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**Exploring (mis)alignments between  
science supply and societal needs/demands:  
research portfolios on rice, influenza and obesity**

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# An agenda for more inclusive metrics

- **Inclusiveness in the inputs**
  - *Broadening out:* Create more diverse indicators
    - Indicators of open science, RRI, hidden, social innovation
    - Improve representation of SSH scholarship, languages other than English, the “South”,...
- **Inclusiveness in the outputs**
  - *Opening up:* develop toolkits that allow exploration of choices. New ways of presenting indicators
    - From indicators to “vector” tools
    - Interactive visualisations
- **Inclusiveness in the policy process (??)**
  - Develop new social processes on use of indicators
    - STI indicators as tools for interpretation and deliberation (R. Barré)

# The societal / broader impact of research

- Increasing # of evaluation studies aiming at capturing “impact” of individual projects - in particular “good” impact
- **Often problematic:**
  - long time lag in impact
  - linear assumptions and attribution problem
  - what type of impact should count?

## **An alternative approach:**

- Methods for a more systemic (landscap) approach
- Research programme or institutional level
- Look if/how a set research activities relates to a given societal need
  - What type of science is done? (Hess, 2007)
- Builds on Stirling (uncertainty/diversity) and Sarewitz (alignment)

# Why a portfolio (repertoire) approach?

- **Substantive Problem:** perceived mismatch between discourses (or expectations) of and actual outcomes of research
  - Across many areas: energy, climate change, the digital economy --  
HEALTH
  - Lock-in, interests and institutional dynamics may shape research priorities towards “sub-optimal” configurations.
  - Prioritising science is only “part” of the problem: inequalities in access to successful outcomes vaccines, treatments, food.
- **Procedural problems:** Respond to current policy demands in grand-challenges
  - Tackling large-scale, multi-stakeholder issues
  - Transparency, accountability, cost-effectiveness, etc.
  - Seeking out alternative research avenues spawning new solutions.

# Relate science supply and societal demand

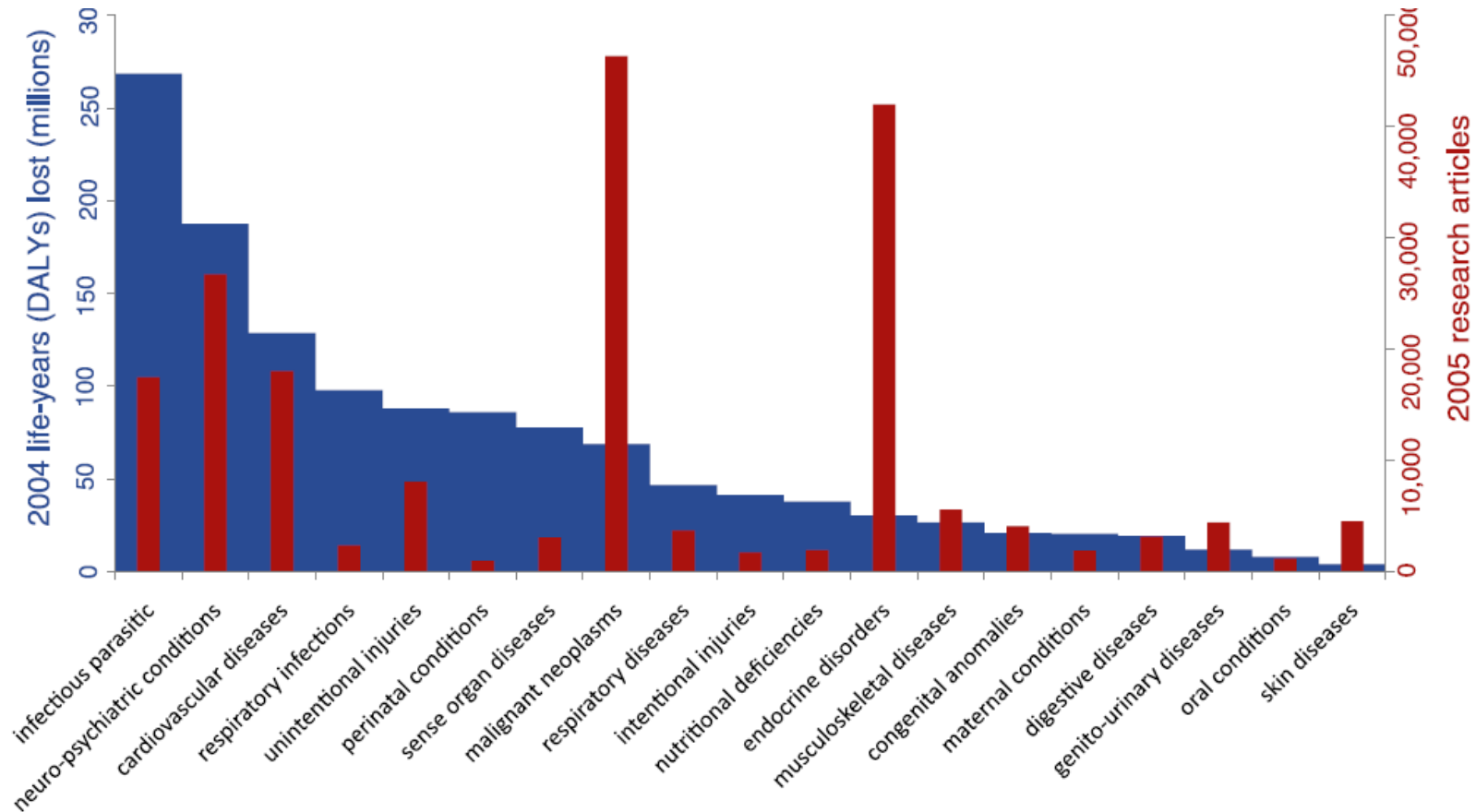
“Scientific priorities and societal needs are poorly aligned” (Sarewitz and Pielke, 2007):

- More “science” or more “impact” does not mean ‘better impact’
  - normative questions of impact
- The relationship between resource allocation, implementation, and outcomes is not linear.
  - effect of institutional norms on directs
  - special/vested interests (research communities, pharma, political constituencies)
- Beyond basic and applied dichotomy

# Priority Setting Type I: Between different “problems”

Mis-alignment between health priorities and research efforts

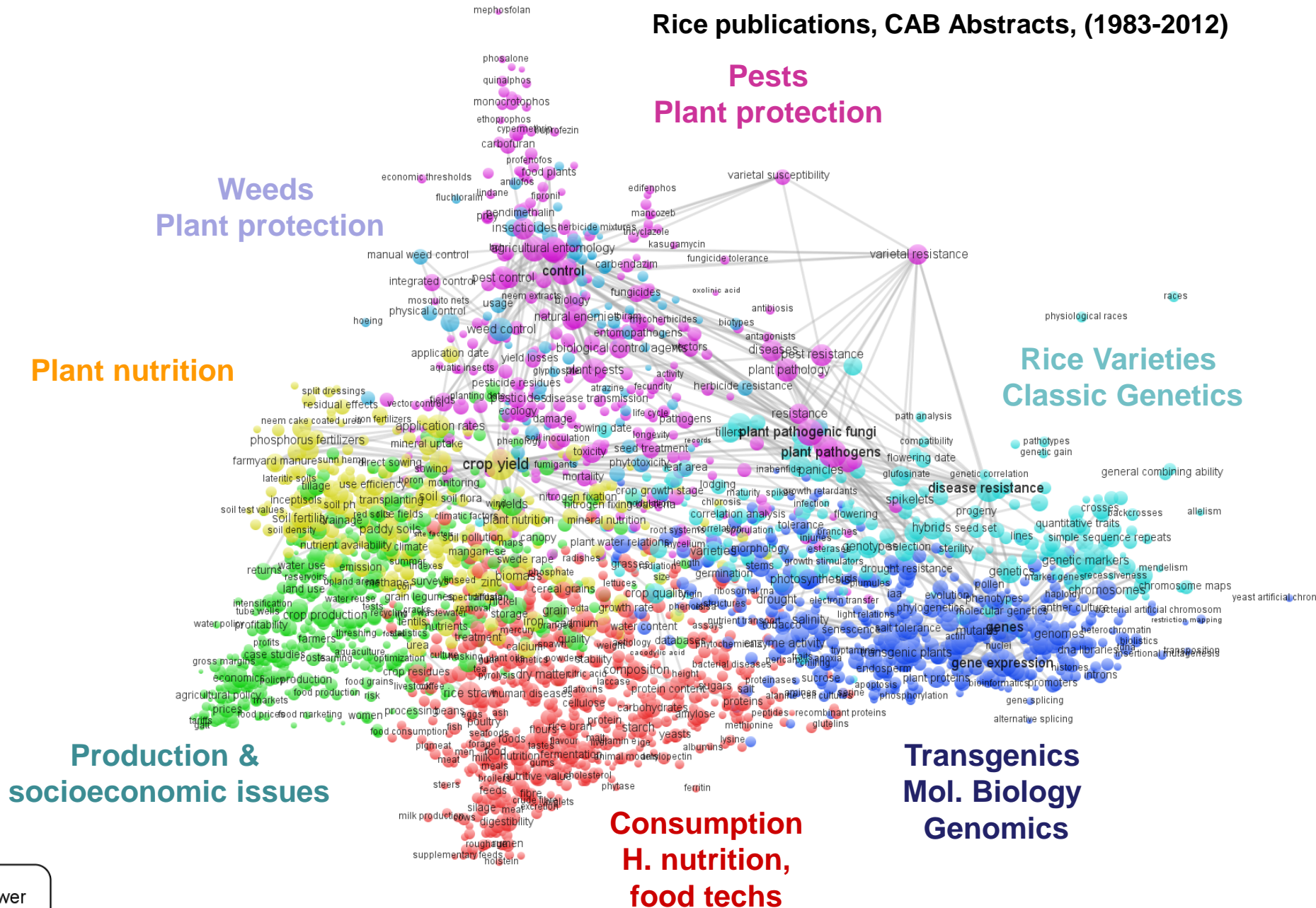
Evans, Shim, Ioannidis (2014)



**Figure 1. 2004 global disability-adjusted life years (DALYs) and 2005 research articles categorized by 19 broad WHO disease and disability categories.** This correspondence suggests the loose relationship between burden of disease and health knowledge (see Figure S1 in File S1 for the distribution of different types of articles by disease).

# Priority setting Type II: Research options for rice research

Rice publications, CAB Abstracts, (1983-2012)



# The question

How should resources be distributed in order to address a given societal problem (or grand challenge) such as obesity or avian flu?

“How do we know if we are doing the right science?”

(Sarewitz and Pielke, 2007)

The (modest) aim of this presentation:

Explore how can methods that compare

- research portfolios (science supply)

- outcomes (contextual societal demands/needs)

.. help in enriching deliberations on priority setting?



