OECD Cooperative Research Program and the New Bioeconomy

Prof John Sadler

OECD Cooperative Research Program Theme Leader

Strategic, Policy and Regulatory issues relating to the invasion threats from new crop species

National and International Policy requirements for the safe importation and use of new cropspecies and varieties

Dr. Alan V. Tasker
Noxious Weed Program Manager USDA-APHIS

The Australian approach to assessing and managing the threats associated with the introduction of new species

Dr Bill Roberts
Principal Scientist Plant Biosecurity Australian Department of Agriculture Fisheries & Forestry

Incorporating biosecurity issues from new cropping systems into the European Strategyon Invasive Alien Species

Dr Piero Genovesi
Institute for Environmental Protection and Research (ISPRA), Chair of IUCN ISSG & co-author of European Strategy on Invasive Alien Species

Organisation for Economic Cooperation and Development Co-operative Research Programme: Biological Resource Management for Sustainable Agricultural Systems

E. John Sadler

Soil Scientist and Theme 1 Coordinator

United States Department of Agriculture
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History

In 1979, OECD established the new

Co-operative Research Programme:

Biological Resource Management for

Sustainable Agricultural Systems.

The programme is renewed in 5-year intervals.

Purpose of the Programme

1. Provide a sound scientific knowledge base to agricultural policy-making
2. Contribute to an informed public debate on current and emerging agri-food issues
3. Promote scientific understanding and standards between major regions of OECD

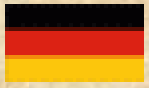
OECD Countries Participating in the Cooperative Research Programme


Australia


Belgium


Czech Republic


Finland


Germany


Hungary


Italy


Korea


New Zealand


Poland


Slovak Republic


Sweden


United Kingdom


Austria


Canada


Denmark


France


Greece


Ireland


Japan


Netherlands


Norway


Portugal


Spain


Switzerland


United States

Programme Structure

The Program is managed by:

- ***A Scientific Advisory Body***, comprised of six scientists and research administrators, that elaborates the Program, ensures its scientific quality, and recommends fellowships, and workshops/conferences to be funded.
- *A* ***Governing Body***, comprised of a representative from each participating country, that defines the general orientation of the program and acts on the recommendations.

Programme Activities

The Programme promotes two activities:

- Research fellowships
- Sponsorship of conferences and workshops

Main Research Themes for 2010-2014

Theme 1: The Natural Resources Challenge

Theme 2: Sustainability in Practice

Theme 3: The Food Chain

Outputs of the Programme

- **Publication of proceedings** from sponsored conferences.
- Evaluation **Questionnaires** from Workshop participants
- Evaluation **Questionnaires** on Fellowships from Research Fellows and Host Laboratories.
- Fellowship **Reports** on substantive outputs as a result of Fellowships.
- **Reports and Publications** received from Fellows after end of Fellowships.

2009 OECD Conferences

Theme	Conference	Place	Dates
2	Forest Biosecurity Conference; workshop on Managing the biosecurity threat to forests in a changing global environment: links between science, policy, regulation and management	Rotorua, New Zealand	17 March 2009 (16-20 March for the whole conference)
3	What Future for the Agriculture and Food Sectors in an Increasingly Globalised World?	Paris, France	30-31 March 2009
1, 2 & 3	Challenges for Agricultural Research	Prague, Czech Republic	6-8 April 2009
1 & 2	Sustaining Soil Productivity in Response to Global Climate Change: Science, Policy and Ethics	Madison, Wisconsin, USA	29 June – 1 July 2009
3	Flavobacterium 2009	Paris, France	21-23 Sept 2009
3	Exploiting Genome-wide Association in Oilseed Brassicas: a model for genetic improvement of major OECD crops for sustainable future farming	Crawley, Perth, Australia	9-12 November 2009
1, 2 & 3	Biosecurity in the New Bioeconomy: Threats and Opportunities	Canberra, Australia	19-21 November 2009

Fellowship Details

Sponsors travel between 26 OECD member countries

Must have a PhD and permanent or term position

(not a postdoc)

Age is not an issue

Duration of travel is 6-26 weeks

Average length of visit is ~12 weeks

Expenses covered include airfare and €400-450/week

Applications for 2010 due August 31, 2009

Earliest travel in 2010 about February 15

Average success rate historically ~ 40-50%

For Further Information on our Programme

www.oecd.org/agriculture/crp

Vision for the Future

The CRP mandate for the next 5 year cycle has been approved by the Council of the OECD.

April 7-8, 2008 – Budapest, Hungary
April 6-8, 2009 – Prague, Czech Republic

Vision for the Future

Achieve the link between science and policy!

National and International Policy requirements for the safe importation and use of new crop species and varieties


Arundo donax

Al Tasker, PhD
Noxious Weed Program Manager
Invasive Species & Pest Management Staff
USDA-APHIS-PPQ
Pest Detection & Management Programs

The Perceived Need

- *"Growing energy demands, a desire to reduce reliance on fossil fuels, and greater awareness of climate change have led both state and federal governments to pursue alternative energy sources."* Jacob N. Barney and Joseph M. Ditomaso – Nonnative Species and Bioenergy: Are We Cultivating the Next Invader? *January 2008 / Vol. 58 No. 1* • ***BioScience***

The Perceived Problem

- *"Biofuel feedstocks are being selected, bred, and engineered from nonnative taxa to have few resident pests, to tolerate poor growing conditions, and to produce highly competitive monospecific stands—traits that typify much of our invasive flora"* Ibid

Potential bioenergy species:

- Trees:
  - Eucalyptus
  - Populus: Hybrid Poplar, hybrid aspen, cottonwood
  - Loblolly pine
  - Sweetgum

Potential bioenergy species:

- Grasses:
  - Switchgrass (*Panicum virgatum*)
  - Prairie cordgrass (*Spartina pectinata*)
  - Miscanthus (*Miscanthus gigantus* or others)
  - Sorghum
  - Sugarcane (*Saccharum officinarum)*
  - Energy cane ('L 79-1002' sugarcane) (a complex hybrid of *Saccharum officinarum, S. spontaneum, S. barberi, and S. sinense)*
  - Reed Canary Grass (*Phalaris arundinacea*)
  - Giant reed (*Arundo donax*)

The Biosecurity Issues

1. **Invasion threats.** New crops in both current production systems and new areas pose significant invasion threats to agriculture, biodiversity and natural ecosystem services through both abandoned trial plantings of uneconomic varieties and feral individuals from economically viable plantations invading agricultural and natural landscapes.
2. Pest Management Threats. New crops will have new pests, weeds and diseases requiring new environmentally sustainable IPM technologies to ensure bottom line production viability

Recent Triggering Events for possible policy change

1. Farm Service Agency (FSA) drafting implementing rule for biomass crop assistance program (BCAP) –- consult w/ APHIS weed program regarding invasiveness language
2. Invasive Species Advisory Council drafted document encouraging the Federal government to reduce the risk of invasive species introduction and spread through its biofuels programs
3. Federal Interagency Committee for the Management of Noxious and Exotic Weeds agencies expressing concern about potential release of bioengineered cold tolerant eucalyptus in the southeastern United States

Policy and Legal Responsibilities

- Specific agency directives for biofuel programs are emerging in Federal legislation. The 2007 Energy Independence and Security Act (EISA) mandates the production of 61 billion liters of plant cellulosic-based fuels.
  - This cannot be met with current agricultural, forestry, and municipal residues alone. It necessitates large-scale planting of dedicated energy crops that do not compete with food or feed.
  - This will require producing and promoting biofuel crops for experimentation and demonstration.
  - The U.S. Department of Agriculture's (USDA) research effort focuses on identifying crops that will maximize yield while allowing cultivation on less productive, marginal lands with minimal agricultural inputs.

NISC Newsletter June 2009 : Some Biofuel Crops Pose Potential Invasive Threats

- Currently, there are serious concerns that many of the traits that make certain plant species like *Miscanthus x giganteus* potential feedstocks for second-generation biofuels also make them attractive for biomass production/potentially invasive:
  - efficient C4 photosynthesis
  - efficient water and nutrient use
  - pest resistance
  - rapid spring growth
  - the ability to sprout from rhizomes

In the News:

- April 22, 2009: Certain biofuel crops are more likely than other plants to become invasive in tropical and subtropical ecosystems worldwide, scientists have found. A weed risk assessment (WRA)–which examines a plant's biology, geographic origin, known pest status and behavior–can be used to predict whether a species of biofuel crop will become invasive, enabling countries to avoid environmental and economic losses.

Identify the issue

- **Describe the issue**
  - Various APHIS partner agencies and other stakeholders want clarification of APHIS intentions regarding regulation or management of potentially invasive plants, including biomass & biotech crops
  - The Farm bill biomass language specifically excludes biomass assistance for “invasive or noxious” plants
  - Many potentially invasive taxa are not currently regulated by APHIS because they do not qualify as traditionally defined quarantine pests

- The Global Invasive Species Programme (GISP) has a set of recommended actions for consideration by those developing biofuels and has identified a list of potentially invasive species that are being considered as biofuel feedstocks. http://www.gisp.org/publications/reports/BiofuelsReport.pdf

- Specifically, the development of production projects should consider:
  - **Information gathering:** check national noxious weed lists, databases and websites for references relevant to the countries where biofuel developments are proposed;
  - **Risk assessment:** use formal risk assessment protocols to evaluate the risk of invasion by species in biofuel proposals, with particular attention and support to countries with less experience in addressing biological invasions or screening for impacts on biodiversity;
  - **Benefit/cost analysis:** conduct market studies and presenting business plans that can show real benefits for the proposed activities before funds are made available, as there are many known cases of introduced species that have never achieved commercial value (but still remained as actual or potential problems);

- **Selection of native or low risk species:** create incentives for the development and use of native and/or non-native species that pose the lowest risks to biodiversity;
- **Risk management:** include monitoring and contingency planning (e.g., control in cases of escape) in proposals for biofuels (particularly biodiesel). Control procedures have to be viable and well-tested, so invading species that are normally dispersed by animals and other active means must not be used without tested contingency plan for escapes;
- **Certification/accreditation processes:** evaluate project proposals according to criteria and/or certification schemes for sustainable biofuels development (a number of such processes are underway at the national and international levels).

