Department
for Environment
Food & Rural Affairs

The UK Plant Health Risk Register – a rapid screening tool for new risks

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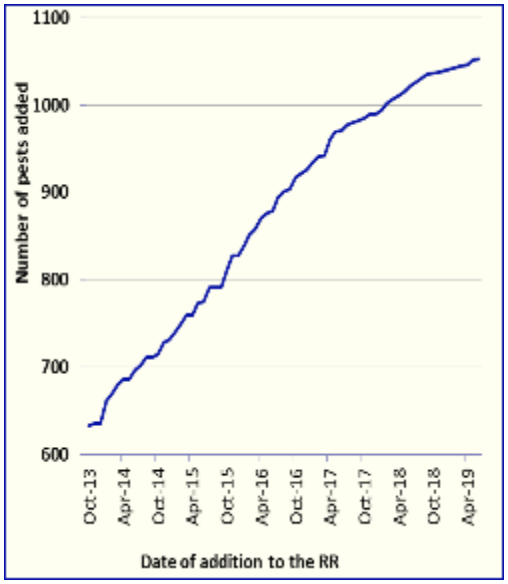
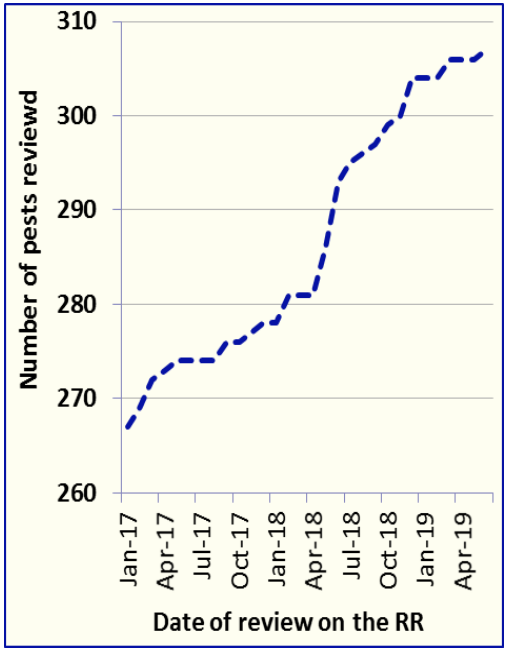
Overview

- The UK Plant Health Risk Register (RR) is a publically available pest risk ranking system
  - First 658 pests added in 2013
  - Currently 1045 pests
- Scores to rank pests from simple rules & calculations
  - Requires (relatively) little background information
  - Dynamic: new information = review of existing scores
- Functioning of RR itself also reviewed
  - Recalibrating one of the calculation matrices
  - Addition of uncertainty
  - Ability to stop updating low-risk pests (archiving)
- RR now primary tool for communicating pest risks in UK between risk analysts, policy makers & industry
- RR is now being used for a wide variety of other purposes by government, academics, industry …



