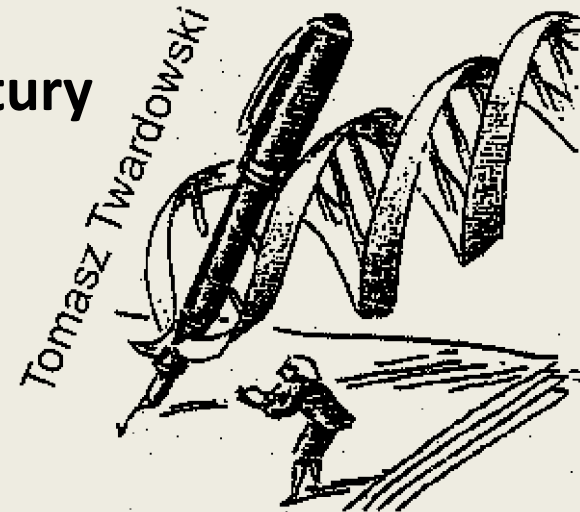


Genetically modified food = Biotechnology for thought

Food and nutrition in 21st century
Warsaw, September 9, 2011



Key issues facts & figures

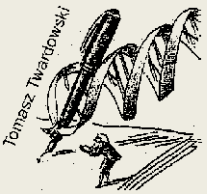
- Science;
- Legislation;
- Market;
- Production;
- Human factor;
- Public acceptance.

Conflict:

- **North** - **South**
quality vs **quantity**

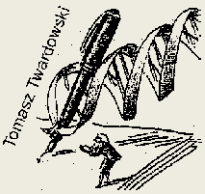
Thomas Malthus, 1798

- *An Assay on the Principle of Population*
- The planet's population grows exponentially
- The food production increases arithmetically



New ways to exploit resources

- Green revolution(s)
 - * about 1920 – fertilizers;
 - * about 1950 – insecticides and herbicides;
 - * about 1970 - Norman Borlaug (rice and wheat);
- **Food and nutrition in 21st century**
 - Gen (r)evolution – DNA recombinant technology**
 - * more productive seeds;
 - * conservation of water resources.



F A O, 2011

- Food production will increase 70% by 2050;
 - Food costs in 2011: 39% higher than in 2010;
- BUT:**
- The amount of meat doubled (2011 to 1980) (6 kg of grain = 1 kg of beef or 6 kg of fish);
 - 2000 – 6% of corn (in US) converted to ethanol; 2011 - 40% of corn converted to ethanol (food for 350 mln people).



V A C

- Value Added Chain =

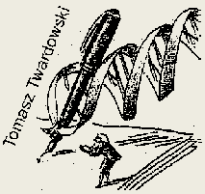
legislation [IPR]

