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PRODUCTION OF A NEW YOGHURT - LIKE PRODUCTS FORTIFIED WITH SOME LEGUMES AND SWEET, CEREAL CROPS AND ITS EVALUATION OF FUNGAL LOAD.

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ABSTRACT

A yoghurt – type product from Beet, Carrot, Peppermint, Lentil, Faba beans, Chickpea, barley Giza 126 and cantaloupe collected from different retail markets in Cairo and fortified with a percentage of 5,10, 15% for each crop. The aime of like products fortified with some legumes and sweet, cereal crops to improve products , increase amino acids and Sulphur-containing amino acids. Results were confirmed yoghurt with 5% the best treatment used in vitro and vivo for syneresis ,grainy flavor and a gritty texture .Milk was prepared by fortification with 5% of some crops to achieve a suitable menu yoghurt-type products to improve nutritive quality and organoleptic properties, and showed that the effect of supplementation on minerals content of yoghurts – like products were slightly increase in Fe, Zn, Cu, Mn and a highly increase in Ca, P, Mg, Na, K in all treatments and some of these ingredients designed to improve flavor.

Samples were analysis amino acids composition of different types of crops and yoghurt like products, reveals the presence of 16 amino acids, the major amino acid were glutamic (4.67) g/ 100g in faba bean while (1.129) g/ 100g in yoghurt – like products, leucine (2.15) g/ 100g in lentil while (0.818) g/ 100g in chickpea yoghurt – like products. This increase of amino acid seems to be related to the increase recorded in the total protein of yoghurt – like products.

All samples were evaluated fungal load Isolated fungi from sterilized fresh samples at zero time (before used).The results revealed that 362 fungal isolates belonging to 9 genera and 15 species were isolated from fresh samples such as *Alternaria spp, Alternaria alternate, Alternaria dauci, Alternaria radicina, Aspergillus niger, A. fumigatus, Fusarium spp., F. oxysporum, F.solani, Macrophomina phaseolina, penicillium spp. Phoma betae, Verticillium albo-atrum, Rhizoctonia solani* and *Sclerotinia sclerotiorum.* Faba beans showed the highest total fungi isolated (67 field fungal isolates) in all examined samples. Carrot recorded the least frequency, total fungi 22 fungal isolates compared with all samples used, and followed by peppermint 29 fungal isolates, it should be free raw material used from fungi and specially mycotoxins fungi to reduce the risks for consumers' health. Nutrient utilization and performance were studied in an experiment with adult Albino rats diets based on basel diet plus yoghurt – like product. And showed that true digestibility (TD) increased with supplementation process of yoghurt with 5% of (beet, lentil, chickpea, and cantaloupe).The data proved that the highest true digestibility of the protein was 94.82 from beet like – yoghurt and the highest protein utilization was 78.04 from lentil

INTRODUCTION

Lactic acid fermentation of cereals has been studied in the past few decades yogurt – like products have been produced from various kinds of cereals such as preformatted flour and extrouded rice *(* Lee *et al., 1992)* and fermented scarified Rice (Chakamas *et al*., 1992), a product was produced from mixture of fermented rice and soy protein isolate (Mok *et al*., 1991). Fermented foods have been arrived on earth since humans be on it and of these fermented milks have long been an important component of nutrition and diet. Fermented milks were developed as a means of preserving nutrients (Beena 2000). The international Dairy Federation *(IDF a,b 1992)* published general standards of identity for fermented milks that could be briefly defined as follows: Fermented milks are prepared from milk and / or milk products (e.g. any one or combinations of whole) partially or fully skimmed, concentrated or powdered milk, also defined fermented milk as products to which other foods substances may be added or not obtained by pH decrease in milk or reconstituted milk, to which other lactic products may be added or not by lactic fermentation, through the action on specific microorganisms (Mercosul 1998). In addition to basic technologies, modern processes lead to milk fermentation under predictable, controllable and precise conditions to yield hygienic fermented dairy products of high nutritive value (Kurmann 1984) and (Tamime and Robinson 1999). Culture addition fermentation, or both are available for creating an assortment of flavors and textures in milk products (Robinson and Tamime, 1995). Recently, a lot of research work is being carried out around the global regarding effect of various adding ingredients on fermented milks, especially yoghurt. Also, it is imperative to know a meaningful dose – benefit relationship associated with a specific fortified food. Some of these ingredients designed to enhance consumer appeal, which may be incorporated into fermented milks include dietary fibers, the beneficial role of dietary fiber in human nutrition has lead to a growing demand for incorporation of novel fibers into foods (Wu *et al.*, 2001).However, say and sugar beet fibers caused a significant decrease in viscosity due to partial syneresis. In general, fiber addition led to lower overall flavor and texture were intense in all fiber – fortified yogurts (Garcia and Gregor, 1997).

Fungi are probably one of the most numerous plant families on earth. Symptoms and disease development come about from the growth of the fungi through the host-parasite interaction. These fungi sometimes produce metabolites (by-products of growth) that are toxic to animals and humans. Reproduction in fungi occurs through the production of spores.

