

Influence of Coriander Seeds on Baking Balady Bread

El Hadidy, G. S. and E. A. Rizk

Bread and Pastry Res.Dep., Food Tec. Res. Institute, ARE, Giza



ABSTRACT

The results cleared that coriander seeds and wheat flour (82%extract) content of 10.50% and 1.20% for ether extract, 19.25% and 10.70% for protein, 6.45% and 1.04% for ash, 63.80% and 87.06% for total carbohydrates, 35.70% and 1.16% for crude fiber and 436.06 or 411.74 for energy value (Cal/100g), respectively. Also, coriander seeds rich in calcium, magnesium, sodium, potassium, phosphorus, zinc, iron comparing wheat flour 82% extraction but Wheat flour rich in manganese comparing coriander seeds. Four levels of coriander seeds powder (2.5, 5, 7.5, 10 %) were used to replace wheat flour (82%) in order to produce balady bread. The obtained results showed that as the level of substitution increase, all components increased except total carbohydrates. The nutritive value of balady bread enhanced due to the content of unsaturated fatty acids (oleic ω 9 and linoleic ω 6) in coriander seed flour. Sensory evaluation of the produced balady bread, The freshness values after 0, 24 and 48 hours were evaluated. Also, Total count bacteria and (yeast and molds) revealed that adding four levels of coriander seeds powder increased shelf life of balady bread compared with balady bread produced without coriander seed.

INTRODUCTION

Bread is the essential food in the nation gives more components compared with any food source, bread provides over 50 % the total calories in diet and in 87% of the nations over 30% and about 70% of the total crude protein the value of grain used for people consumption is over 2.5 times the value of nation steel and iron production, meanwhile, 14% of the cereals grain in the nation is handled through international channels, also cereal grains made more than 50% of all the good in overseas trade Pelshenke., (1961).

Every day, Bread is a main part of diet that closely related to human. It consists of flour, yeast or water. It familiar around the nation or the oldest foods. Bread is main or major source of carbohydrates in the diets or food pyramid to ensure that a people can take enough elements of nutrition that the body were needed. Sivam., (2010).

To made healthy bread, bakers always decrease calories, fat and sugar, meanwhile, increment fiber or water and researching natural components to substitute chemically produced ones.

Coriander plant (*Coriandrum sativum* L., family Apiaceae) is among some of the aromatic herbs that actually gathered when they have finished flowering, with the leaves being referred to as an herb, and the dried seeds as a spice Shahwar., (2012)

Zein, (2006) reported that coriander seeds were high minerals it contains, zinc 5.29mg /100g, magnesium 193mg/100g, sodium 32.18mg/100g, potassium 1026mg /100g, calcium 608.13mg/100g and iron 16.72mg /100g, copper 4.56 mg/100g and phosphorus 172.98mg/100g.

Pandey, (2010) studied that Coriander seed s powder is an important source of fats (16-28%), protein (11-17%) and ash (5-6%) in the fruits. Also, Hessain (2014) stated that coriander seeds powder were a high source of total Carbohydrates (65.2%), protein (13.4%), ether extract (15.1%), ash (6.3%) and (31.6%) crude fiber. The dietary coriander seeds oil contain mainly of oleic, linoleic and palmitic acids.

Coriander seeds ether extract (oil) were used as an anti microorganism agent as it controls broad spectrum anti microorganisms activity Silva., (2011). This oil of coriander seeds were encapsulated in alginates or chitosan, also isolation, transport, protection, and increase of its active components flavours, fatty acids, vitamins, minerals, enzymes, peptides, polyunsaturated fatty acids, antioxidants and living cells Cristian, (2013).

Essential oil or coriander seed powder considered as natural herb preservatives contain antifungal, antibacterial and antioxidant materials Politeo., (2007).

