

# EPPO and Risk Based Sampling

Event: NAPPO Workshop on Risk Based Sampling

Date: 2017-06-26/29

Presented by: Dominic Eyre (Defra, UK)

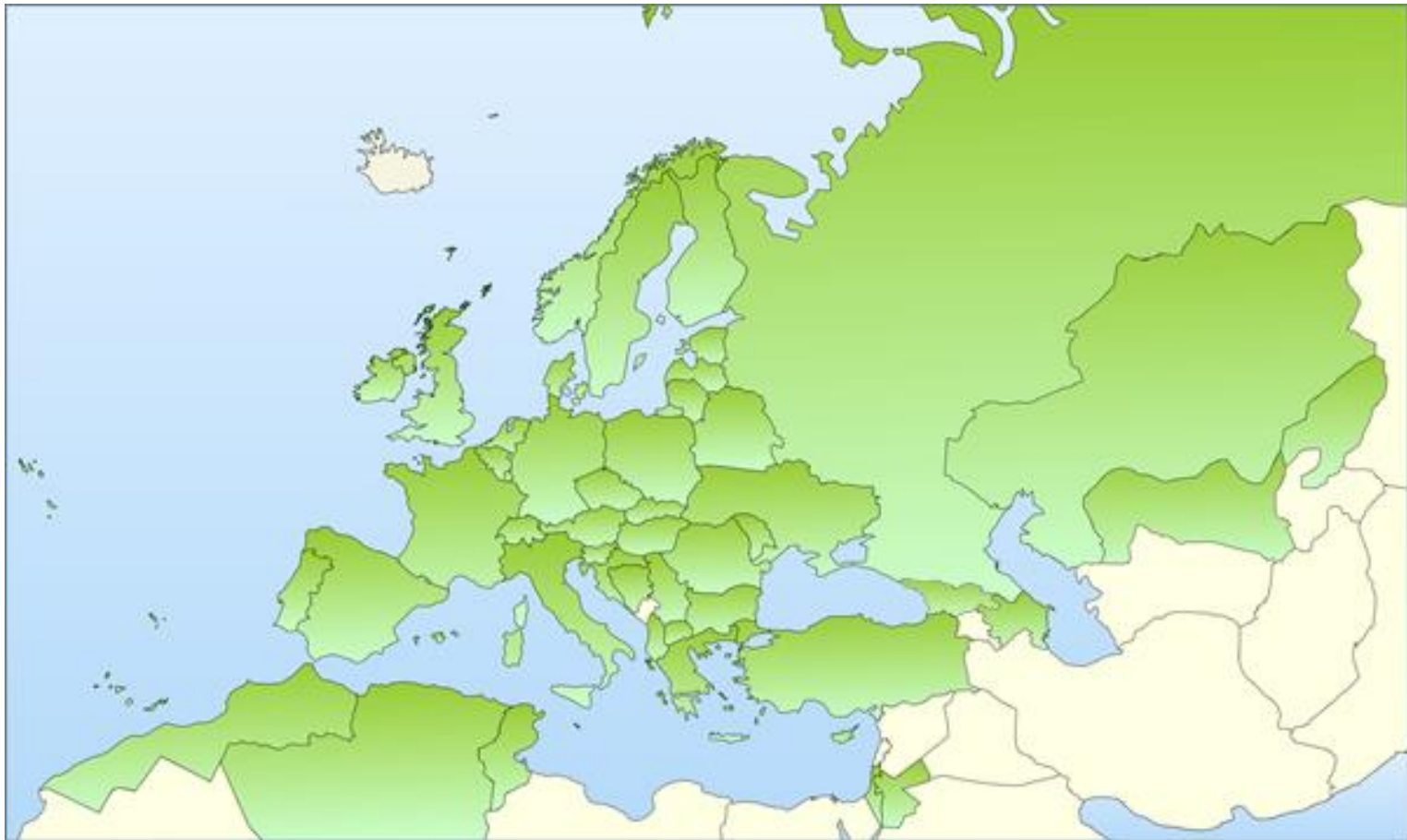
With input from Martin Ward and Françoise Petter

European and Mediterranean Plant Protection Organization

[hq@eppo.int](mailto:hq@eppo.int)



**1951 Convention for the establishment of the  
European Plant Protection Organisation.  
15 member countries in 1951 > now 51.  
One of 9 Regional Plant Protection Organizations**



# Remit

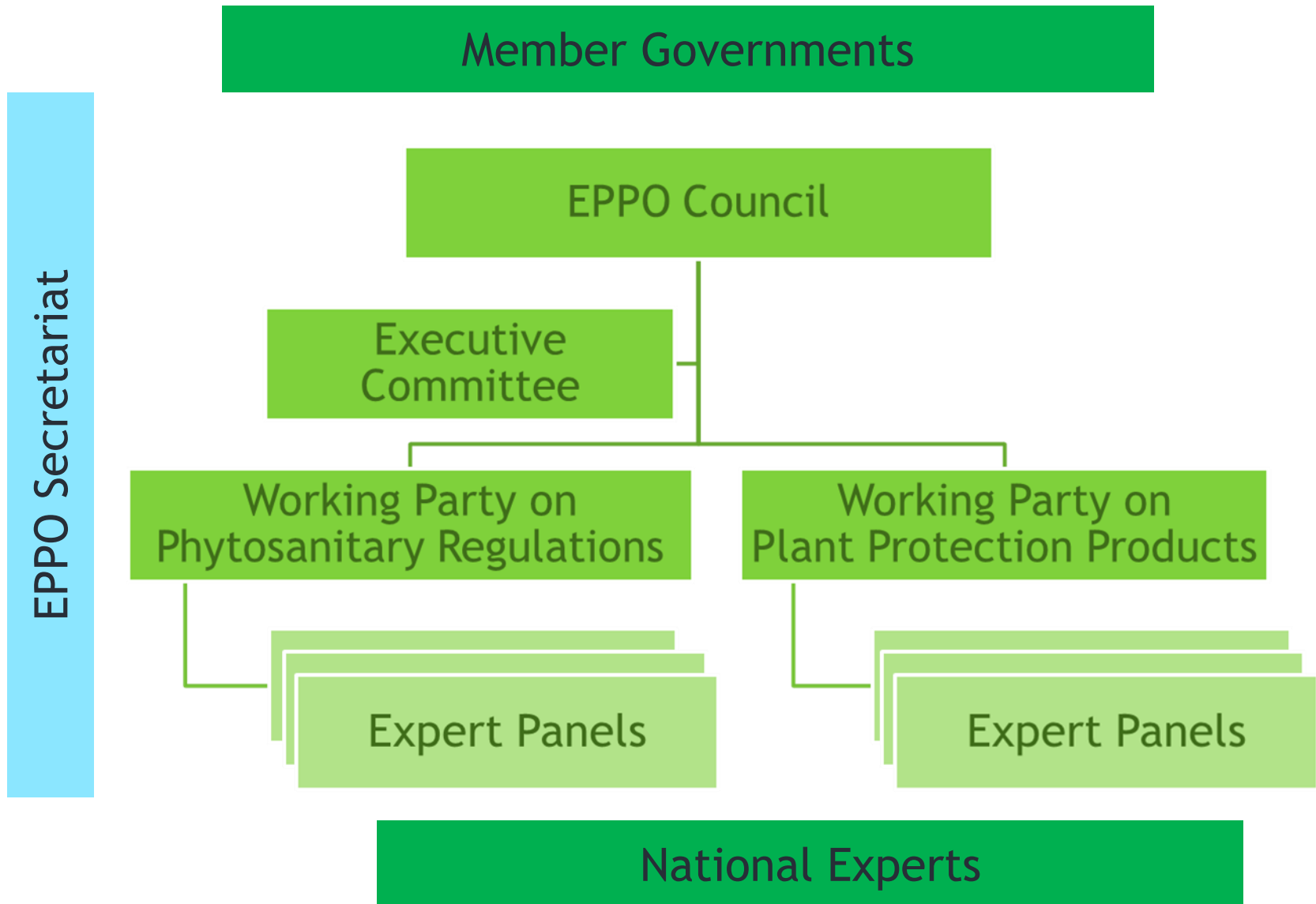
- Plant quarantine
- Regulated Non Quarantine Pests
- Efficacy of plant protection products
- Invasive alien plants
- Biological control agents

Achieved by:

- Drafting and adoption of regional technical standards
- Input to development of international standards
- Sharing information and expertise through networks



# Organisation



# Active Panels

## Plant Protection Products

- General Standards
- Herbicides
- Insecticides and Fungicides
- Resistance
- Harmonisation of Data Requirements

## Phytosanitary Regulations

- Global Affairs
- Phytosanitary Measures
- Forestry
- Potatoes
- Inspection Procedures
- Information
- Diagnostics (General) +
  - Entomology
  - Nematodes
  - Bacteria
  - Fungi
  - Virology
- Invasive Alien Plants
- Biological Control Agents

# Questions for risk based sampling

- What pests or non-compliances to look for?
- What trades to inspect (commodity x origin)?
- Within a trade
  - Which consignments to select for inspection?
  - How many consignments to select?
- Within a consignment
  - Which items to select for inspection?
  - How many items to select?

