Growing Science

Genetically Modified Organism

I believe sometime you've listened about a GMO by accidents in news or in the internet but, have you asked what are they? How are they applied in our life? Their positive and negative aspects? In this article, we are going to give you information about this. The GMO, are now very important in industrial processes and sometimes, they give us solutions to problems we have now. Although the positive aspects this technology gives us, like other scientific discoveries, their acceptation in society is not good. The judments about this organisms are about the healthy, economy, and the ones which are useful tolos for improvement. The main problem in this controversy is the lack of scientific information in the media, making it difficult for society to perform an opinión.

First of all, to get a real understanding of GMO's, its necessary to know some definitions. Biotechnology is the application of living organisms for a service of human beings. It is not a new definiton even if it sounds like that, this one has been used for the production of beer and cheese.

Over time, the society requirements have been evolved and the science has changed to mantain those ones. The modern biotechnology consists in the obtainment of a new modified organism which has been constructed fr helping the society to solve an specific problem. This subjects can use the knowledge of microbiology, biochemistry and cellular biology.

The most part of the time when the media talks about these topics, is focused in specific areas of the biotechnology like the agricuture and they dont talk about many others applications that can be produced. One of this is their use in investigation. As we said before, modifing the genes of animals and plants allow us to study the consequences of these ones and with this, to analize the function and regulation for an iprovement and a better understanding of tese mechanisms.

Using these methods we could establish some genetic aspects like to identify specific sequences of DNA in the chromosomes for maping it. With this we can identify from the embrionic status until specific characteristics of persons. This tool can use from cultivated plants until human beings.

Now, we are going to talk about the areas in which the GMO can be applied with some examples. An example of an organisms with genes of other species is the cat we have in figure 2, in this case the modification is evident. The GFP (green fuorescent proteins) has been inserted in the cat, this porteins is normally used for fireflies . The most common question by seeing this experiment could be: which is the real use for this cat?, well, one of the applications is the monitoring of proteins in the body.

Industry

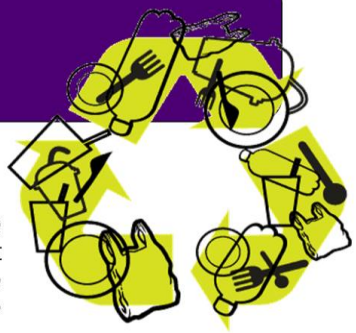
- Since the beggining of industry is has used living things for the processes of it. In this new era, with the support of the technology of the recombinant DNA we have taken the advantage at the 100%. Thus had been realized lots of products and processes, cheaper and better for the environment.

These advantages are important in the textile: the sustitution of processes of washing for enzimatic treatents have reduced the use of water and energy by a 50%.

One of the ways in which the GMO are used in industry are the bioreactors, these are living things which are used for the production of protein of interest. As same as the cat we talk before, these living things are modified genetically for producing compounds that normally, are not produce by them.

In this way we can avail the properties of a lot of microorganisms for the production of basic compounds like organic acids and vitamins. For example, actually, compunds like acetone and butanol are produced through modern techniques of industrial microbiology that allow to reprogram the microbial metabolism for maximize the production of the compund of interest and to give to it the capacity of make new products base don new substrates. In this way, nowadays it is possible to produce through fermentation compounds that before we couldn't.

Environment



The advantages that recombinant DNA gave us in this area are impressive. The damage that human being had given to the environment has had a lot of consequences which have been visible on the last decades. For restoring this damage is necessary the development of products and processes that allow us to make less the creation of chemical compounds in the environment.
Thanks to the GMO's it has been possible the elaboration of products like the biomaterials. These materials are made to substitute the plastic and other ones derived from oil, they are completely biodegradable because that can be destroyed by bacteria easily. Another advantage is that an 80% of the toxic emissions are eliminated . The biomaterials more important until this moment are polymers produced by microorganisms for replacing the plastic. Some examples of thee bioplastics are made from starch or glucose.
A very important bioplastic in the market is a polymer derived from 1-3, propanediol which is obtained by the transformation of the starch throguh modified bacteria. The new fiber is very resistant and flexible which allow its use nowadays.

