

Integrated pest management with particular emphasis on  
biological and biotechnological plant protection in Germany

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## field of research

- entomologist
- development of plant protection concepts in organic farming
- beneficial / pest interactions



# Who we are?



The Julius Kühn Institute (JKI) is the Federal Research Centre for Cultivated Plants in Germany and an autonomous superior federal authority directly subordinated to the Federal Ministry of Food and Agriculture (BMEL)

# What is our aim?



# 2013 National Action Plan on the sustainable use of PPP - global targets

- **Risk reduction** for the environment by 30% until 2023 (reference period 1996-2005)
- **Restriction of PPP** use to the “necessary minimum” (95% of Reference Farms)
- **IPM and organic farming:**
  - Increase of integrated plant protection and organic farming (20% agricultural land)
  - Development of crop specific guidelines and adoption by farmers
  - Demonstration farm project
- **Maintenance of state advisory system**



# Demonstration Farms – Germany

## 2010 – 2013: 27 demonstration farms

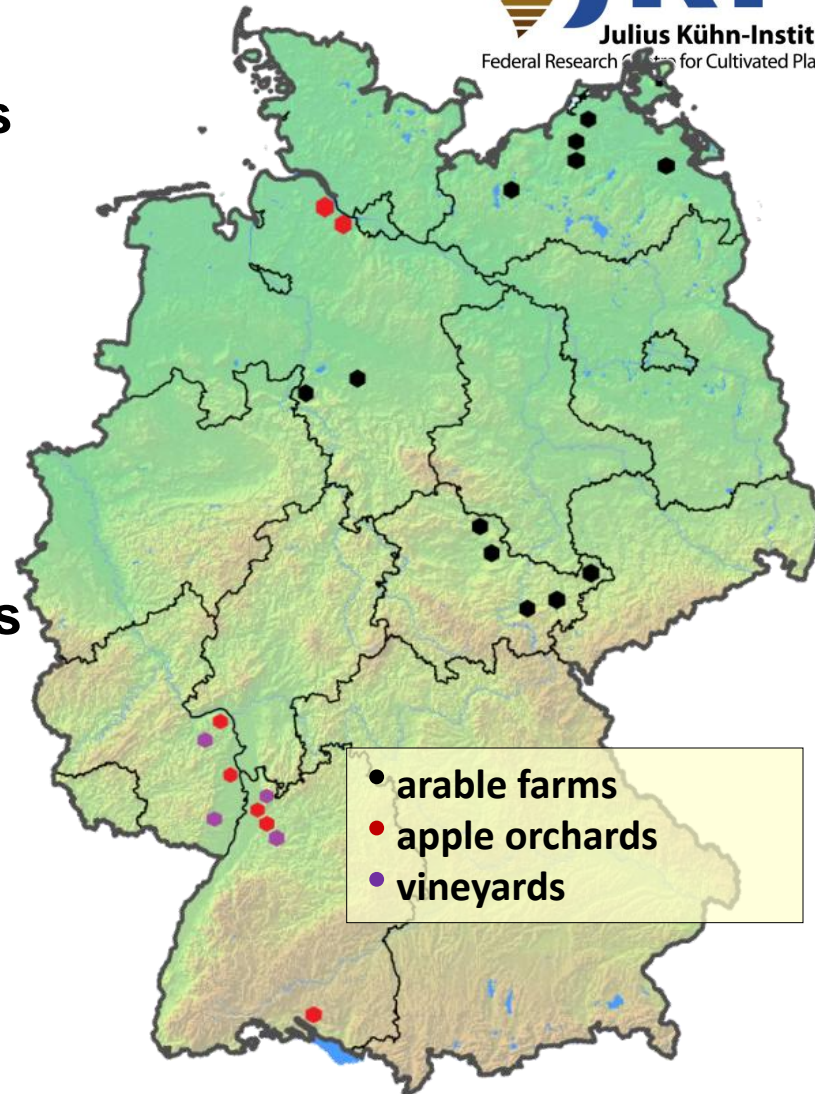
- 17 arable crops
- 7 apple growers
- 4 vineyards

