

PRATI<sup>Q</sup>UE



# PRATI<sup>Q</sup>UE

*Enhancements of Pest Risk Analysis Techniques*

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# Summary of the presentation

- The context of PRATIQUE: Why did Pest Risk Analysis (PRA) need enhancing?
- How did PRATIQUE tackle the key challenges for PRA enhancement?
  - PRA is a young science
  - Lack of data to analyse the risks
  - Insufficient exploitation of important new scientific and technological developments
  - PRA procedures not user-friendly
- How to access the results of PRATIQUE

# Why did PRA in Europe need enhancing?

1. PRA is a young science (first schemes developed only in 1990)
2. Lack of data to analyse the risks posed by pests to all member states of the EU or EPPO
3. Insufficient exploitation of important new scientific and technological developments to enhance the techniques used in PRA
4. PRA procedures are complex\* for the risk analysts and the decision makers. They need to be fit for purpose and user-friendly

*\*EPPO PRA scheme: large number of questions, 5 level risk rating, 3 levels of uncertainty & comment box*

# 1. PRA is a young science

# PRATIQUE



*Enhancements of Pest Risk Analysis Techniques*

March 2008 – May 2011

PRATIQUE: Permission granted to a ship or boat to use a port on satisfying the local quarantine regulations or on producing a clean bill of health

*[French, from Old French pratique, from Medieval Latin prāctica, ultimately from Greek prāktikē, from feminine of prāktikos, practical]*

# PRATIQUE: Partners

5 European universities (IBOT, Imperial, UNIFR, UPAD, WU)

6 European research institutes (CIRAD, Fera, INRA, JKI, LEI, PPI)

2 international organisations (CABI & EPPO)

2 partners from outside Europe (CRCNPB & Bio-Protection)



Food and Environment Research Agency



Plant Protection Institute



Institute of Botany, Academy of Sciences of the Czech Republic



European and Mediterranean Plant Protection Organization



Institut National de la Recherche Agronomique



Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD)



Julius Kuhn-Institut



University of Padova, Environmental Agronomy



Agricultural Economics Research Institute



Wageningen University



University of Fribourg



CAB International



Imperial College London



Cooperative Research Centre for National Plant Biosecurity



Lincoln University, National Centre for Advanced Bio-Protection Technologies

# PRATIQUE: Key partner skills

- Entomologists
- Plant pathologists
- Economists
- Ecologists
- Risk analysts
- Phytosanitary experts
- Plant protection managers
- Computer scientists

# PRATIQUE: Observers

- EU DG Sanco
  - Harry Arjis
- EFSA
  - Elzbieta Ceglarska
- EU Plant Health Standing Committee
  - Jose Fernandez
  - Ernst Pfeilstetter
- Related EU-funded Projects
  - Véronique Decroocq (SHARCO)
  - Alan Inman (EUPHRESCO)
  - Konstadinos Mattas (TEAMPEST)
  - Alex Aebi (ENDURE)
- Norway (Bio-Forsk)
  - Trond Rafoss
- Canada (CFIA)
  - Lesley Cree
  - Louise Dumouchel
  - Andrea Sissons
- USA (USDA-APHIS)
  - Christina Devorshak
- UK (Forest Research)
  - Hugh Evans
- Belgium
  - Etienne Branquart (Belgian Biodiversity Platform )
- UK
  - Gordon Copp (CEFAS)

Also many links with other EU projects, e.g.  
SEAMLESS  
PEPEIRA  
Q-Detect  
ISEFOR

## 2. Lack of Data for PRA

- PRA quality is highly dependent on data
- EU and EPPO need to produce PRAs relevant for all member states
  - Data from some member states difficult to obtain
  - Language barriers
- Specific pest-related information may be lacking but sources are relatively well-known
- Critical crop, pathway, and impacts-related data often very difficult to obtain



## Datasets collected, scored for quality and usefulness and gaps identified

Dataset categories	Total evaluated	General Scores					Total retained
		A	B	C	D	U	
Pests in the current area of distribution (task 1.1)	236	50	61	53	70	2	166
Pathways and economic datasets (task 1.2)	118	5	37	38	16	22	96
Area under consideration for the PRA (task 1.3)	266	30	105	91	27	13	239
Pest management (task 1.4)	155	24	66	28	8	29	147

### Score   Definition


A	Essential, high quality and widely applicable
B	Good quality but applicable to specific regions
C	Narrow or very limited usefulness or overlap with categories A or B.
D	Unreliable, contain too many errors or are generally irrelevant
U	Cannot currently be assessed due to a language barrier

# Access to datasets provided via a dedicated website


CAPRA : Computer Assisted Pest Risk Analysis - Mozilla Firefox

File Edit View History Bookmarks Tools Help

CAPRA : Computer Assisted Pes... x CAPRA : Computer Assisted Pes... x +



CAPRA NETWORK



**Menu**

Home  
Datasets for PRA  
Downloads  
PRATIQUÉ Deliverables

User :  
richard.baker@fera.gsi.gov.uk  
Downloads (CAPRA, user guide,...)  
Datasets  
Disconnect

## Dataset Management System - Pathways and economic datasets

name	area	overall qual	path data	host manage	crop prod	export data	consumer	interception	loss data	control cost	remarks
EPPO report on notifications of non-compliance, EPPO reporting service	Europe	A	A					A			On EPPO website more information available (factsheets etc).
EUROPHYT	Europe	A	A					A			There are different sections to EUROPHYT, which have to be applied to for access. EUROPHYT-CIRCA acts as a notice board for member states and has data on interceptions, technical and biological information reports on surveys and information on trade related issues. EUROPHYT-PHY manages the notifications of interceptions. There is also a report system - where reports already created can be consulted and new reports may be generated. Some data from other categories than those ticked may sometimes and for some countries and pests be available, e.g. I seem to recall seeing some data on costs of Diabrotica control - but it is not consistent.
EUROSTAT	Europe	A			A	A					Quality will depend on individual states which supplies the data
FAOSTAT	worldwide	A	B		A	A	A				Information on trade is difficult to find
GTAP 6.0 dataset	world	A	A		A	A	A				Crop data may be at too high level of aggregation
NISIC	USA	A	A	A		A		A	A	A	Also many links to other resources
Agreste	France	B		B	B	C	C				English version gives no info; only the site in the native language
AIPH, International Statistics Flowers and Plants	worldwide	B			B	B	B				Good quality data for flowers and flower products
Applied Plant Research _WUR	Netherlands	B		B	A						
BMVEL	Germany	B	B	C	B	B	B				
Bundesanstalt für Agrarwirtschaft (Federal Institute of Agricultural Economics)	Austria	B		B	B	B					Extended data available. Follow links: daten und fakten / green report. Search on the base of file titles
DEFRA Agricultural Census data	UK	B		B							
DEFRA Agricultural Census data	UK	B		B							
DEFRA Economics and Statistics	UK	B			B	B	B				

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Contact EPPO

<http://capra.eppo.org/dataset/>

### 3. To exploit new scientific developments:

- PRATIQUE conducted multi-disciplinary research to enhance the techniques used in PRA for:
  - the assessment of economic, environmental and social impacts
  - Ensuring consistency, mapping and summarising risk
  - pathway analysis and systems approaches
  - guiding actions during pest outbreaks

