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How To Identify The Quality Figs?

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Özet

Dünyada oldukça sınırlı sayıda ülkede incir üretimi yapılmakta olup, buna bağlı olarak kuru incir üreten ülke sayısı da oldukça azdır. Türkiye, incir üretiminde dünyada ilk sırada gelmektedir. Ülkemizde en fazla üretim Aydın ve Ege bölgesinde yapılmaktadır. Özellikle Aydın ve İzmir'in Büyük ve Küçük Menderes havzalarında yetiştirilen incirler, dünyanın en kaliteli incirleridir. Bu bölgelerde üretilen incirler sarı lop denilen cinstendir. Bu çalışmada, küçük ölçekli tünel tip bir sera modeli kurutucu tasarlanmış ve imal edilmiştir. Bu çalışmada, yalıtımsız sera ve kolektör sistemi bir arada kullanılarak incirin sıcak hava ile kurutulması işlemi gerçekleştirilmiştir. Kurutulacak gıda olarak 'Sarılop' incir çeşidi seçilmiştir. Deneyler Ağustos 2021 ayı içerisinde Aydın'da gerçekleştirilmiştir. İncir için kurutma paremetreleri belirlenmiştir. Ayrıca, il genelinde piyasaya sunulan incirler incelenmiş, incirde kurutma hasarlarını önleyici, yapılması gereken uygulamalar belirlenmiş olup, kaliteli incir nasıl anlaşılır sorusuna cevap aranmıştır. Çalışmanın hazırlanmasında, tarım il müdürlüğünün çalışmaları, tüik raporları, görsel ve basılı dokümanlar da incelenmiştir.

Anahtar Kelimeler: İncir Kurutma, Sera, Kolektör, Kurutma Tekniği

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Abstract

Fig production is carried out in a very limited number of countries in the world, and accordingly, the number of countries that producing the dried figs is quite low. Turkey ranks first in the world in fig production. In our country, the most fig production is carrying out in Aydın and Aegean regions. Figs grown especially in the Büyük and Küçük Menderes basins of Aydın and İzmir are the highest quality figs in the world. The Figs produced in these regions are called the type of Sarı lop.In this study, a small scale tunnel type greenhouse model dryer was designed and manufactured. In this study, the process of drying of the figs with hot air was carried out by using a combination of uninsulated greenhouse and collector system. 'Sarılop' fig variety was chosen as the food to be dried. The experiments were carried out in Aydın in August 2021. Drying parameters were determined for the Sarı Lop figs. In addition, the figs offered to the market throughout the Aydın province were examined, the practices that should be done to prevent drying damage for the figs were determined, and the answer to the question of how to understand the quality figs was sought. In the preparation of the study, the studies of the provincial directorate of agriculture, TÜİK reports, visual and printed documents were also examined.

Keywords: Fig Drying, Greenhouse, Collector, Drying Technique

1.Introduction

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Food drying is defined as reducing the water content in the food from 75-95% to 10-20% [2]. Drying not only reduces the moisture content of the products, but also changes the physical and biological structure such as enzymatic activity, pleasant smell, and most importantly, antioxidant capacity [4]. Food can also be used out of season thanks to drying techniques [5]. Drying figs with classical methods causes the fig to be exposed to external influences such as dust, soil, flies and insects. These reduce the quality of figs. For this reason, different drying systems have been tried in drying. One of these systems is the drying model in which a tunnel type greenhouse and collector are used together. Despite the COVID-19 Epidemic that started in March 2020, approximately 21 thousand tons of fresh figs and about 50 thousand tons of dried figs were exported in Turkey in the 11 months of 2020, and a total of 255 million dollars was obtained from these exports (Agricultural Products Market Report, 2021). 30% of fig production in the world is produced in Turkey. Approximately 95% of this production takes place in Aydın and İzmir regions. These regions are the most suitable climate for fig production. The world's best and quality figs are grown in this region. In the experiments with figs, I. Class, Sarılop figs grown in Aydın were used. Figs are dried whole. Dikmen E. et al. He carried out the experiments considering the dry state definition, "According to the Turkish standard TS 4087, if the mass difference between two successive scales is less than 1% for each test piece, it becomes fully dry" [8, 9]. Figs were dried in accordance with the Turkish Standard Institute's TS 541 ICS 6708 standard titled "Dried figs". As mentioned in the standard, dried figs should contain 25% moisture. The moisture content should not be more than 26%.

Dried figs should have the following characteristics;

– It must be whole. (The stem and eye (ostiolum) ends of dried figs may be cut off). Also, dried figs may be slit in accordance with their marketing and processing properties (e.g. layer),
- It should be robust, and those that deteriorate and become unsuitable for consumption should not affect the product,
– It should not contain abnormal external humidity,
– There should be no foreign taste and odor,
– No living or dead insects, rodents and other parasites, regardless of their stage of development, whether they are also fumigated or disinfected by other methods,
– It should not be damaged, sunburned, torn or split,
– It should not show excessive dryness,
– It must be clean, free from visible foreign matter,
– There should be no signs of mold and fermentation.

