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MOLECULAR CHARACTERIZATION OF CIDER APPLE CULTIVARS USING SSR MARKERS: INSIGHTS INTO GENETIC DIFFERENTIATION AND IMPLICATIONS FOR CIDER PRODUCTION IN SPAIN

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Abstract

The genetic diversity and aptitude of traditional apple (*Malus x domestica* Borkh) cultivars for cider production remains unexplored in Spain. Modern apple production relies on a limited number of cultivars, risking genetic erosion. However, Spain's cider tradition emphasizes the importance of safeguarding the genetic diversity of traditional apple cultivars since production is based on a diverse group of old cultivars typical to each region. Therefore, germplasm collections offer invaluable resources to conserve and study local cider apples, ensuring their sustainable use in breeding programs and supporting the long-term preservation of this cultural and agricultural heritage. This research aims to elucidate the genetic differentiation between traditional Spanish apple cultivars and well-established cider apple germplasm of England and France. Additionally, it seeks to determine whether Spanish cider cultivars constitute a distinct Iberian genetic pool or exhibit a fragmented genetic structure. To achieve this, 429 apple cultivars were genotyped using 15 SSR markers. The dataset included a diverse collection of cultivars: 78 traditional Spanish cultivars from CITA of Aragón, 141 from UPNA, 55 traditional English cider cultivars from the UK National Fruit Collection, 63 additional English cultivars from the Hereford Museum of Cider, and 49 French cider cultivars from the Biological Resources Center RosePom (INRAE). The results will be discussed in terms of genetic diversity, population structure and genetic relationships among the analyzed germplasm, highlighting the genetic uniqueness of Spanish, English, and French cider cultivars. These findings will provide valuable insights, enhancing our understanding of the genetic diversity available within the analyzed gene pool. They will also aid cider apple breeding, cultivar selection, and cider production, promoting the preservation and sustainable use of traditional apple germplasm for future applications.