The Global Invasive Species Programme recommends that countries do not develop activities that are based on the use of known potentially invasive alien species for biofuels production programmes. The risks to biodiversity are just too great.

Recognizing the reliance on biodiversity by many millions of people, especially in developing countries, GISP feels that risk assessment, monitoring and contingency planning are justified and should be mandatory for the support of projects to grow biofuels en masse. These actions are because the inadvertent introduction of alien species that could become invasive may result in diminished livelihoods, reduced development and more inroads into biological diversity

Identify the issue

- **Define PPQ's role/role of others**
  - **APHIS PPQ role**
    - **Plant Protection Act authority**
      - Federal and state agencies look to APHIS for invasive spp. leadership due to the broad authority regarding pest plants (and plant pests) in the Plant Protection Act
      - Weed Definition

7 USC CHAPTER 104 - PLANT PROTECTION
Sec. 7702 - Definitions

- (10) NOXIOUS WEED.—The term ‘‘noxious weed’’ means any plant or plant product that can directly or indirectly injure or cause damage to *crops* (including *nursery stock or plant products*), *livestock, poultry, or other interests of agriculture,*
- *irrigation, navigation,*
- *the natural resources* of the United States,
- *the public health,* or
- *the environment*.

Identify the issue

- **Define PPQ's role/role of others**
  - **APHIS PPQ role**
    - **Authority**
    - **Risk Assessment**
    - **Management**
  - **BRS role (outside the scope of this presentation)**
    - **Assessment & Regulation of bioengineered taxa**
  - **Other Federal Agency roles**
    - Federal authority for other agencies often extends only to lands directly managed by or adjoining those of the agency

Identify the issue

- Define role of non-feds
  - State & Tribe role
    - Management within state boundaries
  - Industry role
    - Sustainable profitability
    - Environmental protection responsibility

Federal Agency Roles and Responsibilities (ISAC Whitepaper)

- Depending on their mission, Federal agencies might engage in biofuel programs by:
  - conducting biofuel research and development;
  - introducing and producing biofuel crops for experimentation and/or use;
  - subsidizing biofuel research, development, production, and marketing;
  - purchasing biofuels to supplement their energy demands;
  - establishing early detection and rapid response programs for escaped biofuel plants;
  - implementing long-term management of biofuel crops that become invasive; and/or regulating various aspects of the biofuels pathway, when necessary.

Biomass Management thoughts

- APHIS Authority to establish categories
- APHIS Authority to develop management plans (joint with states/tribes)
  - Risk assessment
  - Contingency planning
  - Site selection
  - Benefit/cost analysis
  - Monitoring & EDRR
  - Post performance bonds

Wrap-up of issues

- Biomass systems may in result in more habitat destruction and likelihood of spread than would the occasional feral plant
- In choosing a site it is important to consider:
  - the plants' biology,
  - growth in cultivation,
  - likely resource inputs (e.g. water, fertilizer, etc),
  - planting and harvesting methods, and
  - transport of the feedstock to the biofuel facility.
- Each or all of these have the potential to alter sensitive habitats and make those habitats more susceptible to invasion by other plant species.

Associated Issues

Draft Guidelines

New Pest Response Guidelines -- Noxious Weeds

- … contains information for early detection and rapid response of Federal Noxious Weed (FNW) infestations.
- These guidelines present current available information for implementing detection, control, containment, or eradication programs.
- Specific emergency program activity should be based on information available at that time.
- Eradicating a noxious weed infestation before it becomes widespread in the environment should outweigh temporary harm to an individual site.

Development of a revised weed risk assessment tool for the United States

Tony Koop, Larry Fowler, Leslie Newton, Edward Jones, Sarah Marnell, Barney Caton

Plant Protection and Quarantine (PPQ),
Center for Plant Health Science Technology (CPHST),
Plant Epidemiology & Risk Analysis Laboratory (PERAL)

Characteristics that make plants invasive

- Invasiveness is context dependent.
- Current risk assessment guidelines used by APHIS PPQ are found at http://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/wra.pdf
- Proposed revisions to the guidelines be posted as adopted

Goals

- Develop an accurate but quick WRA model
  - Distinguishes between non- and major-invaders
  - Tested and validated for use in the entire United States
  - Incorporates uncertainty into weed risk assessment

- Adapt our WRA process to our changing needs
  - An efficient process to meet increased need from Q37 revision
  - A process consistent with PPA authority and IPPC standards

Procedure

- Considered strengths & weaknesses of our current WRA system
- Reviewed & compared other WRA systems & studies
- Based new PPQ model similar to the Australian system
- Assessed 204 known major-, minor-, & non-invaders from U.S.
- Assessed using AusWRA & new PPQ model
- Using a training dataset, refined the PPQ model & tested two different secondary screening systems for species with moderate risk scores
- Examined different methods for determining cut-off scores
- Evaluated model & cut-off score methods using a test dataset (N=102)

DRAFT

This is a work in progress that has not yet been reviewed by APHIS program managers

Importation of Plants for Planting; Establishing a Category of Plants for Planting Not Authorized for Importation Pending Pest Risk Docket ID: APHIS-2006-0011 (Comment period closed Oct 21, 2009

- We are proposing to establish a new category of regulated articles governing the importation of nursery stock, also known as plants for planting
- Scientific evidence taxon is a potential quarantine pest or a potential host of a quarantine pest
- Publish by notice
- Public comment
  http://www.regulations.gov/search/Regs/home.html#docketDetail?R=APHIS-2006-0011

Tie-In to Weed Program

- NAPRA list will dramatically increase the number of plant taxa regulated as potentially invasive

  - about 288 in phase 1; 110 in phase 2
- Regulate potential pest plants prior to full PRA & formal listing as FNW
- Demand for weed risk assessment will increase
- Demand for permits will increase
- Official control must be addressed

APHIS Noxious Weed Program Manager
aka Sheriff Al

Alan.V.Tasker@usda.gov
301/734-5708

http://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/index.shtml

End of Presentation

In the News:

- June 18, 2009: Biofuels could be used to replace jet fuel in less than five years, according to plane-maker Boeing. The industry predicts that if 100 percent of all jet fuel was replaced with biofuels, airline emissions would be cut by 80 percent. Recent tests were conducted using biofuels such as jatropha and algae. GISP has categorized *Jatropha curcas* as a high risk species because it has already demonstrated invasiveness on every continent except Europe and Antarctica (GISP, 2008).http://www.reuters.com/article/companyNews/idUKLl80187720090618

- ISAC draft report “Ideally, biofuels should be propagated in containable systems (e.g. terrestrial or aquatic sites constructed specifically to cultivate biofuel plants) and be unable to survive outside of cultivation. Support for biofuels research and demonstration projects will require site selection that minimizes the potential escape of plant species or cultivars to sensitive areas and loss of habitat.”

- APHIS believes that a distinction may be made between terrestrial and aquatic systems.
- Conversation around this point focuses on the use of contained, man-made aquatic systems for the production of aquatic biofuel species.
- Terrestrial biofuel crops are more likely to be propagated in terrestrial systems such as managed forests, plantations, grasslands, or agricultural land previously planted to the same or similar types of crops (but necessarily for use as biofuels) or on underutilized or marginal land. ads/wra.pdf

- These sites are unlikely to be “containable systems.” Some movement of biological material is likely from these sites.
- An important consideration is the consequence of that movement.
  - Are the plants likely to establish;
  - will they persist for multiple generations;
  - will the plants spread from those sites into other areas;
  - do the plants out-complete native or other desirable plants in areas where they have spread or otherwise cause economic or environmental harm or harm to human health?

- Depending of these answers serious consideration should be given as to whether to deploy the biofuel crop, and if so under what conditions to reduce escape and dispersal and to detect and respond to unwanted populations, as included in the other recommendations adopted.
- many desirable biofuel plants will likely survive outside of managed systems.
- While it may be unwise to choose terrestrial plants that are invasive as cultivated biofuel feedstocks, it may also be unwise to choose plants that require large inputs and significant habitat restructuring in order to survive.

Potential traits to be incorporated into a bioenergy crop:

- Fitness traits. These are traits that could increase biomass under optimal or stress conditions.
  - Stress tolerance: drought/cold/heat/salt/heavy metals/flooding
  - Resistance to pests: insects, viruses, fungi, bacteria and tolerance to herbicides
  - Improved water, nutrient, light, CO_2 utilization
  - Rapid growth/increased yield

Potential traits to be incorporated into a bioenergy crop:

- Conversion Traits. Improve energy yield or reduce the cost of processing
  - Altered cell-walls
  - Temperature stable cell wall/degrading enzymes
  - Pretreatment enzymes
-

Potential traits to be incorporated into a bioenergy crop:

- Biocontainment Traits. minimize the spread of the trait outside the production area.
  - Pollen/seed Sterility
  - Domestication traits
-

Environmental Topics:

- Climate Change/Carbon Storage/Soil Quality
- Land Use
- Invasiveness
- Hydrology/water quality
- Biodiversity/Gene Flow

Environmental Topics:

- Climate Change/Carbon Storage/Soil Quality

Environmental Topics:

- Land Use
  - Traits that improve yields will reduce the footprint of land needed for bioenergy crops. In this way, the impact on food security, biodiversity, and conservation areas is lessened.
  - Traits (GE or achieved by conventional breeding techniques) conferring enhanced salt tolerance or heavy metal tolerance, for example, would facilitate production in marginal areas that might otherwise be used for conservation.
  - This could provide an incentive to convert the land from conservation uses to production uses.

