For Years, Biologists Have Been Altering Plants

GOLDENVALLEY, Minn. — Reports of major developments in molecular biology have led many people to believe that the genetic alteration of plants is relatively recent.

In fact, today's plant biotechnology is an extension and refinement of age-old classical plant breeding. It's the result of a great expansion in scientific knowledge, which blossomed with heightened understanding of enzyme chemistry and molecular genetics during the past three decades.

Molecular plant biologists now use recombinant DNA (rDNA) to develop new combinations of genes by splicing together pieces of DNA from various species and organizms.

Plant biotechnology offers advantages that are not available from traditional plant breeding. These benefits can be broadly characterized as economic, environmental, and technical.

• Economic Benefits• Plant biotechnology can favorably influence the economics of agriculture for farmers by reducing front-end production costs. It can also improve the quality and quantity of crop yield by providing plants with in-bred resistance to various diseases and insects.

• Environmental Benefits• The selective alteration of plants could reduce or eliminate the use of certain chemical treatments that are slow to break down in soil and groundwater. Newer chemicals could be paired with transformed plants to limit overall environmental impact.

• Technical Benefits • Plant biotechnology offers increased precision over traditional plant breeding methods because it enables scitentists to identify and alter specific genes. Zeroing in on specific genes may also allow scientist to produce new plant varieties more rapidly. Most promising is plant biotechnology's capacity for broadening the accessible gene pool. With rDNA, scientists can introduce new and useful traits into plants from sources that are unavailable through traditional breeding.

The genetic transformation of plants involves extensive research by scientist in the laboratory and under actual field conditions. Although faster and more precise than traditional plant breeding, the technology is complex, dependent on plant, insect, biology, and genetics experts to determine which genetic transfers are both feasible and beneficial.

Once the research leaves the lab and enters the field, it is subject to approvals from various federal and state regulatory bodies. Field trails are subject to federal review; most must be approved by the United States Department of Agriculture-Animal and Plant Health Inspection Service (USDA-APHIS).

If approved, the USDA issues a permit establishing conditions for the field trial. The USDA also conducts on-site inspections during the course of in-field research and requires reports of research findings. Individual states have varying regulatory requirements for in-field testing as well.

Northup King invests approximately 10 percent of sales revenue in this research each year. The company directs 26 research stations in the United States, Canada, Europe, Mexico, and South America.

In 1989, Northup King conducted its first field trial at research facilities in Stanton, Minn. In the trial, genetically-altered alfalfa was successfully paired with a new and highly-biodegradable herbicide.

In 1992, Northup King received approval to conduct additional trails involving its key product, corn. Two separate trials, conducted at Stanton, Minn., and St. Joseph, Ill., will field-test corn genetically-engineerd to resist European corn borer and maize dwarf mosaic virus (MDMV). The European corn borer and MDMV are responsible for hundreds of millions of dollars in lost crops annually.

AGRICULTURE'S LEADING EDGE FFA