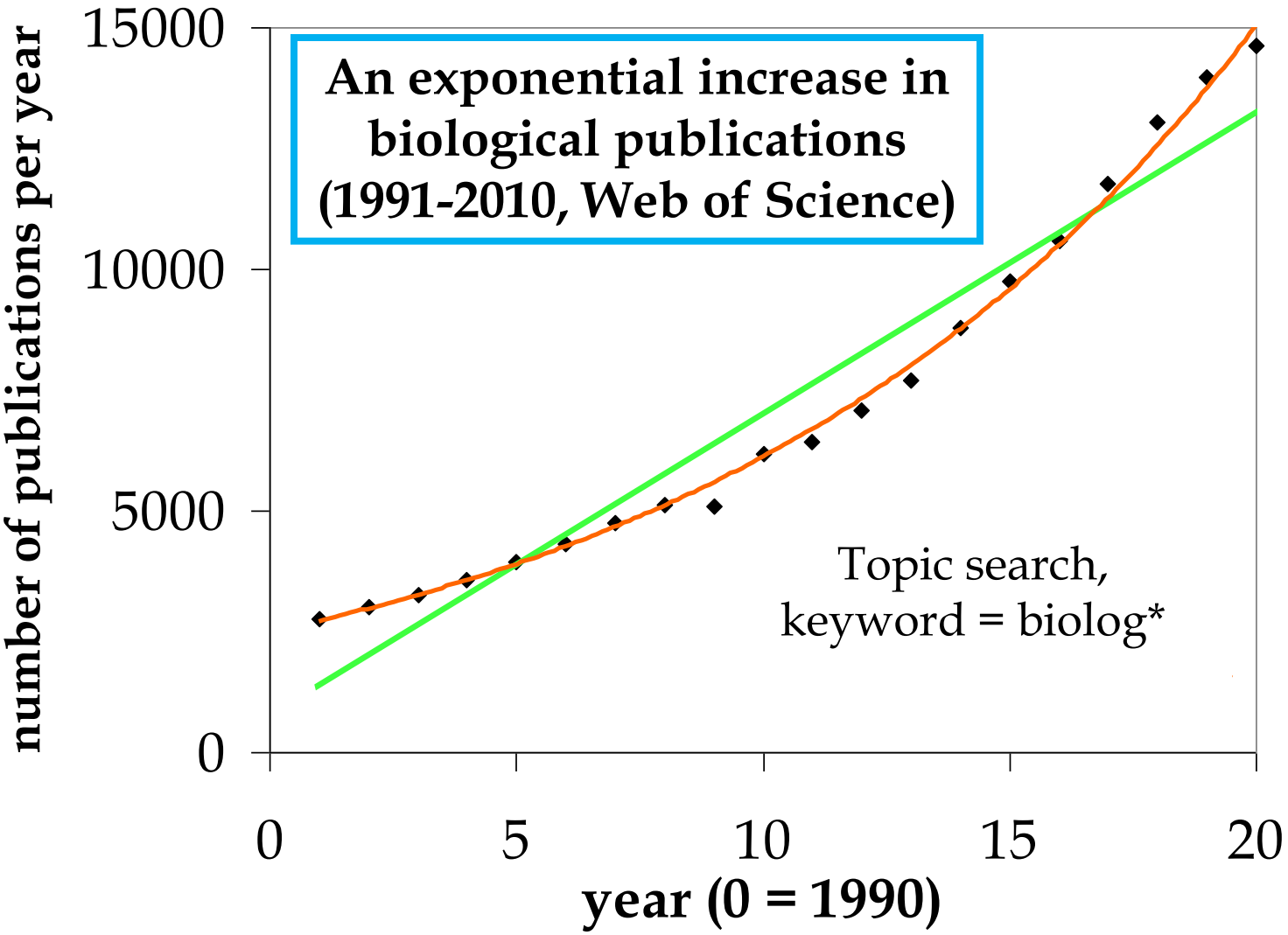
Scientometric approaches in data collection for plant health