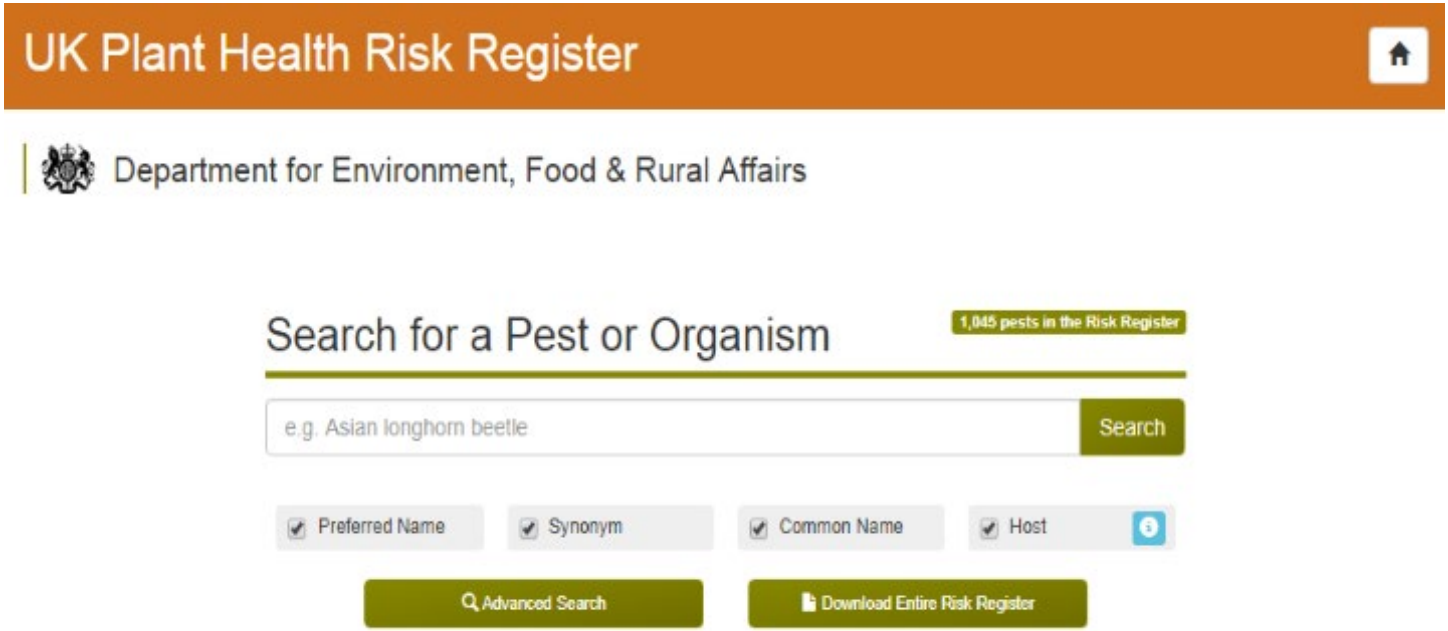


History - setup

- Key recommendation of the Tree Health and Plant Biosecurity Expert Taskforce following Chalara ash dieback in the UK
  - To provide a systematic framework to rank plant pests and pathogens
  - Prioritise those that pose the greatest threat to UK
  - Suggest appropriate actions to mitigate threats
  - An agreed, evidence based framework for decisions on priorities for actions by government and plant health stakeholders
- Developed over 4 months in 2013
- Workshops held with stakeholders early in the process
- 658 pests initially added
  - EC listed pests
  - EPPO listed pests
  - UK PRAs completed
- Published online January 2014

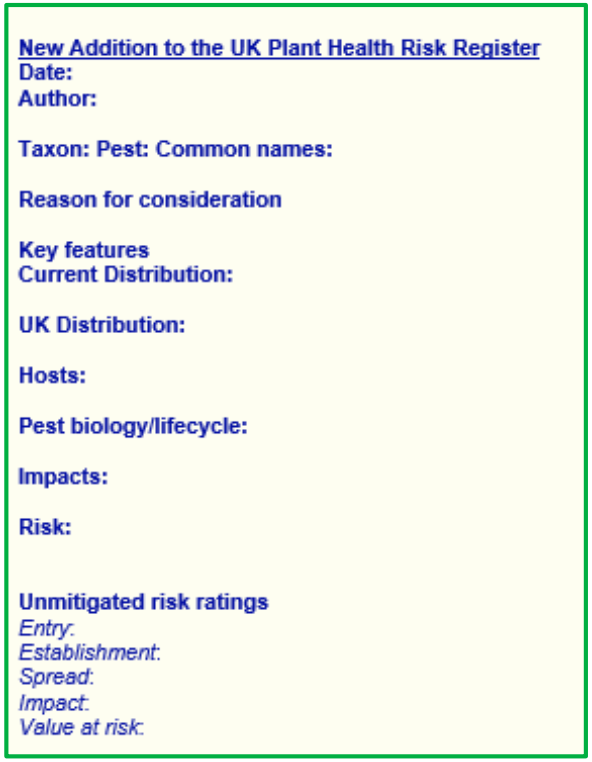
Operation of the Risk Register

https://secure.fera.defra.gov.uk/phiw/riskRegister/



Adding pests to the Risk Register

- Risk Register entries prepared by Pest Risk Analysts
- Each RR entry (after initial 658) has supporting document (template):
  - Pest name
  - Reason for addition (or review)
  - Background information on the pest
    - Distribution, hosts, basic biology, recorded impacts
  - Rationale for ratings
    - Calculated scores and any justification/alterations
  - Key uncertainties
  - References
- Templates technically reviewed:
  - Within PRA team, pest specialist(s), relevant interested parties within government organisations
  - On paper followed by technical meeting discussion
- Templates discussed at meeting with policy & others:
  - Any recommended actions agreed
  - Statements agreed



New Addition to the UK Plant Health Risk Register
Date:
Author:

