

Studies on standardization of ginger-garlic-chilli paste and its utilization in bread

S.V. GHODKE, K.D. MORE AND D.H. CHAVAN

Ginger, garlic and chilli are major spices grown in India. These spices have medicinal importance. Ginger stimulates production of enzymes that detoxify carcinogens, inhibit cholesterol synthesis, block estrogen, lower blood pressure, elevate immune activity and inhibit tumor growth. Garlic is carminative and is a gastric stimulant and thus aids in digestion and absorption of food. Capsaicin found in chillies can kill cancer cells safely. To get these health benefits of spices, it needs to use in various consumable forms. The present investigation was undertaken to standardize the processing for preparation of ginger-garlic-chilli paste and the efforts were made to utilize the paste in bread. Three samples of ginger- garlic-chilli paste were prepared with various proportions and were evaluated for organoleptic properties. Best sample was selected and utilized as ingredient to make 3 samples of bread with 4 per cent, 5 per cent and 6 per cent paste of dough weight. Overall acceptability of prepared bread samples was between 7.6 to 8.1.

Key Words : Ginger, Garlic, Chilli, Paste, Bread

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INTRODUCTION

Ginger (*Zingiber officinale*) word is derived from Sanskrit word, Shringavere meaning shaped like deer's antlers. It belongs to family Zingiberaceae. India and China are the largest producer of ginger in the world accounting for more than half the total world production (Patel, 2007). Ginger contains 1-2 per cent oil, which imparts the unique flavour to the spice. The chief aromatic constituents are zingiberene, curcumene, α -pinene, sabinene, limonene, borneol, geranial, farnesol and citral (Sashidharan and Menon, 2010).

Ginger is most noted for its soothing effect on the stomach, as it is a popular traditional cure for common stomach ailments such as nausea and motion sickness. It is

used to stimulate production of enzymes that detoxify carcinogens, inhibit cholesterol synthesis, block estrogen, lower blood pressure, elevate immune activity and inhibit tumor growth. Ginger aids digestion and stomach ulcers. Fresh ginger has found to have antioxidant activity (Malhotra and Singh, 2003).

Garlic (*Allium sativum*) is native of Western Asia and Mediterranean area. It is one of most popular spices. Garlic's name is derived from Anglo-Saxon word garleac, meaning "spear plant". Allicin (diallyl disulfide) contributes to its strong aroma. Garlic has since long been recognized all over the world as a valuable condiment for foods and also as a popular remedy for various ailments and physiological disorders. Garlic is carminative and is a gastric stimulant and thus aids in digestion and absorption of food (NIIR Board, 2006). Allicin, of garlic has antibacterial properties. It is a powerful drug against amoebic dysentery. It is said to be very effective in bronchial and asthmatic mixtures. Garlic is used in curing several diseases. It acts as a prophylactic against typhoid and diphtheria infections. Diallyl disulphide can be used for tuberculosis of the larynx. Garlic has antihypertensive

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potential, anticancer potential. "Garlic juice" is used as lotion for washing wounds and foul ulcers (Londhe *et al.*, 2011).

Chilli (*Capsicum annuum*) is a member of the family *Solanaceae*. Chilli is sharp, hot, stimulating and helps in digestion. It develops blood and causes the formation of bile in the body. It is a recommended diet in cholera. It also eliminates worms in the intestine and causes inflammation. It destroys phlegm and gives relief from pain. Dry chilli is considered to be an eliminator of flatulence. It stimulates blood circulation and increases perspiration and aids digestion. Chillies are vital culinary addendums enhancing organoleptic characteristic of food. They possess enhancing preservative, antimicrobial properties and nutritional benefits which make them an inevitable food accessory. Chillies are cholesterol free and low in calories and sodium content. They are a rich source of vitamin A and C and a good source of folic acid, potassium and vitamin E. Capsaicin found in chillies can kill cancer cells safely. Capsaicin and other similar compounds, attack the mitochondria of cancerous cells, causing them to "switch off" and die without harming surrounding tissue (Bhupinderk, 2004).

Hence, different products can be prepared of ginger, garlic and chilli. It may include ginger juice, ginger candy, chilli pickle. The Indian household makes a mixed paste of ginger, garlic and chilli and stores them for a period of one or two weeks for the day use in kitchen, especially for flavouring biryani (Girdhari Lal *et al.*, 1998).