**How does EPPPO help its members?**

# Tools for risk based sampling

- What to look for?
  - EPPO Lists of pests recommended for regulation
  - EPPO Alert List of pests not yet regulated
  - Prioritisation systems (EPPO, EU, national)
- What trades to inspect?
  - EPPO Global Database
  - EPPO Reporting Service
  - Interception records from countries, published by EPPO





# Tools for risk based sampling

- Which consignments to select and how many?
  - EPPO Standard PM3/72 "*Elements common to inspection of places of production, area-wide surveillance, inspection of consignments and lot identification*"
  - "Phytosanitary inspection of imported consignments may be carried out at **reduced frequency** if **experience** gained from earlier introductions of plants, plant products or other articles of the same origin indicates that the articles in the consignment or lot are **likely to comply** with the phytosanitary import requirements of the country concerned."
  - One example of this: the EU "reduced checks" procedure
  - Also some specific Standards
- Which items to select and how many?
  - EPPO Standard PM3/65 later replaced by ISPM 31
  - Also some specific Standards



# Tools for risk based sampling

- **Which consignments to select and how many?**

- EPPO Standard PM3/72 "*Elements common to inspection of places of production, area-wide surveillance, inspection of consignments and lot identification*". Provides general guidance on:
  - Maximization of the chance of detection by targeted inspection e.g. plants or units which are most likely to be carrying the organism (e.g. most susceptible varieties, plants from specific origins, plants from origins or producers associated with previous instances of non compliance).
  - levels of confidence and level of detection for plants for planting or fruits and vegetables or cut flowers.
  - Concept of reduced frequency of inspection (currently implemented by the EU)
  - lot identification

- **Which items to select and how many?**

- EPPO Standard PM3/65 later replaced by ISPM 31
- Also some specific Standards

# Specific Standards on Inspection (PM 3 Standards)

- PM3/073(1) Consignment inspection of *Fragaria* plants for planting
- PM3/075(1) *Globodera rostochiensis* and *G pallida*: sampling soil attached to ware potatoes for detection prior to export and at import
- PM3/076(1) Trees of *Malus*, *Pyrus*, *Cydonia* and *Prunus* spp. - inspection of places of production
- PM3/077(1) Vegetable plants for planting under protected conditions - inspection of places of production
- PM3/078(1) Consignment inspection of seed and grain of cereals
- PM3/079(1) Consignment inspection for *Anoplophora chinensis*, *A glabripennis*
- PM3/080(1) Consignment inspection of seed of *Solanum lycopersicum*
- PM3/081(1) Inspection of consignments for *Xylella fastidiosa*
- PM3/082(1) Inspection of places of production for *Xylella fastidiosa*

**Balance between giving guidance on sampling statistics and encouraging inspectors to target risks using all available evidence!**

# EPPO Standard PM3/79 Consignment inspection for *A. chinensis* and *A. glabripennis*

- Section on Wood Packaging Material
  - The quantity of selected items for inspection and the frequency of inspections should depend on the consignment.
    - Commodities from specific origins with interceptions history to be inspected more thoroughly and more often."
  - Look for missing marks, but also low wood quality, damp wood, fungal growth or similar signs, sawdust or other signs of insect activity.
  - Need to develop a risk register of consignments to identify need for higher inspection frequencies."

# EPPO Standard PM 3/80

## Consignment inspection of [tomato] seed

"For pests recommended for regulation as quarantine pests and regulated pests, it is important to maximize the chance of detection by **targeting the consignments most likely to carry the pests** (e.g. the most susceptible varieties, place of origin of the seeds, instances of non-compliance of consignments of certain origins or from certain producers)."



# EPPO Global Database: a useful tool for inspectors <https://gd.eppo.int/>



Search by name or EPPO code...  Go!  
advanced search...

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- Explore by

## *Lycorma delicatula* (LYCMDE)



- MENU
- Overview →
  - Distribution
  - Host plants
  - Host commodities
  - Categorization
  - Reporting
  - Photos
  - Documents

### Overview

#### Basic information

- EPPO code: LYCMDE
- Preferred name: *Lycorma delicatula*
- Authority: (White)



Last modification: 2015-03-03

[more photos...](#)

#### Other scientific names

Name	Authority
Aphaena delicatula	White

#### Common names

Name	Language
<input type="text" value="Search..."/>	- select -
spot clothing wax cicada	English
Chinese blistering cicada	English (US)
spotted lanternfly	English (US)
fulgore tacheté	French

#### Taxonomy

- Kingdom: Animalia (1ANIMK)
- Phylum: Arthropoda (1ARTH)
- Subphylum: Hexapoda (1HEXAQ)
- Class: Insecta (1INSEC)
- Order: Hemiptera (1HEMIO)
- Suborder: Auchenorrhyncha (1AUCHR)
- Family: Fulgoridae (1FULGF)
- Genus: *Lycorma* (1LYCMG)
- Species: *Lycorma delicatula* (LYCMDE)



# Information on pest distribution



EPPO  
Global  
Database

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*Lycorma delicatula* (LYCMDE)



## MENU

- [Overview](#)
- [Distribution →](#)
- [Host plants](#)
- [Host commodities](#)
- [Categorization](#)
- [Reporting](#)
- [Photos](#)
- [Documents](#)

## TOOLS

Save map as png

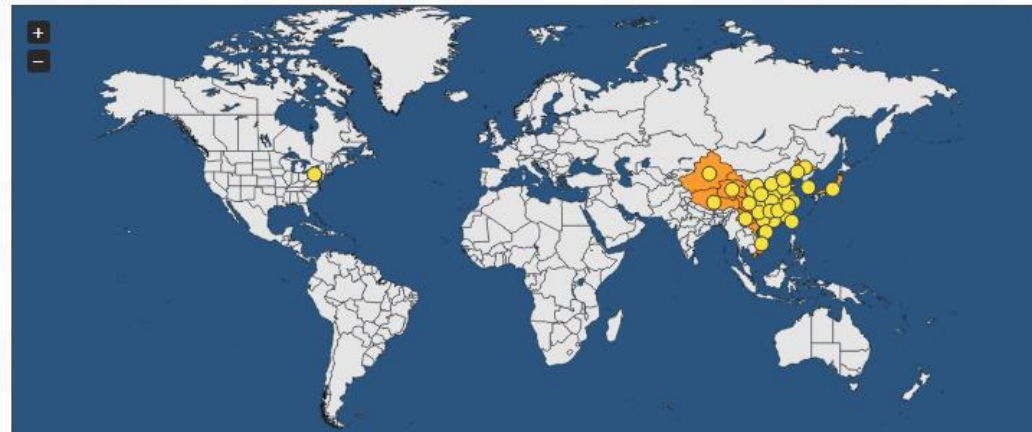
Save map as svg

Save list as excel file

Save list as csv file

## Distribution

Last updated: 2016-10-27



Legend: ● Present ● Transient

Continent	Country	State	Status	
- select -	- select -	- select -	- select -	
America	United States of America		Present, few occurrences	<a href="#">view...</a>
America	United States of America	Pennsylvania	Present, few occurrences	<a href="#">view...</a>
Asia	Cambodia		Absent, unreliable record	<a href="#">view...</a>

# Information on host commodities



EPPO  
Global  
Database

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*Lycorma delicatula* (LYCMEDE)




- MENU
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  - Host commodities →**
  - Categorization
  - Reporting
  - Photos
  - Documents

## Host Commodities

Type ^	Host ^
- select - ▾	Search...
manufactured articles	woody plants (2WOOP)
non-squared wood	woody plants (2WOOP)
packaging material	woody plants (2WOOP)
plants for planting	woody plants (2WOOP)
squared wood	woody plants (2WOOP)