Cantaloupe (*Cucumis melo* L. var. *reticulates* Ser.):

Cantaloupe is one of the most popular cucurbit crops in Egypt either for local consumption or exportation. Cantaloupe, can be fortifies to fermented milk specially yoghurt, for its benefits for helping to lower blood cholesterol levels and high blood pressure. They help to lower the risk of heart disease and cancer, boost the immune system, protect against macular degeneration, aid liver health and have antitumor and anti-inflammatory properties. Cantaloupe include folate, fiber, vitamin C, potassium, calcium, iron, magnesium, phosphorus, sodium, fructose, glucose, sucrose, zinc, copper, manganese, vit B 1,2,6, pantothenic acid, vit E and small amounts of lipids (Phyllis 2003*)*.It was introduced to Egypt, since few decades, as a winter crop and became one of the most important exportation crops due to the relative advantage of its cultivation, warm winter, enough amounts of water. However, cantaloupe plants are vulnerable to attack by bacterial, fungal and viral disease in addition to nematode infections and physiological disorders (Osman, 1966; Abo El-Ghar, 1970 and Muhanna, 2006), (Troutman and Matejka, 1970) surveys over 3 years indicated that cantaloupe root rots are commonly caused by *Rhizoctonia solani, verti-cillium albo-atrum* and an unidentified fungus. All 3 fungi attached cantaloupes under greenhouse conditions and the symptoms are described.

Beet (***Beta vulgaris subsp. vulgaris)***:

Beets, have been used for medicinal purpose since ancient times, they have a cleansing effect on the liver and can be used to treat liver maladies, kidney stones, and disorders of the gallbladder, stomach, and intestines. Beets aid digestion and the lymphatic system. They also help flush out uric acid and table salt. They can combat anemia, debility and general weakness. Beets tone the blood and build red blood cells.Nutrients in beets include calcium, iron, magnesium, phosphorous, sodium, zinc, copper, manganese, vitamins (C,B, thiamine), B2 (riboflavin), B3 (niacin), B6 and pantothenic acid, folate, small amounts of lipids and amino acids in fact, this heavy red color have pigment cold betacyanin is also extracted and used as natural food dye (Phyllis, 2003). (Christen *et al*., 2008) isolated that from sugar Beet, A total of 1952 bacterial and 1344 fungal isolates screened by dual testing for antagonism toward the pathogens *Aphanomyces cochlioides, phoma betae, pythium ultimum, and Rhizoctonia solani.*

Carrots *(Daucus carota subsp. Sativus)*:

Carrot is one of the most popular and commonly consumed vegetables. Carrots are one of the best dietary sources of beta-carotene, which boosts the immune system and reduces the risk of many cancers, including breast, rectal larynx and lung cancer. Almost all epidemiological studies have included that the regular consumption of beta-carotene might reduce the risk of developing cancer by 40-70 percent. Carrots also contain lutein, another anti-cancer careteniod. Carrot stimulates production of T-helper cells, immune cells that protect the body from all types of infection; guard against cardiovascular disease, reduce inflammation; and show the aging process. They build healthy skin, tissue and teeth; improve eyesight; prevent eye and mucous membrane infection nutrients in carrots include fiber, calcium, iron, magnesium, phosphorus, potassium, sodium, zinc, copper, manganese, vitamins (C,B6,K,E,B1,B2,B3). Pantothenic acid, folate, small amount of lipids and amino acids. Physiochemical include alphocarotene, beta-carotene, lutein, tocopherols, apigenin, beta-ionone, beta-sitosterol, coffeic acid, caryophyllene, chlorogeneic acid, chlorophyll, coumarin, eygenol, ferulic acid, kaemplerol, limonene,lycopene, myrcetin,myristic acids,myristicin, P-coumaric acid, pectin, psorolen, quercetin, quercitrin, scopoletin, and stigmasterol (Phyllis, 2003).The carotene is one medium-sized carrot supplies our daily requirement of Vitamin A. commercial carrot production is an economically important industry worldwide, (Rubatsky, 2002*)* noticed that the United States, and Russia are the major producers of carrots. In the United States, nearly two million English tons of carrots are produced annually on over 40.000 ha at a value of $500 million. (Rubatsky *et al.,* 1999) reported that *Aspergillus* species produce toxins that exhibit a wide range of toxicities, with the most

Nearly 100 *Penicillium* species have been reported as toxin produces. Of these the following nine mycotoxins produced by 17 *Penicillium* species are potentially significant to human health citreovirdin, citrinin, cyclopiazonic acid, ochratoxin A, patulin, penitrem A, PR toxin, Roquefortine C, and Secalonic acid D.

Peppermint (*Mentha piperitae*) :

Peppermint is useful for easing insomnia, it's flavor is sweet and cooling, upset stomachs, and nervous tension. It helps the body break down fat by stimulating bile flow. Mint also has been shown to increase the number of phagocytes, cells that are capable of destroying pathogens, bacteria and cancer cells. Nutrients in mint include vitamins (C,A,B6,E,B1,B2,B3). Calcium, magnesium, phosphorus, potassium, manganese, iron, pantothenic acid, folate and fiber.

