Turkish Journal of Agriculture - Food Science and Technology, 9(sp): 2649-2658, 2021
DOI: https://doi.org/10.24925/turjaf.v9isp.2649-2658.4801

Turkish Journal of Agriculture - Food Science and Technology

Available online, ISSN: 2148-127X | www.agrifoodscience.com | Turkish Science and Technology Publishing (TURSTEP)

Evaluation Data of Dried Vegetables and Fruits[#]

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A R T I C L E I N F O

[#]*This study was presented as an online presentation at the 2[nd] International Journal of Agriculture - Food Science and Technology (TURJAF 2021) Gazimağusa/Cyprus*

Research Article

Received : 01/11/2021
Accepted : 31/12/2021

Keywords:
Drying
Nutrients
Greenhouse
Vegetable
Mycotoxins

A B S T R A C T

Drying is the process of removing of the water that has destroying effect in food products by evaporation and. Research project on the basis of direct sun drying and solar greenhouse. Basic operations research in food engineering, food chemistry, food quality control and toxicology has been established over such a broad spectrum. Subjects of investigation were in accordance with all of the values of dry matter basis. The study of dry matter and water activity values of each product (aw), direct sun drying, drying in the greenhouse. It was determined comparing nutrients of samples those were applied directly to the greenhouse and drying in the sun. Sampling patterns of research were explained as follow; tomatoes drying in the sun (external environment), and greenhouse, bell peppers in the greenhouse and drying in the sun, soaked raisins (sultanas) and not-soaked (raisin), sun-dried, sun-dried fig products directly. Nutrients of the samples such as; lycopene, thiamine (B1), riboflavin (B2), retinol (A), Pyridoxine (B6), ascorbic acid (C), folic acid, magnesium (Mg), potassium (K), sodium (Na), phosphorus (P), zinc (Zn), iron (Fe), copper (Cu) were quantitatively determined. The red pepper products, dried figs and dried grapes mycotoxin amounts were in safe levels, which had not created any hazard and risk for health. Red pepper and dried figs, total aflatoxins, (B1, B2, G1, G2), ochratoxin A (OTA) levels in raisin in the European Union is set well below the limits in terms of human health hazard and the risk factor has been identified.

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Introduction

Dried or semi-dried tomatoes, dried peppers provide important inputs for the economy in Turkey's the most important exporting food products as well as in domestic market. Dried tomatoes are mostly produced in Aegean Region (Ayan and Artık, 2010; Şahin et al., 2010; Çağlarırmak and Hepçimen, 2013).

Highly hydrated agricultural products are dried for weight reduction and stabilization,

Including fruits and vegetables, meats and aromatic plants (Bonazzi and Duomolin, 2011).

The basis of food preservation and basing methods is to carry out various food processes to minimize and / or eliminate the factors that spoil the shelf life of food, to stop and slow down the reactions that spoil the food (Hui, 2006).

While performing these processes, preserving the nutritional value of food and ensuring quality, preserving and even improving its sensory properties are also considered as basic principles. Economic, environmentally friendly hybrid systems have been applied in recent years while producing dried food in high quality. (Miranda et al., 2009; Louka et al., 2004).

Mainly food preservation and preservation methods are; Pasteurization and sterilization where thermal processes are applied, freezing, drying, pickling, irradiation, high pressure applications, concentration packaging under modified atmosphere, vacuum packaging, freeze drying (Gould, 2012).

The meaning of hurdle effect is to prevent the harmful effects of microorganisms in food preservation, the main physicochemical parameters that affect the activities of microorganisms; The aim is to ensure food safety by controlling water activity aw, pH, redox potential Eh, high temperature F value during food process and t value during food storage (Singh and Shalini, 2016).

Drying is one of the oldest known methods and it is one of the food preservation methods that are easily made both in industrial and home conditions. The drying method is both economical and, in many cases, environmentally friendly, products that take up less space are obtained due to the reduction of the volume and box in the final product. Reduction in weight and volume, minimizing packaging, storage and transportation costs were obtained as a result of drying process (Okos et al., 1992).

Little or no food additives are added during drying processes. It is simple to apply technologies and food processing that modern systems have been used in recent years (Moses, et al., 2014). Some of food protection agents can used in drying foods, such as salt and metabisulphite applications were carried out in drying tomatoes (Pazır et al., 1996). These are systems where there is not even an operating environment in direct sun drying or low investment and energy costs in greenhouse, tunnel, etc. systems. (Hnin et, al., 2018; Jin et al., 2017).

It is necessary to investigate the difference in terms of changes and differences in nutrients according to various drying methods, as well as in terms of basic food processes and drying parameters, in terms of technology and engineering calculations. (Akpınar, 2010; Li et al., 2020).

Lycopene, one of the most important compounds of beta carotenes, has functional properties such as; antioxidant effect (Oliveira et al., 2016).