Environmental Topics:

- Land Use
  - Production uses generally have greater environmental impacts than conservation uses. However, if the salt tolerance or heavy metal tolerance sequestered these undesirable elements for removal from the site, the result might be an environmental positive. Especially if conservation species which wouldn't tolerate the previous conditions could then be introduced in the succession on these sites.
  - However, if the salt tolerance or heavy metal tolerance sequestered these

Environmental Topics:

- Invasiveness

Environmental Topics:

- Hydrology/water quality

Environmental Topics:

- Biodiversity/Gene Flow

Methods: Model Development & Comparison

WRA Model

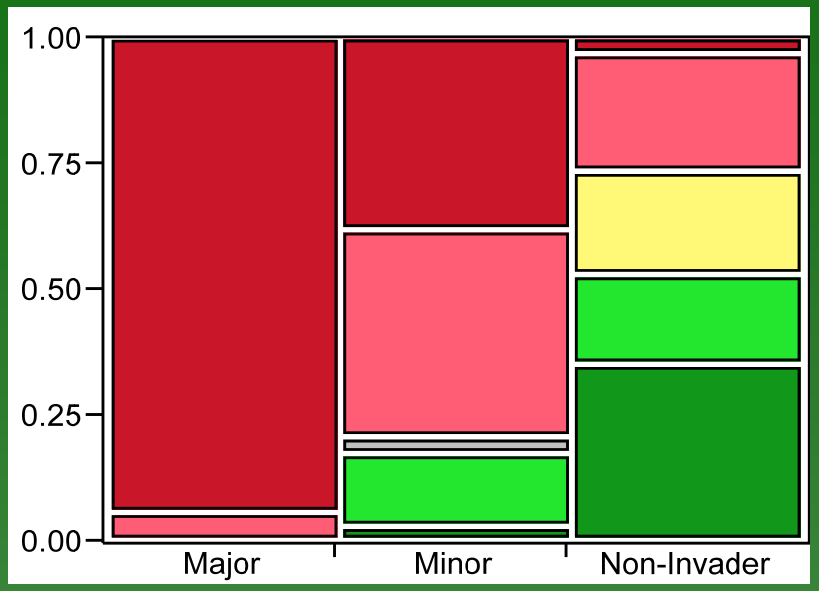
Determination of Cut-off Score

	Aus WRA	PPQ1	PPQ2	PPQ3	PPQ3-SecD	PPQ3-SecN
Manual	X	X	X	X	X	X
ROC	X	X	X	X	X	X
Logistic Regression	X	X	X	X	X	X
Log Reg - ROC	X	X	X	X	X	X

Goal: Find the model that maximizes overall accuracy, minimizes error, and minimizes the number of species in the evaluate further category

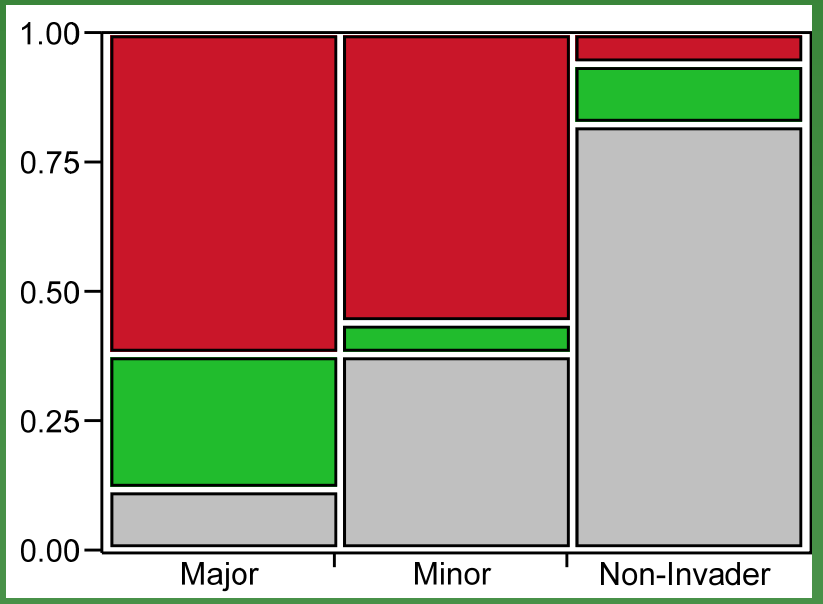
Assessment Model	Question Type (No. of Questions)	No. of Significant X^2-Tests	Proportion of Questions with Significance
Australian	Domestication/Cultivation (3)	1	0.3
41%	Climate & Distribution (5)	2	0.4
	Weed elsewhere (5)	5	1.0
	Undesirable traits (12)	3	0.3
	Plant type (4)	0	0.0
	Reproduction (7)	1	0.1
	Dispersal mechanism (8)	6	0.8
	Persistence attributes (5)	2	0.4
PPQ (Mod 1)	Establishment / Spread (24)	9	0.4
50%	Impact - Environmental (7)	6	0.9
	Impact - Anthropogenic (5)	2	0.4
	Impact - Production (7)	5	0.7
	Impact - General (3)	1	0.3

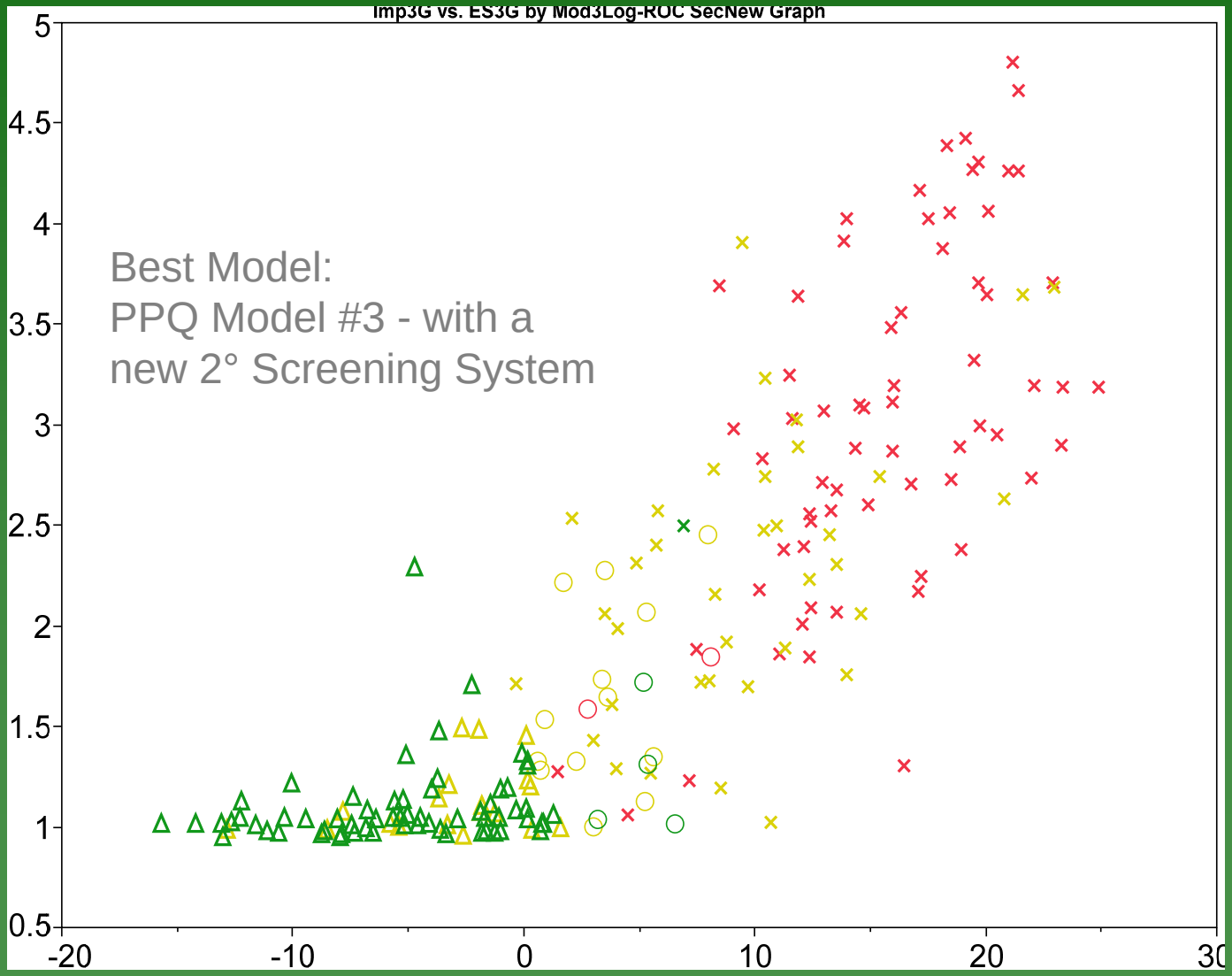
Invasiveness elsewhere (X^2=83.0***)



- Red = Answers contrib to Invasiveness
- Green = Answers don't contrib to Invasiveness
- Gray = Unknown

Forms seed banks (X^2=8.3**)




Imp3G vs. ES3G by Mod3Log-ROC SecNew Graph
Best Model:
PPQ Model #3 - with a
new 2° Screening System
Impact
Establishment / Spread
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
-20
-10
0
10
20
30
Accept
Evaluate
Reject
Non-invader
Minor-invader
Major-invader

Q-37

What is Quarantine 37?

- 7 Code of Federal Regulations (CFR) 319.37
  - 7 refers to Title 7 of CFR, Agriculture
  - Subtitle B Chapter III contains APHIS regulations
  - Part 319 refers to Foreign Import Quarantines
  - Subpart 319.37 refers to the quarantine specific to "Nursery Stock, Plants, Roots, Seeds & other Plant Products"
  - Nursery stock & associated plant products are now being referred to as plants for planting

How Much Corn Stover can a Corn Grower Pick?

- September 21, 2009 How much corn crop residue, or stover, can be removed for biofuels without harming soil?
- Agricultural Research Service (ARS) studied a 10-mile circle around the University of Minnesota's Morris campus
- That area chosen because the university plans to heat its buildings with gas released by a controlled burning of corn stover—(gasification)

How Much Corn Stover can a Corn Grower Pick?

- Using the ARS Environmental Policy Integrated Climate (EPIC) model, if farmers in that area harvested 40 percent of the stover, this would increase soil erosion by only 0.25 tons an acre per year.
- Erosion levels could be minimized by harvesting stover from areas less susceptible to erosion, by removing stover at lower rates, and by using conservation tillage, diverse crop rotations, and other conservation cropping practices.