1 April 2014, Marco Pautasso (ETH Zurich)

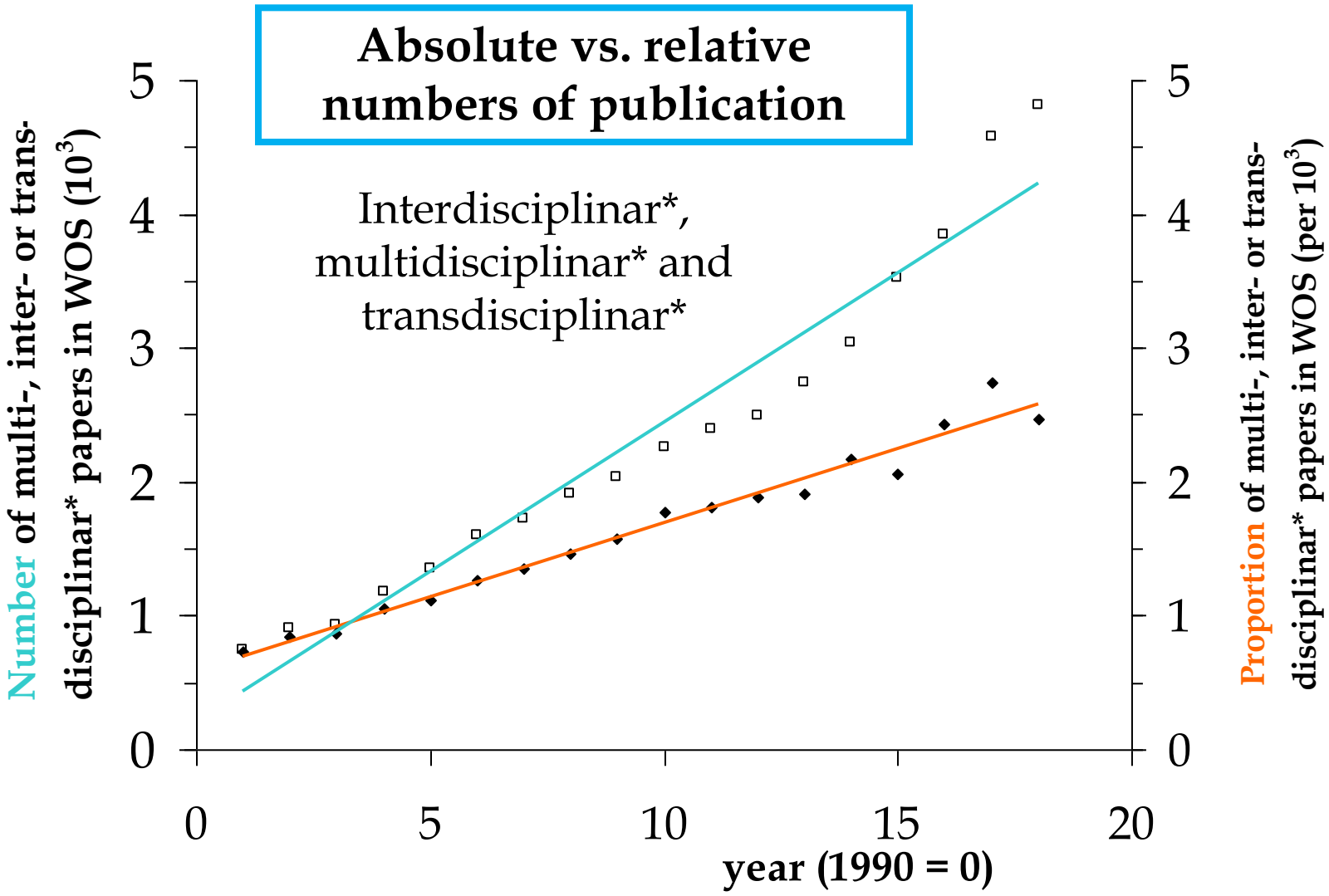
EFSA-EPPO Conference

Scientometrics is the study of publication patterns



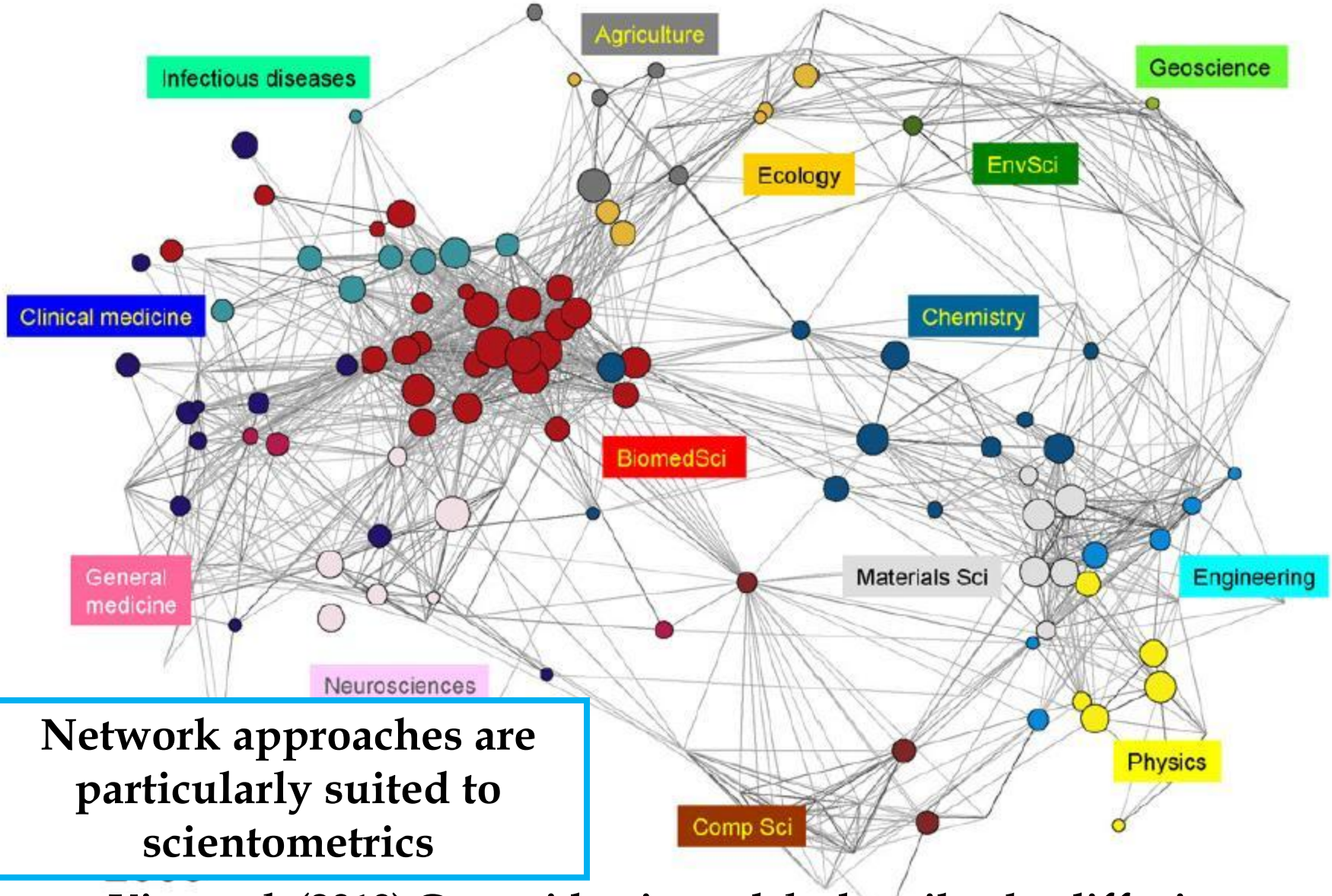
Modified from: Pautasso (2012) Publication growth in biological sub-fields: patterns, predictability and sustainability. *Sustainability*

Increasing inter-, multi- and trans-disciplinarity (1991-2008)



Modified from: Pautasso & Pautasso (2010)
Peer reviewing interdisciplinary papers. *European Review*