This is one of the aims of this current research. The use of various drying methods increases the energy efficiency and ensures the production of quality products.

Traditional drying systems such as sun drying, but depending on time, season and weather conditions, food safety, non-technological, burning danger, environmental negative factors; Contamination by insects, rodents, other creatures, and even cat, dog and human contamination occurs. In this case, it becomes impossible to apply food safety standards. Adverse weather conditions, such as rain, lead to product losses.

Drying in the greenhouse is established in the project. Both types of drying are carried out in the greenhouse and in direct sunlight.

Although there are similar studies on these issues, there are almost no publications that examine both nutrients in some products, food safety and basic drying parameters together.

The quality of dried products is dependent on type of dryer and the drying conditions also biochemical composition and physical properties of the foods (Li et al., 2020).

Dried foods products contain phytochemicals, such as vitamins, minerals, antioxidants, pigments and other bioactive compounds, associated with health benefits. It is well known that these components explore to significant degradation, losings, reductions o during drying, as they are sensitive to heat, light and oxygen (Nguyen and Schwartz, 1999).

Tomatoes with 90–98% all-trans-lycopene as the main carotenoid component (Nguyen and Schwartz, 1999). Authors reported indicate that in contrast to β-carotene, lycopene remained relatively resistant to heat-induced geometrical conversion during typical food processing of tomatoes and related products (Minhthy and Steven, 1999). All-trans-lycopene was expose to degradation at temperatures above 70°C and lycopene bioavailability due to generated cis-isomers (Mayer-Miebach et al., 2005).

One of the aims of this study was to evaluate the combined effect of cultivation methods (conventional and two types of organic farming) and two different small-scale drying techniques on two tomato and bell pepper varieties) and similar study was present in the literature too (Paolo et al., 2019).

Mycotoxins are critical in terms of food safety. Ochratoxin levels have been investigated in major export food products of Manisa, and they were not found to be risky or dangerous in terms of food safety (Çağlarirmak, 2006). Aflatoxins can be formed in the form of harvest, drying, storage, food and feed, as well as in the field (Çoksöyler, 1999).

The minerals of the food products based on the determination of calcium, potassium, magnesium, phosphorus, sodium, zinc and iron. The researchers indicated that drying foods had no significant effect on the mineral elements (Eim et al., 2013).

Fruit and vegetables have functional provide useful positive effects to health such as properties and the protection of many chronic diseases, including cardiovascular disease, type II diabetes, dementia, macular degeneration and some cancers (Barrett and Lloyd, 2012).

The moisture contents of some dried products should be brought to the following ratios; meat, fish, and dairy 3% or less, vegetable products usually to 5%, and cereal products 12% (Rahman and Perera, 2004).

Water activity values were ranging from 0.90 to 1.00. In dehydration the highest water activity value must be around 0.60 for safe storage of vegetables. (Kaur et al., 2008).

Air-drying characteristics of tomatoes were investigated that found result was the increasing in the air temperature in the range 55–70°C. markedly increased the drying rate of tomatoes (Doymaz, 2007).

Materials and Methods

Materials

Research samples: tomatoes, bell peppers, figs and graps were obtained in two different consecutive harvesting? years (2020-2021) Tomatoes and bell peppers were dried under the sun and into green house. Organic and natural tomatoes and bell peppers were dried in two different ways. In the research figs and grapes were dried under the sun. Grapes were sultanas dried by treating with alkaline solution with vegetable oil called as “potasa”, the without treating without any solution, known as raisin.

Drying methods for tomatoes

X-Tomatoes organic, dried in the greenhouse, (TOG)

I. Harvest

l.a-Tomatoes natural, dried under the sun, (TNS1)

l.b-Tomatoes natural, dried in the green house (TNG1)

II. Harvest

ll.a-Tomatoes natural, dried under the sun, (TNS2)

ll.b-Tomatoes natural, dried in the green house (TNG2)

Drying methods for bell peppers

y.Bell pepper natural, dried under the sun (PNS)

l. Harvest

l.a-Bell pepper organic dried under the sun (POS1)

l.b-Bell pepper organic dried in the green house (PNG1)

ll. Harvest

ll.a-Bell pepper organic dried under the sun (POS2)

ll.b-Bell pepper organic dried in the green house (PNG2)

Drying methods for grapes and figs

G. Grapes (sultanas) treating with potasa or alkali solution and vegetable oil,

R. Raisins, without treating any solution.

Sultanas and raisins were dried in the green house.

F. Figs organic, dried in the green house

In the research, depending on the material drying systems, the products were manufactured by drying under the sun or in the greenhouse. The experiments were carried out in a nylon greenhouse set up in the garden of the college. Drying in direct sunlight was also carried out on plastic shallow sieves. With a fan placed on the greenhouse wall inside the greenhouse, both the air flow inside the greenhouse was provided and the humid air formed was removed from here. Approximately 1-2 m/sec air velocity has been provided in the greenhouse.

