30 years of plant biotechnology – where we are today in Croatia?

Round table "GMO in food production"

Hrvoje Fulgosi,
Institute Ruđer Bošković

8th International Congress of Food Technologists, Biotechnologists and Nutritionists

Opatija, 23.10.2014

Proc. Nat. Acad. Sci. USA
Vol. 72, No. 6, pp. 1981–1984, June 1975

Paul Berg in 1980

Summary Statement of the Asilomar Conference on Recombinant DNA Molecules*

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I. INTRODUCTION AND GENERAL CONCLUSIONS

This meeting was organized to review scientific progress in research on recombinant DNA molecules and to discuss appropriate ways to deal with the potential biohazards of this work. Impressive scientific achievements have already been made in this field and these techniques have a remarkable potential for furthering our understanding of fundamental biochemical processes in pro- and eukaryotic cells. The use of recombinant DNA methodology promises to revolutionize the practice of molecular biology. Although there has as yet been no practical application of the new techniques, there is every reason to believe that they will have significant practical utility in the future.

Of particular concern to the participants at the meeting was the issue of whether the pause in certain aspects of research in this area, called for by the Committee on Re-quate to contain the newly created organisms, are employed. Moreover, the standards of protection should be greater at the beginning and modified as improvements in the methodology occur and assessments of the risks change. Furthermore, it was agreed that there are certain experiments in which the potential risks are of such a serious nature that they ought not to be done with presently available containment facilities. In the longer term, serious problems may arise in the large scale application of this methodology in industry, medicine, and agriculture. But it was also recognized that future research and experience may show that many of the potential biohazards are less serious and/or less probable than we now suspect.

II. PRINCIPLES GUIDING THE RECOMMENDATIONS AND CONCLUSIONS

Although our assessments of the risks involved with each of

1978 – CHANG et al.	Expression of first eukaryotic gene in bacteria DHFR
1980 – COHEN i BOYER	patent for cloned gene
1983 – van MONTAGU et al.	Ti-plasmid for transformation of plant cells

Marc Van Montagu (left) and Jeff Schell (right) (1993)

nature International weekly journal of science

Letters to Nature

Nature **255**, 742-743 (26 June 1975) | doi:10.1038/255742a0; Accepted 18 April 1975

Acquisition of tumour-inducing ability by non-oncogenic agrobacteria as a result of plasmid transfer

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▲ Top

IT has been suggested that the tumour-inducing capacity of *Agrobacterium* is determined by plasmid genes[1,2]. The acquisition of virulence by non-pathogenic agrobacteria from pathogenic agrobacteria has been demonstrated by Kerr[3,4]. We investigated whether this phenomenon could be the result of transfer of a plasmid. Besides providing further evidence for the hypothesis that plasmid genes carry the genetic information for the tumour-inducing ability of *Agrobacterium*, the system offers the possibility of studying the genetics and functions of the plasmid.

Science. 1983 Nov 18;222(4625):815-21.

Introduction of genetic material into plant cells.

Caplan A, Herrera-Estrella L, Inzé D, Van Haute E, Van Montagu M, Schell J, Zambryski P.

Abstract

The tumor-inducing (Ti) plasmid of the soil microorganism Agrobacterium tumefaciens is the agent of crown gall disease in dicotyledonous plants. The Ti plasmid contains two regions that are essential for the production of transformed cells. One of these regions, termed transfer DNA, induces tumor formation and is found in all established plant tumor lines; the other, termed the virulence region, is essential for the formation but not the maintenance of tumors. Transfer DNA, which transfers to the plant genomes in a somewhat predictable manner, can be increased in size by the insertion of foreign DNA without its transferring ability being affected. The tumor-causing genes can be removed so that they no longer interfere with normal plant growth and differentiation. This modified Ti plasmid can thus be used as a vector for the transfer of foreign genes into plants.

PMID: 17738341 [PubMed]

nature International weekly journal of science

Article

Nature **328**, 33-37 (2 July 1987) | doi:10.1038/328033a0; Accepted 1 May 1987

Transgenic plants protected from insect attack

Mark Vaeck, Arlette Reynaerts, Herman Höfte, Stefan Jansens, Marc De Beuckeleer, Caroline Dean*, Marc Zabeau, Marc Van Montagu & Jan Leemans

1. Plant Genetic Systems NV, Jozef Plateaustraat 22, B-9000 Gent, Belgium
2. * Permanent address: Advanced Genetic Sciences Inc., San Pablo Avenue, 6701, Oakland, California 94608, USA.

The Gram-positive bacterium Bacillus thuringiensis produces proteins which are specifically toxic to a variety of insect species. Modified genes have been derived from bt2, a toxin gene cloned from one Bacillus strain. Transgenic tobacco plants expressing these genes synthesize insecticidal proteins which protect them from feeding damage by larvae of the tobacco hornworm.