Proposed

PHP: Official Control Draft ANPR

- Will allow state or locally funded programs to be recognized as official control for WTO (IPPC) purposes
- Will impact A2 list

Australian Government

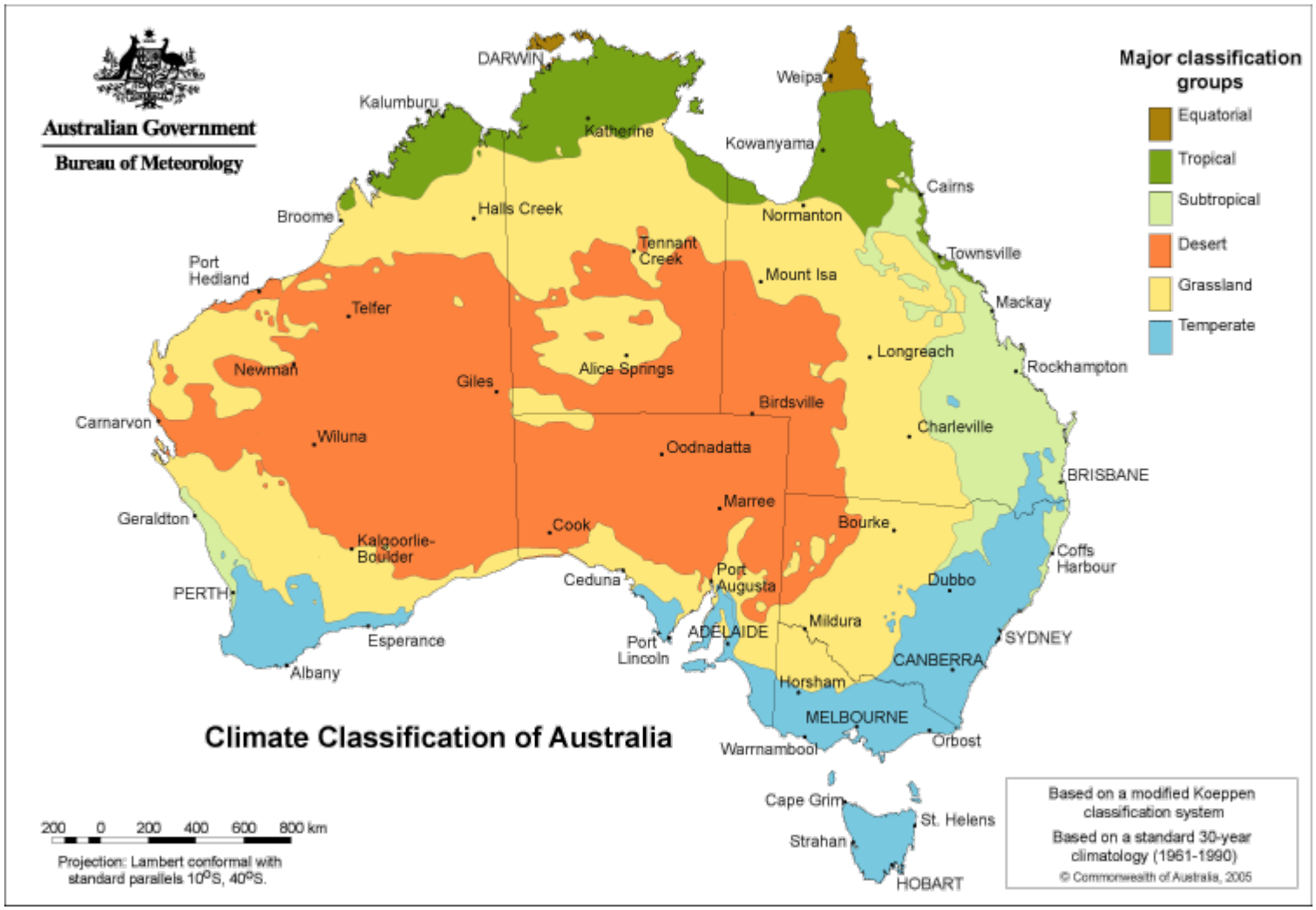
Biosecurity Australia

The Australian approach to assessing and managing the threats associated with the introduction of new species

Bill Roberts, Department of Agriculture, Fisheries and Forestry

Australian environment

- Wide range of climatic zones
  - Cool temperate to tropical
  - Virtually every organism could grow somewhere in Australia
  - Unique native flora and fauna
  - Agriculture dominated by northern hemisphere species but with a mix of tropical species
  - No direct land borders with other countries


Australian Government
Bureau of Meteorology
Major classification groups
Equatorial
Tropical
Subtropical
Desert
Grassland
Temperate
DARWIN
Kalumburu
Katherine
Weipa
Kowanyama
Cairns
Broome
Halls Creek
Normanton
Townsville
Port Hedland
Tennant Creek
Mount Isa
Mackay
Telfer
Longreach
Newman
Alice Springs
Rockhampton
Giles
Birdsville
Carnarvon
Charleville
Wiluna
Oodnadatta
BRISBANE
Marree
Geraldton
Bourke
Cook
Kalgoorlie-Boulder
Coffs Harbour
Port Augusta
Ceduna
Dubbo
PERTH
Mildura
ADELAIDE
SYDNEY
Esperance
Port Lincoln
CANBERRA
Albany
Horsham
MELBOURNE
Climate Classification of Australia
Warrnambool
Orbost
Cape Grim
St. Helens
Strahan
HOBART
200 0 200 400 600 800 km
Projection: Lambert conformal with standard parallels 10°S, 40°S.
Based on a modified Koeppen classification system
Based on a standard 30-year climatology (1961-1990)
© Commonwealth of Australia, 2005

Regulatory framework

- Quarantine Act 1908
  - Quarantine Regulations 2000
  - Quarantine Proclamation 1998
- Environment Protection and Biodiversity Conservation Act 1999
- Gene Technology Act 2000

Regulatory frame work – General Principles

- Risk consists of the harm that might be caused by introduction **and** probability of this harm occurring
- Use a risk assessment process to estimate risk
- Seek to engage stakeholders in the issue
- Does **not** consider the benefits of introduction of individual species

Gene Technology Act

- Scope
  - All organisms modified by gene technology except where sexual reproduction or homologous recombination is used
  - Covers organisms modified in Australia or imported from other countries

Gene Technology Act

- Approach
  - Identifies risks posed by or as a result of gene technology, and managing those risks through regulating certain dealings with GMOs".
- Regulates
  - release into the environment and contained use

Gene Technology Act

- GMO risk is considered relative to the parent organism within the specific receiving environment for use of the GMO.
  - Does the genetic modification increases the level of risk or gives rise to additional risks?

Environment Protection and Biodiversity Conservation Act

- Scope (in regard to new organisms)
  - Potentially all live organisms
    - BUT
  - Relies on the Quarantine provisions for new species of plants
  - Does not regulate the importation of viruses, green algae or single celled organisms such as bacteria or protists
- Generates a live import list of permitted species

Quarantine Act

- Scope
  - Animals
  - Plants
  - Goods
  - People
- Includes viruses, green algae, single celled organisms such as bacteria or protists

Quarantine policy

- Based on the SPS concept of appropriate level of protection (ALOP)
- Expressed as very low but not zero
- Takes account of environment and agriculture
- Substantial operational resources

Risks

- New organism may act as a vector of a pest or disease
- New organism may be a pest or disease
- Organism is invasive or weedy

Imports

- If previously assessed
  - Permitted – with or without conditions
  - Not-permitted

- If not previously assessed
  - Subject to risk analysis

Decision path – organism not assessed previously

- Organism present in Australia and not under official control
  - Will the importation bring in new pests and/or diseases?
  - If no then allow importation

- Organism not present or present but under official control
  - Risk analysis
  - Weed risk assessment

Quarantine risk analysis for imports

- Risk analysis for pests
  - Hazard identification
  - Estimation of the probability of entry establishment and spread
  - Magnitude of the potential consequences if entry establishment and spread occurred
  - Combine probability of entry, establishment and spread with consequences to estimate risk
  - Evaluation of different risk management measures if risk is above ALOP
  - Decision on risk management

Weed RA system - plants

- Based on a series of questions
- Results in a score
- Depending on score
  - Accept the species
  - Reject the species
  - Further assessment needed
- Performs well
- Widely adopted/adapted in other countries

Typical ICON plant listing

- **Species listing for Gerbera spp.**
  - Any species not listed in these tables are prohibited entry into Australia by legislation and require assessment.
- **These species may be imported subject to the conditions C7301, C7302, C7300**.
  - Gerbera jamesonii, Gerbera jamesonii x viridifolia, Gerbera kunzeana
- **These species have been assessed as posing a high risk of becoming weeds in Australia and are prohibited entry by legislation.**
  - Gerbera anandria, Gerbera anandria var. integripetala, Gerbera integrpetala

Some issues

- "Mixed" regulatory environment
  - Importers may need to deal with several agencies
- Critical lack of data
- Often limited risk management options
- Potential benefits not factored into specific decisions
- Evolving policy background

Where to next?

