

Transgenic plants in animal feeding and human uses

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Introduction:-

Before the invention of transgenic, crops were altered to increase their productivity on the basis of selection. Total livestock population in 2019 census of India was recorded 535.82 million with an increase of 4.6%. To meet the needs of such a massive population, food supply would need to grow at the same pace or even faster. As a result, in recent decades, there has been a need to use genetic approaches to boost crop production. Plants with desired traits and even improved yields can be generated using transgenic. More crops will be able to last longer and resist pests and diseases, thanks to transgenic. The future of GM crops is also up for discussion, as its uses have both benefits and drawbacks. Transgenic plants are that who's DNA has been altered by the use of genetic engineering. The aim is to incorporate a new plant feature that does not occur naturally in the species. A transgenic plant has one or more genes that have been altered artificially. This method offers benefits such as longer shelf life, higher yield, higher efficiency, pest tolerance, heat, cold, and drought resistance, and resistance to a number of biotic and abiotic stresses. The public should be informed of the advantages and applications of transgenic plants.

Benefits of transgenic plants in animal population:-

Fulfils scarcity of feed:- GM technology has been used to grow a wide range of crop plants. Food is becoming increasingly scarce as the world's population grows. Foods that have been genetically modified have major advantages in terms of output yield, reducing shipping costs and improving food value. Developments that have resulted in commercially grown varieties in countries such as the United States and Canada have focused on conferring mosquito, pest, or virus resistance as well as producing herbicide tolerance. While these characteristics

benefited producers, it has been difficult for buyers to find any other advantage. In certain circumstances, it can be available at lower price due to lower costs and greater ease of processing. In the next five to ten years, many GM crops for malnutrition are predicted to be released for cultivation.

Insect and pest resistant plants:- Transgenic corn and cotton potatoes that express Bt toxins are two commercial genetically modified insect resistant crops that have been released. These crops are now expanding in large areas across North America, and many more transgenic plants are in the pipeline for release in other countries. The use of insect resistant crops can reduce the expenditure of insecticides and also the health risks such as various cancers they are causing to human population and their residues are also found in meat of animals which can cause great hazards.

Transgenic Plants with Improved Nutrition:-

1. Amino Acids of Seed Storage Proteins:

Of the 20 amino acids present in the humans, 10 are essential while the other 10 can be synthesized by the body. While in case of animals the no. of essential amino acids varies according to species. The essential amino acids (EAAs) have to be supplied through the diet. Cereals (rice, wheat, maize, corn) are the predominant suppliers of EAAs. However, cereals do not contain adequate quantity of the essential amino acid lysine.

On the other hand, pulses (Bengal gram, red gram, soybean) are rich in lysine and limited in sulfur-containing amino acids (the essential one being methionine). Transgenic routes have been developed to improve the essential amino acid contents in the seed storage proteins of various crop plants.

2. Genetic Engineering for Improving Palatability of Foods:

More than the nutritive value, taste of the food is important. It is customary to make food palatable by adding salt, sugar and many other ingredients. It would be nice if a food has an intrinsically appetizing character.



3. Genetic Engineering to Increase Vitamins and Minerals:

The transgenic rice (Golden Rice) developed with high pro-vitamin A content have been developed. Transgenic crop plants are also being developed for increased production of other vitamins and minerals. A transgenic Arabidopsis thaliana that can produce ten-fold higher vitamin E (α -tocopherol) than the native plant has been developed. Some workers are trying to increase the mineral contents of edible plants by enhancing their ability to absorb from the soil. Some success has been reported with regard to increased concentration of iron.

4. **Reduced mycotoxin concentration in fodders:** - It has been observed in some experiments that mycotoxin production is reduced in GM crops especially Bt. Plants. Mycotoxicosis causes great hazards in animal feeding and it can be tackled by using GM crops.

5. **Decreased content of anti-nutritional factors:**-Plants contain several anti-nutritional substances which decrease the utility of nutrients or they may cause toxicities. They are saponins, phytates, glucosinolates, alkaloids etc. By genetic modification these anti-nutritional factors can be reduced.

Improvement in animal products: - It has been observed that by using GM crops the quality of animal products can be improved. Feeding genetically modified fatty acid enriched plants in broilers have resulted in improved omega-3 content of meat. Other production indices in poultry birds such as laying intensity, hatchability and mean egg weight have also been found to increase.

Benefits to human population:-The human population will increase globally from about 7.5 billion to more than 9 billion people in 2050 according to FAO. The need for animal feed and human food will gradually translate into a growing demand for limited natural resources. Hence transgenic technology can serve as boon for fulfilling demands for huge population in terms of quantity as well as quality.