Sarilop variety figs; It is accepted as the most suitable variety for drying with its taste, size, high fleshy part, light color and most importantly its characteristic morphology [1, 3, 6]. Since almost all dried figs in Turkey are supplied from the Aegean Region, the total amount of dried fig production in this region also corresponds to the amount of dried figs in Turkey. Aydın province comes first in terms of dried fig production in the Aegean Region, which meets 23% of the total production [3]. Approximately 150 fig enterprises operating in Aydın and İzmir provinces process and market dried figs to the whole world [7]. It is emphasized that these problems should be addressed, both the difficulties experienced in the dried fig agriculture and the serious economic losses caused by the mycotoxin problem in its marketing are frequently mentioned in the dried fig production. Dried figs, which have great commercial and economic importance for our country, are not only grown in suitable conditions but also harvested, dried and stored without deteriorating their quality.

2. Materıals And Methods

Drying parameters such as temperature, humidity, weight and time, which are important for drying, were recorded. The weight of the food was measured with a load cell. Temperature measurement was made with a thermocouple. The main features of the air heating collectors in the

installed test setup are given in Table 1. and the test setup in Figure 1. The experiments were carried out for an air flow rate of 0.07 kg/s. The summary data table consisting of experimental data is given in Table 2. The monthly total energy amount required for Heating in our system; It is calculated as 8 kW. The total air flow rate of the forced ventilation to be taken into the greenhouse was calculated as 230,860 m^3/h). As mentioned in the standard, dried figs should contain 25% moisture. The moisture content should not be more than 26%.

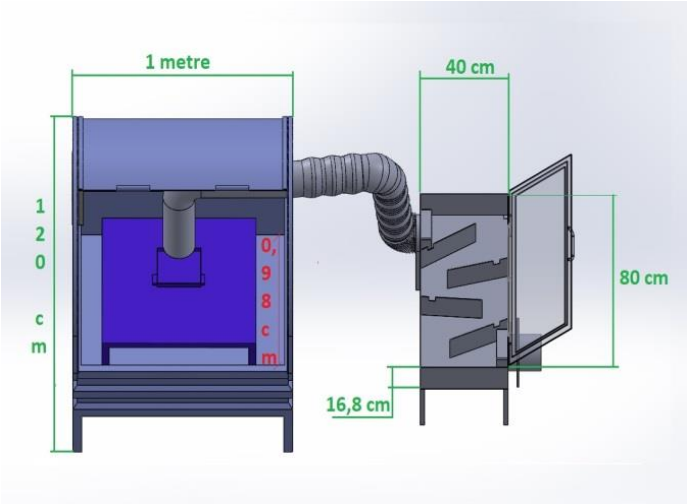

Figure 1. Non-insulated drying model

Table 1. Technical characteristics of collectors

System Element	**Technicial Specifications**
Type	Flat fin type solar collector with air flow
Weather Channels	It consists of spiral pipes with a diameter of 13.2 mm
Case Material and size	2 mm galvanized sheet, 0.4*0.8 m
Transparent cover	2 mm thick window glass material
Absorber Plate Surface Thickness and Material Absorber Surface Feature	Flat type-2 mm galvanized sheet black matte paint
Collector Gross Area and Absorber Surface Area	0,32 m^2
Insulation	non-insulated
Sealing	Except for the air inlet and outlet ducts, all edges are welded and joined in a way that will not cause air leakage
Fans	2 x 18 W, 320 m3/h, diameter 15 cm and 2 x 18 W, 95 m3/h, diameter 12cm

Table 2. Experimental data

Aydın province 2021 year meteorological	**Measurement time at which the experiment started**	**Drying time**	**Outside Air Temperature**	**Greenhouse Temperature (oC)**	**Relative Humidity (%)**	**Wind speed (m/s)**	**solar radiation (W/m^2)**

values							
first attempt		12 saat					
	09.00			28	64	1,8	765,3
	13.00			40	26	4,1	968,7
	19.00			33,6	40	2,3	68,8
	21.00			30,3	34	2,3	4,3

The rate of mass loss from fruits showed a rapid increase at the beginning of drying, then it was observed that this increase continued slowly. It was observed that the drying time was shortened at the values with the highest air temperature, solar radiation intensity and wind speed. Dehydration of fruits with drying causes them to lose their elasticity. It was observed that this situation increased the fruit firmness and negatively affected the edible quality of the fruit.

Applications to prevent drying damage in figs offered to the market;

