

BIOTECHNOLOGY FOR SUSTAINABLE AGRICULTURE - PARTNERSHIP, NOT CONFLICT

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Summary. The application of modern biotechnology to crop production is an area, which we believe holds great promise for farmers and the food chain, and also for consumers and society in general. Not only can this tool be used to improve agricultural productivity, but also to contribute towards reductions in the environmental impact of farming. We recognize, however, that the introduction of crops produced with biotechnology and the use of these crops in foods have raised concerns in Europe, and that future introductions can only be made once consumers feel they have sufficient information to make an informed choice. Our aim is to promote an open and informed debate with all stakeholders, with confidence that, in the fullness of time, GM crops will gain acceptance in Europe as they have in other parts of the world.

MS PowerPoint Presentation:

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PLANT BIOTECHNOLOGY FOR SUSTAINABLE AGRICULTURE – PARTNERSHIP, NOT CONFLICTS

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THE CHALLENGE

On May 14, 2002, UN Secretary General Kofi Annan proposed five priority areas of focus for the World Summit on Sustainable Development:

“Water, Energy, Health, Agriculture, Biodiversity and Sustainable Ecosystem Management (WEHAB)”

But how do we meet this challenge?

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“It is of strategic and long-term importance that Europe masters the new frontier technologies in particular the life sciences and biotechnology, and uses them for the benefit of society.”

Romano Prodi, Commission President, European Commission stakeholder meeting, 27/28 September 2001, Brussels

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Agriculture extends to cover about one third of land surface, and is the largest user of biodiversity and its components;

Projection suggest that global food production will need to double over the next half-century.

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CHALLENGES AND OPPORTUNITIES OF SUSTAINABLE AGRICULTURAL DEVELOPMENT

Sustainable development – development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

7
SUSTAINABLE AGRICULTURAL DEVELOPMENT. PRESSING PROBLEMS

Climate change – more violent weather patterns, like storms and floods, prolonged drought;
 Potential threats to public health – persistent toxic substances, resistance to antibiotics, food safety risks;
 Poverty and social exclusion
 Congestion and pollution

THE HUGE COST OF DOING NOTHING ABOUT THESE CHALLENGES WILL SHOW UP IN THE LONGER TERM. DECISIVE ACTION IS URGENTLY NEEDED.

9
SUSTAINABLE AGRICULTURAL DEVELOPMENT WHAT WE MUST TO DO TO PUT THINGS RIGHT

Better policy integration, relying on a systematic and transparent reviews of the costs and effects of different options, so that:

- **Better co-ordination** - different policies reinforce each other, environmental and social objectives should meet economic cost;
- **Dialogue** – openness facilitate better dialogue between stakeholders with different interests, paving the way for a broad consensus on solutions and their implementation.

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CONVENTIONAL FARMING

World food production has almost doubled from 1961 to 1990:

Better yield varieties were developed;
 Increased use of herbicides, insecticides and fungicides for weed, pest and disease control;
 Increased application of nitrogen and phosphorus;
 Land utilization increased by 10%

But at what cost?

Destruction of ecosystems, loss of biodiversity,

Since 1990 the yields of the 30 crops larger distributed grows slowly (0.5%) than the population (1.5%)

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SUSTAINABLE AGRICULTURAL DEVELOPMENT. IMPROVEMENTS IN WELL-BEING

The average citizen of European Union has never been better off in material terms;

Average incomes are now around 5 times what they were in 1900;

Life expectancy has increased sharply due to better hygiene, nutrition and medical care.

8
SUSTAINABLE AGRICULTURAL DEVELOPMENT WHY THINGS HAVE GONE WRONG?

Forms and citizens are badly informed about the wider effects of sustainable agricultural development actions, or about alternatives.

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AGRICULTURAL PRACTICES

Conventional farming
 Organic farming
 Biotechnology farming

12
ORGANIC FARMING - OPPORTUNITIES AND CONSTRAINTS

Organic agriculture has a legitimate place within sustainable agriculture programs:

First, organic farmers and processors, in their attempts to adhere to rigorous certification standards, may discover new and innovative production technologies that apply to other agricultural systems as well.

Second, organic agriculture may provide market opportunities for farmers and processors who choose to alter their practices to meet certain consumer demands.

Finally, organic agriculture promotes the national and international public debate on sustainability by creating awareness of environmental and social concerns that merit attention.

