Economics

Invasives vs GB economy + GBCrop

CABI

Our Invasive Species Capabilities in Europe

36 scientists in 3 centres

3 quarantine suites

8 laboratories

10 glasshouse chambers

Dozens of field cages

20 students

>35 projects

Recognised globally as leaders in classical biological control

Globally more than 700 years of experience – and rising!!

Expertise

- Policy
- Pest Risk Analysis / horizon scanning
- Awareness raising / public outreach
- Ecological and economic assessments
- Training
- Feasibility studies
- Prioritisation of actions
- Weed biocontrol – classical and mycoherbicide
- Insect Biocontrol – classical and biopesticide

Overview

- Economic assessment of INNS in GB
- questionnaire
- by sector
- overall

The Economic Cost of Invasive Non-Native Species on Great Britain

F. Williams, R. Eschen, A. Harris, D. Djeddour, C. Pratt, R.S. Shaw, S. Varia, J. Lamontagne-Godwin, S.E. Thomas, S.T. Murphy

CAB/001/09

November 2010

www.cabi.org

KNOWLEDGE FOR LIFE

- **It was never "published"**

  227 citations

  countless times the figures are used in policy docs all over the world

Intro to the Economics assessment

- Much more detailed than previous examples
- Only deals with –ve impacts
- If assumptions then they were conservative
- Peer reviewed
- Focuses on direct costs
- Meta analysis suggests costs could be 90x higher

Process

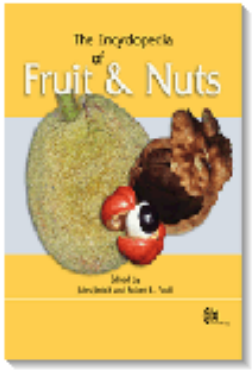
- 520 INNS selected
- Questionnaire to 730 people (with incentive)
- Telephone follow up with 250 experts
- Review of grey literature
- Draft report reviewed by 40 sectoral experts

The Scottish Government

defra
Department for Environment Food and Rural Affairs

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

www.cabi.org



Now Published!

The Encyclopedia of Fruit & Nuts

Edited by J Janick, Purdue University, USA; R E Paull, University of Hawaii at Manoa, USA

January 2008 / Hardback / 976 Pages / 9780851996387

£195.00 / $390.00 / €310.00

Add to Cart

Questionnaire responses

- We received responses from 338 people though only 97 were complete
- the 97 responses, impact of NNS was classed as:

