GENETICALLY MODIFIED CROPS

Ryan Johnson-BME 282-Fall 2009

The term genetically modified organisms refers to crop plants created for consumption that have alteration in their genome. In the laboratory, these plants are modified to enhance certain desired traits; for instance, increase nutrition and resistance to herbicides. Genes can be isolated containing a specific desired trait and can be transferred and expressed into a certain target. Genes can come from a variety of different targets including, genes known to encode an enzyme in the pathway you want to alter, genes known to encode a protein whose function you desire, genes known to induce an antigen for immune response, or genes that encode and antibody. Another example is drought resistance crops where a gene for drought resistance is isolated and then inserted into a different plant and consequently the new genetically-modified plant with gain drought tolerance.

When it comes to the process of genetic engineering there is many intricate steps that must go underway. First, one needs to find a target organism that will likely accept foreign genes. Once a gene is discovered that you would like to introduce, it must be inserted into a vector. The gene of interest is amplified by PCR and is inserted in this vector. The promoter P35, is usually used because it is not specific to any certain plant or part of a plant. This new vector must then be transformed into E.coli to grow in the laboratory. Once the gene is identified and isolated the transformation process must go underway; in most cases Agrobacterium mediated. The bacterium is then mixed with plant cells and the plasmid will insert its DNA into the chromosomes of the plant cell. Once this is done, it is now time to determine if your gene of interest was actually transformed into your desired target. Polymerase Chain Reaction, or PCR, is used to determine if the plants actually incorporated the gene of interest into their genome. Once it is determined that the GOI is in the plant, the next step is to see how many copies of the gene was inserted, which can be established through Southern Blotting. In order to determine amount of expression a Northern blot is then conducted. When discussing the proteins, the abundance and size can be determined through Western blotting. If all of these tests hold true, the desired plant will contain a specific gene of interest.

Genetically modified crops have been used all over the world for a variety of reasons. One very prevalent crop is Golden Rice. This is rice that was genetically engineered to biosynthesize betacarotene, a precursor of pro vitamin A. Soybeans have had a gene taken from bacteria and inserted in order to obtain herbicide resistance. Lastly, a Hawaiian Papaya was inserted with a gene that counteracted the virus, Papya Ringspot Virus, that had once wiped out all of the production across Hawaii.

All in all, Genetically-modified foods have the ability to counteract world hunger and malnutrition problems as well as helping to preserve the community in increasing yields and reducing pests. Though there are many challenges that come with GMC's, they pose as a potential benefit to many of the destructive events that take place around the world as well as assistance in increasing human health.

http://en.wikipedia.org/wiki/Genetically_modified_food

http://www.csa.com/discoveryguides/gmfood/overview.php

http://www.biotech.iastate.edu/biotech_info_series/bio8.html