# Information on categorisation



EPPO  
Global  
Database

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*Lycorma delicatula* (LYCMDE) [Print](#) [Facebook](#) [Twitter](#)

**MENU**

- Overview
- Distribution
- Host plants
- Host commodities
- Categorization →
- Reporting
- Photos
- Documents

**TOOLS**

- [Save list as excel file](#)
- [Save list as csv file](#)

**Categorization**

Country/NPPO	List	Year addition	Year transfer	Year deletion
RPPO/EU				
EPPO	Alert list (formerly)	2015		2016
EPPO	A1 list	2016		

[Contact EPPO](#) [EPPO Website](#) [EPPO Data Services](#) [Sitemap](#)

# EPPO Reporting Service

- Monthly report of pests on the move and other developments of interest to NPPOs
- E-mailed to over 3800 recipients, and on website
- Pest specific items linked from Global Database



ORGANISATION EUROPEENNE  
ET MEDITERRANEENNE  
POUR LA PROTECTION DES PLANTES

EUROPEAN AND  
MEDITERRANEAN  
PLANT PROTECTION  
ORGANIZATION

## EPPO Reporting Service

No. 2 PARIS, 2017-02

### General

[2017/028](#)  
[2017/029](#)

New data on quarantine pests and pests of the EPPO Alert List  
15<sup>th</sup> Congress of the Mediterranean Phytopathological Union: 'Plant Health sustaining Mediterranean Ecosystems' (Cordoba, ES, 2017-06-20/23)

### Pests

[2017/030](#)  
[2017/031](#)  
[2017/032](#)  
[2017/033](#)

First report of *Xylosandrus compactus* in France  
*Xylosandrus compactus* occurs in Lazio, Liguria, Sicilia and Toscana (IT)  
Addition of *Xylosandrus compactus* and of its associated fungi to the EPPO Alert List  
First report of *Paysandisia archon* in Germany

# Early warning/horizon scanning: the EPPO Alert List

- Provides early warning
- Suggests possible candidates for Pest Risk Analysis but also alerts to target inspections

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



## EPPO Alert List

(last updated in 2016-03)



The main purpose of the Alert List is to draw the attention of EPPO member countries to certain pests possibly presenting a risk to them and achieve early warning. Pests are marked with an asterisk\* in the table below when PRAs are planned or under development within EPPO. The entry date corresponds to the date when the pest was added to the Alert List.

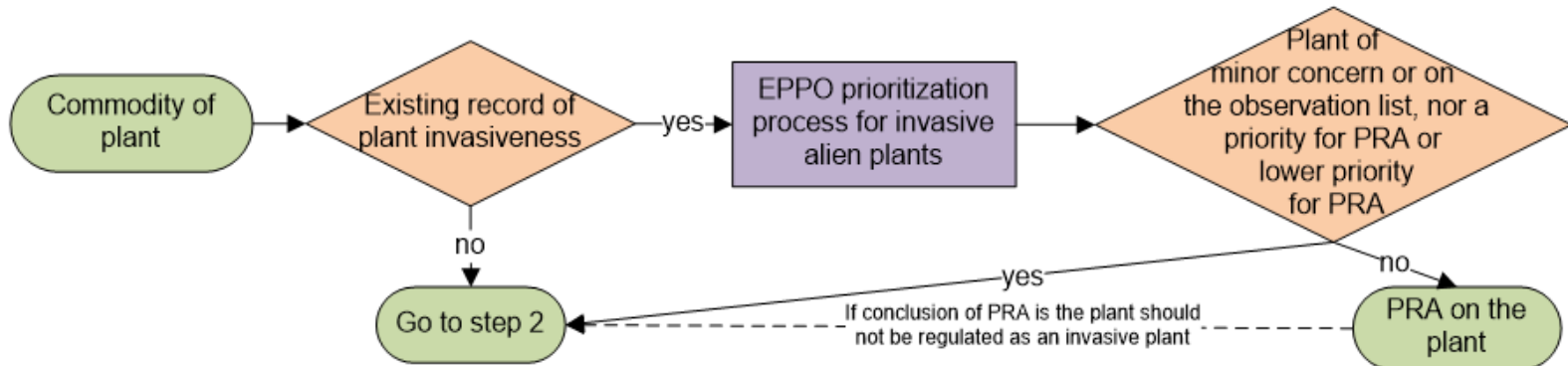
[Read a short introduction to the EPPO Alert List.](#)

[View information on previously listed organisms:](#) as explained in the short introduction, after a certain period, if it appears that the risk is no so high and that no special phytosanitary action is needed, the pests are deleted from the Alert List. On the opposite, when the risk is considered sufficiently high, pests are transferred to the [EPPO A1/A2 Lists of pests recommended for regulation as quarantine pests.](#)

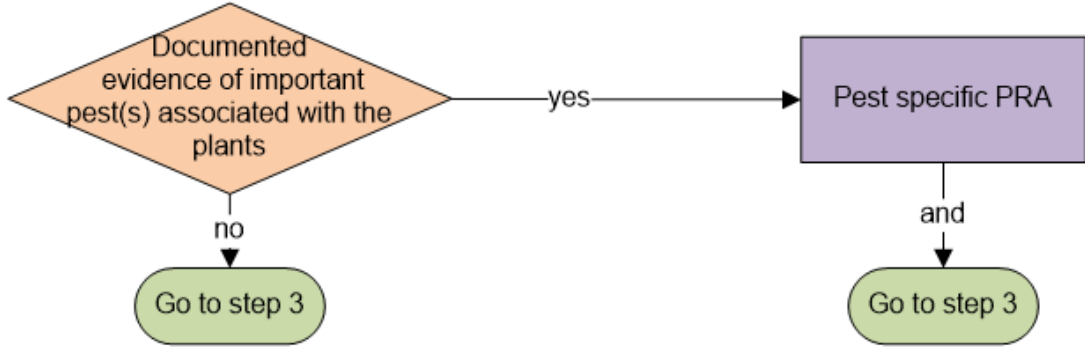
Pest Names	Main host plants or habitats	PRA	Entry date
<b>Insects and mites</b>			
<a href="#">Agrilus auroguttatus</a> (Coleoptera: Buprestidae)	<i>Quercus</i> spp.		2013-03
<a href="#">Aleurotrachelus trachoides</a> (Hemiptera: Aleyrodidae)	Polyphagous	*	2015-11
<a href="#">Bactrocera latifrons</a> (Diptera: Tephritidae)	Fruits (Solanaceae, Cucurbitaceae)	*	2015-10
<a href="#">Ceratothripoides brunneus</a>	Solanaceae and other plant families		2016-02
<a href="#">Ceratothripoides claratris</a>	<i>Solanum lycopersicum</i> and other Solanaceae		2016-02
<a href="#">Contarinia pseudotsugae</a> (Diptera: Cecidomyiidae)	<i>Pseudotsuga menziesii</i>		2016-01
<a href="#">Lycorma delicatula</a> (Hemiptera: Fulgoridae)	Woody plants (including grapevine)	*	2015-02