  Direct - 56.7 %

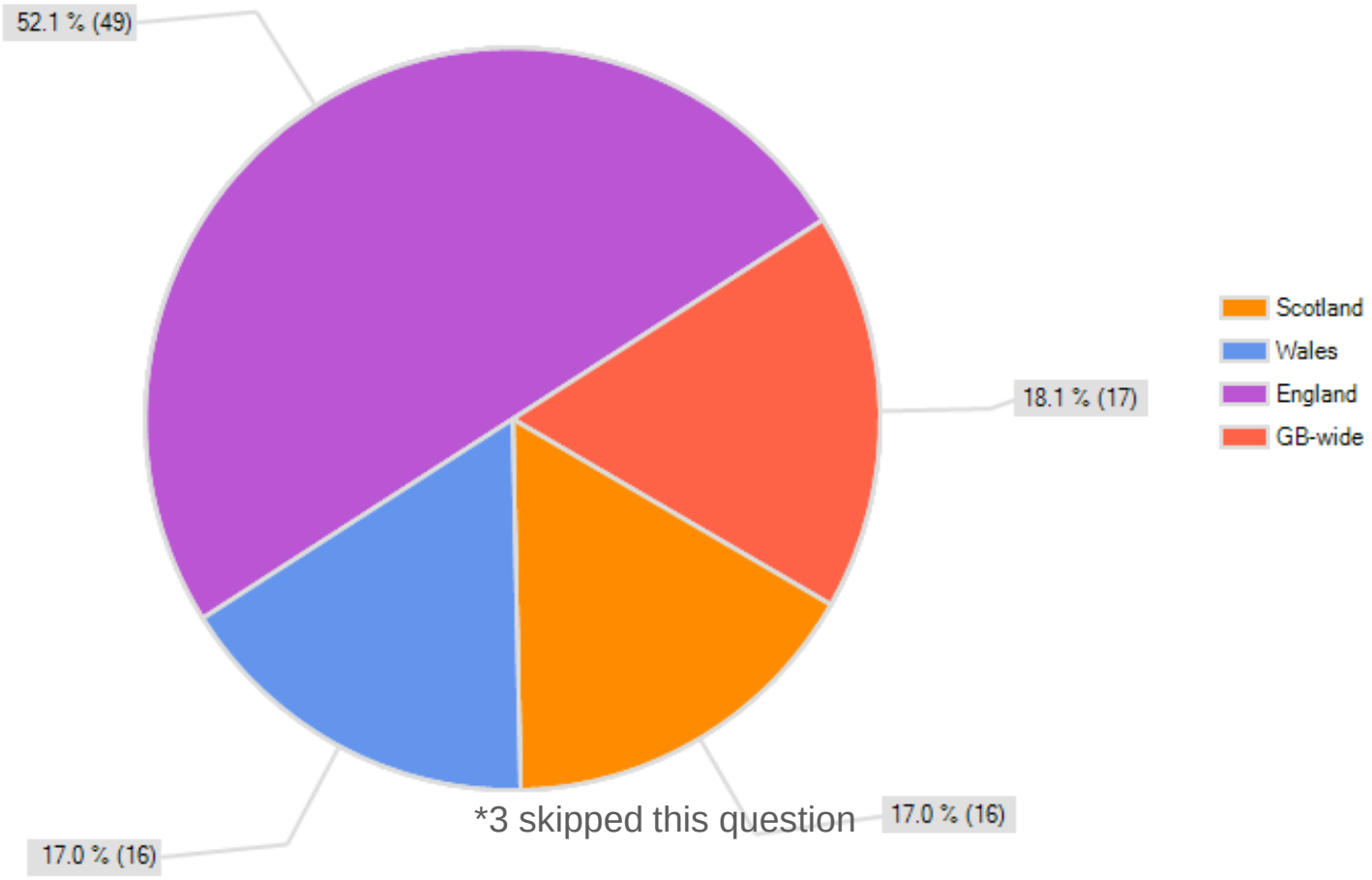
  None recorded but had quantifiable knowledge though research or other - 42.3 %