- Beale Review
  - Establishment of separate agency for quarantine
  - Better integration of environmental and agricultural aspects
  - Rewrite of Quarantine Act
  - Greater use of proponent risk analyses
- Changes to the EPBC Act

Web addresses

- ICON database of import conditions
  - http://www.daff.gov.au/aqis/import/icon-icd
- Weed risk assessment system
  - http://www.daff.gov.au/ba/reviews/weeds/system
- Live import list
  - http://www.environment.gov.au/biodiversity/trade-use/lists/import/index.html
- Genetically modified organisms
  - http://www.ogtr.gov.au/

ISPRA
Istituto Superiore per la Protezione
e la Ricerca Ambientale

IUCN

ISSG
Invasive Species
Specialist Group

Incorporating biosecurity issues from new cropping systems into the European Strategy on Invasive Alien Species

Piero Genovesi
Chair IUCN/SSC Invasive Species Specialist Group

18-21 November 2009
Shine Dome
Canberra, Australia

CSIRO

OECD Biosecurity in the new Bioeconomy

Outline of presentation

1 overview of European framework

- Present European “biosecurity” framework relevant for biofuels
- Biofuels in Europe, new challenges
- EU regulations on biofuels and GMOs

2 IUCN perspective on the principles for a sustainable biofuel production

- IUCN draft guidelines on biofuel and invasives

3 How all this could fit in the development of European policy on invasive alien species

- Where we are in the development of a European policy
- Examples from other sectors

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EU planthealth framework

European and Mediterranean Plant Protection Organization
EPPO OEPP
Organisation Européenne et Méditerranéenne pour la Protection des Plantes

- EPPO A1 and A2 lists of pests
- Inclusion in lists based on transparent Standards on Pest Risk Analysis
  - plant/agent considered invasive or potentially invasive;
  - plant/agent not yet present in Europe or still containable;
  - potential for spread and damage;
  - actively spreading or increasing impacts

EU planthealth framework

European and Mediterranean Plant Protection Organization
EPPO OEPP
Organisation Européenne et Méditerranéenne pour la Protection des Plantes

- EPPO A1 list comprises 181 species; A2 list: 120 species; list of invasive alien plants: 44 species.
- In 2005 only 7 spp in A1-A2

EU planthealth framework

European and Mediterranean Plant Protection Organization
EPPO OEPP
Organisation Européenne et Méditerranéenne pour la Protection des Plantes

EPPO Council Recommendation on Plants for Renewable Energy and Invasive Alien Plants (2007)

- recommends that NPPOs liaise with relevant departments to discourage the planting of invasive alien plants for bioenergy and supports a risk-based approach to avoid spread outside plantations
- EPPO is collecting information from countries on biofuel crops being used
- No further action has been taken under this measure to date.

Biofuels in the EU

- The EU transport sector, accounting for more than 30% of the total energy consumption in the Community, is 98% dependent on fossil fuels
- High share of imports and thus extremely vulnerable to any market disturbance.
- Expected 90% of the increase of CO2 emissions between 1990 and 2010 attributable to transport.

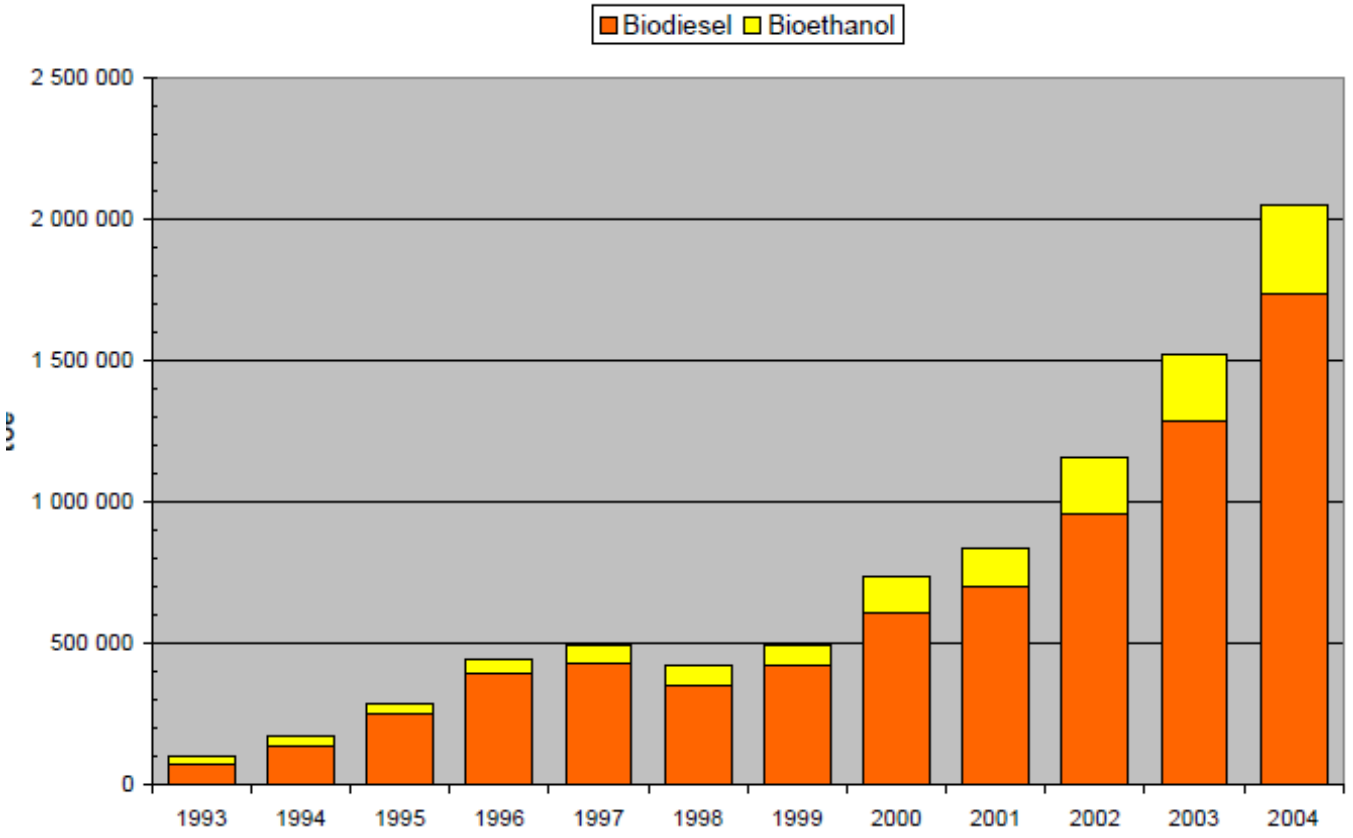
Source: Biofuels in the European Union. 2006 Final Draft Report Biofuels Research Advisory Council

Biofuels in the EU

- EU has agreed on ambitious binding targets: 20% share of energy from renewable sources by 2020 and a 10% share of renewable energy specifically in the transport sector
- It is estimated that between 4 and 13% of the total agricultural land in the EU would be needed to produce the amount of biofuels to reach the level of liquid fossil fuel replacement[1]

[1]Source: Biofuels in the European Union. 2006 Final Draft Report Biofuels Research Advisory Council

Biofuels in the EU



Biofuel production in the EU since 1993. (2004: EU25). Source: Eurobserv'er 2005.

EU legislation on biofuels

Directive on the Promotion of the use of biofuels and other renewable fuels for transport (2003/30/EC)

- promoted the use of biofuels for EU transport.
- 5,75 % of all transport fossil fuels (petrol and diesel) must be replaced with biofuels by 2010 (2% by 2005)

- In 2008 EC announced a revision of this policy
- General concern on the impact of biofuels on rising food prices, and on the destruction of rainforest

EU legislation on biofuels

Directive 2009/28/EC of 23 April 2009

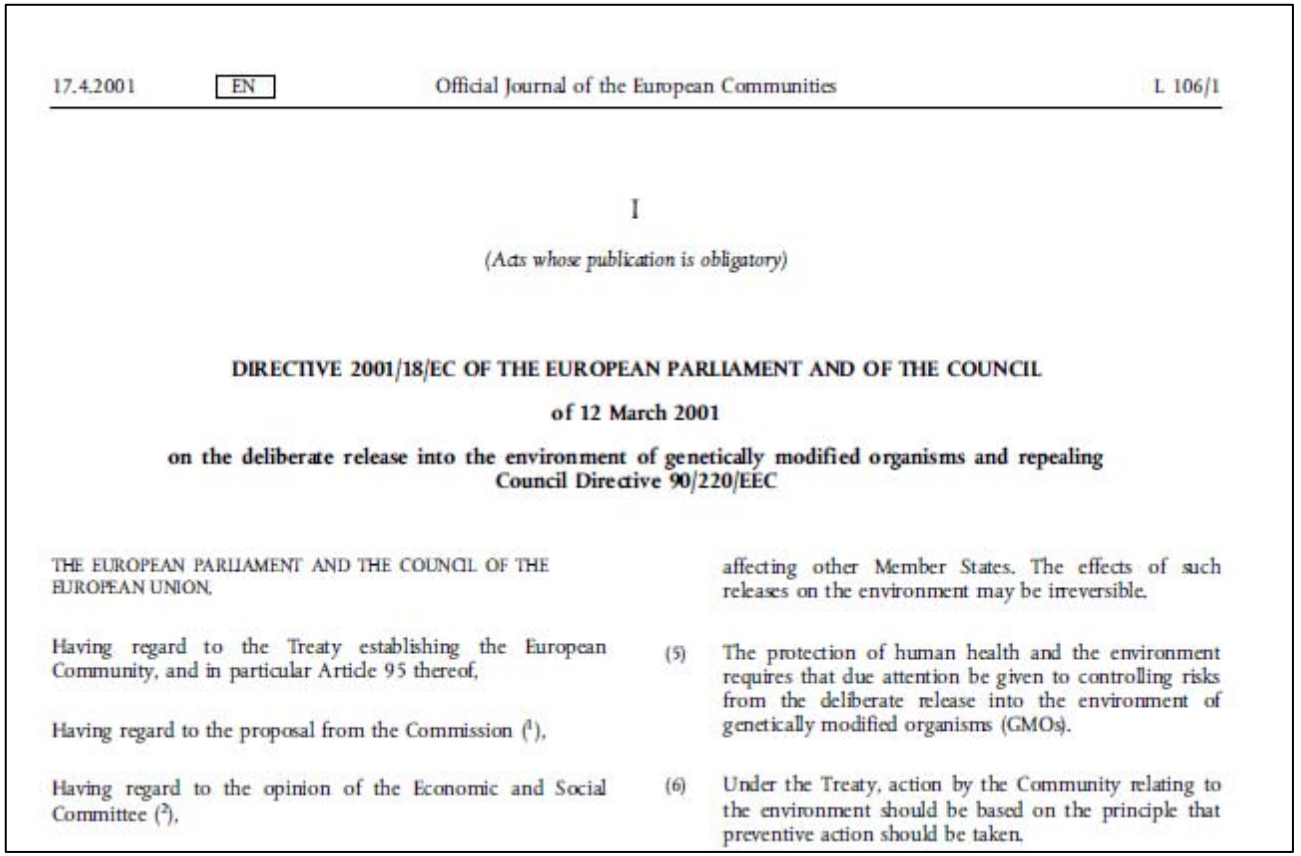
- Confirmed Eu targets: 20% share of energy from renewable sources by 2020 and a 10% share of renewable energy specifically in the transport sector
- Energy generated from biofuels and bioliquids may only count towards Community targets and be eligible for financial support if consistent with sustainability criteria