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Planta. 1972 Sep;103(3):278-80. doi: 10.1007/BF00386851.

Embryoid formation by fragments of cotyledons and hypocotyls in Cucurbita pepo.

Jelaska S.

Author information

Abstract

After a prolonged culture on Murashige-Skoog medium the primary explants of hypocotyls and cotyledons of the pumpkin develop embryoid-producing callus tissue. Ten separate strains of such tissue have been obtained and have now been in culture for more than one year, continuing to produce embryoids.

PMID: 24481562 [PubMed]

Plant Cell Rep. 1984 Aug;3(4):125-9. doi: 10.1007/BF00270204.

Plant regeneration from mesocotyl callus of Hordeum vulgare L.

Jelaska S[1], Rengel Z, Cesar V.

Author information

Abstract

Callus tissue was induced on barley mesocotyl explants of germinated seven-day-old seedlings on MS medium supplemented with 2,4-D or 2,4,5-T in high concentrations. Two morphologically different tissue cultures were maintained in vitro for a long time: a callus tissue without organogenesis and a culture with high rhizogenic capacity. Shoots and plantlets were generated when the auxin-media induced callus was transferred to medium supplemented with 3 μM TIBA. In 62% of cultures, during the first five subcultures, four to twentyeight plants per single mesocotyl were obtained. Some cultures produced shoots even in the 9th subculture, being in culture for nearly 14 months. The largest number of plants obtained per one mesocotyl was forty. Plantlets rooted well on MS with 5.7 μM IAA and survived transplantation to soil in high percentages.

PMID: 24253467 [PubMed]

Int J Dev Biol. 1991 Sep;35(3):259-63.

Peroxidase as a developmental marker in plant tissue culture.

Krsnik-Rasol M.

Author information

Abstract

Peroxidase was studied as a developmental marker in pumpkin (Cucurbita pepo L.) callus lines and horse-radish (Armoracia lapathifolia Gilib) transformants. Embryogenic callus lines DE grown on MS medium with 2.4-D and NA-3 grown on medium with NAA and adenine sulfate showed about a 20 times higher enzyme activity than the habituated non-embryogenic line Z5b/T grown on medium without hormones. A rise in peroxidase activity indicated that somatic embryogenesis was triggered in a few habituated tissue cultures. Separated globular embryoids had a manifold lower enzyme activity than the callus from which they originated. SDS-electrophoresis showed distinct polypeptide patterns between the horse-radish leaves and crown galls, but the tumor characteristic protein bands failed to be identified. In horse-radish crown galls and short bushy plants regenerated from hairy roots an enhanced peroxidase activity was registered. Due to its high peroxidase level and abundant biomass production horse-radish transformants should facilitate enzyme production.

PMID: 1667582 [PubMed - indexed for MEDLINE] Free full text

OKVIR ZA RAZVOJ NACIONALNE STRATEGIJE BIOLOŠKE SIGURNOSTI

Meira Bosnić
Boris Antunović, Hrvoje Fulgosi, Krunoslav Capak,
Irina Zupan, Jelena Žafran Novak, Sanela Ljubenko Mihelj

