

## PRODUCTION OF DRIED BESARAH RECIPES

[7]

Lobna, A.M. Hareedy<sup>1</sup>; W.A. El-Malky<sup>2</sup> and Laila, D. El-Mahdy<sup>1</sup>

1- Food Technology Res. Institute, Agric. Res. Center, Giza, Egypt

2- Medical Food Dept., National Organization for Drug Control and Research (NODCAR), Giza, Egypt

**Keywords:** Green leafy vegetables, Low calorie vegetables, Antioxidant compounds

### ABSTRACT

Besarah recipe is a popular diet in Egypt due to its high nutritional value and cheap price. Seven different recipes were prepared. Only four of which recipes were selected being the most favorable as they attained the highest scores of panelist preference. These recipes were stored at room temperature in four layer aluminum package for up to 3 months during which, the chemical constituents, antioxidants, total chlorophyll as well as the microbial flora were determined. The obtained results revealed that recipe (No. 3) which was prepared from dehulled dry broad bean, onion, garlic, salt, peppermint, dill, cumin, coriander (seeds), coriander (green) and caraway and recipe (No. 4) prepared from dehulled dry broad bean, onion, garlic, salt, peppermint, cumin, coriander (seeds), coriander (green) and celery were the most suitable recipes to produce high quality products. These recipes contain the highest crude fibers, phenolic compounds and flavonoids being 16.59 and 16.81%; 84.4 and 93.58; 11.98 and 14.59 mg/g, respectively. The increase of green leafy vegetables, herbs and spices in the mixture with the decrease of broad bean by 42.2% in recipe (No. 3) and (No. 4) increased the total chlorophyll content by more than two folds (660.3 and 678.3 mg/100g, respectively) compared to the other recipes and the control sample. Results also indicated that these two

recipes had approximately the lowest value of calories (304.58 and 301.64 kcal/100g,) respectively compared to the other recipes as well as the control. All selected samples showed a decrease in phenolic compounds by 10.23 - 13.49% and in flavonoids by 24.88 - 35.28% (after 3 months storage). Total chlorophyll content had a slight decrease in Besarah recipes during storage for the aforementioned period being from 6.34 to 6.48%. Concerning the safety, it was also observed that all recipes were microbiologically safe. Therefore, it could be recommended to produce Besarah recipes (especially No. 3 and 4) from green leafy vegetables, herbs and spices being a good source of crude fibers, antioxidants, chlorophyll and minerals and could be incorporated in the population diets being easily prepared and cooked.

### INTRODUCTION

Super foods include dark green plants, medicinal herbs and spices, natural food concentrates and the most nutritious kinds of fruits and vegetables. Super foods supply a cornucopia of totally natural vitamins, minerals, plant enzymes, antioxidants, phytonutrients (health promoting natural chemicals from plants) and symbiotic intestinal flora for more optimal energy metabolism, fat burning, digestion, detoxification, immunity, repair, recovery, rejuvenation and vital longevity (Schatzin *et al* 2000).

Egyptian Besarah is prepared by stewing broad beans (paste) for its preparation, decorticated

(Received April 14, 2008)

(Accepted April 21, 2009)

broad beans are soaked overnight in water, drained and boiled in fresh water until being tender. The beans are mashed to make a purée, seasoned with mint, garlic, cumin seeds and coriander seeds, then simmered gently for 5 minutes. For serving, Besarrah is poured into individual plates and decorated with fried onion slices.

Vegetable calories are very low when eaten raw but, after boiling, the calorie value for vegetables is usually lower than the same weight of the raw ones. This is because, more water is absorbed into each vegetable during boiling and this simultaneously could increase the total weight and lower the caloric density (Massoud *et al* 2005). Caloric value may not simply by additive metabolize energy from fat, protein and carbohydrates provided by factorial equations but may be a function of the interaction of these nutrients with dietary fibers. Thus, functional equations may be inadequate. However, factorial equations are the only equations approved for use in food labeling (Schatzin *et al* 2000) and (Massoud *et al* 2005). Coriander was a particular favorite; it was not only a flavoring but could be considered to have medicinal properties. Egyptians may take coriander seeds for heart and liver troubles. Celery is known to be nutritionally complete, it contains high potassium content. Potassium helps in reducing blood pressure and can regulate fluids and minerals in the body. Onions are good for our heart. They can thin your blood like aspirin. Onions fight bacteria that can cause stomach cancer. Garlic, onion, spices and herbs are typical food containing antioxidants (Balentine *et al* 1997). Lower cardiovascular incidence, in the high garlic and also green leaves consuming by populations of the Mediterranean and Asian regions compared to those having low garlic and green leaves consumption which can protect them against exclusive cardiovascular disease (Lin, 1994).

