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Is single bulb producing garlic *Allium sativum* or *Allium ampeloprasum*?

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Abstract

A set of control specimens of *Allium sativum* and *Allium ampeloprasum* from different geographic origins were analyzed using karyotype analysis and molecular markers (RAPD, M13 minisatellites and SNPs) to assess the gene-pool source of the single bulb garlic cultivar. Karyotype analysis showed that *A. sativum* and single bulb garlic were diploids, wild *A. ampeloprasum* was 2× (Sardinia and Basilicata) and 4× (Tremiti Island) while Great headed garlic landrace was 6×. Molecular diversity analyses confirmed the differentiation between *A. sativum* (14 specimens) and *A. ampeloprasum* species-complex (18 specimens). The “single bulb” market garlic cultivar, introduced into the European market from China, resulted to be nested in *A. sativum* genetic cluster. The cultivated forms of *A. ampeloprasum* (Leek and Great headed garlic) proved to be more

differentiated than the wild one. Among the wild Mediterranean plant materials, the specimens of *A. ampeloprasum* from Sardinia demonstrated to be more differentiated than the wild genotypes from the west (Basilicata and Tremiti Island) based on either nucleotide variations of ITS1 or RAPD and M13 diversity. No SNP was observed, comparing a consensus sequence of 148 bp at ITS1 gene among three different specimens of *A. sativum*, while 18 mutated positions were detected in seven different specimens of *A. ampeloprasum*. The maximum number of variable positions were detected in the Sardinian wild *A. ampeloprasum*, followed by Leek and the wild *A. ampeloprasum* specimens from Basilicata and Tremiti (South Italy). Overall, it is clearly evident that the single bulb Chinese garlic cultivar is *A. sativum*. M13 marker demonstrated to be the most suitable in distinguishing the two different gene pools performing very well in terms of resolution, cost and ease of use.