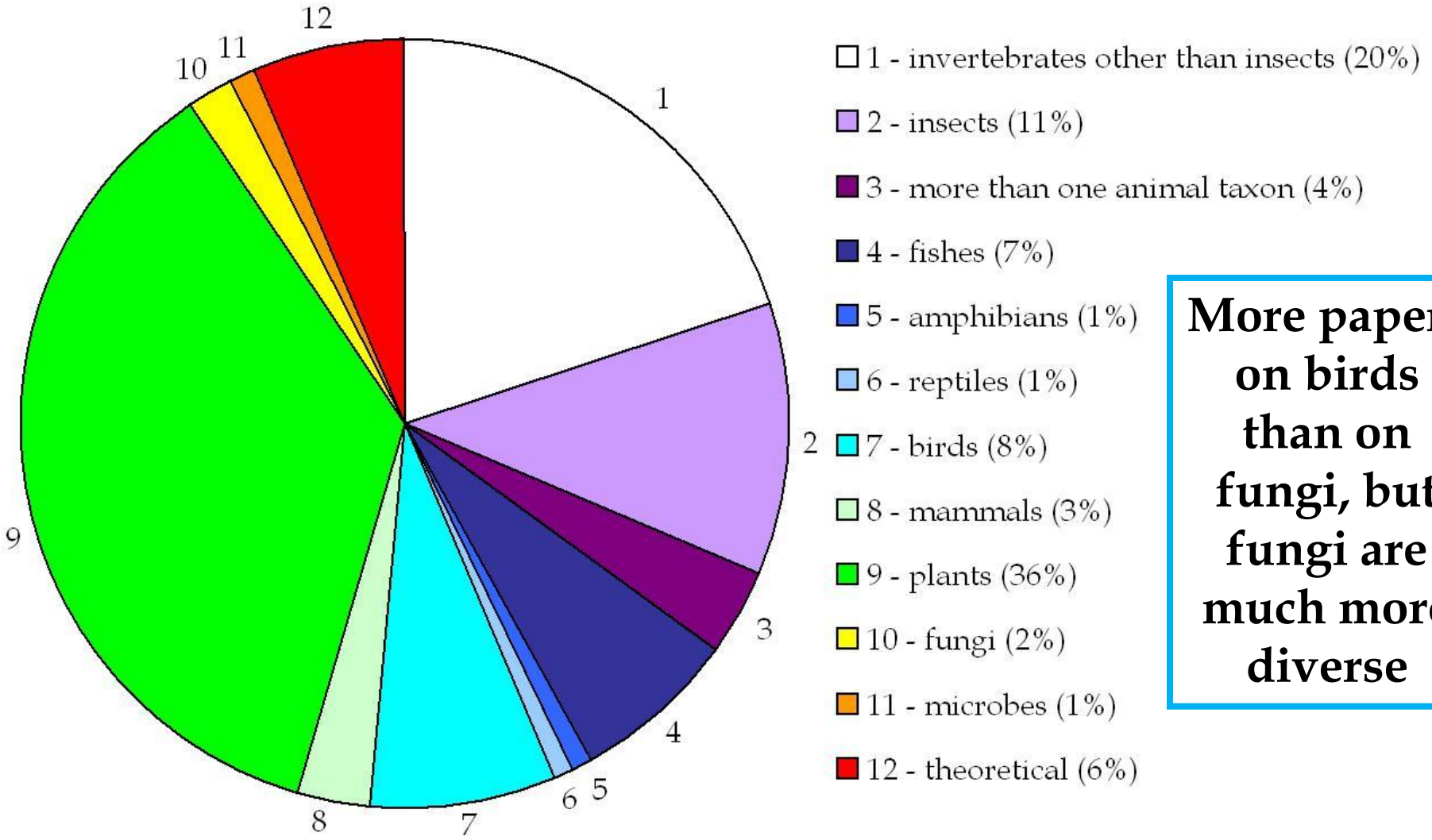
Agriculture as a bridge between epidemiology and ecology?



Network approaches are particularly suited to scientometrics

Kiss et al. (2010) Can epidemic models describe the diffusion of topics across disciplines? *Journal of Informetrics*

Random sample of 100 papers per year on 'species richness' in WOS (1991-2004)



More papers on birds than on fungi, but fungi are much more diverse

from: Lonsdale et al. (2008) Wood-decaying fungi in the forest: conservation needs and management options. ***European Journal of Forest Research***

~20% of the exotic tree pathogens reported in Switzerland take up ~90% of the publications on such pathogens indexed in Web of Science