Budget: ~ 600.000 € per year

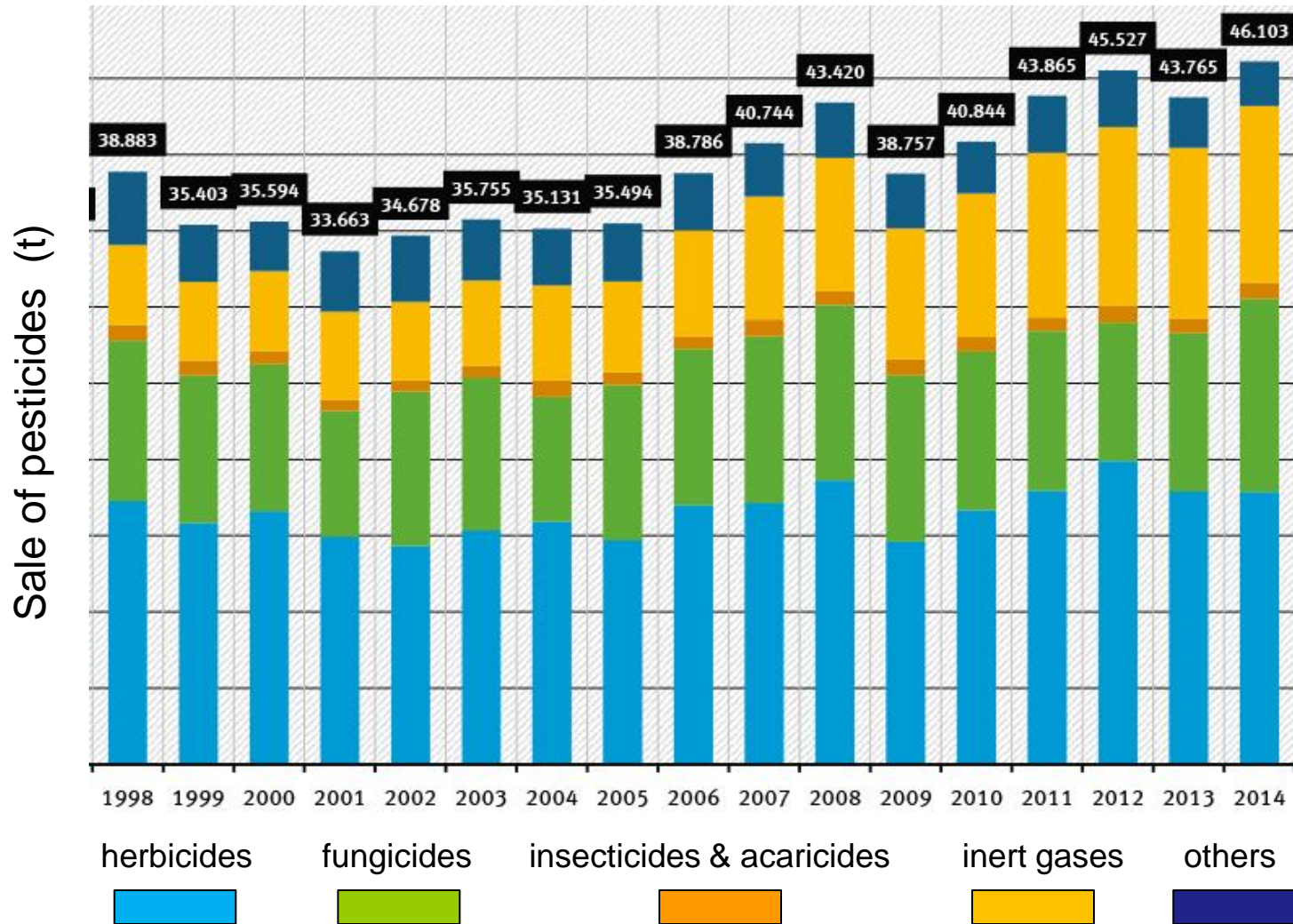
## 2014 – 2018: 66 demonstration farms

- 27 arable crops
- 13 apple growers
- 12 vineyards
- 9 field vegetable growers
- 5 hop growers