+

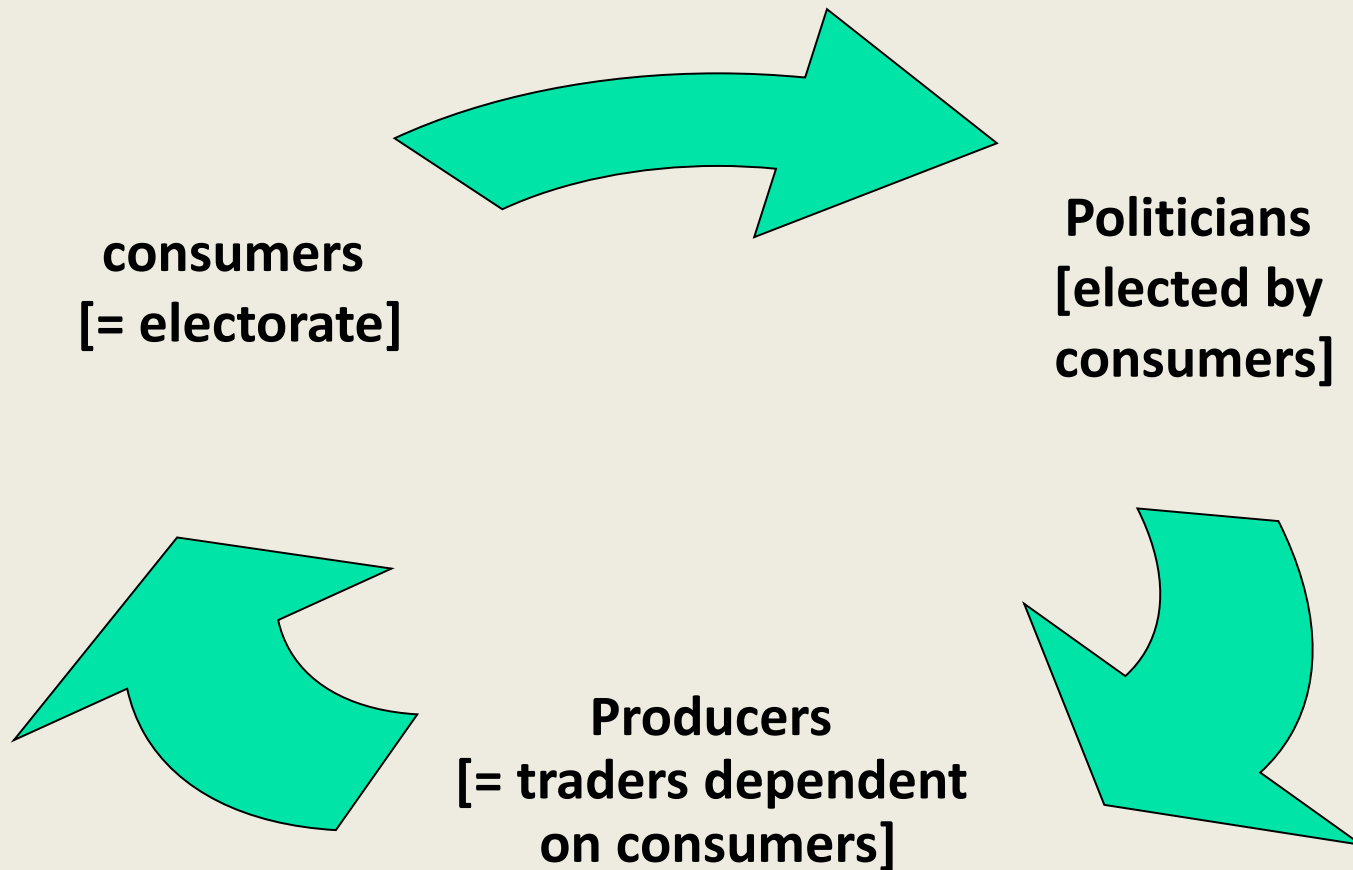
science & technology

+

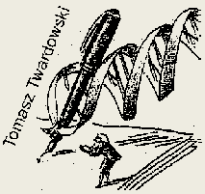
public perception



VDT = Value Dependent Triangle

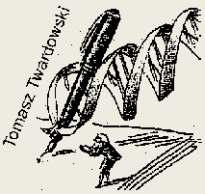


- **GMO and GM products on the European (Polish) market**



Agrobiotechnology production:

- Food,
- Feed [= food],
- Biomaterials [e.g. cotton],
- Bioenergy [bio-ethanol, bio-diesel, bio-hydrogen, bio-mass].

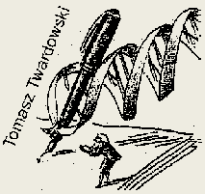


E U

- **Corn 810**
(about 30 varieties, for food and feed)

- **Potato AMFLORA**
(March 2, 2010, exclusively for industry)

- **import**



Four categories of MS EU were identified based on their approaches to biotechnology

- **GE producing MS include the Czech Republic, Poland, Portugal, Romania, Slovakia and Spain. They are all producers of GE crops, and farmers and industry welcome the technology;**
- **MS ready for adoption due to the positive perception by the industry and the non-opposition by the public opinion are the Benelux, Denmark, Estonia, Finland, Lithuania, Sweden, and the United Kingdom (UK). However, in this group no GE crop is cultivated, as those authorized in the EU are not relevant for these markets;**
- **MS with restrictive legislation and hostile opinion, but supportive farmers and industry are Bulgaria, France, Germany, Ireland, Latvia and Slovenia. These countries do not produce GE crops; however, France and Germany did produce GE corn in the past;**
- **MS with the strongest opposition are Austria, Greece, Hungary, and Italy. In these countries, biotechnology has a negative image in the public opinion, national policies are restrictive, and the industry is not open to the technology.**
- **http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Agricultural%20Biotechnology%20Annual_Paris_EU-27_7-15-2011.pdf**