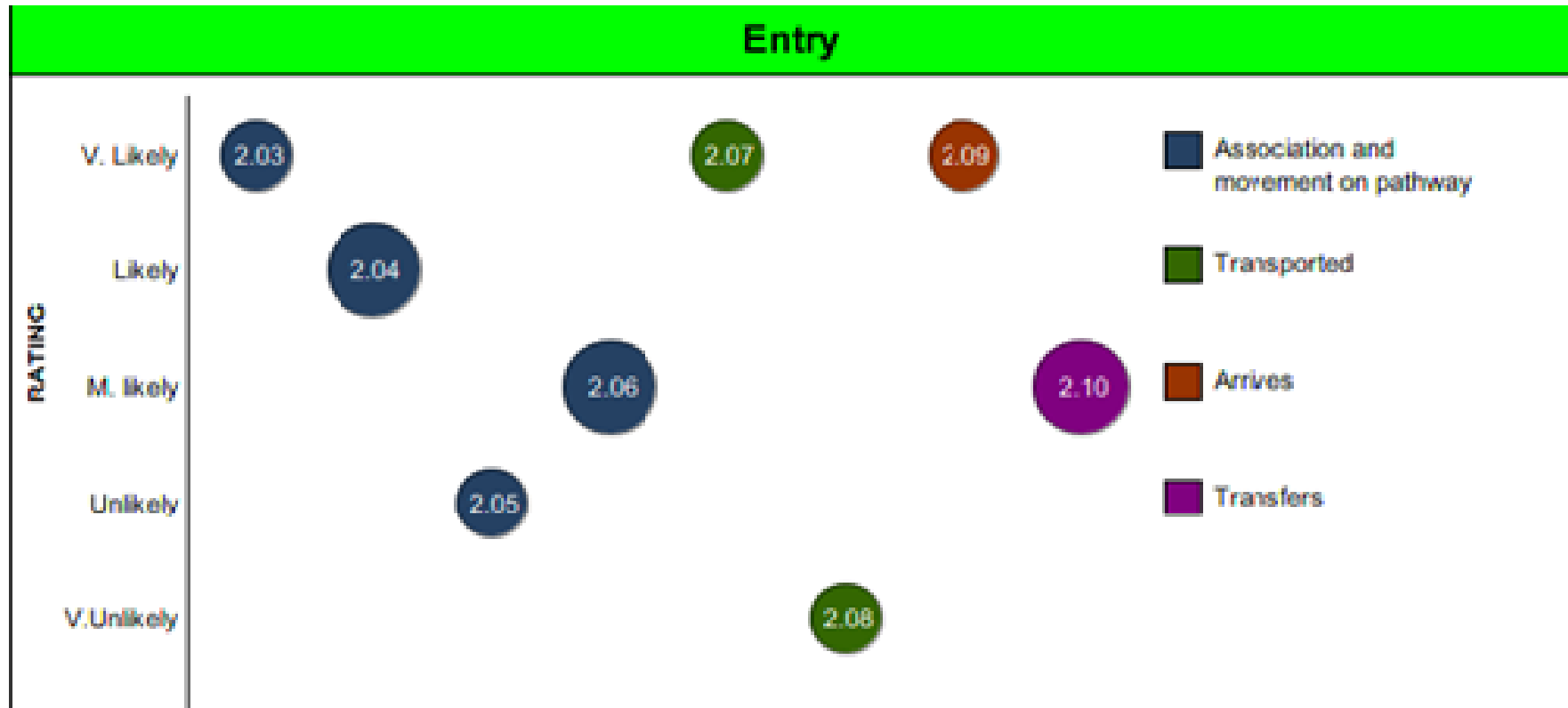
# Qualitative Impact Assessment Methods: (i) Review Consistency Methods

- Review current best practice in 43 schemes and guidelines:
  - Biosecurity and plant health standards
  - PRA schemes
  - Weed risk analysis schemes
  - Animal health
  - Human health
- Consistency in risk rating enhanced by:
  - using a clear and structured framework
  - obtaining responses from groups of assessors
  - providing risk rating examples, e.g. CFIA
  - asking unambiguous questions

## Qualitative Impact Assessment Methods: (ii) revision of the EPPO scheme questions

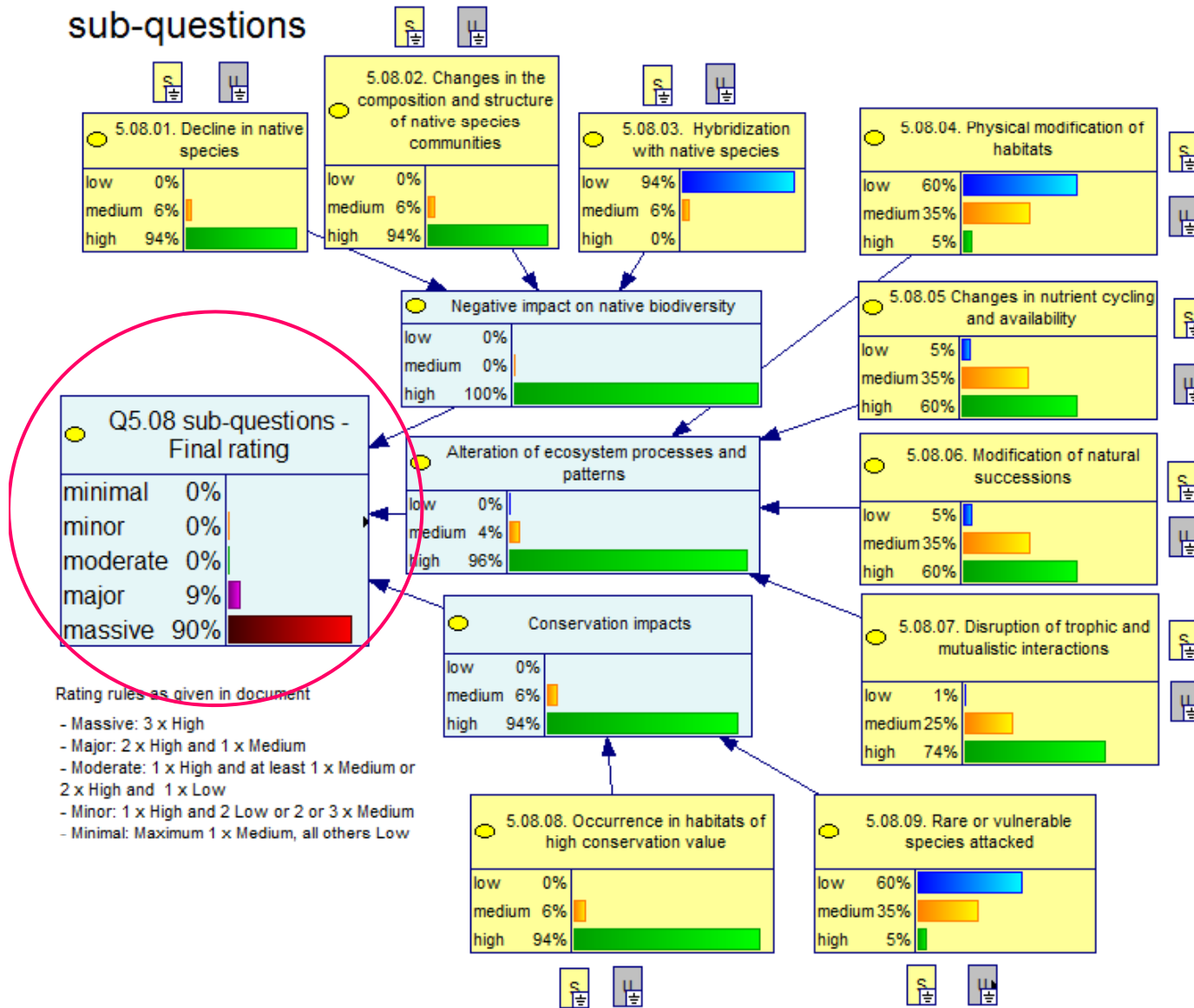
- Questions revised and restructured
- Guidance given on:
  - Risk ratings
  - Time and spatial elements
  - When quantitative analysis is appropriate
- Examples provided to assist with rating risk
- A visualiser developed to review questions
- Matrix models provided to summarise risk and uncertainty from many questions and sub-questions