# EPPO standard (PM 5/7) on prioritising risk assessments for plants for planting, Steps 1 and 2

## STEP 1

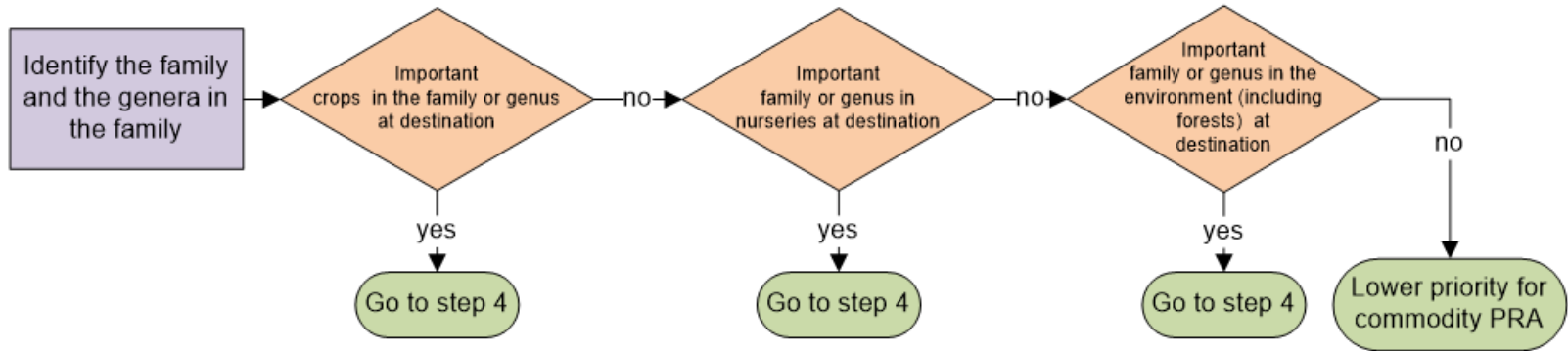


## STEP 2



# EPPO standard (PM 5/7) on prioritising risk assessments for plants for planting, Step 3

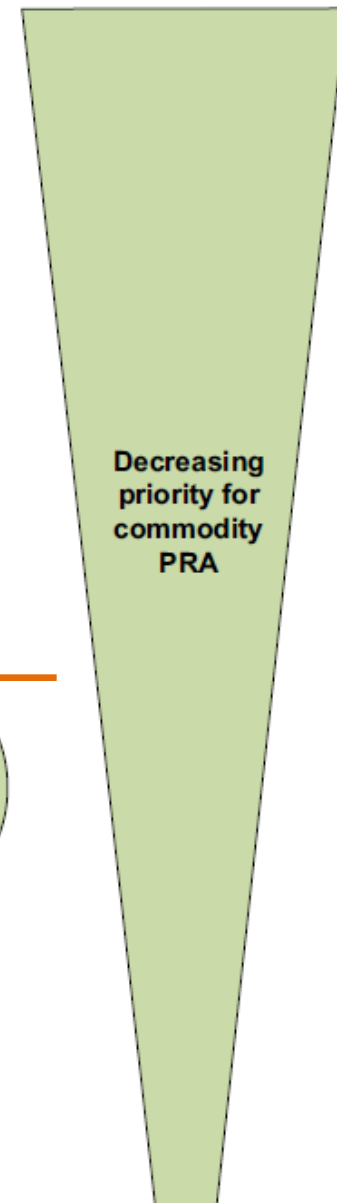
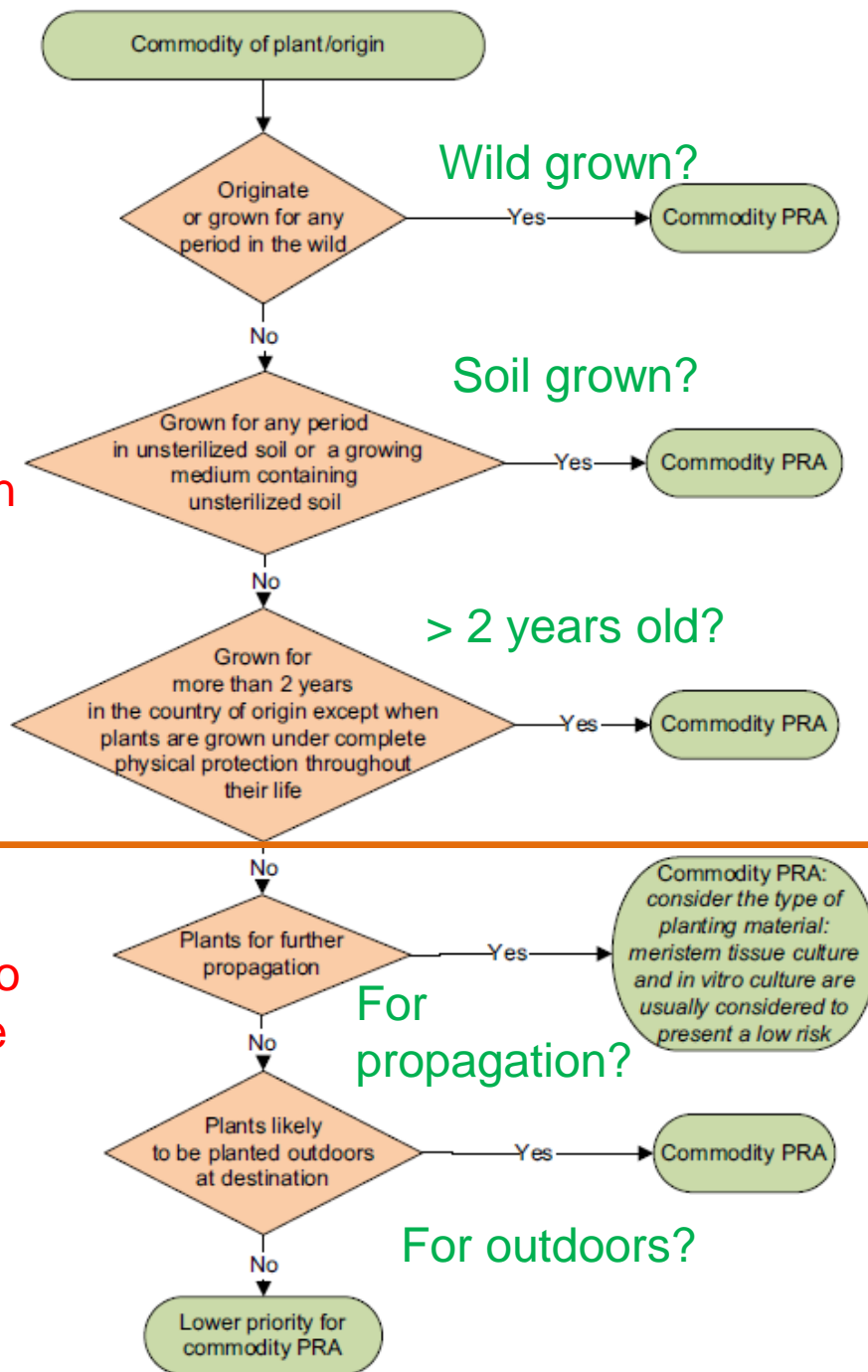
## STEP 3



EPPO  
standard (PM  
5/7)  
on prioritising  
risk  
assessments  
for  
plants for  
planting,  
Step 4

Relate to  
production  
methods  
in  
exporting  
country

Relate to  
final use





# Other relevant EPPO Standards to prioritize risks

- PM9 Standards on regulatory control systems (for eradication, containment and contingency planning)
  - Includes guidance on how to target specific areas for surveillance

Surveys should be **pathway-based**, which will allow resources to be targeted to those pathways with the highest likelihood of the pest being present.

E.g. for *A. glabripennis*

‘...Wood packaging material, in particular associated with imports of stone or tiles from far Eastern countries ...’





# PM9 – National Regulatory Control Systems

PM 9/1(5)	<i>Bursaphelenchus xylophilus</i> and its vectors:
PM 9/2(2)	<i>Clavibacter michiganensis sepedonicus</i>
PM 9/3(2)	<i>Ralstonia solanacearum</i>
PM 9/4(1)	<i>Diabrotica virgifera</i>
PM 9/5(1)	<i>Synchytrium endobioticum</i>
PM 9/6(1)	<i>Heterodera glycines</i>
PM 9/11(1)	<i>Bactrocera zonata</i>
PM 9/13(1)	Potato spindle tuber viroid on potato
PM 9/14(1)	<i>Agrilus planipennis</i>
PM 9/15(1)	<i>Anoplophora glabripennis</i>
PM 9/16(1)	<i>Anoplophora chinensis</i>
PM 9/17(1)	<i>Meloidogyne chitwoodi</i> and <i>M fallax</i>
PM 9/21 (1)	<i>Popillia japonica</i>
PM 9 /22(1)	<i>Epitrix</i> species damaging potato tubers