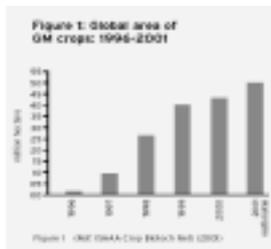
13 **ORGANIC FARMING - OPPORTUNITIES AND CONSTRAINTS**

20% higher price of organic products;
Loss in yields
Greater labor input

15 **CHALLENGES OF BIOTECHNOLOGY APPLICATION**

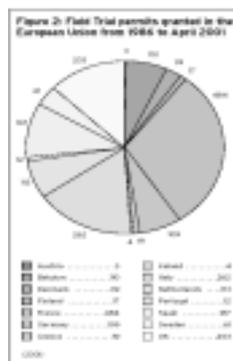
Benefits in the food sector:
Less polluted with chemicals and less contaminated with mycotoxins food;
more balanced diet and from more guaranteed harvest;
better environment
reduction of energy consumption
improved medicines and healthcare
renewable energy resources
cleaner production and improved efficiency and profitability

17 **CROP BIOTECHNOLOGY GLOBAL STATUS**



In 1996, only 1.7 million hectares of biotech crops were planted in 6 countries, 52.5 million hectares in 2001.

19 **CROP BIOTECHNOLOGY EU STATUS**



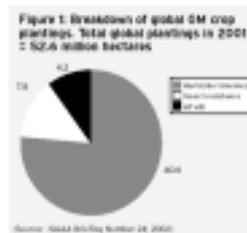
14 **MODERN BIOTECHNOLOGY**

Molecular markers for breeding
DNA sequencing
Monoclonal antibodies
Somatic cell and nuclear fusion
Genetic engineering
Biological processing

16 **EXPANDING THE SPECTRUM OF NOVEL FOOD, BIOCHEMICALS AND PHARMACUTICALS**

Expected they to present second and third generation of genetically improved plants
Two major categories of biomaterials:
Direct improvement of specialized constituents of plant origin
The integration in plants of non-plant origin
Nowadays a number of plant constituents can be modified for using in the food, chemicals, energy and pharmaceutical industry
This includes many "primary" metabolites as carbohydrates, proteins, oils and fats, fibers, etc.
The use of plants as "bio-reactors" for the production of "foreign" non-plant compounds is going momentum and it is expected soon to lead to alternative types of agriculture:
This includes for example production of bioactive pesticide, vaccines, antibodies and range of enzymes mostly for the pharmaceutical industry
For the chemical industry plant can be used to produce biodegradation materials, etc.

18 **CROP BIOTECHNOLOGY. CURRENT APPLICATIONS OF MODERN BIOTECHNOLOGY IN AGRICULTURE**



Herbicide tolerant crops – primary soya, oilseed rape and maize varieties, each tolerant to a single broad spectrum herbicide:

Insect resistant crops – principally maize and cotton producing a protein that controls certain insect species.

20 **CROP BIOTECHNOLOGY EUROPEAN SITUATION**

Spain – the only country in Europe to grow agbiotech crops commercially:
30 000 hectares of Bt maize grown in 2001 (source: Spanish AGPM);
France – 34 hectares in 2001;
Germany – 300-400 hectares in 2001.

21 **EUROPE TOWARD SUSTAINABLE BIOTECHNOLOGY**

In this context, there is a room for biotechnology products and technologies to improve the nutritional value of agricultural products and promote environment - friendly practices;

Food supply is not an issue in Europe given the large surplus of agricultural products.

23 **HOW CAN THE POTENTIAL OF BIOTECHNOLOGY BEST BE HARNESSSED, ENSURING THAT THIS OCCUR IN A SAFE MANNER?**

The only measure to assess safety and environmental friendliness of biotechnology products is a regulatory framework based on sound science; This framework must be determined by experts and endorsed by policy-makers.

