Plant variety and cultivar identification: advances and prospects

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Abstract

Plant variety and cultivar identification is one of the most important aspects in agricultural systems. The large number of varieties or landraces among crop plants has made it difficult to identify and characterize varieties solely on the basis of morphological characters because they are non stable and originate due to environmental and climatic conditions, and therefore phenotypic plasticity is an outcome of adaptation. To mitigate this, scientists have developed and employed molecular markers, statistical tests and software to identify and characterize the required plant cultivars or varieties for cultivation, breeding programs as well as for cultivar-right-protection. The establishment of genome and transcriptome sequencing projects for many crops has led to generation of a huge wealth of sequence information that could find much use in identification of plants and their varieties. We review the current status of plant variety and cultivar identification, where an attempt has been made to describe the different strategies available for plant identification. We have found that despite the availability of methods and suitable markers for a wide range of crops, there is dearth of simple ways of making both morphological descriptors and molecular markers easy, referable and practical to use although there are ongoing attempts at making this possible. Certain limitations present a number of challenges for the development and utilization of modern scientific methods in variety or cultivar identification in many important crops.