Other important creation are the biofuels, these ones are fuels that in contrast with the oil fuels are considered renewable. They are obtained from organic wastes. There are several types of biofuels, they are classified according the input and the technology used for the creation of them.

>> *Another alternative*

The biofuels are being produced froom genetic modified mciroorganisms, which use carbon dioxide for processing them. Unlike the past generations of biofuels, the bacterium is the one which makes all the process for this production.

Agriculture

The biotechnology is used for solving problems in every aspect of the agriculture production, including the breeding for improving the performance, making better the resistance for plagues, animals and abiotic conditions like droughts and cold, even to increase the nutrients in the aliments. It is used for creating a material cheaper and free for diseases and even for accelerate the impovement of plants, cattle, fishes and their properties.

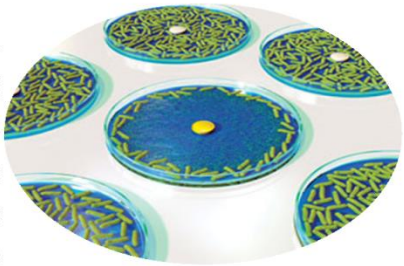
A very important part, is the creation of biopesticides, these ones are pesticides with biologic origin. The creation of these tools is very necessary because the normal delivered a lot of chemical and toxic compounds. These ones are not aggresive for plants and even most of the time cheaper and more effective than the normal ones.

Medicine

The use of the GMO caused a great change in the medical industry. It emerges as an alternative for satisfy the requirements of the health sector, trought the improvement of the preventive and therapeutical measurements that help the human wellfare.

Because of the recent growth in the incidence of diseases the investigation and development of new and better technologies such as vaccines, bioactive molecules and diagnostic methods that can make a significance decrease in deaths caused by health problems.

An example of this is the elaboration of vaccines. The genes that codify for the proteins that cause a inmune answer (the antigen) are isolated and introduced to a new host with the pathogen (bacteria, yeasts and mammal cells) for they to produce a quantity in the laboratory, In Exchange the new vaccines with DNA use a portion of purified DNA that is directly introducedinto a host and they are the same cells that the host uses in order to sinthesize the antigen.



The development of the Genomics and Proteomics, just like the aplication of the Biotechnology in Medicine will allow the identification of genes that interfere in diseases and develop drugs that substitute the modified genes in each pathology.

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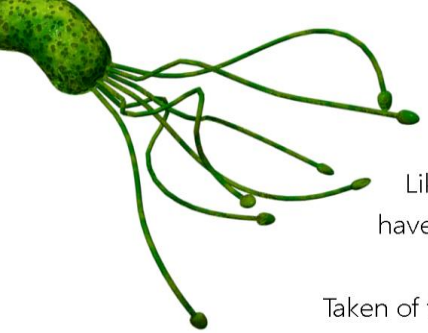
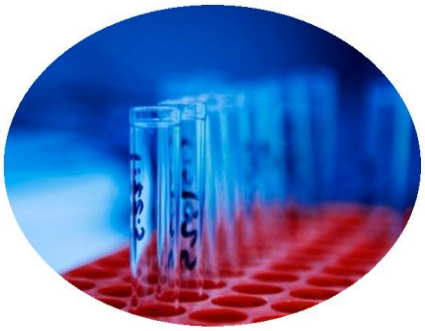


Like we can see , the GMO are vastly used in the economical activities however they have a few uptake in the society.

Taken of the worlds of *Paul Ehrlich*



"An important problem with the contemporary human, is that the rhythm in the cultural evolution, in the science and technology have been extraordinary high, comparung with the lenght of changes in the social attitude and in the politic institutions that could cannel the use of technology in better directions. No one knows what kind of effort from the society could be necessary in order to correct that substantial imbalance in the evolution rates, but is sure that such effort , if it success it could make happier the human perspective ."

