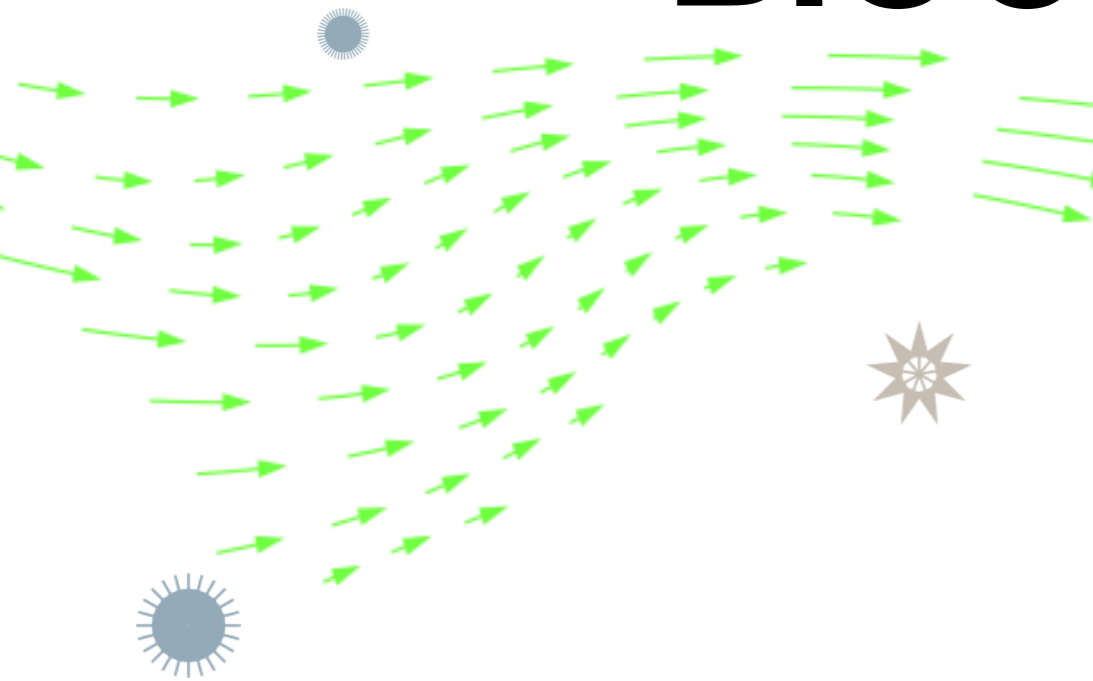


# BIOCOMES



Healthy plants through  
biological control

Jürgen Köhl

Societal Challenge 2 - Dissemination event  
FP7 and Horizon 2020 Calls 2014 and 2015  
Brussels, 27 June 2016

# BIOCOMES

Healthy plants through biological control

## The objectives

- ➔ Avoid losses caused by pests and pathogens in agriculture and forestry
- ➔ Support the implementation of Directive 2009/128/EC on use of Integrated Pest Management (IPM) in agriculture and forestry
- ➔ Develop 11 new biological control products
- ➔ Develop 2 new production technologies



# BIOCOMES – The choice of 11 targeted pests and diseases

- ➔ Food losses
- ➔ Pesticide use
- ➔ Market size for biocontrol products
- ➔ Open field crops
  - ➔ Arable crops, Vegetables, Fruit tree crops, Forestry
  - ➔ New production technologies