## Qualitative Impact Assessment Methods: (iii) Visualiser to review response to questions



# Qualitative Impact Assessment Methods: (iv) Matrix Models to summarise risk and uncertainty

## sub-questions

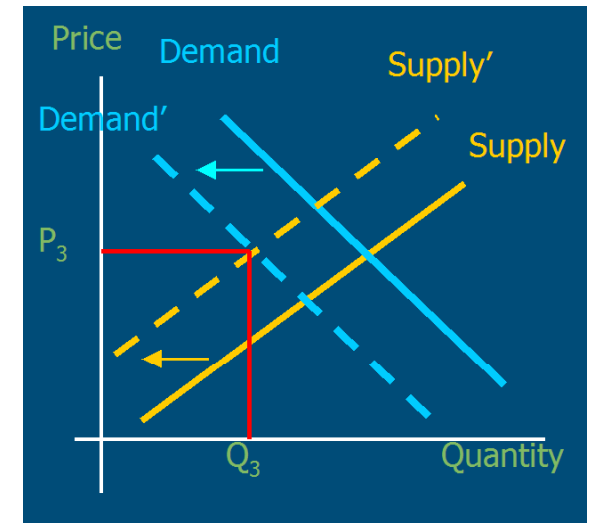


# Impact analysis: (iii) Review of Quantitative Economic Assessment Methods

Only two methods generally needed:

1. Partial budgeting/cost-benefit Analysis
2. Partial equilibrium [If price effects likely]
3. Input-output analysis\*
4. Computable general equilibrium\*

\* Only use if spill-over effects to other sectors of the economy are likely





# Impact analysis: (iv) Quantitative Impact assessments with Partial Budgeting and Partial Equilibrium analyses

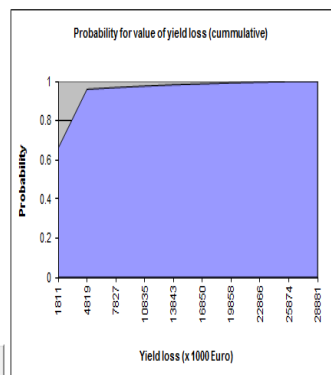
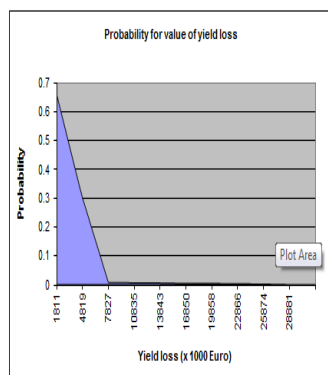
## RESULTS PARTIAL BUDGETTING

Potato

Continue >>

Infested Area	27071	ha
Production on infested area	891	x 1000 tons
Production value on infested area	123700	x 1000 Euro
Costs for crop protection	6642	x 1000 Euro
Yield loss (due to infestation)	14	x 1000 tons
Value of yield loss	3154	x 1000 Euro <i>very uncertain</i>
Yield loss (in % of total production)	0.01%	%
Cost crop protect (in % total prod.)	0.00%	%

Partial Equilibrium Model



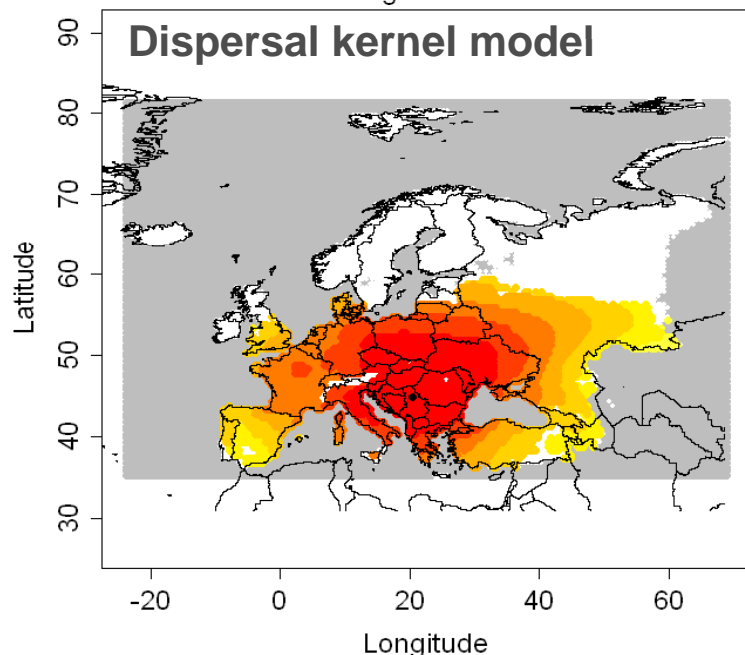
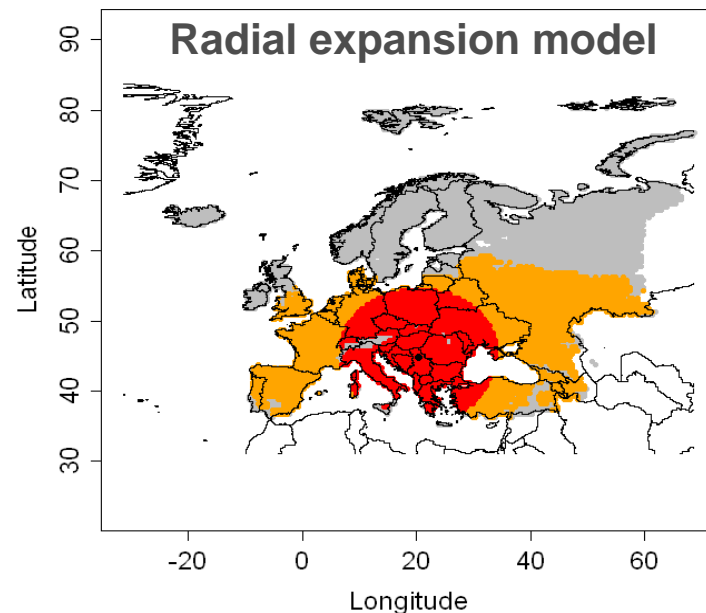
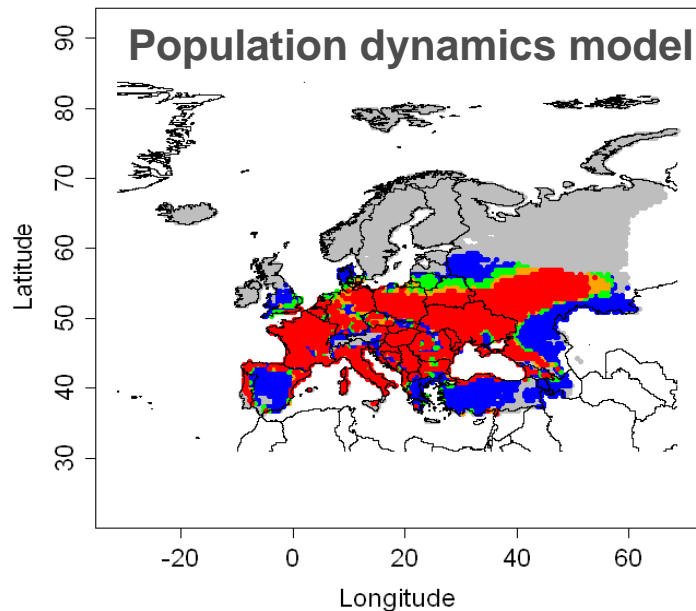
## Partial budgeting for Potato Stem Tuber Viroid – Annual direct impact (1000 €)