Hence, the present investigation was undertaken to standardize the proportion of ginger, garlic, chilli for paste preparation and to study their utilization in bread as ingredient.

METHODOLOGY

Ingredients :

Ginger, garlic and chilli were obtained from local market. The ingredients used in bread were refined wheat flour *i.e.* maida, salt, sugar, yeast, improver and oil were obtained from local market.

Packaging material :

Polyethylene bags were used to pack paste as well as bread.

Equipments :

Equipment such as grinder, dough kneader, cutter,

baking oven, and slicer were used for making ginger-garlic-chilli paste and bread.

Preparation of ginger-garlic-chilli paste :

The detailed process of preparation of ginger garlic chilli paste is shown in Fig. A. Good quality ginger, garlic and chilli were received. Ginger was blanched. All three were

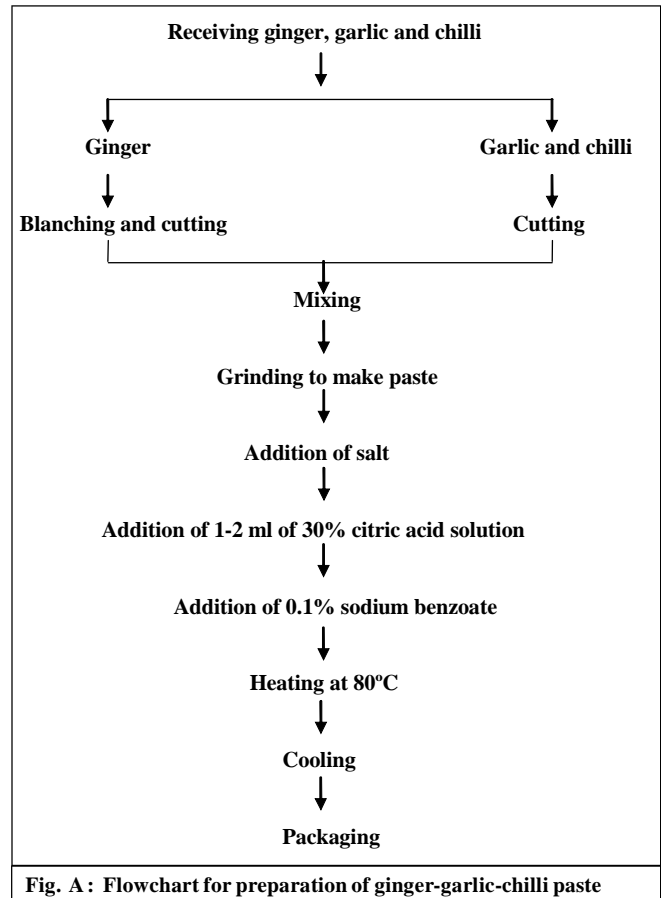


Fig. A : Flowchart for preparation of ginger-garlic-chilli paste

Table A : Proportion of ginger, garlic and chilli in paste

Commodity	S ₀ (g)	S ₁ (g)	S ₂ (g)	S ₃ (g)
Ginger	100	55	60	45
Garlic	-	30	20	40
Chilli	-	5	10	5
Salt	10	10	10	10

Table B : Samples of bread from ginger-garlic-chilli paste

Sample	Maida (g)	Salt (g)	Sugar(g)	Margarine (g)	Oil (g)	Yeast (g)	Gluten (g)	Improver (g)	Calcium propionate (g)	Paste (g)
B ₀	500	10	15	10	5	25	1	1	1	-
B ₁	500	10	15	10	5	25	1	1	1	20 (4%)
B ₂	500	10	15	10	5	25	1	1	1	25 (5%)
B ₃	500	10	15	10	5	25	1	1	1	30 (6%)

then cut in to pieces. They were mixed and ground to make a paste. Salt was added. The pH of resultant paste was adjusted to 4.0 by addition of 30 per cent citric acid solution. 0.1 per cent sodium benzoate was added and mixture was heated at 80 °C. Cooling of paste was carried out and then packed in polyethylene bag. Three paste sample S₁, S₂ and S₃ of different proportions of ginger, garlic and chilli were prepared as shown in Table A and samples of bread from ginger-garlic-chilli paste in Table B.