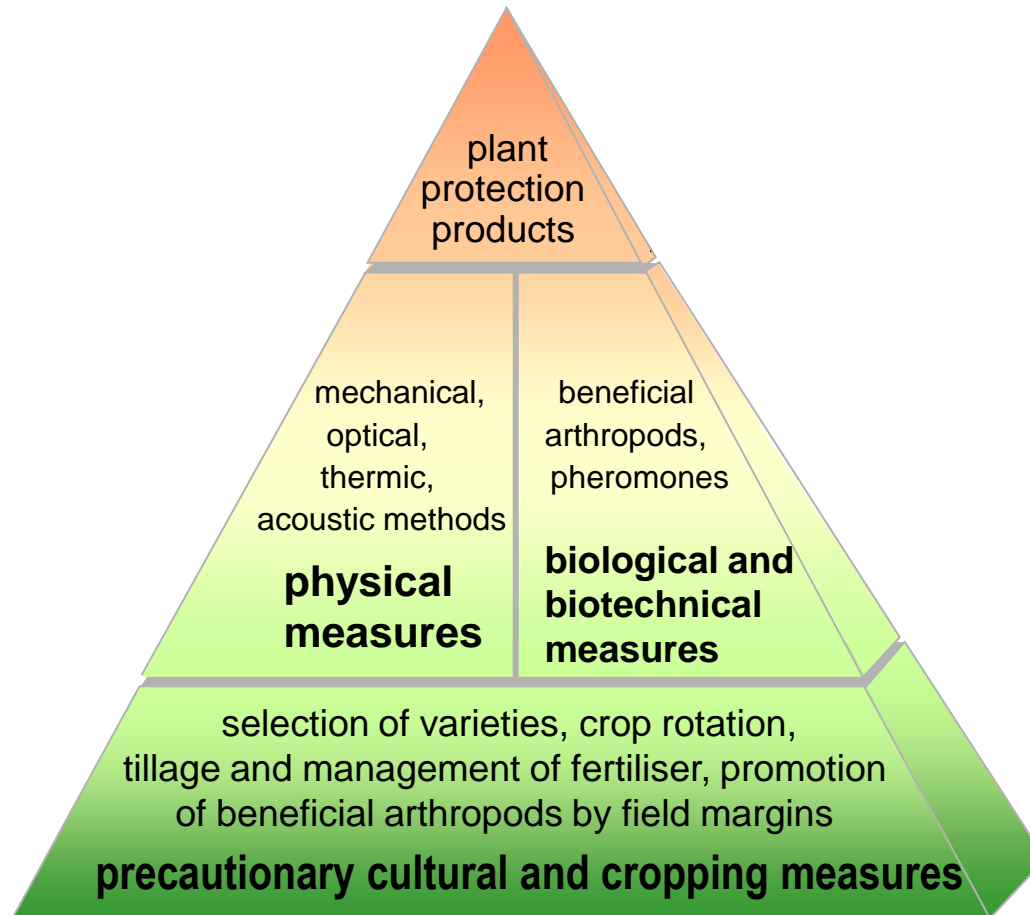
Budget: ~ 1.4 Mill € per year



# Sale of pesticides in Germany



# Integrated plant protection



## German plant protection law from 2012

„... a combination of methods in which prioritizing biological, biotechnological, plant-breeding and cultivation methods. The use of chemical pesticides is limited to the essential minimum“.



# Biological plant protection

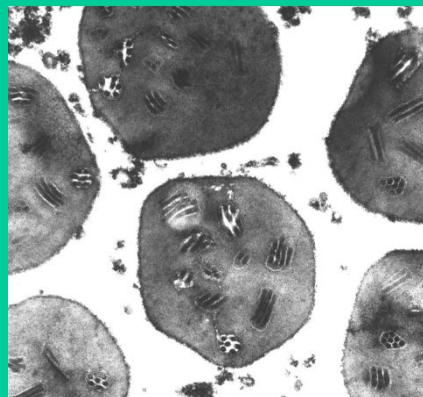
Beneficial organisms  
Macro organisms



[www.ecogenomics.eu/UK/](http://www.ecogenomics.eu/UK/)