GM Biotech Revenues Increase in U.S. [2010]:

- Biodesic 2011 Bioeconomy Update reports that "within the United States, more than 50% of cropland is now planted in [genetically modified \(GM\) seed](#) resulting in 2010 revenues of nearly \$110 billion." Biodesic is an engineering, design and consulting firm based in Seattle, Washington.
- For 2010, total revenues from [GM products](#) including those of biologics and industrial biotechnology exceeded \$300 billion or the equivalent of more than 2% of Gross Domestic Product (GDP). The report further notes that "revenues from [GM crops](#) are growing rapidly and are substantially larger than generally reported."
- [GM corn](#), [soy](#), and [cotton](#) earned \$100 billion in U.S. farm scale revenues in 2010. [GM sugar beets](#) contributed over \$1.5 billion while [GM papaya](#), [canola](#), and other crops gave another billion dollars. "Continued increases in GM crop acreage in the next few years will certainly raise the total, with revenues from [GM alfalfa](#) contributing \$1-2 billion dollars next year," the report added.
- http://www.biodesic.com/library/Biodesic_2011_Bioeconomy_Update.pdf.

GMO and GM products on the European (Polish) market

Shopping List:

- 70% of products with GM additions;

- cakes
- soups
- chocolate
- corns
- meat
- Polish kielbasa
- Pasta
- Vegetarian food

- **FEED!!!**

- **MEDICINES!!!**



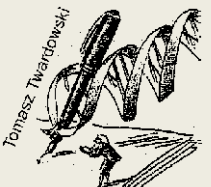
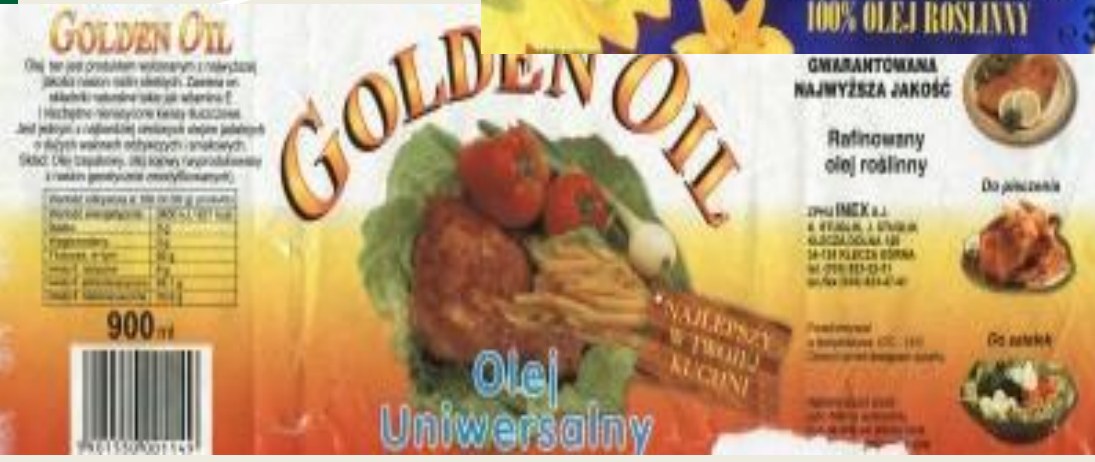
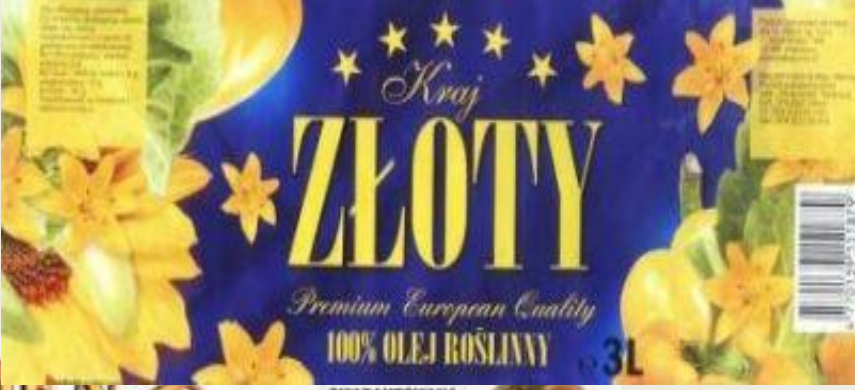
- Labelling = freedom of choice:
- GM food and products - 0.9%
- GM animals products [milk, eggs, meat] - NO

