



The effect of Natural Uranium bed on aflatoxin reduction of pistachio

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ABSTRACT

Nowadays, the separation of pistachios which seem to have aflatoxin is done according to their organoleptic physical qualities like color and etc. As these methods are not fully practical, and there is always a possibility of error and also the conditions like the wrong time harvest, the transportation of picked pistachios, the delay on the processing cause some contaminations in pistachios which do not have particular physical qualities and which are not separable and the detoxification methods must be surveyed. In this paper, the effect of Gamma, Beta, and Alpha rays from natural uranium activity on Aflatoxin reduction was analyzed. Beta and Alpha rays don't pass through the exterior shell of pistachio. Therefore, we need to consider only Gamma rays. So, the Aflatoxin infected pistachios were put into two thick cast iron containers (steam boilers), which one of them included natural uranium soil and the other normal soil and the pistachios were kept there for ten days. Then, the amounts of Aflatoxin in the two boilers were measured by HPLC method and the data were compared. The results show that the B1 Aflatoxin in the natural uranium boiler has reduced from 134.85 ng/g to 72.28 ng/g where as the B1 Aflatoxin in the normal soil boiler has not changed at all. This cheap method on Aflatoxin reduction can cause the increase on pistachio export, improvement of economic situation of the society, reduction of cancer contamination and increase of the society health.

Key Words: Pistachio, Aflatoxin, Natural Uranium

INTRODUCTION

Aflatoxins are the secondary metabolites of some fungi: *Aspergillus flavus* and *Aspergillus parasiticus*. These fungi are widespread all around the globe in the air and water and can attack and infect the living and dead organs of plants and other animates. Due to that, there is always the possibility of the contamination of many agricultural products in farms to theses fungi and their toxics (Bullerman,1984). The studies show that the reduction of fungi contamination of agricultural products before harvest takes

place by correct ways of production which limit the growth and spread of fungi and after harvest by correct ways of processing drying and keeping products in barns (Pitt,1993;Denizel et al,1967); however, there is a possibility of products contamination with Aflatoxins and as Aflatoxins cause a lot of economic problems, lots of studies have been carried out on detoxification of infected products in the recent three decades (Samarajeewa et al,1996). Unfortunately, pistachios which are the most important exporting products of Iran are not immune of these fungi and studies show the existence of *Aspergillus* fungi in the farms and the contamination of the pistachios with them (Boutrif,1998;Doster et al,1994). In the cases when the skins of pistachios are damaged and the pistachios do not have the natural protectors, contamination is inevitable (Pitt,1993). However, nowadays isolating pistachios which seem infected takes place by vision isolation (by eyes) and mechanical machines and contamination of the ultimate products has decreased a lot (Pearson et al,1998). Studies on pistachio's contamination show that the main factors of contamination are early splitting open and damages to skins (Sommer,1986;Fakhri et al,1999). In general, we can divide the deactivation of fungi and decreasing Aflatoxins into physical, chemical and biological methods (Doyle,1982). Physical methods consist of extraction with solvents, deactivation by heating and irradiation. In recent years, irradiation has been suggested as a method to kill harmful microbes in foods and Gamma ray passes easily through liquid and solid materials (Rustom,1996). B1 Aflatoxins absorb ultraviolet rays in 222, 265 and 362 nm (nanometer) wavelengths. Radiation in the 362 nm wavelength causes B1 Aflatoxin's activation and increase of their ruin. The most sensitivity of B1 Aflatoxins to ultraviolet rays is in PHs less than 3 and more than 10 which reduce their poisonousness. Production of more than 12 inactive products after radiation by ultraviolet rays proves that various reactions take place during B1 Aflatoxins breaking. Apart from what was mentioned previously, experiments show some limitations in death of Aflatoxins by ultraviolet rays in food products which may be due to ultraviolet weak passing through and also the small boundary of the used wavelengths (Mirdamadiha,1998). Furthermore, it seems that the first compounds from radiation, remain some poisonous parts which need to be changed to non-poisonous. A ray source is more powerful to change poisonous compounds from the first stage of reaction to non-poisonous. Visible ray has a wide range of wavelengths and Aflatoxins ray sensitivity in water solvents has been proved in early studies. The mycotoxin toxic fungi are produced by filamentous fungi which cause serious problems for animals and humans. Mycotoxinology is the study of fungous toxins. Mycotoxins are produced by *Aspergillus* fungi which include B, G, and M Aflatoxins and Atratoxins A, sterigmatocystinc, and cxclopiazonicacid. Mycotoxins can be dangerous to human beings and animals and cause death and illness and they are transferred via food, breath, and skin. The aimed organs of Aflatoxins include the following: Aflatoxins are transmitted via grains, plants seeds and etc. and cause severe hepatitis and bleeding and these lead to death and diseases and they have harmful effects on liver and they are produced by *Aspergillus flavus* and *parasiticus*. Aflatoxins are sensitive to ultraviolet and Gamma rays. Aflatoxins are reduced 75 to 100 per cents in peanuts after being irradiated by Gamma dose in 1 to 10kGy. Total natural uranium activity in rock and soil was considered to be 0.68 μ Ci/g (Lederer et al.,1978;Kaye,1993). This study has been carried out on the effect of Gamma rays from natural uranium activity in rock and soil bed on Aflatoxin reduction during storage of pistachio.

METHODS AND MATERIALS

The pistachio's type used in the experiment was Akbari and the pistachio was provided from Marjaan Khatam food control lab and was divided into two groups. The first group was put into a normal steam boiler for ten days. The second group was put into a steam boiler contain natural uranium rock and soil for ten days. Then, the amount of Aflatoxins was measured by HPLC method according to the proposed

instruction by inspection office of food stuffs, and standard and industrial researches' main office and the data were analyzed.

THE RESULTS AND DISCUSSION

Pistachios consist of two parts: 1. The seed which is the edible part and is full of nutritious materials. 2. The shell which surrounds the seed. The results show that Aflatoxin's amount of the pistachios put into the natural uranium steam boiler has decreased a lot. The Aflatoxins amount has decreased from 134.85 ng/g to 72.28 ng/g equal to 45 per cents because total natural uranium activity in rock and soil that was considered to be 0.68 μ Ci/g (Lederer et al.,1978;Kaye,1993)or 0.33 μ Ci/g (Hursh and Spoor,1973). The amount of Aflatoxins in the normal steam boiler has had no change.

SUGGESTIONS

The interested can research on Aflatoxins killing on other foods like peanuts, sesame and etc. and analyze the effect of Gamma rays from natural uranium bed in food compounds containing proteins, fats, vitamins, carbohydrates and etc. by experimental analyses of them after taking out from steam boilers.

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