Coriander seeds powder is anti-mutagenic, anti-anxiety, antioxidant, or antimicrobial activity along with analgesic and hormone balancing effect that promotes its use

in foods led to great health benefits and its protective effect to preserve the food for a long time Bhat., (2014).

pH and Moisture content of the foodstuffs have been studied the main biotic factors effect on the fungal deterioration especially in high moisture foods. Bakery products or in cakes there is moulds were *Aspergillus niger*, *Penicillium stoloniferum*, *Rhizopus stolonifer* Darughe., (2012)

This investigation aims to substitute wheat flour (82%) extraction with coriander seed powder to produce bakery product such as Balady bread to improve quality and shelf life.

MATERIALS AND METHODS

Materials

Wheat flour (82%extraction) was obtained from local market Kafrelsheikh, Governorate, Egypt.

Coriander seeds were obtained from local market luxor Governorate, Egypt.

Other materials were obtained from supermarket such as salt, dry yeast and sugar.

Methods

Chemical composition:-

Moisture, protein, ether extract and ash were measured according to the methods of the A.O.A.C. (2000). While total carbohydrates were determined by subtracting the difference from initial weight of the sample as follow:-

$$\% \text{ total carbohydrates} = 100 - (\% \text{ crude protein} + \% \text{ ether extract} + \% \text{ ash}).$$

Also, minerals content were determination according to the methods described in the A.O.A.C.(2000).

Energy value:-

The energy value was estimated according to James (1995).

$$\text{Energy value} = (\% \text{ total carbohydrate} \times 4.1) + (\% \text{ crude protein} \times 4.1) + (\% \text{ ether extract} \times 9.1).$$

fatty acids composition:-

Fatty acids composition of coriander seeds oil were measured according to the method described by Radwan (1978).

Technological methods:

Blends

Coriander seeds powder was added at different ratios (2.5, 5, 7.5, 10%) to wheat flour (82%extraction) to produce bread as illustrate in table (1)

Coriander seeds powders were replaced wheat flour to produce blends (2.5, 5, 7.5, 10%) levels. Balady bread was prepared as formula presented in Table (1) by mixing the formula components with other ingredients which are 1% dry yeast, 2% sodium chloride

and water. The components were mixed in mixer for 20 min. The mix was left for fermentation at 30°C and 85-90% relative humidity for 60 min. After fermentation, the dough was divided into 130 g pieces. Each piece was molded on a wooden board previously coated with a fine layer of bran and putt to ferment about 15 min at the same mentioned temperature and relative humidity.

The fermented dough pieces were flattened to about 20 Cm diameter. After flattening, the dough was put to final fermentation about 15 min until suitable properties. The flat dough was baked in oven at 380-400°C for 3- 4.5 min. The loaves were left to cool at room temperature then sensory evaluation (Yaseen, 1985).

Table 1. Blends coriander seeds powder with wheat flour (82%extraction)

Treatment	Blends
1(Control)	100% wheat flour (82 % extraction)
2	2.5% coriander seeds powder +97.5% wheat flour (82%extraction)
3	5% coriander seeds powder +95% wheat flour (82%extraction)
4	7.5% coriander seeds powder +92.5% wheat flour (82%extraction)
5	10% coriander seeds powder +90% wheat flour (82%extraction)

Sensory Evaluation:

Balady bread was evaluated for their sensory characteristics by ten panelists from the staff in Food Tec. Res., Isntitute Agric. Res. Center. Egypt , according to Hegazy and Faheid (1990). Balady bread was evaluated by using the following scores 20 for appearance and taste, 10 for crust color, rounder and distribution of crumb, while score 15 for odor and separation of layers. Panelists evaluated balady bread samples without special lighting and at ambient temperature (25°C). Water was provided for rinsing purposes.

The mean average of overall scores was transformed to descriptive groups or category as follow:

- 90-100: very good 80-90: good
- 70-79: satisfactory less than 70: questionable

Determiration of Staling rate:

After baking, bread freshness was determined at zero ,24 and 48 hours of storage by Kitterman and Rubentholar(1971).

Microbial examination:

Counting of yeast or molds in bread after of storage on temperature at room interval (5) days and storage on temperature fridge (5C) interval (15) days were performed by agar plate technique method on Martin's medium (Allen,1959).Whereas counting of bacteria were performed on Nutrient agar medium(Atlas,1997).