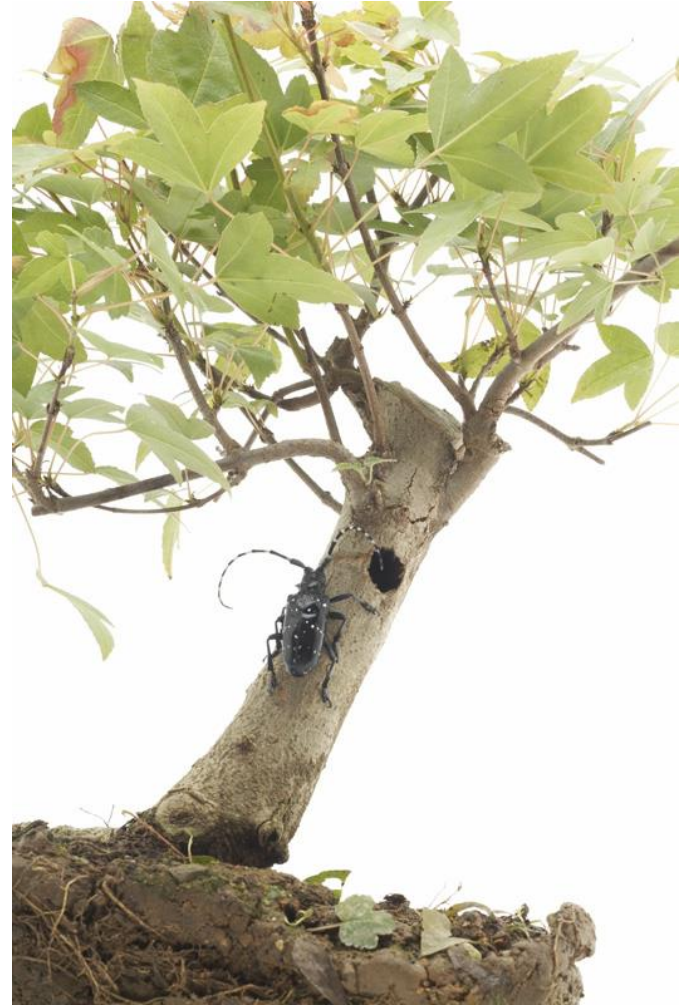


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# European Union examples of risk based sampling

# Customised sampling regime for a particular hosts: imports of maple trees into EU (1)

- *Anoplophora chinensis*, citrus longhorn beetle, is an Asian pest of deciduous trees, esp. maples
- Numerous interceptions in EU in late 2000s
- Had been transported with plants for planting
- Significant outbreaks in Italy, first one reported in 2000
- Outbreaks and interceptions led to two year ban of maples from China



*Anoplophora chinensis*, Crown Copyright

# Customised sampling regime for a particular hosts: imports of maple trees into EU (2)

- The EU introduced revised emergency measures (EU 2010/380/EU) relating to maple trees, *Acer* spp.
- For maples imported from countries where *Anoplophora chinensis* is known to occur, there is a requirement for destructive sampling
- Consignments of 1 - 4,500 trees – 10% trees should be destructively sampled
- Consignments of > 4,500 trees – 450 trees should be destructively sampled



*Anoplophora chinensis* larva  
© Crown Copyright

# European Union (EU) Reduced Frequency of Inspection system (1)

- In the EU there is a list of products that are specifically regulated and require inspection when imported from outside the Union
- The list includes all plants for planting, cut flowers and seeds of certain species, certain fruit and vegetables, and certain categories of timber or wood based products
- Normal regime: 100% inspection of consignments with regulated products
- For fruit/vegetables, wood and cut flowers: the % of consignments for inspection can be reduced, based upon
  - import data,
  - interception records, and
  - estimated mobility of the harmful organism.

# Reduced Frequency of Inspection (2)

## (eligibility of trades)

- Trades eligible if >200 consignments imported into EU each year in each of the previous three years
- If quarantine organisms are detected on 1 % or more of the consignments: the commodity is not eligible for reduced frequency inspections
- Request to apply reduced frequency introduced by Member State
- Regime updated every year and in emergency cases.



Plant Health and Seeds Inspector, UK



# Reduced Frequency of Inspection (3) (current status)

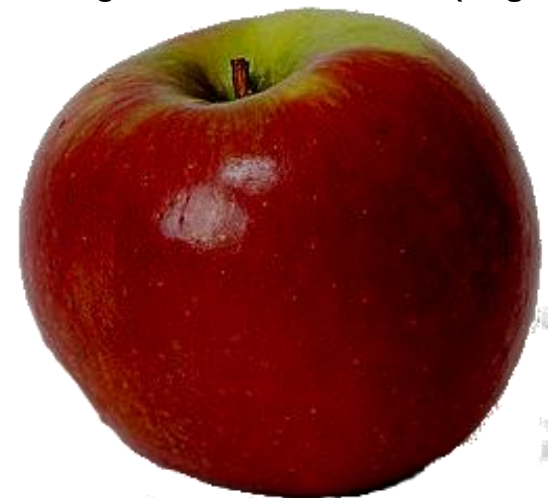
- 52 trades are covered by the system in 2017 (e.g. *Rosa* from Colombia & Ecuador – 3% inspection rate; apples from the USA 50 % inspection rate)
- Recognises good practice, facilitates trades and reduces costs
- Over 30% of regulated consignments imported to the UK are eligible for reduced checks

Reference:

[https://ec.europa.eu/food/plant/plant\\_health\\_biosecurity/non\\_eu\\_trade/less\\_frequent\\_checks\\_en](https://ec.europa.eu/food/plant/plant_health_biosecurity/non_eu_trade/less_frequent_checks_en)



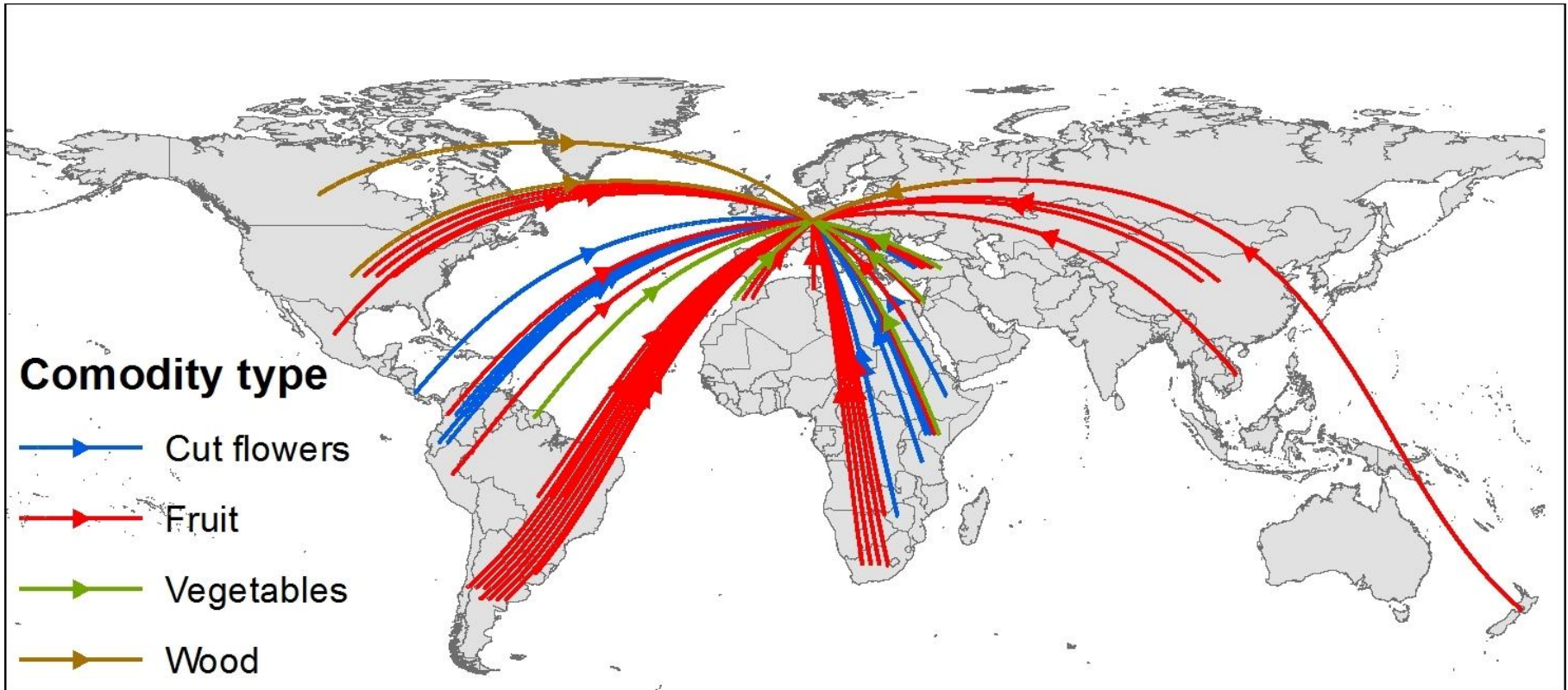
*Rosa gallica* from Wikimedia (Bogdan)