Phytochemicals include limonene. For a fragrant zest, put fresh mint leaves in fruits salads and fruit soups, in new potatoes, in cold fruit beverage, on coked carrots or peas, and on cold grain salads such as tabbouleh. Mint also makes a refreshing herbal tea or an appetizing garnish (Phyllis, 2003). A native of the Mediterranean, peppermint leaves were often used to crown luminaries in ancient Greece and Rome. It continues to be revered for its cooling, crisp aroma, deeply refreshing flavor and smooth finish. If you have yet to try gourmet peppermint tea, made from just pure peppermint (no added oils or sweeteners), you'll be pleasantly surprised by its superior flavor steep at 212° for 5-10 minutes fresh from origin.

Barley (*Hordeum vulgare L*):

Barley (*Hordeum vulgare* L), is the world's most nutritional crop. This is because it contains many elements that rich sources of health and energy. The composition of barely, including the percentage of minerals, barely, flour contained 11.65%, 2.31%, 6.75%, 2.22% and 77.07% crude protein, crude fat, crude fiber, ash and nitrogen free extract, respectively when barley provides insoluble fibers that feed friendly bacteria in digestive tract, this helps to maintain larger populations of friendly bacteria in the digestive tract. In addition to producing the helpful short-chain, fatty acids. Friendly bacteria play an important protective role by crowding out pathogenic (disease-causing) bacteria and preventing them from surviving in the intestinal tract.

Barely and other whole grains one rich source of magnesium, a mineral that acts as co-factor for more than 300 enzymes, including enzymes, involved in the body's use of glucose and insulin secretion (Phyllis,2003).

Chickpea (*Cicer arietinum)*:

Small and compact, chickpeas resemble hazelnuts or acorn's .Nutrient in chickpeas include protein, Fiber, Calcium, iron, magnesium, phosphorus, Potassium, Zinc, Copper, Manganese, Vitamin C, Vitamin B, (niacin), Vitamin B1 (thianine), Pantothenic acid, Vitamin B6, folate, and small amounts or lipids and amino acids. Pytochemicals include beta-carotene (Phyllis,2003).

Several fungi and viruses have been reported of the WRR complex Chickpea Allen (1983) and Cother (1977) like wilt including flaccidity y yellowing ad vascular discoloring induced by *Fusarium oxsporum, F. solani, Macrophomina phaseolina, Verticillium albo-atrum Acrophialophora* *fusispora.*Pande *et. al* (2006) Botrytis grey mould (BGM), caused by Botrytis cinerea per. Ex. Fr., is an economically important disease of chickpea (Cicer arietinum L.), especially in areas where cool, cloudly, and humid weather persists.

Bretag and Mebalds (2008) reported that the disease *Fusarium oxy sporum* and *phoma medicaginis* were are caused by different fungi, they can all cause chickpea plants to wilt and are therefore easily confused. Some pathogens (Ascochyta pisi, Botrytis cinerea, seed-borne and seed transmission may be an important factor in their spread).

Faba Beans(Vicia faba L.):

Faba Beans, these large, lima-shaped beans have a granular texture and robust, slightly bitter flavor. Also called broad beans, they have tough skins and need to be peeled before eating. They go well with zesty herbs and other pungent ingredients. Use in soups, steams.

Nutrients in faba beans include protein, fiber, calcium, phosphorus, potassium, magnesium, zinc, copper, manganese, Vitamin C, vitamin B3 (niacin), Folate, and small amounts of lipids and amino acids. Phytochemicals include beta-carotene (Phyllis 2003).Ghanim (1993) reported that *Sclerotinia sclerotiorum* isolated from bean, lettuce, pepper, cantaloupe and sunflower grown in Egypt. Omar (2004) isolated that from faba beans 17 fungal species were isolated form rood nodule samples taken from faba bean plant collected from different sites at Assiut area (Egypt). The growth of faba bean plants in pots was significantly promoted by soil inoculation with most fungi. Growth was checked in pots with inocula of *Cladosporium cladosporioides, Fusarium moniliforme, F. oxy sporium, F. solani, Macrophominia phaseolina* and *Rhizoctonia solani.* Andrés *et al* .,(2006) isolated *Fu sarium solani* f. sp. *Paseoli, Rhizoctonia solani, Pythium ultimum, Pythium* spp., *Fusarium avenaceu, F. culmorum, Botrytis cinerea, Sclerotinia sclerotiorum* and *Sclerotium rolfsii* from 419 bean (*Phaseolus vulgaris* L) in northwest spain.

Oliver *et al* .,(2008) noticed that *Sclerotinia sclerotiorum* is the causal agent of the white mold of the common bean (*Phaseolus vulgaris* L.). Flowers are generally the first tissue to be colonized by *Sclerotinia sclerotiorum* in bean in Canada.

Ahmed (2010) isolated fungi *Alternaria* app., *Botrytis cinerea, Fusarium* spp., *Mucor* sp., *Penecillium* spp. And *Sclerotinia sclerotiorum* were isolated from beans cultivated in different locations in Egypt. *S. sclerotiorum* and *B. cinerea* were most dominant fungi.