25 **COUNCIL FOR BIOSAFETY OF GENETICALLY MODIFIED HIGHER PLANTS**

COUNCIL FOR BIOSAFETY OF GM HIGHER PLANTS

Chairman is the Minister of Agriculture and Forestry
Secretary – Distinguished Scientist

Members:

Under the Ministry of Agriculture and Forestry functions:

National Service for Plant Protection – pests and plant diseases
Executive Agency for Approbation and Seed Control - approves new plant varieties

Under the Ministry of Environment and Waters

Executive Environmental Agency

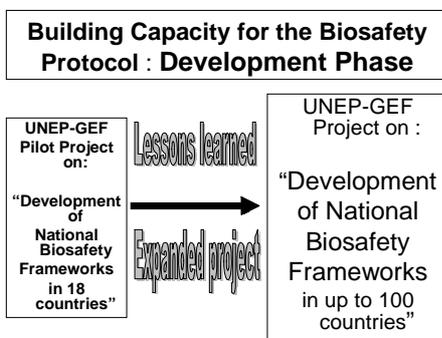
Under the Ministry of Health Care function:

Central Hygiene Epidemiological Inspection - controlling the safe production and distribution of foods

Academic sector

National Center for Agricultural Science - AgroBioInstitute

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22 **WHY PLANT BIOTECHNOLOGY IN BULGARIA**

Continental climate (Very cold winter and very hot summer).
Every year losses range from 20 to 60%;

Climatic and soil variations from region to region, giving rise to a large variation of diseases and pests; Every year losses range from 15 to 50%;

Plant biotechnology is the most suitable alternative, complementing the drawbacks of traditional plant breeding programs, which are rather labor intensive and time consuming:

- Diminishing the genetic erosion (at present narrow genetic germplasm);
- Preservation of genetic germplasm;
- To enhance the genetic variability;
- Low environmental impact and sustainable development;
- New quality, new products;
- Improve the efficiency of the breeding programs.

24 **BIOSAFETY IN BULGARIA**

1996 - First regulation of GMPP in the CEEC

1999 - Sub-regional Center for Biosafety

2002 – Chairmanship of the CEE Steering committee for Biosafety

GEF/UNEP Pilot Biosafety project;

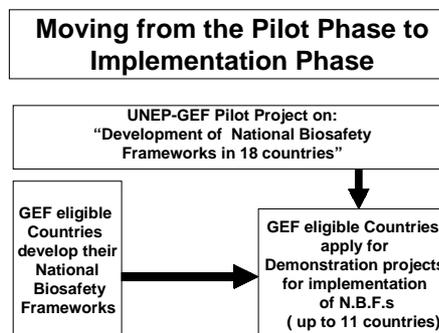
GEF/UNEP Implementing Biosafety project;

Bulgarian GMO DRAFT law

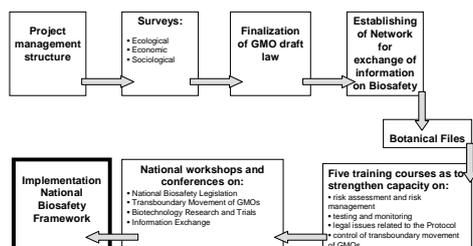
26 **EXPERT COMMISSIONS**

- **Commission on herbology:**
 - Agronomic traits;
 - Cross-pollination /gene transfer/;
 - Soil microorganisms;
- **Commission on entomology:**
 - Target organisms;
 - Non-target organisms;
- **Commission on food safety:**
 - Safety of expressed protein;
 - Compositional analyses;
 - Toxicity and Alergenicity assessment;
- **Independent commission for Council's activities control**

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Flow chart for implementation of National Biosafety Framework



BIOSAFETY FOR ALL

While GM agricultural practices has been addressed by risk assessment procedures and regulatory measures, organic farming received less attention;

Comparative studies on the respective advantages and disadvantages of GM farming as well as traditional and organic farming on food production, health, environment or development must be carried out and communicated;

regulatory measures needed to safeguard co-existence of GM, conventional and organic agriculture.

Priorities:

Finalization of the GMO draft Act;

Drafting the regulations complementing the biosafety Act;

Pilot data collection from field trials and molecular /biochemistry experiments;

Compiling of Botanical files;

Strengthening the laboratories equipment;

Training courses for trainers;

Information sharing and dissemination activities

AGRICULTURAL PRACTICES-COMPETATIVENESS AND SUSTAINABILITY

Measures to protect biodiversity are independent of whether a new crop variety to be introduced is derived from classical breeding or from GM technology;

Biotechnology and organic farming should be combined, because their common goal is to reduce chemicals in food;

Out of the conventional farming there is definitely present and future market nich for the organic and biotechnology farming;

The deal of each of it will be determined by their efficiency, prize, quality, environmental impact.