

International Conference on
FOOD SAFETY AND HEALTH
and
11th World Congress on
FOOD CHEMISTRY AND FOOD MICROBIOLOGY
August 30-31, 2018 Dubai, UAE

Aflatoxin prevention properties of whey protein based edible film

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The pistachio nut (*Pistacia vera L.*) is widely cultivated in saline, dry and hot areas of Middle East, Mediterranean countries and United States. *Aspergillus flavus* and *Aspergillus parasiticus* are major mycotoxin producing fungi can grow on large variety of foods like groundnuts, tree nuts, dried fruits and cereals. Aflatoxins are widely known mycotoxins refer to a class of chemical compounds of related structure include B1, B2, G1 and G2 among which aflatoxin B1 is considered the most potent carcinogen. There are some methods for inhibit fungal growth in pistachio nuts but use of natural plant extracts is popular nowadays because they do not have chemical compounds. *Zataria multiflora* is thyme like plant that grows wild in central and southern of Iran, Pakistan and Afghanistan. Its essential oil contains significant amounts of thymol (48.4%) and carvacrol (12.6%), both of which are having antimicrobial and antifungal properties. Pistachio kernel can treated with *Zataria multiflora* Essential Oil (ZMEO) by dipping or spraying on the surface. When the antimicrobials are incorporated in a film/coating matrix, their migration to the surface of the film and food can be controlled at a desired concentration for an extended period of time. Different concentrations 100, 500, 1000, 1500, 2000, 2500, 3000, 3500, 4000, 5000 and 5500 ppm of *Zataria multiflora* essential oil were used in edible coating composition of pistachio kernel for measuring extension inhibition of inoculated disk growth including nine days mould culture in coated pistachio. Results showed that in essential oil concentrations lower than 4000 ppm, *A. flavus* grown in samples. With increasing essential oil concentration, inoculated mould growth reduced significantly. Afterward inhibition of above mentioned concentrations of *Zataria multiflora* essential oil in pistachio kernel coated by whey protein based edible film incorporated with different concentrations on production aflatoxins B1, B2, G1 and G2 were analyzed by High Performance Liquid Chromatography (HPLC), results showed that concentrations higher than 4000 ppm could inhibited aflatoxin production in pistachio kernel.

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