  Of no relevance -1%

- Responses from all sectors except quarantine/surveillance

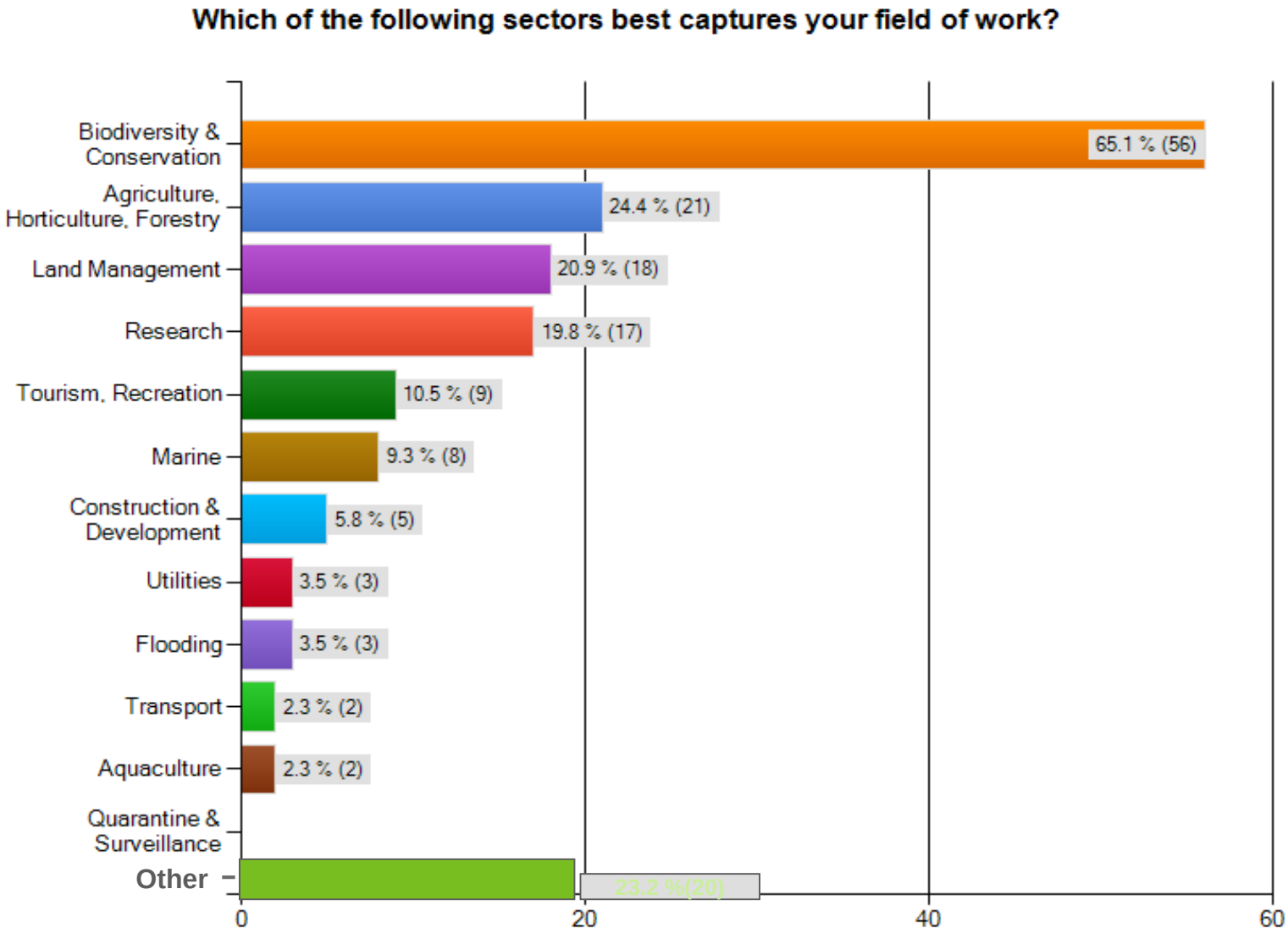
- 17 of the 97 wanted no further contact, 14 gave further names/organisations (contacted)

