

Invited keynote lecture

BIOTECHNOLOGY AND MOLECULAR BREEDING IN LILIES - DREAMS AND REALITY

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The term biotechnology may be defined as any technological application that uses biological systems, living organisms or derivatives thereof to make or modify processes for specific use. Biotechnological techniques have been used by the horticultural industry in both propagation and breeding. Lilies have been among the first floricultural crops to adopt tissue culture methods for rapid propagation of new cultivars or valuable plant material and production of virus-free stocks. Plant breeders use in vitro techniques such as embryo-rescue, ovary-slice culture, ovule culture and protoplast fusion in order to overcome compatibility barriers and generate interspecific hybrids. Recently, biotechnology is used in conjunction with molecular markers and genetic engineering. *Lilium* has been transformed using both *Agrobacterium*-mediated and microprojectile-acceleration methods. The purpose of which is to insert commercially-valuable genes that are not known to be present in *Lilium*. The success of the transformation in both systems depends upon the successful assembly of several key components and the calibration of the entire system. One element is the availability of a genetic construct carrying a target gene, a reporter gene and an appropriate selectable marker, all under the control of the appropriate promoters. A second element is the plant organ or tissue. It has to be competent for genetic transformation, being capable of expressing the genes and maintain the capability to regenerate into plants. Although several valuable genes are available and the transformation systems are well calibrated, very few attempts have ended successfully and none, to date, resulted in a registered cultivar. Marker-free technology is needed in order to overcome obstacles in cultivar registration and ease the risk assessment process. Also, the proposed cultivar has to be free of any patented technology or, alternatively, covered by freedom to operate agreements. The Issue of public concerns also has to be addressed before a new transgenic lily can be commercialized.