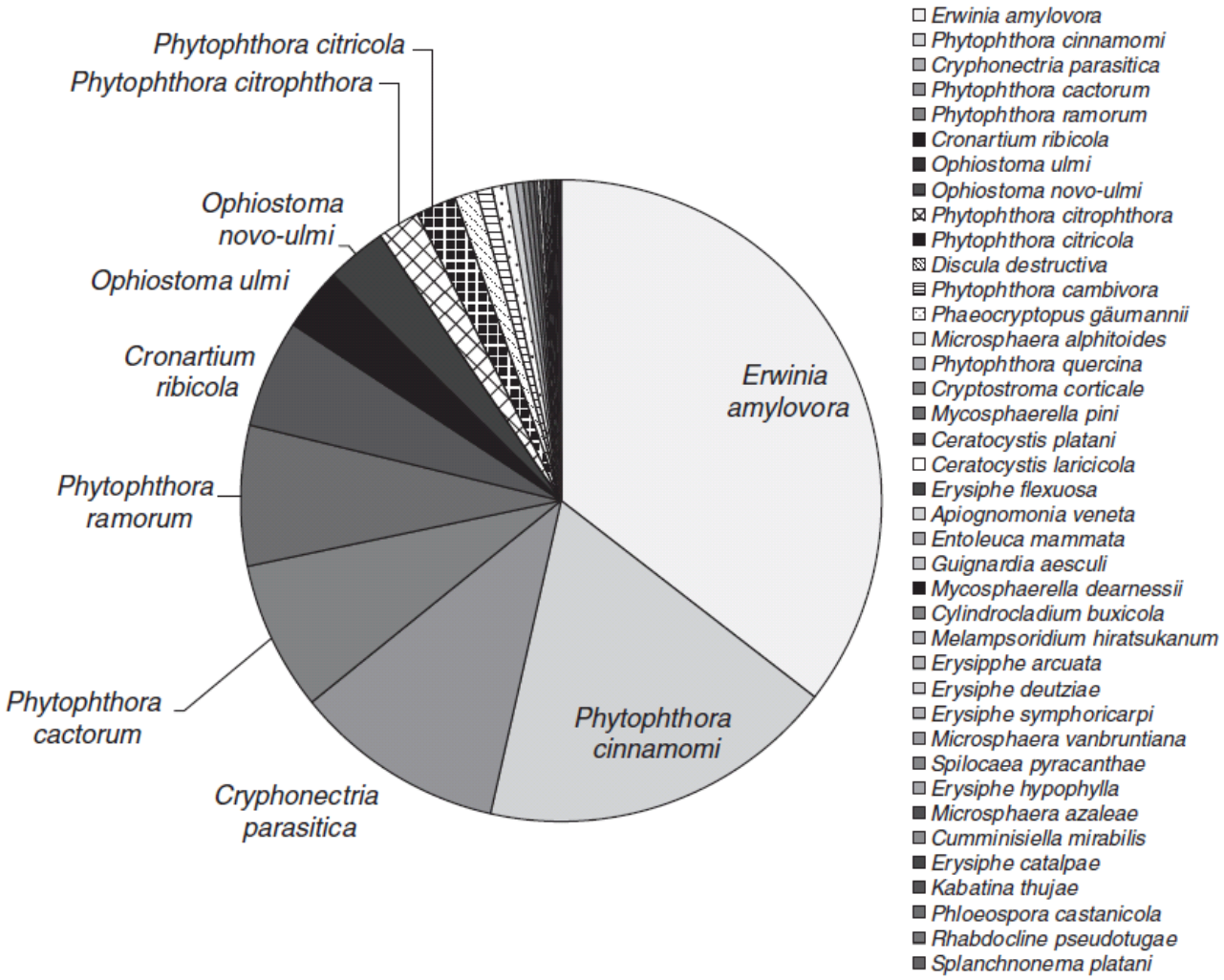


Fig. 28.4. Relative number of publications on the Web of Knowledge (Thomson Reuters, formerly ISI) for the 39 exotic tree pathogens reported in Switzerland up to October 2011. The eight more commonly studied pathogens (approximately 20%; *Erwinia amylovora* to *Ophiostoma novo-ulmi* in the pie chart) cover