April, 2005

UNEP
United Nations Environment Programme

gef
GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

DRŽAVNI ZAVOD ZA
ZAŠTITU PRIRODE

2005 GMO legal framework was developed

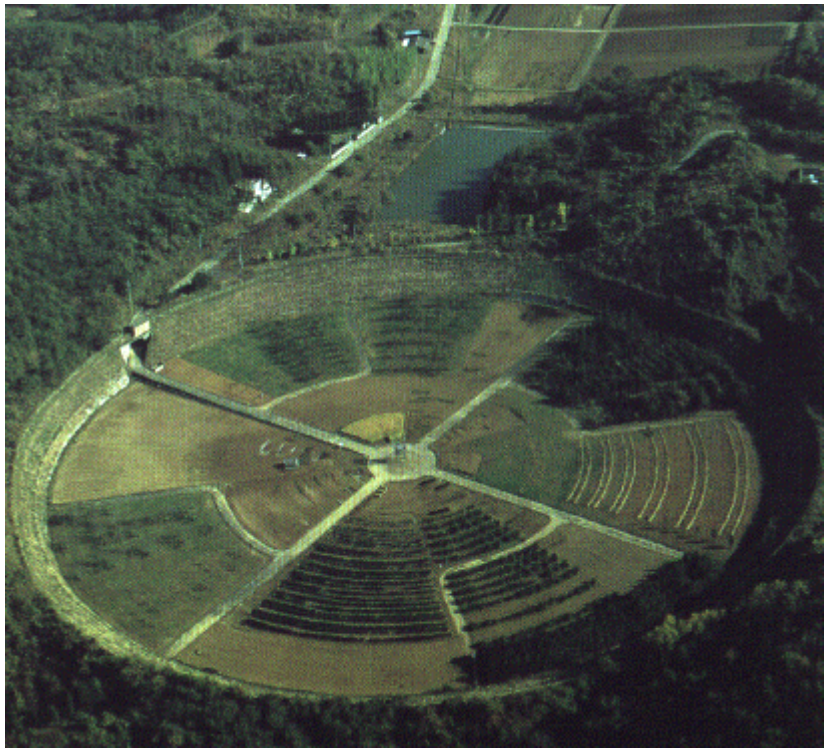
- Contained use
- Deliberate release

Ministry of Health
Ministry of Environmental Protection
Ministry of Culture
Ministry of Agriculture
Ministry of Science

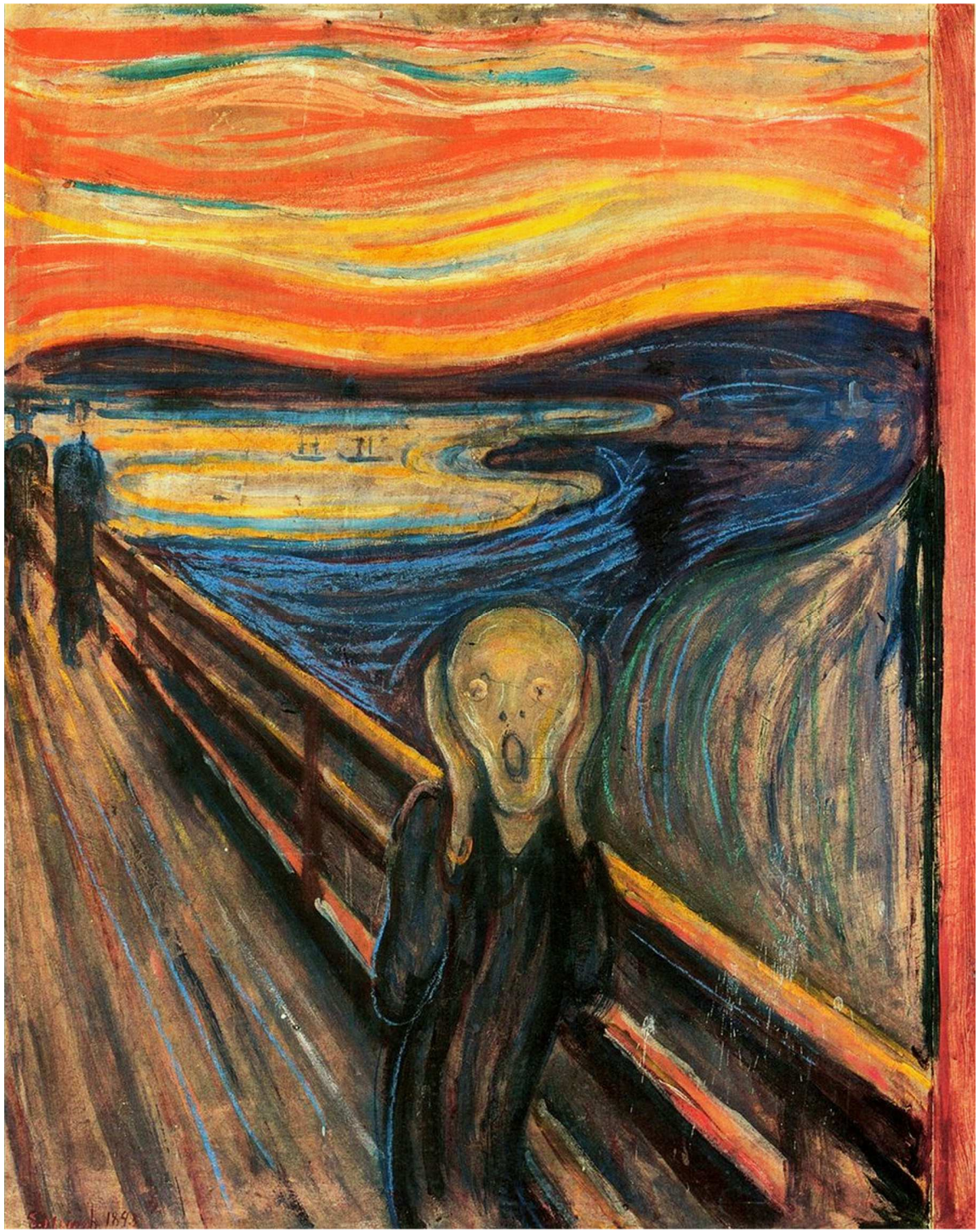
GMO Council of the Government
Deliberate Release Board
Contained Use Board

From all these documents and similar documents of the EU organisms that have been modified by gamma ray bombardment or chemical mutagenesis ARE EXCLUDED.