Taxon: Pest: Common names:

Reason for consideration

Key features
Current Distribution:

UK Distribution:

Hosts:

Pest biology/lifecycle:

Impacts:

Risk:

Unmitigated risk ratings
Entry:
Establishment:
Spread:
Impact:
Value at risk:

Scoring in the Risk Register (1): Likelihood

- Ratings on a scale of 1 to 5
- 2-Risk-Registers-in-1
  - Pest spreads to maximum extent
  - Pest is introduced

- Likelihood of spread to maximum extent
  - Calculation natural rate of spread – often overruled to account for trade

- Likelihood of introduction
  - Entry combines
    - Trade volume
    - Inherent pathway risk
  - Establishment combines
    - Climate suitability
    - Host distribution
  - Lower score of entry/establishment becomes the likelihood

Commodity Volume rating	Inherent Pathway Risk Rating				
	1	2	3	4	5
5	3	4	4	5	5
4	2	3	4	4	5
3	2	2	3	4	4
2	1	2	2	3	4
1	1	1	1	3	3

Host Distribution	Climate suitability				
	1	2	3	4	5
5	1	3	3	5	5
4	1	2	3	5	5
3	1	2	3	4	5
2	1	1	2	3	4
1	1	1	1	2	3

Scoring in the Risk Register (2): Impact

Economic impact

- Rules in place to calculate economic impact
  - Questions on pest ability to multiply
    - Spread
    - Climate suitability
  - Questions on ability to cause harm to hosts
  - Combined to calculate an overall rating

Environmental impacts

Social impacts

  - Both expert judgments based on guidance

Overall impact

- Highest of the three ratings

Scoring in the Risk Register (3): Value at risk

	Value	Field crop	Fruit	Ornamentals	Forestry
5	> £1,000 million	*Solanum tuberosum* (potato)	*Fragaria* (strawberry)	Hardy ornamental nursery stock	*Pinus* (pine)
4	£500 - £1,000 million	*Daucus carota* (carrot)	*Malus domestica* (apple)		*Pseudotsuga menziesii* (Douglas fir)
3	£50 – £500 million	*Allium porrum* (leek)	*Pyrus communis* (pear)	*Euphorbia pulcherrima* (poinsettia)	*Populus* (poplar)
2	£5 - £50 million	*Apium graveolens* (celery)	*Prunus cerasus* (cherries)	*Alstroemeria* cut flowers	
1	< £ 5 million	*Helianthus annuus* (sunflower)	*Prunus persica* (peach)	Minor single species of ornamental	

Scoring in the Risk Register (4): Overall rating

= Likelihood * Impact * Value at risk

(range of scores 1-125)

Unmitigated risks

- Based on no controls
  - All imports possible
  - No actions at border
  - No actions post-border

An unregulated pest on an unregulated pathway will have little/no change in scores:

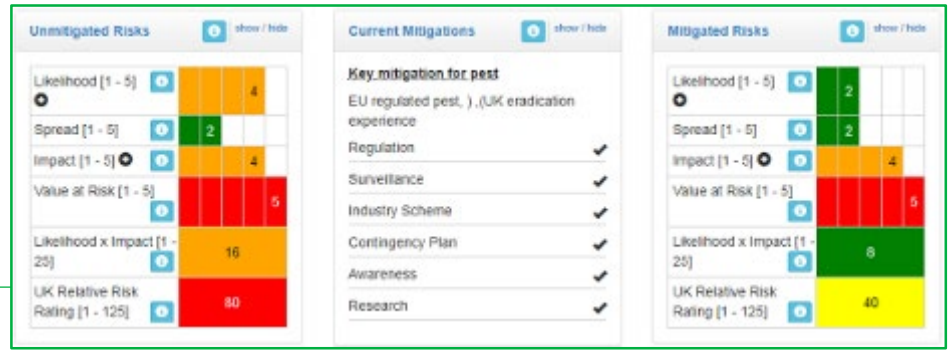
Phytophthora foliorum

Mitigated risks

- Based on existing controls
  - Legislation
  - Border inspections
  - Eradication, industry management, etc.

