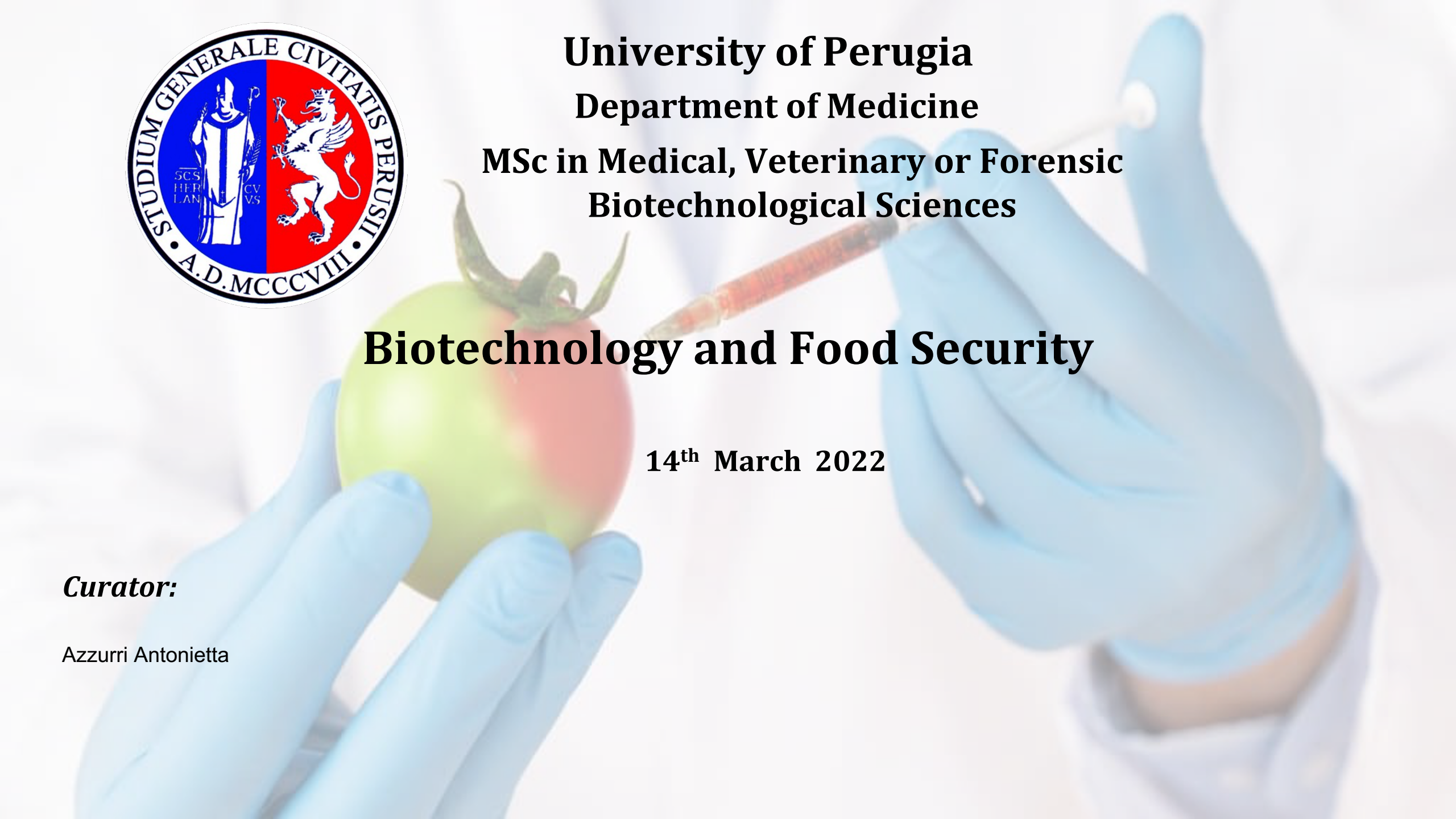

University of Perugia

Department of Medicine

MSc in Medical, Veterinary or Forensic Biotechnological Sciences

Biotechnology and Food Security

14th March 2022

Curator:

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WHAT IS BIOTECHNOLOGY?

"Biotechnology is the technological application that uses biological systems, living organisms, or derivatives of these, to make or modify products or processes for specific use"

"Convention on Biological Diversity"

BIOTECHNOLOGIES

TRADITIONAL

Technologies used for millennia, such as agriculture, animal husbandry and the exploitation of the fermentative activities of microorganisms

INNOVATIVE

Technologies based on the use of recombinant DNA techniques.