RESULTS AND DISCUSSION

The chemical composition of coriander seeds powder and wheat flour (82%extraction)

Results presented in Table(2) cleared that coriander seeds and wheat flour (82% extract) content of 10.50 and 1.20 for ether extract,19.25 and10.70 for protein, 6.45 and 1.04 for ash, 63.80 and 87.06 for total carbohydrates, 35.70 and 1.16 for crude fiber, Also, 436.06 and 411.74 for energy value (Cal/100g). respectively.

These results are similar to Hessain (2014) who reported that coriander seeds contained 65.20% total carbohydrate, 6.30% ash,13.40% crude protein and 31.60% crude fiber ,while Rizk (2014) noticed that wheat flour (82%extract) content of 1.26% for ether extract, 10.65% for protein, 1.11% for ash, 85.81% for total carbohydrates.

Mineral content of coriander seeds and wheat flour (82% extraction)

Data listed in Table (3) reveals coriander seeds rich in calcium, magnesium, sodium, potassium, phosphors, zinc,

iron comparing wheat flour 82% extraction. Also, Wheat flour rich in manganese comparing with coriander seeds. Therefore, fortification of wheat flour (82%) give arise to high levels of minerals. These results for coriander seeds are in agreement with USDA (2013) reported that Calcium, iron, Magnesium, Phosphors, potassium, sodium, and Zinc were 709, 16.32, 330, 409, 1267, 35and 4.70 (mg/100g), respectively. Also, Rizk(2014) revealed that wheat flour 82% containCa, , Mg, Na, Mn, Zn and Fe were 18.40, 150, 4.91, 2.08, 4.15 and 2.29(mg/100g)

Table 2.The chemical composition of coriander seeds powder and wheat flour (82%) extraction

Components	coriander seed powder	Wheat flour (82%)
Ether extract %	10.50	1.20
Crude protein %	19.25	10.70
Ash %	6.45	1.04
Total carbohydrates %	63.80	87.06
Crude fibers %	35.70	1.16
Energy value (Cal/100g)	436.06	411.74

Energy value = (% total carbohydrate × 4.1) + (% crude protein×4.1) + (% ether extract×9.1)

% total carbohydrates = 100- (% crude protein + % ether extract+ % ash)

Table 3. Mineral content ofcoriander seed and Wheat flour (82%extraction)

Minerals (mg/100g)	Coriander seed powder	Wheat flour (82%)
Ca	650.31	19.30
Mg	345	160
Na	28.19	4.80
K	1290.03	16.80
P	392.90	185
Mn	1.83	2.02
Zn	4.55	4.50
Fe	17.72	2.80

Some fatty acids of coriander seed powder (g/100g)

Results presented in Table (4) coriander seeds powder had a high content of unsaturated fatty acids. Also,it could be noticed that the major fatty acids in coriander seeds were oleic acid 70% and linoleic acid 15%.

The coriander seeds rich in essential fatty acid such ω9 and ω6.Respectively. These results are in agreement with Ramadan and Morsel,(2002) who reported that coriander seed oil contain fatty acids oleic 65.7% and linoleic 16.7%. Also Msaada ,(2009) revealed that coriander seed oil contain fatty acids oleic 80.9% and linoleic 13.6%.

Table 4. Some fatty acids of coriander seeds powder.

Polyunsaturated fatty acids	Polyunsaturated fatty acids(g/100g)
Oleic C18:1 ω9	70
Linoleic C18:2 ω6	15

Chemical composition of produced balady bread

The results in Table(5),stated chemical composition of balady bread produced from 100 % wheat flour (82%) extraction were ether extract (1.02%), crude protein (10.70%), ash (1.04%), total carbohydrates (87.06%) and energy value were (411.74Cal/100g), respectively.

