GM Food Newsletter

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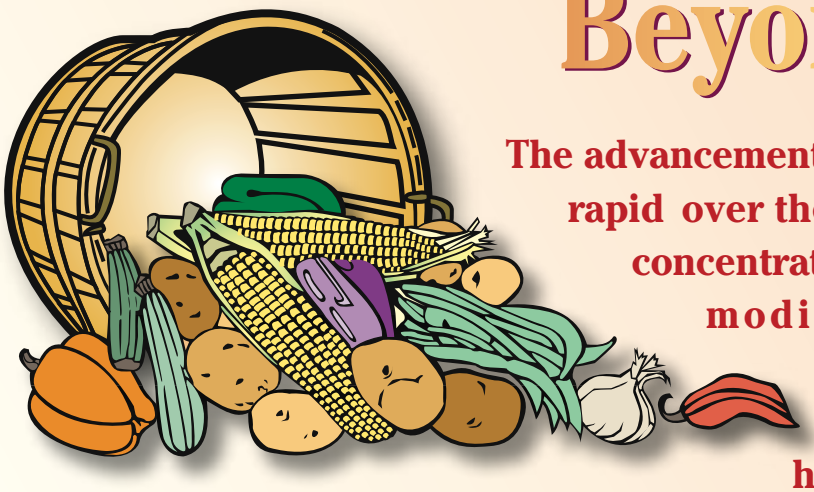
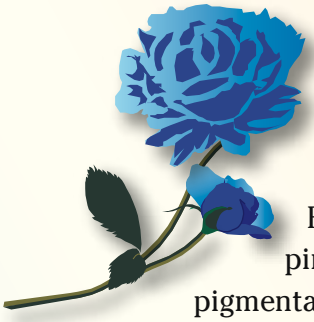
# Genetically Modified Plants Beyond Food Use



**The advancement of biotechnology has been relatively rapid over the last two decades. Efforts have been concentrated on the development of genetically modified (GM) crops with improved agricultural performance to boost food production. These include herbicide tolerant soybeans, insect resistant corns and virus resistant potatoes which provide benefits to farmers. In recent years, more and more GM plants are being developed for purpose beyond food use and are intended to benefit consumers and industries.**



## World's first blue rose

Roses are famous for their beautiful colours. Growers have been breeding roses for years, creating different varieties that produce flowers in various colours and sizes. Roses are very good at producing red pigment and hence it is not difficult to find red, pink, orange, and yellow roses in the florists. However, since roses naturally lack blue pigmentation, blue roses do not exist in nature. Many of the so called "blue roses" are, in fact, created by dyeing white roses. Breeding a truly blue rose has long been the "Holy Grail" of rose breeders.

To possess the once impossible dream, scientists first had to turn off the gene that produces red pigments in roses through genetic modification. Once the gene is turned off, genes from pansy and iris, which are responsible for blue pigment production, are introduced into rose DNA to synthesise a full range of hues from palest baby blue to deep navy in petals.

It is through genetic modification the world's first blue rose is developed. This GM blue rose has just been commercialised and scientists expect that even bluer flowers will be available in the near future.

## Phytase corn for feed use

Phosphorus is an essential element for growth and development of all animals. However, phosphorus in corn is enclosed in an indigestible form (phytate) which is not readily absorbed by animals. As a result, farmers add the enzyme phytase as an additive in animal feed to release phosphorus from phytate. It is estimated that the addition of phytase can increase phosphorus absorption in animals by 60%. In Europe, Southeast Asia, South Korea and Japan, addition of phytase as an additive for animal feed is mandatory for environmental purposes.

Currently, phytase is produced by microorganisms and purchased separately with corn. The insertion of a phytase gene into corn allows the plant to produce kernels containing high levels of the phytase enzyme. This, on one hand, can help improve the nutritional value of livestock feed. On the other hand, the better digestion of phytate can reduce phosphorous pollution caused by animal waste. Since the animal can absorb more phosphorous directly from their feed, the need for phosphate supplements and cost of feed can also be reduced.

Recently, the phytase corn has passed a safety evaluation in the Mainland and has been granted with a safety certification for commercial production. It is expected that this GM phytase corn will soon be available on market as feed for livestock animals.

## GM corn for ethanol production

Currently, the majority of corn is grown for feed or food use. However, an increasing percentage is being used for the production of ethanol as a biofuel alternative to petroleum products derived from the non-renewable fossil source.

During the process of ethanol production, an enzyme called alpha-amylase is added to break down starch in corn flour into sugars, which are later fermented to produce ethanol. In fact, alpha-amylase exists naturally in corn, however, they are destroyed by the high temperature needed for ethanol production, making it necessary to add external source of amylase preparations.

The use of genetic modification allows the introduction of a heat-stable alpha-amylase from microorganisms living near deep sea thermal vents. Since the transgenic alpha-amylase is already present in the GM corn kernel and able to work at high temperatures, it eliminated the need of any external source of the enzyme and increase the efficiency of ethanol production by allowing an operation at higher temperature.

Despite the fact that this GM corn is designed purposefully for industrial use, it cannot be denied that if any GM corn is accidentally diverted into food supply, it would have an impact on food safety. To address the concern of adventitious mixing, the safety of this GM corn has been assessed as GM corns intended for food use and proven to be safe for human consumption in a number of countries.

Beside for feed and industrial use, GM plants are also developed as “factory” to produce products such as vaccines and therapeutic medicine. At present, many of these GM plant-derived pharmaceutical products are still in the technology discovery stage. Perhaps one day, we may get vaccinated just by eating a few pieces of GM lettuce and that would be good news for people with needle phobia.



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