Impact	Host	Potato		Tomato	
		ware	seed	sheltered	unsheltered
Yield loss		2,552	739	4,304	5,867
Protection cost		0	69	23	47
Total		2,552	808	4,328	5,914

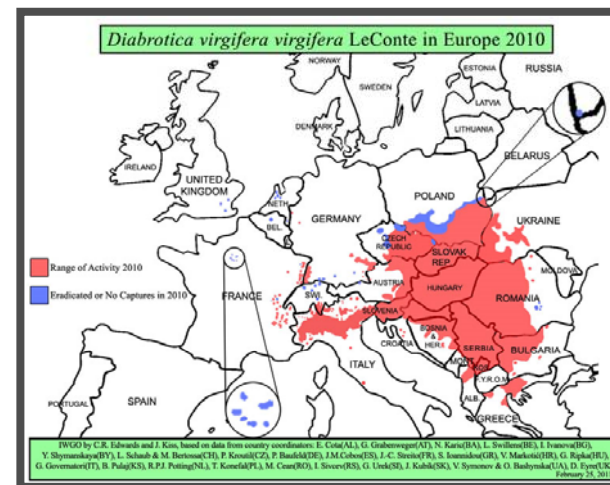
## Impact on producer welfare under different export ban scenarios (M €)

crop	seed potato	ware potato	tomato
No ban	-2.3	0.007	-5.7
50% ban	-135	-13.2	NA
full ban	-262	-26.7	NA

# Impact analysis: (v) A suite of five pest generic spread models created



*Diabrotica v. virgifera* spread 2010



# Mapping endangered areas

1. Guidance provided on when to map (rather than just describe) endangered areas
2. Decision support schemes provided for mapping:
  - climatic suitability:
    - based on the information available on its climatic responses, the location data and how well each climatic mapping method is likely to perform
  - area of potential establishment
    - based on climate, hosts, soils etc
  - endangered areas (and the area at highest risk)
    - Based on the area of potential establishment, crop production and value, environmental impacts etc

# Area of potential establishment for *Diabrotica virgifera virgifera*

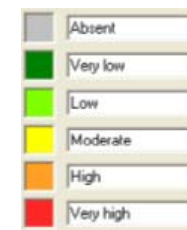
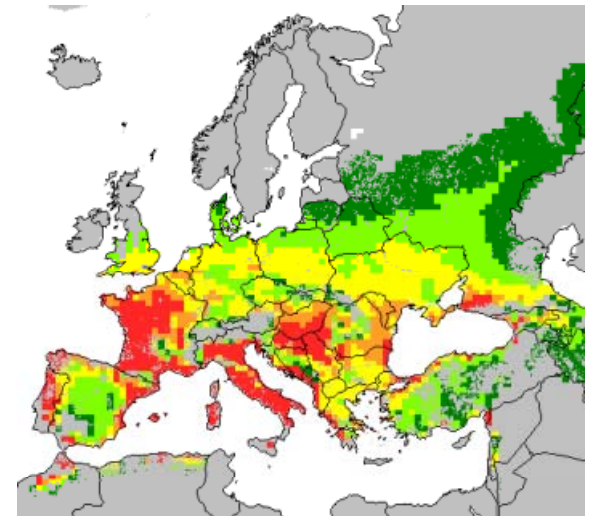
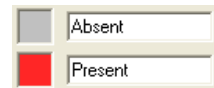
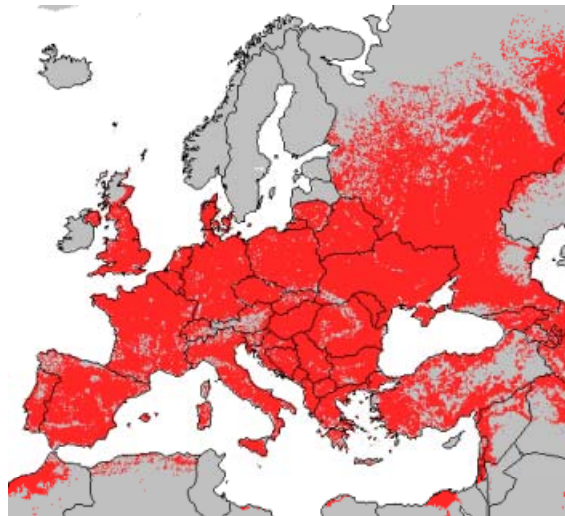
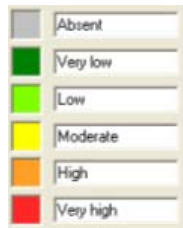
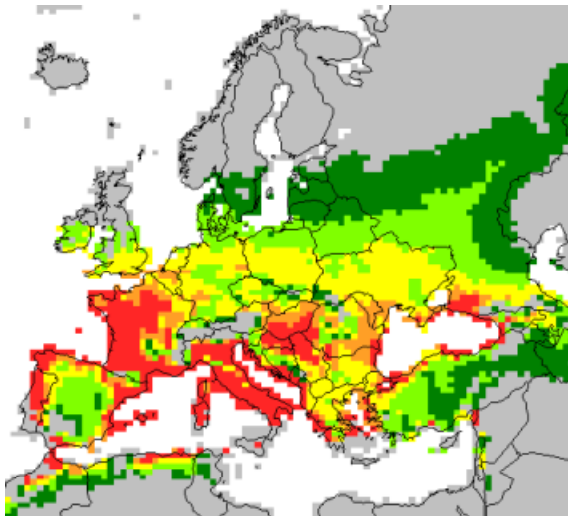
Climatic suitability

X

Hosts

=

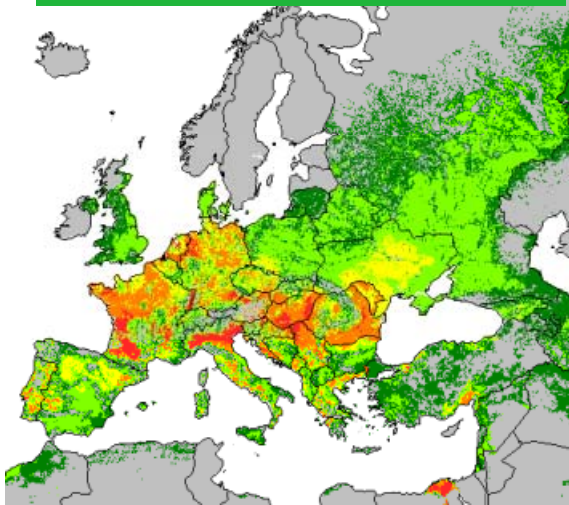
Area of potential establishment





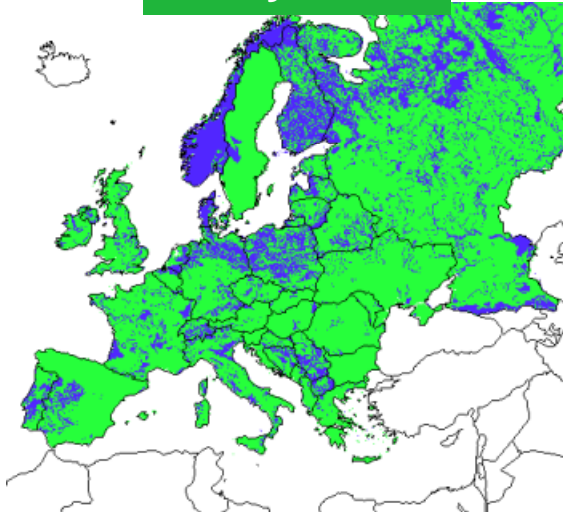
# Area of highest risk for *Diabrotica virgifera virgifera*