Lentil:

Lentils, belong to the pea family. This tiny, disk-shaped legume comes in a mainbow of colors, though red, brown, and green lentils are the most common in the United States. Cooking, lentils have a delicate flavor and creamy texture. They do not need presoaking cook quickly.

Nutrients in lentils include protein, fiber, potassium, folate, phosphorus, magnesium, manganese, vitamin B3 (niacin), iron, copper, vitamin A, vitamin B6, calcium, and phosphorus. (Phyllis 2003). Zara *et al*.,(2011)reported that skim milk was supplemented with 1-3%(w/v)lentil flour inoculated with yogurt culture and noticeted that syneresis in 1-2%lentil flour supplementation yogurts was significantly higher than allother samples

,however ,greater lentil supplementation (3%)resulted in the lowest syneresis during 28 days storage.

Khare *et al.* (1990) reported that Among of the diseases affecting lentil, vascular wilt by *Fusarium oxysporum f. sp.* Lentis root rots caused by *F. roseum, F. solani, Rhizoctonia bataticola, R.* rot *Botrytis cinerea, Ascochyta* blight *Ascochyta lentis,* rust *Uromyces fabae.* Downy mildew *peronospora lentis,* powdery mildew *Erysiphe polygoni,* root-knot M*eloidogyne sp.*Bayaa *et.al* (1994) noticed that, Lentil wilt disease ,caused by *F.oxysporum f.sp.* lentils, is considered the most important disease affecting lentils in Syria causing significant economic losses.

The aim of the present study is to evaluate the health benefits and to explore the nutritional and biological effect of different kinds of crops adding to milk fermented to achieve a yogurt – like products . Chemical , microbiological(evaluation of fungal load for crops adding used) and organoliptical properites are studied to evaluate the blends . Experimental rates were used to evaluate the true digestability ,biological value and net protein utilization.

MATERIALS AND METHODS

Materials:

Milk:

Fresh buffalo's milk was obtained from the dairy technology unit, Fac. of Arabic. Cairo univ., Egypt.

Yoghurt starter culture:

Yoghurt starter culture (a mixture of *streptococcus thermophilus* and *lactobacillus delbreukii spp bulgoricus* 1:1) were obtained from MIFAD company (Misr Food Additives) Egypt.

Barley(Naked), Chickpea ,Beet, Carrot ,Peppermint, Lentil and Faba were purchased from the local market at Giza governorate, Egypt.

Material and method

Preparation of starter culture:

The culture was propagated in sterilized reconstituted skim milk powder (121°c for 15 min.).

Preparation of yoghurt:

Control yoghurt treatment was made from buffalo milk (3.76% fat), heated in water bath (90°c/5min) and then cooled to the inculcation temperature (42°c). yoghurt starter was added at the level of 2% of mixed culture (1:1) of *streptococcus salivarus subsp. thermophilus & lactobacillus delebreukii ssp*. *bulgaricus*. The dry crop (dehull lentil, faba bean, chickpea, naked barley) were ground and sieved to pass through a 70 mesh to get powder. While (beet, carrot, peppermint, cantaloupe) were washed, peel skin and minced with mixer . Then all of the dry and wet crops were added to milk with a percentage of (5,10,15) , it could be adding after cooling with starter culture under controlled condition. Finally filled into 100ml poly-vinyl chloride (PVC) containers, covered and incubated at the same temperature until coagulation (about 3h). the containers were transferred to the refrigerator and kept for analysis.

Analysis of fermented product:

Moisture content , total nitrogen content and fat content :

The moisture content , total nitrogen of fermented product were determined by the semi micro kjeldahl, fat content was determined by the Gerber's method as described by ling (1963). The modification of fat in products.

Sensory evaluation:

Sample of fermented product were organoleptically evaluated as given by Hamdy *et al., (1972)*.

Biological value:

An experiment was carried out to estimate BV, TD and NPU using 9 groups of rats. Were determined according to the micro kJeldahl method as described in A.O.A.C. *(2000)*.

Chemical analysis of row material:

(Beet, Nacked barley, chickpea, carrot, peppermint, lentil (dehull), faba bean and cantaloupe) samples were analyzed for moisture, protein, fat, ash according to the methods described in A.O.A.C. (2000). Mean while carbohydrates were calculated by differences.

Amino acids composition:

Amino acids composition of all samples were analyzed using Amino Acid Analyzer, Beckman 7300, according to the method of Lopez *et al*. (1991).

Minerals determination:

Nine minerals Mg, P, Na, K, Ca, Mn, Fe, Zn and Cu were determined according to the methods authored in A.O.A.C. (2000) using the perkin Elmer 3300 (USA) atomic absorption.

Isolation and identification:

Samples were carefully washed with sterilized water, cut into small pieces for beet, carrot peppermint and cantaloupe, disinfested by immersing in 5% sodium hypochlorite for 2 min, washed thoroughly with sterilized water (Eisa, *et al.,* 1996). Samples were aseptically transferred to ready plates of potato dextrose agar medium – PDA (Christensen, 1957). Plates were then incubated at 25°C and observations were daily recorded up to the 7^{th} day. The emerged fungi were counted, and then purified using the single spore technique fungal isolation and identification were made according to Kulwant, *et al.,* (1991) in Regional Center for Food & Feed (RCFF) and confirmed by plant pathology Department, Agriculture Research Center (ARC).

