Seminar V

Recent Advances in Biotechnology to make Transgenic Plants

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Summery

Plant Biotechnology is the most selective and classical breeding approach over the traditional programs through which the specific gene/genes could be engineered using of a vector with a view to improve crop plants. These plants are usually termed transgenic - that is containing genes from another organism (which can also be a plant). Plants containing transgene are often called Genetically Modified or GM crops. Transgenic technology has opened new avenues to modify crops, and provided new solutions to solve specific needs. However, there is great potential for genetic manipulation of crops to enhance productivity through increasing resistance to diseases, pests, and environmental stress and by qualitatively changing the seed composition. In the near future, the proportion of acreage planted with transgenic crops, and the range of transgenic crop is sure to increase.

All plants can be changed genetically by using two basic approaches : 1) transformation, and 2) the use of known DNA markers. Transformation involves the introduction of genes into a plant from some outside foreign source. At present the process of transformation is actually carried out either by a so-called Gene (Biolistics/Biological Ballistics/Microprojectile Bombarddment) or by the use of a bacterial vector (Agrobacterium tumifaciens) in a dish in a laboratory.

The use of DNA markers, on the other hand, allows a gene to be inserted into a plant using what is already known about the chromosomes of a plant through the mapping process.

These two methods are based on a step - called Regeneration of whole Plant. It is a pre-requisite and has been a stumbling block in Plant Biotechnology. In this case a tissue culture stage is required in most current transformation process to ultimately recover plants. Therefore, without establishing a suitable Regeneration Protocol, one should not proceed Transformation of gene/genes with a view to engineer a crop. Nevertheless, the next challenge is to develop technology that minimize or eliminates the Tissue Culture steps, and provides predictable transgene expression.

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