# BIOCOMES consortium



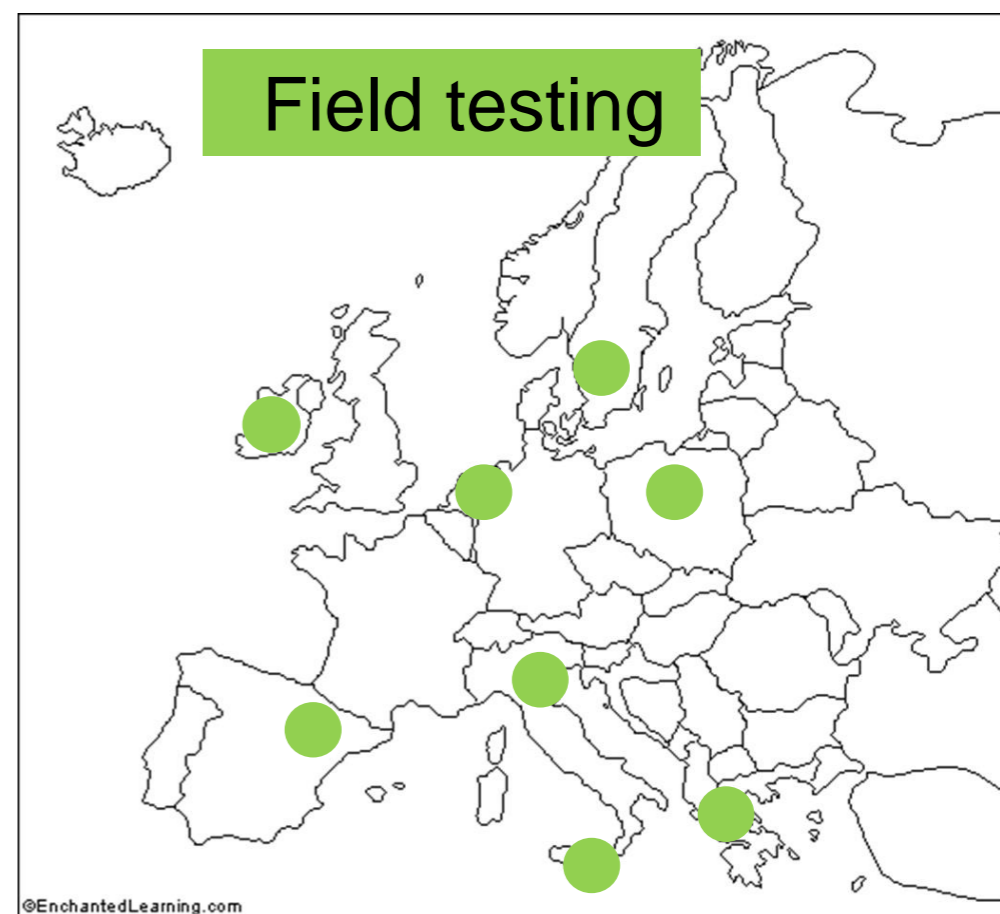
- ➔ 13 industrial partners
  - ➔ Production and marketing of BCAs 6
  - ➔ Evaluation of risk and sustainability of BCAs 2
  - ➔ Field testing of BCAs 5
- ➔ 14 research institutes and universities
- ➔ 14 countries
- ➔ Wageningen UR: project coordination & communication
- ➔ Duration: 48 months; Start: 1 December 2013

# BIOCOMES consortium

**Teams per biocontrol product**  
1 Biocontrol industry partner  
+ Partners with specific expertise  
needed

## Common infrastructure

- Field testing
- Molecular identification
- Registration issues
- Economic evaluation
- Environmental sustainability



# BIOCOMES – The targeted pests and diseases

## Arable crops

Wheat  
Powdery mildew



Rapeseed  
Verticillium wilt



Maize and wheat  
*Fusarium* spp.