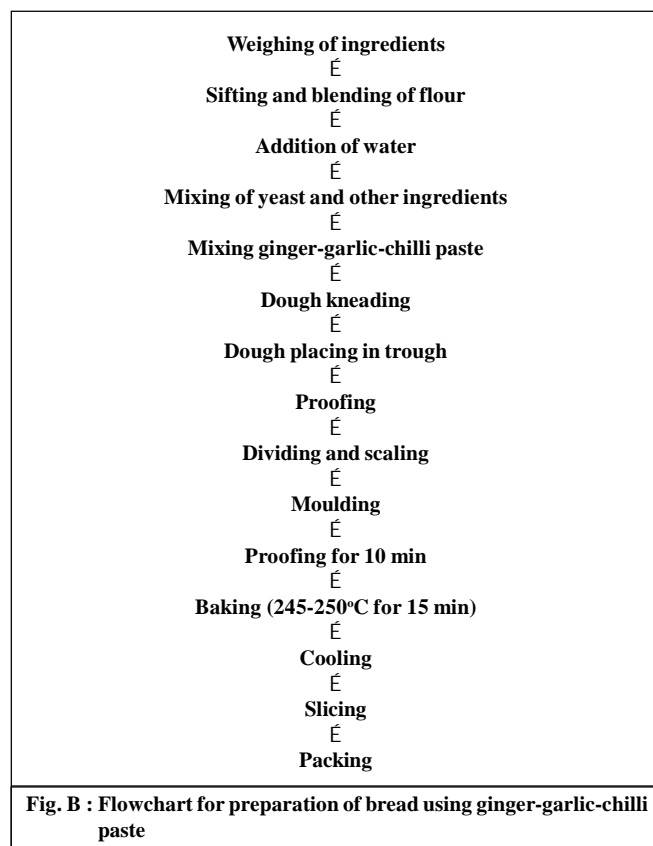


Fig. B : Flowchart for preparation of bread using ginger-garlic-chilli paste

Preparation of bread using ginger-garlic-chilli paste :

The bread was prepared as per the method given by Khetarpaul (2005) and process is shown in Fig. B. Straight dough process was used for bread making. All the ingredients along with paste were weighed and mixed to develop dough that was then allowed to ferment. Paste was added in 4 per cent (20g), 5 per cent (25g), and 6 per cent (30g) weight of dough. During fermentation, the dough was usually punched one or more times. After fermentation, it was divided into loaf sized pieces, round moulded into the loaf shape and placed into the baking pan. The risen dough was put into oven and baked for 15min at temperature of 245-250°C. After baking it was cooled at room temperature and slicing was done. Then prepared bread packed in polyethylene bags. Control sample was prepared without addition of paste.

Determination of physical properties :

Length, width and thickness :

Length, width, thickness of randomly selected 10 ginger, garlic and chilli were measured by using vernier caliper and average value was recorded.

Edible index :

Edible index of garlic, chilli and ginger was calculated. Edible index is the ratio of edible part (W_2) to total weight (W_1) multiplied by 100.

$$\text{Edible index (\%)} = \frac{W_2}{W_1} \times 100$$

Waste index :

Waste index of garlic, chilli and ginger was calculated. Waste index is the ratio of waste part (W_2) to total weight (W_1) multiplied by 100.

$$\text{Waste index (\%)} = \frac{W_2}{W_1} \times 100$$

Chemical analysis :

Determination of moisture :

The moisture content was determined by AOAC (1990). The sample of 5g (fresh) was cut and dried in an oven at 100°C to constant weight. After cooling in the desiccators, the sample was weighed again. The loss in weight was recorded as moisture content.

$$\text{Moisture (\%)} = \frac{W_1 - W_2}{W_1} \times 100$$

where,

W_1 = Weight of wet sample

W_2 = Weight of dry sample

Determination of fat :

Fat was estimated by using Soxhlet apparatus method (Ranganna, 1995).

$$\text{Crude fat (\%)} = \frac{\text{Weight of ether soluble material}}{\text{Weight of sample}} \times 100$$

Determination of protein content :

The protein content was estimated by using micro-kjeldahl method (Ranganna, 1995).

$$\text{Nitrogen (\%)} = \frac{(\text{Sample titre} - \text{Blank titre}) \times \text{Normality of HCl} \times 14 \times 100}{\text{Weight of sample} \times 1000}$$

$$\text{Protein content (\%)} = \text{Nitrogen (\%)} \times 6.25$$

Determination of carbohydrate :

For determination of carbohydrate Anthrone method was used (Ranganna, 1995).

