

MOLECULAR MARKERS SYSTEMS AND THEIR APPLICATION IN PLANT BREEDING

Summary

The development of molecular techniques has led to significant improvement in our knowledge of plant genetics and understanding of the molecular mechanisms operating within plant genomes. Considerable emphasis has been laid on the use of molecular markers in studying DNA sequence variation among species, monitoring genetic variation and in genotype identification. Molecular (genetic) marker is defined as a sequence on a chromosome with specific location e.g. restriction enzyme cutting site, coding regions of DNA or segment of DNA with no known coding function but with determinable inheritance pattern. Improvements in marker systems and in the techniques used to identify DNA sequences linked to useful traits, have both enabled

tremendous advances in the area of plant breeding. The first developed marker system, RFLP, has laid the groundwork for modern genetic analysis and its numerous improvements led to development of separate systems such as RAPD and AFLP. The increasing knowledge of genotypes, acquired through genome sequencing projects, enabled designing of marker systems based on highly specific motifs such as minisatellite and microsatellite DNA repeats. Other molecular marker-based systems like sequence-tagged sites (STS), sequence characterized amplified regions (SCAR) and single nucleotide polymorphism (SNP) have been routinely used to assist selection for desirable characters, comparative mapping, sequencing of plant genomes and breeding programs.