Pandey *et al* (2006) noticed that the green leaves contain significant amount of iron and leaf concentrates made from fractionating fresh green leaves are one of the richest source of this element. Besides, it also contains large amount of  $\beta$ -carotene, folic acid and protein as well as a considerable amount of pyridoxine, riboflavin and copper. Leaf concentrates can be considered as an excellent dietary factor for the prevention of anemia. So, this work aimed to produce Besarrah recipes as a dried product which could be easily cooked and prepared to encourage its consumption being a useful source of antioxidants, minerals and phytonutrients.

## MATERIALS AND METHODS

### Materials

Full mature dried dehulled broad beans (*Vicia faba*, L.); green herbs, spices (coriander, caraway, cumin, dill, peppermint) parsley, onion, garlic and salt, and also control sample (commercial dried Besarrah mixture) were obtained from the local market and from the medicinal plants. Res. department, A.R.C. Egypt. The percentage of components were according to Table (1).

### Methods

Cleaned dehulled broad beans and spices were ground using mincer, while, green herbs were dehydrated in air circulated oven (Tray type, fisher scientific, ser. No. (253855) iso temp. oven) at 55°C. The component percentages of different dried Besarrah recipes (Table 1) were mixed using a mincer then packed into four layer aluminum packaging materials then stored at ambient temperature till analysis.

### Analytical methods

- Viscosity (cps) (using Brookfield DV III ultra programmable Rheometer at 20°C) was determined according to the method of Ranganna (1979).
- Total calories of Besarrah recipes were calculated by the formula of James (1995) as follows: Total calories = fat x 9 + protein x 4 + Total carbohydrates x 4.
- Sensory evaluation: sensory attributes (color, taste, odor, texture and overall acceptability) of dehydrated Besarrah recipes after preparing different recipes 20 gm/150 ml hot water were evaluated directly after 5 min of cooking by 15 panelists in the food Tech. Res. Inst. Lab. according to the method reported by (Lindley *et al* 1993).
- Moisture; ash; crude fiber; crude protein and ether-extract contents were determined according to the A.O.A.C. (2000) method.
- Total phenolic compounds, total flavonoids and total chlorophyll contents were determined using the methods described by Swin and Hillis (1959) and Snell and Snell (1954).
- Minerals (Iron, calcium, potassium, sodium, magnesium, zinc, manganese, copper and phosphorus) were determined by dry ashing using atomic absorption Pye unican spectrophotometer Sp. England, as mentioned by Kasal *et al* (1997).

Table 1. Ingredients percentages of different dried Besarah recipes

Ingredient	* Recipes						
	1	2	3	4	5	6	7
Dehulled dry broad bean	61.0	61.0	40.0	40.0	56.0	54.0	58.0
Parsley	-	-	-	-	1.0	1.5	1.0
Onion	10.0	10.0	20.0	20.0	14.0	16.0	14.0
Garlic	4.0	4.0	5.0	5.0	3.0	4.0	4.0
Salt	12.0	12.0	6.0	6.0	10.0	8.0	6.0
Peppermint	2.0	4.0	5.0	5.0	1.0	3.0	2.0
Dill	1.0	1.0	5.0	-	4.0	3.5	3.0
Cumin	2.0	4.0	2.0	2.0	4.0	2.0	5.0
Coriander (seeds)	4.0	2.0	4.0	4.0	5.0	6.0	4.0
Coriander (green)	4.0	2.0	10.0	10.0	2.0	2.0	3.0
Caraway	-	-	3.0	-	-	-	-
Celery	-	-	-	8.0	-	-	-
Total/gm	100	100	100	100	100	100	100

\* Rehydration of recipes in hot water by 20 gm/ 150 ml water for 5 min.