Cabbage  
Cabbage moth



## Vegetables

Tomato & potato  
Tomato leaf miner  
Potato tuber moth



Vegetables  
White flies



# BIOCOMES – The targeted pests and diseases

## Fruit tree crops

Apple, pear, plum, peach, apricot, cherry

Aphids



Stone fruits

Brown fruit



## Forestry

Conifers

Large pine weevil



Various tree species

Gypsy moth



Tree seedlings

Damping off



# BIOCOMES – The biocontrol products

 Virus




 Bacteria



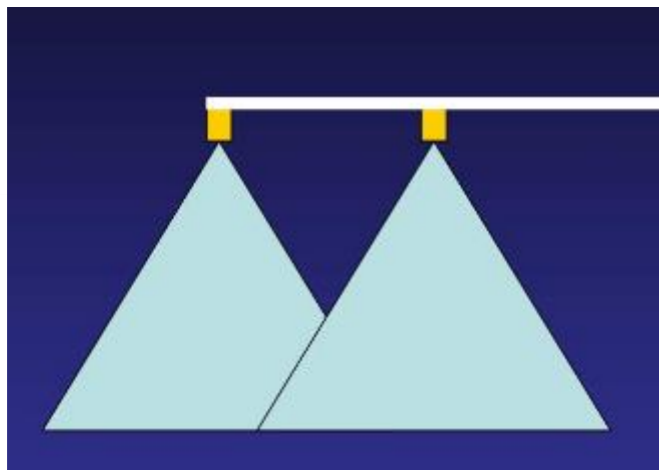
 Fungi



 Nematodes

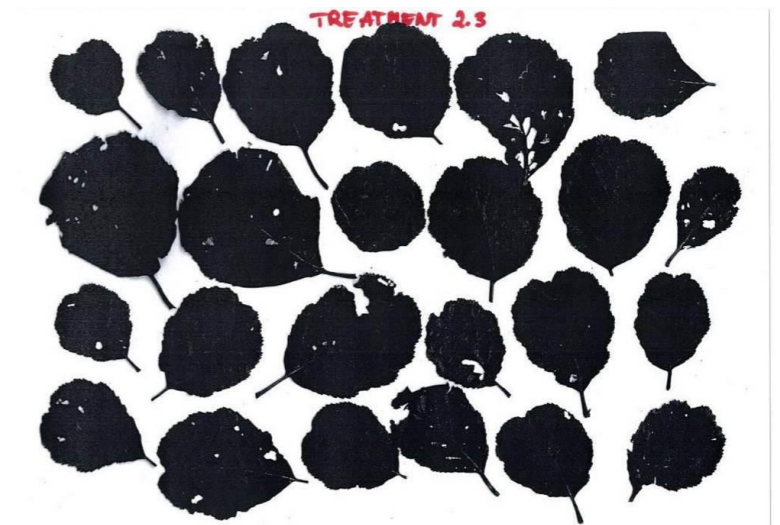
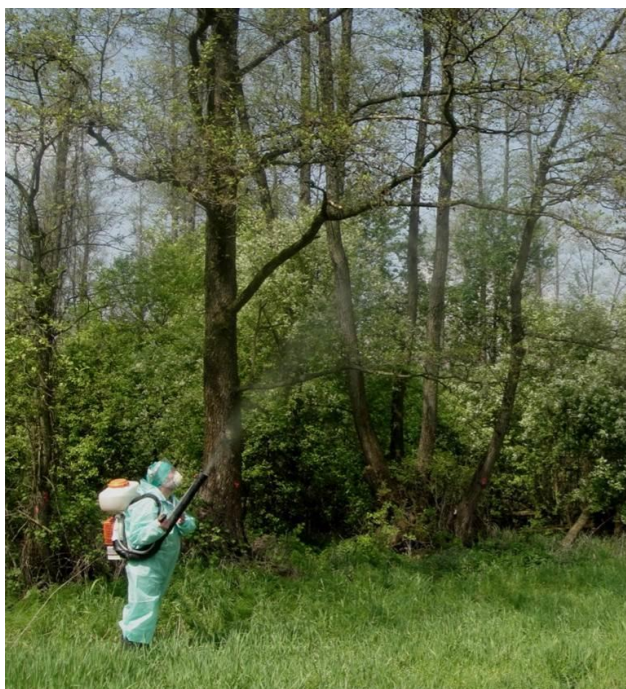


 Insects





# Gypsy moth biocontrol by LdMNPV

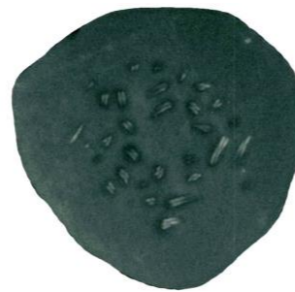


# Production technologies for entomopathogenic viruses

Gypsy moth



LdMNPV Baculovirus



*In vitro* production



## The challenges

- *Lymantria* cell lines
- Choice of bioreactor technology
- Retaining of infectivity on host insect

## Achievements

- *Lymantria* cell established
- Production parameters for cell cultures optimized