Regulated by Federal  
Nature Conservation  
Act

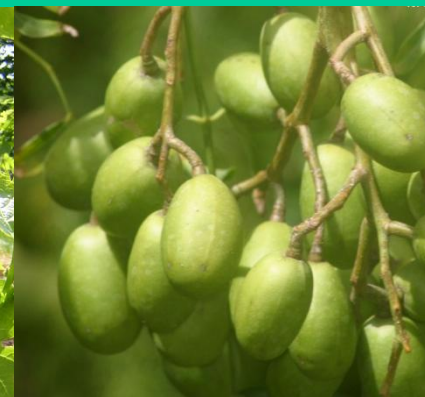
Microorganisms/  
viruses



Semiochemicals  
pheromone



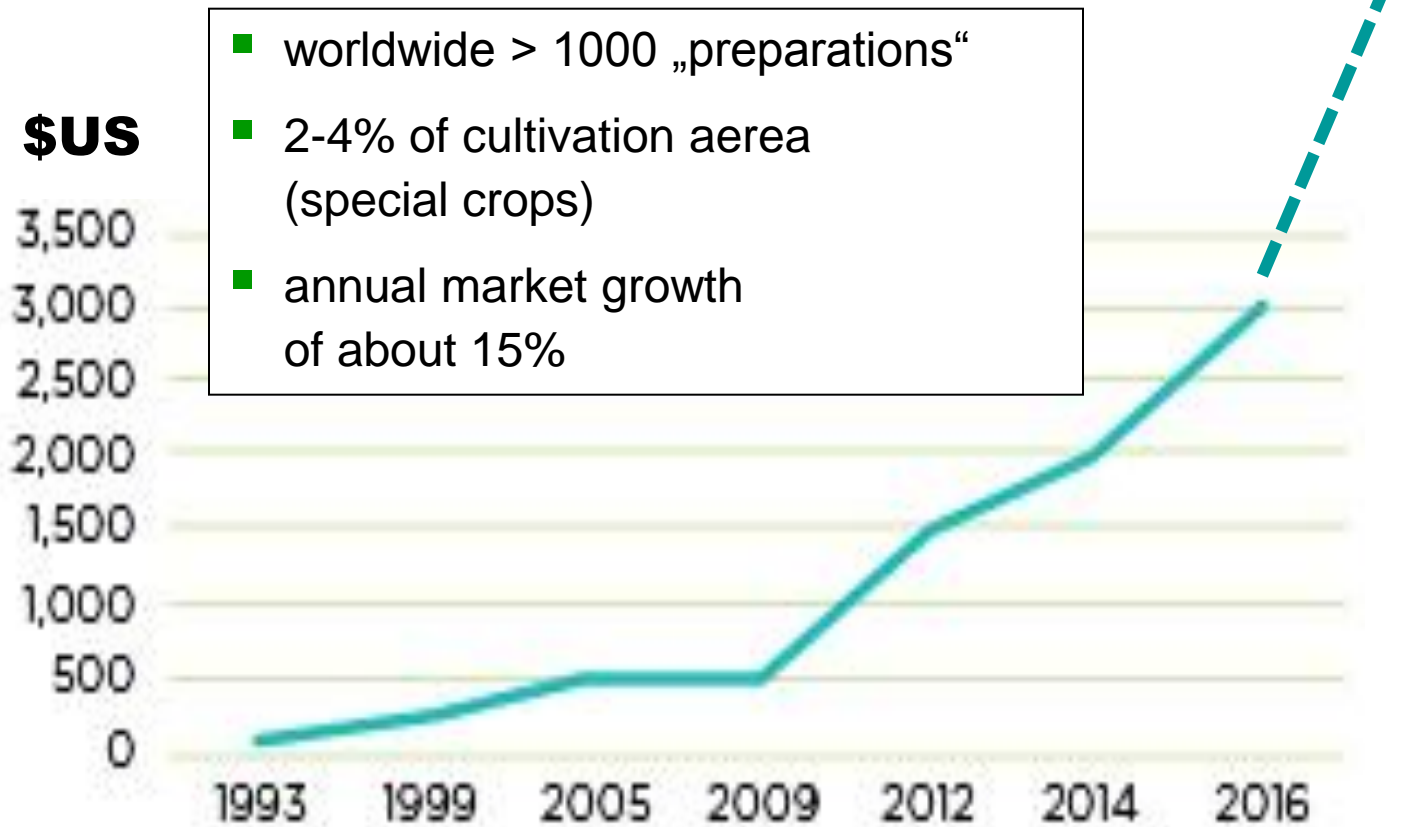
Natural substances/  
botanicals



Active substance approval and PPP authorisation by  
**(EG) Nr. 1107/2009** and Plant Protection Act