Country breakdown



*3 skipped this question

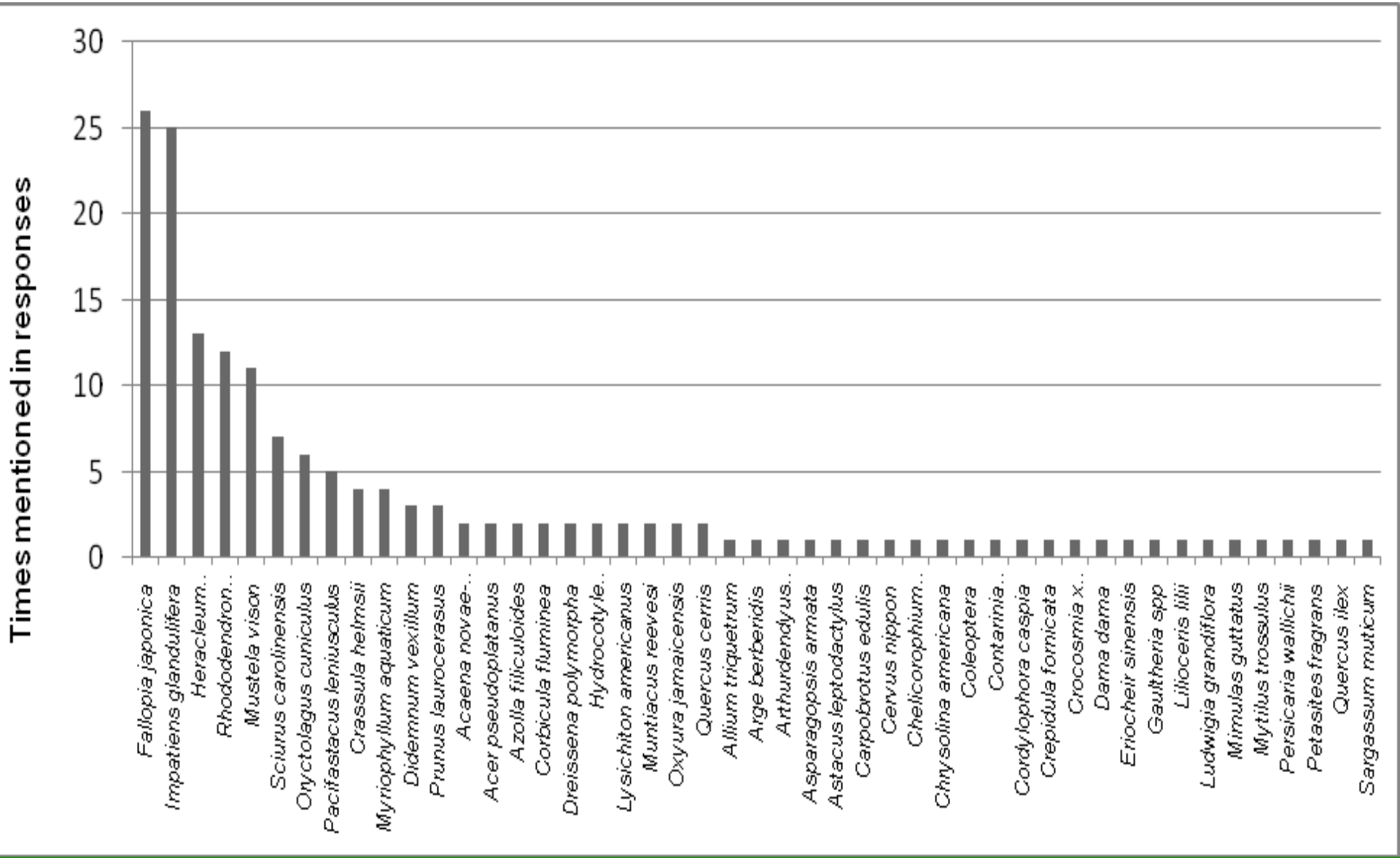
Sector breakdown



*11 skipped this question

Other e.g. Woodland owner, golf, falconry, planning authority

Which ones were most frequently mentioned?



Follow-ups

Over 250 follow up interviews were made

- Many people were not able to provide figures due to;
  - privacy
  - lack of data
  - extra work involved in calculating separate figures
  - or simply not knowing
- Varied response from calls – some provide valuable data, others just make further contacts
- Some people do not have data, but are aware of the issue of INNS
- Others state there is no issue relating to INNS in their area
- When data was obtained they could be very accurate and useful

Difficulties

- Some difficulties in obtaining costs where INNS are not managed separately from native species that are pests.
- Commercial conflicts of interest on major species.
- Christmas!!
- Lack of confidence in extrapolating cost figures
- Embarrassment
- Disagreement amongst peers
- Necessity of making assumptions, (e.g. spread, amount controlled) to extrapolate figures

Large costs to Agriculture

Table 5.14. Total estimated annual costs of non-native species to agriculture.

	England	Wales	Scotland	GB
Herbicides	£78,505,000	£1,229,000	£10,920,000	£90,654,000
Yield loss - weeds	£89,731,000	£13,852,000	£1,134,000	£104,717,000
Pesticides	£22,871,000	£284,000	£2,885,000	£26,040,000
Yield loss - invertebrates	£105,642,000	£18,222,000	£5,477,000	£129,341,000
Sprayer water	£672,000	£9,000	£77,000	£758,000
Storage pests	£15,412,000	£86,000	£2,145,000	£17,643,000
Nematodes	£38,605,000	£841,000	£10,554,000	£50,000,000
Varroa mite	£13,837,000	£6,758,000	£6,524,000	£27,119,000
Plant pathogens	£341,928,000	£8,825,000	£50,954,000	£401,707,000
Deer	£5,836,000	£1,222,000	£204,000	£7,262,000
Rabbit	£113,677,000	£15,381,000	£58,563,000	£187,621,000
Rats	£10,915,000	£4,366,000	£6,549,000	£21,830,000
Mink	£78,000	£24,000	£112,000	£214,000
Geese & Swans	£1,470,000	£11,000	£22,000	£1,503,000
Parakeets	£10,000	-	-	£10,000
Total	**£839,189,000**	**£71,110,000**	**£156,120,000**	**£1,066,419,000**