Pacific Rose apple from Wikimedia (Scarce)



# Trades that are part of the EU reduced checks scheme in 2017 (4)

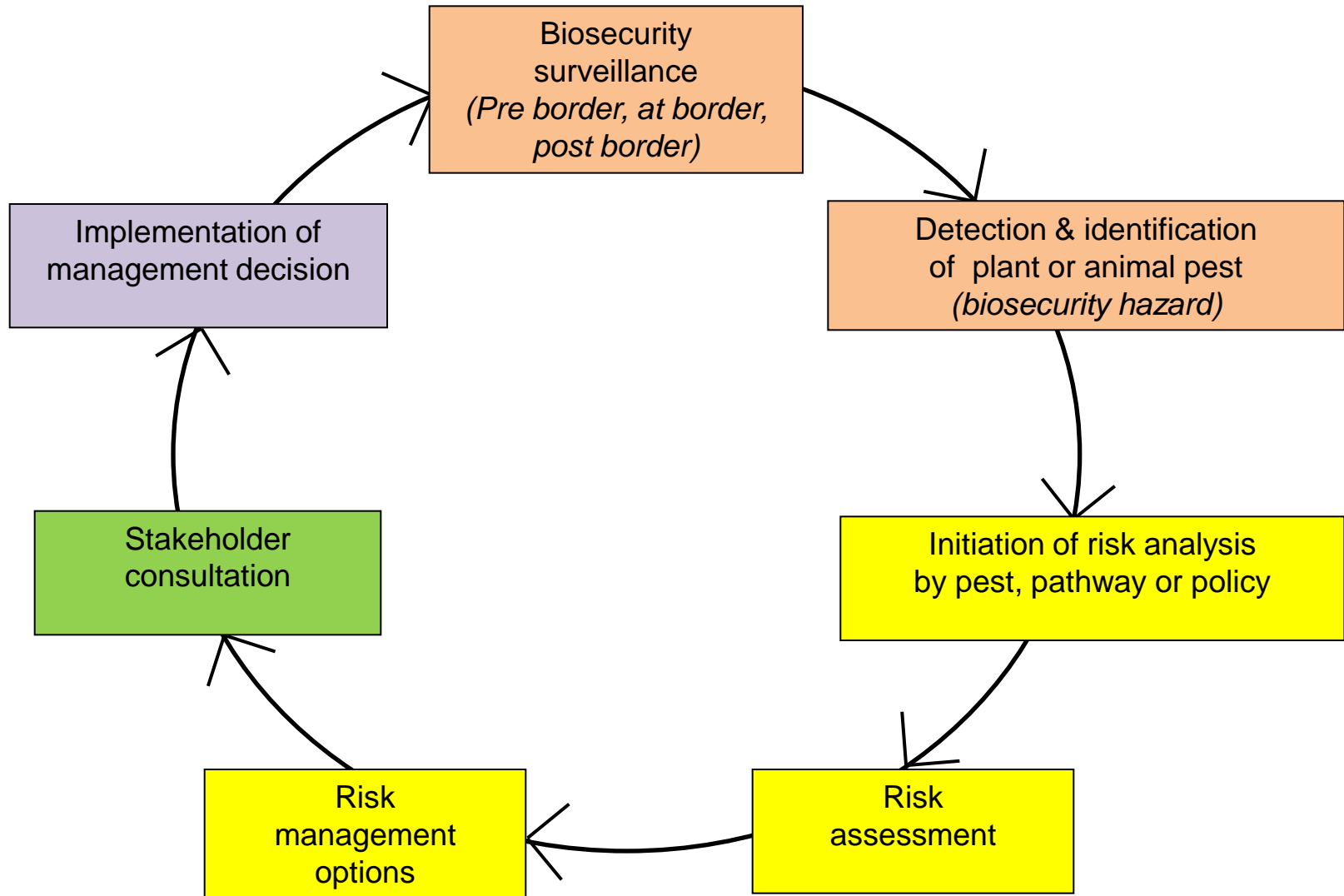




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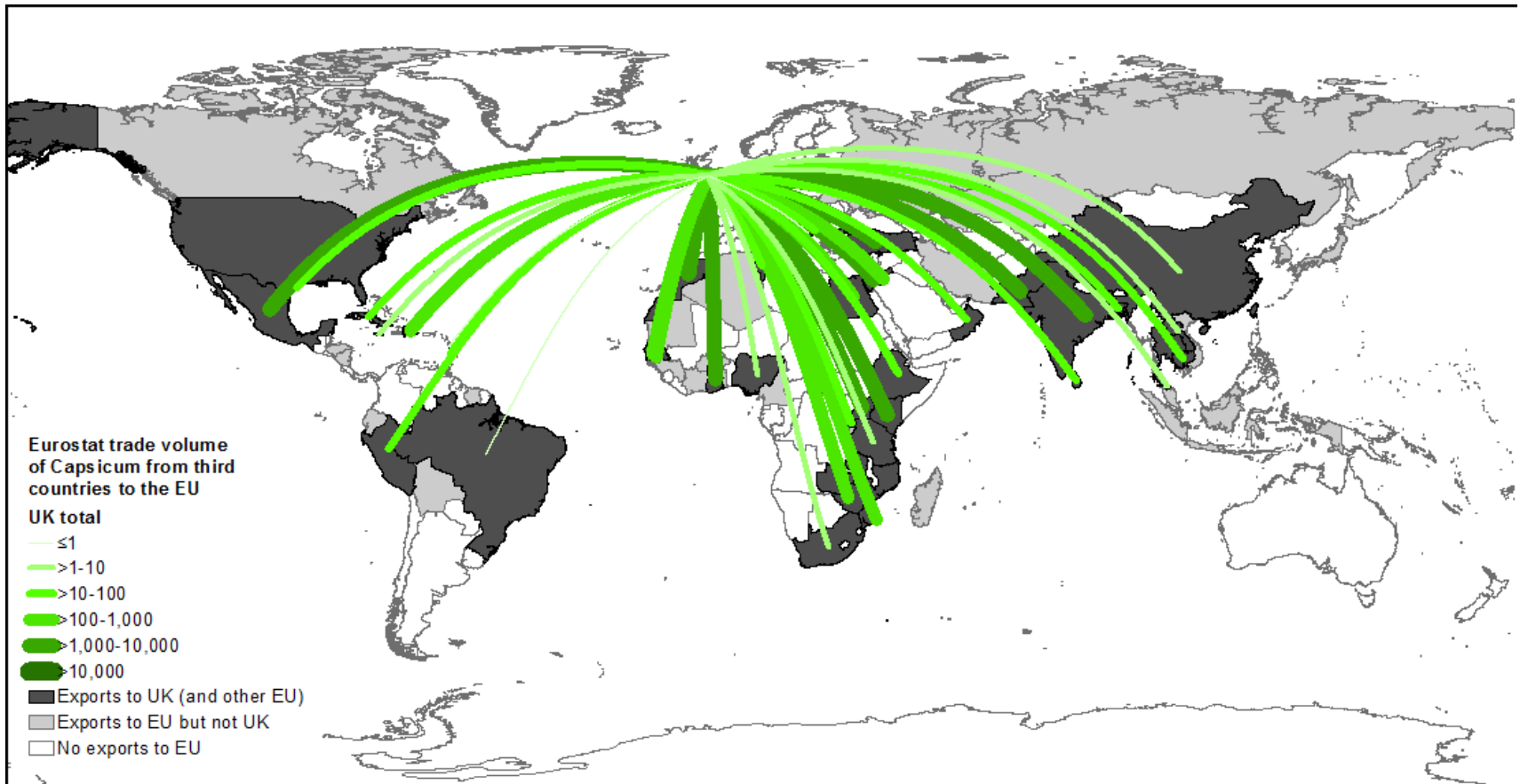
# United Kingdom examples of risk based sampling

