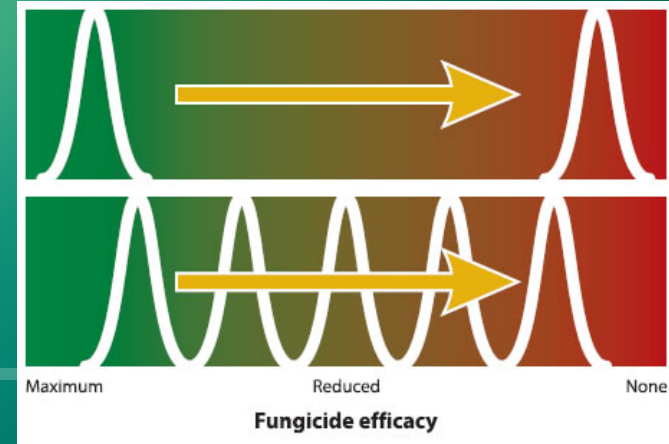




# WELCOME TO THE 9<sup>TH</sup> NORBARAG MEETING VILNIUS 2017!



# OUR MANDATE:



Forum for information exchange regarding pesticide resistance and efficacy evaluation

- To discuss strategies to avoid resistance and to manage resistant populations
- To define research needs, discuss test methodologies and agree on standards
- Promote collaboration on resistance screening and other research topics
- Promote awareness on pesticide resistance issues
- Maintain contacts to similiar groups in other countries

# WHAT HAVE WE FOCUSED ON OVER THE LAST 9 YEARS?

- Database on resistant and potential resistant weed species
- Development of testing procedures to detect pesticide resistance
- Information and updating on resistance cases in insect pests, weeds and diseases within agriculture



# What are HRAC, FRAC and IRAC doing?

- HRAC: Collect, assess and share information, e.g. International survey on herbicide resistance (<http://www.weedscience.org/>)
- IRAC: Educate about insecticide resistance, develop testing methods, update insecticide resistance status
- FRAC: Identify existing and potential cases of fungicide resistance, develop testing methods, educate and develop resistance management strategies

# PESTICIDE RESISTANCE- MORE RELEVANT THAN EVER!

‘A concerted approach, supported by a normative/legal backup of countermeasures to pesticide resistance is imperative for long-term preventive and curative resistance management. There is an urgent need to conserve, through coordinated PRM, efficient low-residue pesticides.’

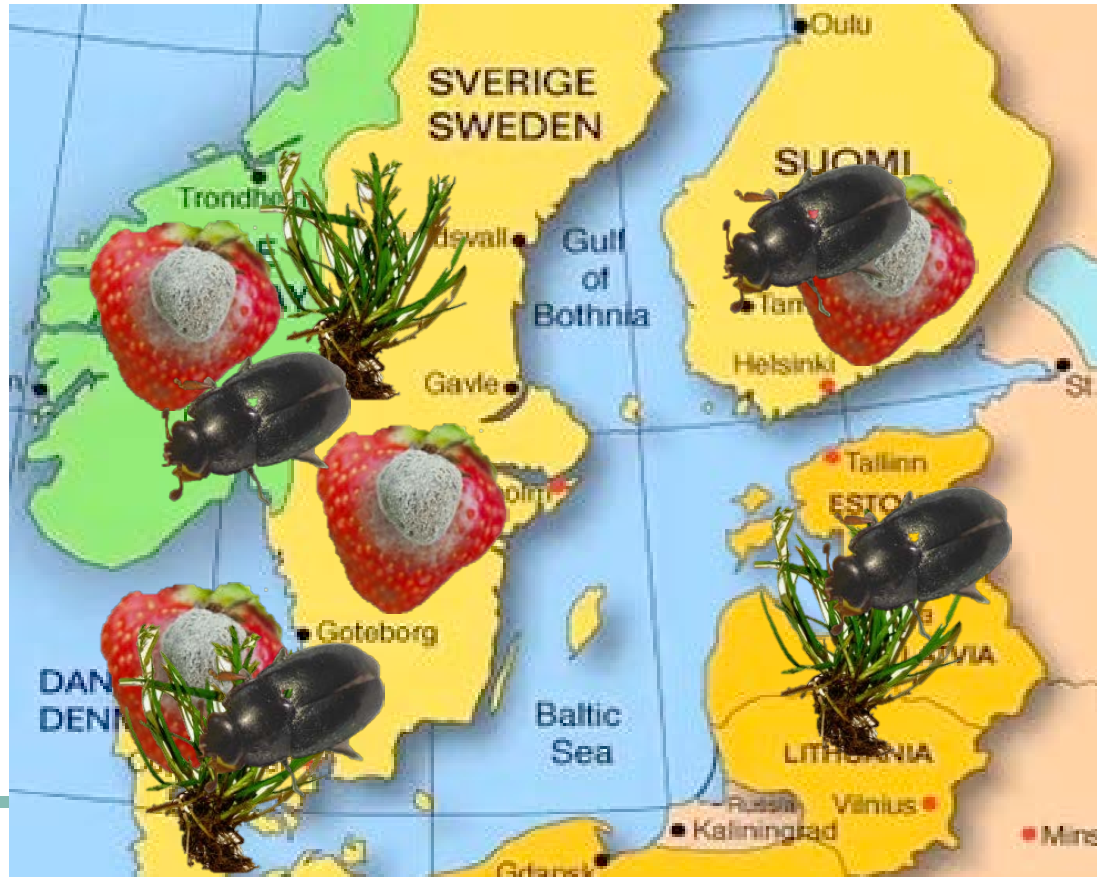
**F. Thullner :Impact of pesticide resistance and network for global pesticide resistance management based on a regional structure 1997**