A highly regulated pest on a highly regulated pathway will show a large drop in mitigated scores – if mitigation effective:

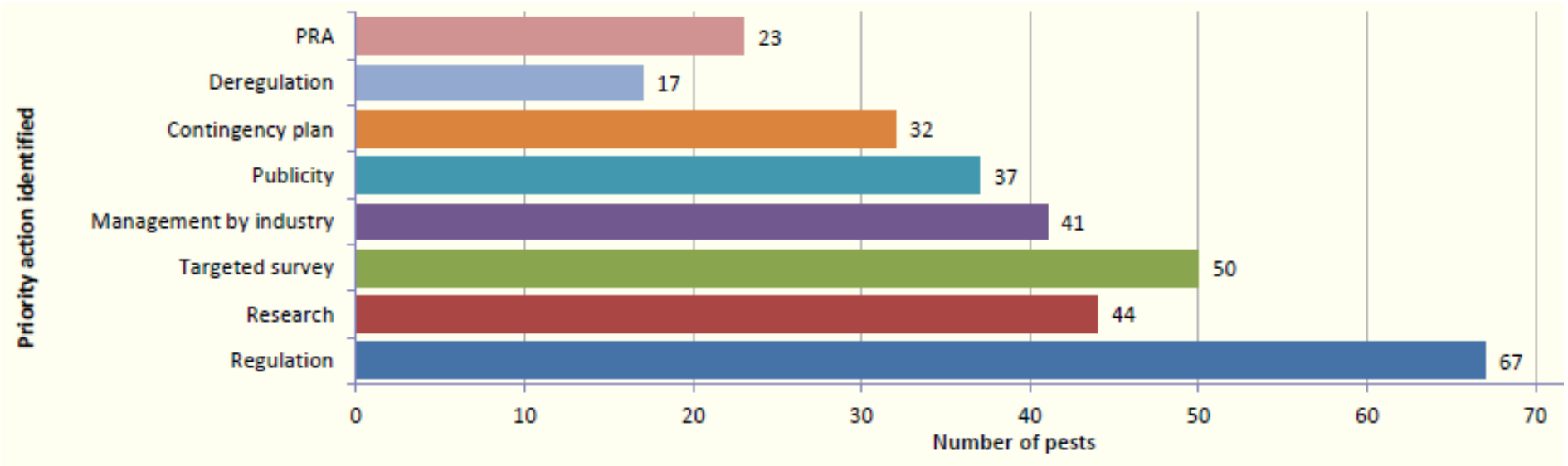
Anoplophora glabripennis



Actions from the Risk Register

Determine priorities for additional action(s) including:

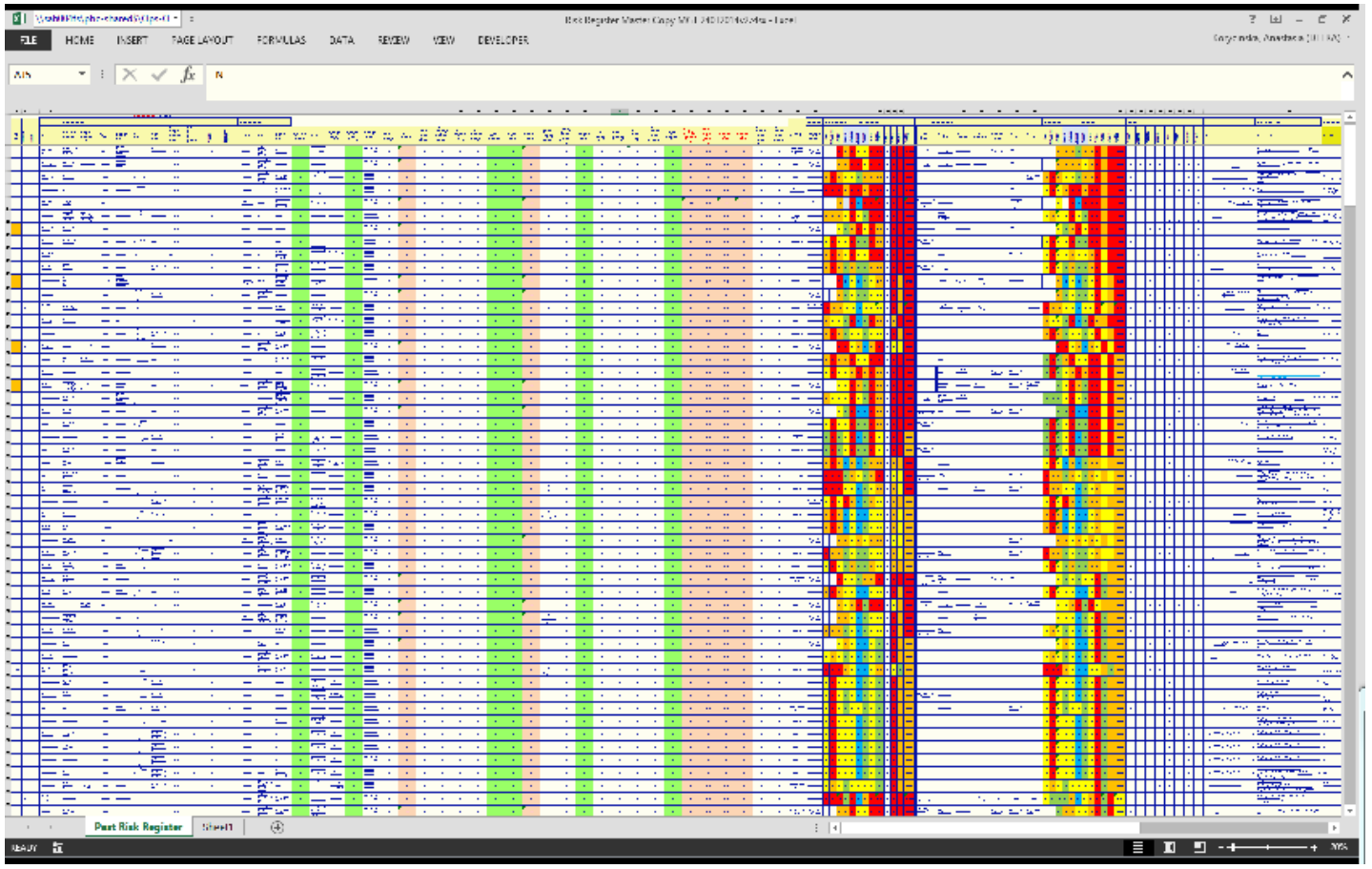
- Regulation
- Deregulation or reduced regulation
- Management by industry
- Targeted survey
- PRA
- Contingency plan
- Publicity
- Research



