Research Paper Food Science

Guar Gum Hydrocolloid as An Antistaling Agent in Bread

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ABSTRACT

Guar Gum was used as an antistaling agent in bread at various levels 0.5, 0.75 and 1.0% concentration. The most accepted concentration of guar gum was found to be 0.5% associated with overall quality. Bread prepared with guar gum had shelf life of 4 days without any change in taste and quality with initial reduction in staling rate whereas; bread prepared without guar gum became tough on 3rd day only.

Keywords : Guar gum, staling, retrogradation, bread and hydrocolloid

1.1 INTRODUCTION

Bread is one of the important fermented processed products in developed and developing countries. The staling is major factor which affects shelf life of bread which is characterized by deterioration in quality other than microbial spoilage results in products loss in freshness. Rate of firming is dependent on several factors including product formulation, baking process, and storage condition. The shelf life of most baked food is only a few days. Staling eventually causes a product to become unacceptable at the retail or consumer level. It is estimated to 3-5% of all baked goods, produced in the United States is discarded due to loss in freshness.

It is generally accepted that staling is the term that describes the textural and flavor changes in bread. Bread staling is due to retrogradation. It is a change in starch, from an amorphous structure to a partially crystalline one (Habeda et al 1990). The formation of crystallization is considered to be the interchain association of the amylose and amylopectine fraction i.e. intermolecular or intra molecular association of starch molecule via hydrogen bonding that is the retrogradation. Retrogradation rates differ due to differences in polymer structure. However other studies described the gluten-gluten and gluten-starch as the main causes of bread firmness. Martin (1989) stated that bread firmness results mainly from the formation of cross links between partially solublized starch and gluten proteins.

It is obvious that prolonging the freshness of baked goods by retarding staling would be a beneficial to the consumer. Hassan et al. (1996) gives One of the proper way for improve the quality of bread is to use hydrocolloids in formulation. All hydrocolloids were use to reduce the loss of moisture content during bread storage, reducing the dehydration rate of crumb. In addition, during storage, alginate and gaur gum showed antistaling property, retard the crumb hardness. Baking industries throughout the world have tried to inhibit staling through the addition of ingredients such as alpha amylases, lipids, surfactants, sweeteners and other chemicals and also gums like guar gum.

The objective of present investigation is utilization of guar gum as an antistaling agent and helps to increase its shelf life.

MATERIALS AND METHODS

Maida, sugar, salt, shortening and yeast were obtained from Parbhani local market while gaur gum was obtained from college of food technology, MKV, Parbhani.

1.2.1 Proximate Composition of Maida

Moisture, protein and ash content were determined by using AOAC (1984) method.

1.2.2 Physico- chemical properties of maida

Gluten content, Zeleny's Sedimentation Test, Pelshenke Value, Alcoholic Acidity Test and Water Absorption Test were determined according to standard procedure given by AOAC (1984).

Recipe of Bread preparation

Sr.No.	Ingredients	Weight (g)
1	Flour	100
2	Water	60
3	Salt	1.3
4	Yeast	2.2
5	Sugar	12.25
6	Shortening	3.2
7	SMP	1
8	GMS	0.2
9	Cal. Propionate	0.2
10	Total	180.35

Preparation of Bread

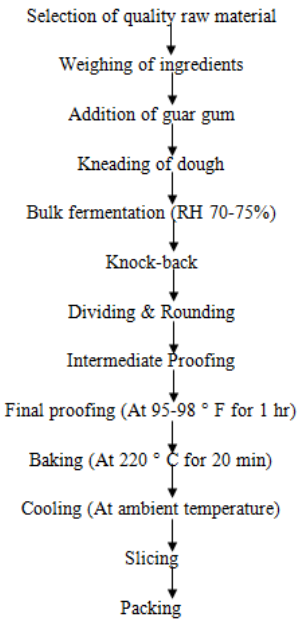

Fig. A.1 Process flow sheet for preparation of bread by straight dough method.

1.3 RESULTS AND DISCUSSION

The major ingredient for bread making i.e. maida was procured from the local market and analyzed for proximate composition.