APPLICATIONS OF AGRICULTURAL BIOTECHNOLOGY

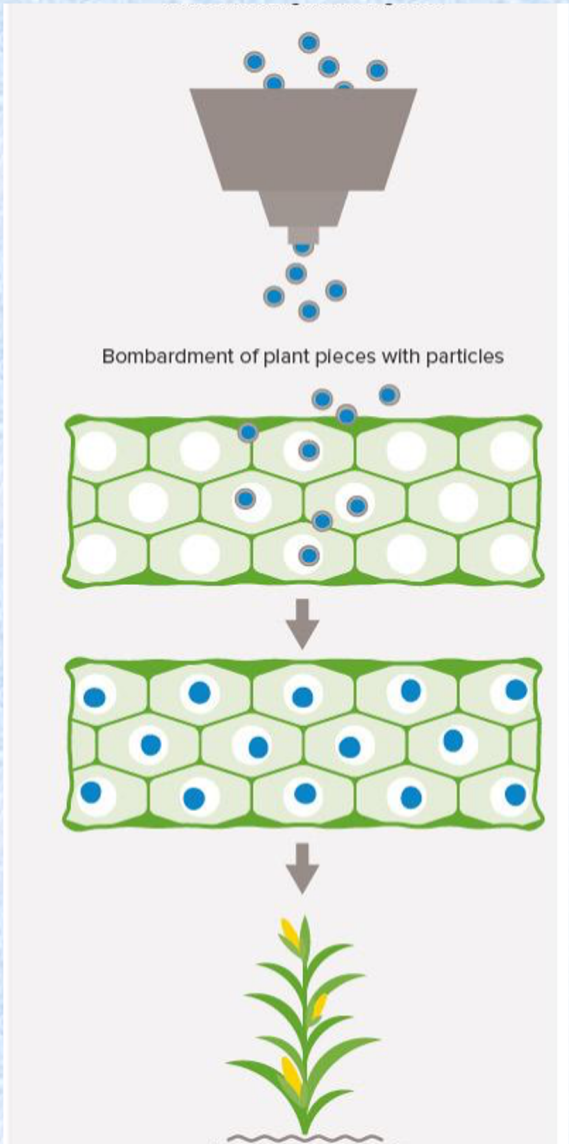
Agricultural biotechnology focused on genetically modified crops has the purpose to make genetic improvements of plants, to increase their yields and efficiency.

What are GM crops?

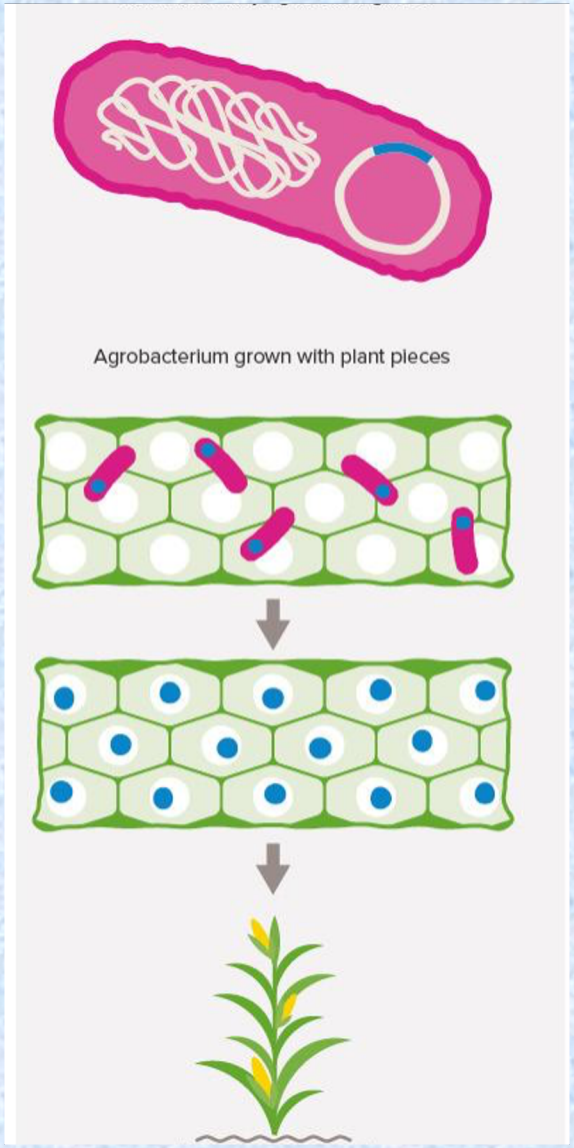
Genetically modified crops are plants used in agriculture, whose DNA has been modified through the use of genetic engineering methods

How to produce GM crops?

Particle-bombardment



Infection



The production of GM crops could allow to:

- Reduce the use of artificial fertilizers, herbicides and pesticides
- Create food with added nutrients
- Make plant that can be grown in a less-hospitable environments.