These techniques are considered/defined as the „Classical Techniques of Breeding”

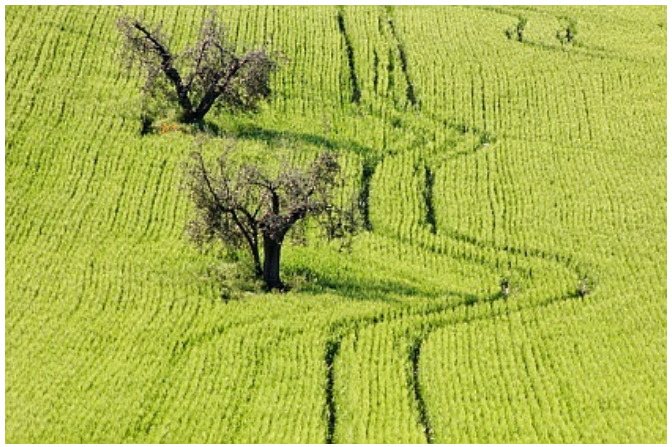


GMO Regulation Index



Influence on biodiversity: GMO lowers biodiversity?

YES, but every cultivation, being it ecological, integrated, conventional, or based on GM plants lowers biodiversity.



Introduction and goals “Perceprion of food risks” HAH

- ***Metoda istraživanja***
  - ☑ Istraživanje face to face (licem u lice), provedeno od 1. do 15.veljače 2011., tvrtka Ipsos Puls

- ***Uzorak***
  - ☑ Slučajan, reprezentativan uzorak od 580 ispitanika, starosti od 15 do 50 godina, s područja cijele Hrvatske
  - ☑ Uzorak je reprezentativan prema spolu, dobi, obrazovanju, veličini naselja, tipu naselja i regiji

