

Development of value added wheat Bread by incorporating *Sesbania grandiflora* and *Hordeum vulgare*

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ABSTRACT : This study was conducted to improve the nutritional property of baked products especially bread by incorporating barley and *Sesbania grandiflora* (agathi) leaves extract in wheat breads. *Sesbania grandiflora* commonly known as agathi leaf belongs to *Fabaceae* family. Agathi is rich in vitamin C and also contain iron, phosphorous, calcium. *Hordeumvulgare* is commonly known as barley. It is rich in nutrients including protein, dietary fiber, vitamin B6 and also has low glyceemic index. Dough is prepared by mixing wheat flour with agathi leave extract and barley in various compositions along with the other requires flavours and sweeteners. This dough is baked at 200°C for 25 minutes. The incorporation of agathi leave extract and barley flour in wheat breads will show positive results in terms of enhanced nutrient content, taste, appearance, colour, mouthfeel and also we can increase the consumption of agathi in our daily diet to obtain the benefits of agathi.

KEYWORDS: Agathi leave extract, Barley flour, Wheat flour, Butter, Glycemic index, Vitamin.

LINTRODUCTION

In the present era of increasing population, bakery products are also considered as one of the major source of food. Bakery products are considered as one of the major food by almost all age group of people. It is classified into three categories: breads, biscuits and cookies. In which bread is one of the major food consumed by many people. Since it is baked food product that is made mainly from flour that is moistened, kneaded and fermented even can be consumed by sick people. It is considered as one of the major foods since prehistoric times. It is also considered as basic food in the periods of extreme food poverty. Although bread is considered good for health, the high level intake of these breads also have some negative health effects due to their high sugar content. The higher consumption may lead to diabetics, heart diseases and other conditions. While this bread which is incorporated with agathi extract and barley flour will have positive effects on human health even consumed in large number. *Sesbania grandiflora* is the botanical name of agathi leaf. Agathi tree is also called the “August tree” popularly. Agathi leaf has more nutritional value and medicinal uses. Agathi leaves are bitter in taste but they have incredible medicinal uses. It has capacity to cure digestive disorder, arthritis, night blindness, blood purifier and piles etc. Fiber, fat, calories, protein, calcium, iron, vitamin C, minerals are present in agathi leaves [1]. Agathi leaf contains the following nutrients such as fiber (1.9 g), f at (1.3 g), calories (93 Kcal), moisture (74.5 g), protein (7.5 g), calcium (120 mg), phosphorus (80 mg), iron (4 mg), vitamin C (165 mg), carbohydrates (12 g), minerals (3.4 g) [2]. Barley is easily available and is one of the cheapest grains. It has protein, mineral selenium, magnesium, iron, copper, vitamin B&C and both soluble and insoluble fibre [3]. Wheat is an important source of carbohydrates. It is also rich in protein called gluten. Wheat provides multiple essential nutrients such as protein, dietary fibre, manganese, phosphorus & niacin. Palm sugar is used because it has more nutritional content such as vitamins and minerals. Ingredients which are used in bread such as agathi leaves extract, wheat flour, barley flour, palm sugar candy, sugar, milk and yeast increases nutritional properties of the breads and they are also beneficial to the consumers in an effective way (Figure 1).

II. MATERIAL AND METHODOLOGY

2.1 Materials

- Agathi leaves extract

- Wheat flour
- Barley flour
- Palm sugar
- Milk
- Sugar
- Yeast

2.2 Methodology

2.2.1. Preparation of Agathi leaves extract

Agathi leaves were brought from the local market. They were separated from the stalks. The leaves are cleaned and foreign particles present in the leaves were removed. The leaves were washed with water 2 times. The leaves were dried and grinded into fine powder. Boiling water is added to the agathi powder, and it was filtered using white cloth.

Figure 1: Agathi leaves and barley flour



2.2.2. Preparation of Barley flour

Barley grains were purchased from the local market. They were soaked and allowed to sprout and the sprouted grains are dried. The dried barley grains were grinded into fine powder.

2.2.3. Preparation of Bread

Initially all the ingredients were weighed accurately using weighing machine (Table 1). Then, in order to activate the yeast, a known amount of yeast and white sugar were added into the lukewarm milk and stirred well until yeast and sugar gets completely dissolved in the milk. This mixture is kept aside for 10 minutes. Then the wheat flour, Agathi leaf extract, barley flour, palm sugar, baking soda, baking powder were added in this yeast mixture along with fat. The mixture was kneaded well for 15 minutes and was kept aside for 2-3 hours for fermentation. Then the dough is placed in a greased tray and baked for 25 minutes at 200°C (Figures 2 and 3).

Table 1: Composition of Ingredients in various trail

Ingredients	T1	T2	T3	T4	T5
Wheat flour (g)	100	90	80	70	60
Barley flour (g)	0	10	20	30	40
Agathi leaves extract (ml)	0	5	10	15	20
Butter (g)	20	20	20	20	20
Palm sugar (g)	75	75	75	75	75
Milk (ml)	50	50	50	50	50

Figure 2: Prepared dough



Figure 3: Prepared breads



2.3. Sensory Evaluation

The sensory evaluation was performed by evaluating five major sensory attributes such as appearance, taste, texture, aroma, and overall acceptability using nine point hedonic scale. Ten members evaluated the bread samples from various trial and the sensory evaluation are consolidated in Table 2.

Table 2: Sensory evaluation of wheat breads enriched with agathi leaves and barley flour

Sample	Appearance	Taste	Texture	Aroma	Overall acceptability
T1	7	6	7	6	6.5
T2	7.5	7	7	7	7.1
T3	8	7.5	7	7	7.4
T4	8.5	8	7	9	8.1
T5	8.5	8.9	8	9.1	8.6

2.4. Biochemical analysis

2.4.1 Moisture content

The sample was weighed carefully in weighing balance and is transferred into the sample cup. Then the sample was kept in the hot air oven at 95°C. The sample is weighted at 10 minutes interval until equivalent weight was obtained continuously [4].