Animals and Diets:

Four weeks – old male Albino rats were housed individually in an air-conditioned room at 21-24°C with 12h – light/12 dark cycle. The rats maintained on a commercial non-purified diet (Cairo poultry company, Giza, Egypt) for 10 days before introducing the purified diets. The basal diet was prepared according to Egyum (1973). Experiments were carried out with 9 groups of albins male rats each group contain five rats. The experiment period of 18 days experiment period (Balance period). The rats fed 150 mg N and 10 g dry matter per rat per day with vitamins and minerals mixtures. Weight the rats three times at the beginning of the experiment. Nitrogen of urine and faces was determined according to the kjel-dahl method of the A.O.A.C. (2000). Calculation TD, BV and NPU were calculate as follows:

True digestibility (TD):

$$TD = \frac{N\ intake - (faecal\ N - Metabolic\ N)}{N\ intake}$$

Biological value (BV):

$$BV = \frac{N\ intake - (faecal\ N - Metabolic\ N) - (urinary - endogenous\ N)}{N\ intake - (Faecal\ N - Metabolic\ N)}$$

Net protein utilization (NPU):

$$NPU = \frac{TD \times BV}{100}$$

RESULTS AND DISCUSSION

Chemical composition of Naked barely, chickpea, lentil (Dehull) , faba bean (Dehull), carrot beet, cantaloupe and peppermint are illustrated in Table (1).

Table (1): Chemical composition of different crops (based on dry weight).

Material	Chemical composition %					
	Moisture	Protein	Fat	Fiber	Ash	Carbohydrates
Naked barley	7.43	8.88	3.92	4.35	0.22	75.30
Chickpea	11.21	25.2	5.6	1.3	2.20	63.02
Lentil (Dehull)	8.22	27.11	0.85	1.2	2.11	65.22
Faba bean (Deull)	7.16	30.12	0.63	1.13	1.4	60.16
Carrot	14.40	8.2	0.73	8.40	6.7	52.60
Beet	86.70	5.6	0.14	7.45	13.4	73.41
Cantaloupe	85.8	3.12	0.0	2.18	6.7	87.99
Peppermint	83.00	3.2	1.89	8.18	10.5	51.53

It could be observed that faba bean, lentil, chickpea contained 30.12, 27.11, 25.20% protein respectively.These additives to obtained high alternative sources of protein. However carrot, peppermint, beet and barley contained 8.40, 8.18, 7.45, 4.35% fiber respectively.In general, fiber addition of different sources to yoghurt to obtain a new product rich of fiber. These results are similar with those obtained by Howard, (1981), Phyllis,(2003) and Flores *et al.,* (2005). On the other hand, the chemical composition of all types of yoghurt – like products are shown in Table (2). It could be observed that new products have high fat, carbohydrate contents than those in yoghurt control type. Our results are similar with those of Zedan *et. al.,* (2002) and Tamime and Robisnon (1999). Table (3) regarding the amino acids composition of different types of crops and yoghurt like products, reveals the presence of 16 amino acids, the major amino acid were glutamic (4.67) g/ 100g in faba bean while (1.129) g/ 100g in yoghurt – like products, leucine (2.15) g/ 100g in lentil while (0.818) g/ 100g in chickpea yoghurt – like products. This increase of amino acid seems to be related to the increase recorded in the total protein of yoghurt – like products. These results are in agreement with El-Samkery *et al.,* (1995) and El – Deeb and Salam (1984).

Table (2): Composition analysis of buffalo's yoghurt fortified with 5% of different crops.

Treatments	Composition analysis%					
	Ts	Fat	*Total protein	Total carbohydrates	Ash	Fiber
Fresh whole buffalo's milk	12.85	3.78	3.67	4.67	0.43	-
Control plain yoghurt (y)	13.08	4.13	3.89	3.26	0.49	-
T1 (y + barely Giza 126)	17.63	4.14	4.503	7.08	0.94	0.33
T2 (y + chickpea)	17.64	4.41	5.15	6.41	0.60	0.07
T3 (y + Faba beans(Dehull)	17.72	4.16	4.70	6.27	0.56	0.06
T4 (y + lentil(Dehull)	14.07	4.20	5.35	6.29	0.90	0.48
T5 (y + carrot)	17.36	4.17	4.30	5.89	0.83	0.42
T6 (y + beet)	13.75	4.14	4.17	6.93	1.16	0.37
T7 (y + cantaloupe)	13.79	4.13	4.05	7.66	0.83	0.11
T8 (y + peppermint)	13.93	4.14	4.05	5.84	0.54	0.41

*** Total protein of crops : N ×6.25**

Table (3): Amino acid composition of different crops and some yoghurt – like products.