Total maize output



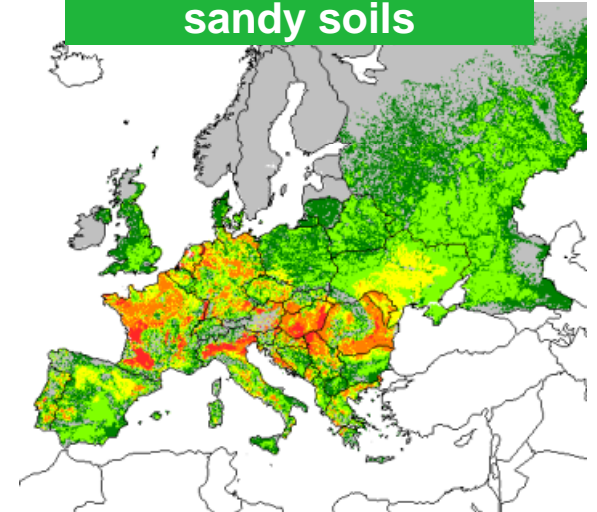
X

Sandy soils

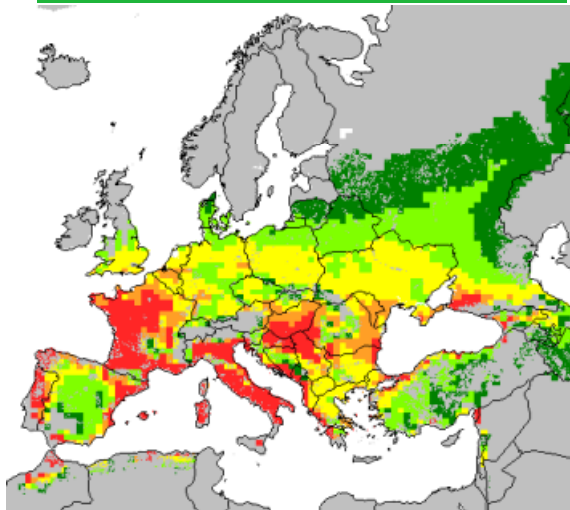


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Maize output not on sandy soils

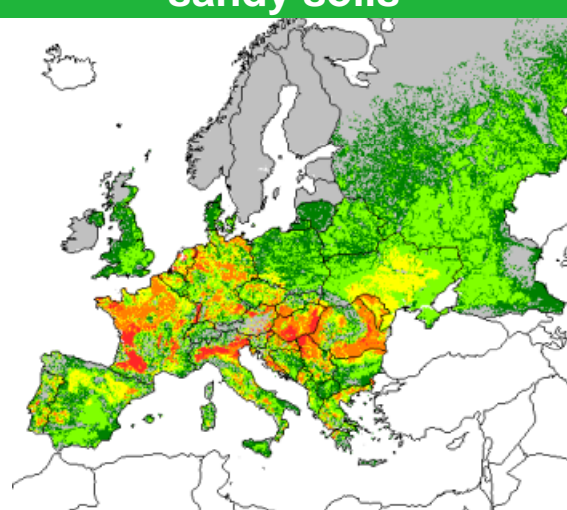


Climate suitability



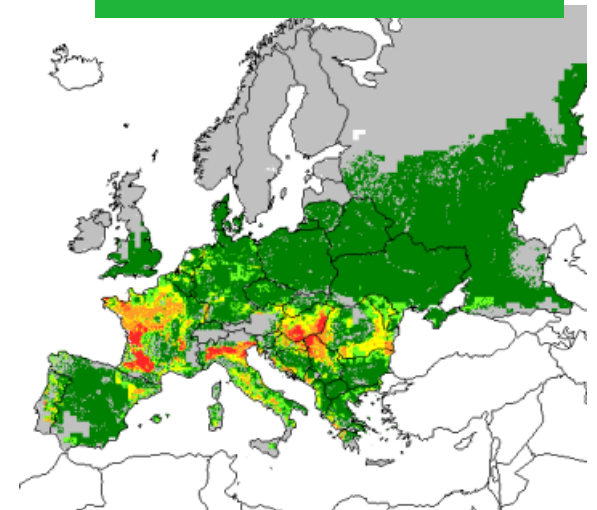
X

Maize output not on sandy soils



=

Area at highest risk



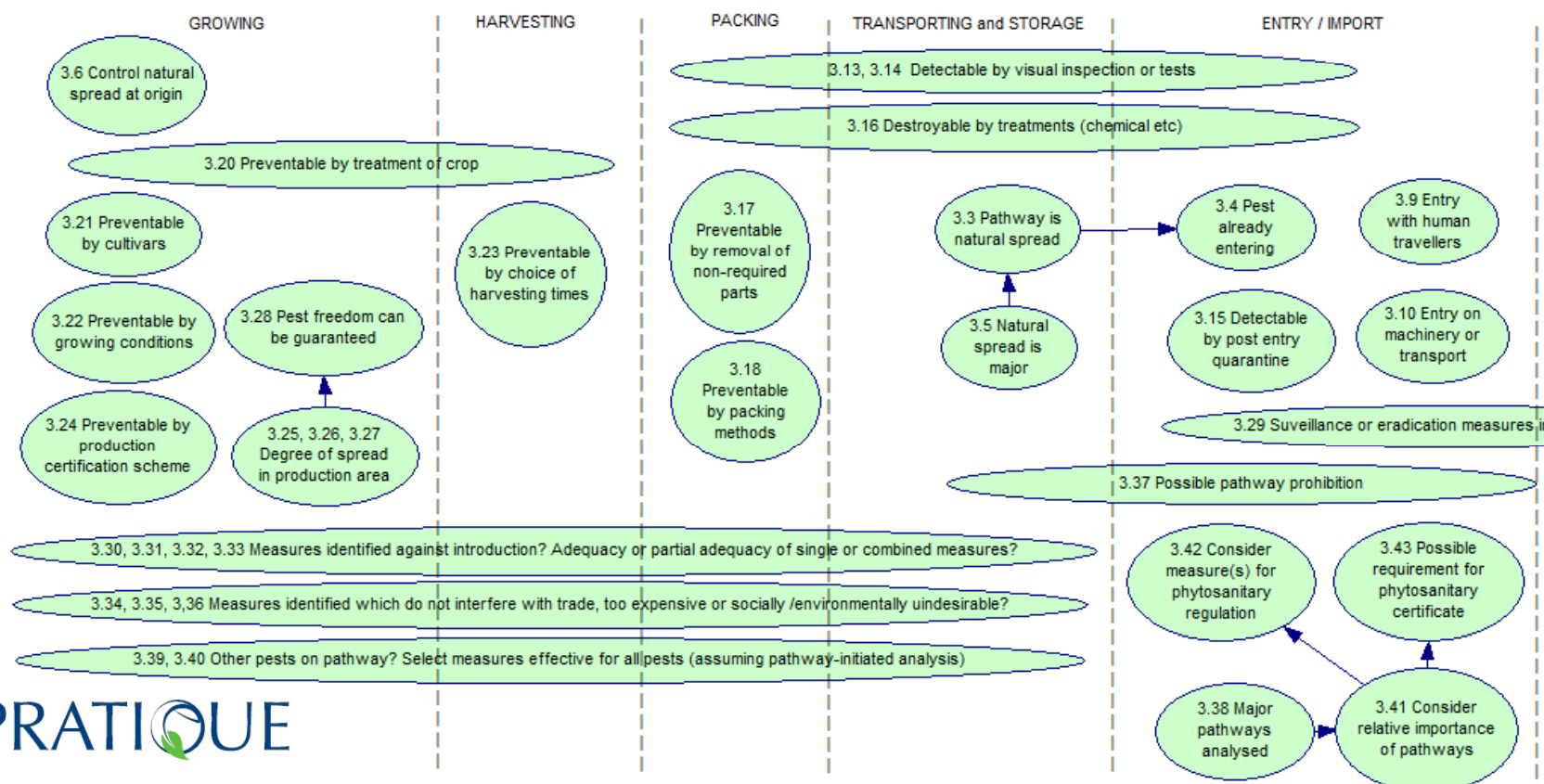
# Enhancing techniques for pathway analysis and systems approaches