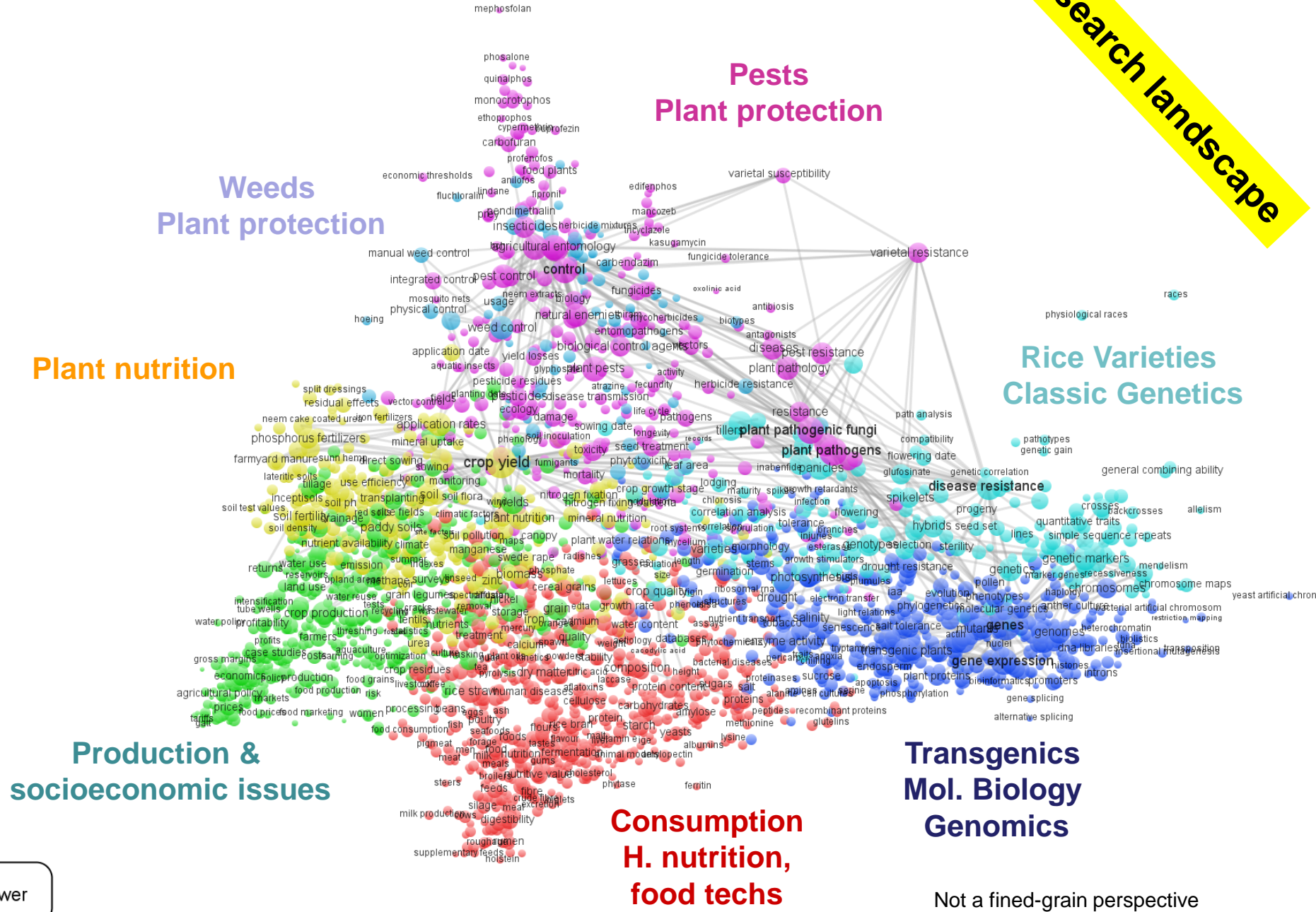
SCIENCE SUPPLY OF A RESEARCH TOPIC

THE CASE OF RICE

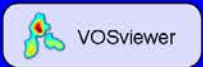
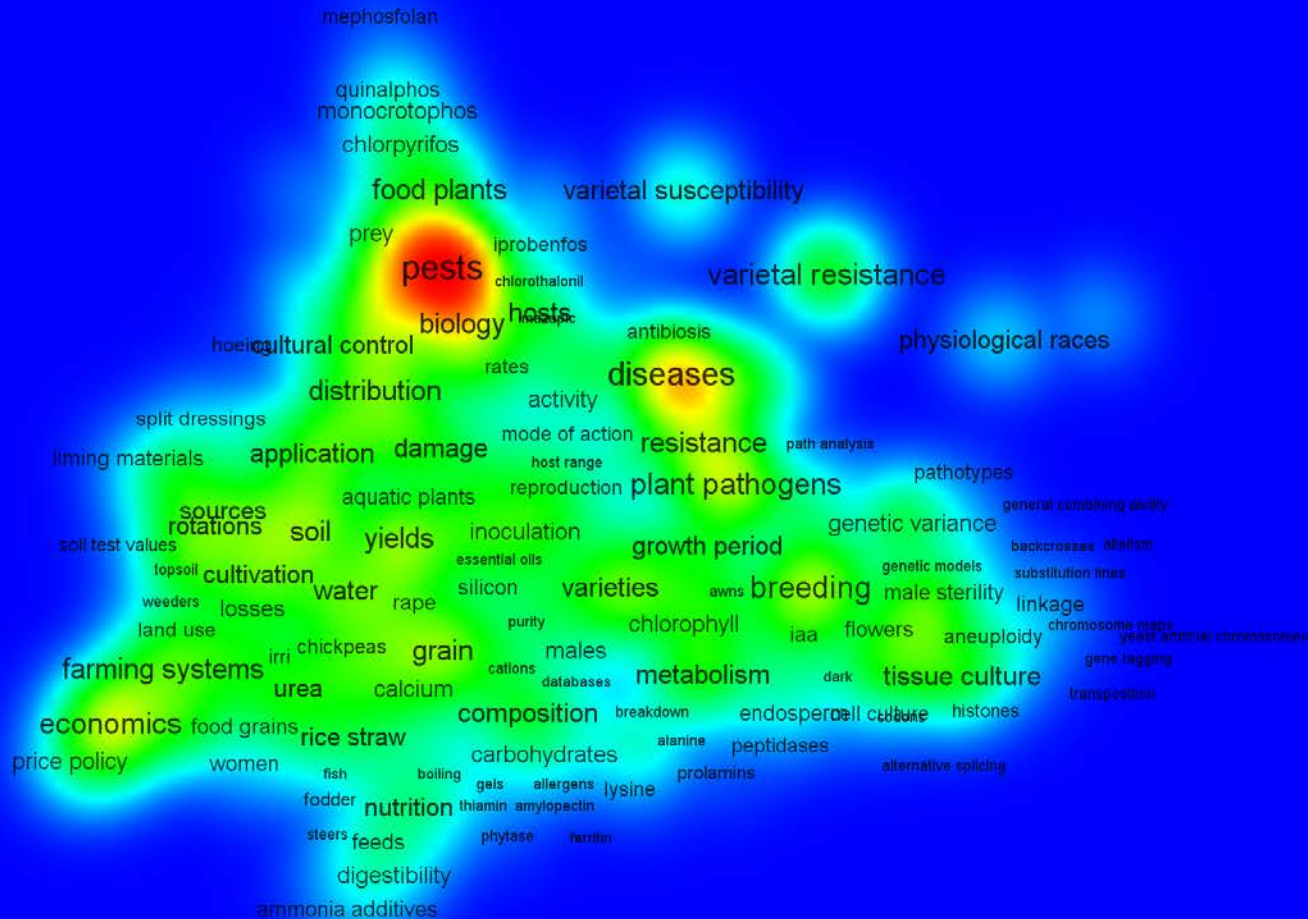
DIFFERENCES BY COUNTRY