Amino acids	Amino acid (g / 100g)								
	Raw material				control	Y+ crops			
	Chickpea	Lentil	Faba bean	Naked barley (g / 26)	Yoghurt	T1	T2	T3	T4
Therionine	1.04	1.05	1.09	0.31	0.14	0.159	0.195	0.198	0.196
Valine	1.29	1.35	1.33	0.48	0.258	0.282	0.323	0.324	0.326
Methionine	0.52	0.47	0.44	0.13	0.029	0.036	0.045	0.051	0.053
Isolucine	1.14	1.15	1.11	0.29	0.196	0.220	0.253	0.252	0.254
Leucine	2.11	2.15	2.14	0.64	0.356	0.388	0.818	0.463	0.464
Phenylalanine	1.16	1.19	1.15	0.47	0.180	0.204	0.238	0.238	0.178
Histidine	0.76	0.84	0.76	0.24	0.112	0.124	0.150	0.150	0.154
Lycine	1.53	1.55	1.65	0.32	0.286	0.301	0.363	0.369	0.364
Aspartic acid	1.89	2.06	1.95	0.53	0.331	0.358	0.426	0.429	0.434
Serine	1.17	1.26	1.26	0.36	0.139	0.157	0.198	0.202	0.202
Glutamic acid	4.37	4.71	4.67	0.39	0.895	1.015	1.114	1.129	1.131
Proline	1.87	1.94	1.79	1.05	0.354	0.560	0.448	0.444	0.451
Glycine	0.53	0.59	0.62	0.35	0.064	0.082	0.091	0.095	0.094
Alanine	0.81	0.85	0.85	0.32	0.129	0.145	0.170	0.172	0.172
Cystine	0.27	0.25	0.20	0.11	0.038	0.044	0.042	0.048	0.041
Argnine	1.00	1.24	1.03	0.68	0.112	0.146	0.162	0.164	0.174

T1(Y+barley), T2(Y+chickpea), T3(Y+faba bean), T4(Y+lentil).

Minerals content of yoghurt – like product and mineral content of yoghurt is shown in Table (4). Data showed that the effect of supplementation on minerals content of yoghurts – like products were slightly increase in Fe, Zn, Ku, Mn and a highly increase in Ca, P, Mg, Na, K in all treatments this results are in accordance with Magnesium act as a co-factor for more than 300 enzymes, including enzymes involved in body's use of glucose and insulin secretion, iron increased in product yoghurt compared with control (118 mg/ 100g) therefore these minerals will be playing on important role in bones, blood in human metabolism Tharanuthan & Mahadevamma 2003). Effect of supplementation of yoghurt with5%of different crops (chickpea, barley, beet, carrot, peppermint, lentil, faba bean and cantaloupe) on TD, BV and NPU is shown in Table (5) Data showed that true digestibility (TD) increased with supplementation process of yoghurt with 5% of (beet, lentil, chickpea, and cantaloupe). supplementation of yoghurt with 5% of (carrot and lentil) increased the BV, on the other hand data showed that supplementation of yoghurt with 5% of barley decreased BV. *(*Although data illustrated in the same table show that barley significantly decreased NPU, and the results were confirmed yoghurt with 5% the best treatment used in vitro and vivo. Our results were in agreement with Amankwah *et al.*, (2009). Data of the occurrence and frequency of the isolated fungi Table (6) reveal that 362 fungal isolates belonging to nine genera and fifteen species were isolated from fresh samples (beet, carrot, peppermint and cantaloupe) and seeds as faba beans at zero time (before used).

Table (4): Minerals content of yoghurt and yoghurt – like products.

Minerals	Treatment(mg / 100g)								
	Control yoghurt	T1	T2	T3	T4	T5	T6	T7	T8
Calcium, Ca	120	33	142	129	127	115	113	110	144
Iron, Fe	0.09	3.2	3.4	0.12	3.5	3.6	0.90	0.33	3.3
Magnesium, Mg	118	144	129	117	142	134	113	110	121
Phosphorus, P	95	108	112	102	116	113	98	97	105
Potassium, K	2.54	262	291	261	293	318	264	263	336
Sodium, Na	99.3	117	128	101	105	586	142	119	131
Zinc, Zn	1.57	1.62	1.67	1.48	1.69	1.49	1.32	1.21	1.40
Copper, Cu	0.360	0.451	0.478	0.421	0.475	0.451	0.401	0.390	0.432
Manganese, Mn	0.003	1.14	1.15	0.004	1.14	1.10	1.07	1.04	1.12

Table (5): Effect of replacement of different crops on True digestibility, Biological value. and Net protein utilization of yoghurt – like products.