The data pertaining to proximate composition of maida is given in table 1. It is observed from the table 1 that moisture content was found to be 12.61%. The other parameters like protein, ash and acid insoluble ash content were also determined. The values for protein, ash and acid insoluble ash were found to be 11.00%, 0.43% and 0.05% respectively.

Table 1: Proximate composition of maida

Parameter	Quantity
Mill fraction	Maida
Moisture (%)	12.61
Total protein (%)	11.00
Ash (%)	0.43
Acid insoluble ash content (%)	0.05

1.3.2 Chemical Characteristic of Wheat Flour

Chemical Characteristics like gluten content, sedimentation value, peleshenke value and alcoholic test are very important for deciding the quality of maida for bread making. Therefore all these parameters were analyzed.

Table 2: Chemical characteristic of wheat flour

Mill fraction	Maida
Dry gluten content (%)	10.00
Sedimentation value (ml)	21.95
Pelshenke value (min)	78
Alcoholic acidity test (%)	0.12

The data depicted in table 2 reveals that the dry gluten of maida was found to be 10.00 per cent. The sedimentation value of maida was 21.95 ml. The Pelshenke value was 78 minutes for maida while Alcoholic acidity test was 0.12%.

1.3.3 Sensory evaluation

In the present investigation the bread was prepared with different levels of guar gum i.e. A (0.5%), B (0.75%) and C (1.0%). The control bread was also prepared without addition of guar gum.

The bread evaluated by semitrained panelist by 9 point hedonic scale. The standard organoleptic attributes were crust, colour, taste, flavor, crumb structure, texture and overall acceptability. The sensory score secured by each organoleptic attribute was recorded in table 3.

The data depicted in table 3 reveals that the sample A (0.5%) was found significantly rated for color and flavor which is equal to control. Control sample scored highest for taste while sample A scored highest for crumb structure and texture than others. Sample A (0.5%) was found to be overall accepted.

Table 3: Sensory evaluation of bread

Sample No.	Crust color	Taste	Flavor	Crumb structure	Texture	Overall acceptability
Control	7.5	7.7	7.5	7.1	7.2	7.5
A	7.5	7.5	7.5	7.7	7.5	7.5
B	6.7	6.8	6.7	7.0	6.8	6.7
C	7.0	6.9	6.5	7.1	7.0	6.9

A-0.5% guar, B-0.75% guar gum, C-1.0% guar gum, Control-0.0% guar gum.

1.3.4 Bread texture

The bread prepared using different levels of guar gum as well as control were subjected to puncture test i.e. weight in gram required to puncture the bred from first day to fifth day was recorded in table 4 that there is general trend of increasing the weight required during the storage period in both the bread samples. But in case of bread prepared with the guar gum required less weight as compared to the control even up to 5th day (112 hrs).

Further from the same table it is seen that as the gum concentration increases (0.5 to 1%) weight required to puncture the bread reduces.

Table 4: Weights required puncturing the bread after baking

Sr. No.	Sample	Weight (gm)														
		First day (hr)			Second day (hr)			Third day (hr)			Fourth day (hr)			Fifth day (hr)		
		Fresh bread	8	16	24	32	40	48	56	64	72	80	88	96	104	112
1	Control	20.33	22.66	25.66	25.5	27.00	27.83	29.66	30.16	34.16	37.16	38.00	39.33	42.50	42.16	42.83
2	A	19.33	21.66	22.33	24.16	24.33	26.16	25.00	27.16	31.50	33.50	33.83	35.50	38.83	40.33	40.66
3	B	18.33	20.33	21.00	22.33	23.00	23.33	23.16	23.16	29.50	31.50	32.00	34.00	35.16	37.16	39.33
4	C	16.66	18.33	19.00	20.33	20.66	21.16	21.66	22.66	24.50	28.00	28.66	32.00	33.00	34.66	36.50

1.4 CONCLUSION

It was concluded that the most accepted concentration of guar gum in bread associated with overall quality of bread is of 0.5% .The use of guar gum as an antistaling agent gives an optimum reduction of crumb firmness over long storage periods (112 hrs). At the same time, better crumb texture and slicing properties were observed.

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