Methods

Investigated main nutrients of dried samples were as follows; lycopene (in tomato samples), A, (in sultana and un-dipped (raisin) samples), vitamins; ascorbic acid (vitamin C), thiamine (B1), riboflavin (B2), pyridoxine (B6) , retinoic acid (vitamin A), folic acid, copper (Cu), iron (Fe), zinc (Zn), magnesium (Mg), calcium (Ca), sodium (Na), potassium (K), and contaminants; aflatoxin in red pepper and fig, ochratoxin.

In the study, same food components of dried tomatoes organic and natural, dried bell pepper were organic and natural were investigated in two different harvest periods.

Lycopene and vitamins were determined following references and methods: Lycopene; Zakaria et al., 1979, the vitamins were made according to these methods: B1, B2, B6 (19-23). (Finglas and Foulk, 1984; Kamman et al., 1980; A vitamin, Manz and Philiph, 1998; AOAC, 2000; folic acid R-Biopharm Art. No. 1002, AOAC, 2005; 999,985.35). Mineral analysis was carried out according to the AOAC standards (1990). (Çağlarırmak, 2007; Gökmen et al., 2000).

Ash was dissolved in 5 ml 20% HCI, diluted and filtered through 0.45 µm pore size filter. Lanthanum was added to overcome interferences for Ca and Mg determination. Minerals were established by AAS, (atomic absorption spectrophotometer) except for Na, K which were detected by FES (flame emission spectrophotometer) (AOAC, 2005; Çağlarırmak and Hepçimen, 2013).

Ochratoxin A (in raisins, dipped and not dipped samples were analyzed according to Rhone Diagnostics Technologies (1999) Notes (sultanas and raisin). Aflatoxin (total aflatoxin and aflatoxin B1 analysis was analyzed according to AOAC 2005 (999.07) (paprika and figs).

Moisture determinations and water activity analysis (aw): Moisture determinations were made with Sartorius automatic moisture meter scales. Water activity measurements were made with a Testo hand-held measuring device.

Statistical analysis was made according to Alpar, 2020.

Results and Discussions

In the research, Nutrients of sample and main mycotoxins in kinds of dryin methods were compared and applied statistic analysis were established in detail in the tables as follows:

Test was independent t test. (Test 3). Tests whether there is a statistically significant difference between the mean of two independent groups.

When Table 1 is examined, there was significant differences at the level of 5% between the nutrients dried in the sun and in the greenhouse, except B6, Zn and Cu.

There is a statistically significant difference between lcp, A vitamin, FA, C at the level of 5%. However, there is no statistically significant difference between B1 and B6. (Table 5).

Lycopene amounts were investigated in the literature by Giovanelli et al., 2002) (mg / kg dm). Investigated lycopene values were in a large scale because of each of dried samples had different dry weights. Thus, the values found are close to the literature.

Table 1. Descriptive Statistics of the Nutrients of Greenhouse Dried Organic Tomato (TOG) (on Dry Weight Basis mg/100g, DWB**)

	Descriptive Statistics					
	N	Min	Max	Mean	Std.Dev	Variance
Lcp	3	28.93	31.05	29.99	1.06	1.124
Avit*	3	14.64	15.70	15.17	0.53	0.281
B1	3	0.26	0.70	0.48	0.22	0.048
B2	3	1.15	2.67	1.91	0.76	0.578
B6	3	0.89	1.73	1.31	00.42	0.176
FA*	3	32.77	34.65	33.71	0.94	0.884
Cvit	3	7.31	9.17	8.24	0.93	0.865
Mg	3	130.89	132.51	131.7	0.81	0.656
Zn	3	5.85	7.33	6.59	0.74	0.548
Ca	3	94.02	94.98	94.5	0.48	0.230
Na	3	11429.71	11430.29	11430	0.29	0.084
K	3	2620.53	2622.47	2621.5	0.97	0.941
Fe	3	6.16	7.58	6.87	0.71	0.504
Cu	3	0.56	0.58	0.57	0.01	0.000
P	3	177.41	177.79	177.6	0.19	0.036
Valid N	3					

*µg/100g DWB, **TOG; DWB, %71.43 a_w: 0.606

Table 2. Descriptive Statistics on Nutritional Values of Greenhouse and Sun-dried Natural Tomatoes in 1st Harvest Time (on Dry Weight Basis mg/100g, dw**)