Tourism and leisure

Table 9.6. Total annual costs of INNS to British Tourism and Leisure Industry

	England	Wales	Scotland	GB
Coastal tourism	£15,000			£15,000
Golf	£6,047,000	£717,000	£1,647,000	£8,411,000
Angling (inland)	£2,281,000	£364,000	£2,249,000	£4,894,000
Recreational boating	£28,101,000	£379,000	£1,971,000	£30,451,000
Waterway management costs	£17,488,000	£2,186,000	£2,186,000	£21,860,000
Giant hogweed	£516,000	£160,000	£289,000	£965,000
Japanese knotweed	£3,444,000	£469,000	£1,724,000	£5,637,000
Hull fouling	£18,441,000	£1,073,000	£1,854,000	£21,368,000
Shooting	£2,587,000	£411,000	£1,139,000	£4,137,000
Total	**£78,920,000**	**£5,759,000**	**£13,059,000**	**£97,738,000**

infrastructure

Table 10.2. Estimated annual costs of INNS to the Construction, Development and Infrastructure sectors

	England	Scotland	Wales	GB
Japanese knotweed - construction	£141,358,000	£1,508,000	£7,644,000	£150,510,000
Japanese knotweed – housing devaluation	£963,000	£97,000	£56,000	£1,116,000
Japanese knotweed - households	£383,000	£42,000	£23,000	£448,000
Japanese knotweed – local authority management	£270,000	£96,000	£66,000	£432,000
Other plants - construction	£1,317,000	£13,000	£67,000	£1,397,000
Brown rat-control	£27,101,000	£2,867,000	£1,582,000	£31,550,000
Brown rat –surface control	£300,000	£43,000	£28,000	£371,000
House mouse-control	£15,355,000	£1,625,000	£896,000	£17,876,000
Edible dormouse	£114,000	–	–	£114,000
Grey squirrel - damage	£4,699,000	£118,000	£311,000	£5,128,000
Grey squirrel - control	£1,755,000	£44,000	£116,000	£1,915,000
Parakeets	£10,000	–	–	£10,000
River/ Canal bank/lock infrastructure repairs	£300,000	£30,000	£20,000	£350,000
Buddleia - disrepair control	£158,000	£181,000	£10,000	£349,000
Buddleia- listed buildings	£147,000	£206,000	£259,000	£612,000
Termites	£190,000			£190,000
Total	**£194,420,000**	**£6,870,000**	**£11,078,000**	**£212,368,000**

Research Funding

Table 13.11 Total Research Funding

Funder	Annual Estimated Amount
Defra	£6,935,000
Fera	£300,000
Environment Agency	£3,520,000
Forestry Commission / Forest Research	£1,945,000
Scottish Government	£701,000
Scottish Natural Heritage	£1,047,000
Welsh Assembly Government	£107,000
Countryside Council for Wales	£29,000
National Research Councils	£1,291,000
European Funding	£200,000
Other, including private funding	£771,000
Total	**£16,846,000**

Early intervention vs late

Table 16.1. Cost of intervention controls by species.