## Next steps

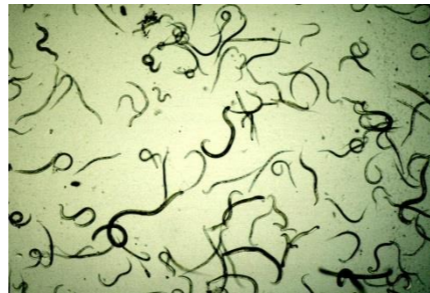
- Optimize *in vitro* LdMNPV production and yields
- Quality control
- Field testing of *in vitro* produced LdMNPV

# Production technologies entomopathogenic nematodes

Western Corn  
Rootworm



*Heterorhabditis*



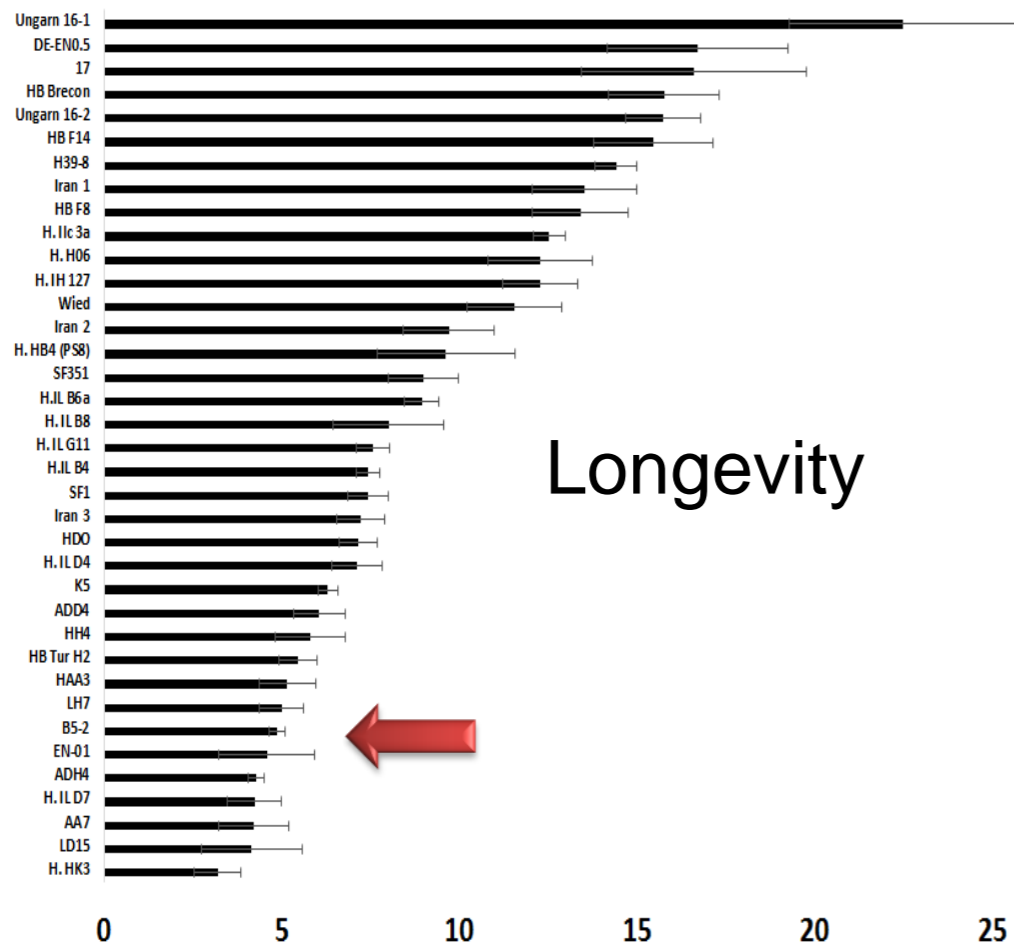
Downstream technology  
Genetic improvement of  
shelf life