# The relationship between biosecurity surveillance and risk analysis

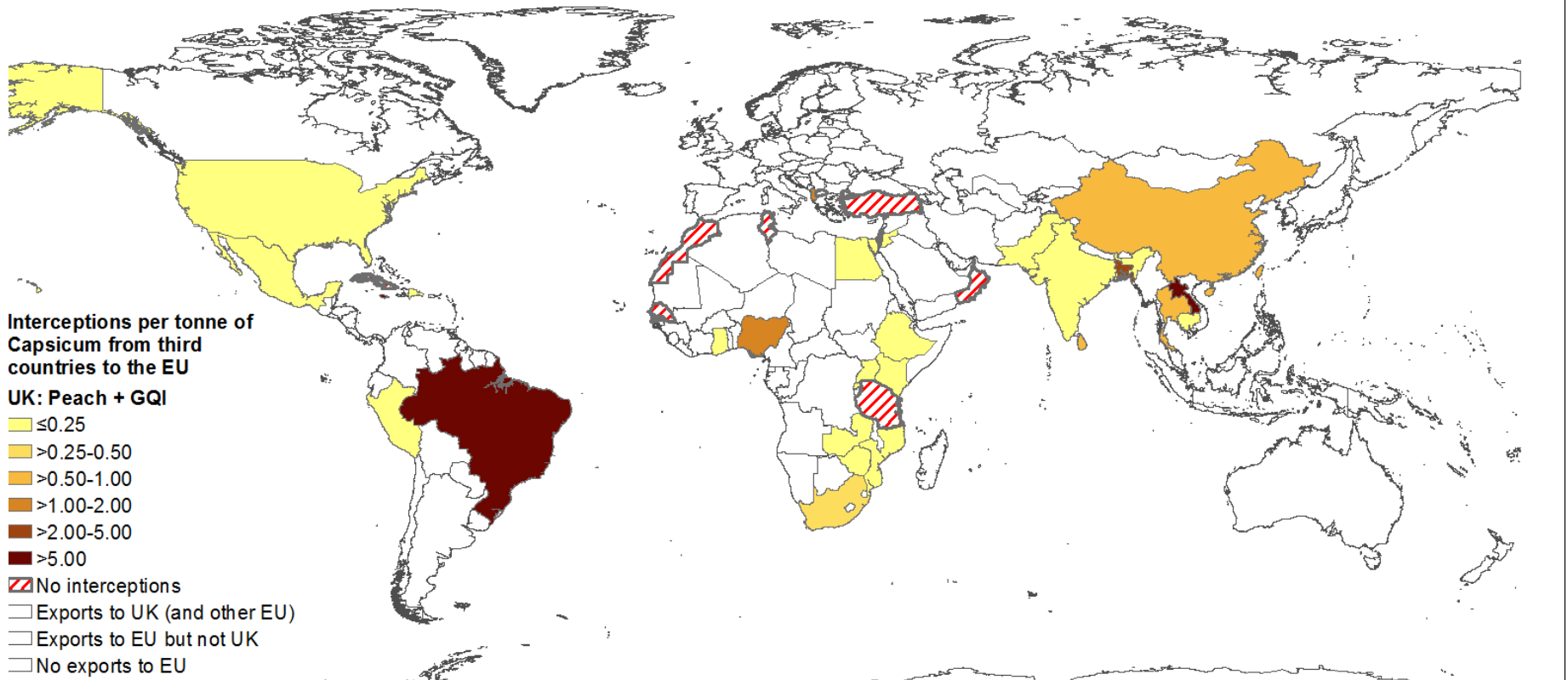


From MacLeod (2015) book chapter in 'Biosecurity Surveillance'. Ed. Jarrad et al.

# Trade pathways are complex: UK imports of *Capsicum* (peppers), Jan 2014 – Mar 2016



# One measure of risk: interceptions per tonne of *Capsicum* imports (Jan 2014 – March 2016)



# System for prioritising inland inspections in England and Wales (1): the rating system

<b>RISK</b>	<b>1 points</b>	<b>2 points</b>	<b>3 points</b>
<b>Volume of trade</b>	Small	Medium	large
<b>Business Activity</b>	Garden Centre Produce trader Processing business Landscapers Aquatic plant retailers	Production nursery Wholesaler	Propagator Distribution Centre
<b>Origin of plant material</b>	UK	EC	Third Country

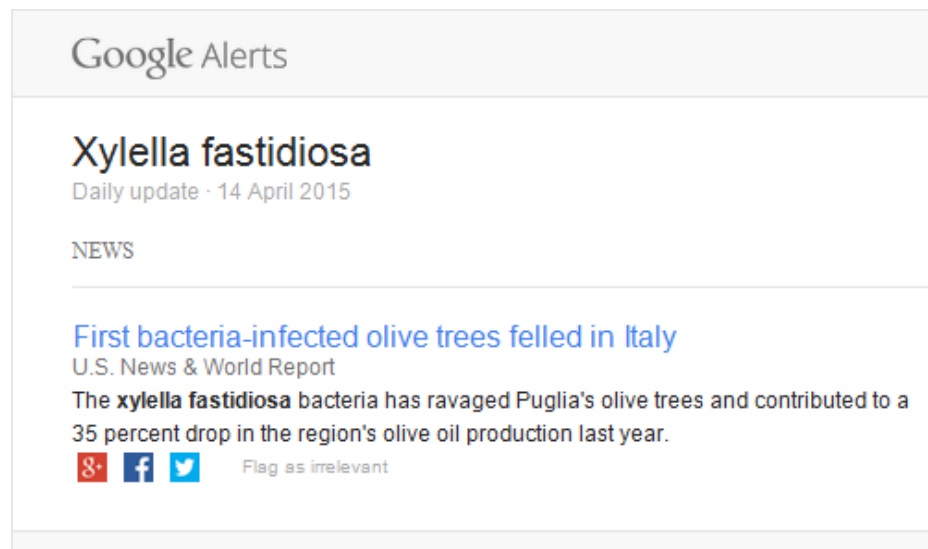
# System for prioritising inland inspections in England and Wales (2): the rating system

<b>Plant Health Risk Rating</b>	<b>Risk Category</b>	<b>Frequency of visits</b>
3	Low Risk(1)	One visit every 2 years
4	Low Risk(1)	One visit every 2 years
5	Medium Risk(2)	2 visits per year
6	Medium Risk(2)	2 visits per year
7	High Risk(3)	4-6 visits per year
8	High Risk(3)	4-6 visits per year
9	Very High Risk(4)	10-12 visits per year



# UK plant health risk register: A tool for prioritising actions

- The Risk Register assists with the prioritisation of actions against pests of plant health importance in response to:
  - Interceptions**
  - Horizon scanning**
  - Outbreaks**
  - Stakeholder feedback**
- This covers adding new pests, but also reviewing pests currently on the Risk Register as the situation changes
- As of May 2017 there are c. 960 pests on the Risk Register



# UK plant health risk register: How does it work?

- The Risk Register uses rules to rate the likelihood of a scenario (1-5), and the impacts of that scenario happening (1-5)
- There are two principal scenarios:
  - **Pest is introduced to the UK**
  - **Pest spreads to maximum extent in the UK**
- Risk is initially scored without mitigations, and then again assessed with current mitigations in place



Reference: Baker, R.H.A., Anderson, H., Bishop, S., MacLeod, A., Parkinson, N & Tuffen, M. 2014. The UK Plant Health Risk Register: a tool for prioritizing actions. EPPO Bulletin 44: 187-194