One of the argument against of GMO is the risk of creating new dangerous pathogens, for this a set of government rules has been establish to act like a security measure, creating procedures that make impossible the departure of microorganisms from laboratpory. However sometimes this is not enough. In order to facilitate their introductions in society , a lot of control mecanisms have been developed for the propagation and function of this organisms. The microorganism strains used in DNA experimnts are genetically modified in order to be imposible for them to survive outside the laboratory. This strategy although prevents the propagation, it destroys the investigation and limits a lot to the scientists because instead of creating a solution we are stoping the advance.

Myths VS Reality

With the development of new technologies for the benefit of humanity a lot of debates have been rising about if the application of the new knowledge can cause more bad than good

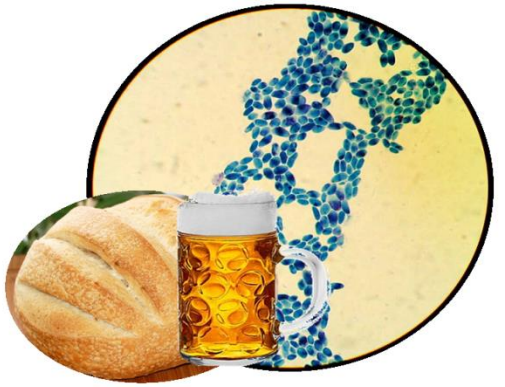
Talking of the perspectiv of the world about the production of transgenics, a lot of countries (The Europian Union) have closed their doors to the application of this technology, but, in the other side of the coin , a lot of industrialized and developing countries count with transgenic crops (United States, Canada, China, Argentina and Mexico, etc). Watching it from a smaller scale, there are groups that are totally against the production of Genetically Modified Organisms (Greenpeace, Ecologist in action, COAG, etc) this groups presents a variety of arguments against this technology this is what caused a great debate about the acceptance of the transgenics in the actual society. Here are some of the arguments a information provided by these groups;

1. The modified organisms can genetically contaminate those which are not.

Because the modified organisms share genetic information with the members of their species that have grown naturally, these two can reproduce between them. Making to the offspring to have the modified genetic material.

This can cause fear in a part of the population because throgh time is estipulated that there will be no more "pure" genetic material This argument is based because in 1997 a farmer from Canada reported that a Roundup Ready organism propagated and contaminated another plants that did´nt show the inserted gene in the modified organism.

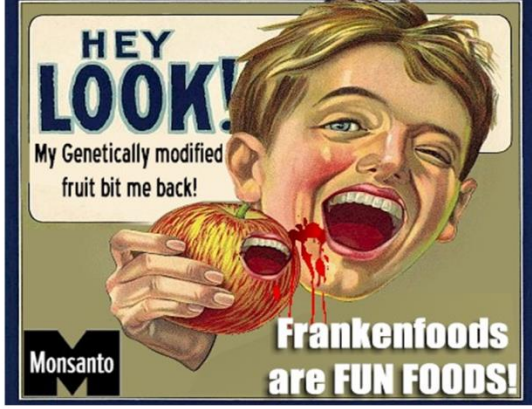
A new way has been developed In order to avoid this kind of problems happening today and guarantee safety to the consumers,. It conssists of avoiding the propagation of the genes inserted in a organism, in order to stop this "genetic pollution" that was happening in previous years. This technology is known as "terminator technology " which constitutes of steril sedes, this sedes cannot cause the germination of new modified plants.



2. The transgenics are poisonous for the consumers

Like any other product that will be consumed by a human. The transfenics before being comercialized must fulfill a list of quality requirements . One of these requirement is its safe consume for the human being , because of this our health is not affected in the momento of eating them

Another argument of this kind is that a lot of allergies are affecting people who eat transgenic food, but, A thing that must be taken in mind is that allergies have nothing to do with the fact of being genetic modified because even the "normal food" can cause problems with the people who eats them.