# What are the “options” in rice research?

Research landscape

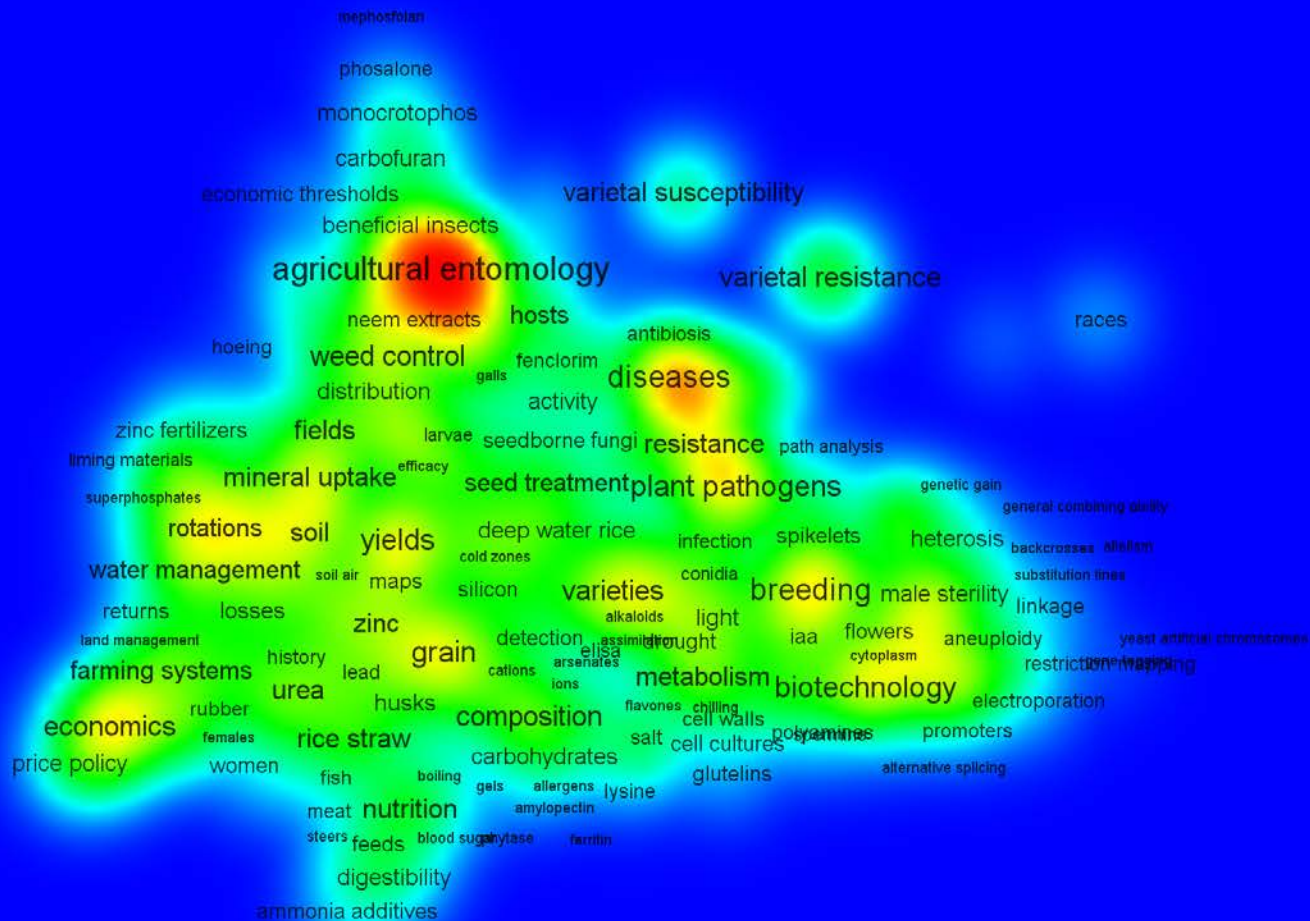


# Trajectory of rice research, 1983-2012



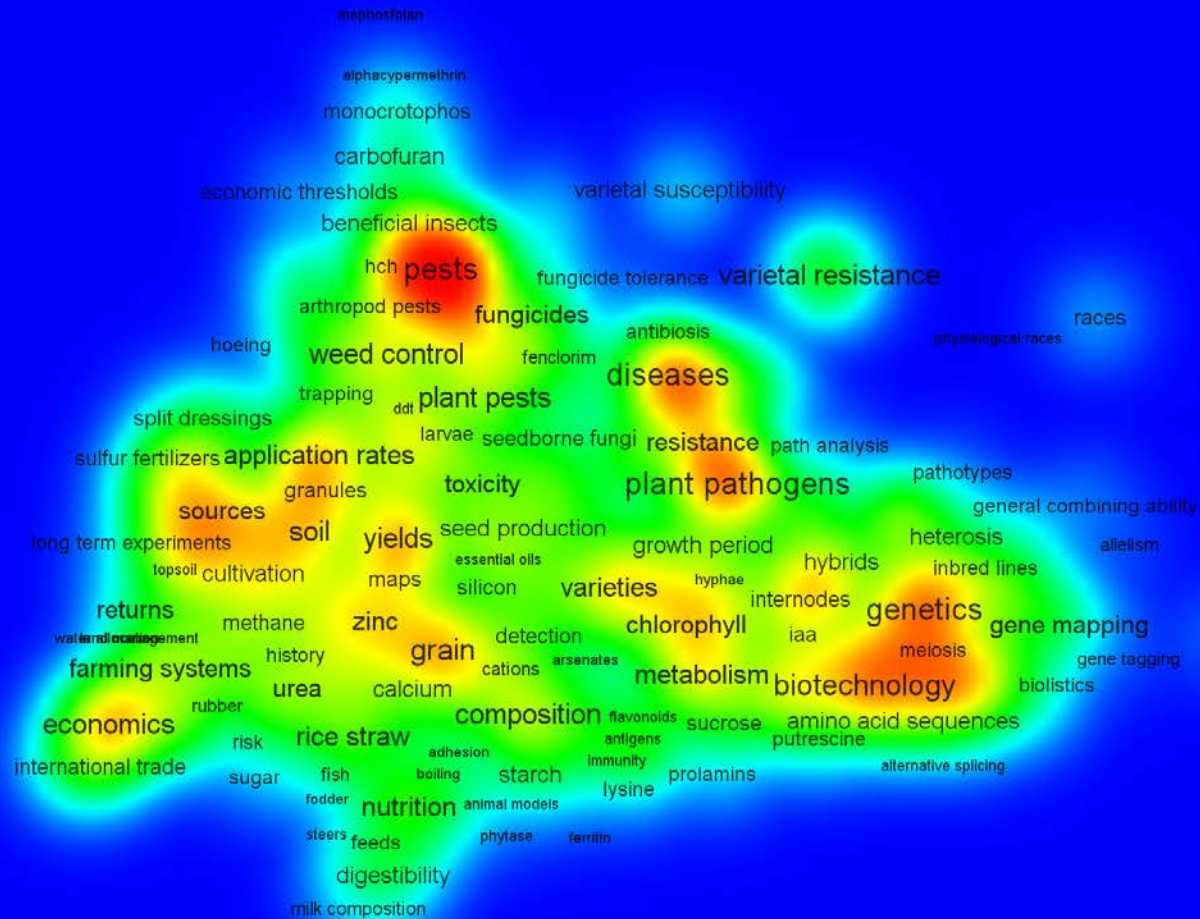
1983-87

# Trajectory of rice research, 1983-2012



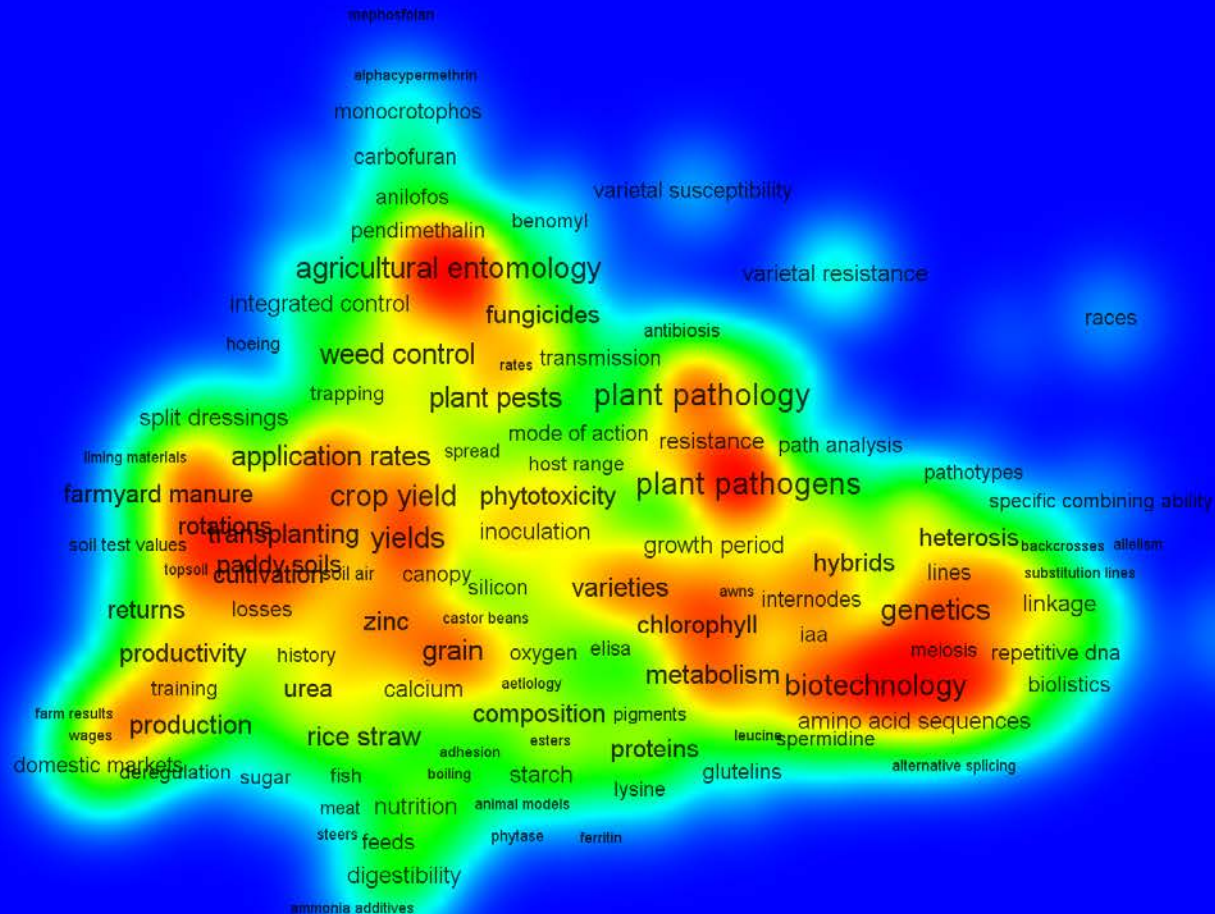
1988-91