	Group Statistics				
	TNG1/TNS1	N	Mean	Std. Deviation	Std. Error Mean
Lcp	Natural Greenhouse	3	18.4800	1.25000	0.72169
	Natural Undersun	3	51.7000	1.38000	0.79674
Avit*	Natural Greenhouse	3	12.8900	0.56000	0.32332
	Natural Undersun	3	20.6900	0.98000	0.56580
B6	Natural Greenhouse	3	0.7300	0.28000	0.16166
	Natural Undersun	3	0.7700	0.70000	0.40415
FA*	Natural Greenhouse	3	22.9800	0.07000	0.04041
	Natural Undersun	3	243.3000	0.17000	0.09815
Cvit	Natural Greenhouse	3	5.8400	0.34000	0.19630
	Natural Undersun	3	9.1900	0.16000	0.09238
Mg	Natural Greenhouse	3	106.7000	0.79000	0.45611
	Natural Undersun	3	155.6000	0.52000	0.30022
Zn	Natural Greenhouse	3	3.5800	0.53000	0.30600
	Natural Undersun	3	2.8400	0.14000	0.08083
Ca	Natural Greenhouse	3	85.4000	0.56000	0.32332
	Natural Undersun	3	90.9000	0.08000	0.04619
Na	Natural Greenhouse	3	8499.5000	0.40000	0.23094
	Natural Undersun	3	8477.0000	0.74000	0.42724
K	Natural Greenhouse	3	2486.0000	0.07000	0.04041
	Natural Undersun	3	3275.0000	0.86000	0.49652
Fe	Natural Greenhouse	3	6.6500	0.62000	0.35796
	Natural Undersun	3	4.6800	0.22000	0.12702
Cu	Natural Greenhouse	3	00.6300	0.05000	0.02887
	Natural Undersun	3	0.6533	0.02517	0.01453
P	Natural Greenhouse	3	167.9000	0.49000	0.28290
	Natural Undersun	3	228.8000	0.80000	0.46188

*µg/100g DW, **TNG1; DW % 70.68, Water activity; a_w: 0.59, **TNS1, DW % 81.19, a_w: 0.45

Table 3. The Results of Independent Samples t test on Nutritional Values of Greenhouse and Sun-dried Natural Tomatoes in 1st Harvest Time (on Dry Weight Basis mg/100g, dw)

		Independent Samples Test				
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	T	Df	Sig. (2-tailed)
Lcp	Equal variances assumed	0.019	0.896	-30.902	4	0.000
Avit*	Equal variances assumed	0.554	0.498	-11.969	4	0.000
B6	Equal variances assumed	1.241	0.328	-.092	4	0.931
FA*	Equal variances assumed	1.183	0.338	-2075.660	4	0.000
Cvit	Equal variances assumed	0.918	0.392	-15.441	4	0.000
Mg	Equal variances assumed	0.326	0.599	-89.553	4	0.000
Zn	Equal variances assumed	2.025	0.228	2.338	4	0.080
Ca	Equal variances assumed	2.880	0.165	-16.840	4	0.000
Na	Equal variances assumed	0.653	0.464	46.329	4	0.000
K	Equal variances assumed	3.353	0.141	-1583.818	4	0.000
Fe	Equal variances assumed	1.479	0.291	5.187	4	0.007
Cu	Equal variances assumed	0.731	0.441	-.722	4	0.510
P	Equal variances assumed	0.437	0.545	-112.438	4	0.000

*µg/100g DW

The amount of lycopene contained in the samples within a certain range also varies according to the amount of DM, but it is within acceptable limits. In addition to its powerful antioxidant properties, lycopene becomes more active in heat-treated foods, so consumption of dry tomatoes such as 50-100 g as a direct table food can be protective and preventive, especially in preventing prostate cancer or the growth of the prostate gland and even the formation of other types of cancer (Willis and Wiani, 2003).

Biochemical compositions or nutrients dried tomatoes were gıven Tables 1, 2. On the other hand, Descriptive Statistics on Nutritional values and independent sample tests were shown in Table, 3, 4, 5.

Since B1 thiamine deficiency, the disease occurs and is one of the coenzymes (Sencer, 1983). It plays an important role in energy metabolism in the body. Thiamine values in the study in mg / 100 g on a DM basis in dry tomatoes (0.48-2.53).

Table 4. Descriptive Statistics on Nutritional Values of Greenhouse and Sun-dried Natural Tomatoes in 2nd Harvest Time (on Dry Weight Basis mg/100g, DWB**)

	Group Statistics				
	TNG1/TNS2	N	Mean	Std. Deviation	Std. Error Mean
Lcp	Natural Greenhouse	3	44.27	1.02	0.59
	Natural Undersun	3	49.33	0.035	0.02
Avit*	Natural Greenhouse	3	25.19	0.575	0.33
	Natural Undersun	3	16.58	0.07	0.04
B1	Natural Greenhouse	3	0.30	0.01	0.0058
	Natural Undersun	3	0.31	0.01	0.0058
B2	Natural Greenhouse	3	0.02	0.00000[a]	0.00000
	Natural Undersun	3	0.03	0.00000[a]	0.00000
B6	Natural Greenhouse	3	0.12	0.01	0.0058
	Natural Undersun	3	0.11	0.0058	0.003
FA*	Natural Greenhouse	3	15.41	0.065	0.0378
	Natural Undersun	3	82.2	1	0.58
Cvit	Natural Greenhouse	3	18.06	0.14	0.081
	Natural Undersun	3	21.13	0.78	0.45

a. t cannot be computed because the standard deviations of both groups are 0.

