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# Evaluation of Garlic (*Allium sativum* L.) Peeling Methods

UMESHA*, T. L. PRAKASHA[1] , S. C. MANDHAR[2], K.S. RAJASEKHARPPA AND K. VENKATACHALAPATHY

*Department Agricultural Engineering, University of Agricultural Sciences, GKVK, Bangalore 560010, India*
*[1]Department of Plant Pathology, College of Agriculture, University of Sciences, Dharwad, India*
*[2]Section of Agricultural Engineering, Indian Institute of Horticulture Research (IIHR), Bangalore, India*
*E-mail : umesh_aug15@indiatimes.com*
**Correspondence*

**Abstract**

The different methods of garlic peeling viz., machine peeling, oven peeling, conventional peeling, and flame peeling were evaluated on capacity, performance, quality of peeled garlic, and cost involved in it. Garlic cloves were preheated and peeled by different methods. Results revealed that garlic peeler had the higher peeling efficiency (79.56%) than that of other peeling methods. In oven and conventional peeling methods, gunny bag was used for peeling; it has not good abrasive surface to peel the garlic. Chemical components such as crude protein and volatile content were decreased much in garlic, peeled by flame peeling method. TSS content was increased in conventional peeling method. Cost of peeling was found to be lower (Rs 1.43) in machine peeling compared to highest cost of peeling in conventionally peeling method (Rs 9.91).

**Key words : Garlic peeling, Evaluation.**

Garlic (*Allium sativum* L.) is the second most widely cultivated allium vegetable next to onion. It is grown through the plains of India and used by most of the people in various forms. The medicinal values of garlic have boosted the scope for the production of the crop. It has been reported that consumption of garlic lowers blood cholesterol. Apart from its indispensible value in up keeping the human health, it has insecticidal, fungicidal and bactericidal properties. Garlic powder, paste, flavor, pickle and flakes are few value added products. Peeled garlic packed in polythene bags is also available in foods stores. Encapsulated garlic powder, flavor and volatiles are now exported. Peeling of garlic cloves is essential for processing of garlic. Whole garlic bulb consists of firmly attached through membranous layer all around. Processing of garlic requires care and attention due to presence of volatile oils in the epidermal cells imparting characteristics aroma. Peeling of garlic is an essential operation prior to pickling and powder making. Traditional methods of peeling garlic in processing industries and at kitchens are laborious with time, cost and restrict the processing activity. To determine the best of peeling method with respect to performance, capacity, quality of peeled garlic and cost involved in it, the present research work was under taken.

## Methods

Well matured, cured, uniform size garlic (var) Anupam safed) with moisture content 57.5% were procured from market. The experiments were conducted at the section of Agricultural Engineering, Indian Institute of Horticulture Research (IIHR), Bangalore, Garlic was peeled by different methods as described below.

*Machine peeling*

The garlic cloves were separated from the bulbs using garlic bulb breaker developed at the section of Agricultural Engineering, IIHR; thin papery layers were blown off. Cleaned cloves were heated in cabinet tray drier at 60C for 45 minutes (1) for conditioning and to remove surface moisture (2). Then the cloves were fed into hand operated garlic peeler developed at the section Agricultural Engineering, IIHR. It consisted of cylinder, which was covered with a hopper. A concave is provided underneath cylinder with outlet. The rotating cylinder was lined with rubber sheet to impart abrasive action against garlic cloves between the cylinder and concave (screen). Peeled cloves were separated by blowing the skin.

*Oven peeling*

Oil (sesame) smeared garlic cloves were placed in tray drier at 60C for 30 minutes. Then cloves were

**Table 1.** Comparison of different peeling methods of garlic.

| Peeling methods | Damage (%) | Per cent unpeeled (%) | Per cent peeled (%) | Efficiency (%) | Capacity (kg/h) |
|---|---|---|---|---|---|
| Machine peeling | 10.66 | 10.93 | 78.40 | 79.56 | 11.66 |
| Oven peeling | 11.14 | 42.88 | 46.60 | 50.49 | 0.90 |
| Conventional peeling | 12.02 | 34.32 | 53.61 | 57.02 | 0.76 |
| Flame peeling | 8.21 | 42.00 | 49.78 | 51.96 | 8.66 |

peeled by rubbing in between the layers of jute bag (3).Peeled cloves were separated by blowing off the skin.

*Conventional peeling*

Oil (sesame) smeared garlic cloves were spread under sun light for 5 hours (2). Then cloves were peeled by rubbing between the layers of jute bag (3). Peeled cloves were separated by blowing off the skin.