Treatments	Biological values		
	T.D	B.V	N.P.U.
Y + Beet	94.82	73.29	69.49
Y + Carrot	88.73	83.95	74.19
Y + Peppermint	70.64	67.59	47.75
Control (Yoghurt)	85.69	81.94	70.21
Y+ Lentil	94.75	82.36	78.04
Y + Faba beans	86.73	75.65	65.61
Y + Chickpea	94.32	75.18	70.91
Y + Naked barley G 126	68.52	36.44	31.53
Y+ Cantaloupe	93.95	63.65	59.79

6

The isolated fungi were identified as *Alternaria spp ,Alternaria alternate, Alternaria dauci, Alternaria radicina,,.Aspergillus niger*, *A . fumigatus ,Fusarium spp. , F. oxysporum, F.solani , Macrophomina phaseolina,Penicillium spp. Phoma betae, Verti-cillium albo-atrum, Rhizoctonia solani* and *Sclerotinia sclerotiorum.* Among isolated fungi, *Alternaria alternate* showed highest frequency pathogen in beet recorded 38%(14 isolates) followed by *Verti-cillium albo-atrum*21.5% (8 isolates) . on the other hand carrot recorded the least frequency , total fungi 22 fungal isolates and comparison with all samples used because exhibit a wide range of toxicities Rubatsky *et al*.(1999),and followed by peppermint 29 fungal isolates also recorded *Alternaria alternate* showed the highest frequency20%(6 isolates) these results. These findings are in harmony with the previously recorded results Christen *et al*.(2008).

Although faba beans showed the highest total fungi isolated (67 field fungal isolates) comparison with all samples used , *Alternaria spp, Penicillium spp* and *Rhizoctonia solani* recorded highest frequency 15%(10 isolates) , followed by chickpea recorded total fungi isolated (64 fungal isolates).while cantaloupe recorded (40 field fungal isolates) and *Penicillium spp ,Rhizoctonia solani, Verti-cillium albo-atrum,* showed the highest frequency(28%,27%and 25% respectively) The above mentioned results are in agreement with Allen (1983), Ghanim (1993), Andrés *et al* (2006) Omar (2004) and Muhanna, (2006) . On the other hand lentil, isolates fungi recorded (53 field fungal isolates and storage fungal), *Fusarium solani* recorded highest frequency(19%),followed by *Fusarium spp., Sclerotinia sclerotiorum* recorded frequency11.5%

(6 isolates) Similar results were obtained also by Khare *et al*. (1990),Bayaa *et al*. (1994) Sensory characteristics of yoghurt replacement with barley, chickpea, lentil, faba beans, carrot beet, cantaloupe and peppermint according to the present results, it could be concluded that yoghurt contributes unique characteristics to the appearance, texture, flavor and is a source of energy, amino acids, minerals and several health promoting components. Results presented in Table (7) it could be seen that flavor scores of fermented milk of different treatment were found to be accepted. Zara *et al*.,(2011)reported that skim milk was supplemented with 1-3%(w/v)lentil flour inoculated with yogurt culture and reported that syneresis in 1-2%lentil flour supplementation yogurts was significantly higher than another samples ,however ,greater lentil supplementation (3%)resulted in the lowest syneresis during 28 days storage. In general, fiber addition led to lower overall flavor and texture scores as a grainy flavor and a gritty texture were intense in all fiber fortified yoghurts our results are imaginary with those of (Garcia and Gregor 1997) and Zedan *et al*., (2002).

Table (7): Sensory characteristics of yoghurt-like product with 5% replacement with different crops during sold storage.

Treatment fresh	(10) Appearance	(10) Activity	(45) Flavor	(35) Bodes & texture
Control	9.00	9.7	43.8	33.9
T1	7.3	8.5	40.6	29.6
T2	7.5	8.7	41.1	29.8
T3	7.6	8.4	41.3	30.1
T4	7.9	8.1	41.6	30.3
T5	8.6	7.6	42.8	29.0
T6	8.0	7.5	42.2	28.9
T7	8.2	7.4	41.4	28.5
T8	8.4	7.1	41.5	28.3

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إنتـاج منتجـات شـبيهة بالزبـادي مدعمـة بـبعض المحاصـيل السـكرية والحبـوب والبقوليات وتقييم الحمل الفطري لهذه المحاصيل.

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إستهدف البحث إلاستفادة من الفوائد الغذائية والصحية لبعض المحاصيل والحبوب والبقوليات في صناعة المنتجات مشابهة للزبادي ذو جودة مقبولة ودرجة عالية من الأحماض الأمينية والأملاح المعدنية والألياف باستخدام البنجر والجزر والنعناع والعدس والفول والشعير والحمص والكنتالوب بنسب خلط ٥، ١٠، ١٥% للحصول على متنج متخمر بالمقارنة بالمنتج المتخمر الناتج من اليوجهورت العادي. والهدف من أضافة المحاصيل السكرية والحبوب والبقوليات لرفع القيمة الغذائية للزبادى من ناحية البروتين والاحماض الامينية وأهمها الليسين والأحماض الأمينية الكبريتية.

وجد أن إضافة أوأستبدال ٥% هى الأفضل من١٠ %، ١٥% من ناحية التقييم الحسى وكذلك فى تكوين الخثرة للزبادى على النطاق المعملى والتجارى .

وأوضحت نتائج التحليل الكيماوى للعناصر للعينات عند أضافة ٥%،١٠ %، ١٥% للأنواع السابقة الذكر زيادة طفيفة لعناصر الحديد والزنك والنحاس والمنجنيز وزيادة كبيرة للعناصر (الكالسيوم –الفوسفور –المنجنيز-الصوديوم والبوتاسيوم) .