*µg/100g DW, **TNS2, % 79.65, aw: 0.44, **TNG2 % 81.00, aw: 0.50

Table 5. The Results of Independent Samples t test on Nutritional Values of Greenhouse and Sun-dried Natural Tomatoes in 2nd Harvest Time (on Dry Weight Basis mg/100g, dw)

		Independent Samples Test				
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	T	Df	Sig. (2-tailed)
Lcp	Equal variances assumed	3.714	0.126	-8.582	4	0.001
Avit*	Equal variances assumed	3.096	0.153	25.735	4	0.000
B1	Equal variances assumed	0.000	1.000	-1.225	4	0.288
	Equal variances not assumed			-1.225	4.000	0.288
B6	Equal variances assumed	0.400	0.561	1.000	4	0.374
FA*	Equal variances assumed	3.471	0.136	-115.445	4	0.000
Cvit	Equal variances assumed	2.609	0.182	-6.710	4	0.003

*µg/100g DW

B2 riboflavin was studied in the same examples. Riboflavin is a light-sensitive vitamin and together with niacin, which acts as a coenzyme, it is a vitamin that causes Pellagra disease in its deficiency. Dry weight or dry material, mg / 100g in dried tomatoes (0.81-1.92).

The values found show that dried tomato samples can contribute to nutrition in terms of riboflavin. Vitamin A retinol amounts were determined. Vitamin A is a fat-soluble vitamin and shows antioxidant properties. According to this, vitamin A values in dry tomato samples are µg/100g on DM basis; It was detected in the range of (12.89-20.69) (Table 2).

Pyridoxine (B6) Dry Matter mg / 100 in dried tomato samples; (0.73-1.31). In dried tomato samples (Ascorbic acid), vitamin C was found as DW (mg / 100 g) (5.84-9.19).

Vitamin C (Ascorbic acid) KM (mg / 100 g) in dried tomato samples (5.84-9.19). It was the so sensitive vitamin against physical and chemical factors. Dried tomato samples cannot provide whole vitamin C requirement of body.

Folic acid (FA) is one of the important group B vitamins and megaloblastic anemia occurs in its deficiency (Sencer, 83). Taking pregnancy in the first months of pregnancy is important for the healthy course of pregnancy for the good development of the fetus. FA was detected in the samples at the level of µg / 1000g.

Vitamins are sensitive nutrients that can be affected quickly and easily by physical factors such as heat, light, oxygen, heavy metals, acidic environment or alkaline environment, pH. Exposure to heat, light and oxygen are important factors in research. All samples were sliced or divided and dried in the drying greenhouse set up in the garden of the school. Changes in dry matter ratios in the samples affected the vitamin quantities.

Minerals are cofactors and are important nutrients that the body needs. In a balanced diet, it should be evaluated within important food groups as well as other nutrients (Table1,2).

Minerals may increase in quantity on DM basis in dried products. This is an expected situation.

However, there may be changes in the quantities of salting mineral substances such as salt (NaCl), sulfur dioxide, or other preservative or other additives, contamination from drying vessels or as expected additives.

Magnesium (Mg) plays a role in the regulation of intestinal peristaltic movements. It is found in the cardiovascular system and bone structure. In this current research, Mg in dried tomatoes was detected in the range of mg / 100g (131.7-155.55) in dry tomatoes.

Potassium (K) is the important electrolyte found in intracellular fluid. Dried tomatoes showed a wide range value of DW mg / 100 g (2486-32750). Approximately 90% increase in dry matter basis caused these values to increase. The consumption of small amounts of dried vegetable samples meets the K requirement, but consumption of these products may not be recommended even as 50-100 g for chronic kidney patients.

Sodium (Na) is an important electrolyte found in the extracellular fluid, while others have increased the DM basis, as well as increasing the Na quantities of salt-dried products. It shows range values around tenfold. Dried tomatoes contained Na in range mg/100g in dry weight basis (1143-84995).

Table 6. Descriptive Statistics of the Nutrients of Greenhouse Dried Naturel Bell Pepper (PNS) (on Dry Weight Basis mg/100g, DWB**)

	Descriptive Statistics					
	N	Min	Max	Mean	Std. Dev	Variance
Avit*	3	39.50	40.86	40.18	0.68	0.462
B1	3	1.32	2.34	1.83	0.51	0.260
B6	3	0.23	1.25	0.74	0.51	0.260
FA*	3	201.28	201.72	201.5	0.22	0.048
Cvit	3	440.78	441.30	441.04	0.26	0.068
Mg	3	152.23	152.77	152.5	0.27	0.073
Zn	3	5.16	5.64	5.4	0.24	0.058
Ca	3	47.84	49.36	48.6	0.76	0.578
Na	3	470.10	471.10	470.6	0.50	0.250
K	3	2794.88	2796.12	2795.5	0.62	0.384
Fe	3	14.10	14.70	14.4	0.30	0.090
Cu	3	0.31	1.49	0.9	0.59	0.348
P	3	266.82	266.98	266.9	0.08	0.006
Valid N (listwise)	3					