But...

despite the possible advantages,
conflicting opinions have arisen

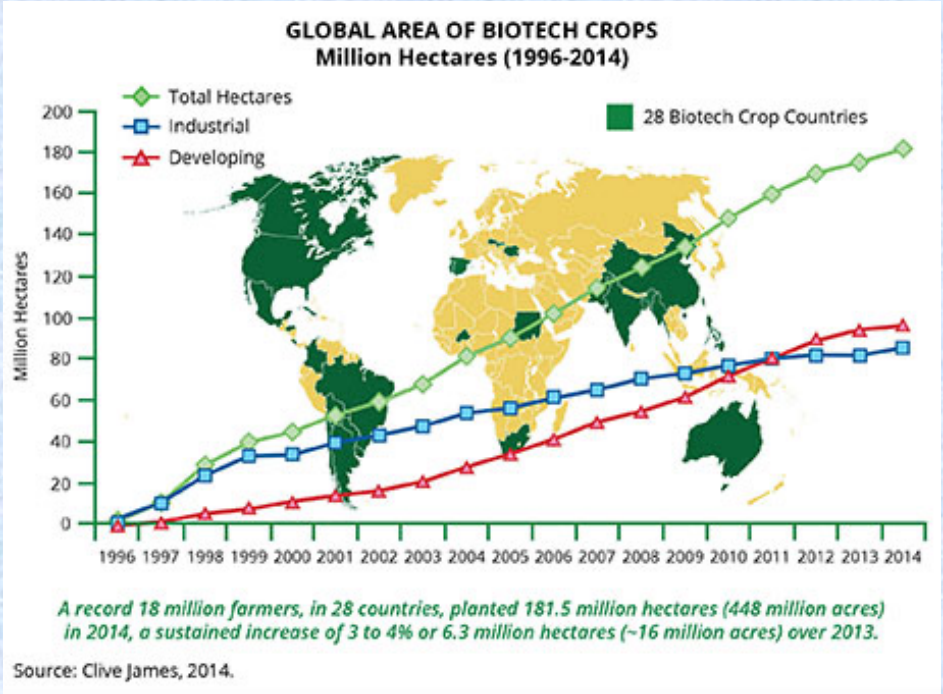
BENEFITS?

RISKS?

GENETICALLY MODIFIED ORGANISMS

RESISTANCE TO PATHOGENS
ADAPTABILITY
HERBICIDES TOLERABILITY
↑ ORGANOLEPTIC PROPERTIES OF FOODS
↑SHELF-LIFE OF FOODS
↓ INSECTICIDES

UNWANTED MUTATIONS
ALLERGENICITY
↑ ENVIRONMENTAL TOXINS
GENE FLOW



Rank	Country	Area (million hectares)	Biotech Crops
1	USA*	73.1	Maize, soybean, cotton, canola, sugarbeet, alfalfa, papaya, squash
2	Brazil*	42.2	Soybean, maize, cotton
3	Argentina*	24.3	Soybean, maize, cotton
4	India*	11.6	Cotton
5	Canada*	11.6	Canola, maize, soybean, sugar beet
6	China*	3.9	Cotton, papaya, poplar, tomato, sweet pepper
7	Paraguay*	3.9	Soybean, maize, cotton
8	Pakistan*	2.9	Cotton
9	South Africa *	2.7	Maize, soybean, cotton
10	Uruguay*	1.6	Soybean, maize
11	Bolivia*	1.0	Soybean
12	Philippines*	0.8	Maize
13	Australia*	0.5	Cotton, canola
14	Burkina Faso*	0.5	Cotton
15	Myanmar*	0.3	Cotton
16	Mexico*	0.2	Cotton, soybean
17	Spain *	0.1	Maize
18	Colombia*	0.1	Cotton, maize
19	Sudan*	0.1	Cotton
20	Honduras	<0.05	Maize
21	Chile	<0.05	Maize, soybean, canola
22	Portugal	<0.05	Maize
23	Cuba	<0.05	Maize
24	Czech Republic	<0.05	Maize
25	Romania	<0.05	Maize
26	Slovakia	<0.05	Maize
27	Costa Rica	<0.05	Cotton, soybean
28	Bangladesh	<0.05	Brinjal/Eggplant
	Total	**181.5**	

* 19 biotech mega-countries growing 50,000 hectares, or more, of biotech crops

PRINCIPLE OF PRECAUTIONARY

...SOME LAWS

COMMUNITY SOURCES FOR:

- Moderate use of GMOs
- Legal protection of genetic inventions
- GMOs on market

- European Parliament regulation CE n. 178/2002
- Protocol of Cartagena 2002
- Directive 2001/18/CE

CONCLUSIONS

- **Food Biotechnology really improved small-scale farmer production**

- **Biotechnology is leading agriculture to new dimensions:**
  - Could traditional method and GM production coexist?
  - Small farmers will survive the expansion of large -scale producers?

CONCLUSIONS

New challenge for the future

- Biotechnology should be developed not only for the profit of large-scale producers but in order to reach food security

- Improvements of traditional methods + giving access to water, lands, credits to small-farmers + food biotechnology can assure food security for the future, in prevision of increasing of population and resources demand.

THANK YOU FOR THE ATTENTION