# Trajectory of rice research, 1983-2012



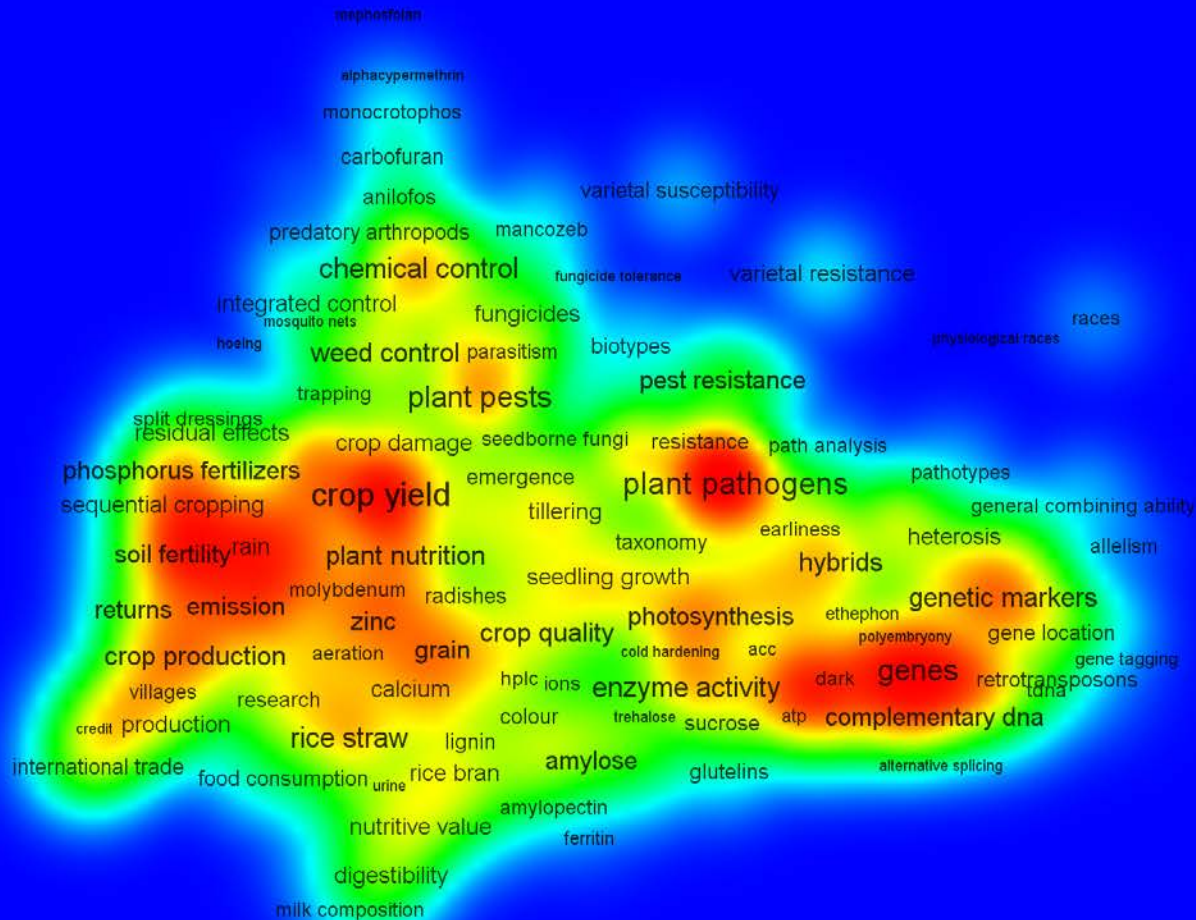
1992-95

# Trajectory of rice research, 1983-2012



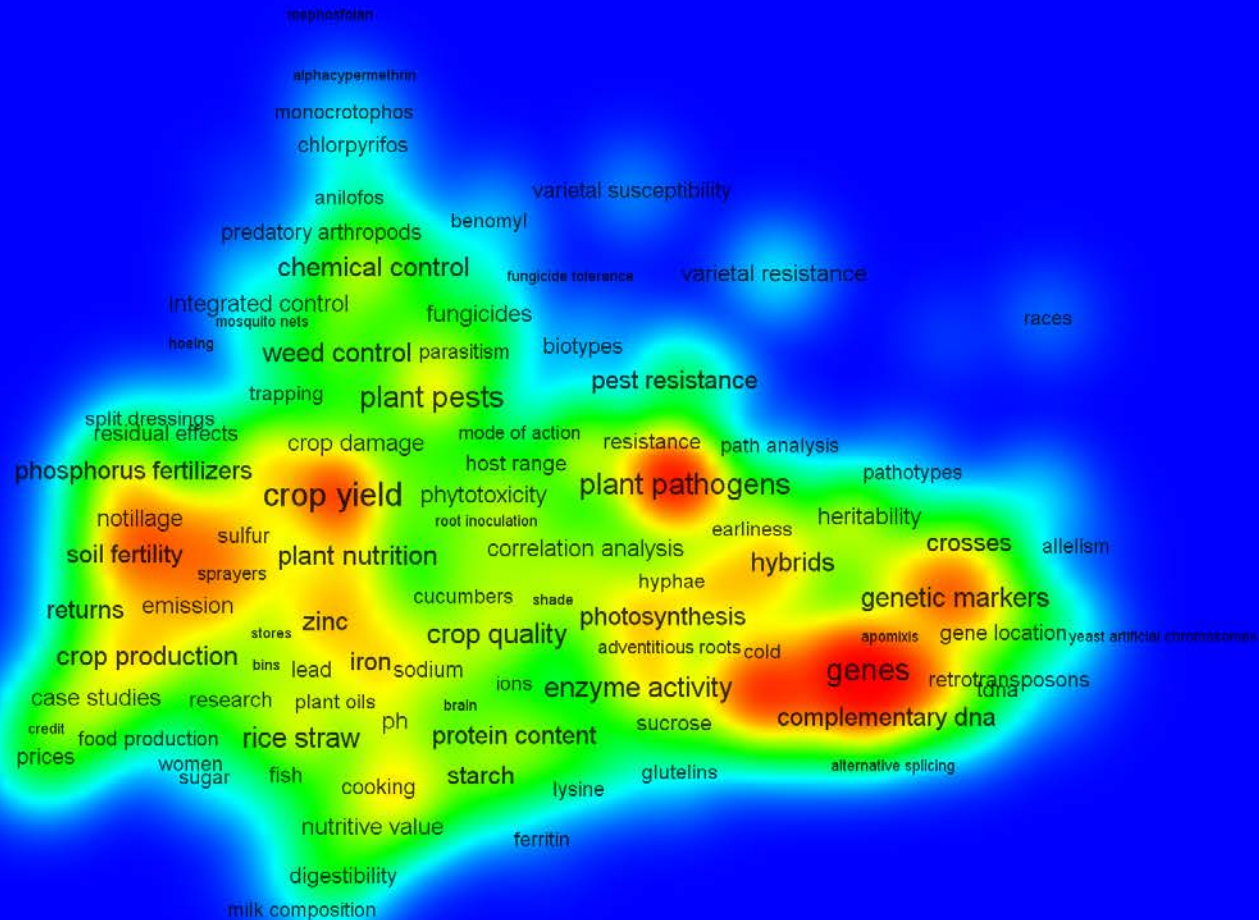
1996-99

# Trajectory of rice research, 1983-2012



2000-02

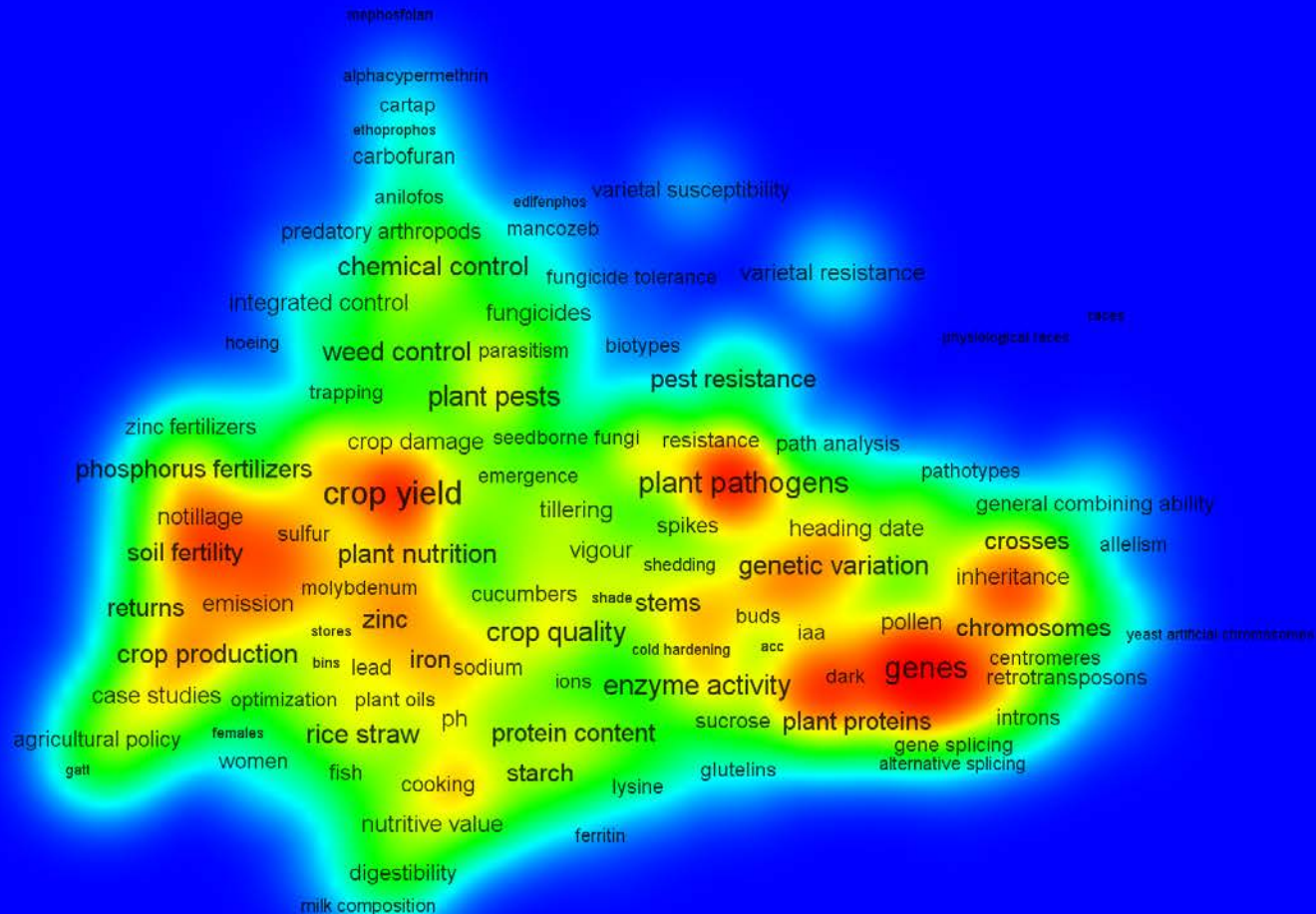
# Trajectory of rice research, 1983-2012