*µg/100g DW, (PNS) DWB % 86.87 aw = 0.40

Table 7. Descriptive Statistics on Nutritional Values of Greenhouse and Sun-dried Organic Bell Pepper in (POS1) 1st Harvest Time (on Dry Weight Basis mg/100g, dw)

	Group Statistics				
	POS1/PNG1	N	Mean	Std. Deviation	Std. Error Mean
Avit*	Organic Greenhouse	3	25.0500	0.76000	0.43879
	Organic Undersun	3	23.0100	0.95000	0.54848
B1	Organic Greenhouse	3	1.8700	0.75000	0.43301
	Organic Undersun	3	1.3400	0.70171	0.40513
B2	Organic Greenhouse	3	0.4400	0.10000	0.05774
	Organic Undersun	3	0.3800	0.02000	0.01155
B6	Organic Greenhouse	3	1.0800	0.10000	0.05774
	Organic Undersun	3	.6133	0.11015	0.06360
FA*	Organic Greenhouse	3	179.2500	0.28000	0.16166
	Organic Undersun	3	207.8000	0.78000	0.45033
Cvit	Organic Greenhouse	3	10.6500	0.92000	0.53116
	Organic Undersun	3	3.3900	0.31000	0.17898
Mg	Organic Greenhouse	3	140.1000	0.52000	0.30022
	Organic Undersun	3	143.8000	0.16000	0.09238
Zn	Organic Greenhouse	3	3.3500	0.39000	0.22517
	Organic Undersun	3	9.3600	0.06000	0.03464
Ca	Organic Greenhouse	3	52.3000	0.20000	0.11547
	Organic Undersun	3	61.7000	0.93000	0.53694
Na	Organic Greenhouse	3	366.2000	0.08000	0.04619
	Organic Undersun	3	3526.5000	0.74000	0.42724
K	Organic Greenhouse	3	2846.0000	0.30000	0.17321
	Organic Undersun	3	2846.5000	0.84000	0.48497
Fe	Organic Greenhouse	3	4.1000	0.66000	0.38105
	Organic Undersun	3	8.9000	0.56000	0.32332
Cu	Organic Greenhouse	3	1.0200	0.99000	0.57158
	Organic Undersun	3	0.7400	0.14000	0.08083
P	Organic Greenhouse	3	279.2000	0.44000	0.25403
	Organic Undersun	3	310.3000	0.37000	0.21362

*µg/100g DW, (POS1) DWB % 84.84 aw: 0.41

Table 8. The Results of Independent Samples t test on Nutritional Values of Greenhouse and Sun-dried Organic Bell Pepper (PNG1) in 1st Harvest Time (on Dry Weight Basis mg/100g, dw)

		Independent Samples Test				
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Avit	Equal variances assumed	0.098	0.770	2.904	4	0.044
B1	Equal variances assumed	0.004	0.950	0.894	4	0.422
B2	Equal variances assumed	2.462	0.192	1.019	4	0.366
B6	Equal variances assumed	0.034	0.862	5.433	4	0.006
FA	Equal variances assumed	1.456	0.294	-59.669	4	0.000
Cvit	Equal variances assumed	1.579	0.277	12.953	4	0.000
Mg	Equal variances assumed	1.751	0.256	-11.779	4	0.000
Zn	Equal variances assumed	2.798	0.170	-26.381	4	0.000
Ca	Equal variances assumed	2.356	0.200	-17.115	4	0.000
Na	Equal variances assumed	3.145	0.151	-7354.177	4	0.000
K	Equal variances assumed	1.466	0.293	-0.971	4	0.387
Fe	Equal variances assumed	0.053	0.829	-9.605	4	0.001
Cu	Equal variances assumed	2.891	0.164	0.485	4	0.653
P	Equal variances assumed	0.059	0.820	-93.699	4	0.000

*µg/100g DW, (PNG1) DWB: % 84.02, a_w: 0.45

Table 9. Descriptive Statistics on Nutritional Values of Greenhouse and Sun-dried Organic Bell Pepper (POS2) in 2nd Harvest Time (on Dry Weight Basis mg/100g, dw)