- Global review of current approaches to pathway analysis and systems approaches in PRA
  - Varying interpretations of ISPM 14 - no clear example of best practice
  - Each region or country has its own methodology, relating to its political realities and administrative strengths
- Development of a pathway risk analysis systems approach module for the PRA scheme
- Linking risk assessment responses and analysis of risk management options

# Enhancing the Analysis of Risk Management options

- Restructuring the questions for wider application to species, pathway and the systems approach

Questions from Stage 3 Pest Risk Management grouped according to a general commodity import sequence. Different questions are relevant according to the nature of the pathway considered, e.g. for natural spread many questions would not apply but the general sequence can still be followed. By grouping possible interventions at each stage the potential for systems approaches may be more apparent from the beginning



# Ranking of proposed measures

Risk reduction measures (control points) & relevant guidance	Responsible party and time frame	Efficacy	Validation (indicator)	Accuracy (level of confidence)	Criteria (rank in terms of negative to positive: xx, x, 0, +, ++)						
					acceptable to importer	feasibility	cost/benefit	trade impact	environment	social	Other (e.g. Acceptable to most exporters?)
A list of some possible measures appear in the schematic. Note if there is an ISPM for the measure or other guidance is used for implementation.	Describe who will carry out action and when/where it will be done. (Or same for those already being implemented.) When/where would be at production site, in packing shed, during transport, etc. Time frame might be at a single point or ongoing over a period of the chain (e.g. cold treatment post harvest and during transport). Verification is discussed in more detail to right. Any concerns with the parties implementing this measure go here.	Describe with as much detail as possible and note what factors affect efficacy. Include parameters used (e.g. mortality) and source of estimate. Comment on the expert/group's certainty about own judgement.	If it is possible to validate the efficacy/ impact of the measure, describe what the indicator will be and, if verified at a different time, when/where and by whom.	Explain the level of accuracy (confidence) in the estimates of efficacy and/or validation process. What will effect this? Can additional measures enhance this, or would they be redundant?							



## 4. PRA process not user-friendly (i)

- For the analyst
  - Many questions
  - Some seem repetitive
  - Difficult interface
  - Difficult to make consistent judgements
  - Difficult to summarise
- For the decision maker
  - Lengthy documents produced
  - Difficult to focus on key elements

*\*EPPO PRA scheme: large number of questions, 5 level risk rating, 3 levels of uncertainty & comment box*

## 4. PRA process not user-friendly (ii)

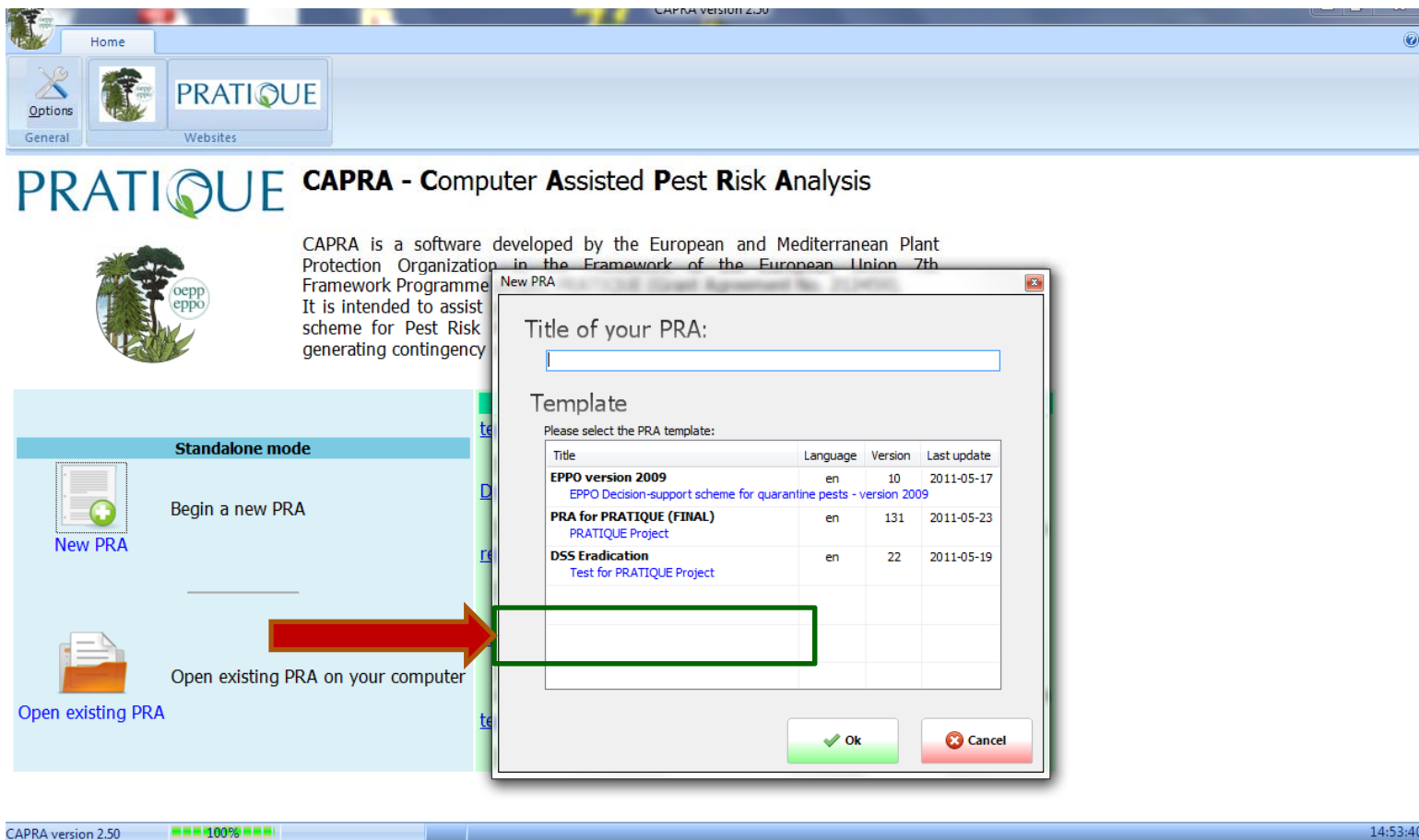
- Validate PRATIQUE outputs:
  - independent experts, e.g. EPPO Panels
  - a wide range of pests and pathways
- Create a computerised EPPO PRA scheme incorporating PRATIQUE outputs
- Consolidate and disseminate project outputs by providing:
  - a manual
  - examples of best practice
  - the computerised PRA scheme

# Testing PRATIQUE Outputs

- Workshops with pest risk analysts and pest risk managers
- EPPO Panel meetings on PRA, phytosanitary measures and invasive alien species