EU legislation on biofuels

…**Directive 2009/28/EC of 23 April 2009**

- Wetlands and continuously forested areas ineligible for producing biofuels.
- Biofuel production should comply with EC environmental requirements for agriculture, protection of water quality, and social requirements.
- Sustainable production of biofuels worldwide through multilateral and bilateral agreements to cover key environmental and social considerations
- Monitor impact of biomass cultivation, such as through land-use changes, including displacement, the introduction of invasive alien species…

European legislation on GMO



17.4.2001 EN Official Journal of the European Communities L 106/1

I

(Acts whose publication is obligatory)

DIRECTIVE 2001/18/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 12 March 2001

on the deliberate release into the environment of genetically modified organisms and repealing Council Directive 90/220/EEC

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 95 thereof,

Having regard to the proposal from the Commission (1),

Having regard to the opinion of the Economic and Social Committee (2),

affecting other Member States. The effects of such releases on the environment may be irreversible.

(5) The protection of human health and the environment requires that due attention be given to controlling risks from the deliberate release into the environment of genetically modified organisms (GMOs).

(6) Under the Treaty, action by the Community relating to the environment should be based on the principle that preventive action should be taken.

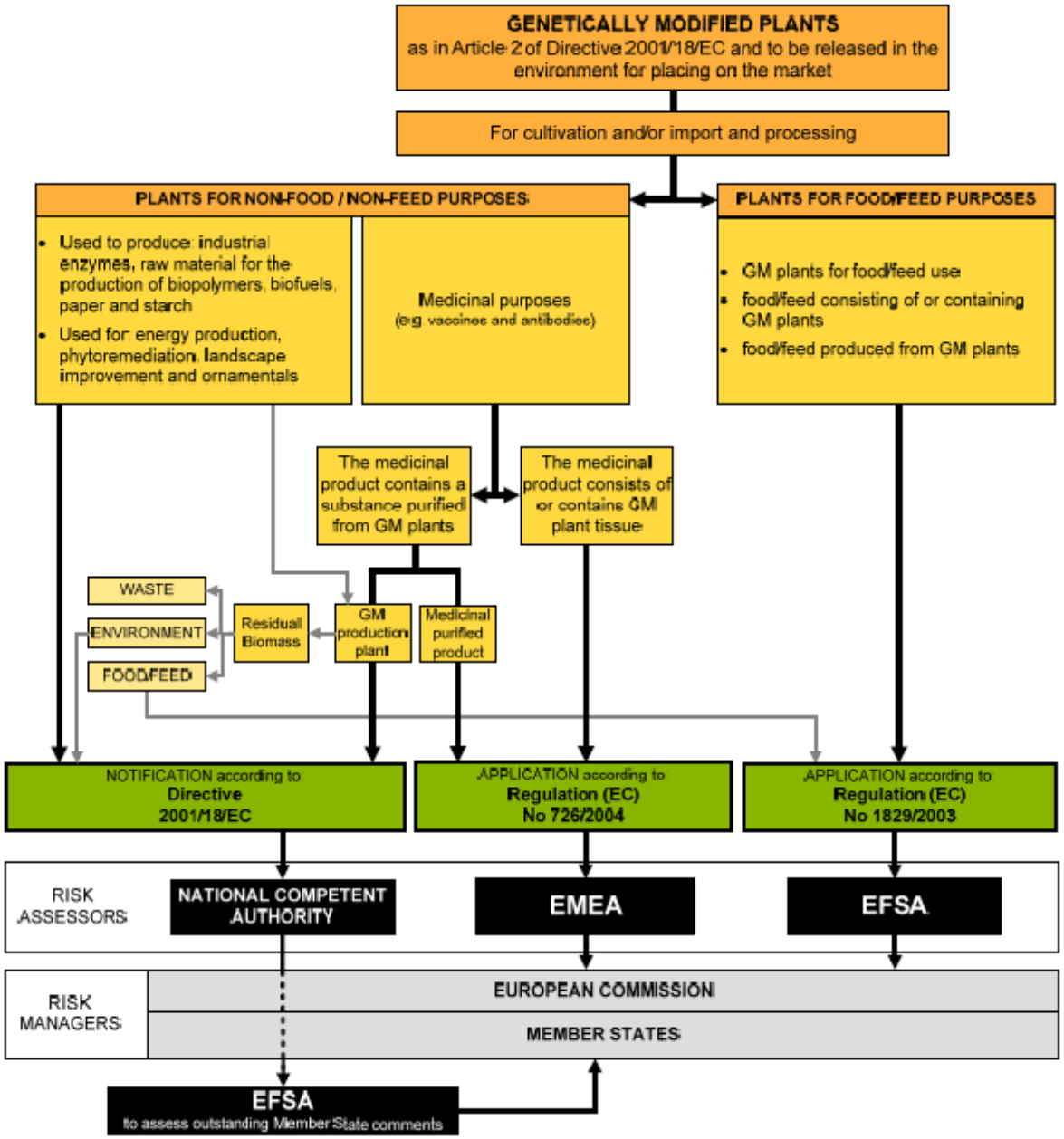
European legislation on GMO

Art. 4

1 Member States shall, in accordance with the precautionary principle, ensure that all appropriate measures are taken to avoid adverse effects on human health and the environment which might arise from the deliberate release or the placing on the market of GMO

2 Any person shall, before submitting a notification .. carry out an environmental risk assessment

4 Member States shall designate the competent authority responsible for complying with the requirements of this Directive



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  - Who we are
    - EFSA structure
    - Management Board
    - Executive Director
    - Operational Management
    - Staff directory
    - Scientific Panels & Units
    - Declarations of Interests

Who we are

Who we are

The European Food Safety Authority (EFSA) is an independent European agency funded by the EU budget that operates separately from the European Commission, European Parliament and EU Member States.

EFSA Management Board

EFSA is governed by an independent Management Board whose members are appointed to act in the public interest and do not represent any government, organisation or sector. The 15-member Board sets EFSA's budget, approves the annual work programme and is responsible for ensuring that EFSA works effectively and co-operates successfully with partner organisations across the EU and beyond.

Executive Director

EFSA's Executive Director, currently Catherine Geslain-Lanéelle (appointed in July 2006 for a five year term), is the legal representative of the Authority. She is responsible for all operational matters, staffing issues and drawing up the annual work programme in consultation with the European Commission, European Parliament and EU Member States

EFSA Science

EFSA's Scientific Committee and Panels are composed of highly qualified experts in scientific risk assessment. All members are appointed through an open selection procedure on the basis of proven scientific excellence, including experience in risk assessment and peer reviewing scientific work and publications

