AgriCos e-Newsletter
ISSN: 2582-7049
Volume : 01 Issue : 03 July 2020 Article No: 55

Impact of Genetic Engineering on Agricultural Production

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SUMMARY

Over the last 50 years, the field of genetic engineering has developed and become more common in agriculture. Recent developments in biotechnology have many benefits for the agricultural world. The most noticeable benefit is that, it develops more crops for cultivation in a shorter time period. The major goal of plant breeders and scientists developing plant varieties expressing good agronomic characteristics and also maintain high productivity under stress as well as developing crop with enhance nutrition value. Due to the modifications in plant genetic constituent these crops show resistant to diseases, it has been possible to increase overall yields. Genetic engineering is rapidly replacing traditional plant breeding programs and has become the mainstay of agricultural crop improvement.

INTRODUCTION

When the genetic makeup of organism is altered by inserting, deleting, or changing specific pieces of DNA. First Genetically improved crops were introduced commercially in 1990s. After two decades construction of market for production, some groups and individual come up with concerns about possible adverse effect on environment, human health and ethical considerations based on technology. For the first 20 years debate about these and other questions related to the genetic engineering techniques goes on. Globally there are over 25 countries that grow genetically engineered crops on approximately 420 million acre of land and those number are increasing every year. The importance of optimal nutrition for human health and development is well recognised. Although many crops have been genetically engineered over the years there are three crops – Soybean, Corn, Cotton that are the focus of genetic engineering. In genetic engineering Agricultural crops are modified into resistant to disease, produce crop which contains higher yield, high protein, higher level of vitamins and minerals and delayed ripening, early stage of maturity etc....

Application of Genetic Engineering in Agriculture Production

- Insect resistance
- Viral resistance
- Fungal/ bacterial disease resistance
- Herbicide resistance
- Seed storage protein
- Nutritional enhancement
- Abiotic stress tolerance
- Edible vaccine
- Delayed fruit ripening
- Nutritional enhancement

Example of genetic engineering applications in Agriculture

Most of the genetically engineered products are currently altered to be pest and herbicide resistant the high-tech genetic engineering industry focused on large commercial crops such as corn, cotton, soybean, canola etc. For example:

Bt-cotton: Specific By toxin gene were isolated from Bacillus thuringiensis and incorporated into the several crop plants such as cotton. The choice of gene depends upon the crop and the targeted pest, the toxin is coded by a gene named cry gene.

Bt-corn: a common crop which express Bt bacillus thuringiensis, a bacterium that is toxic to insect. Conventionally, farmers spread by on crop to prevent insect infestation.

Soybean. – "Roundup read" soybean herbicide does not affect these plants which increases crop yields because weeds are easily eliminate from crop.

Tomato - flavor saver tomato **-** Is developed by introducing an additional copy of polygalacturonase encoding gene in the antisense orientation. This results in less production of praying degrading enzymes polygalacturonase therefore these tomatoes have longer shelf life. Flavor is saved its additional advantage.

Benefits of Genetic Engineering in Agricultural Production

The most noticeable benefits are that genetic engineering has made it possible to produce to more crop in a shorter time. Due to genetic engineering increase overall yield of crops. They tolerate salty soils be more drought resistant and increase their rate of photosynthesis to take advantage of limited sunlight. Increase productivity – they resistant to disease and insect, less chemical pesticides have to be used to combat disease and pest. Genetically modified to include components of fertilizers, less chemical fertilizers have to be placed on the field. Genetic engineering has also made it possible to produce new varieties of crops by mixing gene from multiple different species. Increase in ability of plants to remove toxic materials from soil. (Bioremediation). Production of more biodegradable industrial products. Development of novel oils, starch and industrial applications including raw material for biodegradable plastic (e.g. soybean with higher levels of oleic acid). The enhancement of vitamins and minerals in food grains. (e g. Golden rice). The elimination of certain allergens and anti nutritional compounds from food / product. Improve transport and shelf-life of certain products (e.g. controlled ripening in melons, tomatoes).

Risk of Genetic Engineering in Agricultural Production

It increases the cost of cultivation and more inclined towards marketization of farming that work on immoral profits. There can be negative slide effects that are unexcepted, like gene flow from one plant to other. They must have tissue specific primers, then rick of gene flow and other hazards can be minimised.

CONCLUSION

Genetic engineering technology hold exceptional promise for improving agricultural production. Potential benefits include higher productivity of crops and livestock increased pest control and reduce pesticides use, reduce fertilizer use by enhance nitrogen fixation. Therefore, time and effort must be devoted to laboratory and field testing before the release of genetically engineered plant. Without caution and suitable regulation, environment problem is likely of genetic engineering. Along with the potential benefits for agriculture come some risk. The release and regulations of genetically engineered organism into the environment should be similar to the release and regulation of exotic plant and animal species into a new environment.

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