# EPPO Computerised PRA Scheme (CAPRA): introductory page



Available here: <http://capra.eppo.org/download.php>

# EPPO Computerised PRA Scheme (CAPRA): main menu

The screenshot displays the CAPRA version 2.64 interface for *Drosophila suzukii*. The top navigation bar includes 'Home' and 'Sections' tabs. Below these are four buttons: 'Close this PRA', 'Change PRA Title', 'Generate report', and 'Gen Graph'. A secondary bar contains 'Global', 'Section tools', and 'Externals t...'. The left sidebar lists the stages of the PRA scheme: 'Introduction', 'Stage 1: Initiation', 'Stage 2: Pest Risk Assessment', and 'Stage 3: Pest Risk Management'. Under 'Stage 1: Initiation', a progress bar for 'Q 1.01 to 1.07' is shown. Under 'Stage 2: Pest Risk Assessment', several sections are listed with their respective question ranges and progress bars: 'Section A: Pest categorization (Q 1.08 to 1.19)', 'Section B: Probability of entry of a pest (Q 2.01 to 2.14)', 'Section B: Probability of establishment (Q 3.01 to 3.21)', 'Section B: Conclusion of introduction (C1)', 'Section B: Probability of spread (Q 4.01 to 4.05)', 'Section B: Eradication, containment of the pest and transient populations (Q 5.01 to 5.03)', 'Section B: Assessment of potential economic consequences (Q 6.01 to 6.16)', and 'Section B: Degree of uncertainty and Conclusion of the pest risk assessment (C2 to C3)'. The main content area is titled 'Decision-support scheme for quarantine pests' and contains a 'Specific scope' section. This section states that the standard is based on the ISPM No 11 *Pest Risk Analyses for Quarantine Pests including analysis of environmental risks and living modified organisms*. It provides detailed instructions for the following stages of pest risk analysis (PRA) for quarantine pests: initiation, pest categorization, probability of introduction, assessment of potential economic consequences and pest risk management. It also mentions that the scheme can be used for PRAs initiated by the identification of a pathway or the review of a policy, and that expert judgement may be used in answering the questions. Below this, an 'Introduction' section explains that the EPPO decision-support scheme for quarantine pests is intended to be used to assess the potential importance of a particular pest for a clearly defined area (the PRA area). The PRA area may be the whole EPPO region or part of it or whole or part of several countries. It further states that the scheme concentrates on the assessment of individual pests; if a risk assessment is being performed on a particular pathway, the scheme can be used once the individual pests likely to be associated with the pathway have been identified. At the bottom, the status bar shows 'CAPRA version 2.64 - 100%', the file path '20111118173154', and the time '17:33:15'.

CAPRA version 2.64 - *Drosophila suzukii*

Home Sections

Close this PRA Change PRA Title Generate report Gen Graph

Global Section tools Externals t...

Introduction

Stage 1: Initiation

Q 1.01 to 1.07

Stage 2: Pest Risk Assessment

Section A: Pest categorization  
Q 1.08 to 1.19

Section B: Probability of entry of a pest  
Q 2.01 to 2.14

Section B: Probability of establishment  
Q 3.01 to 3.21

Section B: Conclusion of introduction  
C1

Section B: Probability of spread  
Q 4.01 to 4.05

Section B: Eradication, containment of the pest and transient populations  
Q 5.01 to 5.03

Section B: Assessment of potential economic consequences  
Q 6.01 to 6.16

Section B: Degree of uncertainty and Conclusion of the pest risk assessment  
C2 to C3

Stage 3: Pest Risk Management

Q 7.01 to 7.45

## Decision-support scheme for quarantine pests

### Specific scope

This standard is based on the ISPM No 11 *Pest Risk Analyses for Quarantine Pests including analysis of environmental risks and living modified organisms*". It provides detailed instructions, for the following stages of pest risk analysis (PRA) for quarantine pests: initiation, pest categorization, probability of introduction, assessment of potential economic consequences and pest risk management. It provides a simple scheme based on a sequence of questions for deciding whether an organism has the characteristics of a quarantine pest, and if appropriate to identify potential management options. The scheme can also be used for PRAs initiated by the identification of a pathway or the review of a policy. Expert judgement may be used in answering the questions.

### Introduction

The EPPO decision-support scheme for quarantine pests is intended to be used to assess the potential importance of a particular pest for a clearly defined area (the PRA area). The PRA area may be the whole EPPO region or part of it or whole or part of several countries.

The scheme concentrates on the assessment of individual pests; if a risk assessment is being performed on a particular pathway, the scheme can be used once the individual pests likely to be associated with the pathway have been identified.

The scheme provides detailed instructions for the following stages of pest risk analysis: initiation, pest categorization, probability of introduction, potential economic consequences and pest risk management. Figures 1, 2 and 3 present a flow diagram of the sequence of

CAPRA version 2.64 - 100% 20111118173154 17:33:15

# EPPO Computerised PRA Scheme (CAPRA): question template

CAPRA version 2.64 - Drosophila suzukii

Home Questionnaire

Go to section list Save Show Left Menu <<< Previous Next >>> Add tagNote Search Answer Dataset Explorer

Global Interface Navigation Tools

### Questions

- Intro. - Introduction
- 3.00.01A>3.00.01C - Host plants ...
- 3.00.02A>3.00.02C - Alternate h...
- 3.00.03A>3.00.03C - Climatic sui...
- 3.00.04A>3.00.04C - Other abiot...
- 3.00.05A>3.00.05C - Competitio...
- 3.00.06A>3.00.06C - The manag...
- 3.00.07A>3.00.07C - Protected C...
- 3.01>3.07 - Identification of the ...
- 3.08 - Identification of the area o...
- 3.09>3.16 - Suitability of the are...
- 3.17 - Reproductive strategy
- 3.18 - Adaptability
- 3.19 - Establishment in new areas
- 3.20 - Conclusion on the probabli...
- END - END

### 3.09>3.16 - Suitability of the area of potential establishment

<<< Previous

#### Host plants and suitable habitats

**3.09** - How likely is the distribution of hosts or suitable habitats in the area of potential establishment to favour establishment?

**Guidance**

☐ very unlikely  
☐ unlikely  
☐ moderately likely  
☐ likely  
☒ very likely

Level of uncertainty: low ?

Justification Edit... Preview...

#### Climatic suitability

**3.11** - Based on the area of potential establishment already identified, how similar are the climatic conditions that would affect pest establishment to those in the current area of distribution?

A qualitative assessment of the suitability of the climate for pest establishment has been developed in the framework of PRATIQUE.  
To access it, click on the following link: [rating guidance for climatic suitability \(only available when online\)](#)

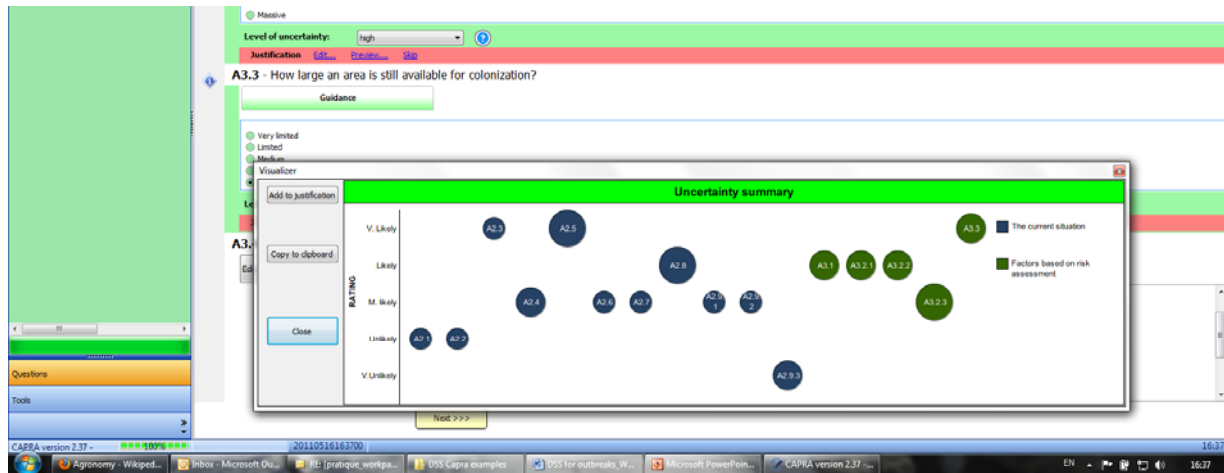
A climatic suitability risk mapping decision-support scheme has also been developed.  
This decision support scheme (DSS) is intended for use by risk assessors who have already undertaken a qualitative assessment of the suitability of the climate for pest establishment.  
To know more on this DSS and its objectives and to use it, click on the following link: [Climatic Mapping DSS \(only available when online\)](#)