Table 5. The chemical composition of balady bread produced of wheat flour(82%extraction) and different levels coriander seed

Component Samples	Ether extract %	Crude protein %	Ash %	Total carbohydrate %	Energy value (Cal/100g)
1(Control)	1.20	10.70	1.04	87.06	411.74
2	1.66	11.13	1.31	85.9	412.93
3	2.13	11.55	1.58	84.74	414.09
4	2.60	11.98	1.85	83.57	415.42
5	3.06	12.41	2.12	82.41	416.33

%total carbohydrates = 100-(% crude protein + % ether extract+ % ash)

Table 6. Sensory evaluation of balady bread produce from wheat flour (82% extraction) and different levels of coriander seed powder

Samples	General Appearance	Taste 20	Crust Color 10	Separation of Layers 15	Rounder 10	Distribution of crumb 10	oder 15	Overall Scores 100	Grade
Controll	19	18	10	14	10	10	14	95	V.G
2	18	19	9	13	10	9	15	93	V.G
3	18	20	8	13	9	8	15	92	V.G
4	17	20	7	14	9	8	15	91	V.G
5	15	20	7	15	8	8	15	89	G

Freshness of balady bread made from wheat flour and different levels of coriander seeds powder

Results in Table (7) showed that there were a gradual decrease in swelling power of balady bread produce from wheat flour82% extraction and all its blends with coriander seeds after baking Balady bread showed a decrease in swelling power from 275 at zero time to 254 or 237 after 24 hours or 48 hours. Data presented in this table showed the positive effect of adding of coriander seeds powder on retarding staling of baked balady bread during 24 or 48 hours. Also, it was estimated the levels of replace coriander seeds powder increase, the swelling power was increase ,while, the rate of decrease of all blends in balady bread was decreased during storage at 24 or 48 hours.(reported Das ,(2015) reported that added 3% of coriander leaf powder to wheat flour to produce bread improve the crumb quality due to increase loaf volume and uniform texture to increase porosity and increase shelf life bread.

Effect of adding different levels of coriander seeds powder to wheat flour (82%) extraction on the total count of bacterial and mould or yeast count at room temperature for 5 days.

The data on the bacterial colony counts in of balady bread produce from wheat flour (82%) extraction or different levels of coriander seeds powder ,packed in polyethylene bags and stored at room temperature for five days. Maximum number of bacterial colonies were observed in the balady bread made from 100% wheat flour (82%) extraction which recorded (91×10³),(6×10³) or(10×10³) in samples contain (2.5 or 5%) of coriander seed ,also, levels (7.5 or 10%) were negatively.

The data on the fungi colony counts in of balady bread produce from wheat flour (82%extraction) and different levels of coriander seed powder, packed in polyethylene bags and stored at room temperature for 5

Regarding the chemical composition of produce balady bread with 2.5, 5, 7.5, 10% substitution of coriander seeds powder increase, all chemical composition and energy value except total carbohydrate were decreased. These results are in agreement with Hessain (2014) who reported that an acceptable breadsticks could be produced by adding coriander seeds powder up to 20% substitution of wheat flour 72%.

Sensory evaluation of balady bread produce from wheat flour and different levels of coriander seed powder

The results concerning sensory evaluation of balady bread produce of wheat flour (82%) and different levels of coriander seed powder were illustrate in Table(6) observed that samples of balady bread which made from 100% wheat flour (82%extraction) were high in acceptability for all parameters and they had a very good grade. But the samples 10% coriander seeds powder was a good grade. These results are similar to Zein, (2006) who reported that chemical composition of breadsticks increased all components (protein, ash, ether extract and fiber) by adding coriander seeds powder at level (5 or 10%) comparing breadstick without coriander seeds.

days. Maximum number of fungi colonies were observed in the balady bread made from 100%wheat flour (80% extraction) which recorded (13×10³),also, fungi colony in all samples were lower than the control sample made from balady bread produce from wheat flour(80%extraction).

Table 7. Effect of adding different levels of coriander seed powder to wheat flour (82%) extraction on alkaline water retention capacity AWRC (%) of stored balady bread.