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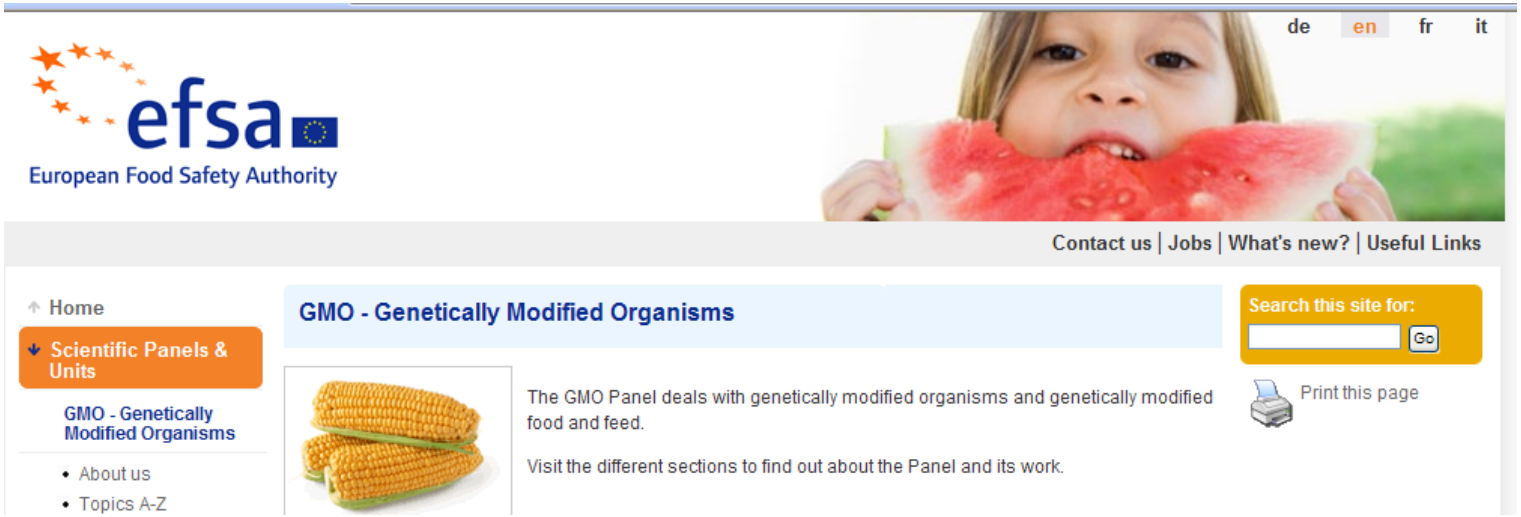
EFSA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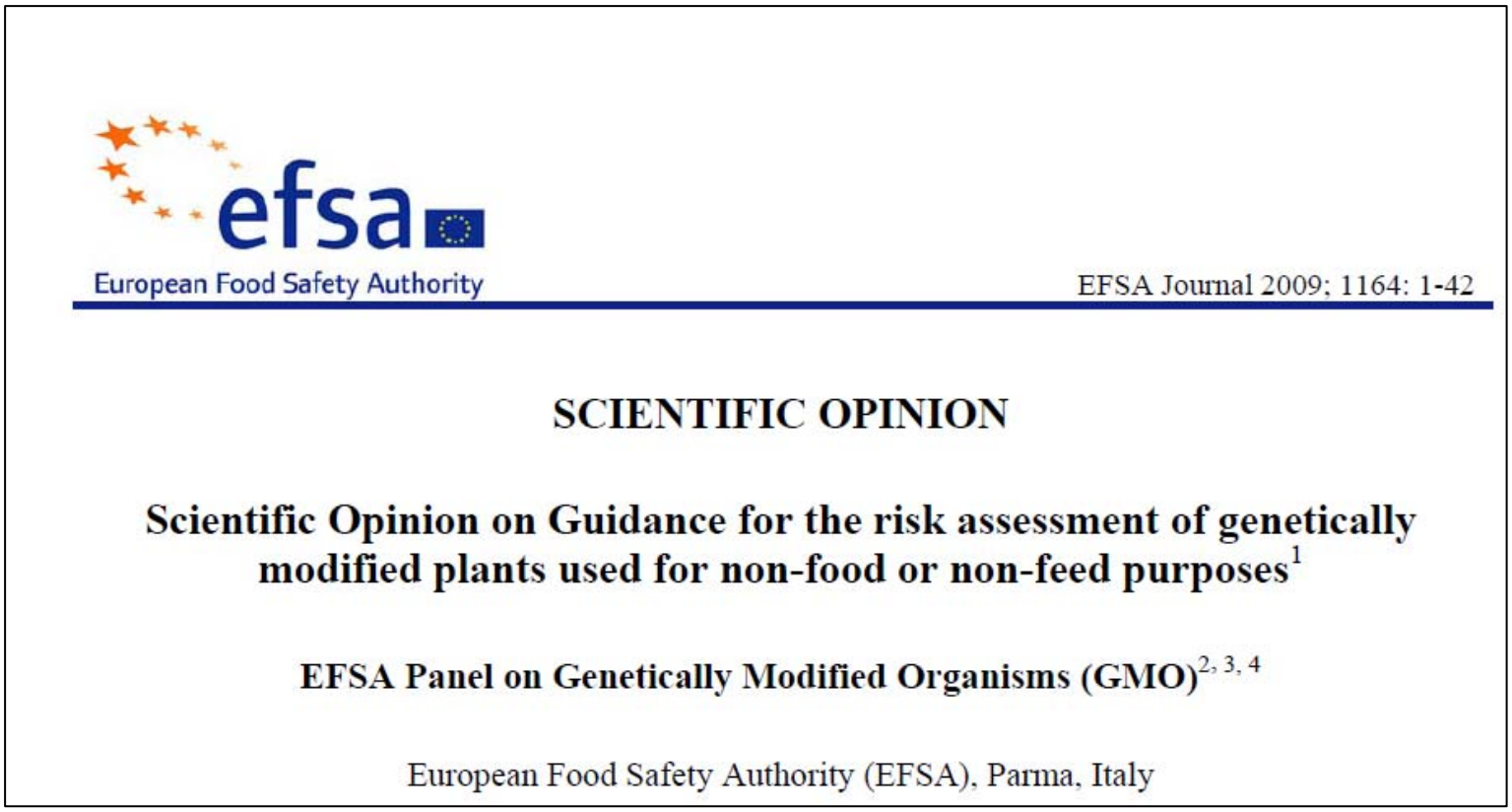
Risk assessment of non food GMOs



European Food Safety Authority

EFSA Journal 2009; 1164: 1-42

SCIENTIFIC OPINION

Scientific Opinion on Guidance for the risk assessment of genetically modified plants used for non-food or non-feed purposes[1]

EFSA Panel on Genetically Modified Organisms (GMO)[2, 3, 4]

European Food Safety Authority (EFSA), Parma, Italy

Risk assessment of non food GMOs

Risk assessment of non food GMOs

- comparative approach valid, but to be applied carefully;
- Consider risk of accidental intake or exposure by humans, livestock and wildlife animals
- Confinement measures (abiotic and biotic conditions), methods of production stewardship, safety thresholds and inspections

3.4.1. Persistence, invasiveness, selective advantage or disadvantage

- Persistence, invasiveness, selective advantage or disadvantage. It will be important to determine whether they also have advantages in other niches and a tendency to displace other plant species

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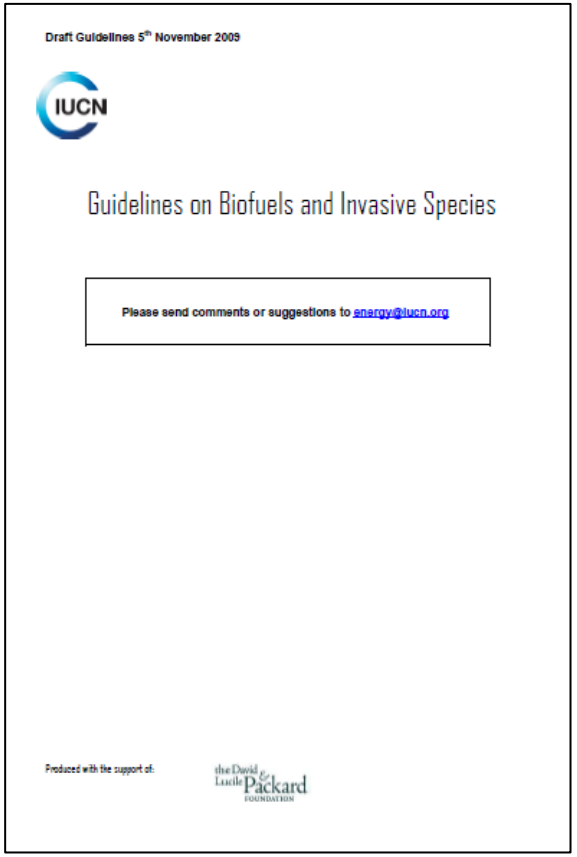
IUCN draft guidelines

- Last April IUCN and GISP held a meeting in Nairobi to address the risks that biofuels promote biological invasions
- Draft guidelines were produced and widely circulated within the IAS IUCN community
- Aim to incorporate revised gudelines into the work of the IUCN Roundtable on Sustainable Biofuels


Draft Guidelines 5th November 2009

IUCN

Guidelines on Biofuels and Invasive Species

Please send comments or suggestions to energy@iucn.org

Produced with the support of: the David & Lucile Packard Foundation

IUCN draft guidelines

Five key recommendations

1. Follow a precautionary approach when choosing feedstocks
2. Work with stakeholders to build capacity
3. Obey regulations
4. Develop and follow Environmental Management Plans
5. Extend planning, monitoring and assessments beyond the field

IUCN draft guidelines

Planning

- Stakeholders should conduct a cost-benefit analysis that includes the potential costs from an invasion.
- Governments should develop Strategic Environment Assessments to plan biofuel production at national level and developers and investors should conduct Environment Impact Assessment at project level that include weed risk assessments.
- Contingency fund as insurance for any necessary remedial actions in the future.

IUCN draft guidelines

Importation

- Importation within a suitably robust quarantine system.
- Governments should strengthen their capacity to monitor and enforce phytosanitary regulations and base policies on sound ecological principles.
- Developers and investors should comply with all national regulations relating to the importation and introduction of live plants or propagules.

IUCN draft guidelines

Production

- Feedstock plantations should only be developed subject to the development, submission and implementation of an Environmental Management Plan, that should include:
- Specific best practices to be followed
- A contingency plan in the event of “escapes”
- Contingency fund to pay for eradication, containment, management, or restoration.
- Monitoring system that checks for escapes and the presence of pests and pathogens.
- EMPs should ideally be audited by a neutral third party.

IUCN draft guidelines

Transportation/Processing

- Risks of invasion related to transportation and processing of feedstocks should be minimized. Robust monitoring system.

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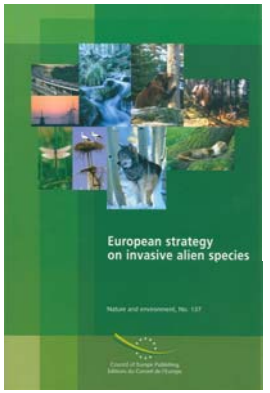
Toward a European strategy

European Strategy on Invasive Alien Species
(Genovesi & Shine 2004)

- Approved by the Standing Committee of the Bern Convention in 2003
- Welcomed by the European Council and by the CBD COP (Decision VI/23)
- Kyiv Resolution on Biodiversity call European states to implement the European strategy on IAS

Prevention of intentional introductions

Proposed introductions are assessed through risk analysis. Only low risk spp permitted



- Prohibit intentional introductions of alien species without priori authorisation from competent authority
- Evaluation process including risk analysis
- Work toward a regional listing system
- Apply existing regulations/codes of conduct (i.e. IPPC/EPPO codes for biological control agents)

Box 15 Possible components of an agreed listing system for alien species

- **Black list**
- **White list**
- **Grey list**

EU decisions and commitments

Communication on Biodiversity, May 2006:
"Halting the loss of biodiversity by 2010 and beyond"

- IAS as key priority area of "EU Action Plan to 2010 and beyond"
- Objective 5: To substantially reduce the impact of invasive alien species and alien genotypes
- 4 actions required in Action Programme:
  1. to assess gaps and develop an EU strategy to address IAS
  2. Member States to develop national strategies

EU decisions and commitments

Communication on Biodiversity, November 2009: "Towards an EU Strategy on Invasive Species"

- Proposes 4 options
  - A) Business as usual
  - B) Maximising the use of existing legal instruments together with voluntary measures
  - B+) Adapted existing legislation
  - C) Comprehensive, dedicated EU legal instrument

- EU Strategy established by 2010

Results of EC funded assessments

- "Scope option for EU action on invasive alien species" (IEEP 2006):
  - Assessed EC legal and policy framework
  - Identified gaps
  - Proposed changes and options for future work