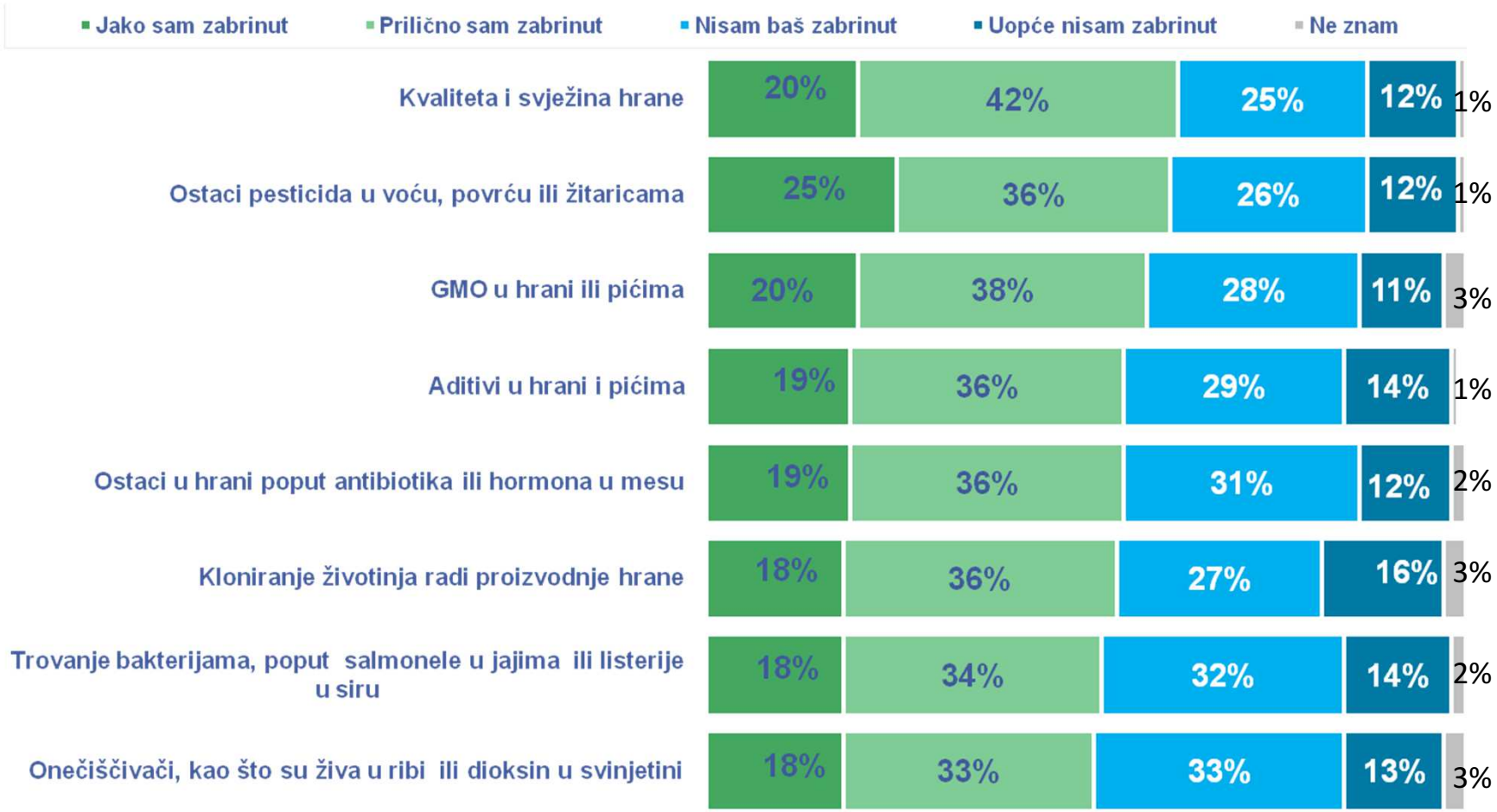
- ***Ciljevi istraživanja***

→ *Jednako istraživanje provedeno je u lipnju 2010., na zahtjev EFSA-e, na području zemalja članica EU, (EUROBAROMETER “Food- related risks”), a donosi rezultate vezane za:*

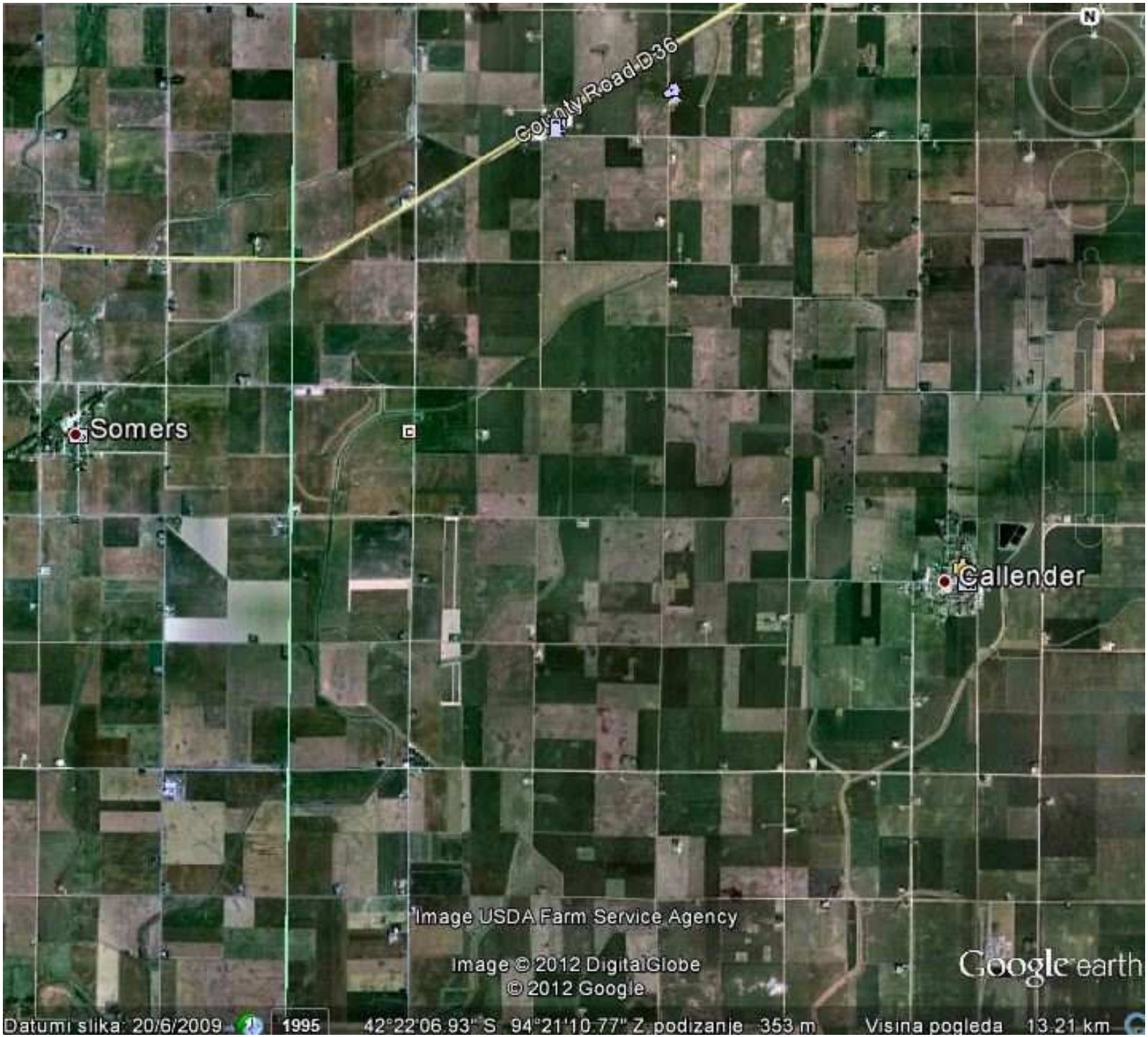
- ☑ Asocijacije vezane uz hranu i prehranu
- ☑ Asocijacije i percepcija rizika vezanih uz hranu i prehranu
- ☑ Razina zabrinutosti rizicima
- ☑ Povjerenje u izvore informiranja o rizicima vezanim uz hranu
- ☑ Stavovi o sigurnosti hrane i djelovanju javnih vlasti u HR i EU
- ☑ Procjena vlastitih mogućnosti u izbjegavanju rizika
- ☑ Reakcija na saznanje da neka hrana nije sigurna ili je loša za zdravlje.

