

The impact of GMO and organic production on the environment



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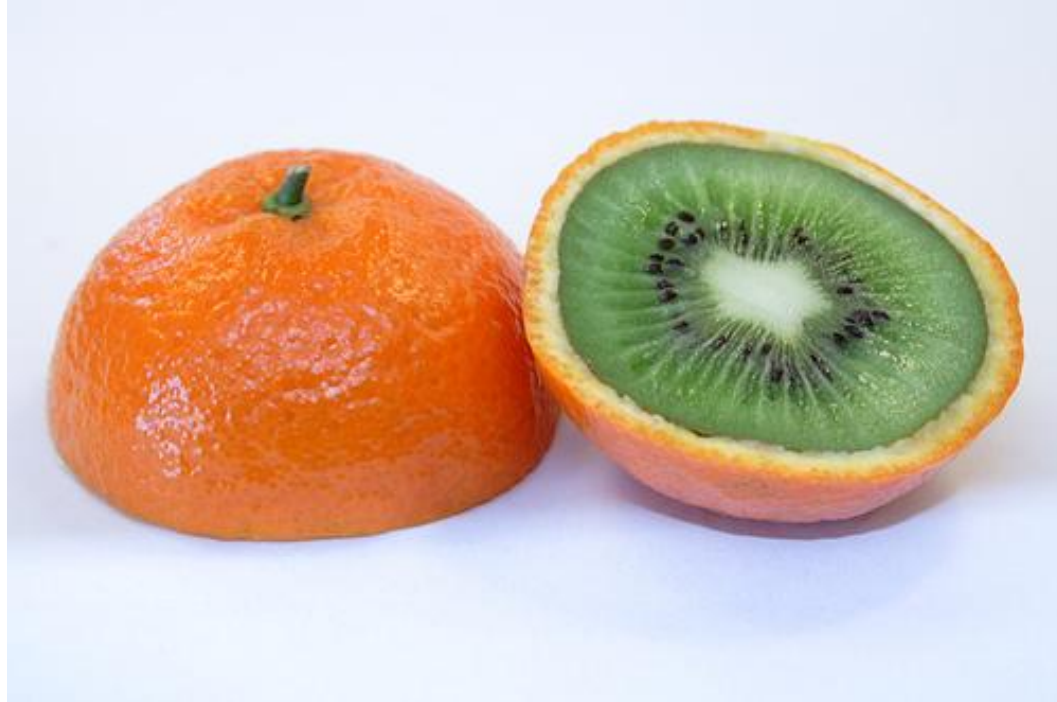
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GMO

A **genetically modified organism (GMO)** is an organism whose genetic material has been altered using genetic engineering techniques. GMO include micro-organisms such as bacteria and yeast, insects, plants, fish, and mammals.



Advantages of GMO production

- More food from less land



Improved productivity from GMOs might mean that farmers in the next century won't have to bring so much marginal land into cultivation.

- GMOs might reduce the environmental impact of food production and industrial processes



Genetically engineered resistance to pests and diseases could greatly reduce the chemicals needed for crop protection.

- Bioremediation



Rehabilitation of damaged land may also become possible through organisms bred to restore nutrients and soil structure.

Advantages of GMO production

- Rehabilitation of damaged or less-fertile land



Large areas of cropland in the developing world have become saline by unsustainable irrigation practices. Genetic modification could produce salt-tolerant varieties.



Enough food for everyone?

- Longer shelf lives



The genetic modification of fruits and vegetables can make them less likely to spoil in storage or on the way to market. This could expand trade opportunities as well as reduce massive wastage incurred in transport and supply.

- Biofuels



Organic matter could be bred to provide energy.

Environmental benefits of GM crops:

A study assessing the global economic and environmental impacts of biotech crops for the first fifteen years (1996-2010) of adoption showed that the technology has reduced pesticide spraying by 443 million kg and has reduced environmental footprint associated with pesticide use by 17.9%.

The technology has also significantly reduced the release of greenhouse gas emissions from agriculture equivalent to removing nine million cars from the roads.

In the USA, adoption of GM crops resulted in pesticide use reduction of 46.4 million pounds in 2003.

Biotech cotton has been documented to have a positive effect on the number and diversity of beneficial insects in the US and Australian cotton fields.

Negative effects of GMO on environment

Monoculture – decrease of biodiversity - lower resistance to epidemics, outbreaks of pests, local climate and climate change

Contamination of organic crops by GM plants – coexistence is impossible

Releases of GM organisms are irreversible

Some plants are capable to intra-species pollination

Instability of the GMO genome may results in assimilation resistance for antibiotics by the intestinal and soil bacteria

Bt Maize



Bt toxin from *Bacillus thuringiensis* bacterium

With time pests are becoming resistant to toxins

Toxic effects on non-target organisms such as butterflies and beneficial insects

In rats fed on Bt maize liver damages were found and other traces of toxin activity

Infertility and false pregnancy in animals

Roundup Ready soybeans

Glyphosate-resistant soya produced by Monsanto

Excessive use of pesticides

Creation of plant resistant to chemical pesticides caused appearance of superweeds



Roundup Ready soybeans

Examination of mice's livers that were fed on Roundup Ready soybeans showed changes in gene expression (encoding of proteins) and changes in activity and structure of the whole organ

Pancreas cells of mice fed on Roundup Ready soybeans produced considerably less digestive enzymes

Cause allergy



Negative effects of GMO

GMO organisms are subject to intellectual property law

No reports of ill effects have been documented in the human population from GM food



Organic production

Production of livestock and crops without the use of synthetic chemicals and inorganic fertilizers.

Form of agriculture that relies on techniques such as crop rotation, green manure, compost and biological pest control.

Local, small-scale, family operated, biologically and culturally diverse, humane, and socially just.

Advantages of organic production

- Soil – organic systems foster soil building, improve soil structure, improve organic matter, development of soil microfauna and decrease soil loss.
- Better water management – more humus in the soil, better rooting in the lower layers, reduced evaporation from the soil surface.
- Air – organic products show lower CO₂ emission than comparable, conventional products.

Advantages of organic production

Biodiversity – effective conservation of biodiversity is essential for human survival and the maintenance of ecosystem processes.

In organic agriculture, the biodiversity is mobilized to make agriculture sustainable both, in ecological and also economical terms and ecological services that environment offers are used.



Advantages of organic production

Short food supply chains – using the local production resources

Care for local and traditional food and environment

Lower energy consumption can help decrease environmental problems



Disadvantages of organic production

- Productivity** – An organic farm cannot produce as much food as conventional;
- Cultivation** – Organic farmers are dependent on cultivation to remove weeds prior to sowing;
- Consumer purchasing capacity** – organic food costs 15 – 20% more than conventional;
- Seeds** – organic seeds are less than non-organic seeds.

Conclusions

- Organic farming produce healthy and safety food.
- GMO have not developed further enough to conclude that it is safe for human health.

Thank you for your attention

