

# POST-HARVEST HANDLING OF GARLIC

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**G**arlic (*Allium sativum* L.), the spice of human life and one of the most important perennial bulb crop of the lily family (*Liliaceae*) which is grown all over the plains of India. It is used as the spice or condiment throughout the world and is valued for its flavour. Furthermore, it has extensive application in food and pharmaceutical preparations. The flavour of garlic is attributed to the sulfur containing volatiles called allin. Nowadays, people become more aware about health and start consuming garlic in daily life. So, processing and value addition in garlic could generate big market scope

## Medicinal benefits:

Garlic has antioxidants, antibacterial and antibiotic properties. Allicin content in garlic helps to reduce cholesterol levels. It is immensely beneficial to regulate blood pressure and blood sugar levels. It has organo-sulfur compound which has been effective in destroying the cells in glioblastomas (brain tumor). Diallyl sulfide, a compound in garlic, is 100 times more effective than antibiotics. Prophylactic use of garlic may decrease the frequency of colds in adults.



## Harvest and post harvest practices of Garlic



### Harvesting

- Look for the bottom leaves on the stalk to turn brown while upper leaves remain green.
- Pull the garlic using garden tools rather than pulling the stems.

### Selection and Storage

- Select the clean, firm and unbroken skin garlic bulbs which are heavy in size. Garlic bulbs should not have any sign of moulding and sprouting without mechanical damage or bruises.
- Store the bulbs at room temperature for a week to cure it and spread in single layer over the storage racks such that bulbs and roots are all uppermost for best air flow.
- Place garlic in nylon netting which is hung vertically to allow good flow of air. Good ventilation is required during its storage generally at the rate of 25 changes/ hour with continuous supply of fresh air.
- Garlic can be kept in good condition for 1-2 months at ambient temperatures of 20-30° C under low relative humidity (<75%).

Commodity	Temp		R.H.	Potential storage duration
	0°C	°F	%	
Garlic	0°C	32	70	6-7 months
	28-30	82-86	70	1 month

### How to Process and preserve Garlic?

There are number of preservation techniques in addition to being healthy increases consumption of its bitter fruit. Further, processing of garlic can become great source of income among farmers and women. Following processing and preservation techniques makes availability of garlic for whole year.

**1. Peeling:** Peeling of garlic can be done by four different methods.

a) **Lye peeling:** Garlic is immersed in hot

caustic soda solution. Vigorously rinsed with water rinse to remove the chemicals adhered to the skin. Neutralized in acid bath and trimmed to give perfect finish.

b)**Water dipping:** Submergence of cloves in warm water for 5-10 minutes.

c)**Oven peeling:** Garlic is placed in oven for 5-10 seconds. The root is then cut and skin slides off easily.

d)**Flame peeling:** Garlic is brought into direct contact with the live flame. High temperature burns the outer skin and can be easily removed.



## Different Preservation techniques for Peeled cloves

Preservation Technique	Method
Freezing	<ul style="list-style-type: none"> <li>Peel the cloves and place them in freezer bags in the freezer.</li> <li>Another method for freezing garlic is to chop it and wrap it tightly in plastic wrap or freezer bag.</li> <li>Garlic puree oil can be prepared by adding one part peeled garlic cloves in a blender or food processor along with two parts olive oil.</li> <li>Puree the mixture, then immediately transfer it to a freezer container. Cover the container and place it in the freezer.</li> </ul>
Roasting	<ul style="list-style-type: none"> <li>Wrap the peeled cloves in baking dish and bake at 350°F (180 °C) for 45 minutes to 1 hour.</li> <li>Sprinkle with olive oil or some greasing agent to be used as side vegetable with pinch of salt and other herbs.</li> </ul>
Garlic in wine or vinegar	<ul style="list-style-type: none"> <li>Prepared by adding peeled garlic cloves to undiluted full strength wine or vinegar and keeping it under refrigerated conditions.</li> <li>Preserves garlic- liquid mixture for about four months.</li> <li>Submerged cloves can be further utilised for preparing other dishes.</li> </ul>
Garlic in oil	<ul style="list-style-type: none"> <li>Garlic in oil is prepared by adding citric acid or phosphoric acid to increase its acidity.</li> <li>Chop the peeled garlic into pieces of 6mm or not longer than ¼th of inch.</li> <li>Take 2 cups of warm water and add 1 tablespoon equivalent to 15 ml or 15 g of citric acid powder. Add 2/3 cup of chopped garlic to 2 cups of prepared solution and stir it.</li> <li>Store at room temperature or in refrigerator.</li> </ul>

### Drying

- Open or Shade Drying:**
  - Place the product under the direct sunlight or it can also be carried out undershade. It is widely method.
  - Preserves nutritional components during shade drying.
- Solar Drying:**
  - Solar drying has faster drying rates.
  - Air is heated to 10-30 °C above ambient, which causes air to move faster through drying and reduces its humidity.
- Cabinet Drying:**
  - Superior method than sun drying and other drying techniques.
  - Optimum levels for cabinet drying - 60 °C temperature, 30 mm thickness, 9m/s velocity and 0.1% concentration of sodium metabisulphite as pre-treatment. Garlic slices were found to be lighter in color (i.e having higher values of L), high dehydration ratio and moisture content below 5.5%, high organoleptic score
- Tray Drying:**
  - Garlic is dried by spreading on the trays which can be perforated or non-perforated.
  - Generally recommended temperature of drying is 60 °C for duration of 1 hour at an air velocity of 2m/s
- Fluidised Bed Drying:**
  - Most suitable method of drying for drying fruits and vegetables which are small in size.
  - Drying is achieved by fluidisation of food products by the underneath flow of air which is cut into small size or converted into granular form.
  - Recommended conditions for fluidisation of garlic is 60 °C for 4 hours with good quality of powder and low in moisture content (<3%),
- Microwave Drying:**
  - Microwave Drying can be performed individually or in combination with conventional drying methods.
  - Rapid method of drying without causing overheating of product.
  - The best suitable parameters for microwave air drying are at the temperature of 40, 50, 60 and 70 °C at air velocities of 1.0 and 2.0 m/s using continuous power of 40 W

The best recommended drying parameters are:

- \*Air temperature : 50-90°C
- \*Air Relative humidity : 10-40%
- \*Air Velocity : 1-4 m/s

- Dry garlic can be kept at temperature of 0-1 °C and 65-70 % relative humidity.
- For sun drying, garlic must be protected from sun scald especially during periods of high temperature and bright sunlight.

## Packaging and transportation

Raw garlic is packaged in wooden jointed boxes (17 Kg) and in 25 Kg jute bags, baskets or chip baskets. PP bags and PVC punnets overwrapped with cling film are most suitable for packaging peeled garlic cloves at ambient as well as refrigerated conditions.