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Review Article

New Insights in Genetically Modified Crops and Plant Diseases through Molecular Biology

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Abstract

Genetically modified genetically plants pass through diverse domestication from wild species and many generations of selection by humans for desirable traits. These genetically modified genetically crops are diversely produced in different industries to decrease the attack of pests by transferring different combinations of genes through advanced technologies. The gene of interest is inserted into the crop's genome using a vector that exhibits the biological carrier genes. Bacillus thuringiensis (Bt) corn is the genetically modified corn that produces most of essential proteins necessary for human body also secrete toxic to certain insect pests. Genetically engineered cotton is the most evolutionary step to replace the traditionally used methods for production of cotton. Genetically engineered canola has been produced by inserting through high technology methods. Protein samples can be obtained from genetically modified crops can be resolved with the one-dimensional SDS-gel electrophoresis. Genetically engineered crops have many advantages, and the benefits of being able to use herbicides that would cause unacceptable phytotoxicity to a crop are clear.

Keywords: Genetic engineering, crops, cotton, oilseeds, protein purification.

INTRODUCTION

Genetically modified plants have great resistance to environmental stresses such as high temperature, pressure and great potential as compared to the ordinary growing plants. These genetically modified plants also possess the large gene pool of genes that increases the chances production of new varieties [1,2]. Genetically modified genetically plants pass through diverse domestication from wild species and many generations of selection by humans for desirable traits. These traits make the significant roles in the agriculture sectors for both economic and industrial point of view. The new traits also helpful for breeding and cross selection among different groups of plants. It also reduced the risk of different diseases such as gray leaf spot, northern corn leaf blight. The genes that to be transferred in appropriate ways develop the functional features in newly developed varieties [3-5].

Genetic makeup of the plant is its genome, which in all plants that is made of DNA. These genetically modified genetically crops are diversely produced in different industries to decrease the attack of pests by transferring different combinations of genes through advanced technologies. While on the other hand, traditionally used methods for genetically modified plants are less susceptible as compared to the modern technology. The genome comprised of genes, DNA that usually carry the instructions for making proteins. These advances helpful to reduce the use of different chemical treatments in the form of fertilizers. Genes transformations among different groups of plants reduced the attack of aphids through biological control measures [6,7].

Advances in genetically modified crops

Gene's transformation among plants leads to induction of the characteristics in the form of genetic traits that also increase the demand of newly developed varieties. For instance, colour of flowers can be determined through the induction of gene or group of genes that carry the instructions for making proteins involved in producing the pigments that colour petals. There are different approaches for production of genetically modified crops[8,9]. The gene of interest is inserted into the crop's genome using a vector that exhibits the biological carrier genes and such as promoters, transcription terminators, and antibiotic resistance and marker genes. The transferred genes in the host also used for the creation of mutations. Through transgenic DNA technology, different genes that break up and reintegrate into the genome for causing chromosomal rearrangement in successive and leads to the developmental change the transgenic crops in a way to produce proteins[10,11].

One of the most important crop is the most growing crop on the world that has been used in potential agricultural sectors as a source of food due to its immense used in food products. Different industries like baking and food industries reply on it because they use the pure corn to make the food items. Bacillus thuringiensis (Bt) corn is the genetically modified corn that produces most of essential proteins necessary for human body also secrete toxic to certain insect pests but not to humans, pets, livestock, or other animals[12,13]. The main principle of producing the GMO Bt corn is to reduce the need for spraying insecticides while still preventing insect damage these GMOs based corn goes into processed foods and soft drinks also used feed livestock, like cows, and poultry, like chickens. Processing of the corn through advanced technologies increased the value of GMOs corn as it prevents the lots of infectious among plants [14-16].