AWRC% Samples	zero time	after 24 hours	after 48 hours
1(Control)	275	254	237
2	289	256	249
3	278	258	246
4	285	275	273
5	290	288	282

AWRC : alkaline water retention capacity

Darughe ., (2012) revealed the yeast or moulds activity of coriander seed essential oil in cake having pH or moisture content ranges between (6.64 - 7.81%) or (13 - 15.5%), respectively. After 4 weeks, it was stated that percentage of moulds in cake contain coriander seeds powder essential oil at 0.05% did not significant from cake addition, 0.01% BHA and both concentration were no effect control mould in cakes but addition concentration of coriander seeds of oils up to 0.15%, were effect on yeast or mould compared with control and sample treatment with .01% BHA.

Effect of adding different levels of coriander seeds powder to wheat flour (82%) extraction on the total count of bacterial and mould or yeast count at 5°C fridge for 15 days. The results on the bacterial colony counts and fungi colony were negatively at stored for 15 days on temperature fridge (5°C).coriander seed oil were used as anti microbial material. Oil of coriander seed is effect on both gram negative or gram

positive bacteria and also against pathogenic fungus. Coriander seed powder oil exhibits bactericidal activity with the exception of *Enterococcus faecalis* or *Bacillus cereus* Silva,(2011).

Table 8. Effect of adding different levels of coriander seeds powder to wheat flour (82%) extraction on the total count of bacterial and mould or yeast count at room temperature for 5 days (CFU/g).

Samples	Bacteria CFU/g	Fungi CFU/g
100%	91×10 ³	13×10 ³
2.5%	6×10 ³	5×10 ³
5%	10×10 ³	2×10 ³
7.5%	ND**	6×10 ³
10%	ND**	2×10 ³

*Fungi are yeast and molds

**ND means not detected.

From the mentioned results, it could be said that, coriander seeds could be used improve balady bread when it was used it till 10% with wheat flour (82%extraction).It could improve the nutritive value of the produce bread as well as the quality.

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تأثير استخدام بذور الكزبرة علي الخبز البلدي

جمال سعد الحديدي وعصام عبدالحميد رزق

قسم الخبز والعجائن – معهد بحوث تكنولوجيا الأغذية – مركز البحوث الزراعية

أجري هذا البحث بهدف دراسة أستبدال مطحون بذور الكزبرة بنسب من دقيق القمح أستخلاص ٨٢% لإنتاج الخبز البلدي وتحسين جودته وإطالة فترة الحفظ له. وأظهرت النتائج أن بذور الكزبرة ودقيق القمح أستخلاص ٨٢% يحتوي علي مستخلص اثيري (١٠.٥٠ و ١٠.٢٠%) وبروتين (١٩.٢٥ و ١٠.٧٠%) ورماد (٦.٤٥ و ١.٠٤%) وكربوهيدرات كليها (٦٣.٨٠ و ٨٧.٠٦%) وألياف (٣٥.٧٠ و ١.١٦%) وكذلك أرتفاع مطحون بذور الكزبرة من العناصر المعدنية مثل الكالسيوم والماغنسيوم والبوتاسيوم والفوسفور والزنك والحديد مقارنة بدقيق القمح أستخلاص (٨٢%) و تم استخدام أربع نسب من مطحون بذور الكزبرة (٢.٥ و ٥ و ٧.٥ و ١٠) لأستبدال مع دقيق القمح (٨٢%) لإنتاج الخبز البلدي . وقد أظهرت النتائج المتحصل عليها أنه كلما زادت نسبة الأضافة كلما زادت نسبة المحتوي من عناصر التركيب الكيماوي فيما عدا الكربوهيدرات الكلية. وقد تحسنت القيمة الغذائية للخبز المصنع وذلك بسبب المحتوي لمطحون بذور الكزبرة من الأحماض الدهنية الغير مشبعة ومنها (أوليك أو ميجا ٩ و حمض اللينوليك أو ميجا ٦). كذلك تم تقدير كلا من التقييم الحسي وتحديد درجة الطزاجه للخبز البلدي وتقدير العد الكلي للبكتريا والأعفان وأظهرت الأضافات الأربعة للخبز البلدي أن بذور الكزبرة أدت إلي اطالة فترة صلاحية الخبز البلدي المصنع بدون بذور كزبرة.