# Spread of *Botrytis cinerea* Strains with Multiple Fungicide Resistance in German Horticulture

Sabrina Rupp<sup>1</sup>, Roland W. S. Weber<sup>2,3</sup>, Daniel Rieger<sup>4</sup>, Peter Detzel<sup>5</sup> and Matthias Ha

<sup>1</sup> Department of Biology, University of Kaiserslautern, Kaiserslautern, Germany, <sup>2</sup> Esteburg Fruit Research and Advisory Centre, Jork, Germany, <sup>3</sup> Department of Food Science, Aarhus University, Årsløv, Denmark, <sup>4</sup> Belchim Crop Protection, Burgdorf, Germany, <sup>5</sup> NüPA GmbH, Karlsruhe, Germany

# MAPPING IS IMPORTANT...



# WHAT PRM STRATEGIES TO DISCUSS?

- Avoid/reduce pesticide use
- Mix pesticides with different MOA
- Alternate with different MOA
- Use recommended dose







# DO THESE STRATEGIES ACTUALLY WORK?

- Countries with low pesticide use should have fewer resistance cases
- Will mixing with MoA-1 work to safe MoA-2, if the pest is already resistant to MoA-1?
- Reduced dose might reduce resistance development (*K. Brent, 2007 in Fungicide resistance in crop pathogens*)
- What about resistant pests from neighbor fields/regions/countries?



# HOW TO MOVE ON?

- Mapping and screening for pesticide resistance cases is essential
- Prevent?
- Delay?
- Accept?



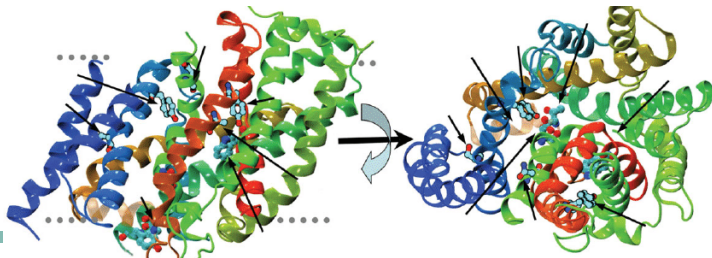
# RESISTOPP- A 5-YEAR RESEARCH PROJECT:

Pesticidresistance: Mutation, selection and distribution

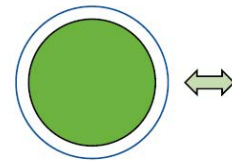
- More efficient methods to test for resistance
- Understand the molecular, cultural and climatic drivers for resistance
- Test resistance management strategies in the field

Project leader: Gunn Mari Strømeng

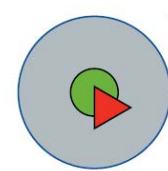
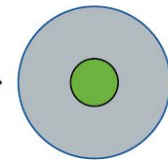
Funding: 1.7 mil Euro (NIBIO/Department of agriculture)



Agar without azole



Agar supplemented with azole



Paul Verweij, 2016

# AZOLRES: COLLABORATION BETWEEN MEDICAL, VETERINARY AND AGRICULTURAL INSTITUTES

- Do agricultural azoles increase resistance risk in medical populations of *Aspergillus fumigensis*?

Funding: Applied to the Norwegian Research council



# IN THAT SPIRIT- TO THE SUBGROUP MEETINGS!

- Discuss, suggest and consider old and new PRM strategies
- What goals can we achieve?
- Funding? Projects? Initiatives?