# UK plant health risk register: Introduction

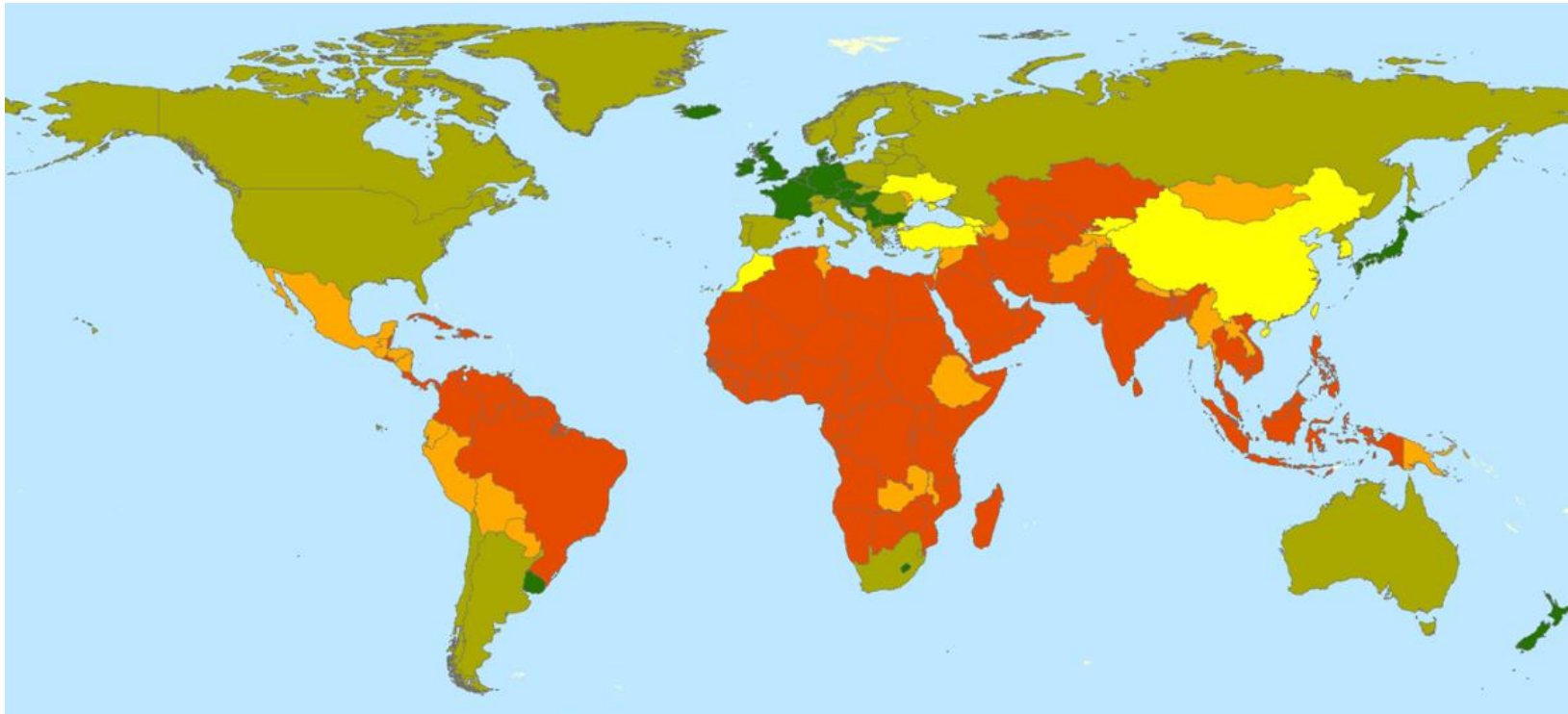
- Introduction of a pest requires both **entry** and **establishment**.
- Entry and Establishment are scored on a scale on 1 – 5
- Lower of the two scores becomes the likelihood of introduction



Colorado potato beetle

# UK plant health risk register: Establishment

- What are its hosts? Are they widely distributed in the UK, or only rarely grown?
- Where is the pest? How suitable will the climate of the UK be?



5

4

3

2

1

# UK plant health risk register: Impacts

- Impact is split into economic, environmental and social, each rated 1-5
- Largest of the three scores becomes the impact score



Palm destroyed by red palm weevil



Pines killed by pine wood nematode

# UK plant health risk register: Value at risk

	Range	Field crop	Fruit	Ornamentals	Forestry
5	> £1,000 million	Potatoes	Strawberries	Total Hardy ornamental nursery stock	Pine
4	£500 - £1,000 million	Carrots	Apples		Douglas fir
3	£50 – £500 million	Leeks	Pears	Poinsettias	Poplar
2	£5 - £50 million	Celery	Cherries	<i>Alstroemeria</i> cut flowers	
1	< £ 5 million	Sunflowers		Minor single species of ornamental	



# UK plant health risk register: Risk Ratings

## Unmitigated risk

Likelihood	Impact on sector	Likelihood x Impact	Value of sector	Overall rating
4	3	12	5	60

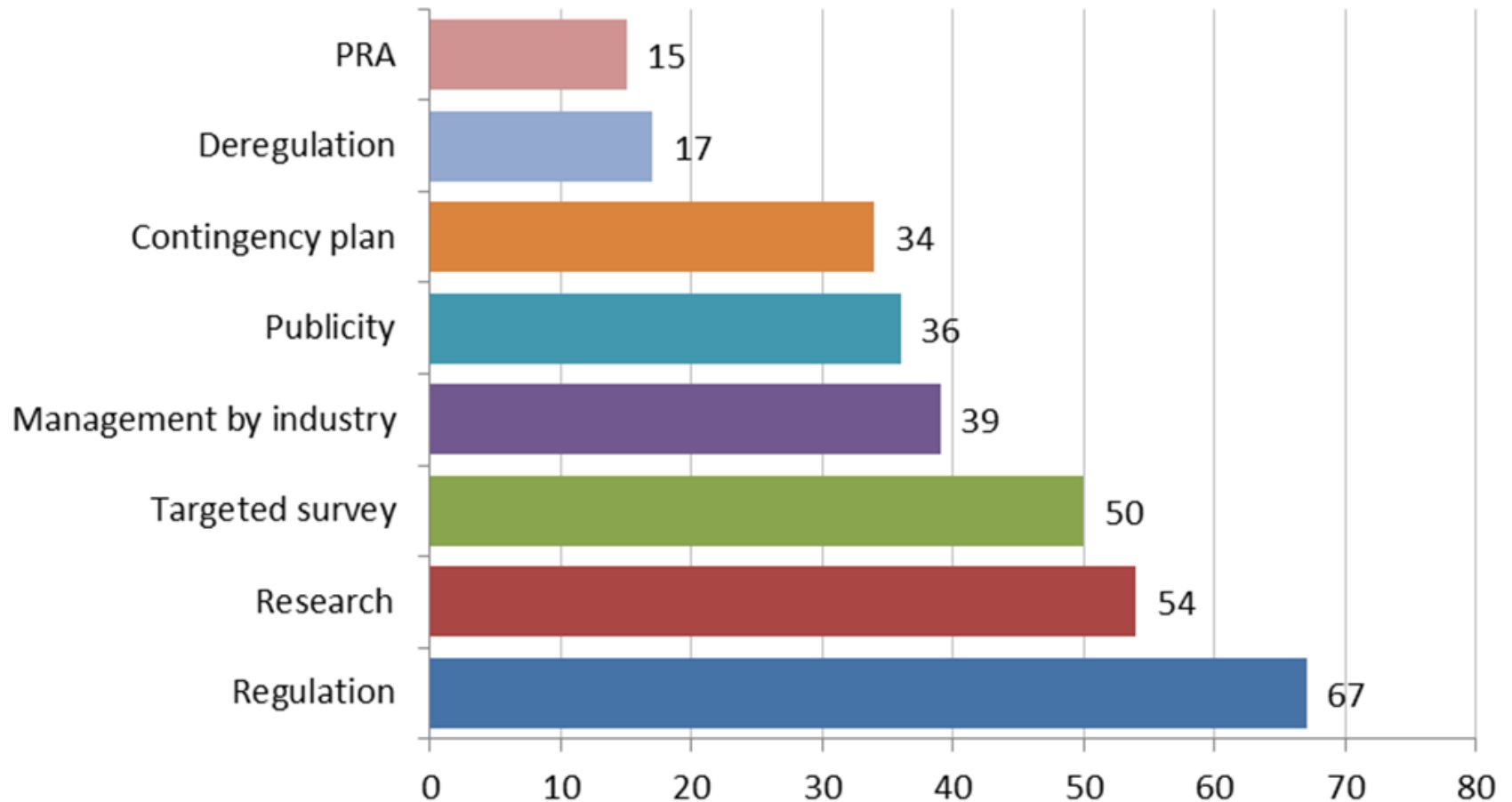
## Mitigated risk

Likelihood	Impact on sector	Likelihood x Impact	Value of sector	Overall rating
2	2	4	5	20



# UK plant health risk register: Proposed actions to further reduce risk

## Number of Pests per Priority Action



# Conclusions and points for further consideration

- Visual inspection is likely to have a bias towards the detection of invertebrates over pathogens since many pathogens have a latent phase
- Many finds of quarantine pests do not occur until the goods reach nurseries, warehouses etc.
- Due to the volume of traded goods and the difficulties of detecting certain pests, inspection can only be considered as part of the risk reduction process
- One of the main functions of inspection is to gather evidence for changes in legislation / regulation
- Any risk based system needs to be dynamic to respond to changes in trades within and between years

# Acknowledgements

Alan MacLeod, Helen Anderson , Anastasia Korycinska and Richard McIntosh in Defra's plant health Risk and Horizon Scanning Team

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