about 90% of the approximately 5800 publications retrieved

More evenly distributed research attention among pathogens would help us prepare for future threats?

Pautasso (2013) Responding to diseases caused by exotic tree pathogens. *CABI book chapter*

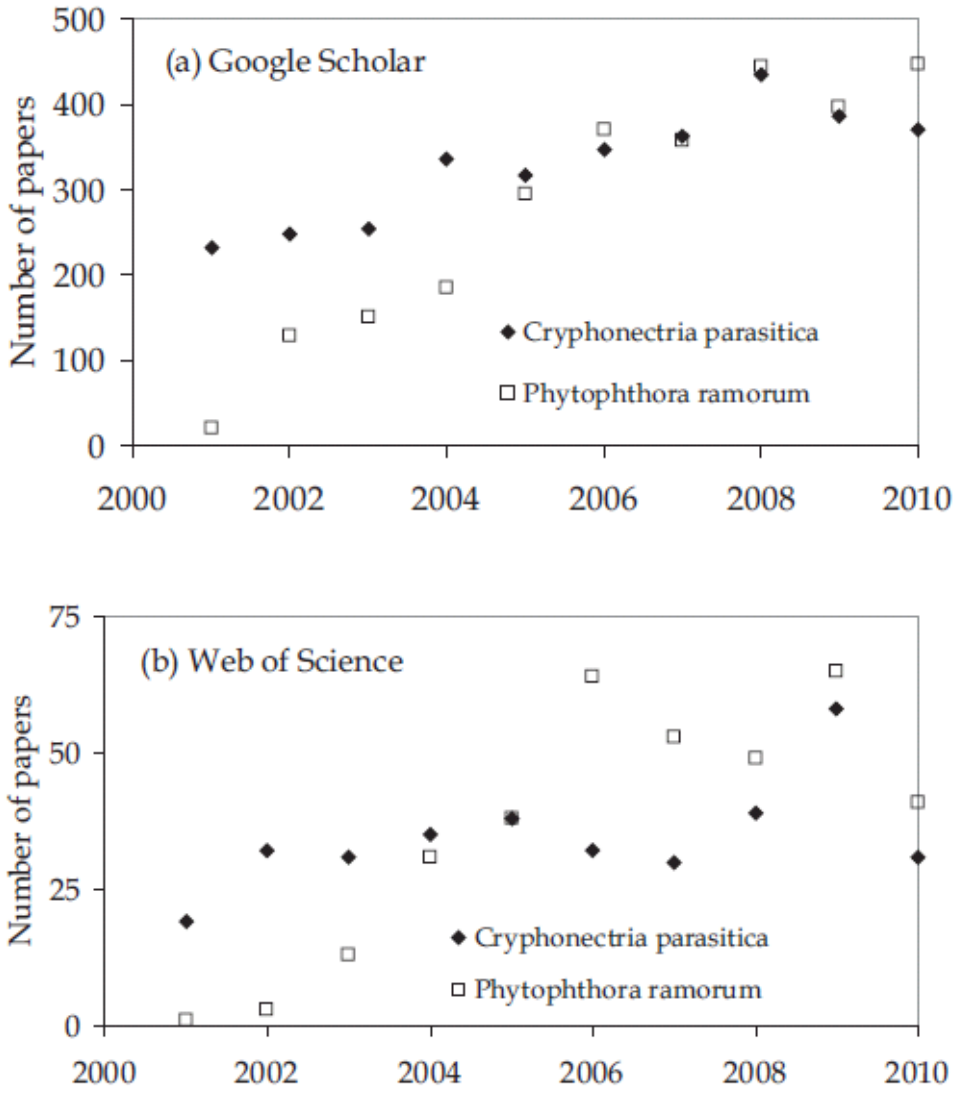
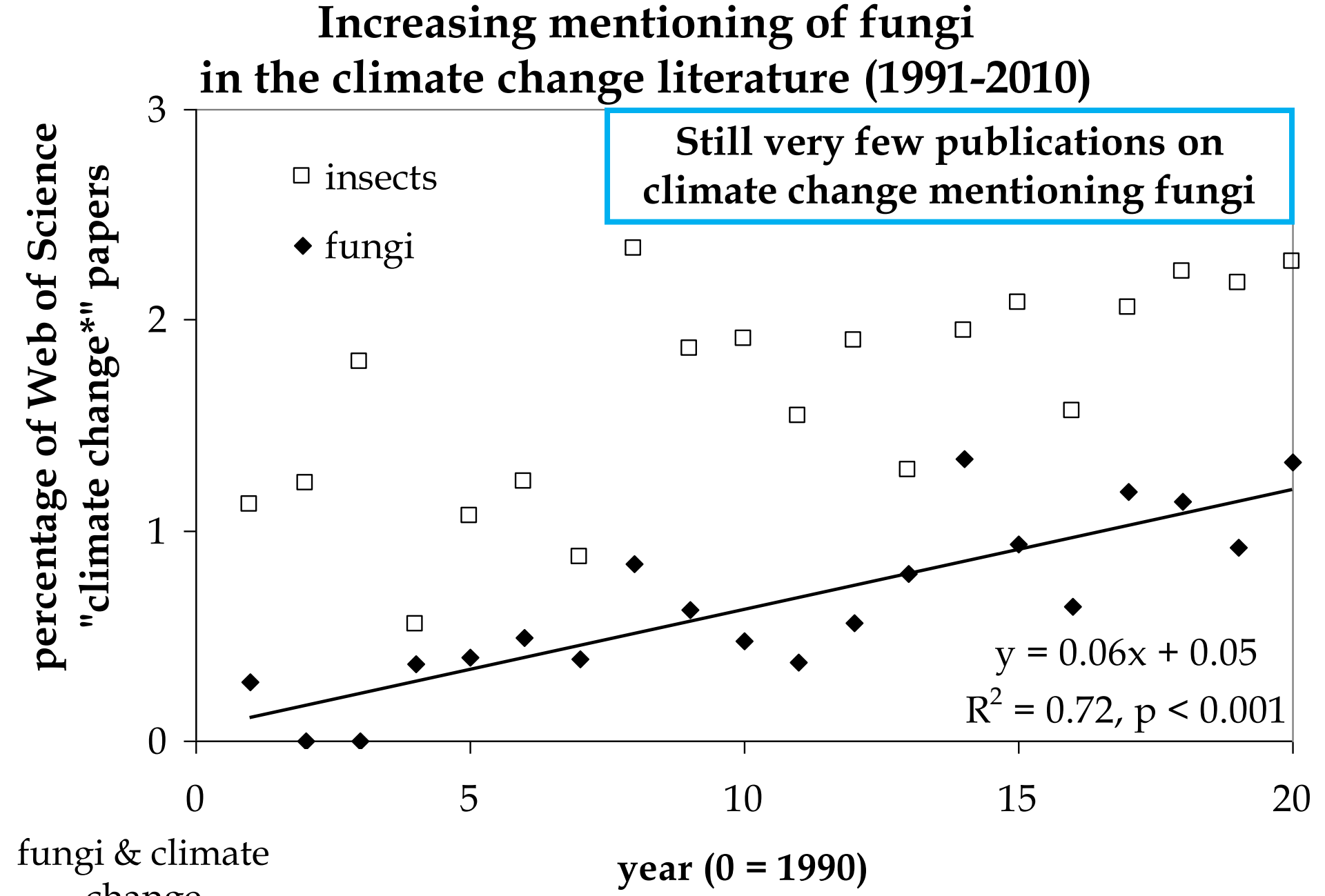