After completion of action(s)

- **Risk Register entry is reviewed – including identification of new action(s)**
- **Scores adjusted**

Developing the Risk Register



https://secure.fera.defra.gov.uk/phiw/riskRegister/

Updating establishment matrix (1)

When:

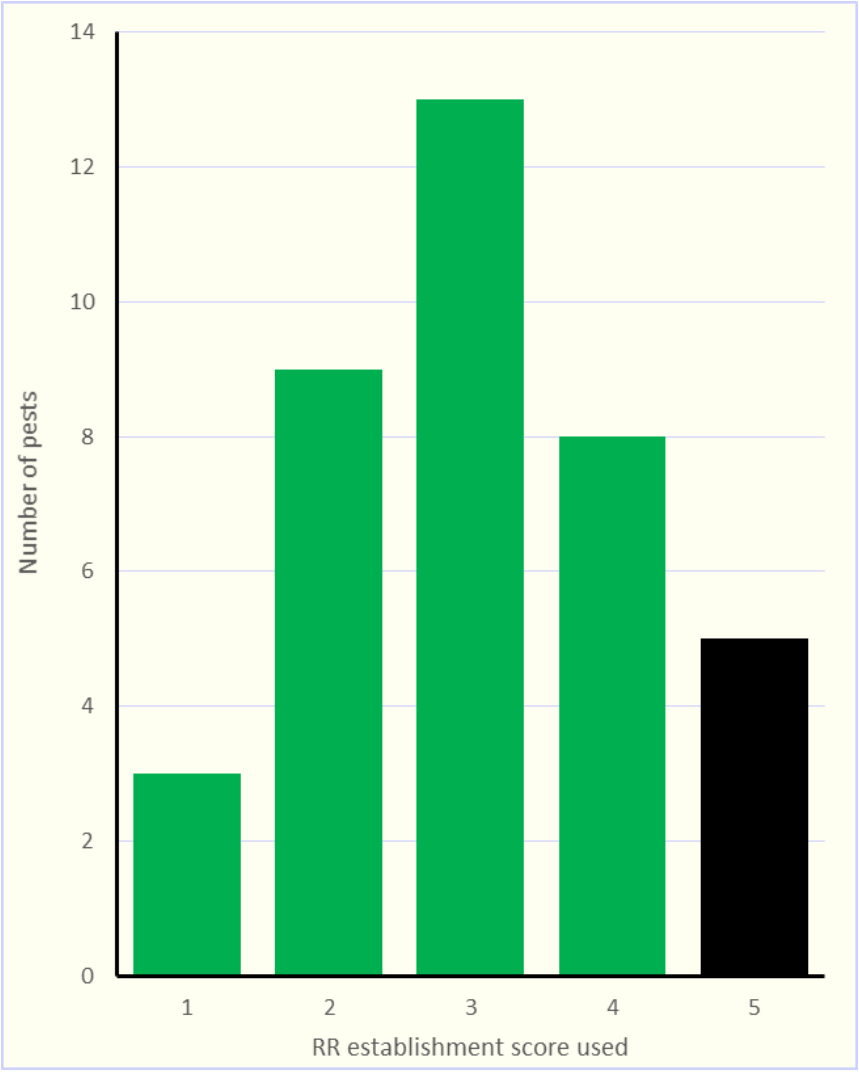
- Climate suitability = 3
- Host distribution = 5