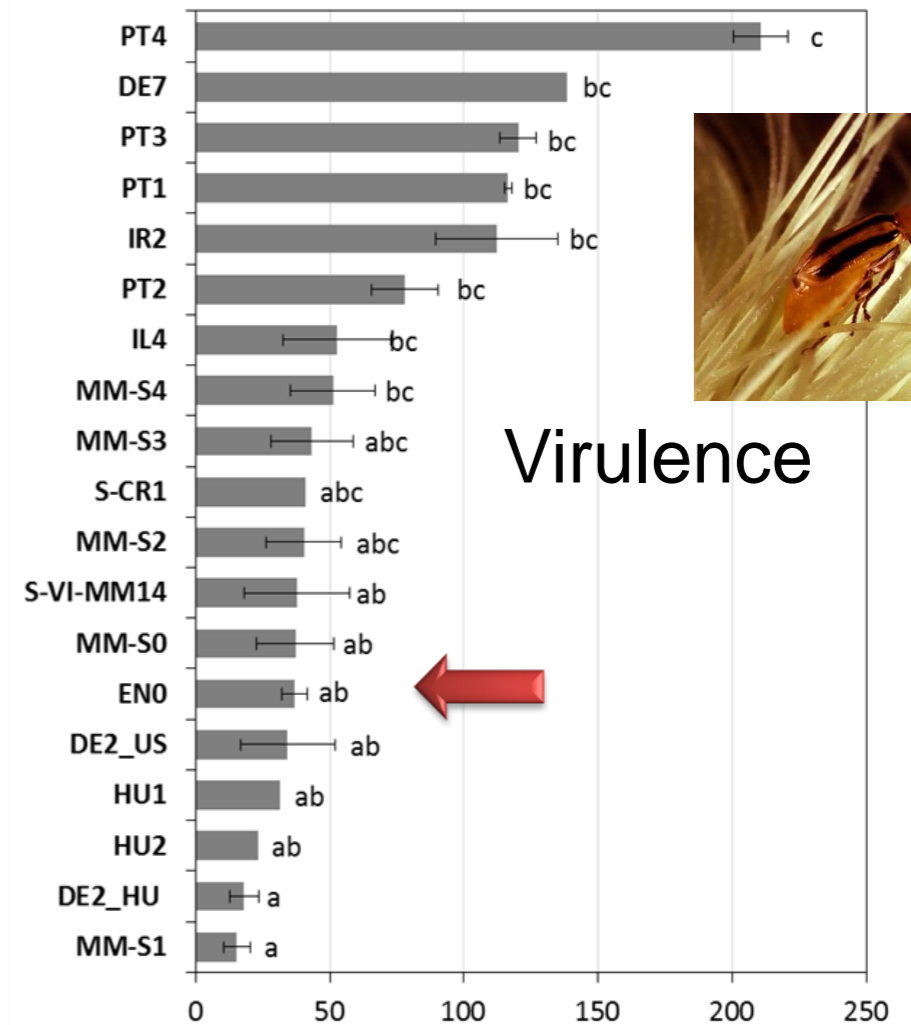
- E-nema is marketing EPN products
- BIOCOMES is investing in genetic improvement of EPNs' longevity, virulence and stress tolerance
- Improvement of shelf life and field persistence will allow use of EPN in huge markets for arable crops such as maize



# Improvement of entomopathogenic nematodes



Longevity



Virulence



Mean longevity in 70 mM H<sub>2</sub>O<sub>2</sub> (days)

Mean lethal dose (LD<sub>50</sub>)