1: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green).

2: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) (different percentage).

3: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) and Caraway

4: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) and celery.

5,6 and 7: Recipes being to similar No. 1 and 2 with different percentages.

- Total viable counts, Yeast and mould counts and spore forming bacterial counts were carried out by the method of Smith and Townsend (1999).
- Statistical analysis: The data were tabulated and analyzed by statistical method completely randomized design as described by Snedecor and Cochran (1980).

## RESULTS AND DISCUSSION

Table (2) shows the sensory evaluation parameters (color, Taste, odor, texture and overall acceptability) of Besarah recipes. These parameters were evaluated to select the best ones having the highest preference. Commercial Besarah mixture was used as a control. The main ingredients of all recipes were dehulled broad beans used in high ratios. The increase of green leafy vegetables, herbs and spices (onion, garlic, peppermint, dill, coriander (green), caraway, cumin and celery) in the mixture with the decrease of broad bean by 42.2% in recipe (No. 3) and (No. 4) gave the best color, texture and acceptability compared to the

other recipes and the control sample (Table 2). Moreover, increasing the peppermint, cumin and garlic level improved the color, taste, odor, texture and also acceptability for recipes No. 1 and No. 2. It was clearly noticed that recipes 1, 2, 3 and 4 had the highest acceptability scores ( $7.85 \pm 0.94$ ;  $7.30 \pm 1.25$ ;  $6.90 \pm 1.52$  and  $7.13 \pm 1.11$ ), respectively. So, these four recipes were selected being the most favorite ones and were stored at ambient temperature up to 3 months for analysis. From Table (2), it could be seen that the increase in peppermint, cumin and garlic percentages (Table 1) gave the best scores for Besarah recipe (2) at zero time and till the end of the storage period at ambient temperature when compared with the control sample. Generally, panelist scores indicated that tested Besarah recipes especially No. 1, 2, 3 and 4 soaked in hot water had the highest scores and came in the first order compared with all other tested recipes. Therefore, these four recipes namely 1, 2, 3 and 4 of Besarah recipes were chosen to continue for other analysis through 3 months.

Table 2. Sensory evaluation of dehydrated Besarrah recipes during storage at ambient temperature