2003-04

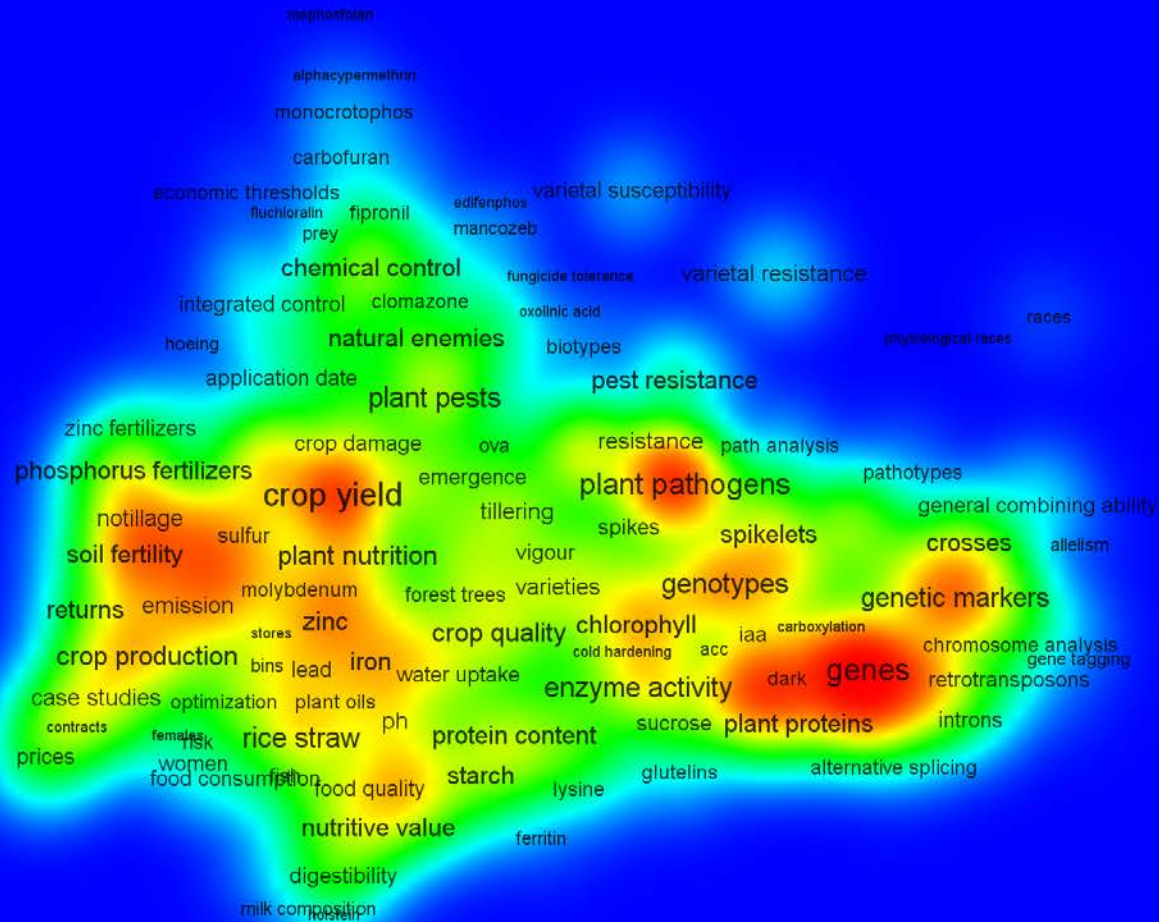


# Trajectory of rice research, 1983-2012



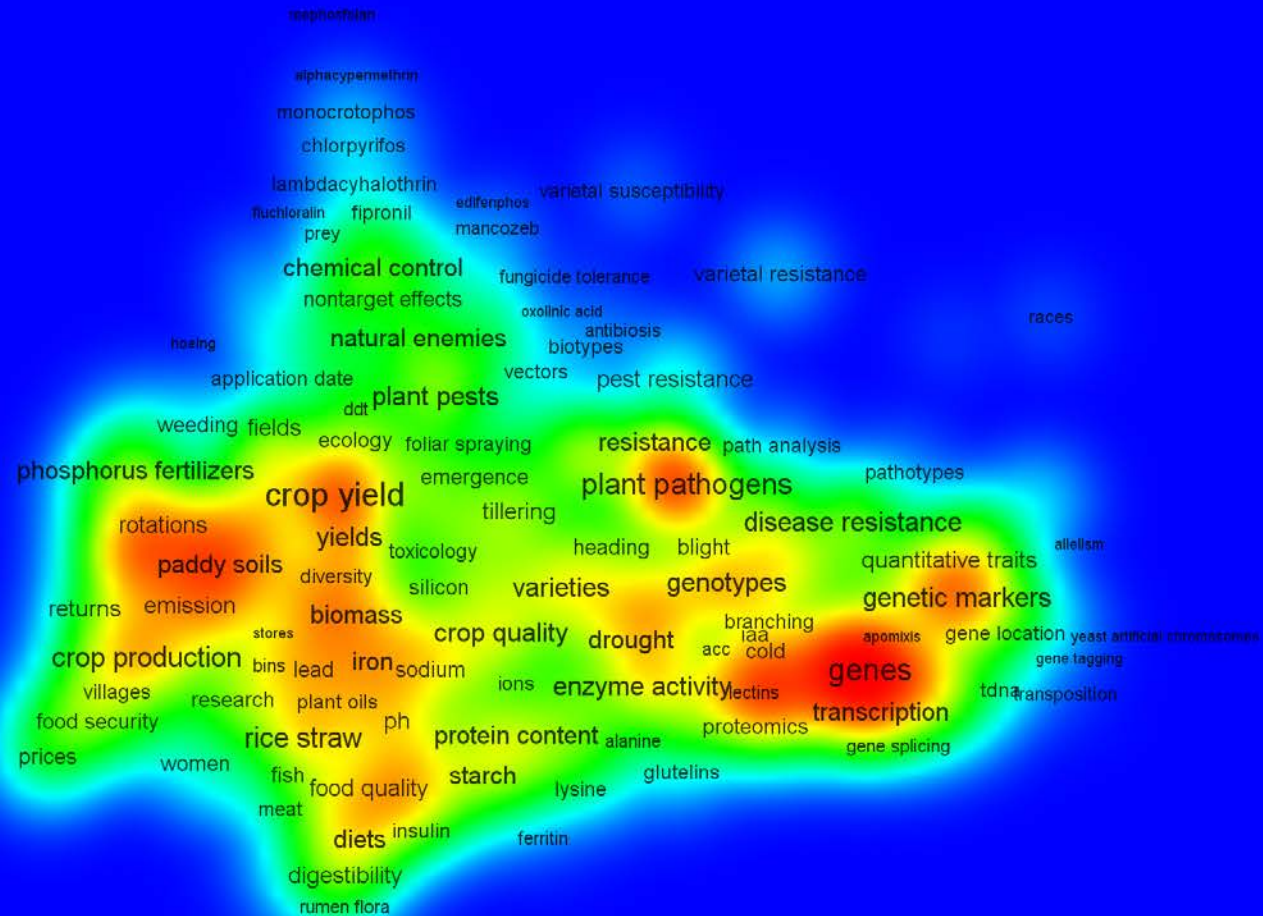
2005-06

# Trajectory of rice research, 1983-2012

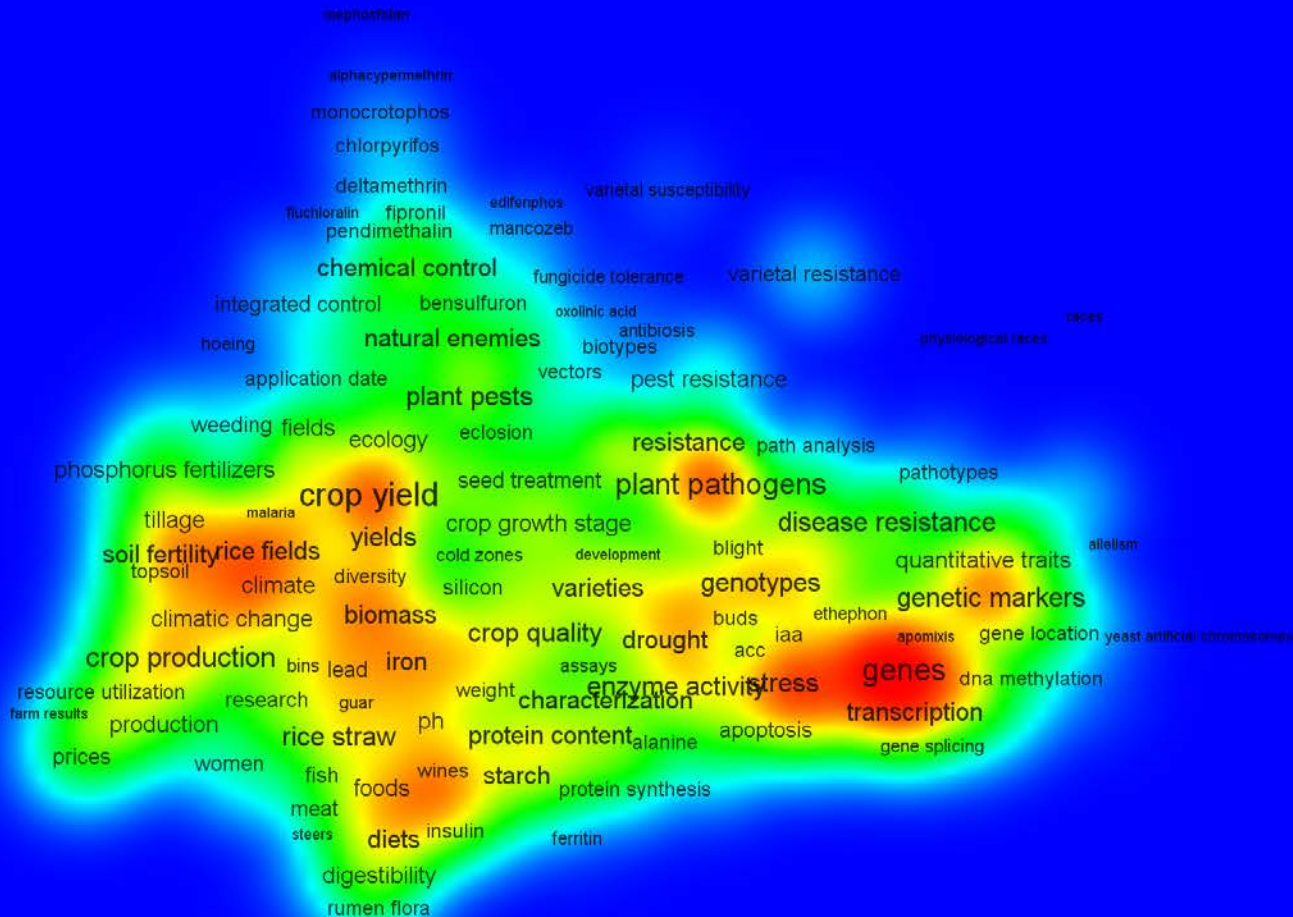


2007-08

# Trajectory of rice research, 1983-2012

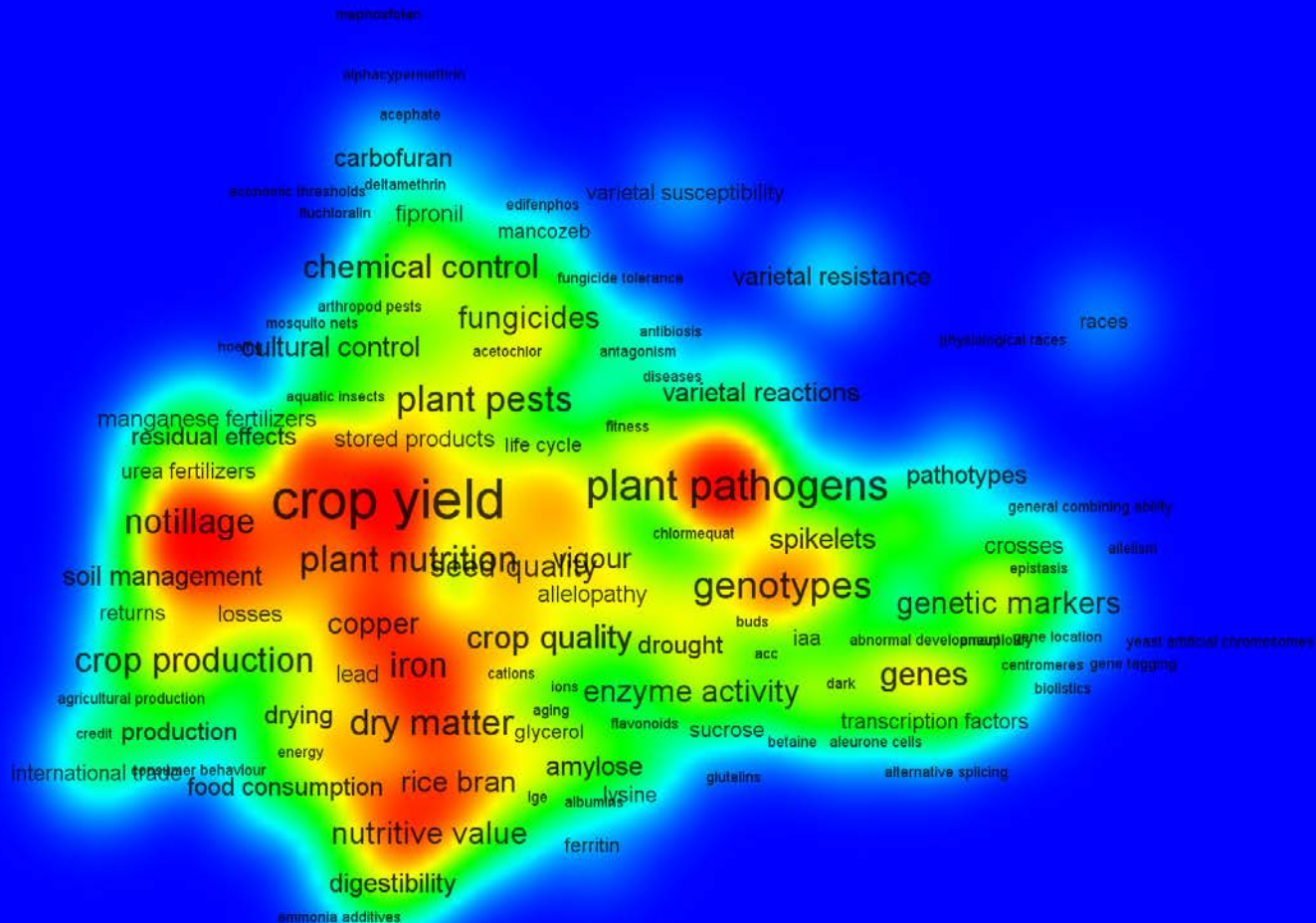