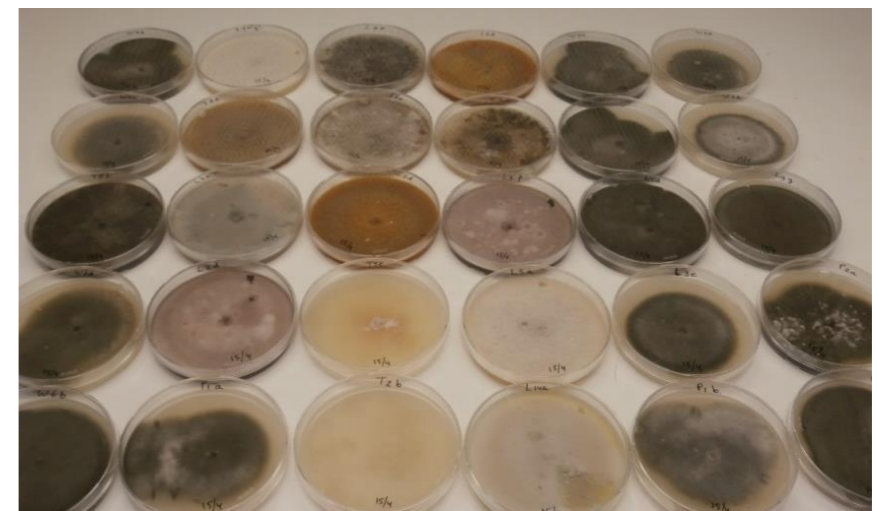
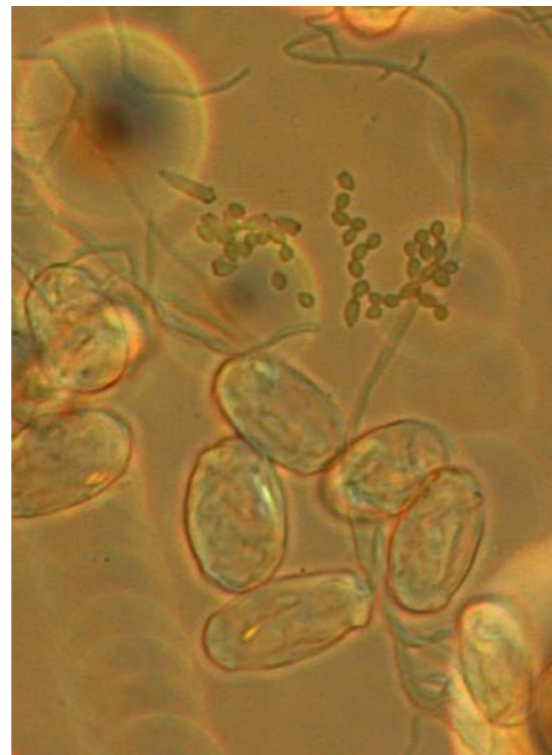
- Breeding by crossing and selection is time-consuming
- Search for molecular markers based on sequence information
- Marker-assisted selection



# Arable crops - Cereal diseases

*Blumeria graminis*  
Powdery mildew

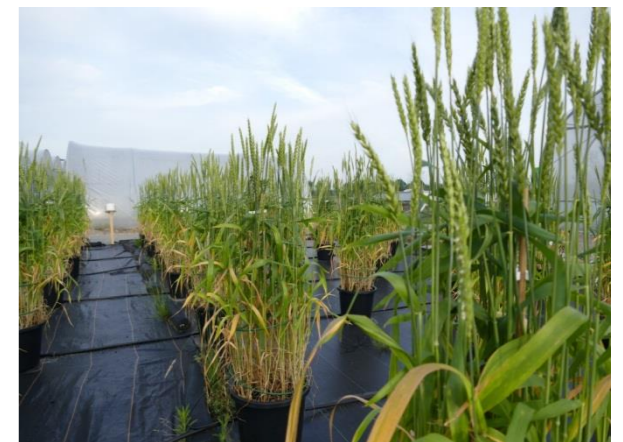
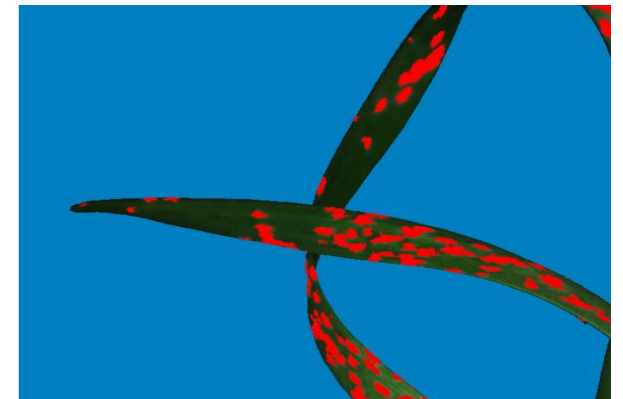
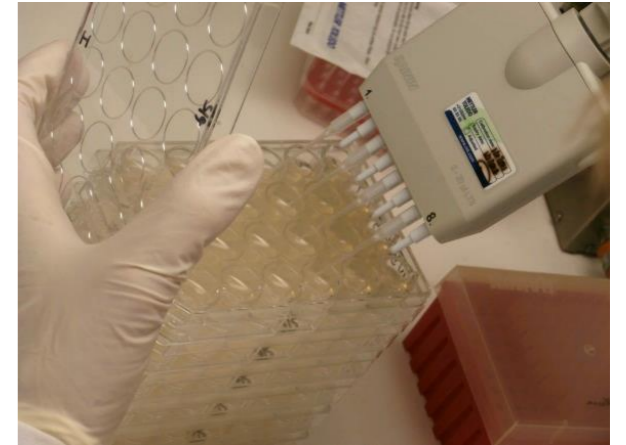
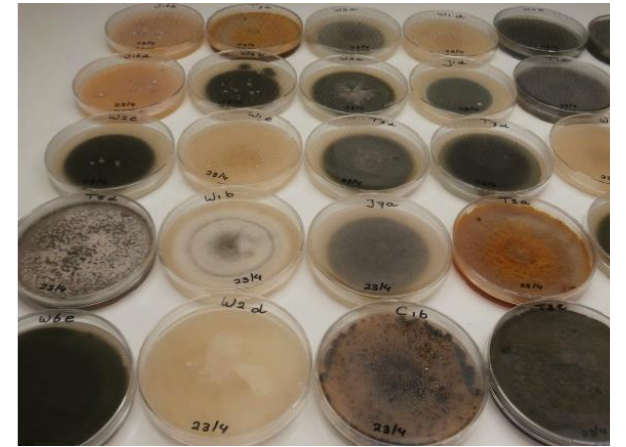
New screening of  
fungal antagonists