	Group Statistics				
	POS2/PNG2	N	Mean	Std. Deviation	Std. Error Mean
Avit	Organic Greenhouse	3	7.0167	0.02517	0.01453
	Organic Undersun	3	7.4500	0.20000	0.11547
B1	Organic Greenhouse	3	0.8567	0.03512	0.02028
	Organic Undersun	3	0.9467	0.01528	0.00882
B2	Organic Greenhouse	3	0.3300	0.01000	0.00577
	Organic Undersun	3	0.4900	0.00000	0.00000
B6	Organic Greenhouse	3	0.4067	0.00577	0.00333
	Organic Undersun	3	1.2400	0.01000	0.00577
FA	Organic Greenhouse	3	176.5500	1.95000	1.12583
	Organic Undersun	3	197.1000	3.30000	1.90526
Cvit	Organic Greenhouse	3	15.4200	0.07000	0.04041
	Organic Undersun	3	109.0000	1.00000	0.57735

(POS2) DWB: 84.5 % a_w 0.37

Table 10. The Results of Independent Samples t test on Nutritional Values of Greenhouse and Sun-dried Organic Bell Pepper (PNG2) in 2nd Harvest Time (on Dry Weight Basis mg/100g, dw)

		Independent Samples Test				
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	Df	Sig. (2-tailed)
Avit	Equal variances assumed	2.969	0.160	-3.723	4	0.020
B1	Equal variances assumed	1.385	0.305	-4.070	4	0.015
B2	Equal variances assumed	4.000	0.116	-27.713	4	0.000
B6	Equal variances assumed	0.400	0.561	-125.000	4	0.000
FA	Equal variances assumed	0.496	0.520	-9.286	4	0.001
Cvit	Equal variances assumed	3.443	0.137	-161.690	4	0.000

(PNG2) DWB: 85.14% a_w:0.45

High levels of both Na and K in products are not a good rate in terms of cardiovascular diseases. Products with low Na content but high K content are beneficial in terms of cardiovascular diseases.

The quantities of minerals such as Ca, Mg, Na, K were found to be high values in the research. In the products dried by sprinkling salt, the salt added as a homogeneous solution by sprinkling different randomly and drying has increased the values of K, Mg and Ca, especially Na, which may come from the salt, compared to the literature (Demirbaş, 2010).

Zinc (Zn) is one of the important cofactors and is a mineral that contributes positively to the epithelium tissue in wound healing. Zinc amounts in dry tomatoes were determined in the range of mg / 100g (6.59-35.84) on dry matter basis.

Iron (Fe)is an essential trace element that carries oxygen to anemic tissues in Fe deficiency. Fe quantities in dried tomato samples were determined in the range of mg / 100g d (6.87-66.47) on dry matter weight basis.

Copper (Cu) is the cofactor that causes copper deficiency anemia in the deficiency of large amounts in the body. It is in the structure of polyphenol oxidase enzyme in plants. This causes enzymatic browning reactions. Dry matter in dried tomato samples is in the range of Cu mg / 100g (0.56- 6.50).

Descriptive Statistics and Independent Samples dried bell peppers Tests were given tables 6, 7, 8, 9, and 10. Each of chemical composition and nutrient contents were evaluated for nutrition impacts. In the literature very less studies were present and dried sample values were varied according to dry basis of tomatoes and peppers.

Vitamin B1 in chili peppers on a mg / 100g dry matter basis (1.14-1.87). It has been found in the range. In terms of thiamine, peppers show more stable and compatible values. In dried red peppers, B2 riboflavin vitamin on the basis of mg / 100 g dry matter weight; Vitamin A was found in the range of (0.38-0.48) and retinol in the range of (23.01-40.18) in red peppers. Vitamin A content of dried red peppers can contribute to nutrition in terms of vitamin A.

B6 pyridoxine values in dried peppers are mg / 100 g on dry matter weight basis; while it is in the range of (0.41-1.25), it is surprising that vitamin C is found in a very wide range in dry pepper samples, but the difference in the amount of dry matter may be due to such situations.

Folic acid FA was determined in dry red pepper samples in the range of mg / 100g (179.25- 207.8) on dry matter weight basis. Especially k. It has been determined that red peppers are rich in folic acid and give the highest values. Essential nourishing minarets were found in the samples in the study.

Magnesium Mg in dried pepper samples, mg / 100g on dry matter weight basis; (1401-1525) Potassium K found in intracellular fluid (27450-28465), and sodium Na in the cell decay fluid (3662-35265).

High levels of both Na and K in products are not a good rate in terms of cardiovascular diseases. Products with low Na content but high K content are beneficial in terms of cardiovascular diseases.

As mentioned before, the quantities of minerals such as Ca, Mg, Na, K were found to be high values in the research. In the products dried by sprinkling salt, the salt added as a homogeneous solution by sprinkling different randomly and drying has increased the values of K, Mg and Ca, especially Na, which may come from the salt, compared to the literature (Demirbaş, 2010).

Phosphorus P is one of the important essential nutrient minerals found in bones and teeth after calcium in energy metabolism. It is especially high in foods with high protein content.

The values found in the research examples (Table 2) show that these products can contribute significantly to nutrition.