# Development of the market volume of biological plant protection preparations

Forecast 2020  
6 billions \$US

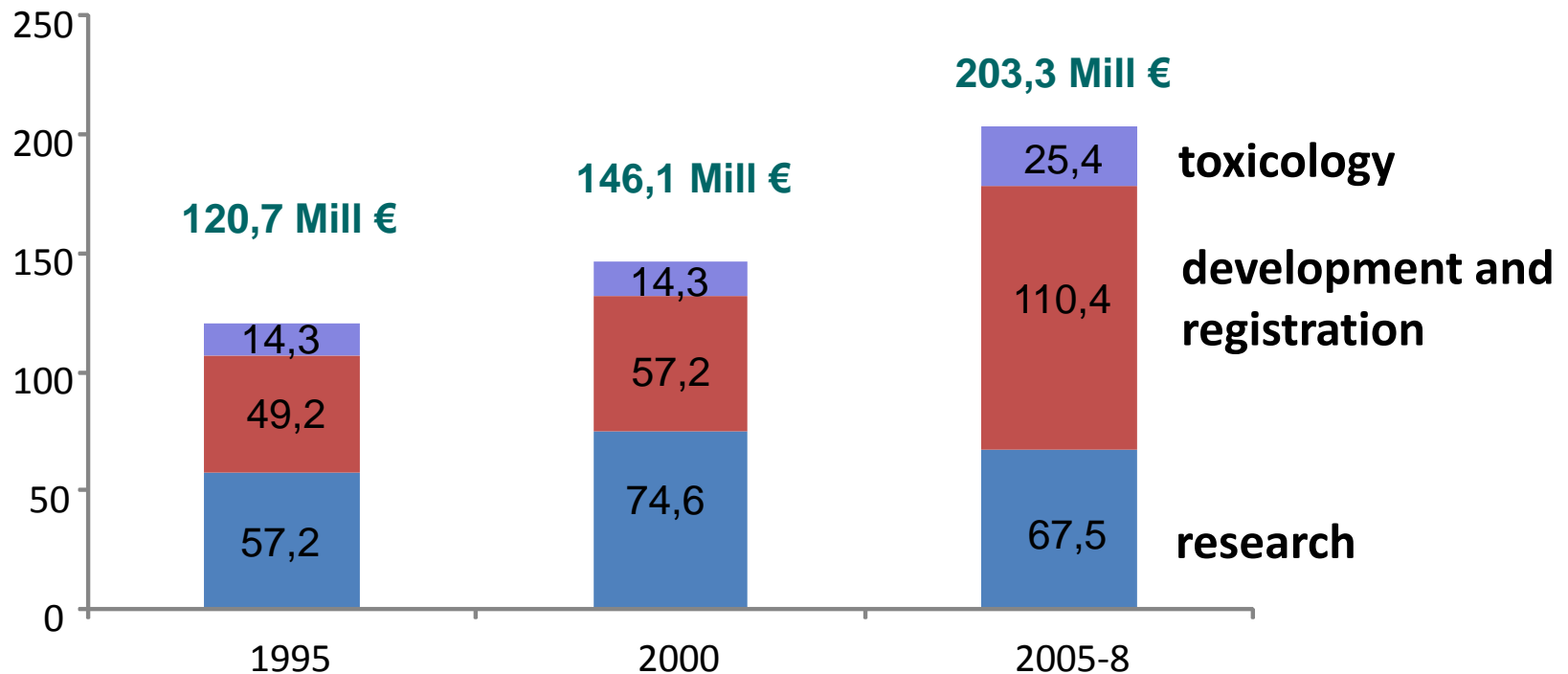