Host Distribution	Climate suitability 1	2	3	4	5
5	2	3	**5**	5	5
4	1	2	4	5	5
3	1	1	3	4	5
2	1	1	2	3	4
1	1	1	1	2	3

Calculated establishment score = 5 (black bar) (n=38 pests)

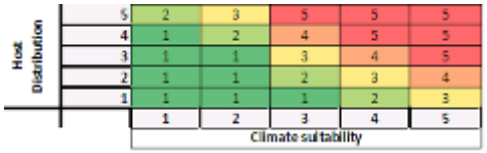
This is not the figure most frequently used for establishment

Countries with a climate suitability of 3 include Morocco, South Korea and Ukraine



Updating establishment matrix (2)

Black bars indicate calculated score



Host distribution

5 4 3 2 1

No pests on RR with these input scores

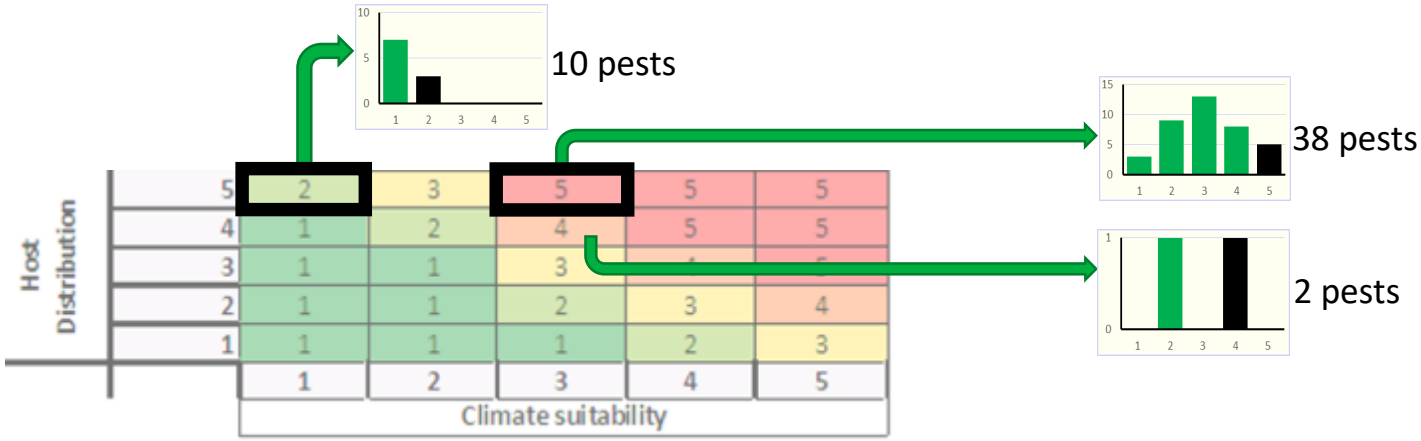
No pests on RR with these input scores

1 2 3 4 5

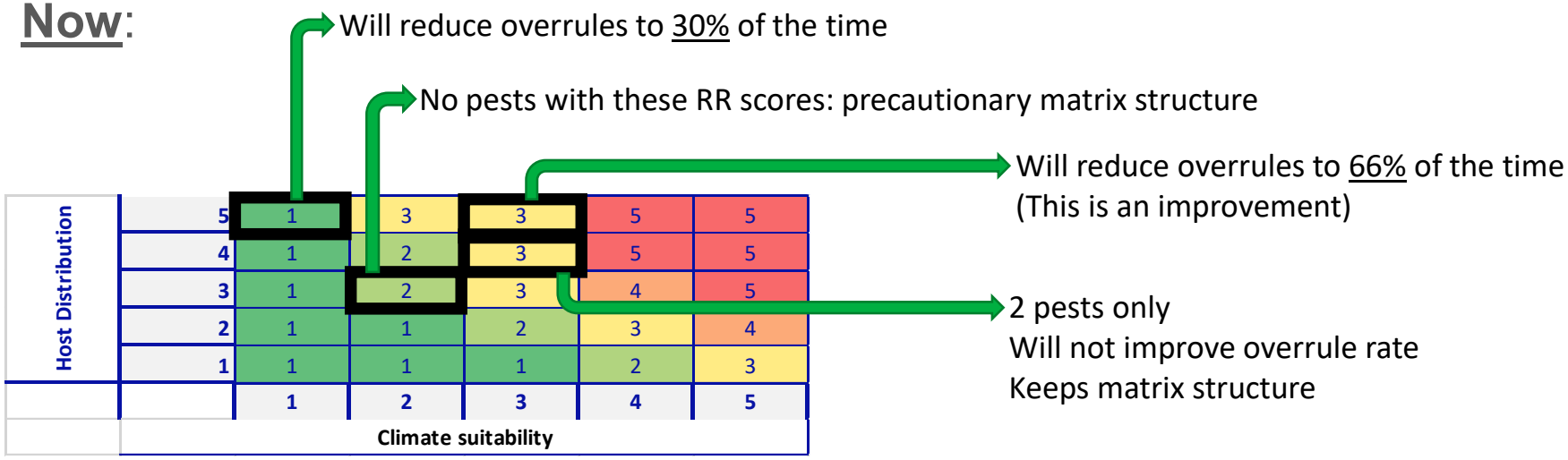
Climate suitability

Updated establishment matrix - implemented

Was:



Now:



Uncertainty (1)

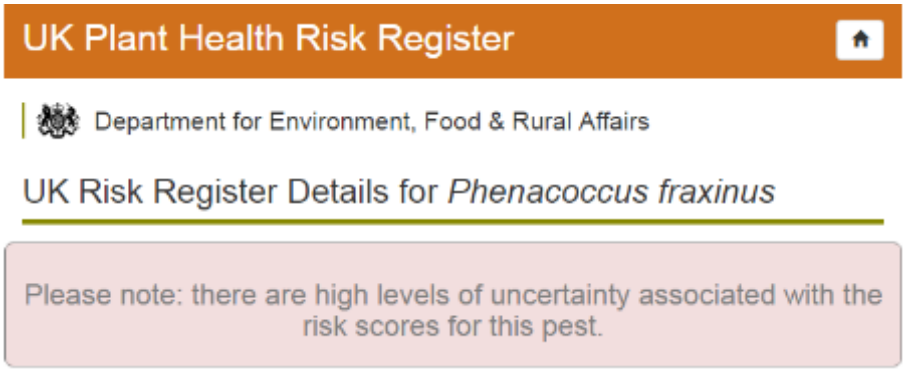
- Uncertainty always included in internal templates
