb production or smaller bulb production. The ideal growth temperature for garlic is 13 to 24°C, however, longer exposure to low temperature may produce bulbils in the axils of the leaves, which reduce the bulb yield. Short day garlic requires 10-12 hrs day length for bulbing, while, long-day garlic requires 13-14 hrs day length.

Planting

Garlic is propagated vegetatively by cloves. Individual clove from seed garlic bulbs is to be separated (Not long before planting) by twisting off the outer skins and take the cloves apart without breaking the basal plate of the cloves, as broken cloves are not used for planting. Cloves of 8- 10 mm diameter with more than 1.5 g weight are to be selected for planting, while, small, diseased and damaged cloves should not be used for planting. Big sized cloves from outer side of the bulbs are to be selected, while, long, slender cloves present in the centre should not be used for planting because such cloves gives poorly developed bulbs. Incidence of fungal diseases during establishment can be minimized by dipping cloves in carbendazim solution (0.1 %), just before planting. For planting in one hectare area about 400-500 kg cloves are required. Cloves should be planted vertically 2 cm below soil surface at 15 cm x 10 cm spacing (Khade *et al.*, 2017).



Clove planting on raised-bed at spacing 15 x 10 cm

Nutrient management

Bio-fertilizers like *Azospirillum/ Azotobacter* 5 kg/ ha, *Phosphorus solubilizing bacteria* (PSB) 5 kg/ ha to be applied before planting through 100-200 kg 50 % moisturized FYM (After overnight

enrichment). Experimental results from MPKV., Rahuri confirmed that FYM 20-25 t or vermicompost 7.5 t or poultry manure 7.5 t; 100:50:50 kg NPK/ ha gives better bulb yield. Basal dose of NPKS 50:50:50:40-50 kg/ ha is to be applied at the time of planting, whereas, remaining N 50 kg/ ha to be applied in 3 equal splits at 30, 45 and 60 DAP. At 30, 45 and 60 DAP 0.5% spray of 19:19:19 enhances crop growth and garlic bulb yield. Like onion, micronutrients deficiency can be corrected by spraying 0.2% Grade-IV (Zn 6%, Fe 4%, Mn 1%, Cu 0.5% and B 0.5%) at 45 and 60 DAP (Sable et al., 2025).

Weed management

Application of oxyflurofen 23.5% EC 1.5 -2.0 ml/ L before or at the time of planting + one hand weeding at 40-60 DAP shows higher weed control efficiency (Singh et al., 2016, Khade et al., 2017 and Dubey and Gupta, 2021).

Micro-irrigation and Fertigation

Drip as well as sprinkler irrigations save water, fertilizers and enhances bulb yield 15-25% as compared to flood irrigation in case of drip. For drip irrigation, seed cloves are to be planted at a spacing 15 x 10 cm in raised bed/ broad bed furrow having height 15 cm and top width 120 cm with 45 cm furrow. Each raised bed should have two 16 mm size drip laterals at 60 cm distance with emitters at around 30-50 cm distance having discharge capacity 4 L/ hr. While, in case of sprinklers, the distance between two 20 mm size laterals should be 6 m having a discharge capacity of 135 L/ hr.

Nitrogen use efficiency can be increased by applying 30 kg N/ ha in soil at the time of planting and the remaining 70 kg N/ ha in seven splits equally at weekly interval up to 60 DAP through drip irrigation (<https://dogr.icar.gov.in>).



Garlic grown on raised-bed at spacing 15 x 10 cm



Garlic grown on raised-bed with sprinkler irrigation

Harvesting and yield

Harvesting starts when the leaf tops starts to dry, discolour and bend towards the ground. Another indication of bulb maturity is the reduced thickness of the sheath leaves surrounding the bulb. Generally, garlic matures in 130-160 days depending upon the cultivar, location and season. Early harvest results in bulbs which are immature and tend to shrivel when cured, while, late harvest may result in bulbs which have stained and have partially decayed wrapper leaves and exposed cloves. Garlic bulbs along with top may be cured/ dried in the field for two to three days after harvesting to increase storage life by minimizing microbial and fungal infection and water loss during storage. It yields 9- 10 t/ ha.



Harvesting of Garlic

Disease and pest management

Thrips (*Thrips tabaci*) is major pests of Garlic and Onion. Diseases like purple blotch, stemphyllium leaf blight, Irish yellow spot virus and onion yellow dwarf virus (OYDV) etc. are severe diseases. Suitable plant protection measures can be taken to minimize yield losses, while, adapting plant protection measures some points need to be considered viz. start foliar sprays of pesticide as soon as pest and disease appears in the field; interval 10-15 days depending upon the intensity of pest and disease; spreader to be added @ 0.5 % while spraying and avoid repeated application of pesticides belonging to the same group. For effective management of OYDV, IPDM strategies should be followed viz. selection of OYDV resistant variety, aphid management as aphids is the vector, spray of insecticides like profenofos @ 0.1% or carbosulfan @ 0.2% or fipronil @ 0.1% for aphid management. Iris yellow spot disease (virus) transmitted through onion thrips and can be managed by adapting thrips management practices.

Management of Stemphyllium blight and thrips

- At 3-5 DAP: Application of *Trichoderma* 1.25 kg and *Pseudomonas* 2.5 kg/ ha.
 - Fungicides and insecticides spray (per lit of water)
- 1 At 30 DAP: Mancozeb 2.5 g + fipronil 5 SC 1 ml.
 - 2 At 45 DAP: Propiconazole 25% EC 1 ml + carbosulfan 25% EC 2 ml.
 - 3 At 60 DAP: Copper oxychloride 2.5 g + profenofos 1 ml.



Stemphyllium blight in Garlic

CONCLUSION

The improved production technology (INM, IWM and IPDM) of Garlic gives higher yield.

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