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Effect of harvesting time on nut quality of pistachio (*Pistacia vera* L.) cultivars

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ABSTRACT

The appropriate time of harvest is one of the most important factors affecting the quality of pistachio. Cultivars 'Ahmad-Aghaii', 'Kaleh-Ghoochi', 'Ohadi' and 'Badami-Zarand' were evaluated for qualitative indices of nut over a period of four years from 2001 to 2004. Nut samples were collected during eight successive weeks from 23 August to 11 October. Splitting, early splitting, hull cracking and hulling percentage continually increased toward the last harvest week while non-splitting, immaturity, number of nuts per ounce and moisture content decreased during the harvest weeks. The increment of splitting and the number of nuts per ounce was not significant from 20 September to the last week of harvest. Early splitting, hull cracking and aflatoxin contamination of kernel progressively increased from 13 September. Total crude fat and sugar contents showed a peak in the middle of September. The concentration of aflatoxins prior or at maturity stage of selected cultivars was lower than the critical level. In general, the appropriate time of harvest for the cultivars studied is the middle of September to avoid contamination of nuts to aflatoxin and to ensure the nut quality. This study emphasizes different quality indices for determining the optimum harvest time of pistachio crop.

1. Introduction

Pistachio (*Pistacia vera* L.) is an increasingly important nut crop, widely cultivated in hot dry areas of eastern Mediterranean (e.g. Iran, Turkey, Syria) and the US. Pistachio nut is a drupe characterized by a split in the shell (endocarp) along the suture at the calyx end of the nut and the hull (mesocarp) usually encloses the shell. There is a space between the hull interior and shell exterior, so the normal shell can split open without splitting the hull (Pearson et al., 1996; Doster and Michailides, 1995). Two types of hull rupture occur before harvest. In the first type, early splitting, the hull ruptures along the shell split. In the second type, hull cracking, the hull ruptures elsewhere (Doster and Michailides, 1999). The hull typically does not rupture before harvest and protect the kernel from fungal infection and insect infestation. Genetic characteristics of scion and rootstock, climatic conditions, unbalanced nutrition and irrigation and improper harvest date are responsible for production of early-split and cracked nuts (Hosseinifard and Panahi, 2006; Tajabadipour et al., 2006; Doster et al., 1999; Doster et al., 2001). Early-split nuts as well as blankness and cracking are among the most important physiological disorders affecting the quality and the yield of pistachio crop (Khezri et al., 2010).

The quality of a split pistachio nut is defined in particular by size and shapes of the nut, moisture content as well as biochemical compositions (e.g. carbohydrate, fat and protein) (Crane, 1978). These qualitative factors can be influenced by genetic characteristics of the scion and rootstock, ecological conditions, location and horticultural practices (Tajabadipour et al., 2006; Seferoglu et al., 2006).

Determining the optimal harvest date of pistachio nut is one of the most important horticultural practices to increase the quality of nut production. Both early and late harvesting time decrease the quality of pistachio nut. Early harvested nuts are mostly non-split and immature often including an undeveloped kernel. Pistachios harvested too late are clearly vulnerable to hull cracking, shell staining, hull and kernel deterioration, fruit shedding, mechanical injuries and insects and bird attacks (Ferguson et al., 2005). Of special concerns with late harvesting is kernel decay by *Aspergillus* spp. contaminated the early-split and hull cracked nuts. Pistachio nuts are a suitable target for aflatoxins accumulation and the aflatoxins contents in the tested samples is dependent on the cultivar's type (Bensassi et al., 2010). Species of the *Aspergillus* group produce secondary metabolites called aflatoxins which are harmful mycotoxins for humans and animals (Klich, 2009), therefore, regular sampling and testing of pistachios has been recommended to control the presence of aflatoxins for commercial trade (Fernane et al., 2010). Although the importance of early splitting and cracking for mold, aflatoxin and insect contamination is well established, very little is known concerning when early splits and cracking occur and become contaminated.

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