- Fig harvest season in Aydın is August and September. Figs are dried by going through certain processes. However, transactions in the market; It can be summarized as processing, ripening, harvesting, drying, classification, fumigation, possible aflatoxin fig sorting, washing, shaping, packaging and storage, respectively. If adequate precautions are not taken during the fig drying phase, insect, mold and darkening occur in the dried figs. For this, one of the most important details you need to pay attention to the harvesting the fig at the right time. In addition, the drying processes and storage part of the harvested figs are also important. The most common problem in dried figs is the presence of aflatoxin and mycotoxin, in the product. Mycotoxins are known as toxic metabolites produced by fungi that can be found in many processed or unprocessed foods and threaten human health. Many producers in the market used hydrogen peroxide treatment on figs in the past to disinfect figs and whiten blackened figs. It has been determined that there are many manufacturers who use the application, which is prohibited because it is harmful to health, even though it is prohibited today. It has been observed that some producers have made this illegal application in order to remove the blackening of the figs, to whiten the figs and to increase their attractiveness. Dark-colored figs, which have low material value, are whitened and shown as better quality. The fact that hydrogen peroxide breaks down and disappears does not mean that it is not harmful, on the contrary, it leaves behind a large amount of cancer-causing substances as it disappears. Therefore, dried figs should not be purchased from anywhere. Dried figs produced especially in places such as under the stairs should not be purchased. In addition, when a suspicious situation is encountered, a complaint should be made to the Ministry of Agriculture and Forestry via the Alo 174 line.

How to understand quality figs;

There are some tricks to understand the fig that has not been processed. First of all, the color of real and pure dried figs is yellowish brown. It has been determined that there are chemical drugs on the blanched figs. Figs with blackening, mold, infestation and souring that go beyond light browning should not be consumed as they carry the risk of microbiological contamination, mycotoxins, especially aflatoxin. “Dried figs get their white and clean appearance thanks to the chemical substance called peroxide. Therefore, care should be taken to ensure that the product looks natural. Dipping is done to prevent worming and to make it last longer. In addition, bay leaves and salt are applied inside the fig package.
For Aflatoxin Inhibition;

During the harvest period, we need to minimize the contact of dried figs with the soil as much as possible. Harvesting at the right time and separating high quality figs will greatly prevent the formation of toxins. The drying process of the figs should be under the tunnel and on the decks. The aim here is to try to keep away from environmental factors. (Wind, rain, soil, etc.) Storage conditions of figs collected after harvest, use of crates, direct contact of the products with the ground, temperature and humidity controls should be paid attention to. Dried figs should be stored

in cold storage at 4 C degrees. Toxic fig separations in dried figs are carried out in dark rooms under purple light and offered to both domestic and foreign markets.

Aflatoxin limits in Turkey and EU countries are as follows:
Turkey Aflatoxin Limits
B1 ; 8.0 µg/kg
B1+B2+G1+G2 ; 10 µg/kg
EU Aflatoxin Limits
B1 ; 6.0 µg/kg
B1+B2+G1+G2 ; 10 µg/kg

With the RASSF Rapid Alarm Notifications system used by the EU, products with aflatoxin exceeding the limit are sent back. When the amount of dried figs returned is compared with the amount of dried figs exported, it is calculated that 2-5% of the exported dried figs are returned on average every year.

Picture 1. Defective figs in the market and toxic figs detected under purple light

3. RESEARCH RESULTS

Dried figs are one of the important export products of our country and have found value in the world with brands such as “Turkish Dried Figs” / “Aegean Figs” / “Aydin Figs”. In order to protect and improve brand value and product quality, it is necessary to create the most suitable conditions in production. As mentioned in the standard, dried figs should contain 25% moisture. The moisture content should not be more than 26%.

REFERENCES

[1] Somuncuoğlu, Ş. (2007). Kuru incirde siklopiazonik asit varlığının ve miktarının belirlenmesi. Yüksek Lisans Tezi, İstanbul Teknik Üniversitesi Fen Bilimleri Enstitüsü, İstanbul, 60 s.
[2] Kılıç F., Köse, A., Meyve-Sebze Kurutma Makineleri İçin Arduino Tabanlı Neme Duyarlı Fan Kontrol Tasarımı. In 1st International Turkish World Engineering and Science Congress Antalya, (2017).
[3] Anonim. (2017). Kuru incir sektör raporları. TürkiyeCumhuriyeti Ekonomi Bakanlığı, Ankara.
[4] Jiang, N., Liu, C., Li, D., Zhang, Z., Liu, C., Wang, D., Niu, L., Zhang, M., Evaluation of freeze drying combined with microwave vacuum drying for functional okra snacks: Antioxidant properties, sensory quality, and energy consumption. LWT - Food Science and Technology, 82(216-226), (2017).
[5] Aktas, M., Gonen, E., Bay Leaves Drying in a Humidity Controlled Heat Pump Dryer. Journal of the Faculty of Engineering and Architecture of Gazi University, 29(2)(433-441), (2014).
98-108.
[6] Yaşartürk, Z.E. (2016). Sarılop incir çeşidinde bazı uygulamaların meyve kalitesi üzerine etkileri. Yüksek Lisans Tezi, Adnan Menderes Üniversitesi Fen Bilimleri Enstitüsü, Aydın, 99 s.
[7] EİB. (2017). Ege kuru meyve ve mamülleri ihracatçıları birliği ocak-aralık sektör raporu. http://upload.eib.org.tr/20150512/00000000004256.pdf.
[8] Dikmen E., Şahin A.Ş., Yakut A. K., Design of An Experimental Drying System and Investigation of Operating Parameters. J. of Thermal Science and Technology, 32 (2) (81-88), (2011).
[9] Official Method of Analysis, J. of Association of Official Analytical Chemist, IAC, Arlington, Virginia, (1990).