**Guidance**

☐ not similar  
☐ slightly similar

CAPRA version 2.64 - 100% 17:13:14

# The decision support system for the eradication and containment of pest outbreaks: Computerised system in Capra



**B1.9 - Scoring matrix for comparison of candidate measures**

Measures available	Objective	Efficacy			Costs		Acceptability and safety	
		B1.1 - What is the likelihood that the measures will be successful?	B1.2 - How long will this management measure take to be successful?	B1.3 - How difficult will it be to apply this measure taking into account enforcement, resources and operational factors?	B1.4 - How high are the direct costs of the management measure?	B1.5 - How high are the indirect costs of the management measure?	B1.6 - How high are the environmental impacts?	B1.7 - How acceptable is the measure likely to be to the public?
selective crop destruction	Eradication	very likely	less than one month	Easy	Moderate	Moderate	Minor	Minor opposition
imported seed lots control	Eradication	likely	less than one month	Easy	Moderate	Moderate	Minor	Minor opposition

## Legend

greater likelihood of success				lower likelihood of success
lower cost				high cost
fewer confounding issues				many confounding issues



## RISK ASSESSMENT TASKS

## HELP PROVIDED BY PRATIQUE

Answer PRA Question

Explanatory Note

Risk Rating

Risk rating guidance

Uncertainty Rating

Uncertainty rating guidance

Justify score & uncertainty  
with detailed text

Links to relevant datasets

Create Risk Map

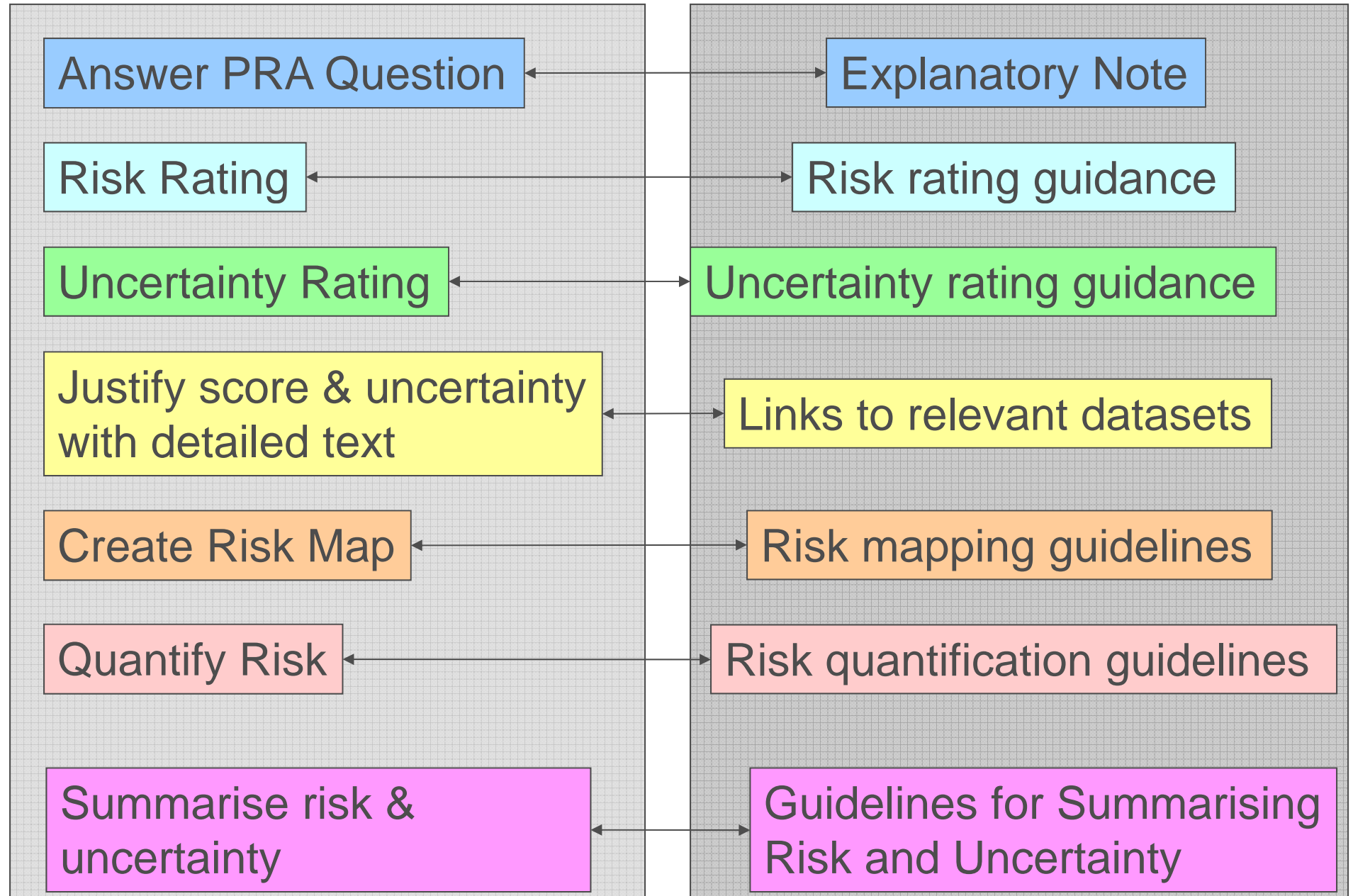
Risk mapping guidelines

Quantify Risk

Risk quantification guidelines

Summarise risk &  
uncertainty

Guidelines for Summarising  
Risk and Uncertainty





# PRATIQUE: Progress beyond state of the art

- Organised inventory of relevant datasets for PRA
- Reviews of best PRA practice worldwide
- Enhanced and validated methods for:
  - Assessing spread and impacts
  - Ensuring consistency, managing uncertainty, summarising risk and mapping endangered areas
  - Screening species in pathway analysis and developing systems approaches
  - Eradicating, containing and surveying pests
- User-friendly PRA scheme

# Accessing PRATIQUE Outputs

## 1. Summary of the Project Objectives

Baker RHA, Battisti A, Bremmer J, Kenis M, Mumford J, Petter F, Schrader G, Bacher S, De Barro P, Hulme PE, Karadjova O, Lansink AO, Pruvost O, Pysek P, Roques A, Baranchikov Y & Sun JH (2009) PRATIQUE: a research project to enhance pest risk analysis techniques in the European Union. *EPPO Bulletin* **39**, 87–93

## 2. Deliverables

All deliverables will soon be freely available here:

<http://capra.eppo.org/deliverables>

[www.pratiqueproject.eu](http://www.pratiqueproject.eu)

## 3. Capra Computerised Scheme

<http://capra.eppo.org/download.php>

## 4. Publications

15 papers in a special PRATIQUE issue of the EPPO Bulletin will be published in April 2012

Other papers are appearing in the scientific literature

# PRATIOUE

*Enhancements of Pest Risk Analysis Techniques*

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