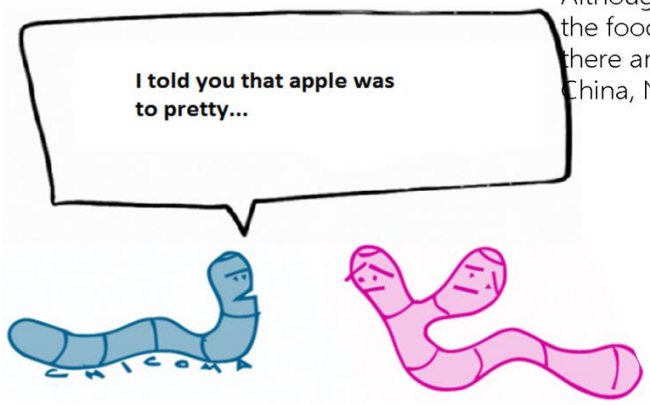
3. The modified plants in order to produce natural pesticides afect in the population of bees in charge of polinization process

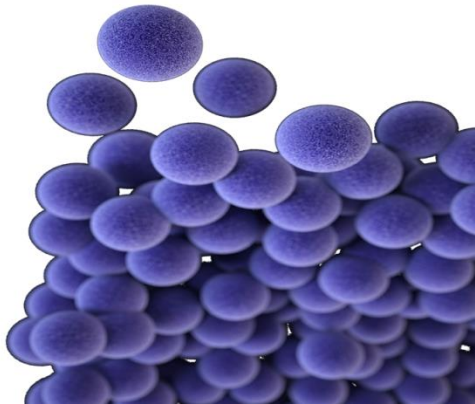
A lot of ecologist groups such as Greenpeace blame the production of transgenic as one of the main causes of the decrease of bee population , although investigations have obtain that an important factor causing this is the low level in the diversity of plants that is causing a damage in the inmune system of the bees, causing a problema named Colony Collapse disorder.

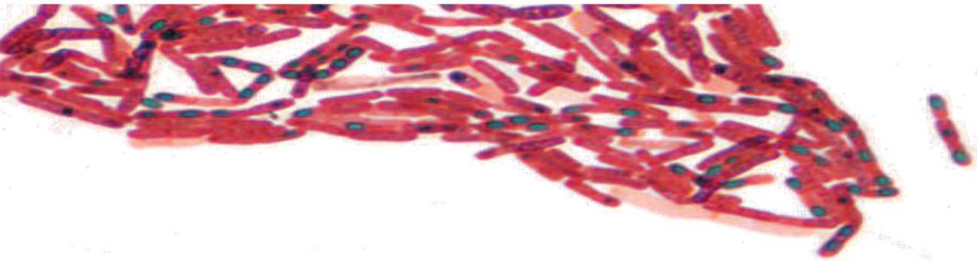
This disorder causes to the worker bees to die at the momento of going out of the comb in search of polen, and leave the queen bee alone and without protection what causes the death of the queen.

4. The information of genetically modified ingredients in food is privated to the consumer.

Although there are countries that have laws that do not demand to give knowledge to the consumers if the food contain genetically modified ingredients sucha as United States there are countries in which is a requirmente, some of them are: Chile, China, New Zealand and members of the European Union







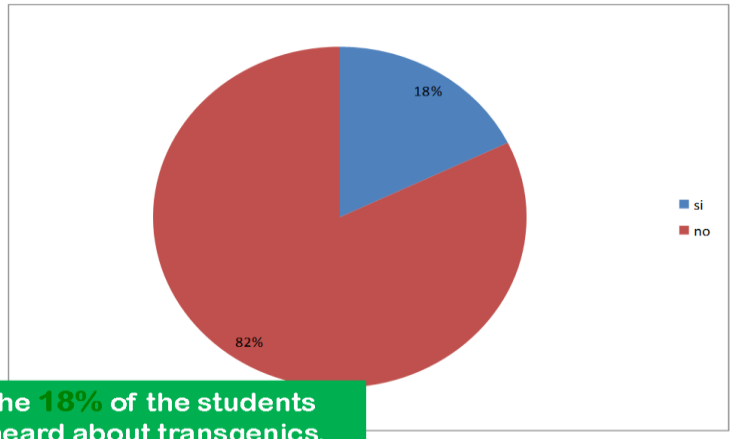
5. The transgenic crops cause soil erosion.