Storage period (months)	Samples	Color (10)	Taste (10)	Odor (10)	Texture (10)	Overall acceptability (10)
Zero	Control	7.64±1.12 <sup>**</sup> a	7.17±1.17 ab	7.64±1.36 ab	7.45±1.07 ab	7.91±1.20 a
	Recipe (1)	7.32±0.90 ab	6.92±1.03 b	6.64±1.21 bc	7.1±0.74 ab	7.85±0.94 a
	Recipe (2)	7.41±0.97 ab	7.25±0.76 ab	6.85±1.13 b	7.95±0.69 a	7.30±1.25 b
	Recipe (3)	6.64±1.43 bc	6.00±0.89 bc	5.83±1.63 C	6.85±1.78 b	6.90±1.52 b
	Recipe (4)	6.09±1.30 bc	5.83±0.98 cd	5.91±1.42 C	6.90±2.16 b	7.13±1.11 ab
	Recipe (5)*	5.40±0.97 C	4.83±0.98 d	5.27±1.27 cd	5.0±1.419 cd	4.7±1.49 d
	Recipe (6)*	4.95±0.96 d	4.71±1.11 d	5.55±1.37 C	4.7±1.16 d	4.82±1.54 d
	Recipe (7)*	5.0±0.89 C	5.0±1.09 cd	5.0±1.34 cd	4.4±1.16 d	5.30±1.34 C
One	Control	6.42±1.27 bc	7.09±1.38 ab	7.0±1.63 ab	6.62±1.45 bc	7.36±1.38 ab
	Recipe (1)	6.50±1.64 bc	6.83±1.17 bc	6.57±1.81 bc	6.20±1.30 bc	7.07±1.10 b
	Recipe (2)	7.0±0.58 ab	6.57±0.79 bc	6.71±1.71 bc	7.57±0.79 ab	7.17±1.47 ab
	Recipe (3)	6.33±2.25 bc	5.22±0.42 C	5.33±0.52 C	6.50±1.38 bc	6.67±1.86 bc
	Recipe (4)	5.67±1.86 C	5.0±0.63 cd	5.83±1.6 cd	6.33±1.22 bc	6.92±2.15 b
Two	Control	6.20±1.42 bc	6.24±1.33 bc	6.70±1.89 bc	6.20±0.92 bc	6.95±1.39 b
	Recipe (1)	6.10±1.97 bc	5.67±2.0 C	6.78±1.64 b	6.33±1.12 bc	6.50±1.72 bc
	Recipe (2)	6.60±2.0 bc	6.11±1.17 bc	6.89±0.76 bc	7.30±0.95 ab	7.15±1.16 ab
	Recipe (3)	5.70±1.64 C	4.83±0.87 d	5.82±1.66C	5.8±1.54 C	6.3±1.77 bc
	Recipe (4)	5.80±1.75 C	4.75±0.98 dc	6.1±2.08bc	5.61±1.36 C	6.32±1.98 bc
Three	Control	5.58±0.3 C	6.0±0.96 bc	6.33±1.1 bc	5.4±1.2 C	5.75±0.9 C
	Recipe (1)	5.75±0.1 C	6.1±0.99 bc	5.80±0.8 C	4.75±1.1 d	6.0±1.0 bc
	Recipe (2)	5.58±0.17 C	6.65±1.2 b	6.96±0.9 b	6.5±0.8 bc	6.5±1.2 bc
	Recipe (3)	5.17±0.9 Cd	5.40±1.4 C	5.3±1.0 C	6.5±1.4 bc	5.5±1.3 C
	Recipe (4)	5.58±0.9 C	5.60±0.9 c	5.5±1.3 c	5.9±1.2 bc	5.6±1.6 C

\* discarded \*\* Values are means ± SD.

For each treatment within a column, means not sharing the same alphabetical letter are significantly different at 0.05, SD= Standard error.

1: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green).

2: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) (different percentage).

3: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) and Caraway

4: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) and celery.

5,6 and 7: Recipes being to similar No. 1 and 2 with different percentages.

### Physical and chemical characteristics

Data presented in Table (3) show the chemical composition of selected Besarrah recipes having the highest organoleptic scores. From the same Table, it could be seen that viscosity of control sample was higher than the other tested recipes being 2311cps and this may be due to the increase in dehulled broad bean content. Crude fibers and total ash content in recipe 3 and 4 was higher compared to the other selected recipes and the control sample. These results would be due to the

decrease in the percentage of dehulled broad bean by 42.2% and also the increase of herbs and spices content (recipes No. 3 and 4). Data in Table (3) also indicate that the same recipes (3 and 4) had approximately the lowest calories (304.58 and 301.64 kcal/100g), and this may be attributed to the increase in fibers content and also the decrease in protein and ether extract content. It could also be stated that the starch content in all selected recipes are in agreement with those obtained by El-Sherbiny *et al* (1996).

**Table 3. Viscosity; Chemical constituents and total calories of dried Besarah recipes (on dry weight basis)**

Constituents	Control	1	2	3	4
Viscosity (cps) **	2311*	813	911	366	339
Moisture content %	4.65	5.42	5.01	5.33	5.77
Total solids %	95.35	94.58	94.99	94.67	94.23
Crude Protein %	11.10	13.70	13.23	12.81	12.06
Crude Fiber %	9.83	13.82	12.68	16.59	16.81
Total Ash %	9.36	7.38	8.61	10.81	10.96
Ether Extract %	10.07	9.16	8.14	7.10	7.16
Total carbohydrates % ***	54.99	50.52	52.22	47.36	47.24
Total Calories Kcal/100g	354.99	339.32	335.50	304.58	301.64

\* Mean values of triplicate samples.

\*\* After reconstitution recipes in hot water (20gm/150ml/5min.).

\*\*\* Calculated by difference.

1: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander

(seeds) and coriander (green).