2.4.2 Ash content

A small amount of sample was taken, and it was powdered. The powder was taken in a crucible and then burnt in a muffle furnace. This method is used to determine the ash content of the prepared bread [5].

2.4.3 Protein content estimation

The protein content of the bread was determined by Bradford’s method. Various concentrations of above sample were taken and standardized using 0.15M NaCl. 1mL Bradford’s reagent was added and mixed well. The absorbance was measured at 595 nm using a spectro manometer. Thus concentration of the protein in the samples was determined around 29.3% in the prepared bread.

2.4.4 Fat content estimation

The Fat content present in the prepared breads was determined using gravimetric method. By using this method the lipid in the bread sample is extracted using non polar solvent [6].

2.5. Physical properties

The external characteristics of bread i.e, volume, color of crust, symmetry of form, evenness of bake, character of crust and internal characteristics such as chewiness, elasticity and hardness were evaluated [2].

2.6. Microbial analysis

The total plate count was determined by using spread plate method. Nutrient agar (NA), potato dextrose agar (PDA) and McConkey agar (MA) were used to determine the bacteria, coli form and fungal count respectively. The Nutrient agar and MA plates were incubated at 37°C for 48 hours and PDA plates were incubated at 28°C for 4 days. The colonies were then counted [7,8].

2.7. Shelf life estimation

The shelf life was determined by packing and sealing the prepared breads in polyethylene pouches. Those bread packets were stored at room temperature and also at refrigeration. The changes in sensory attributes such as colour, texture, appearance were investigated at the interval of 1 to 6 days. The results shows that the bread stored in the room temperature has a shelf live upto 5 days at the same time the bread stored in fridge shelf life around 7 days.

III.RESULTS AND DISCUSSION

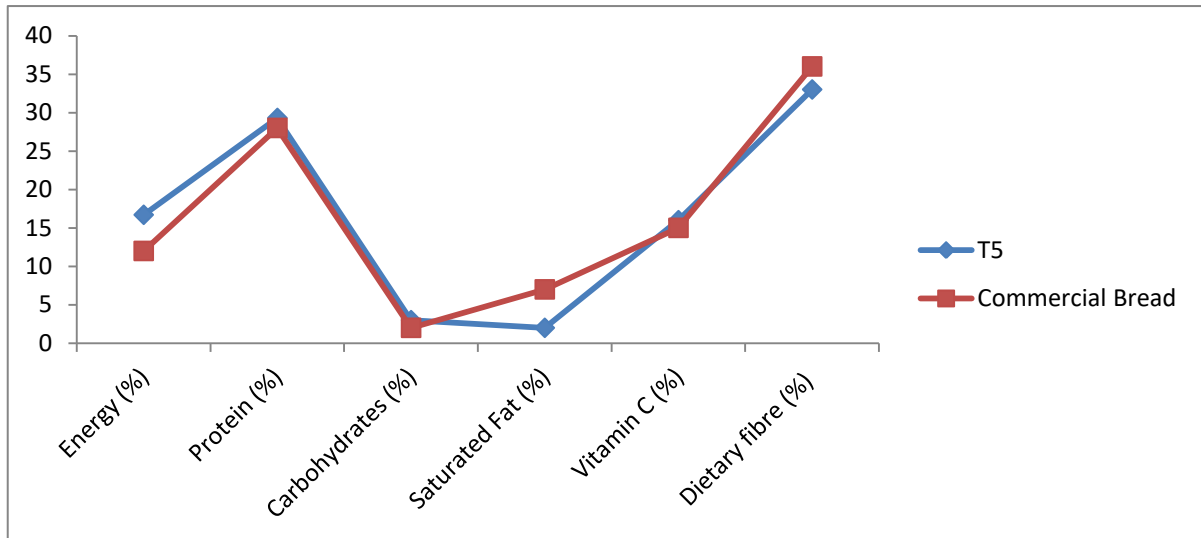
The incorporation of agathi leaves extract, barley flour and wheat bread showed enhanced nutrition content, flavor, color and texture. The breads which were stored at room temperature lasted for 4 days without microbial spoilage and any changes in sensory attributes. The breads which were stored at refrigeration lasted for 5 days without any spoilage. The sensory evaluation of the breads were done and results are shown in Table 2. From the results, it is shown that bread T5 has the most acceptable sensory attributes than the other samples.

The nutrient content of bread such as fat, dietary fibre, carbohydrates, total fat, vitamin C and protein were determined using various standard methods and the results are tabulated in Table 4. The table shows a raise in the nutritional content of the prepared breads as the ratio of agathi leaves and barley flour increases (Fig. 4).

Table 4: Comparison of biochemical analysis of prepared breads and commercial bread

Parameters	T5	Commercial Bread
Energy (%)	16.7	12
Protein (%)	29.3	28
Carbohydrates (%)	3	2
Total Fat (%)	2	7
Vitamin C (%)	16	15
Dietary fibre (%)	33	36

Figure 4: Graphical representation of the biochemical analysis of the prepared breads



IV.CONCLUSION

Based on the results of this study, the fortification of the wheat breads with agathi leaves and barley flour significantly enhanced the nutritional content of the prepared breads. This study also helps to utilize the nutrition of Agathi leaves effectively. The results also shows that the prepared bread sample (T5) have better sensory and nutritional properties than the usual wheat bread. It is concluded from the study that the fortification of wheat bread with Agathi leaves extract and barley flour is successfully done and breads with higher nutritional content and better sensory attributes are also prepared successfully.

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