و أوضحت نتائج تحليل الأحماض الأمينية للعينات وجود ١٦ حمض أمينى وكان الجلوتاميك٦٧، ٤جم/١٠٠جم فى البقوليات ولكن سجل فى فى الزبادى ١٢٩، ١ جم/١٠٠جم وايضا الليسين ١٥، ٢ جم/١٠٠جم والعدس٨١٨، جم/١٠٠جم وترجع زيادة الأحماض الأمينية المختبرة لزيادة الأحماض الامينية لبعض المحاصيل والحبوب والبقوليات المختبرة.

في هذه الدراسة تم تجميع عينات طازجة مثل (البنجر و الجزر والنعناع والكنتالوب والفول البلدي والعدس)من كل من محال البيع المختلفة بالقاهرة والجيزة وتم تقييم الحمل الفطري لكل العينات المختبرة .وأوضحت النتائج أن ٣٦٢ عزلة فطرية من العينات تم تعريفها وتمثل ٩ اجناس ١٥ صنف وهذه العزلات هي *Alternaria dauci ,Alternaria radicina ,Aspergillus niger, A.fumigatus ,fusarium spp ., F.oxysporum,F.solani,Macrophomina phaseolina, Penicillium spp.Phoma betae,Verticillium albo-atrum,Rhizoctonia solani and Sclerotinia sclerotiorum.*

وسجلت المحاصيل البقولية أعلى تلوث بالفطريات ٦٧عزلة من كل الأنواع الأخرى .وسجل الجزر أقل تلوثا ٢٢عزلة فطرية من كل الأنواع الأخرى ويتبعة النعناع ٢٩ عزلة.ولذلك يجب نظافة المواد المستخدمة وخلوها من الفطريات وخاصة الفطريات المنتجة للسموم الفطرية.

وتم إجراء بعض التجارب البيولوجية لفئران التجارب لتقييم هذا المنتج الجديد من الناحية البيولوجية لمعرفة القيمة الهضمية الحقيقية .T.D أو الفعلية له و القيمة البيولوجية الحيوية .B.V، و إلاستفادة الفعلية من البروتين.N.P.U.

وسجل ٥% إضافة لكل الأنواع المستخدمة أعلى قيمة هضمية للبروتين بنسبة ٩٤.٨٢%للبنجر وسجل العدس أيضا إلاستفادة القصوى من البروتين بنسبة ٧٨.٠٤%.

قام بتحكيم البحث

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Table (6): Frequency and percentages of isolated fungi from different samples.

Fungal isolates	Beet		Nicked barley		Carrot		Peppermint		Lentil		Faba beans		Chickpea		cantaloupe	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Alternaria spp.	5.0	13.5	0.0	0.0	3.0	13.5	5.0	17.0	2.0	4.0	10.0	15.0	3.0	5.0	3.0	8.0
Alternaria alternate	14.0	38.0	5.0	10.0	5.0	23.0	6.0	20.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alternaria dauci	4.0	11.0	0.0	0.0	6.0	27.0	5.0	17.0	0.0	0.0	0.0	0.0	5.0	8.0	0.0	0.0
Alternaria radicina	0.0	0.0	0.0	0.0	5.0	23.0	0.0	0.0	3.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0
Aspergillus niger	0.0	0.0	10.0	20.0	0.0	0.0	0.0	0.0	5.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0
Aspergillus fumigates	0.0	0.0	11.0	22.0	0.0	0.0	0.0	0.0	3.0	6.0	5.0	7.0	4.0	6.0	0.0	0.0
Fusarium sp.	0.0	0.0	13.0	26.0	0.0	0.0	0.0	0.0	6.0	11.5	4.0	6.0	8.0	12.5	0.0	0.0
Fusarium oxsporum	0.0	0.0	5.0	10.0	0.0	0.0	0.0	0.0	5.0	9.0	6.0	9.0	11.0	17.0	0.0	0.0
Fusarium solani	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	19.0	8.0	12.0	0.0	0.0	0.0	0.0
Macrophomina phaseoina,	0.0	0.0	0.0	0.0	0.0	0.0	5.0	17.5	0.0	0.0	3.0	5.0	7.0	11.0	0.0	0.0
Penicillium spp.	0.0	0.0	6.0	12.0	0.0	0.0	3.0	10.5	6.0	11.0	10.0	15.0	8.0	12.5	11.0	28.0
Phoma betae	3.0	8.0	0.0	0.0	3.0	13.5	0.0	0.0	0.0	0.0	0.0	0.0	7.0	11.0	0.0	0.0
Verti-cillium albo-atrum	8.0	21.5	0.0	0.0	0.0	0.0	5.0	17.5	0.0	0.0	4.0	6.0	11.0	17.0	10.0	25.0
Rhizoctonia solani	3.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	13.0	10.0	15.0	0.0	0.0	11.0	27.0
Sclerotinia sclerotiorum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	11.5	7.0	10.0	0.0	0.0	5.0	12.0
Total colonies	37.0		50.0		22.0		29.0		53.0		67.0		64.0		40.0	
Total	362															