2: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander

(seeds) and coriander (green) (different percentage).

3: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander

(seeds) and coriander (green) and Caraway

4: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander

(seeds) and coriander (green) and celery.

Addition of green leafy vegetables, herbs and spices to recipes No. 3 and 4 increased the chlorophyll A, B, total phenolic compounds and also total flavonoids contents being (384.92, 275.42mg/100g, 84.4 and 12.98mg/g), for recipe No. 3 and (393.35-285.00 mg/100g ; 93.58 and 14.59mg/g), for recipe No. 4, respectively (Table 4).

Finally it could be concluded that recipes No. 3 and 4 had adequate antioxidants and chlorophyll content, lowest calories and highest crude fibers.

Data in Table (5) show the minerals content of selected dried Besarah blends. Magnesium, sodium, potassium, iron, calcium, manganese, copper, phosphorous and zinc were determined and the obtained results indicate that Mg, Na, K, Fe and Ca were the major minerals detected in all selected recipes which recorded 235.1, 5300.6, 3123.5, 9.84 and 158.20mg/100g, respectively in recipe (4). This could be due to its higher content of leafy vegetables, herbs and spices which are considered as rich sources of minerals.

#### Physico-chemical composition of selected dried Besarah recipes during 3 months of storage

Results in Table (6) reveal that moisture, viscosity, crude fibers, total solids and total carbohydrates contents of all selected recipes packaged in four layer packages showed negligible changes during storage at ambient temperature for three months. Results also illustrate that recipe No. 3 and 4 contained higher amount of crude fibers (16.611% and 16.796%) and lower amount of total carbohydrates being 47.56 and 47.42%, respectively compared to the other tested samples after storage at ambient temperature for 3 months. Finally it could be concluded that the differences in the chemical composition of selected low calorie Besarah recipes could be observed after storage for 3 months at ambient temperature.

**Table 4. Antioxidant and chlorophyll contents of selected dried low calorie Besarrah recipes (mg/100g)**

Constituents	Control	1	2	3	4
Chlorophyll A	114.66*	231.25	216.78	384.92	393.35
Chlorophyll B	45.04	110.84	133.77	275.42	285.00
Total phenolic compounds (mg/g)	69.55	75.33	71.22	84.40	93.58
Total flavonoids (mg/g)	6.59	9.78	10.53	12.98	14.59

\* Values are means of three replicate samples.

- 1: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green).
- 2: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) (different percentage).
- 3: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) and Caraway
- 4: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) and celery.

**Table 5. Minerals content of dried low calorie Besarrah recipes**

Minerals mg/100g	Control	1	2	3	4
Mg	193.17*	198.64	207.86	231.64	235.1
Na	5365.37	4520.30	4758.99	4822.36	5300.6
K	2637.2	2564.20	2443.11	2756.13	3123.5
Fe	5.47	6.03	6.34	7.63	9.84
Ca	74.44	75.06	76.93	87.45	158.2
Mn	0.895	0.896	0.942	1.04	1.26
Cu	1.403	1.109	0.930	1.02	1.20
P	0.28	0.32	0.32	0.28	0.32
Zn	2.82	2.86	2.87	2.71	2.76

\* Mean value of triplicate samples.

- 1: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green).
- 2: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) (different percentage).
- 3: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) and Caraway
- 4: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) and celery.

**Table 6. Effect of storage at ambient temperature on viscosity and chemical constituents of selected dehydrated Besarah recipes (on dry weight basis)**

Storage period (months)	Recipes	Moisture content %	Viscosity (cps)*	Crude fibers %	Total solids %	Total carbohydrates %
One	Control	4.942	2304	9.682	95.058	54.80
	1	5.576	800	13.682	94.424	50.30
	2	5.432	900	12.556	94.568	51.81
	3	5.888	364	16.438	94.112	47.51
	4	5.146	336	16.666	94.854	47.33
Two	Control	5.011	2301	9.811	95.389	54.62
	1	5.721	800	13.822	94.279	50.33
	2	5.561	910	12.951	94.439	51.90
	3	6.111	361	16.549	93.889	47.50
	4	5.342	334	16.813	94.658	47.36
Three	Control	5.123	2303	9.831	94.077	54.70
	1	5.811	789	13.841	94.189	50.41
	2	5.723	900	13.013	94.277	51.69
	3	6.213	360	16.611	93.787	47.56
	4	5.513	330	16.796	94.487	47.42

\* After recipes reconstitution in hot water (20gm/150ml for 5 min).