Figure 1 Increase in the number of papers retrieved per year in (a) Google Scholar and (b) Web of Science (2001–2010, as of December 2012) using as keyword '*Phytophthora ramorum*', in comparison with '*Cryphonectria parasitica*', the pathogen that has been causing chestnut blight for many decades both in North America and Europe.

Scientometric catching up of *Phytophthora ramorum* (2001-2010)

The approach can be used to track research attention to individual pathogens through time

Pautasso (2013) *Phytophthora ramorum* – a pathogen linking network epidemiology, landscape pathology and conservation biogeography. *CAB Reviews*

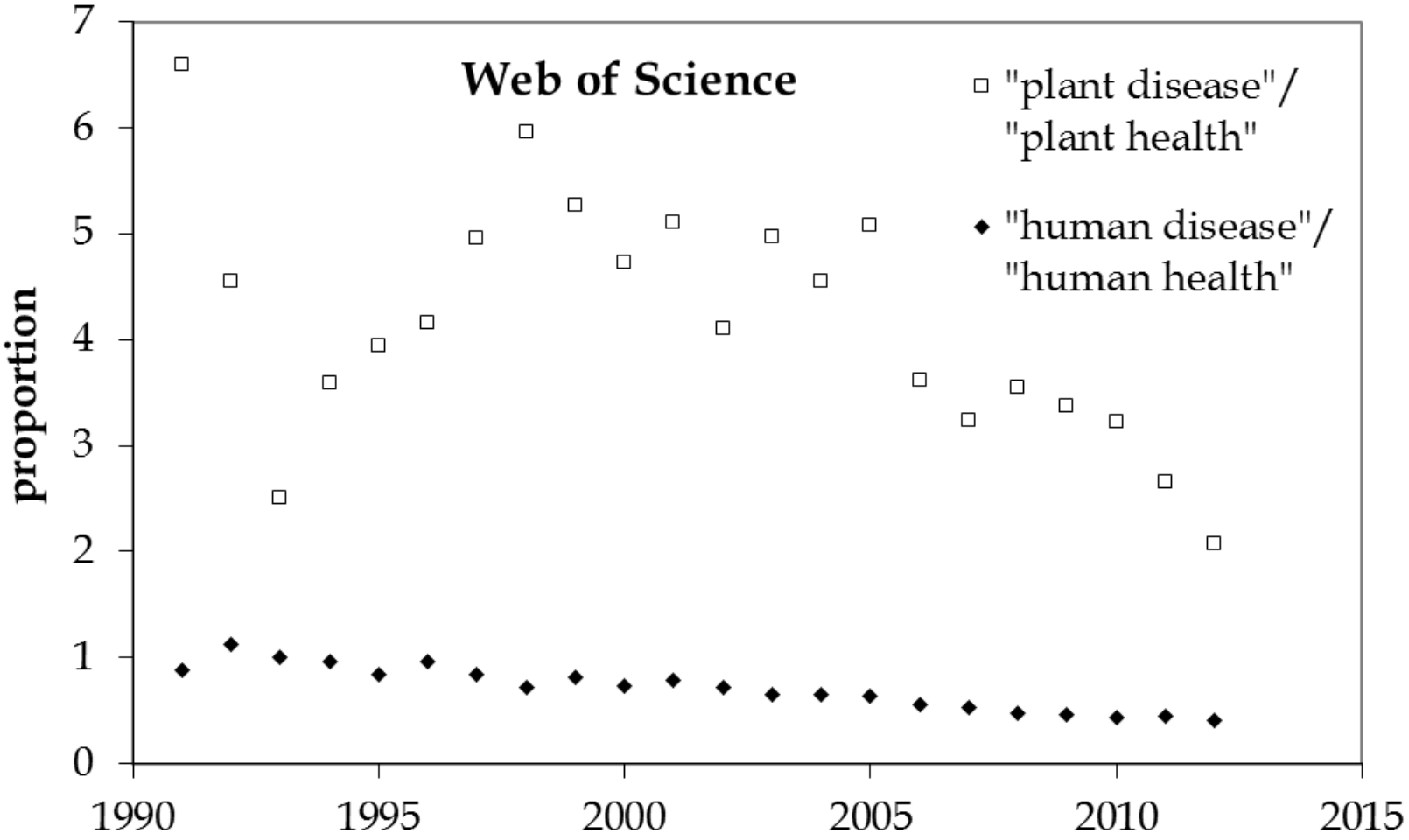


fungi & climate change / climate change

Modified from: Pautasso (2013) Fungal under-representation is (slowly) diminishing in the life sciences. *Fungal Ecology*

Is health just the absence of diseases?

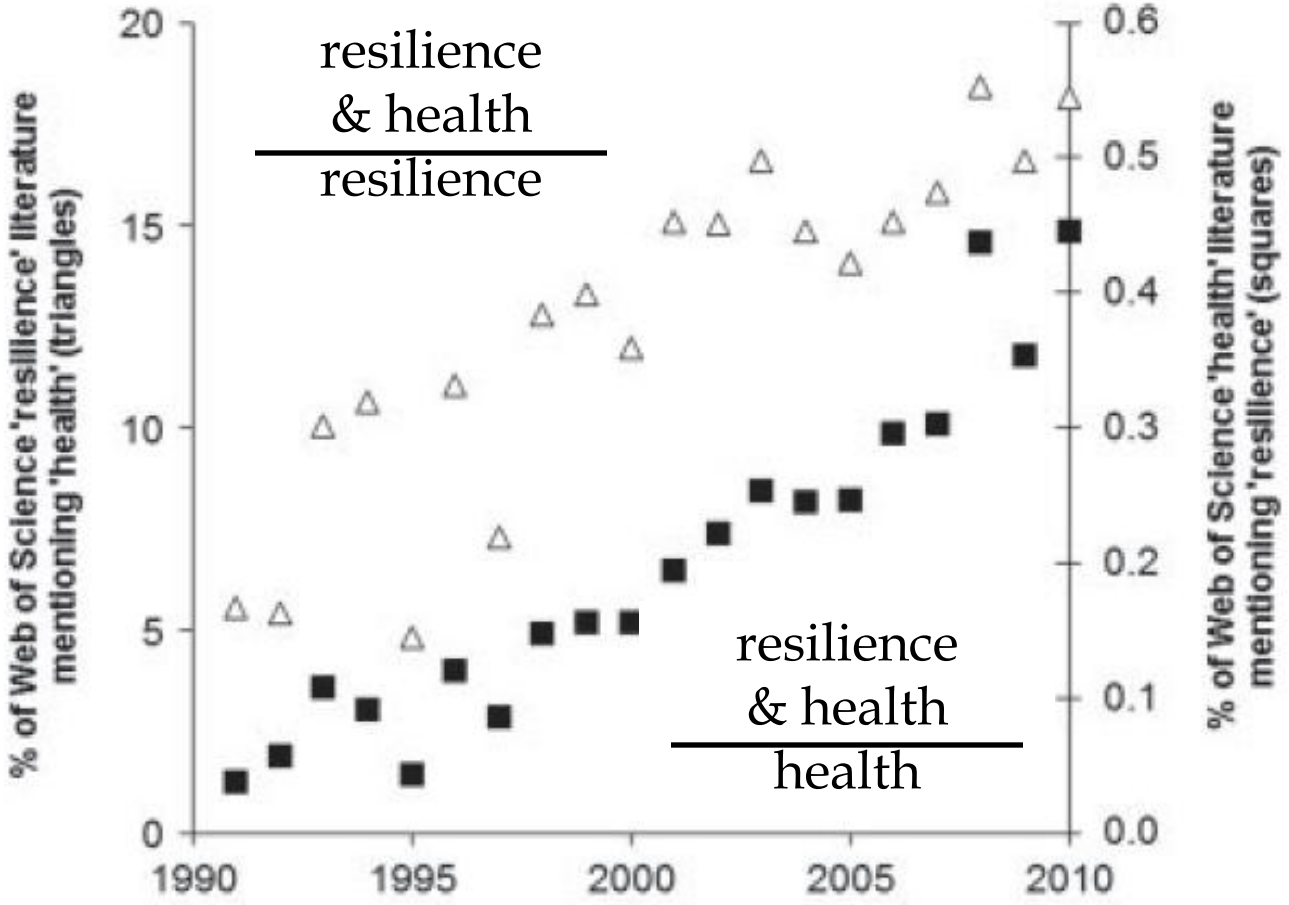
Importance of health vs. disease in human medicine vs. plant sciences



Pautasso & Jeger (in review) Impacts of climate change on plant diseases: new scenarios for the future. Institute of Medicine, National Academy of Sciences USA