*Flame peeling*

Cleaned garlic cloves were flamed on the mesh by using oxyacetylene gas to slightly burn the skin of cloves (4,5) and to remove surface moisture. Then cloves were peeled in garlic peeling machine.

In all the peeling methods unpeeled, damaged and peeled garlic cloves were separated manually and weighed. The following formula was used to calculate the efficiency of peeling methods.

$$E=(1-mu/mt)(1-md/mt) \times 100 \quad (6)$$

Where, E=Efficiency of peeling (per cent), Mu=Mass of unpeeled garlic (kg), Md=Mass of damaged garlic (kg), Mt=Mass of total garlic used for peeling (kg).

Moisture content of garlic was determined by convection oven method (7). Total soluble solids (TSS) and volatile content of fresh and peeled garlic were determined by standard method. Crude protein of garlic was determined by micro-Kjeldhal method as outlined by Ranganna (8). The total cost involved in each peeling method with respect to labor, time and other materials were noted to calculate the cost of peeling.

**Table 2.** Effect of peeling methods on chemical composition of garlic

| Peeling methods | Moisture content (%) | Total soluble solids ($^0$B) | Volatile oil content (%) | Crude protein (%) |
|---|---|---|---|---|
| Machine peeling | 54 | 45 | 0.8 | 4.10 |
| Oven peeling | 54 | 45 | 0.8 | 4.10 |
| Conventional peeling | 50 | 50 | 0.7 | 4.80 |
| Flame peeling | 55 | 44 | 0.5 | 3.10 |
| Fresh garlic | 57.5 | 41 | 0.9 | 5.10 |

## Results and Discussion

*Evaluation of Peeling Methods*

The results obtained on existing practices such as conventional peeling, oven peeling, flame peeling methods were evaluated along with machine peeling are presented in Table 1. Per cent damage was found to be non-significant among the all peeling methods. Per cent unpeeled was more in oven peeling method (42.88%), and minimum in of machine peeling method (10.93%). Per cent peeled and efficiency was more in machine peeling of 78.40% and 79.56% respectively. In oven peeling and conventional peeling methods gunny bag were used for peeling it did not have good abrasive surface for peeling. In flame peeling method, the charred thin papery layer on garlic cloves adhered to the surface of cloves was not peeled properly.

*Chemical Composition*

Data pertaining to chemical composition of garlic peeled by different methods are presented in Table 2. The chemical properties, crude protein and volatile content were decreased much in flame peeled garlic compared to other peeling methods. This may be due to high temperature flame application, might have

**Table 3.** Cost of garlic peeling under different peeling methods.

| | Peeling methods | Peeling cost (Rs/kg) |
|---|---|---|
| 1 | Machine peeling | 1.43 |
| 2 | Oven peeling | 6.39 |
| 3 | Conventional peeling | 9.91 |
| 4 | Flame peeling | 2.60 |

caused volatile oil to evaporate and crude protein to denature. In conventional peeling, TSS content was increased whereas moisture content was decreased compared to other peeling methods. This may be due exposure to sun for 5 hours.

### *Cost of Peeling*

Cost of garlic peeling under different peeling methods is presented in Table 3. Cost involved in machine peeling was less of Rs 1.43 as compared to mother peeling methods, because of less labor, time involved and also due to higher capacity of peeler.

### References

1. Pruthi J. S., L. J. Singh and Giridharalal. 1959. Some technological aspects of dehydration of garlic—A study of some factors affecting the quality of garlic powder during dehydration. *Food Sci.* Dec. 441—444.
2. Sahay K. M. and K. K. Singh. 1994. *Unit operations of agricultural processing.* Vikas Publ. House Pvt. Ltd., New Delhi, India.
3. Charan Radha 1995. Developments in ginger processing. *AMA* 26 : 49—51.
4. Gould W. A. 1993. *Tomato production, processing and quality ecvaluation,* AVI Pub. Co.Inc., Wesr Port,CT.
5. Huxoll C. C. and T. Smith. 1975. Peeling potatoes for processing, in tall burt. *In* WF, Smith (ed). *Potato processing*. The AVI Pub. Co. Inc., West Port, CT.
6. Sharma S. K. and B. L. Mandhyan. 1988. Develop ment and evaluation of green pea peeler. *J. Agric. Engg*. 25 : 63—68.
7. Madamba P. S. , R. H. Driscoll and K. A. Buckle. 1993. Moisture content determination of garlic by convection method. *ASEAN Food J.* 8 : 81—83.
8. Ranganna S. 1986. *Hand book of analysis and quality control for fruits and vegetable.* McGraw Hill Pub. Co. Lt., New Delhi, India.