Ispitanike najviše brine kvaliteta i svježina hrane u Hrvatskoj

Ukupno 62% ispitanika je zabrinuto kvalitetom i svježinom hrane. Potom slijede kategorije vezane uz kemijske tvari u hrani (pesticidi, aditivi, antibiotici), te GMO i kloniranje. Svi ovi rizici brinu barem polovinu ili više ispitanika.



Molim vas recite u kojoj ste mjeri zabrinuti ili niste zabrinuti vezano uz sljedeće teme?


County Road D-36
Somers
Callender
Image USDA Farm Service Agency
Image © 2012 DigitalGlobe
© 2012 Google
Google earth
Datumi slika: 20/6/2009
1995
42°22'06.93" S 94°21'10.77" Z podizanje 353 m
Visina pogleda 13.21 km

Small is beautiful!

Small is beautiful!

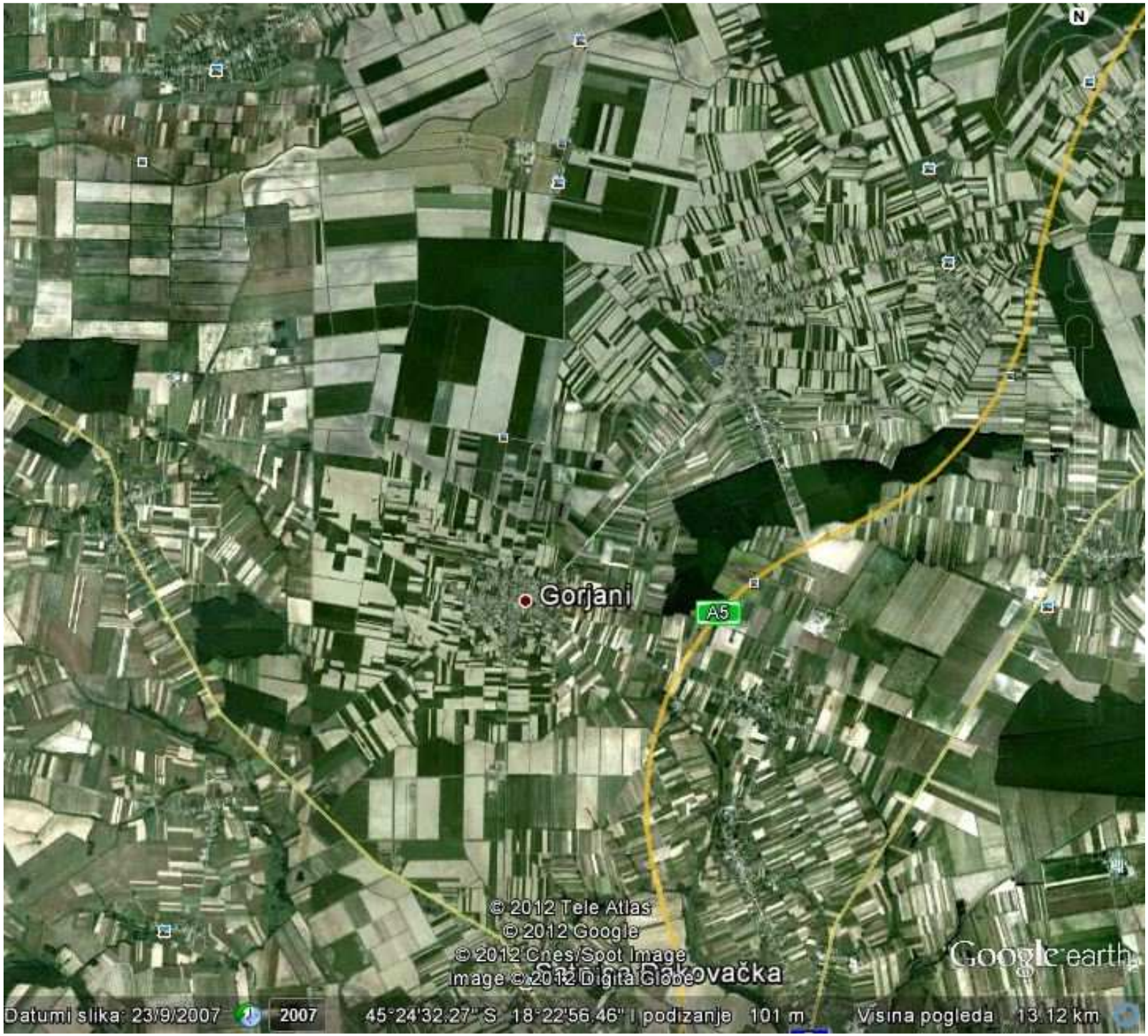

N
Gorjani
A5
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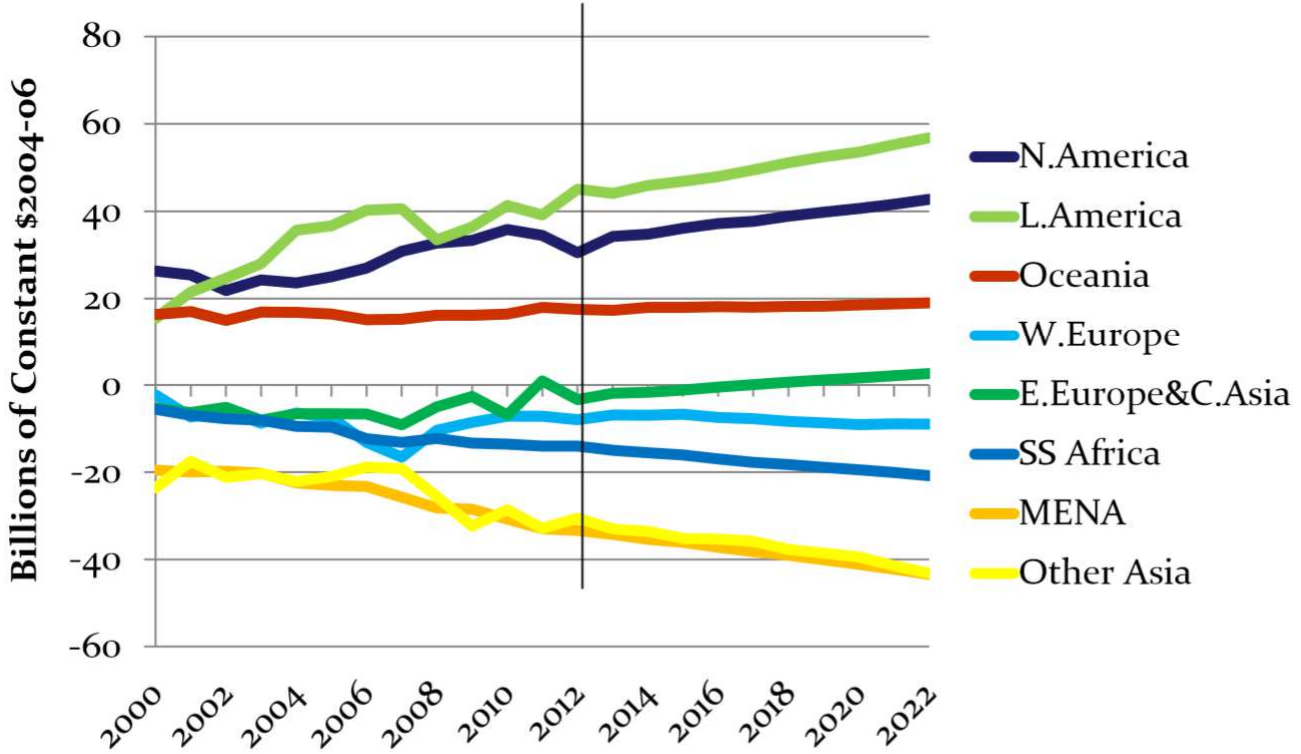
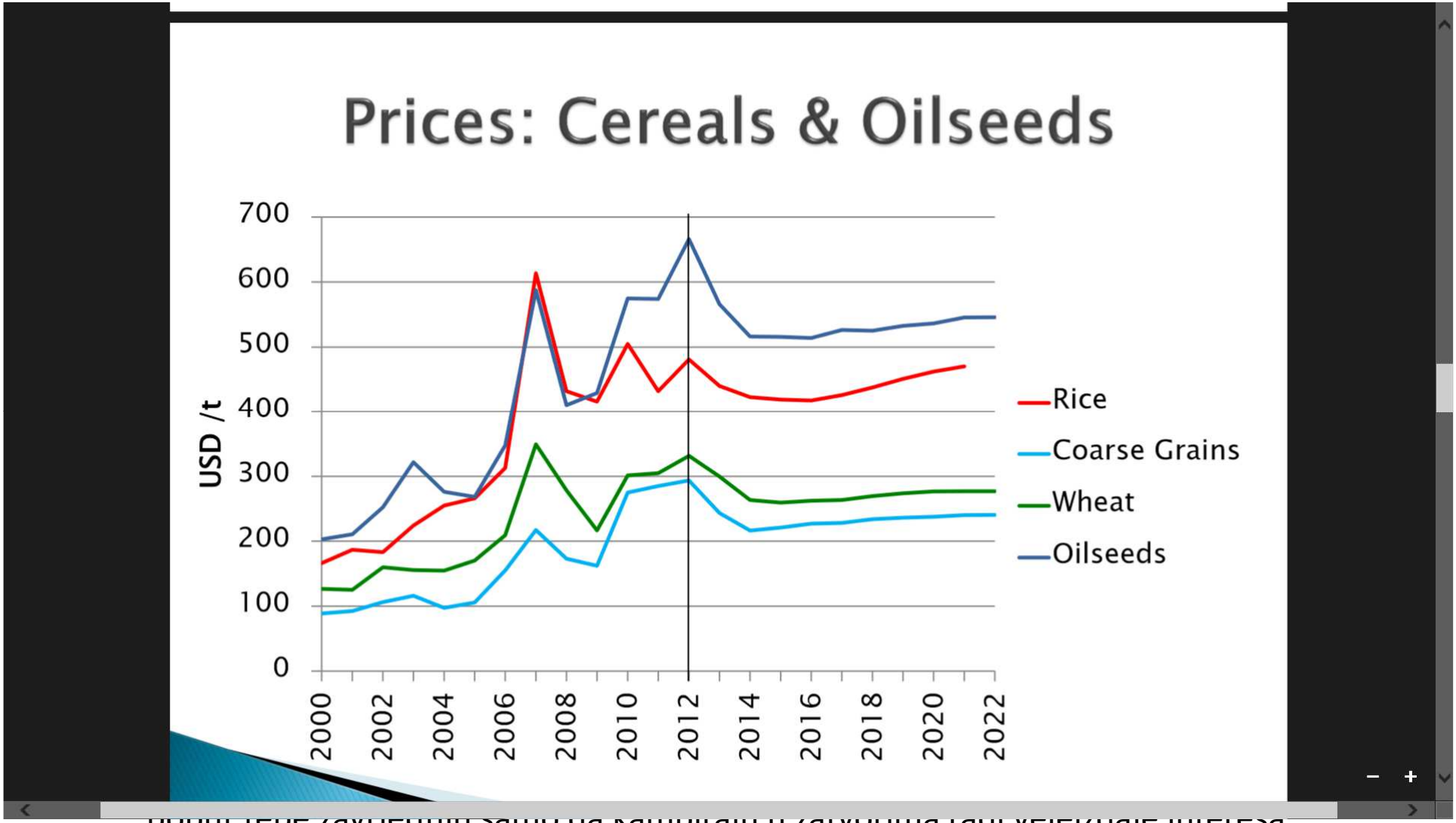
Image © 2012 DigitalGlobe
Google earth
Datumi slika: 23/9/2007
2007
45°24'32.27" S 18°22'56.46" i podizanje 101 m
Visina pogleda 13.12 km