Determination of total ash :

Total ash content of sample (fresh) was estimated by using direct-heating method of muffle furnace (Ranganna, 1995).

$$\text{Ash (\%)} = \frac{\text{Weight of Ash}}{\text{Weight of sample}} \times 100$$

T.S.S :

Total soluble solids of ginger, garlic, chilli and paste were determined by using hand refractometer.

Determination of pH :

pH of sample was measured by laboratory pH meter.

Determination of titrable acidity (%) :

The acidity was determined by the procedure as reported by Ranganna (1995).

$$\text{Titrable acidity as citric acid (\%)} = \frac{\text{Titre} \times \text{N of alkali} \times \text{volume made up} \times \text{Equipment weight} \times 100}{\text{Volume of sample taken} \times \text{Weight of sample taken} \times 1000}$$

Organoleptic evaluation :

The organoleptic evaluation in respect of colour, flavour, texture, taste and overall acceptability was evaluated by semi-trained judges using nine point hedonic scales (Amerine *et al.*, 1965). The sample of paste score was analyzed for chemical parameters.

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as relevant discussion have been summarized under the following heads :

Physical properties of ginger, garlic and chilli :

Physical properties of ginger, garlic and chilli were determined. The data of physical properties are represented in Table 1. The data indicated that the ginger has average length 8.13 cm, average width 4.12 cm, average thickness 1.0 cm. The waste index calculated was 15.8 per cent and edible index was 84.1 per cent. Hence, the waste index was less, it indicated that ginger was fresh and less bruised. The data indicated that garlic has average length 2.38 cm, average width was 1.6 cm and average thickness 0.9 cm. The waste index calculated was 12.89 per cent and edible index was 87.11 per cent. Chilli had average length of 11.46 cm, average width of 2.1 cm and average thickness of 0.4 cm. The waste index calculated was 2 per cent and edible index was 98 per cent. Hence, it showed that chilli was fresh.

Table 1 : Physical properties of ginger- garlic and chilli

Parameter	Ginger	Garlic	Chilli
Length	8.13cm	2.38cm	11.46cm
Width	4.12cm	1.6cm	2.1cm
Thickness	1.0cm	0.9cm	0.4cm
Waste index	15.8%	12.89%	2%
Edible index	84.1%	87.11%	98%

Chemical composition of ginger, garlic and chilli :

Chemical composition of fresh ginger was determined. It is presented in Table 2. Data indicated that the moisture content of ginger was 79.6 per cent, pH was 6.4, similarly the acidity was 0.42 per cent and the mineral content *i.e.* ash was low 1.2 per cent, whereas the protein content was 2.2 per cent and fat was also low it was about 1.8 per cent. Garlic had moisture 60.8 per cent, whereas the pH was 5.8 and acidity was 0.54 per cent. The ash content was low, it was 0.9 per cent, protein was 6.1 per cent and the fat content was also low, it was about 0.1 per cent.

Table 2 : Determination of proximate composition of ginger, garlic and chilli

Parameter	Ginger	Garlic	Chilli
Moisture	79.6(%)	60.8(%)	86.8(%)
Fat	1.8(%)	0.1(%)	0.6(%)
Protein	2.2(%)	6.1(%)	2.3(%)
Carbohydrate	14.1(%)	29.1(%)	8.6(%)
Ash	1.2(%)	0.9(%)	0.9(%)
T.S.S.	12 ⁰ bx	17 ⁰ bx	18 ⁰ bx
pH	6.4	5.8	8
Acidity	0.42(%)	0.54	0.5(%)

Proximate composition of chilli indicated that chilli has moisture content upto 86.8 per cent which was more and the pH was 8. The acidity was low and it was 0.5 per cent similarly the ash content was low (0.9 %). Protein content was about 2.3 per cent, whereas, the fat was also significantly low *i.e.* it was 0.6 per cent. Carbohydrate content of ginger, garlic and chilli was found 14.1 per cent, 29.1 per cent and 8.6 per cent, respectively. TSS of ginger, garlic and chilli was 12⁰bx, 17⁰bx and 18⁰bx, respectively.

