Genetics Project

Problem

In many developing countries, nutritional deficiency is a major problem since most people can not afford adequate and balanced nutrition. In Turkey, people's nutritional status varies according to socioeconomic level, settlement and seasons. The consumption of wheat products and bread increases as you go from urban places to rural areas. In today's world, roughly a third of the world's population is affected by Anaemia, and half these cases are due to iron deficiency. It is considered to be a major global public health problem that affects maternal and child mortality and physical performance. Most people in rural areas are easily able to afford high energy foods such as wheat-based products. However, the problem with high energy compounds is that they do not contain iron. Hemoglobin is the substance that carries oxygen from the lungs to transport it throughout the body. If there is a lack of iron in the body, the body will not be able to make enough healthy oxygen-carrying red blood cells. The lack of red blood cells is called iron deficiency anemia. Without healthy red blood cells, the human body will become fatigued, and it will cause exhaustion. The exhaustion can affect everything from your brain function to your immune system's ability to fight off infections. If a person is pregnant, iron deficiency may increase a baby's risk of being born too early, or smaller than normal.

Economy

In Turkey and many developing countries, potato is a reliable food that can be easily afforded by people with all different kinds of socio-economic level. Potato is the third most important food crop in the world in terms of human consumption. More than a billion people worldwide consume potatoes, and global total crop production exceeds 300 million metric tons. From 1997 until 2007, potato cultivation in developing countries increased by 25 percent. Although it is reliable and a cheap crop, it does not have a lot of ferritin and therefore it may cause some problems since it is consumed a lot by people.

New Transgenic Plant

The gene that is being transferred in Agrobacterium-mediated is the ferritin gene of the soybean. With the use of molecular markers, it is possible to find the genes responsible for the high iron contents and use these markers to facilitate crossing the genes into new breeding lines. Soybeans and the foods derived from soybeans are packed with iron. The gene that is being transferred is the ferritin gene expression from soybeans. FTH1 gene will be transferred to potatoes to increase

the iron content found in potatoes. FTH1 gene codes for the heavy subunit of ferritin, the major intracellular iron storage protein in prokaryotes and eukaryotes. Potato is a common crop grown in developing countries, and it is considered an insufficient iron source. Thousands of people suffer from this malnutrition and it can lead to multiple health problems. By increasing the iron content in potatoes more people will have a better quality of life.
Method to Use

Ferritin is a bioavailable iron source that acts as a sustainable source to global dietary iron deficiency. Transgenic potatoes with high levels of iron could be produced via Agrobacterium-mediated gene transfer of the soybean. Transgenic plants are plants that have undergone genetic modification. In these modifications, one or more genes can be taken from a species and transferred to another. The TI plasmid method could be used for this crop. This method occurs in the bacterium Agrobacterium tumefaciens, which infect plant cells and cause a formation of bulbous growth on the plant. Agrobacterium naturally transfers DNA located on the tumour inducing plasmid into the nucleus of plant cells and slowly inserts the DNA into the plant genome. The T-DNA integrates into the plant genome and causes uncontrolled cell growth that can result in a tumour even though researchers have altered it to not cause a tumour. A recombinant DNA molecule is produced in which the FTH1 gene is inserted into the altered T-DNA region of the Ti plasmid of the potatoes.

References

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