**not exist**

**small enterprises**

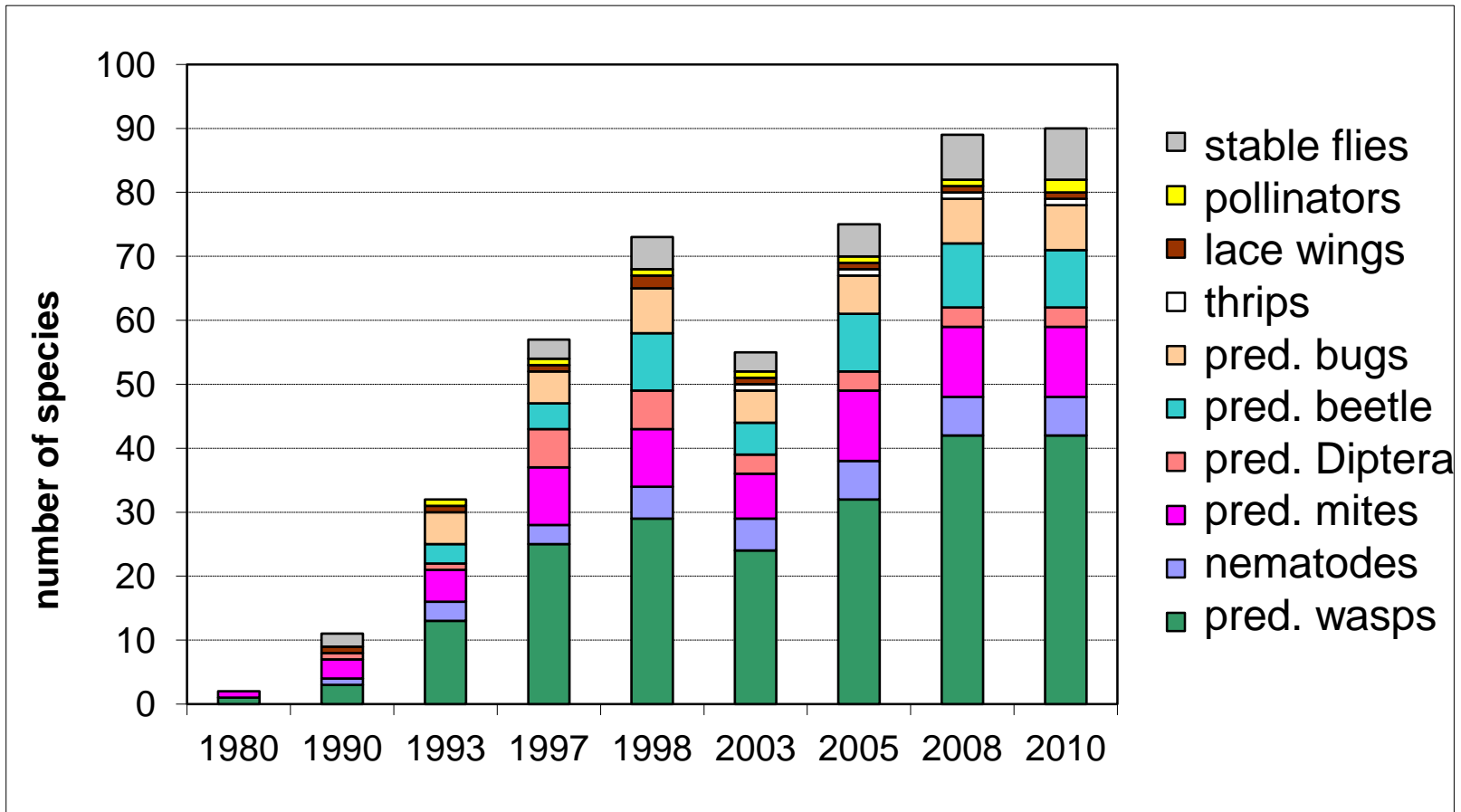
**big players**

# Development costs for one pesticide