Sensory evaluation of organoleptic properties of ginger-garlic-chilli paste :

The organoleptic evaluation of ginger-garlic-chilli paste was evaluated by a panel of 10 semi-trained judges (AOAC, 1962). The sensory evaluation was carried out for colour, texture, flavour, taste and overall acceptability of the paste. From Table 3, it is seen that colour of S₁ was good than S₂ and S₃. S₂ had better texture than S₁ and S₃. S₁ had good taste and S₂ had good flavour. S₂ having overall acceptability score of

8.6 was more acceptable than S_1 and S_3 . Overall acceptability of sample S_2 (60:20:10) was found more (8.6) than S_1 (55:30:5), S_3 (45:40:5) and S_0 (control). Hence, sample S_2 was used for preparation of bread.

Table 3 : Sensory evaluation of ginger-garlic-chilli paste

Sample	Colour	Texture	Taste	Flavour	Overall acceptability
S_0	7	7.5	7.1	7	7.5
S_1	8	7.3	7.6	8.1	7.8
S_2	7.6	7.8	7.5	8.8	8.6
S_3	7.5	7.4	7.5	8	7.8

Proximate composition of ginger-garlic-chilli paste :

The proximate composition of ginger-garlic-chilli paste (60:20:10) is given in Table 4. The values revealed that the moisture content of paste was 75.8 per cent, TSS was 19.2⁰ bx, pH was 3.5 and acidity was 2.56 per cent. The fat, protein, carbohydrate and ash contents were 7.8 per cent, 3.6 per cent, 9.6 per cent and 2.8 per cent, respectively.

Table 4 : Determination of proximate composition of ginger garlic chilli paste

Parameter	Value
Moisture	75.8(%)
Ash	2.8(%)
Fat	7.8(%)
Protein	3.6(%)
Carbohydrate	9.6(%)
TSS	19.2obx
pH	3.5
Acidity	2.56(%)

Sensory evaluation of organoleptic properties of bread :

The paste prepared by using 60:20:10 proportions was used for preparation of bread. Three samples were prepared by using 4 per cent, 5 per cent and 6 per cent paste. The results are tabulated in Table 5. The results showed that B_1 and B_2 had good colour. Texture of B_2 having score of 8 was better than B_1 and B_3 . B_3 had good taste (8.3) and B_2 of score 8.4 had good flavour. B_2 sample was superior to B_1 and B_3 . The organoleptic score of bread containing 5 per cent paste was more among all the levels of incorporation of paste (4% and

Table 5 : Organoleptic evaluation of ginger garlic and chilli bread

Sample	Colour	Texture	Taste	Flavour	Overall acceptability
B_0	6.8	7.0	7.0	7.0	7.0
B_1	7.6	7.4	7.6	7.8	7.6
B_2	7.6	8.0	8.2	8.4	8.1
B_3	7.4	7.3	8.3	7.8	7.8

6%). B_0 was used as control *i.e.* bread prepared without addition of ginger-garlic-chilli paste. (Elias *et al.*, 1984) found that spices are more profitable than that of their others competitive crops. Rahman (1993) also shown that net returns of turmeric and chili production are higher than *Rabi* vegetables production.

Conclusion :

An investigation was undertaken to standardize the processing for ginger-garlic-chilli paste. The ginger-garlic-chilli paste prepared with 60 part of ginger, 20 part of garlic and 10 part of chilli was found to be acceptable as compared with other levels of proportion. The sensory score of bread prepared by 4 per cent and 6 per cent level of incorporation of paste, was found to be rated low as compared to the control. But the organoleptic score of bread prepared by 5 per cent addition of paste obtained higher score as compared to control. Hence, it is concluded that the bread prepared by using 5 per cent addition of paste was found to be more acceptable without affecting the sensory attributes.

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