

Biotechnology - An Emerging Tool in Agriculture

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Indian agriculture has undergone many drastic changes and has achieved many milestones despite of many setbacks. The green revolution transformed India from a food deficient stage to surplus market place. Indian economy mostly depends on agriculture sector. Even today, 58% of the population of India depends on agriculture for food and livelihood. At present various modern technologies are used in agriculture for enhancing the production. Out of them biotechnology is emerging as a very effective tool.

Application of biotechnology in agriculture involves increased production, enhanced crop protection, improved food processing, improved nutritional value, environmental benefits and Tissue culture etc.

Increased crop productivity

Crop productivity has been increased by introducing various genes such as disease and pest resistance gene, drought tolerance gene to the crops. Now, researchers transfer genes from other species to important crops which ultimately increase the nutritional value and yield. For example, Papaya varieties are developed in Cornell University which are resistant to papaya ring spot virus by the use of biotechnological tools.

Enhanced crop protection

Transgenic plant is produced by the use of biotechnology which plays a very important role in crop protection. For example BT cotton where gene from *Bacillus thuringiensis* has incorporated in cotton plant. As a result cotton plants become resistant to boll worm which cause severe menace in cotton. Many diseases of plant can be identified by using PCR techniques and also various management techniques like RNAi interference, Vaccination are developed to protect the crops from diseases.

Improvements in food processing

Genetic engineering is used in most of the food processing industry. The best example of this is Chymosin which is the first enzyme produced by the use of genetic engineering technology which replaces the calf rennet in cheese-making industry. Due to this the productivity is increased within a very less span of time, production cost is also reduced and Quality is also increased.

Improved nutritional value

With the use of biotechnological tools the nutritional value, texture and flavour of food have increased. The best example is golden rice. In golden rice the vitamin A content and iron content are at a superior level. As a result by consuming this rice night blindness can be reduced and haemoglobin in blood can be increased.

Environmental benefits

Due to the use of genetic engineering in crop plants disease and pest resistance plants are developed. As a result the pesticide consumption is reduced to a great extent which in turn protects the environment.

Tissue culture

Plant tissue culture is a technique to grow plants in *in-vitro* condition on a nutrient culture medium of known composition. It helps in quick production of planting materials. Those plants which cannot be propagated through seeds can be propagated and genetically modified by this technique. By the use of meristem tip culture virus free plants can be produced.

Although many techniques are developed in agriculture still a lot of techniques are not exploited till date. So it has a wide scope for research and development in this field. Government has also

taken many steps to promote this technology in India. For that agriculture biotechnology department has opened in all agricultural universities. If we can exploit all the techniques of biotechnology in agriculture then it will become a boon in agriculture and make another green revolution possible.

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