- 1: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green).
- 2: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) (different percentage).
- 3: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) and Caraway
- 4: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) and celery.

#### Effect of storage period on antioxidants and chlorophyll contents of dried Besarah recipes

The data presented in Table (7) illustrate the effect of storage at ambient temperature for 3 months on the antioxidant and chlorophyll compounds of selected Besarah recipes. These results indicate that the total phenolic compounds of all samples changed during storage. It decreased by 23.95; 15.27; 13.47; 10.04 and 10.23% in the control, recipes 1, 2, 3 and 4 respectively. Also, the flavonoids content decreased by 41.43; 35.28; 25.07; 26.19 and 24.88%, respectively after 3 months of storage.

Meanwhile, total chlorophylls content decreased by 18.10; 6.34; 7.03; 9.26 and 6.48% in

the control, and recipes 1, 2, 3 and 4 respectively, after storage for 3 months at ambient temperature, (Table 7). Results in the same table also show that total chlorophyll contents of the control sample was lower by more than two folds (18.10%) compared to the other tested samples during storage for up to 3 months. These results could be attributed to the absence of some green leafy vegetables in the control sample. Finally it could be concluded that addition of green leafy vegetables, herbs and spices to recipe (4) followed by recipe (3) using good packaging materials gave adequate antioxidant compounds and total chlorophyll and also could be considered as sufficient sources of antioxidants for humans.

**Table 7. Effect of storage at ambient temperature on antioxidants and chlorophyll contents of dehydrated Besarah recipes**

Storage Period (months)	Recipes	Total phenols mg/g	Total flavonoids mg/g	Chlorophyll (mg/100g)		
				A	B	Total
Zero	Control	69.55**	6.59	114.66	45.04	159.70
	1	75.33	9.78	231.25	110.84	342.09
	2	71.22	10.53	216.78	133.77	350.55
	3	84.40	12.98	384.92	275.42	660.34
	4	93.58	14.59	393.35	285.00	678.35
One	Control	61.54	6.23	112.61	43.020	155.63
	1	72.16	9.35	226.30	103.80	330.10
	2	70.31	10.17	211.80	130.70	342.50
	3	81.44	11.24	376.30	260.60	636.90
	4	88.73	13.55	381.90	270.30	652.20
Two	Control	56.90	5.07	101.91	40.00	141.91
	1	70.34	7.30	224.30	100.90	325.20
	2	67.10	8.41	211.00	125.30	336.30
	3	78.90	9.85	373.40	258.10	631.50
	4	86.71	10.91	280.80	263.60	641.40
Three	Control	52.89	3.86	100.80	30.000	130.80
	1	63.83	6.33	220.60	100.00	320.40
	2	61.61	7.89	200.90	125.00	325.90
	3	75.93	9.58	360.10	239.10	599.20
	4	84.01	10.96	370.30	264.10	634.40

\* on dry weight basis. \*\*Values are means of three replicate samples.

- 1: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green).
- 2: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) (different percentage).
- 3: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) and Caraway
- 4: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) and celery.

#### Microbiological examination

The best dried Besarah recipes were evaluated microbiologically (total viable counts, yeast and mould counts and spore forming bacterial count) during storage at ambient temperature for 3 months as shown in the data presented in **Table (8)**. The bacterial flora in the control was slightly lower than the prepared recipes. Generally the flora increased slightly and gradually during storage (**Table 8**). Meanwhile, recipe (No. 2) contained lower yeast and mould count (2.49 log cfu/g) when

compared with the other tested recipes and also recipe (No. 1) having a lower spore forming bacterial count (2.65 log cfu/g) after three months of storage. All recipes of dried Besarah products were coliform free. Therefore, all prepared recipes could be considered healthy and safe.