Americas are increasingly the largest net exporters





poput tebe zavrjeduju samo da kampiraju u zatvorima radi veleizdaje interesa naroda i znanosti.

Borba protiv GMO-a je hrvatski nacionalni interes

Petir, Šuica, Picula i Borzan
Izvor: Pixsell , Autor:Patrik Macek

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REVIEW ARTICLE

An overview of the last 10 years of genetically engineered crop safety research

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Abstract

The technology to produce genetically engineered (GE) plants is celebrating its 30th anniversary and one of the major achievements has been the development of GE crops. The safety of GE crops is crucial for their adoption and has been the object of intense research work often ignored in the public debate. We have reviewed the scientific literature on GE crop safety during the last 10 years, built a classified and manageable list of scientific papers, and analyzed the distribution and composition of the published literature. We selected original research papers, reviews, relevant opinions and reports addressing all the major issues that emerged in the debate on GE crops, trying to catch the scientific consensus that has matured since GE plants became widely cultivated worldwide. The scientific research conducted so far has not detected any significant hazards directly connected with the use of GE crops; however, the debate is still intense. An improvement in the efficacy of scientific communication could have a significant impact on the future of agricultural GE. Our collection of scientific records is available to researchers, communicators and teachers at all levels to help create an informed, balanced public perception on the important issue of GE use in agriculture.

Keywords

Biodiversity, environment, feed, food, gene flow, –omics, substantial equivalence, traceability

History

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