

Biotechnology

Technology



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Biotechnology is a broad term that applies to all practical uses of living

organisms-anything from microorganisms used in the traditional fermentation of beer to

the today's most sophisticated and complex applications of gene therapy and monoclonal

antibodies. According to the United Nations Convention on Biological Diversity,

" Biotechnology means any technological application that uses biological systems, living

organisms, or derivatives thereof, to make or modify products or processes for specific

use." (Article 2. Use of Terms, 1992, para. 3). Since Biotechnology is a generic term used

to describe practical uses of living organisms hence it combines a wide range of

biological disciplines like genetics, molecular biology, biochemistry, embryology and

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cell biology which are in turn linked to practical disciplines like genetic engineering,

chemical engineering, biochemical engineering, bio-process engineering, biosystem

engineering and even information technology and robotics. As a result it has strong

impact on a number of sectors including health care, crop production and agriculture,

none food uses of crops (e. g. biodegradable plastics, vegetable oil, biofuels).

Although each of above mentioned practical discipline of biotechnology has its

importance and application yet genetic engineering, is considered to be an area of

tremendous interest and importance. Based on the artificial manipulation and transfer of

genetic material from one organism to another, genetic engineering can be <https://assignbuster.com/biotechnology-essay-samples-6/>

used to modify

the genetic composition of plants, animals, and microorganisms to have better yield and

tolerance against damaging factors. An important example of applications of genetic

engineering is commercially available insect-tolerant plants. These plants contain a

naturally occurring soil bacterium called *Bacillus thuringiensis*, referred as Bt: a highly

effective toxin for many pest organisms, like beetles and moth larva, but not toxic to

mammals and most other non-target organisms. *Bacillus thuringiensis* produces a protein

that is incorporated into the genetic material of crops by recombinant DNA using

bacterial plasmids and a "clone" or an identical copy of the gene that can produce the

toxic protein is produced (Gallo & Fulford, 2003, pp. 1-2).

Field and greenhouse tests of different Bt crops like rice, maize etc.

produced by

public institutions have confirmed the effectiveness of Bt technology in controlling the

respective crop pests in many countries particularly in China, India and Pakistan. Unlike

chemical insecticides, Bt crops effectively controls Lepidopteron pests without inducing

the emergence of other friendly pests, such as brown plant hopper. As a component of

integrated pest management systems, Bt technology has the potential to increase yields

and greatly reduce the use of different insecticides to control the damage caused by pests

(Toenniessen, et al. pp. 192-193).

Every technology can have both positive and negative attributes.

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Biotechnology is

no exception. The application of genetic engineering techniques to transfer genetic

materials from one organism to another is not accomplished through traditional breeding

procedures and as a result, genetically engineered specimen may contain components not

normally found in the traditional versions of that specimen. For example to increase the

freezing tolerance of vegetables, scientists have transferred genes for antifreeze proteins

from arctic fish to tomatoes. Similarly, insect resistant plants have been created by

adding a gene from soil bacteria. The incorporation of genes from other organisms may

change specific properties of an altered species and surely a concern about its effects. For

example, genetically engineered tomatoes could potentially contain a protein gene from

wheat that could cause an allergic reaction in some people. Also some people believe it is

not ethically or morally acceptable to alter the natural properties of any species as they

believe that this act is a direct interference in natural phenomenon (Martin & Riepe, n.

d., p. 6).

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