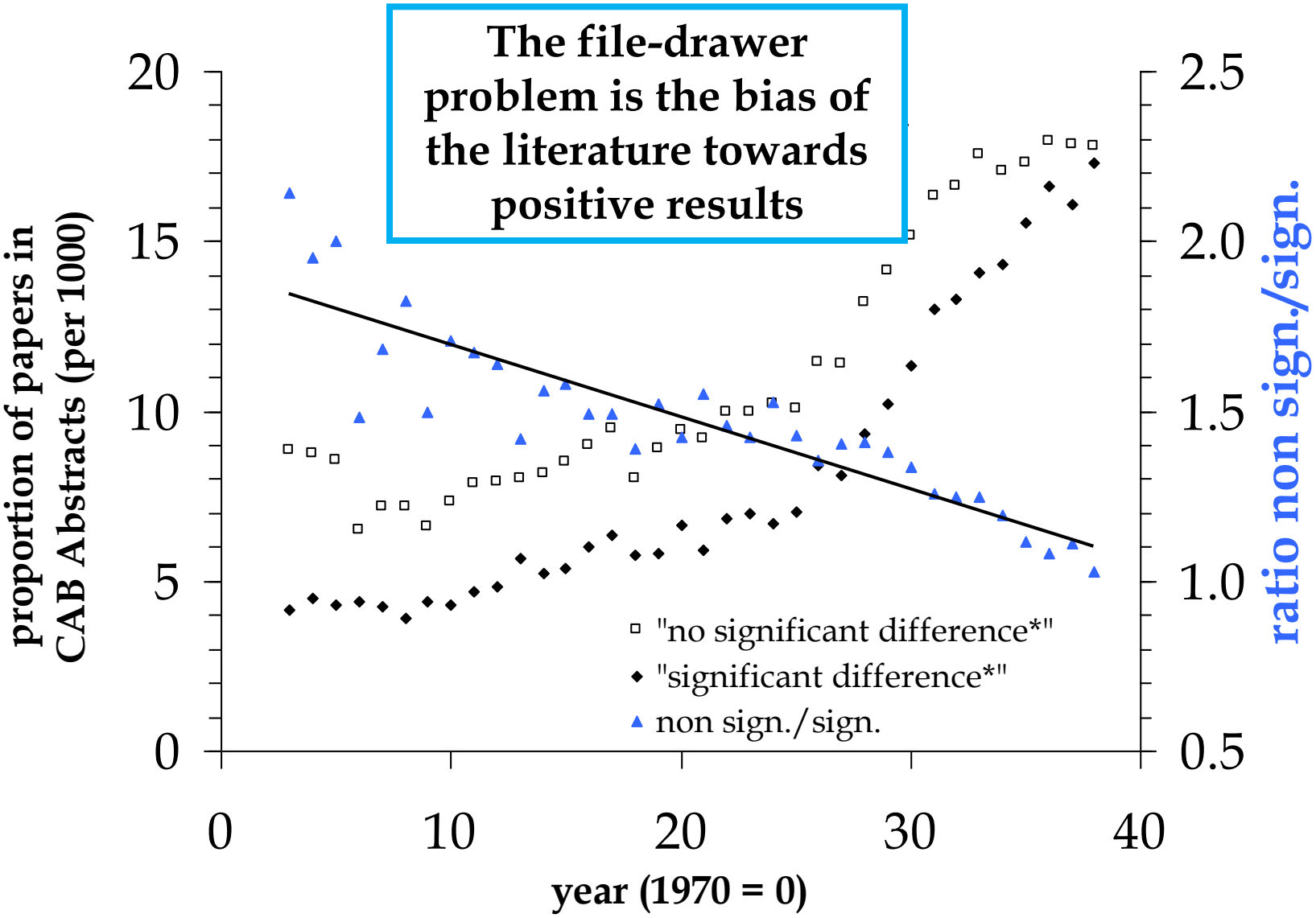
Is resilience a good health indicator?

Increasing overlap between the literatures on health and on resilience



Doering et al. (2014) Resilience as a universal criterion of health. Journal of the Science of Food and Agriculture

Worsening of the file-drawer problem (CAB Abstracts, 1973-2008)