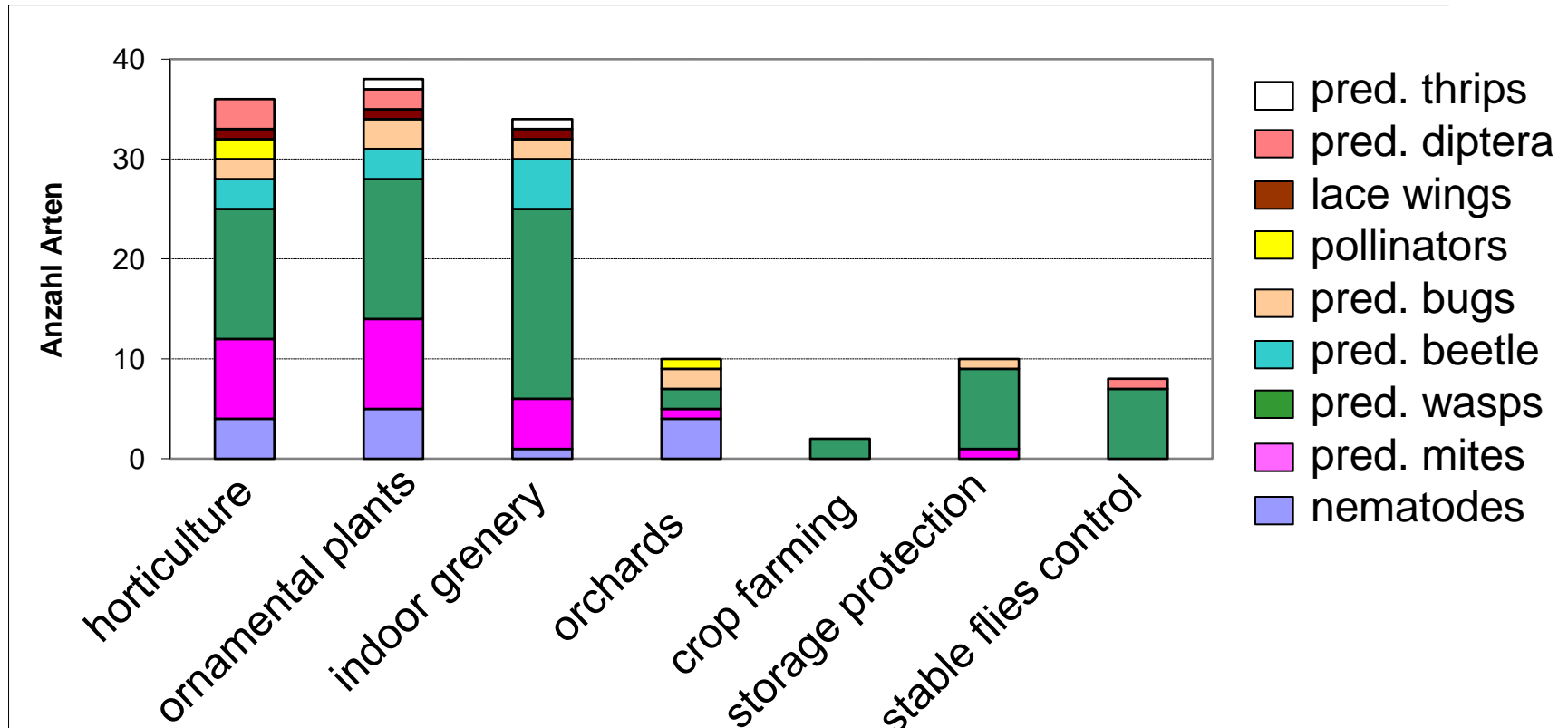


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# 30 years of beneficial arthropods in Germany

