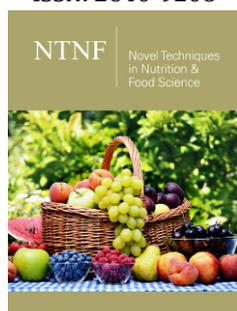


## Drying of Fruits: A Mini-Review

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### Abstract

Fruit drying is a method used for a long time in order to extend the life of the fruit, allowing the producing countries, access to international markets by making seasonal fruits available throughout the year. However, drying may have positive or negative effects on the product.

**Keywords:** Fruit; Drying; Quality; Effect

### Introduction

In general, fruits are food that have a short shelf-life after harvest, especially climacteric or ethylene dependent fruits in which ripening is accompanied by a peak in respiration and concomitant burst of ethylene and have the capability to ripen after the harvest with the help of ethylene production [1,2]. The producing and exporting countries of fruit and climacteric fruits are still faced with conservation problems. Despite the nutritional and economic importance of the fruits and the food interest that the people give them, there are also highly perishable, soon after ripening, the fruit starts decaying and quickly becomes unfit for consumption, thus its use is limited by huge post-harvest losses since, for example, fresh mango can be stored for less than 10 days at room temperature. It does not tolerate freezing and browns under prolonged refrigeration. A real problem of conservation therefore arises [3]. It is in a major concern of the rapid deterioration of climacteric fruits that several processing technologies from pulp to juice and nectars exist as well as the production of jellies and jams [4]. Among these technologies, drying which is a very ancient practice for food preservation still in use nowadays. Previous work [5,6] shows that drying fruits is an interesting and practical alternative, especially in rural areas. Indeed, drying is a dehydration technique that allows to partially or completely remove the liquid impregnating a solid and permit the extension of product shelf life. It is known that introduction of a thermal treatment induces an increase, a decrease or induce no significant changes in chemical composition, affecting the bioavailability and content of chemo preventive compounds and the antioxidant activity in fruits [7,8]. Therefore, the objective of this investigation is to describe, briefly, the various effects of different drying methods on fruits.

### Importance of drying fruit

The main purpose of drying is to convert perishable foodstuffs into stabilized products. It is generally considered that a product is stable when its water activity is less than or equal to 0.65. The reasons for drying are as numerous as the products to be dried, but they can be grouped into three main categories:

- A. lengthen the product life, so facilitate the conservation of products by lowering water activity;
- B. Decrease the mass and volume of foods to reduce and facilitate their packaging, transport and storage;
- C. Give a presentation, structure or feature specific to the product. In view of these advantages, it is therefore quite appropriate to popularize, at least modern drying techniques in rural communities in order to reasonably reduce post-harvest losses and losses during the transport of fresh product over long periods of distances.

## Effect of drying on fruits

Drying often modifies the product in its texture, shape, taste or nutritional qualities. These modifications can be sought, or they can be a disadvantage. The results of the Akoy et al. [9] study suggest that the drying time strongly affects the color of dried mango slices at different temperatures (60, 70 and 80 °C). Adepoju & Osunde [10], in their study on Niger mangoes, showed that there was a retention of nutrients, vitamin C and  $\beta$ -carotene, of dried mangoes samples that had undergone pre-treatment, which makes them healthy and nutritious but also an important ingredient in the food industry for the production of food supplements and other functional foods. The antioxidant capacity of sliced mangoes dried by different methods (freezing, microwave (120 and 350W) and hot air (60, 70 and 80 °C) decreased by 18.4-54.6% compared to fresh mangoes, while the phenolic content was remarkably the highest for the microwave-dried sample at 350W and the lowest for the hot-air dried at 80 °C [11]. Moreover, the vitamin C content of mango was not significantly affected by freeze-drying for 48 to 72 hours and the  $\beta$ -carotene content of freeze-dried mango was lower than that of fresh mango (3-100%) [12]. The contents of tomatoes ascorbic acid were significantly ( $P < 0.05$ ) reduced after drying from 27.3mg/100g in the control sample to 11.4, 7.9 and 5.3 mg/100g in sun-dried, solar-dried and 60 °C oven dried, respectively. As for the Carotenoids, they were best retained in samples dried at 60 °C, and lycopene content was higher in tomatoes dried in the solar dryer. Tomatoes dried in the oven at 60 °C had the least aerobic and fungal counts, which were higher in sun-dried samples [13]. It has, also proven valuable in describing visual color deterioration and providing useful information for quality control in various fruits and vegetables during drying such as kiwifruit and mango pulp [14,15]. It is known that dried fruits are more concentrated in polyphenolic compounds and have significantly greater antioxidant activity compared with fresh fruits because of concentration. This was attributed to concentration of polyphenolics during drying and to the Maillard reaction products. Drying process can also lead to losses in total polyphenolic compounds and changes in ratios of free to total polyphenolics, as shown in two types of dried plum on the study of Piga et al [16]. Karadeniz et al. [17] who studied raisin samples, including sun-dried, dipped, and golden raisins, found that flavanols were not influenced by processing while procyanidins and flavan-3-ols were completely degraded in all raisin samples. This decrease or degradation can be explained by the implication of these compounds in oxidative reactions by enzymatic pathways, which contribute to degrading them and to the browning of grapes.

## Conclusion

This brief overview of the effect of drying on fruit leads us to say that, despite some disadvantages of drying, this technique remains very practical to implement. It helps to extend shelf life, minimize loss and make available, all year long, the fruits of seasonal production.

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