It could be recommended that Besarah made from dried green leafy vegetables, herbs and spices then cooked being a good source of antioxidants, minerals and fibers may be incorporated in the diets of the population, especially, that which could be easily prepared and cooked.



**Table 8. Microbiological examination of dehydrated Besarrah recipes during storage at room temperature up to 3 months (log cfu/g)**

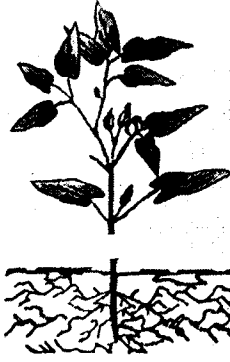
Samples	Total viable counts				Yeast and mould counts				Spore forming bacterial count			
	Storage period (months)											
	0	1	2	3	0	1	2	3	0	1	2	3
Control	3.30*	3.78	3.95	4.67	2.00	2.48	2.90	2.78	2.64	2.73	2.85	2.89
Recipe No.1	3.78	3.10	4.68	4.95	2.30	2.41	2.53	2.72	2.49	2.53	2.58	2.65
Recipe No. 2	3.90	4.56	4.83	4.96	1.90	2.00	2.38	2.49	2.58	2.64	2.70	2.80
Recipe No. 3	4.32	4.58	4.72	4.89	2.48	2.30	2.70	2.91	2.99	2.93	2.97	3.01
Recipe No.4	4.11	4.38	4.63	4.79	2.23	2.40	2.53	2.88	2.81	2.85	2.90	2.96

\* Values are means of three replicate samples.

- 1: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green).
- 2: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) (different percentage).
- 3: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) and Caraway
- 4: Recipe composed of dehulled dry broad bean; parsley, onion, Garlic, salt, peppermint, Dill, cumin and coriander (seeds) and coriander (green) and celery.

#### REFERENCES

- A.O.A.C. (2000). Association of Official Analytical Chemists. *Official Methods of Analysis*. (17<sup>th</sup> Ed.), Washington, DC, USA.
- Balentine, D.A.; S.A. Wisema and L.C. Bouwens, (1997). The chemistry of tea flavonoids. *Crit. Rev. Food Sci., Nutr.* 37(8): 693-704.
- El-Sherbiny, G.A.; S.S. Eizk and M.A. El-Shiatty (1996). A better recipe to upgrade the nutritional value of Besarrah, Egypt. *J. Food Sci.*, 14(1): 121-129.
- James, C.S. (1995). *Analytical Chemistry of Foods*, Chapter (6) p. 135 in *General food studies*. Blachie Academic and Professional, London.
- Kasai, M.; N.O. Kamoto; K. Hatne and A. Shimada, (1997). Role of calcium and magnesium ions in the hardening of pressure-treated root vegetables. *J. Agric. Food Chem.*, 45: 599-606.
- Lin, R.I.S. (1994). Phytochemical and antioxidants. In: Goldberg, I. (ed.). *Functional Food*. pp. 393-453. Chapman and Hall, New York.
- Lindley, M.G.; P.K. Beyts; I. Canales and F. Borrego, (1993). Flavor modifying Characteristics of the intense sweetener meohesperidin dihydrochalcone. *J. Food Sci.* 58: 592-598.
- Massoud, L.; S. Salem-Aida and N. Ziada-Nawal, (2005). Production of Low Calorie Functional Foods. The 2<sup>nd</sup> International Conf. Future Trends in Food Science and Nutrition, pp. 171-186, Cairo, Egypt.
- Pandey, M.; A.B. Anbidi; S. Sadhua and P. Singh, (2006). Nutritional evaluation of leafy vegetable paratha, *J. Hum. Ecol.*, 19(2): 155-156.
- Ranganna, S. (1979). *Handbook of Analysis and Quality Control for Fruit and Vegetable Products*, 2<sup>nd</sup> Ed pp. 269-280. Measurement of Consistency. Tata Mc Graw-Hill Publishing Co., limited, New Delhi.
- Schatzin, A.; E. Lanza; D. Corle; P. Lance and J. Cahill (2000). Lack of effect of a low – fat, high – fiber diet on the recurrence of colorectal adenomas. *N Engl. J. Med* 342: 1149-1155.
- Smith, C.F. and D.E. Townsend, (1999). A new medium for determining the total plate count in food. *J. Food Protect.*, 62(12): 1404-1410.
- Snedecor, W. and W. Cochran, (1980). *Statistical Method*, 7<sup>th</sup> Edition p. 109. The Iowa Stat University Press, Ames, U.S.A.
- Snell, F.D. and C.T. Snell, (1954). *Colorimetric Method of Analysis*. 3<sup>rd</sup> Ed. p. 93. Von Nostrand and Co., N.Y.
- Swin, T. and W.E. Hillis, (1959). The phenolic constituents of prumus domestica. I. The quantitative analysis of phenolic constituents. *J. Sci. Food and Agric.*, 10: 63-68.