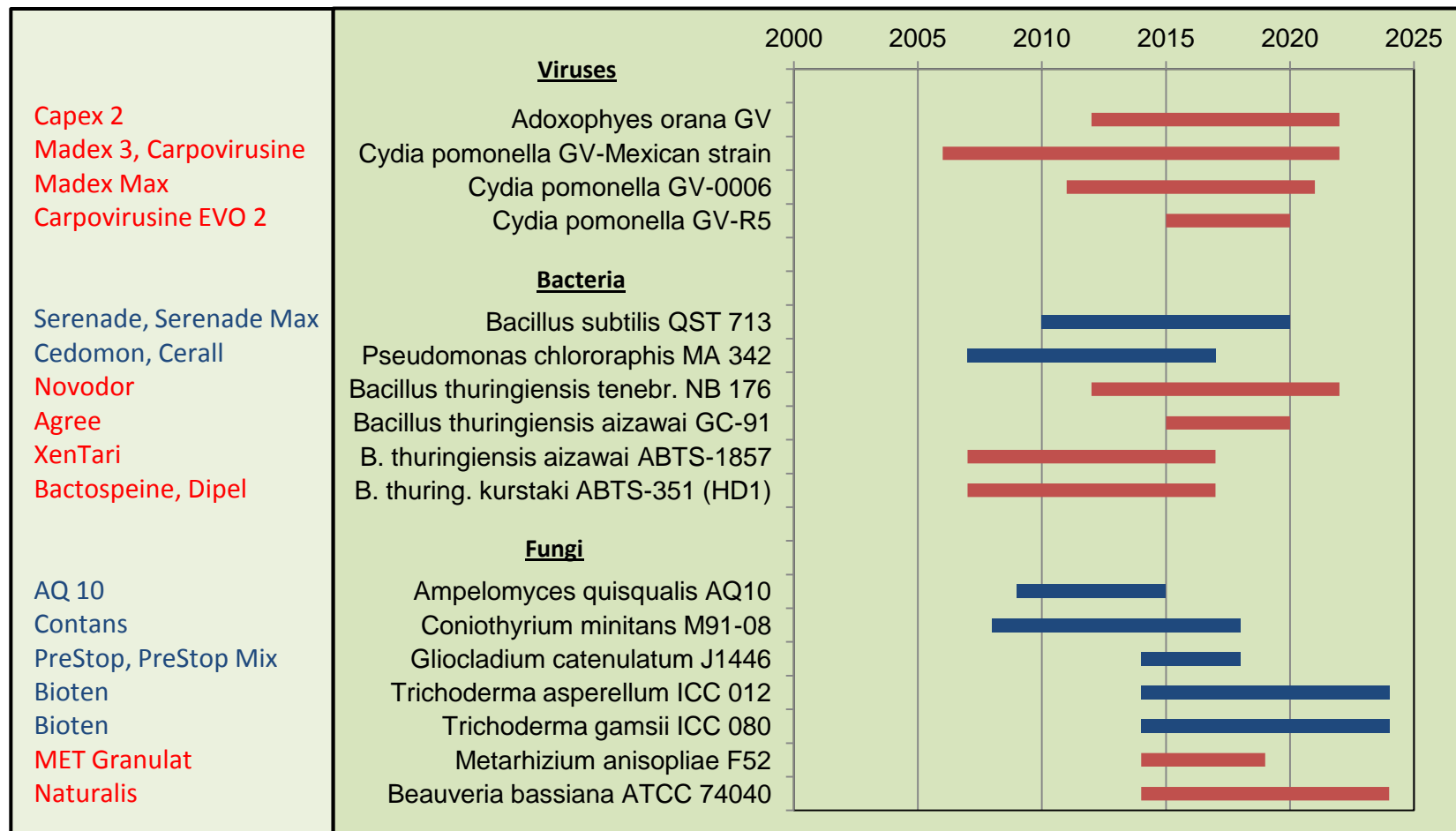


# Aereas of application





# Registered Microbial Biocontrol Agents in Germany



█ insect control    █ disease control

# Advantages

- no risk for non-target organisms
- positive effect by proper application
- no residues in crops
- no waiting times
- protection of established beneficials –  
biocontrol is selective
- low hazard to develop resistance
- green washing

# Disadvantages

- knowledge about biology of pests and beneficials are necessary → effectiveness
- high selectivity could be disadvantage if multi pest infestation
- higher costs than chemical control
- combination of chemical control and beneficials is difficult
- a systemic approach is important!

# Plant protection – quo vadis?

## More technology – lower agricultural input

- plant breeding
- forecast models
- biological plant protection
- smart breeding
- precision and digital farming