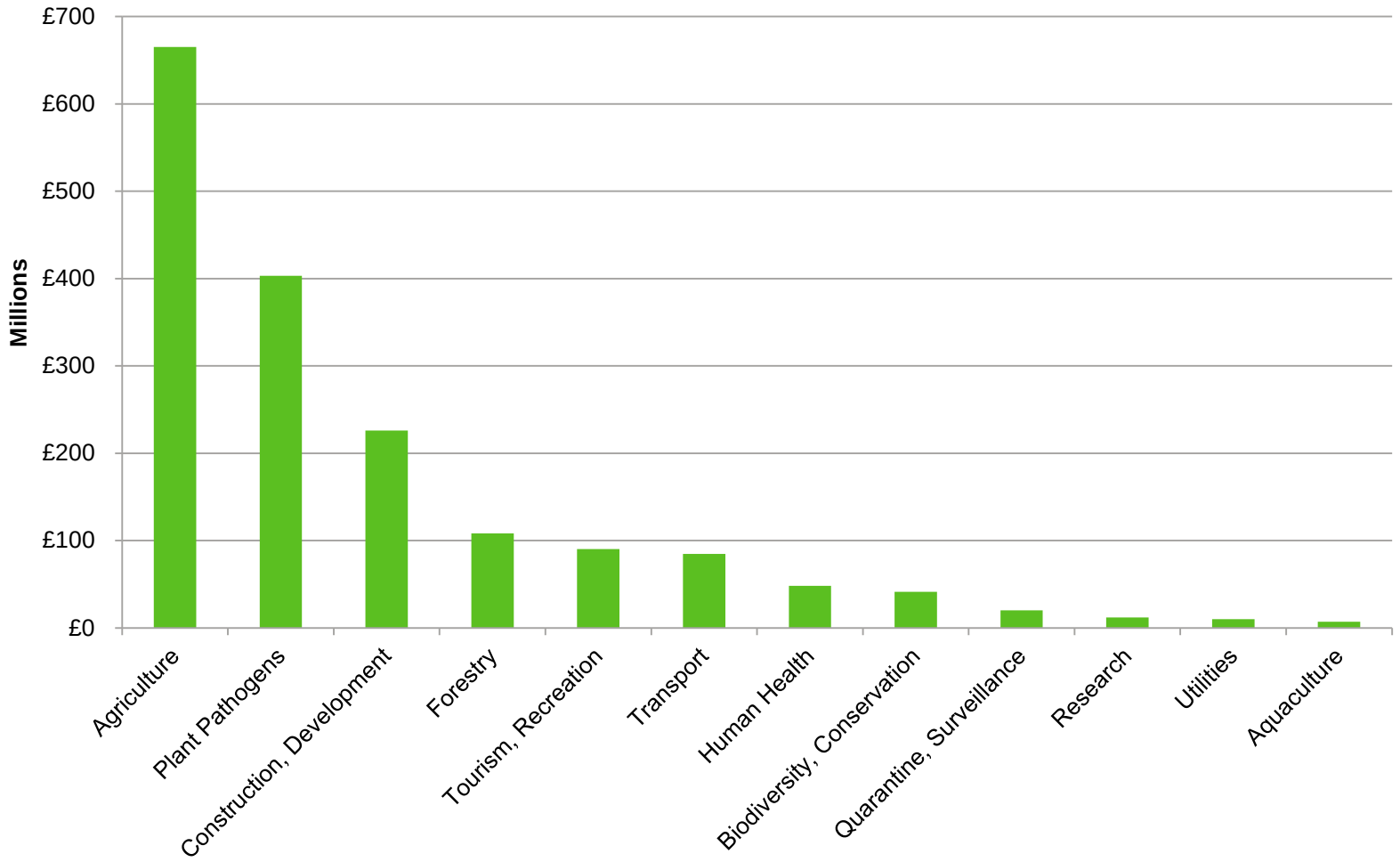
Species		Control Stage	Cost
Asian long-horned beetle	*Anoplophora glabripennis*	Early stage eradication	£34,000
		Late stage eradication	£1,316,416,000
Carpet sea squirt	*Didemnum vexillum*	Early stage eradication	£2,356,000
		Late stage eradication	£927,608,000
Water primrose	*Ludwigia* spp.	Early stage eradication	£73,000
		Late stage eradication	£241,908,000
Grey squirrel	*Sciurus carolinensis*	Early stage eradication	£440,000
		Late stage eradication	£850,734,000
Coypu	*Myocastor coypus*	Mid stage eradication	£4,700,000
		Late stage eradication	£18,800,000