In dried pepper samples, on dry matter weight basis mg / 100 Zinc Zn; (33.53-93.47) Iron Fe; (40.19- 143.7) and Copper Cu; It has been determined as (8, 99-10, 19) and Cu is at a level that can contribute to nutrition in research samples.

Mycotoxin Results in The Research

Aflatoxins

Pepper 8: Total aflatoxin (B1, B2, G1, G2): <0.5ng / g
Aflatoxin B1: <0.2ng/g
Pepper 9: Total aflatoxin (B1, B2, G1, G2): <0.5 ng / g
Aflatoxin B1: <0.2ng / g
Pepper 13: Total aflatoxin (B1, B2, G1, G2): <0.5 ng / g
Aflatoxin B1: <0.2 ng/g

Ochratoxins OTA

Grape dipped (sultanas): Ochratoxin A: <0.23 ng / g
Grape not dipped (raisin): Ochratoxin A: 1.04ng / g.

Dried fruits and vegetables are preferred because of their nutritional energy value together with addition of kinds of foods because of their contribution to both taste and nutritional value according fresh products (Debra et al., 2011).

Another aim of this research is to investigate products in terms of food safety as well as the research of nutrients for preparing food labels. Preserving food by drying is one of the oldest methods and has been the subject of national and international research in terms of both quality control and basic processes Çağlarırmak, 2006; Cemeroğlu and et al., 2009).

Aflatoxins found in food and feed are under severe control. The US Food and Drug Administration (FDA) has determined the maximum 20 ng / g that can be found in foodstuffs.

AFs are listed as AFB1> AFG2> afb2> afg2 according to the toxin potency they create. AFB1 has the highest toxic effect. However, in the EU regulation published for the last time on 8 March 2010, there was no change in the amount of AF B1 in dried fruits (Şen ve Nas, 2010). This limit has been determined as 4 ng / g for total AF and 2 ng / g for AFB1 as the European Union limits (Anonymous, 2007; Şen and Nas, 2010).

Aflatoxin (AF) and Ochratoxin (OTA) are important danger and risk factors that constitute critical control points in food processes that cause cancer-causing liver and kidney tumors. No method can ensure that the toxins are eliminated after these toxins are present in the products at a high rate. In this case, there is no other option but to destroy the product.

Total aflatoxin contents in dried red pepper products were analyzed. Total aflatoxin was found to be <0.5,> 0.5,> 0.5 for pepper 8, pepper 9 and pepper 13, and> 0.2, 0.2 and 0.2 for aflatoxin B1. In figs, it was found as 0.1 ng / g, 0.024 ng / g, and considering that it is 4 ng / g for total aflatoxin and 2 ng / g for AFB1 as the European Union limits, aflatoxins found do not pose a risk or danger.

It is well below EU limits. OTA grape values are <0.23 ng / g for sultanas and 1.04 ng / g for raisin. Considering that the EU limits are 10µg / kg, very low values are obtained. Grapes do not pose any danger or risk in terms of OTA.

Mycotoxin study is limited in this study. Because the healthy harvest of the products, their drying without contact with the soil and their short-term but cold storage have been important factors in obtaining low mycotoxin values.

Conclusion

Dried and semi dried tomatoes and bell peppers were consumed in a large quantity together with grapes (sultanas and figs) also all of they are the important importing products of Turkey. There are sorts of drying processes such as under the sun, in greenhouse and solar drying. In the research there were the main drying systems; under the sun and greenhouse. The comparing data of nutrients were obtained between the two systems drying because of there are the affecting factors of nutrient values those were exposing the sun and oxygen, pH, drying temperature and period. These nutrients were including minerals were investigated in dry weight or dry matter bases. They were explained in statically descriptive Statistics on Nutritional values and independent t tests.

The main evidence of the research was studied nutrients in dried tomatoes and bell peppers can contribute the nutrition daily intake. The comparing data of nutrients in drying systems were varied and could explained statistically. Data were determined in different harvesting periods for dried tomatoes and peppers.

On the other hand, mycotoxins cause to food safety problems for health and in the market. Mycotoxin levels dried grapes and figs were determined and found that no hazardous levels of mycotoxins were found in the dried grapes and figs. They were safer from point of mycotoxin levels.

Acknowledgement

The authors are thankful to Celal Bayar University Scientific Research Project Commission for both their financial and moral support in Manisa City, TUB‹TAK-MAM (The Scientific and Technological Research Council of Turkey-Marmara Research Center) Food Research and Development Analysis laboratory of TUBITAK in Kocaeli City. We would also like to thank the following public and private sector organizations for their support;• TÜBİTAK MAM Food Institute Laboratories,• Saruhanlı Vocational School personnel who contributed to the project.

- We would like to thank especially the technical staff Mehmet Kayar, who is in our memories and lost suddenly. • Kybele Gourmet Ltd.,
- Şenaylar Petrol, Food Cotton Ltd.,
- Salkım Agricultural Products Ltd.

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