Table-1: Shows the genetically modified varieties and advantages

Potential Genetically Modified Varieties/Plants Characteristics	Functions	Advantages	Reference
Genetically modified plants	These plants have great resistance to environmental stresses.	These genetically modified plants also possess the large gene pool of genes that increases the chances production of new varieties. The new traits also helpful for breeding and cross selection among different groups of plants.	[1,2,3]
Gene transformation	Induction of the characteristics in the form of genetic traits that also increase the demand of newly developed varieties.	The gene of interest is inserted into the crop's genome using a vector that exhibits the biological carrier genes.	[8,9,10]
Bacillus thuringiensis corn	It is the genetically modified corn that produces most of essential proteins necessary for human body.	These also reduce the need for spraying insecticides while still preventing insect damage	[12,13,14]
Genetically engineered cotton	These are created to be resistant to bollworms and helped revive cotton industry.	It is most reliable source of cotton for the textile industry that has been used for production of cottonseed oil.	[20,21]
Genetically engineered potatoes	These are developed to resist the attack of different insect pests and disease	These genetically engineered potatoes have been produced by inserting through high technology methods to insert one or more genes from into different species of potatoes.	[24,25]
Genetically engineered alfalfa	It contains a gene making it resistant to herbicide.	It is also effective against the killing weeds without affecting the crop. It also useful to improve the quality of crops with high quality yields.	[26,27]

The other crop that has been genetically engendered is the GMO soy that the most growing crop on the world. It comprised of deferent proteins that makes them ideal for food industries for making the different food items, livestock animals. It is also used for the production of soybean oil. It is also used as ingredients such as lecithin, emulsifiers in processed foods. The major development in soybean agriculture over the last decade has been genetically modified (GM) soybeans. This genetically engineered soybean has been produced through high technology methods to insert one or more genes from into soybean species. Different varieties have been produced through this genetic engineering technology. Some GMO plants contain genes that make them resistant to certain antibiotics. This resistance could pass on to humans. There is need to design such kind of strategies that reduced the use of excessive chemicals or sprays directly on different crops in order to main their natural composition[17-19].

Genetically engineered cotton is the most evolutionary step to replace the traditionally used methods for production of cotton. Genetically engineered cotton is created to be resistant to bollworms and helped revive cotton industry. This genetically engineered cotton has been produced through advanced technology methods to insert one or more genes from in the cotton. Different varieties have been produced through this genetic engineering technology. Genetically engineered cotton is the most reliable source of cotton for the textile industry that has been used for production of cottonseed oil at industrial scale which is used in packaged foods and in many restaurants for frying[20, 21].

Genetically engineered cottonseed meal and hulls are also used in food for animals. It has been effectively used as a source of food for human and animals with great bioavailability. Some variations found in the production of cotton that needed to resolve through the genome editing using the CRISR technology. Much of GM cotton is turned into cottonseed oil, which is used for frying in restaurants and in packaged foods like potato chips. Different defective genes can be identified through this technology. CRISR technology makes the significant revolutions for human welfare and agricultural sectors for production of high quality foods that free from insects attack [22,23].

Genetically engineered potatoes gave been developed to resist the attack of different insect pests and disease. They are also used in packaged foods and in many restaurants for cooking, homes and industries for the manufacturing of different food items. These genetically engineered potatoes have been produced by inserting through high technology methods to insert one or more genes from into different species of potatoes. Genetically engineered potatoes high quality as compared to those of the ordinary potato, it often leads to food being unnecessarily thrown away because people mistakenly believe browned food is spoiled [24, 25].

Genetically engineered alfalfa that contains a gene making it resistant to herbicide. This genetically engineered alfalfa has been produced by inserting through high technology methods to insert one or more genes from into different species of alfalfa. It is used mainly as hay for cattle. It is also effective against the killing weeds without affecting the crop. It also useful to improve the quality of crops with high quality yields. These advances in crops to made in order to increase the resistance against pests, weeds and different pathogens that can attack under different favorable conditions [26, 27].

Canola is grown for its seed that can be crushed for the oil used for different purposes. Genetically engineered canola has been produced by inserting through high technology methods to insert one or more genes from into different species of canola. After the oil is extracted, the by-product is a protein-rich meal, which is used to feed livestock. Canola is grown around the world and appears as yellow flower with sometime seasonal changes leads to changes in color formation [28, 29].

