Nut and kernel characteristics of twelve hazelnut cultivars grown in Iran

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Commercial hazelnut (Corylus avellana L.) cultivars vary considerably in their nut and kernel characteristics. In the present investigation, nut and kernel traits and kernel composition of 12 hazelnut cultivars grown in Astara, Iran were investigated. The cultivars included four major commercial cultivars (Barcelona, Segorbe, Merville, and Daviana), four local Iranian cultivars (Pashmine, Rasmi, Shastak and Tabestane), and four recently introduced and less known cultivars (Nemsa, Prones, Christian and Prostirka). Our results showed significant differences exist among all genotypes across a number of morphological traits and compositional properties. The imported cultivars generally showed improved physical traits, such as larger nuts and kernels and a higher kernel percentage, as well as a higher kernel oil content, than the Iranian cultivars. However, the Iranian cultivars had a higher kernel protein content (from 17.09% to 24.61%) compared to the imported ones. ‘Rasmi’ showed some advantages such as high fat content (61.33%), which suggest its further investigation as a promising multi-use cultivar for Iran. Furthermore, the newly introduced cultivar Prones ranked first among all cultivars in some traits including the highest oil content (68.44%). Mean comparisons supported the observation of significant variation among the 12 hazelnut cultivars, which suggests significant genetic diversity is present in the plant material, which is of great value for breeding.

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1. Introduction

Hazelnut (Corylus avellana L.) is one of the world’s major tree nut crops with world production totaling 888,328 MT in 2010 (FAOSTAT, 2012). About 90% of the world crop is shelled and sold as kernels with the remaining 10% remaining in-shell for fresh consumption (Valentini et al., 2006). Besides providing desirable flavor and texture to various foods, hazelnut can play an important role in human nutrition and health due to its high oil, protein, vitamin and mineral content (Ozedmir and Akinci, 2004).

Since most hazelnuts are used for processing purposes, cultivars are largely grown that produce uniform, high-quality, round kernels that meet market standards determined by the requirements of the food industry. The inherent susceptibility of crops based on a limited number of genotypes and the existing need for improved cultivars demonstrates the importance of germplasm collection, characterization and evaluation, including evaluation in different growing areas (Cristofori et al., 2008). Nut and kernel size and shape, ratio of kernel mass to nut mass (kernel percent), presence of kernel defects, and kernel flavor, as well as oil content and oil characteristics (fatty acid composition) and protein content must be considered in hazelnut cultivars evaluation (Botta et al., 1997). The study of these characteristics can help one better understand and define the relationships between cultivar and quality as they are affected by environmental and cultural factors.

Iran produced 24,300 MT of hazelnuts in 2010, ranking 6th in world production (FAOSTAT, 2012). Northern Iran is part of the natural distribution of C. avellana (Meuniercraeker, 1991; Thompson et al., 1996) and has a climate suitable for cultivating high-quality hazelnuts. However, research on the characteristics of hazelnut cultivars when grown in the region is limited. The objectives of this study were to investigate and document nut and kernel characteristics and kernel composition of local and imported hazelnut cultivars growing in Iran.

2. Materials and methods

Hazelnut samples evaluated in this study were collected in the second half of September 2010 from trees growing at the Astara Hazelnut Research Station in Astara, province of Guilan, Iran (38°25′ N, 48°52′ E). The average annual precipitation was 1350 mm, and the annual minimum and maximum temperatures were −5°C and 36.5°C, respectively. The soil texture of the station was loam. Nuts were collected from 12 cultivars (three trees of each), which

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