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Agricultural Biotechnology

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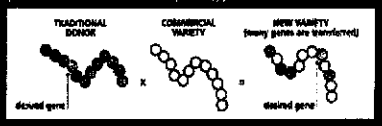
Elements of GE Technique

- Select desirable gene
- Prepare a "construct" (the gene and its regulators)
- Insert the construct
- Verify location, function, and stability

Traditional Plant Breeding

Combines all genes of the parents (both desirable and undesirable traits may be expressed in the offspring)

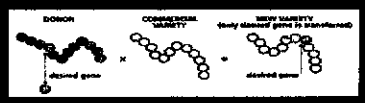


Only plants from "related species" can be interbred (narrows the sources of potential desirable traits)

Genetic engineering

Facilitates the transfer of a greater variety of genetic information in a more precise manner

Using genetic engineering, a single gene may be added to the strand



These genes are very specific, and allow the plant to *precisely* express the desired trait

Elements of GE technique

Select gene

Prepare a "construct" (the gene and its regulators)

Insert the construct

Verify location, function, and stability

Evaluation and safety testing

Extensive laboratory testing

Regulated field testing

Residue studies

Nutritional analysis

Oversight agencies:

EPA
- environmental impacts

USDA (APHIS)
- agronomic issues

FDA
- food safety

Benefits of Ag Biotechnology:

Safer food supply
- less insect and disease damage

Increased production efficiency
- more food and fiber from the same land area

Lower environmental pressure
- less chemical use
- greater water use efficiency

Potential for Ag Biotechnology:

Enhanced nutritional quality
- Improved Wheat Quality
  - modify starch, proteins, and lipids
- reduced allergenicity
  - peanuts
  - celiac disease
- higher vitamin content
  - rice

New bio-materials
- fibers, dyes, fuels