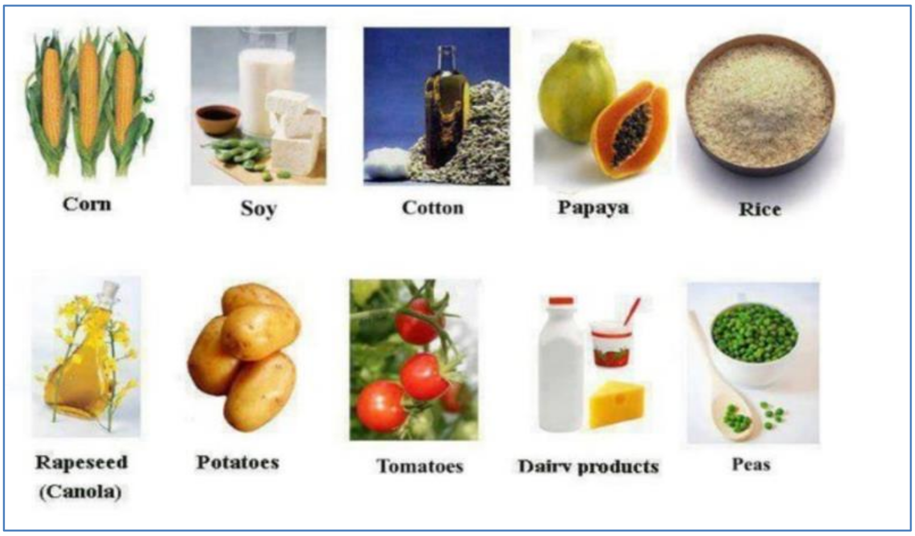

Fig-1: Shows the genetically modified foods through genetic engineering

Genetic engineering Approaches

Many of the protein based methods have been used for the detection and purification of food products and different crops components. Detection through advanced protein purification techniques leads to accuracy of genetically modified foods. Protein samples can be obtained from genetically modified crops can be resolved with the one-dimensional SDS-gel electrophoresis. But one dimensional method is not reliable as it is more time consuming and high cost. Therefore, the need for searching the low cost increased through recent advances in agricultural sciences. Two-dimensional gel electrophoresis that provides the better resolution but still may generally not be able to provide the unequivocal identification of a transgene product unless combined with immunological methods. The gene through these methods is relatively sometimes low due to constitutive promoters to drive the expression [30-32].

Through recent advances in genetic engineering, introducing of the new genes into the different plants can be performed through using the promoter specific to the area where the gene is to be expressed. For The expression of gene also depends upon the promoter site. The stronger the promoter, the more chances of the expression of different proteins in specific tissue. For instance, to express a gene only in rice grains and not in leaves, an endosperm-specific promoter is used. It also increased the expression as it activates the receptors. The codons of the gene must be optimized for the organism due to codon usage bias. While on the other hand, weaker the promoter, the less chances of the expression of different proteins in specific tissue [3, 6, 7].

Different strategies have been proposed in order to combat the infectious diseases in different crops. Genetic engineering playing a vital role in weed management and some other methods based on herbicides. Weed control is vital to agriculture, because weeds decrease yields, increase production costs, interfere with harvest, and lower product quality. Genetically engineered crops have many advantages, and the benefits of being able to use herbicides that would cause unacceptable phytotoxicity to a crop are clear. Genetic engineering can be done with plants, or bacteria and other very small organisms. Genetic engineering also allows the scientists to move the desired genes from one plant or animal into another. Genes can be inserted from one plant to other plant or vice versa [8, 10, 18, 19].

CONCLUSION

The process to create GE foods is different than selective breeding. This involves selecting plants or animals with desired traits and breeding them. Over time, this results in offspring with those desired traits. One of the problems with selective breeding is that it can also result in traits that are not desired. Genetic engineering allows scientists to select one specific gene to implant. This avoids introducing other genes with undesirable traits. Genetic engineering also helps speed up the process of creating new foods with desired traits.

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