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Overproduction of Recombinant Proteins in Plants

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Recombinant protein production in microbial hosts and animal cell cultures has revolutionized the pharmaceutical and industrial enzyme industries. Plants as alternative hosts for the production of foreign proteins are being actively pursued, taking advantage of their unique characteristics. The key to cost-efficient production in any system is the level of protein accumulation, which is inversely proportional to the cost. Levels of up to 5 g/kg biomass have been obtained in plants, making this a cost competitive system with microbial hosts. Increasing protein accumulation can be addressed at the cellular level by varying host, germplasm, location of protein accumulation, and transformation procedure. At the molecular level increased expression can be achieved by improving transcription, translation and accumulation of the protein. The greatest increase in protein accumulation will occur when various optimized parameters are more fully integrated with each other. Because of the complex nature of plants, this will take more time and effort to accomplish than has been the case for the simpler unicellular systems. However the potential for plants to become one of the major avenues for protein production appears very promising. Approaches to optimizing foreign protein expression in transgenic plants will be discussed along with the examples of promising plant-produced protein products.

Recombinant protein production in microbial hosts and animal cell cultures has revolutionized the pharmaceutical and industrial enzyme industries. Plants as alternative hosts for the production of recombinant proteins are being actively pursued, taking advantage of their unique characteristics. The key to cost-efficient production in any system is the level of protein accumulation, which is inversely proportional to the cost. Levels of up to 5 g/kg biomass have been obtained in plants, making this production system competitive with microbial hosts.

Increasing protein accumulation at the cellular level by varying host, germplasm, location of protein accumulation, and transformation procedure is reviewed. At the molecular level increased expression by improving transcription, translation and accumulation of the protein is critically evaluated. The greatest increases in protein accumulation will occur when various optimized parameters are more fully integrated with each other. Because of the complex nature of plants, this will take more time and effort to accomplish than has been the case for the simpler unicellular systems. However the potential for plants to become one of the major avenues for protein production appears very promising.

A group of organic molecules are called Proteins. Proteins are very essential of all the materials that make up all living organisms. Proteins are chains of amino acids, programmed by DNA. Proteins are copious in different types and are present in every single living cell of all organisms. The uniqueness of the organisms are found out by protein activity for instance, eye color, immune system operation, etc,. Recombinant protein is a protein that whose code is carried by a recombinant DNA. The term recombinant DNA means that two segments of DNA in a plasmid. Plasmids are those which generally occur in bacteria. Once a recombinant DNA is inserted into bacteria, these bacteria will make protein based on this recombinant DNA. This protein is known as "Recombinant protein". Now-a-days, the utilization of bacteria for producing recombinant protein is very advanced. Recombinant DNA (rDNA) molecules are DNA sequences that is a consequence of molecular cloning (used to assemble recombinant DNA molecules) to assemble the genetic material from various sources, making sequences that cannot be predicted in biological organisms. This technique is often used to produce human growth hormone and insulin. Occasionally, Recombinant DNA molecules are known as “chimeric DNA”, as they are made of material from two species.