Biocontrol is an exception to the rule of increasing costs

Photo – fynboshub.co.za

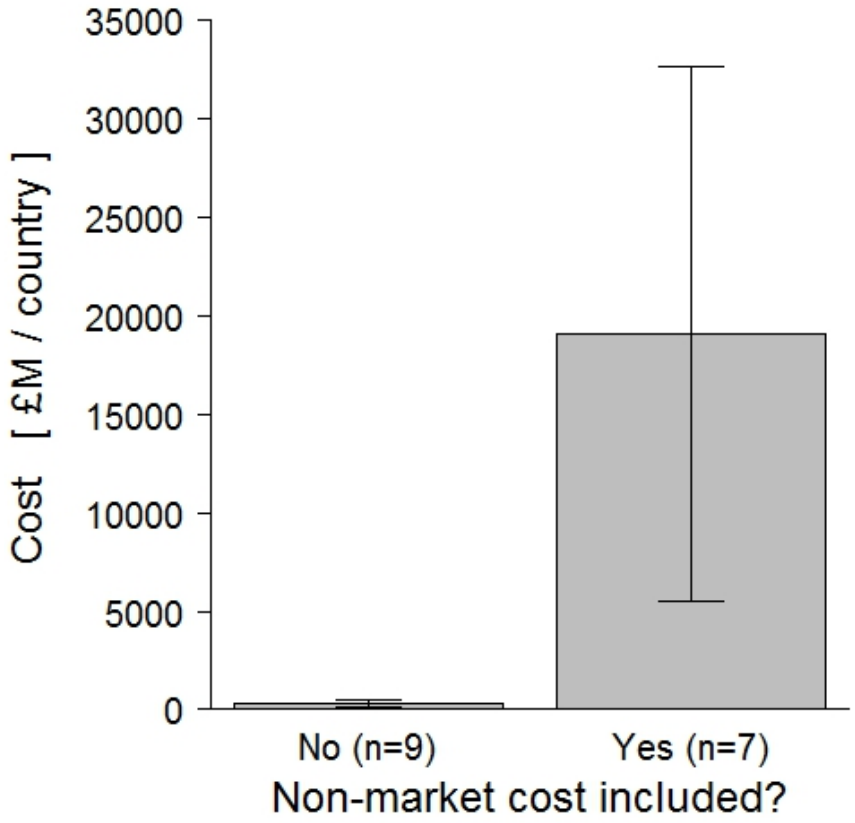
- *Acacia saligna* controlled by rust fungus in Fynbos *Uromycladium tepperianum*
- 80% reduction in density

INNS costs to Great Britain



Total costs estimated at £1.7 billion (England £1.3 billion; Wales £125 million; Scotland £245 million)

Indirect Costs



What next

- Some people seem to want an update now we are 10 years on
- We have currently launched a new initiative to do a similar activity for sub-Saharan Africa

Global Burden of Crop Loss

Overview and aims

A Grand Challenges Call to Action project

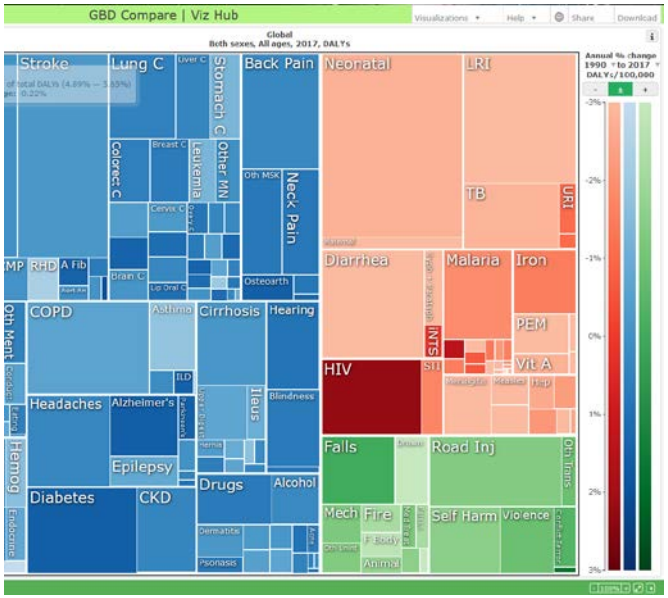
The Global Burden of Crop Loss initiative aims to provide rigorous, authoritative evidence on **impacts**, **causes**, and **risk factors** of crop loss.