- Needed to show it on external website
- Round #1
  1. Assigning probability – range given instead of one number
  2. Listing uncertainties – assessor identifies areas of key uncertainty
  3. Proxies – range of questions with numerical scores applied
  4. Combination of 3. with 1. or 2.
  5. Only highlighting very uncertain pests
  6. Keep the uncertainty assessments internal
- Round #2
  1. Listing uncertainties – assessor identifies areas of key uncertainty
     - Fewest difficulties
  2. ~~Proxies – range of questions with numerical scores applied~~
     - ~~Proxy scores often did not match analysts' impressions of uncertainty~~
  3. Only highlighting very uncertain pests
     - Where is the cut-off?

Uncertainty - implemented

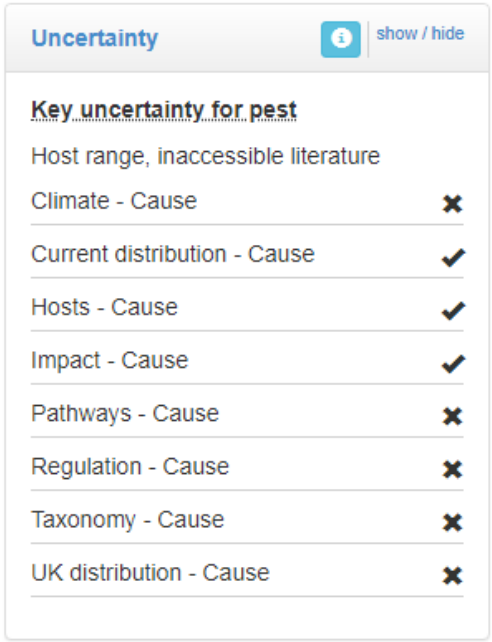
Internal:

Uncertainty			
Are the risk scores for this pest very highly uncertain?	**Yes**	**Key uncertainty for pest:** Host range, inaccessible literature	
Taxonomy:			
Current distribution:	The sub-national distribution within China.		
UK distribution:			
Hosts:	Which species of *Fraxinus* are hosts. Whether species other than *Fraxinus* are hosts.	Establishment, impact and value at risk scores will be over-estimated if *F. excelsior* is not a suitable host. The volume of trade of non-*Fraxinus* hosts has not been fully assessed, as non-*Fraxinus* hosts appear to be minor.	
Impact:	What conditions allow high populations to build up and cause damage.	The impact score is precautionary, and assumes damaging populations can build up in the UK.	
Pathways:			
Climate:			
Regulation:			
Other:	Most of the literature is in Chinese, and appears to be of variable quality.		

- Very high uncertainty “banner”:



- All pests:



Archiving

Reducing the burden of maintaining >1040 pests

Pests clearly identified as such

Selecting suitable pests:

- Low-priority pest
- Exceptions – high-profile pests
- Exceptions – occasional listed pests with very little information

- Minor updates will not occur
- Significant changes will result in updates & review of risk, such as:
  - Spread to a new continent
  - Host range expansion to important UK crop/ornamental

The many and varied uses of the Risk Register

https://secure.fera.defra.gov.uk/phiw/riskRegister/

Communicating with Policy

- Became the main reference tool for Policy
- Risk Register key method of bringing new pests to Policy attention
- Key tool for identifying which pests should be prioritised for which actions
- Pests constantly reviewed in response to new information
- Risk Register used to answer questions such as:
  - Which pests are associated with *Fagus*?
  - Suggesting pests & hosts for new EU regulation
- Publicity including multi-pest factsheets identified by RR
  - Protected cultivation
  - Tomato pests

Department for Environment Food & Rural Affairs

Plant Pest Factsheet

Pests of tomato crops

Background

Tomato growers should be aware of the potential risk from viroids, viruses and other pests and diseases that can affect tomato crops. This leaflet details some of the main pests of tomatoes and suggests methods of minimising the risk of transmission.

Department for Environment Food & Rural Affairs

Plant Pest Factsheet

Pest and Disease Threats to Herbaceous and Ornamental Crops

Very large database used by diverse users…

Industry

- UK nurseries selecting where to source stock
- Which pests might be associated with Christmas trees?

Government

- Identifying pest/host combinations for post-entry quarantine
- Northern Irish Risk Register
- Forestry indicators (performance metric)

Also academia, members of the public, other NPPOs….

Challenges

- Communicating that the RR contains only a subset of information
  - Pests not on the RR still pose a risk
  - Hosts – deliberately limited lists
- Uses we never dreamed of!

Future ideas for the Risk Register

https://secure.fera.defra.gov.uk/phiw/riskRegister/

Planned development of the Risk Register

- Value at risk
  - Reviewing the values & their generation (external)
  - Making it easier to update (mostly internal)
- Adding new advanced search options (external)
- Better co-ordination between "parent" database and the Risk Register (internal)

Analysing our own dataset

- So many ideas, so little time…
- No resource to create proposed full receptor or pathway Risk Registers
  - Investigate using filters on the pest RR to produce simpler "receptor" and "pathway" versions?

Risk Register does not replace PRA

Challenge	Risk Register	Pest Risk Analysis
Many potential threats	Ability to identify many potential threats rapidly	Intensive process, limited pests assessed
Limited resources	Screen out minor pests quickly	Focus on complex and important threats
Stakeholders	Increased stakeholder engagement	Technical, lengthy documents off-putting
Scores	Precautionary and pests can be over-rated	Risks assessed as accurately as possible
Methods used	Simple rules to rate scenarios based on key information about the pest	**Structure based on international standards with a thorough evaluation of the evidence**
Role of risk ratings	To inform prioritisations and actions in UK Plant Health	**To identify and justify phytosanitary decisions**

Thank-you for your attention

https://secure.fera.defra.gov.uk/phiw/riskRegister/

Publication:

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