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Biotechnology in Vegetable Improvement

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Abstract
Biotechnology brings effective and costeffective solutions for Human Income a Use organis ms to create organisms with special forms to make or change things, improve plants and anim als, or create more valuable products and tools. It has become the world's largest and most ad vanced technology, especially in agriculture, creating unprecedented opportunities in the past two years. It has the potential to increase food production while reducing agriculture's depend ence on chemicals, reducing feed costs and reducing environmental impacts associated with t he production process. Recombinant DNA (rDNA) technology solves abiotic and biotic probl ems. Similarly, mapping of quantitative trait loci (QTL) and tissue culture techniques help im prove crop quality at the molecular level. Current understanding of new tools for genetic anal ysis supports the use of these tools in vegetable breeding.

Introduction
The advent of modern biotechnology has provided new ways of growing plants. The term bio technology is defined as a technological process that uses biological materials or processes to create new and useful products and processes. It is used to solve problems in production and operation. Therefore, vegetables play an important role in maintaining health as they contain vitamins, minerals, antioxidants and fibre. Plant biotechnology has been used to make crops s table and sustainable; ameliorate pest, disease, and abiotic stress such as drought and cold; and to enhance the nutrtional content of foods.

Why should biotechnological methods be used?
• Eliminate long-term trials
• Ensure 100% replacement of desired genes, no replacement of unwanted genes, no loss of o riginal genes
• Overcome problems with long-term hybridization
• Lack of affinity Hybridization in cross-pollinated varieties Development of cross-suppressed inbred varieties
• Effective marker-assisted selection
• Production of disease-resistant plants in the context of cloning.
•No type/breed barrier
•Production of genetically unique plant species

Use of Biotechnology in Vegetables
1. Propagate selected clones from hybrids or parental line of conventional micropropagation or somatic embryogenesis and rapidly produce microbes without multiplication.
2. Plant varieties are created by genetic engineering of plant species combined with whole pla

nt breeding.
3. Application of molecular markerbased genetic mapping techniques in addition to plant bre eding programs.
4. In vitro culture of zygotic embryos (embryo rescue) can overcome mating interference cau sed by zygotic failure.

Vegetable development requires the use of biotechnological methods:-

• Does not harm gene transfer to the model/genus
• Eliminate long-term experiments
• Complete 100% gene transfer
• Shorten breeding time cycle
• Eliminate unreliable phenotypic evolution
• No linkage
• High production as a species
• Overcomes barriers to long-distance hybridization

Approaches in the field of biotechnology

Different specifications and techniques are briefly discussed below:-
1. By genetic engineering method
2. Molecular markers
3. Tissue Culture

Improvement of vegetable crops through genetic engineering

• Increasing the capacity and productivity of vegetable or horticultural crops can be achieved through advanced genetic engineering techniques.
• The process of genetic engineering involves the genetic modification of plants by incorporat ing new genes to improve plant resistance (disease-
free) or valuable food or agricultural work, and is cultivated for commercial value in many co untries. called genetically modified plants or genetically modified products.
•Color, aroma, flavor, size, storage life, pesticides, etc. The role of genetic engineering has be en expanded due to the cultivation of crops with special characteristics such as
• There are two important genetic modification strategies to improve vegetable crops:

1. Transgenic approaches to biological stress management.
A. Virus resistance
B. Antifungal
C. Antibacterial
D. Disease
E. Herbicide Resistant
2. Transgenic approach for abiotic stress management
A. Male Infertility Engineering
B. Food and good design
Nutrition and **Quality Design:**
• Grain amaranth is a melancholy due to excessive stored grain protein. This protein now cont ains 24 times more essential amino acids, lysine, threonine, leucine and methionine than ordi nary protein. The AmA1 gene responsible for long-
term storage was successfully transferred to potatoes.
• Use a variety of potatoes when preparing french fries. Sugar carbonation occurs when the su gar in the potato is highest.
• The food industry should have potato varieties with higher starch content.
• The starting enzyme in the starch biosynthetic pathway is ADPGPP-
ADP glucose pyrophosphatase.

• This gene was removed from E. coli. The starch content in potatoes increases from E. coli t o potato varieties.

Molecular Markers

• Molecular markers are DNA segments that can be identified throughout the genome. Molec ular markers are located in specific locations in the genome.

Use of **markers** in **potatoes:-**

• Molecular markers allow direct genotypic information

Genome Sequencing

• Next generation sequencing helps in the development of new characters and discovery of lar ge seeds for crop improvement. agricultural science. It allows the development of high-density genetic maps.

• The information obtained will help determine the genes responsible for different characteris tics.

• This information can explain the management process that supports diversity and help pave the way for success.

Tissue Culture

• Transforming a plant from disease-
free parts into a fully mature plant under laboratory conditions or in vitro conditions called cu lture.

• Micropropagation is a tissue culture technique that supports the production of plant clones.

Meristematic explant culture

• Meristematic culture was first used to obtain infected dahlia plants (Morel & Martin 1952).

Important points **for success:**

• Apical shoots and root meristems are not infected.

• Metabolic activity is high due to the growth of meristematic cells.

• There is no vascular system in the meristem.

Anther Cultures

•Use of Anther Cultures

•Isolation of homozygous species.

• Hybrid development.

• Triggering mutations.

• Triggering genetic diversity.

• Create male plants in asparagus.

• Combination.

• Double haploidy in genome mapping.

Somatic Hybridization

• The fusion of two somatic cells belonging to different species, genus or family is considered somatic hybridization (Rai & Rai 2006).

• The process of hybrid production by separating somatic protoplasts under in vitro condition s and producing their products in hybrid plants is called somatic hybridization.

• In somatic cell hybridization, the nuclei and cytoplasm of the parents combine in the hybrid cell**.**

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