# Trajectory of rice research, 1983-2012



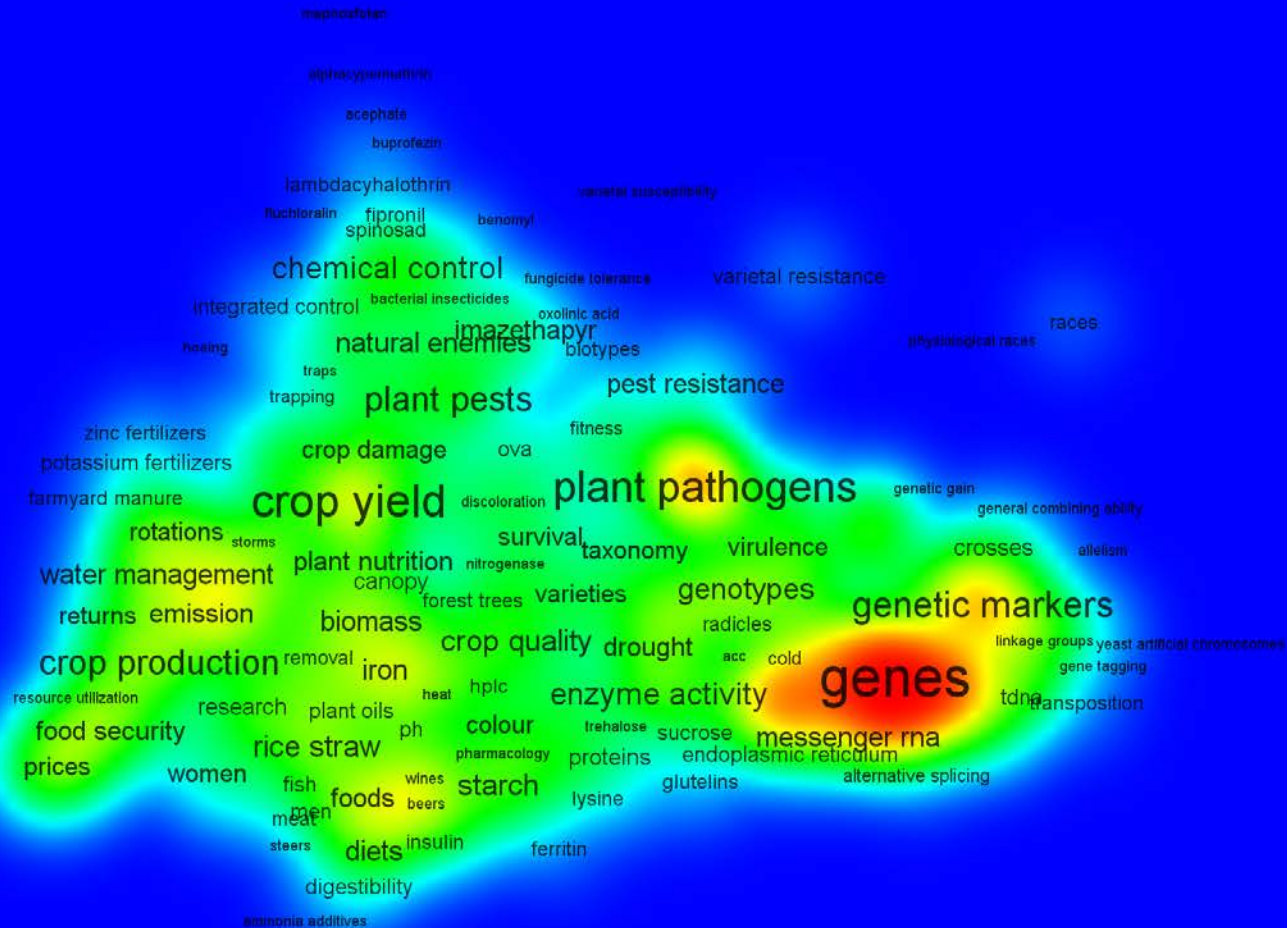
2011-12

# How research priorities differ by country



Brazil 2000-12

# How research priorities differ by country



US, 2000-12



SCIENCE SUPPLY OF A RESEARCH TOPIC:

THE CASE OF AVIAN FLU

SHAPING BY INSTITUTIONS



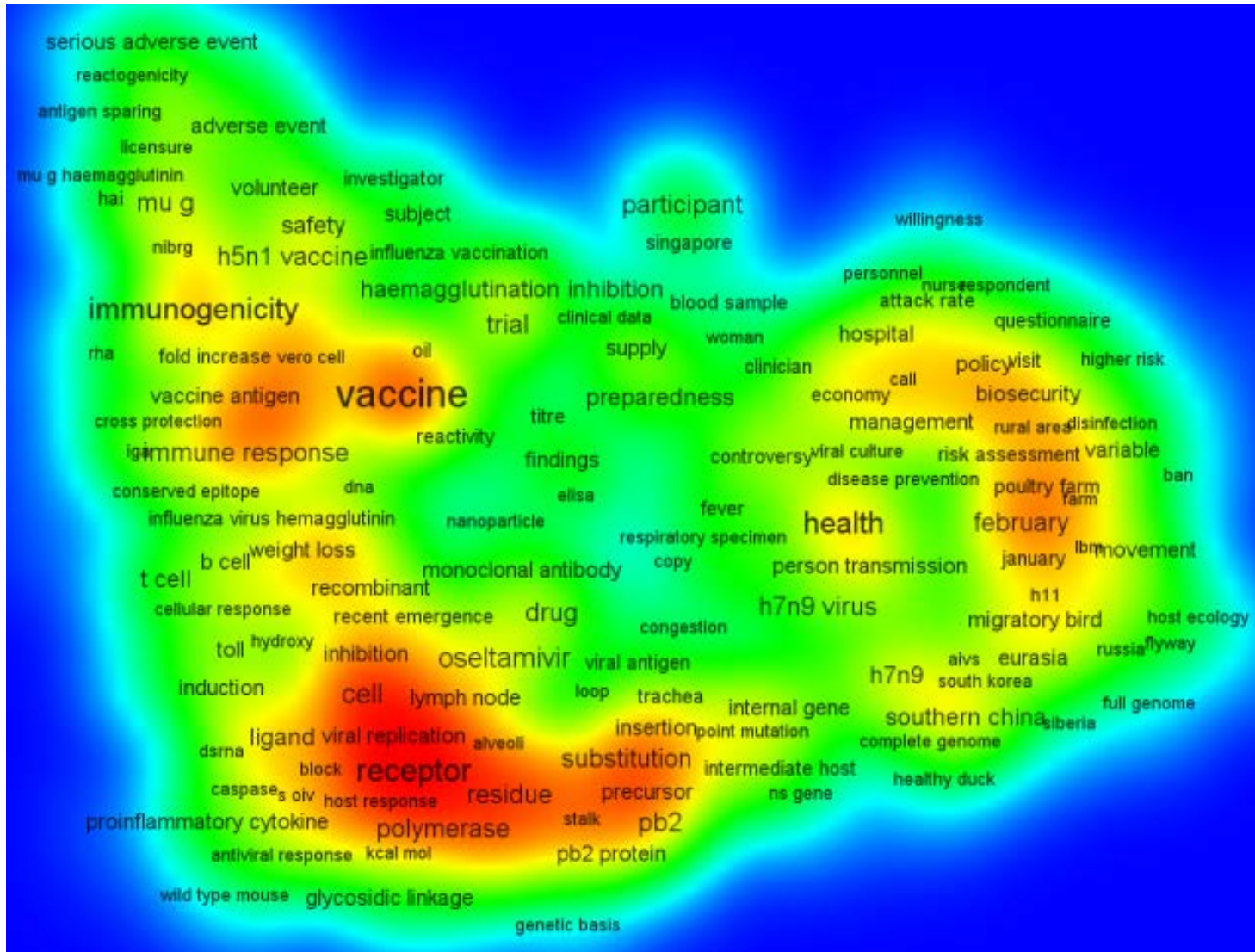








# Institutions and the research agenda



Academic reward -- Top “multidisciplinary” journals overlay

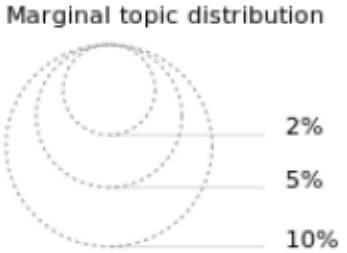
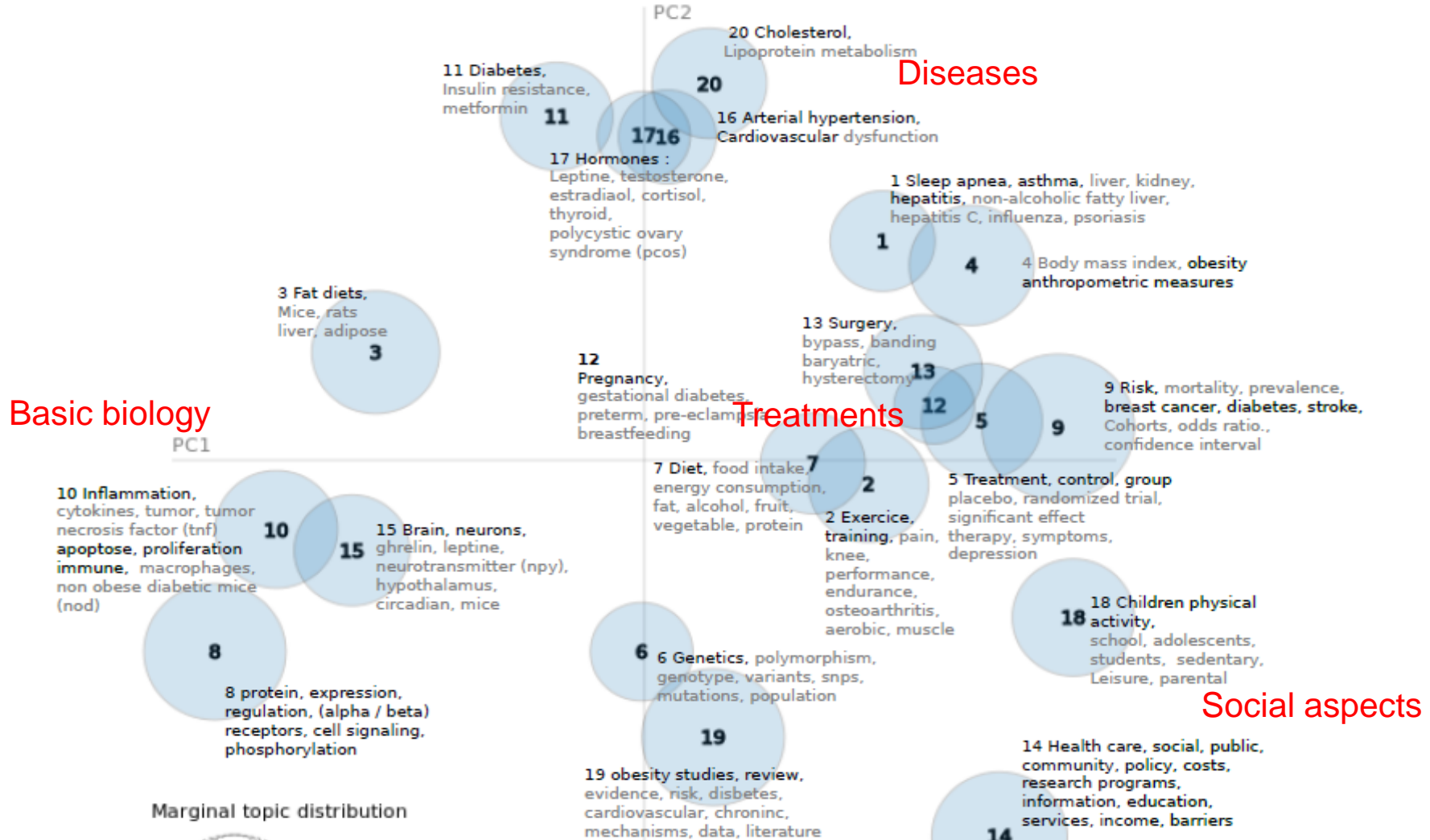