## دراسة وصفات مختلفة لإنتاج بيصارة جافة

[٧]

لبنى عبد الفتاح هريدي<sup>١</sup> - وجيه المالكي<sup>٢</sup> - ليلى ضياء الدين المهدي<sup>١</sup>

١- معهد بحوث تكنولوجيا الأغذية - مركز البحوث الزراعية - الجيزة - مصر

٢- الهيئة القومية للرقابة والبحوث الدوائية - الجيزة - مصر

### الموجز

واشارت أيضاً النتائج إلى أن زيادة الخضروات الورقية والأعشاب والتوابل في مخاليط البيصارة الناتجة وخفض الفول المقشور بنسبة ٤٢,٢% في كلاً من الخلطة رقم ٣، ٤ أدى إلى زيادة محتوى الكلوروفيل لأكثر من الضعف حيث وصل إلى ٦٦٠,٣، ٦٧٨,٣ ملجم/١٠٠جم على التوالي وذلك بالمقارنة بالخلطات الأخرى بالإضافة إلى الكنترول المقارن، أيضاً احتوت تلك الخلطات على أقل السعرات الحرارية ٣٠٤,٥٨، ٣٠١,٦٤ كيلو كالورى/١٠٠جم على التوالي. وكذلك حدث تغير في محتوى الخلطات من الفينولات والفلافونات خلال فترات التخزين وحتى ثلاثة أشهر (حيث بلغ متوسط الإنخفاض حوالي ١١,٨% وكذلك ٣٠,٨% على التوالي في نهاية فترة التخزين). لذلك توصى الدراسة بإمكانية إنتاج مخاليط بيصارة جافة غنية في مضادات الأكسدة والعناصر المعدنية وأمنة صحياً كما ثبت بالتحليل الميكروبيولوجى لتشجيع إدخالها في الوجبات للأفراد وخاصة أنها سهلة التحضير ويمكن طبخها وإعدادها في دقائق معدودة.

تعتبر البيصارة من الوجبات الشعبية المحببة لدى الكثير من المصريين لذلك تم في هذه الدراسة إعداد مخاليط من البيصارة الجافة غنية في المحتوى من العناصر المعدنية ومضادات الأكسدة بالإضافة إلى سهولة التحضير والطبخ، ولذلك تم تحضير سبعة مخاليط حسيًا لاختيار أفضلها ومن خلال هذا التقييم تم اختيار أربعة خلطات واختبارها كيميائياً وميكروبيولوجياً خلال فترة التخزين لمدة ٣ شهور على درجة حرارة الغرفة. وأشارت النتائج إلى احتواء الخلطة (رقم ٣) والتي تحتوى على فول مقشور مجفف - بصل - ثوم - ملح - نعناع - شبت - كمون - كزبرة خضراء وجافة وكراوية وكذلك الخلطة (رقم ٤) والتي تحتوى على جميع المكونات الخاصة بالخلطة (رقم ٣) فيما عدا الشبت والكراوية والتي استبدلت بالكرفس على أعلى نسب من الألياف الخام والمواد الفينولية والفلافونات بنسب ١٦,٥٩، ١٦,٨١%، ٨٤,٤، ٩٣,٥٨ وكذلك ١١,٩٨، ١٤,٥٩ ملجم/جم على التوالي (لكلاً من الخلطة رقم ٣، ٤)،