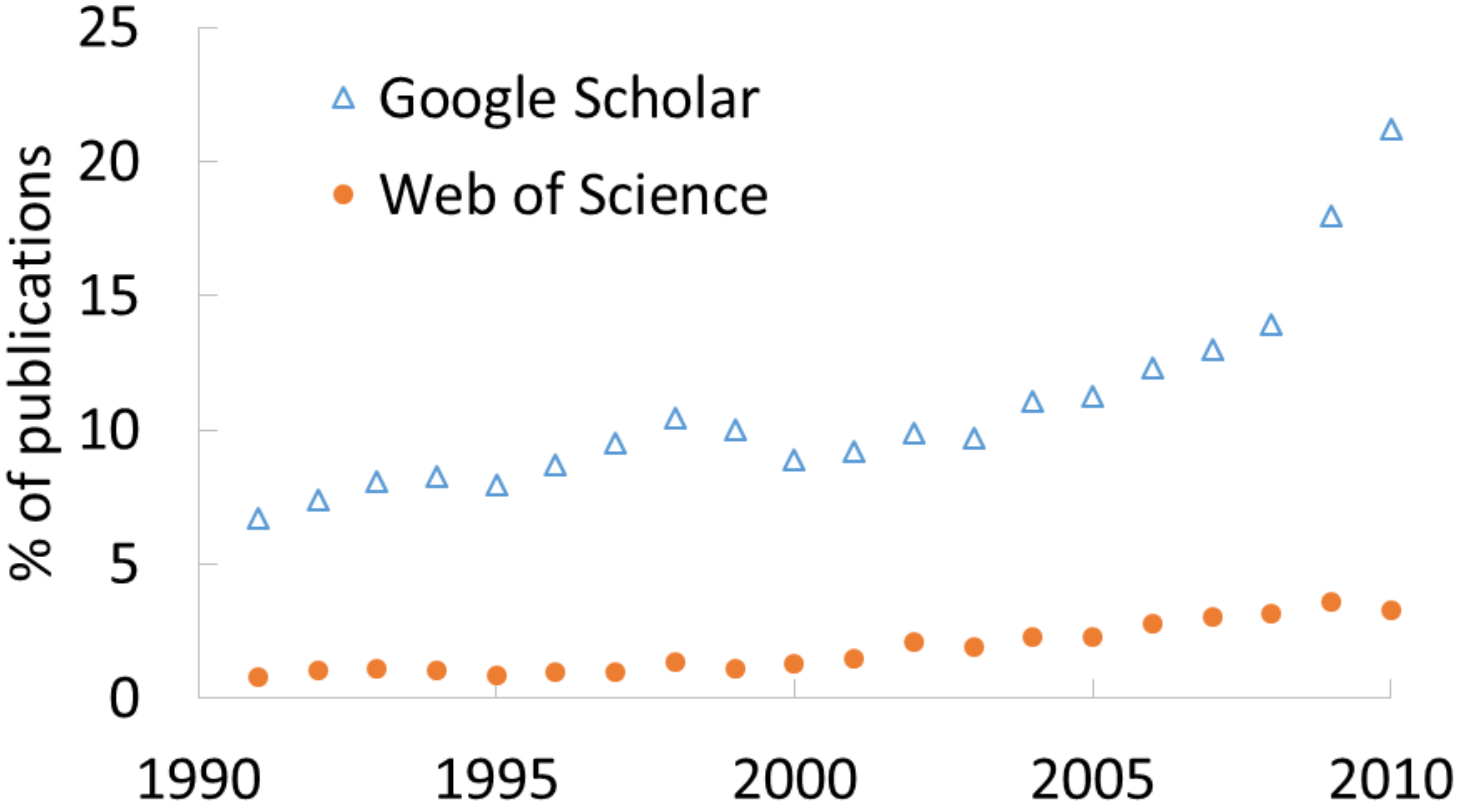


Modified from: Pautasso (2010) Worsening file-drawer problem in the abstracts of natural, medical and social science databases. *Scientometrics*

Increasing relevance of networks in epidemiology

Proportion of publications on epidemics mentioning networks in Google Scholar and Web of Science over the period 1991-2010

$$\frac{\text{epidemics \& networks}}{\text{epidemics}}$$



It is often a good idea to check patterns in various databases

Pautasso & Jeger (2014) Network epidemiology and plant trade networks. ***AoB Plants***

Plant health studies based on long-term datasets are still relatively rare

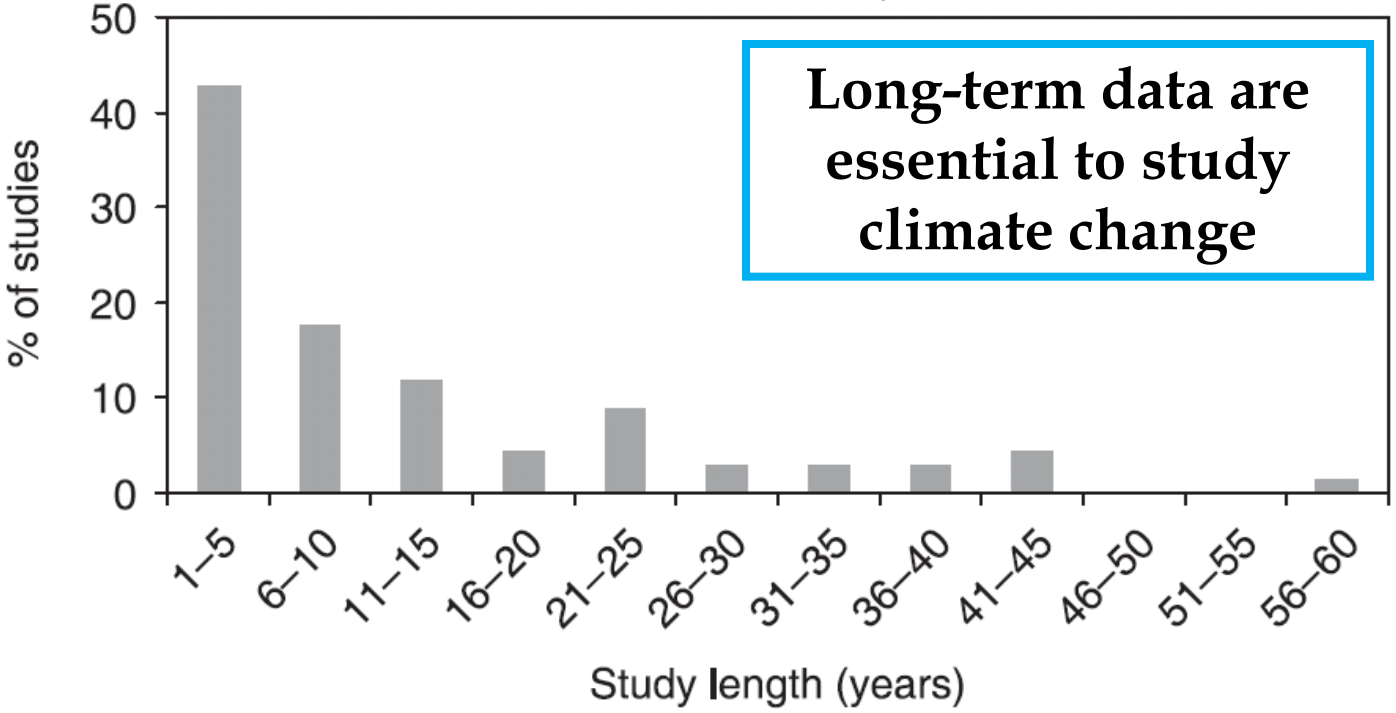


Fig. 1 Frequency distribution of 67 studies modelling tree mortality published between 1997 and 2006, according to the length of the period upon which models were based. Sixty-seven of the 141 papers retrieved contained data about the study plots used to validate models. About 60% of these 67 models were based on surveys of less than 10 yr.

Jeger & Pautasso (2008) Plant disease and global change – the importance of long-term data sets. *New Phytologist*

Scientometric approaches in data collection for plant health

1. Scientometric studies can deliver new insights about patterns in the plant health literature

2. There has been relatively little use so far of scientometrics in plant health, despite its potential

3. The approach is particularly suited for long-term monitoring