**EXPLORING DEMAND:**

**THE CASE OF OBESITY**

**MAPPING BOTH SUPPLY AND DEMAND**

# Science supply map using topic modelling



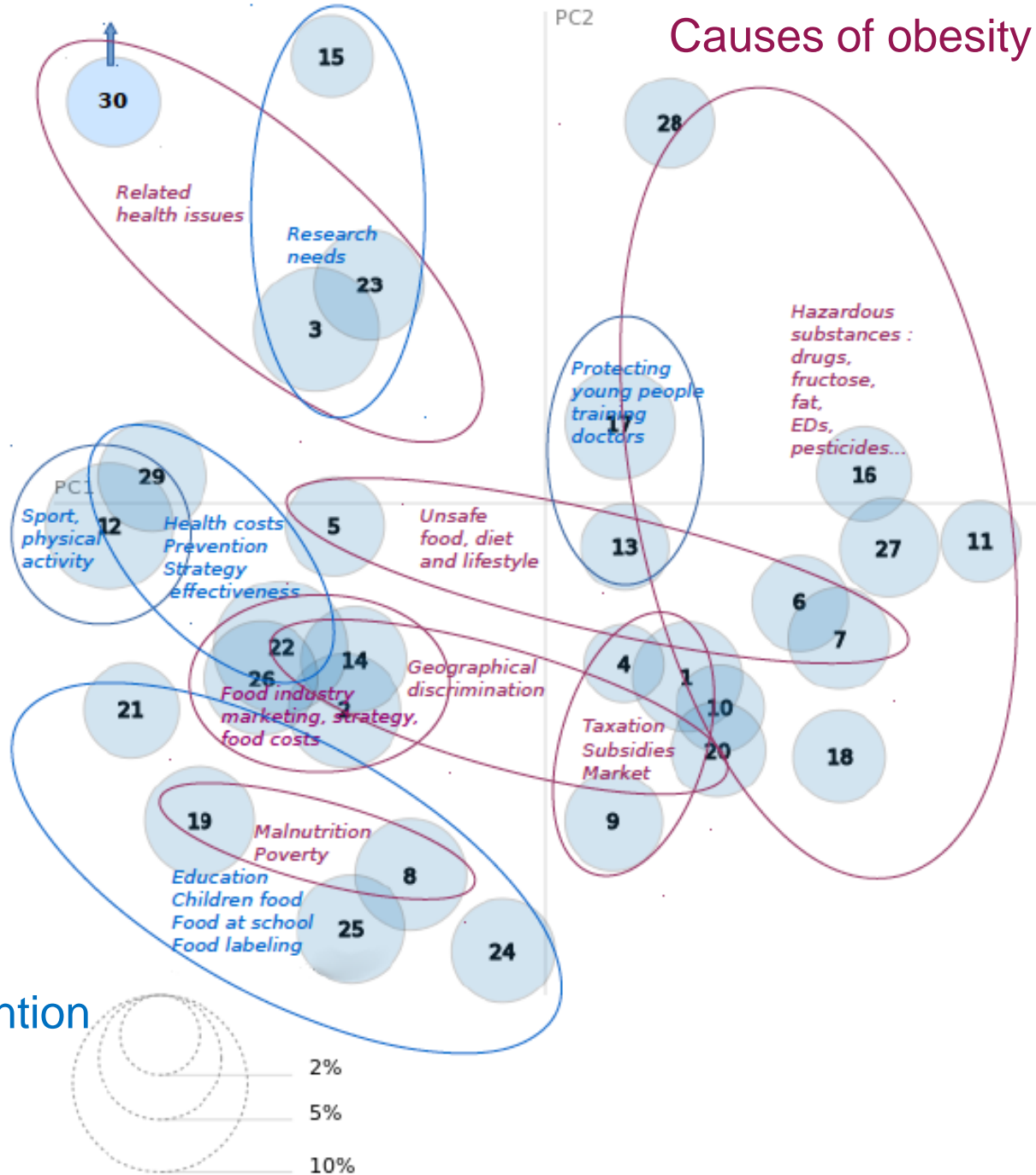
## Population studies



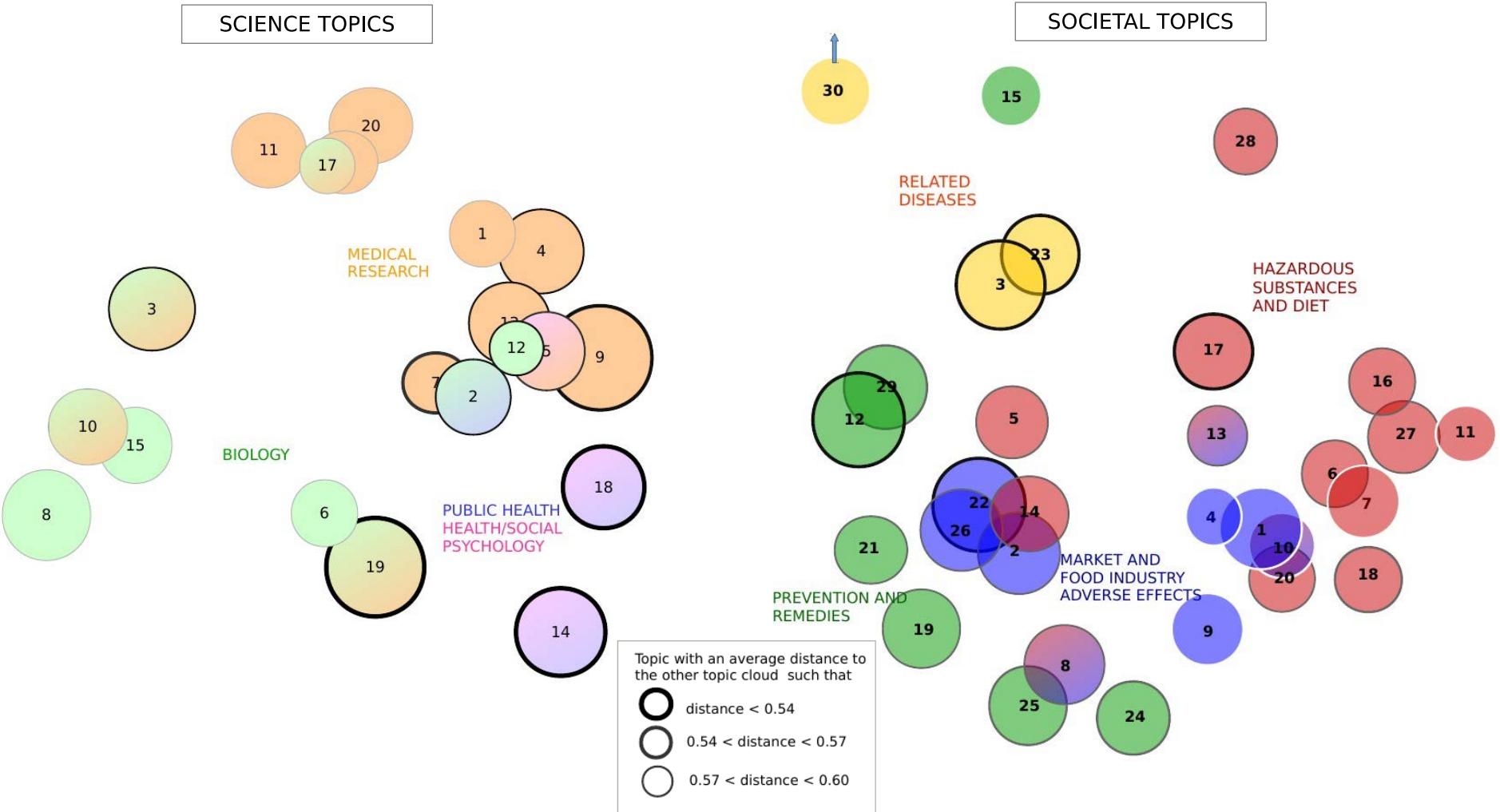
# EU parliament Themes

Not obvious how to relate policy themes with research themes

Actions for prevention



# Relation between supply (left) and demand (right)



# Summary of methodology

## Building the portfolio

1. Gather data (pubs, grants, news...) on relevant cognitive space (e.g. obesity)
2. Classify data into areas - generate the **research landscape**
  - Top down (use existing classifications)
  - **Bottom up (clustering, topic modelling, ...)**
3. Find portfolio of an organisation, region, i.e. distribution over topics

## Exploring the portfolio

1. Try to **relate science supply** and **societal needs/demands**
2. **Diversify 'smartly'**: in the face of uncertainty / ambiguity, balance portfolios
3. **Seek synergies** between different areas in a portfolio.

# Humbling insights from exploratory case studies

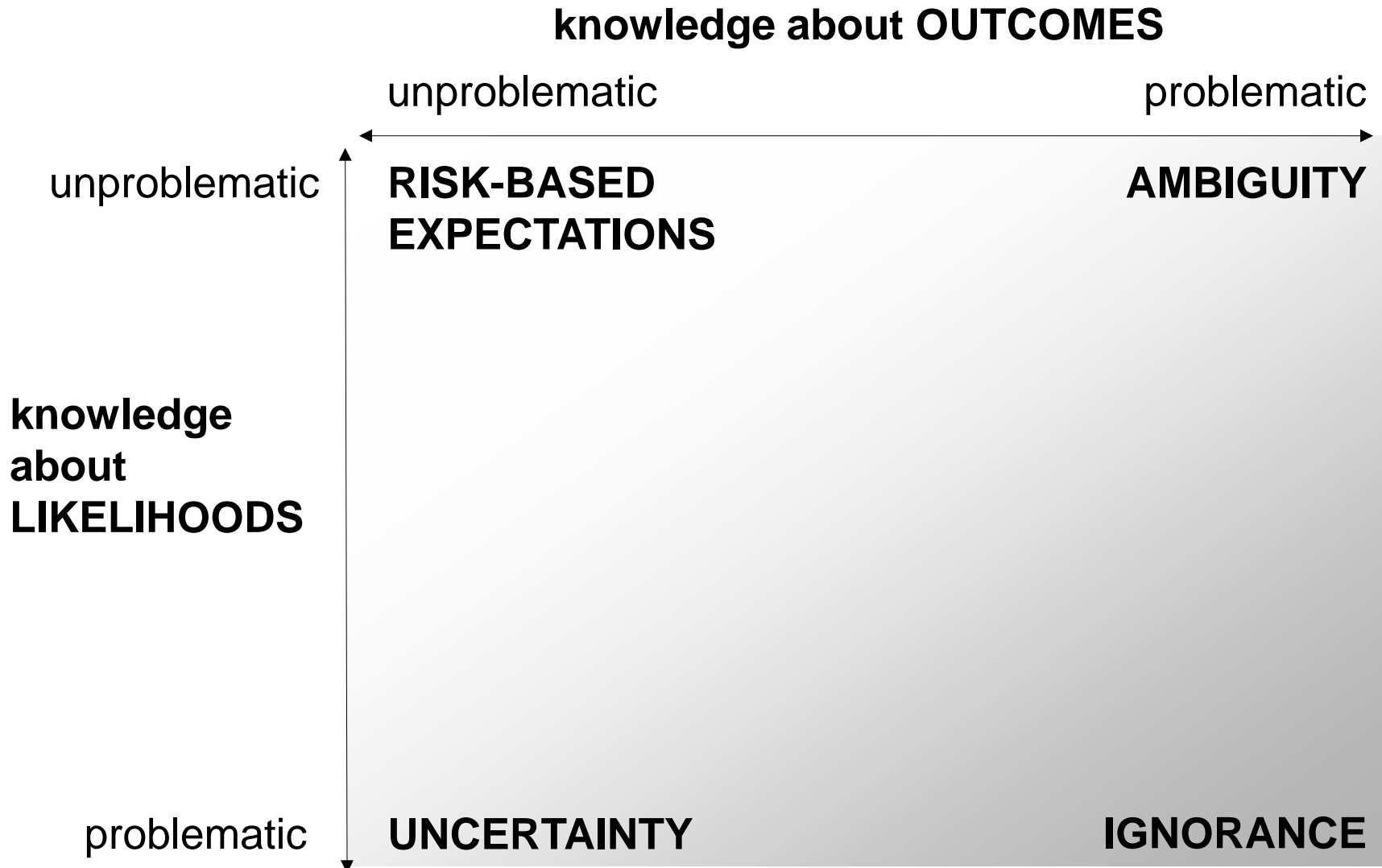
- Science maps provide “one” perspective on research options and relative degree of activity.
  - Attention: lack of coverage (WoS, Scopus) - bias in results.
- However, there are different valid and legitimate perspectives.
  - Need to develop qualitative methods of data triangulation
- Problematic to elicit outcomes or societal needs from text analysis.
- Unclear relation between research options and desired outcomes or policy goals

In spite of lack of robustness of current analyses, it may enrich deliberations on priorities - it brings in research directions.



# Acknowledge ambiguity and uncertainty

Incompleteness of knowledge in research portfolios





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Incompleteness of knowledge in research portfolios

knowledge about **OUTCOMES**

unproblematic

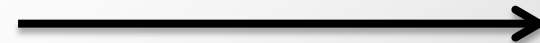
problematic

unproblematic

**RISK-BASED  
EXPECTATIONS**

**AMBIGUITY**

Financial Portfolio



knowledge  
about  
**LIKELIHOODS**

**From Returns to Benefits:**

Not one desired outcome (returns), but many possible outcomes (benefits and downsides) (e.g. vaccines vs. antiviral drugs vs. bird population monitoring)

problematic

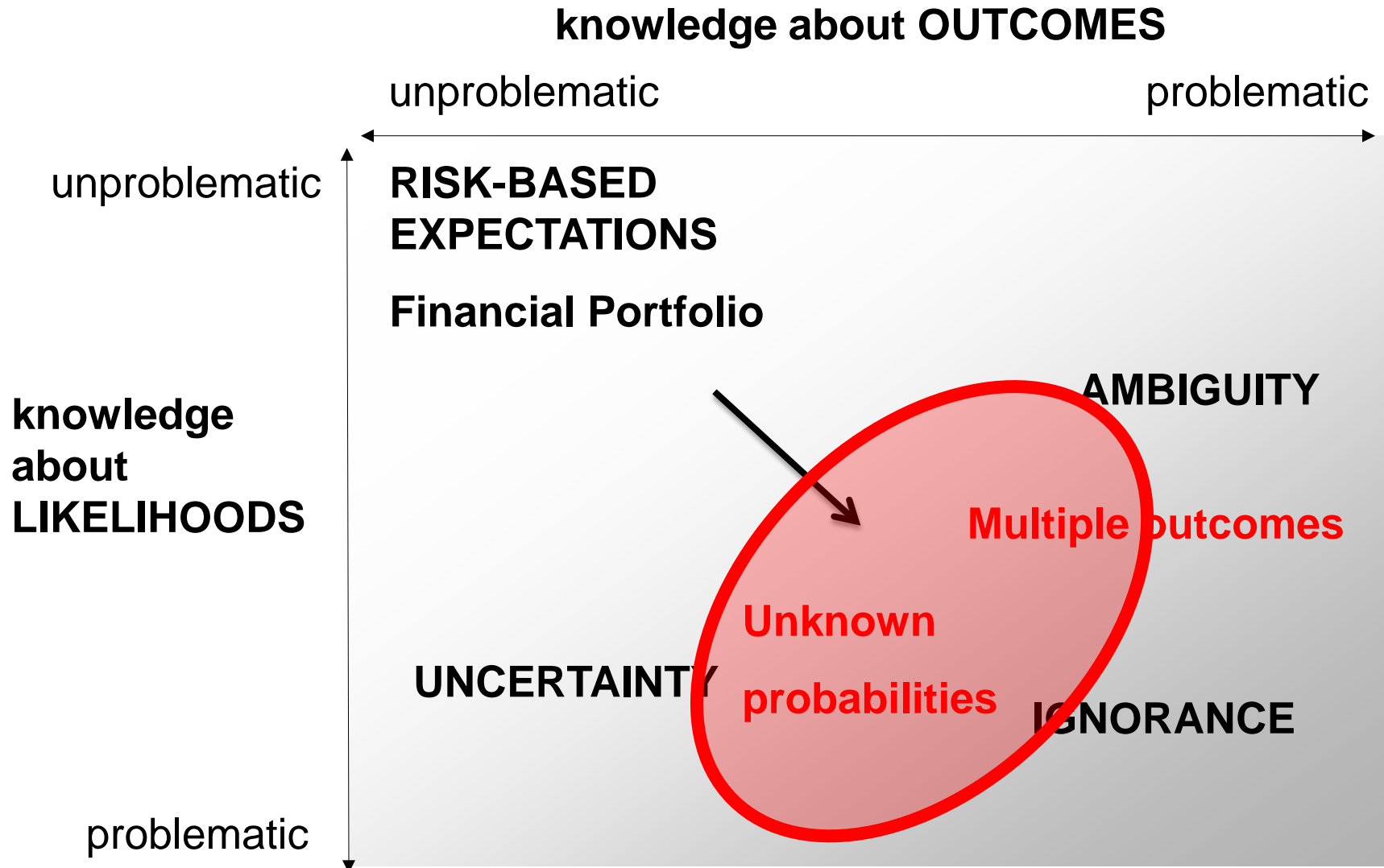
**UNCERTAINTY**

**IGNORANCE**



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