Institute for European Environmental Policy

SCOPE OPTIONS FOR EU ACTION ON INVASIVE ALIEN SPECIES (IAS) ENV.B.2/SER/2005/0078r

FINAL REPORT

June 2006

- "Technical support to EU strategy on IAS" (IEEP 2009)
  - Estimates costs of IAS in Europe (> € 12 bln/yr)
  - Identifies policy options
  - Discusses costs/benefits of the options


Institute for European Environmental Policy

TECHNICAL SUPPORT TO EU STRATEGY ON INVASIVE ALIEN SPECIES (IAS)

Assessment of the impacts of IAS in Europe and the EU

FINAL DRAFT REPORT

June 2008

Opinions by other bodies

EUROPEAN UNION

Committee of the Regions

80th plenary session
17-18 June 2009

OPINION
of the
Committee of the Regions
on
A NEW IMPETUS FOR HALTING BIODIVERSITY LOSS

48. considers that only a European level strategy for combating invasive species can hope to be effective

Opinions by other bodies

European Economic and Social Committee

on the

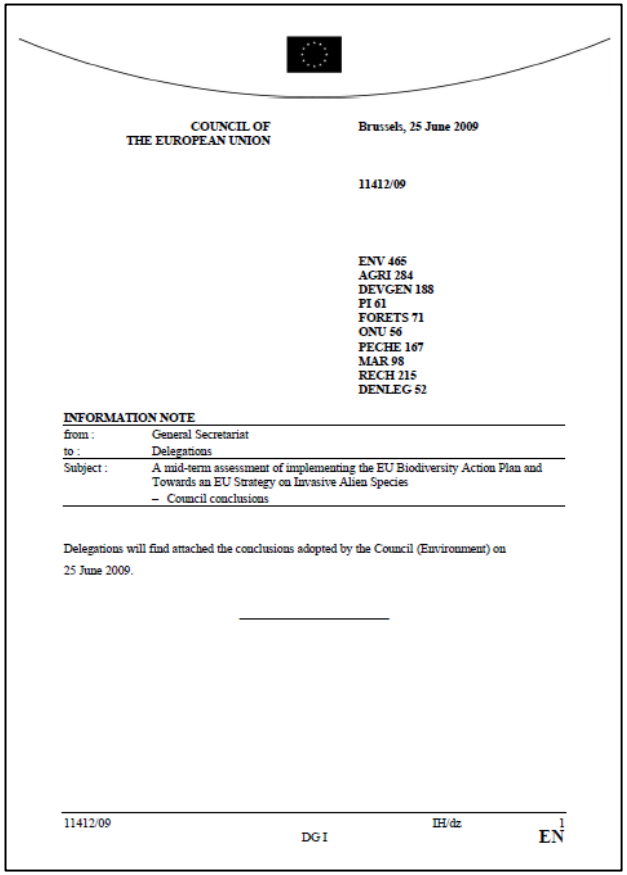
Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions – Towards an EU strategy on invasive species

COM(2008) 789 final

6.2.2 The Committee is convinced that the best way to tackle the threat of IS would be through the adoption of a comprehensive, dedicated EU legal instrument as well as the establishment of a new European Agency.

EU Council Conclusions 25th June 2009

- Urgent need for an EU strategy on invasive alien species, based on CBD guiding principles, Bern "European Strategy on IAS", Plant Health framework
- Cooperation of all MS and the EC in addressing IAS issues



COUNCIL OF
THE EUROPEAN UNION

Brussels, 25 June 2009

11412/09

ENV 465
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PI 61
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ONU 56
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MAR 98
RECH 215
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INFORMATION NOTE

from :	General Secretariat
to :	Delegations
Subject :	A mid-term assessment of implementing the EU Biodiversity Action Plan and Towards an EU Strategy on Invasive Alien Species – Council conclusions

Delegations will find attached the conclusions adopted by the Council (Environment) on 25 June 2009.

Toward a European strategy

- EU Council did not indicate which option should be considered:

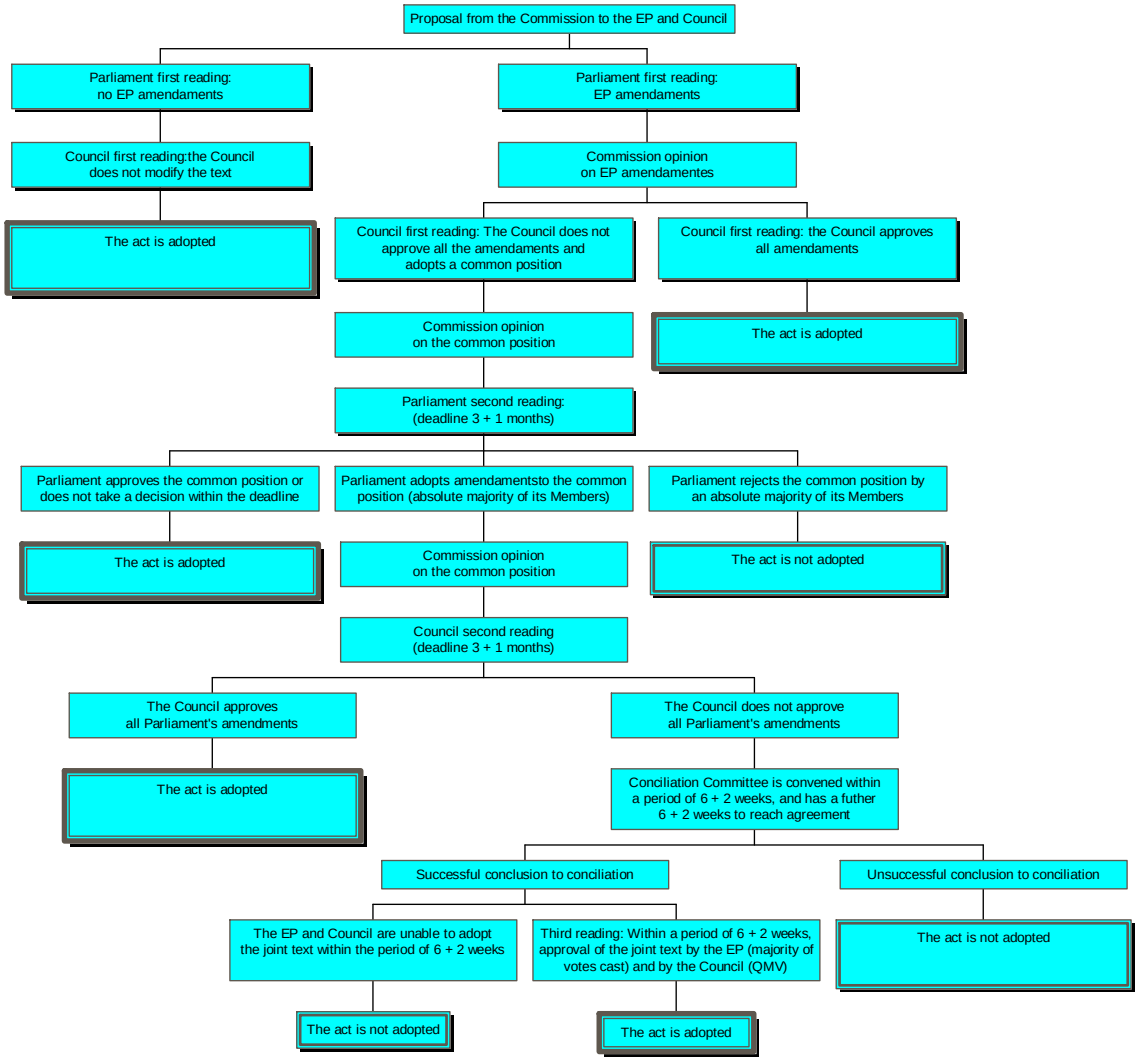
  B) Maximising the use of existing legal instruments together with voluntary measures

  B+) Adapted existing legislation

  C) Comprehensive, dedicated EU legal instrument

Sectoral *vs* comprehensive "biosecurity"

EU decision process



Aquaculture regulation

L 156/6 EN Official Journal of the European Union 14.6.2008

COMMISSION REGULATION (EC) No 535/2008

of 13 June 2008

laying down detailed rules for the implementation of Council Regulation (EC) No 708/2007 concerning use of alien and locally absent species in aquaculture

THE COMMISSION OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Community,

Having regard to Council Regulation (EC) No 708/2007 of 11 June 2007 concerning use of alien and locally absent species in aquaculture [1], and in particular the third paragraph of Article 23 and Article 24(3) thereof,

HAS ADOPTED THIS REGULATION:

Article 1

This Regulation lays down detailed rules implementing the conditions necessary for adding species to Annex IV to Regulation (EC) No 708/2007 and regarding the development of a specific information system concerning the permits for the introductions and translocations of alien and locally absent species in aquaculture.

Aquaculture regulation

- Requires MS to ensure that all appropriate measures are taken to avoid adverse effects
- Each MS designate an authority and may appoint scientific advisory committee
- Import requires a permit, based on PRA
- Consultation with neighbouring MSs
- Possible regulation of containment facilities
- “White list” of permitted species

Aquaculture regulation

- **Aquaculture regulation can be a pilot policy framework:**
  - Establishes a clear decision framework: EC directive gives guiding principles; MSs responsible for decision, based on technical advice
  - Introduces a “white list” system
  - Permitted species based on PRA

Conclusions

- Rapid growth of biofuel vs “weak” biosecurity framework
- EU biofuel policy reflects traditional scarce attention to risks of invasions, in respect for ex. to the concerns on GMOs or landuse changes
- Legislation more stringent for GM biofuel crops
- Potential positive role of independent PRA authority
- Europe still in a dynamic phase:
  - Biofuel regulatory approach being developed
  - European comprehensive “biosecurity” policy being discussed

Acknowledgments

- Sarah Brunel (EPPO)
- Valeria Giovannelli (ISPRA, GMO regulations)
- Geoffrey Howard, Sam Keam (IUCN/GISP, Naiobi)
- Clare Shine (IUCN/ISSG/GISP, legal expert)