HUNGARIAN TOMATO SOUP
 WITH MEATBALLS
SOUPE DE TOMATES HONGROISE
 AUX BOULETTES

Eat at any time of the day, as a snack or part of a meal
 Serving suggestion: add half a finely shredded red pepper
 and fried crispy bacon

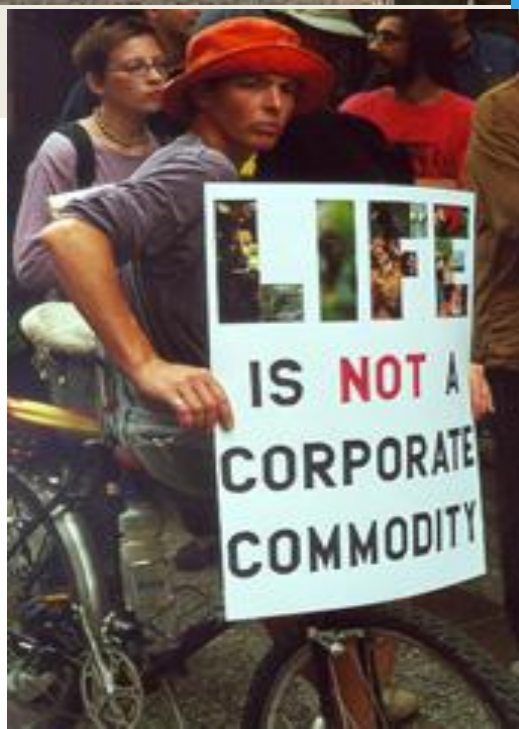
Se consomme à tout moment de la journée,
 comme en-cas ou comme repas
 Suggestion de présentation : ajouter un demi-poivron rouge
 coupé en fines lamelles et du bacon frit.

Contains soy, gluten and egg products.
 E number: additives approved by the EU.
 Contient du soja, du gluten et des produits d'œufs.
 Numéro E : additifs approuvés par l'UE.



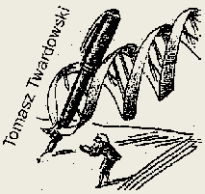
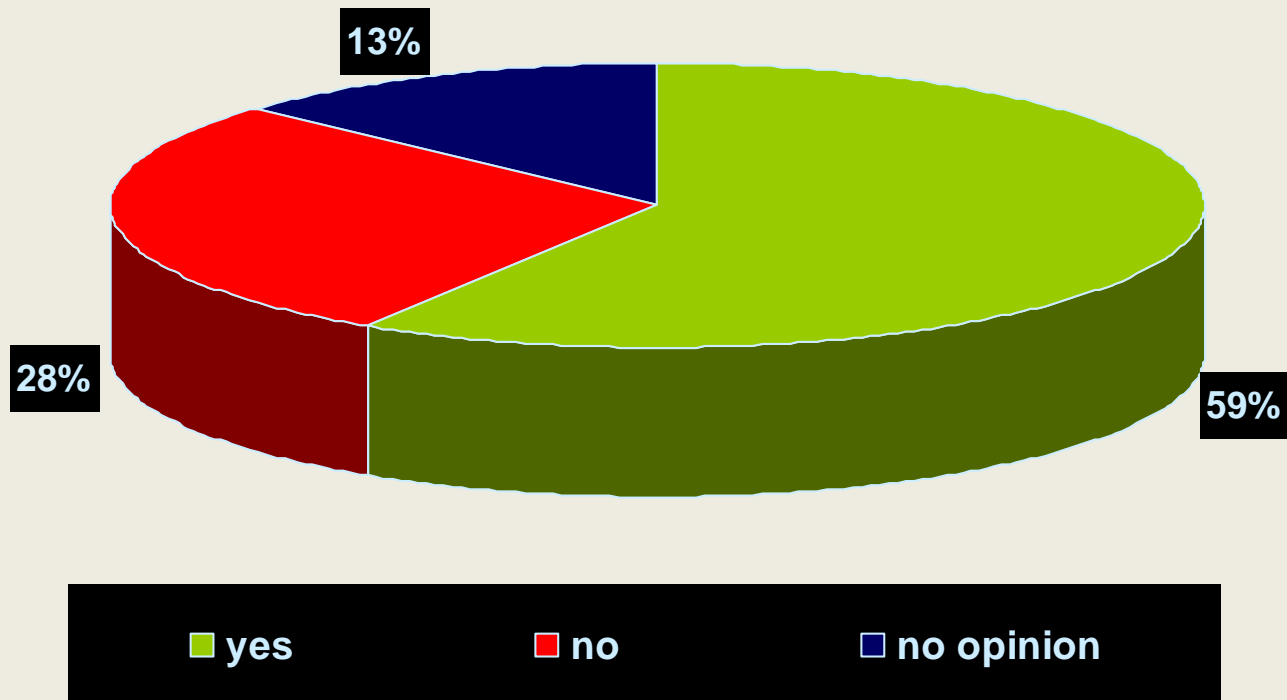


