

BIOTECHNOLOGY IN AGRO-FOOD PRODUCTION: A PERSPECTIVE TO DISCUSS

Romeo de Jesús Barrios Calderón^{1*} ORCID ID: 0000-0002-8025-6369

Ana Laura Gálvez López¹ ORCID ID: 0000-0002-0233-4501

¹Universidad Autónoma de Chiapas, Facultad de Ciencias Agrícolas. Entronque Carretera Costera y Pueblo de Huehuetán. Huehuetán, Chiapas, México. C.P. 30660.

*Author of correspondence: romeo.barrios@unach.mx

Man has unconsciously carried out actions that have overtaken the planet, so it is man himself who has taken control of his own universe. Biotechnology, more than a science, is the synergy of the multidisciplinary approach of different sciences such as biology, biochemistry, engineering, genetics, agronomy, chemistry, medicine, veterinary medicine, etc., aimed at solving problems and obtaining goods and services for human benefit (Wilches Flórez, 2010). The application of biotechnology in food production is not a recent practice; since ancient times, man has used technology to transform his food through fermentation and processing of products such as grapes, milk, etc., and to preserve food. Farmers have deliberately used techniques such as selective breeding and cross-fertilization to modify or improve plants and animals, and to stimulate desirable traits to improve agricultural food production and to meet other human needs (UNEP, 2003). However, the major biotechnological advances made in agricultural production over at least the last 50 years, along with efforts to alleviate poverty and inequality, have proven to be insufficient, especially in rural areas (Cano-Estrada et al. 2017).

Biotechnology and its use responsibility

Over the years, we have seen how biotechnology has evolved and will continue to change. Biotechnology is a scientific discipline that involves biological processes, organisms, cells and their components to develop new tools and technologies applied in agriculture, industry and health, contributing to improve the quality of life and sustainability of the planet (Orozco-Ugarriza, 2019).

There are those who point out that it is a discipline that has uncontrolled processes. However, biotechnology is suspected of genetic manipulation and modification of the natural environment, which has given rise to risks and/or ecological disasters, or simply its mismanaged use can lead to possible ecological disasters due to the lack of control in the processes of genetic modification (Costa and Costa, 2003).

In view of all this, it is important to emphasize that biotechnology requires responsible and intelligent use, which is why it is considered a discipline that requires an immense field of knowledge and a high level of education, along with its responsible use and application. This is based on the premise that there are people who use nature without much concern, but there are also people who use nature with much concern.

Contributions and implications

Although the emergence of biotechnology has brought multiple contributions, mainly to agrifood production (Rodríguez, 2013), biotechnology is inherent to human activity; we see nature as a blank canvas to do with as we please. Throughout history, the process of domesticating some foods, such as corn, soybeans, beans, cotton, etc., and producing new varieties through genetic modification has led to a loss of biodiversity (Smith et al., 2015). Although biodiversity feeds on genetic diversity, the use of genetically modified organisms favors the loss of original indigenous varieties that existed thousands of years ago, thus altering biodiversity (CONABIO, 2020).

Maize cultivation is a clear example of the reality that currently prevails in local communities, where native maize production has been reduced to subsistence and large companies producing transgenic maize varieties have taken over the market.

On the other hand, human beings, in their eagerness to seek personal benefit, select the things they like and leave aside the things they do not like. However, the process of domestication inherently involves a loss of biodiversity in the production of traditional crops, with the introduction of new genetically engineered species that displace native species at the genetic level.



Corn / Source: Freepik.

Transgenic foods and biotechnological resilvestrization

Transgenic foods have been a topic of debate, mixing technical and biological aspects with others, such as patents, consumer protection, farmers' rights, economic interests, biosafety, environmental safety, etc., provoking opposing reactions from different non-governmental organizations (NGOs) and environmental groups (Romero et al., 2019). Another process that has had a significant impact on the loss of species, given the domestication processes in the various sources of genetic variability, is resilvestrization (bringing things from the wild into new varieties).

Although in Mexico the supply of seeds and the use of native and improved varieties is strategic and affects the possibility of increasing production (Espinosa-Calderón et al., 2014), one of the biggest problems is the lack of government programs to promote the introduction of parental products or hybrid seeds. Consequently, the

only thing that prevails in the face of this is an endless number of transnational companies, such as Monsanto, Syngenta, Du Pont, among others, that have taken over the agrifood industry, giving us processed products, such as low quality corn. The little work we have in the country on the generation of hybrids is presented in research institutions such as INIFAP, which has done work on corn and soybean crops, but the work is very scarce, so we cannot compete with other powers in the field. Another problem with the consumption of transgenic products lies in the fact that there is no regulation of the consumption of food as food grains, because in many cases their origin is unknown.



Seeds / Source: Freepik.

Final considerations

In conclusion, biotechnology and the food industry will continue to evolve. There will be those who oppose food production because they believe that the agrifood industry can pose serious threats to human health and the environment, while there will also be those who advocate the controlled and regulated use of genetically modified foods. The decision to use or consume them is a matter of free choice for consumers, who should inform themselves about the possible advantages and disadvantages of consuming this type of food.



Food choice /Source: Freepik.

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