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Graduate school

Faculty of Agriculture

Department of Horticultural Science and Greenery

Dissertation for M.Sc Degree in Horticultural Plants

**Investigation of Pomological, Morphological and Molecular Diversity of Sistan  
region Apple geneotyps**

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December ۲۰۱۹

## Abstract

Apple (*Malus domestica* Borkh, Rosaceous) is forth produced fruit in the world after orange, grape, and banana, respectively and is considered as the most important fruit in the temperate regions. From the commercial point of view, Iran is forth producer country and the seventeenth apple exporter country in the world. This plant is highly diverse because of being nearly apple's center of diversity and the cultivation of the plant in different regions of Iran. This research was conducted to determine the characteristics and germplasm grouping of different genotypes of apples in Sistan and Baluchestan province. Therefore, 75 apple genotypes were collected from three regions of Hamoun, Banjar and Imamieh in Zabol city and one area in Zahedan and were studied for morphological, pomological and genetic traits. Genetic diversity of the studied genotypes was evaluated using REMAP and IRAP primers. The results of this study showed that the studied genotypes were highly diverse in most morphological and pomological traits related to tree, leaf and fruit and there was a significant difference between the studied genotypes in pomological traits. The results of correlation analysis showed a significant positive correlation between stalk thickness, stalk length, fruit width and fruit weight and annual shoot diameter with width of eye basin, depth of eye basin and fruit length. The results of molecular analysis with REMAP and IRAP primers also showed genetic variation among the genotypes studied. In total, REMAP and IRAP primers identified 75 gene loci. The results showed that the primers used are suitable for investigating the genetic diversity of apple genotypes. This high morphological and genetic diversity among genotypes is a good genetic source for breeding and, as it is clear, morphological and genetic traits play an important and effective role in the evaluation of plant genotypes and can be considered in the future. Genotypes that are ideal for most traits were modified to reduce production costs and increase the quantity and quality of the product.

Keywords: Apples, Genetic Diversity, Microsatellite Primer, IRAP, REMAP