As part of a Grand Challenges, Call to Action project, we are driving an innovative program that will bring together **people**, **data**, and **ideas** to **work collaboratively** on developing a data-driven system to help answer pressing questions on the scale, scope and impact of crop loss.

Evidence on the drivers and impacts of crop loss will help **direct funding**, **policy**, and **research** efforts to reduce crop loss at the farm level.

Learning from human health systems …

Inspired by the Global Burden of Disease for human health, this initiative requires high-quality data gathering mechanisms, analytical methods that “crosswalk” data from different sources and the creation of new metrics that are globally recognised.



The Global Burden of Disease initiative, led by the Institute for Health Metrics and Evaluation (IHME), has transformed the health agenda over the past 25 years.

The system provides comprehensive, authoritative data on the impact of hundreds of health problems and risk factors using DALYs = Disability Adjusted Life Years in order to compare different diseases across very different countries

Why is it in needed in plant health?

Data on the scale and causes of crop loss are sparse and outdated.

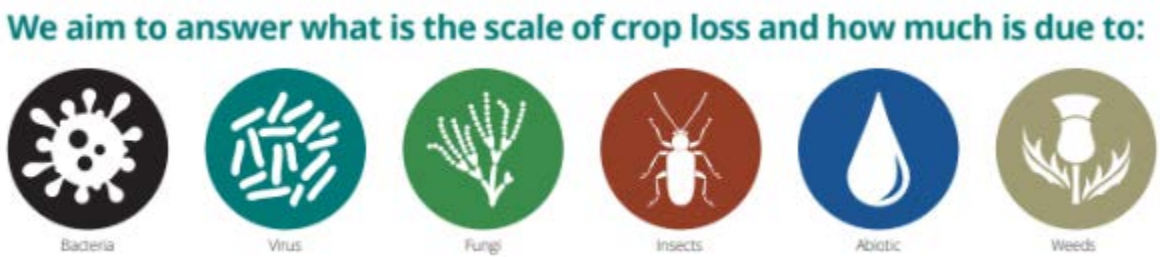
We aim gather reliable data to act as evidence to

- Improve our ability to predict the impact of emerging diseases, to generate a higher resolution map of incidence
- Provide the most accurate and relevant information for decision makers
- Allocate resources between pests and systematically develop investment in, and capacity of, plant health systems.

From: https://twitter.com/FAOstatistics/status/780420534786031617

We are trying to answer...

- How many of the world's crops are lost to insects, disease, weeds or abiotic factors?
- How is this affected by geography, or by crop?
- What is the economic impact of crop loss, and where is it most damaging?



Improved statistics and indicators to answer these questions would put us in a much clearer position to address the most damaging causes of crop loss.

Call to Action project aims

As part of the initial 18-month Grand Challenges Call to Action project, we aim to:

Build a research and data collection network

Define rigorous metrics, evaluate analytical methods

Assess the data landscape

Develop a community of collaborators, stakeholders and other interested parties

Develop a results dissemination framework

Beyond the Call to Action

Using the outputs from the scoping project, we will:

- Agree on an implementation plan with key stakeholders
- Formally launch the initiative as part of the International Year of Plant Health in 2020
- Seek to secure further funding
- Develop an implementation framework to publish initial estimates in the next 3 to 4 years
- Demonstrate that despite the magnitude of the challenge this is an initiative that is deliverable

We aim to develop a system that can help policy makers and funding bodies identify where investments in plant health should be prioritised

Thank you
&
Questions

To find out more or to get involved:

Website: www.croploss.org

Contact: croploss@cabi.org

CABI is an international intergovernmental organisation, and we gratefully acknowledge the core financial support from our member countries (and lead agencies) including:

UKaid from the British people

Ministry of Agriculture and Rural Affairs, People's Republic of China

Australian Government
Australian Centre for International Agricultural Research

Agriculture and Agri-Food Canada

Ministry of Foreign Affairs of the Netherlands

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Swiss Agency for Development and Cooperation SDC