Understanding the GM food revolution



Farmer's opinion (2006)

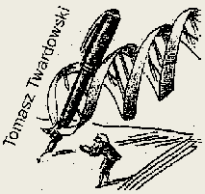
Q: Should farmers have a possibility to use GM plants



Position of the European Commission:

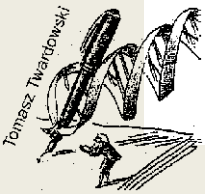
- 1997 – 2002, 2010
81 projects, over 500 mln Eur
- GM food = „standard food”
- The wealth of scientific data during past 15 years:

Support the safety of commercialized GM products



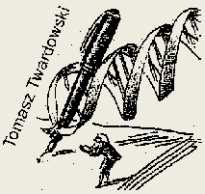
Fundamental data concerning DNA and peptides in GM food and feed

- All DNAs and peptides [including rDNA and peptides as the products of expression of rDNA] are composed of the same 4 nucleotides and 20 amino acids, respectively;
- Recombinant DNA technologies neither change the chemical properties of DNA either peptides;
- DNA and rDNA are hydrolysed according to the same kinetics;
- DNA [either rDNA] are not toxic [at standard consumption];
- DNA [either rDNA] neither is allergenic nor immunogenic according to available data;
- DNA [either rDNA] is not incorporated into genom of vegetrabes during the consumption;
- Consumption of GM food or feed does not change the total amount of consumed DNA or proteins.



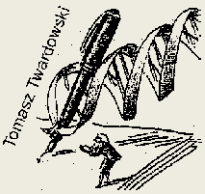
International legislation:

- Biosafety Protocol;
- WTO;
- FAO;
- OECD;
- EPO, WIPO;
- **EUROPEAN UNION.**



Poland – legislation [domestic]:

- „About GMO” dated 2001 and brand new projects „GMO law”, dated 2007 and 2008, 2011, but ...
- „About seeds”, Sejm & Senat voted on July 1 & 29, 2011:
 - * no GM seeds trade,
 - * no GM plants registration in Poland,
 - * but ... August 24, 2011, President of Poland: **no**
- „about feed”, 2006/Aug 2008 – no GM feed in Poland, but ... 1.01.2013
- Others: IPR, food, health ...



Conclusions ⁽¹⁾:

Environment for the biotechnology in nutrition development

- **Society**

(public opinion)

- **policy makers**

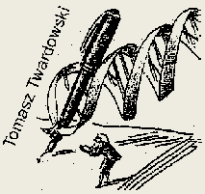
(legislation, IPR)

- **entrepreneurs**

(investment and business growth)

- **scientists**

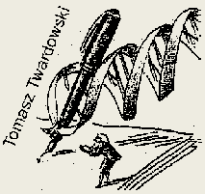
(research and development)



Conclusions ⁽²⁾:

Needs:

- Improve the distribution;
- More money for R&D;
- **Balanced and fair information to advance public debate;**
- **combined contributions of scientists, industrialists, as well as governmental and media;**
- **Biotech will be a part of the „food solution” (whether we like it or not).**

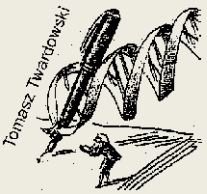


Conclusions ⁽³⁾:

- biotechnology within BIOECONOMY

=

- **BIOTECHNOLOGY for THOUGHT**



Thank you

- Enjoy your dinner tonight; while you can still afford it.