Some groups say that the transgenic plants known as Bt (Bacillus thurigensis) created in order to produce protein Cry, which are known for their insecticide function cause erosion in the soil because of the protein accumulation on it. Without doubt this is false, because the Cry proteins are well known for being biodegradable which do not allow the acumulation of it.

The debate about GMO will keep happening for some years and maybe will never end, but, informing the persons about this technologies and that they can help the world can cause the vastly application of it. Like any other technology, it has it´s pros and cons but since the use of medicines and vaccines that in their momento caused a lot of conmosion and today the society would not be the same without them, The GMO are here in order to help us.

Do you know about transgenics?

In this article we wanted to know the amount of people who knows what a transgenic is, however we wanted to start with our University. We interview students of the different careers of the *Universidad Autonoma de Nuevo Leon* and from that we obtained the following data:



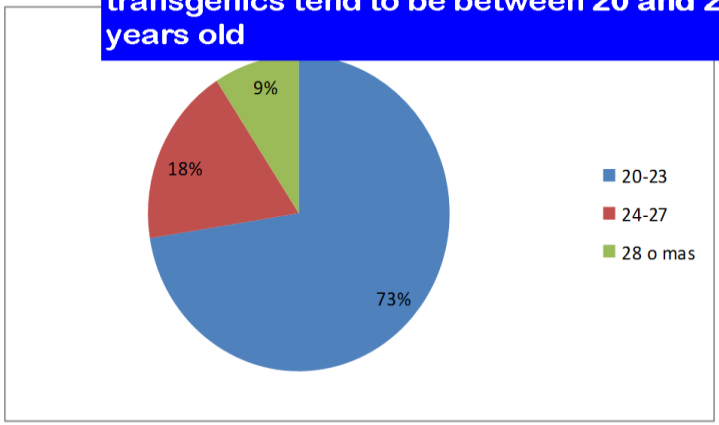
Only the **18%** of the students have heard about transgenics.

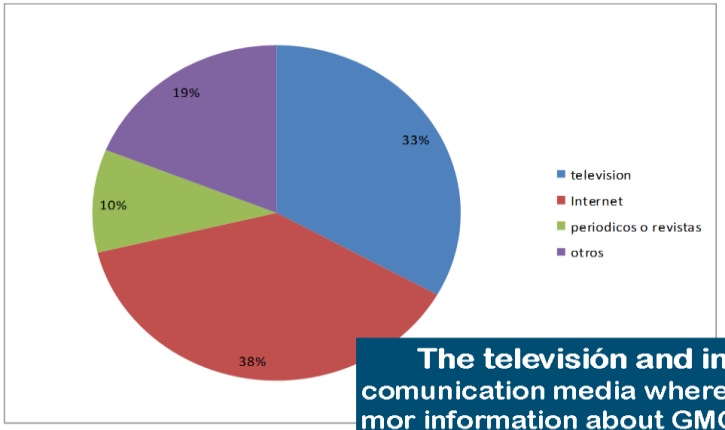
Only the **7%** of the sudents know what a t ransgenic is.

While the **10%** thinks that they know..

A **67%** of the people that do not know what a transgenic is are against them

The students who know more about transgenics tend to be between 20 and 25 years old





The televisión and internet are the comunication media where people obtain mor information about GMO.

According to this estadistic tests the wrong information on media influence in a **0.85** (in a scale of 1) in having a bad idea about transgenics