# Antagonist screening

## Bioassays and field tests

- 1200 fungal isolates collected from powdery mildew pustules from D, S and NL
- 1200 fungal isolates pre-screened:
  - No growth at 36°C
  - Mass production
  - Cold tolerance
  - Drought tolerance
  - UV-B resistance
- 185 fungal candidate antagonists tested in bioassays
- The 10 best isolates are tested in the field in 2016 and 2017

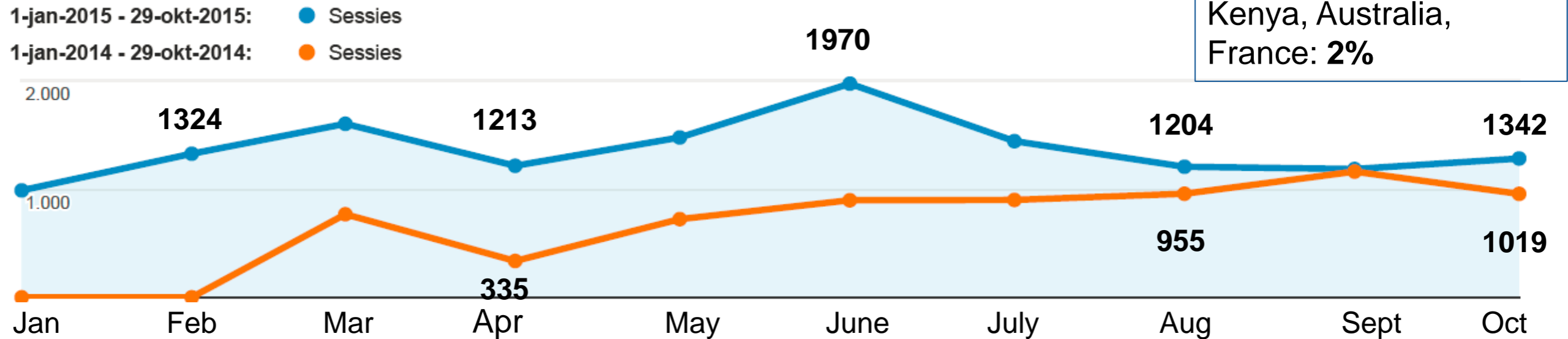


# Visits [www.BIOCOMES.eu](http://www.BIOCOMES.eu) January – October 2015 vs 2014

➔ Total visits per month in May 2016: 2130

## 2015

Russia: 12%  
US: 11%  
Netherlands: 10%  
India: 9%  
Germany: 5%  
UK: 4%  
Spain: 3%  
Kenya, Australia,  
France: 2%



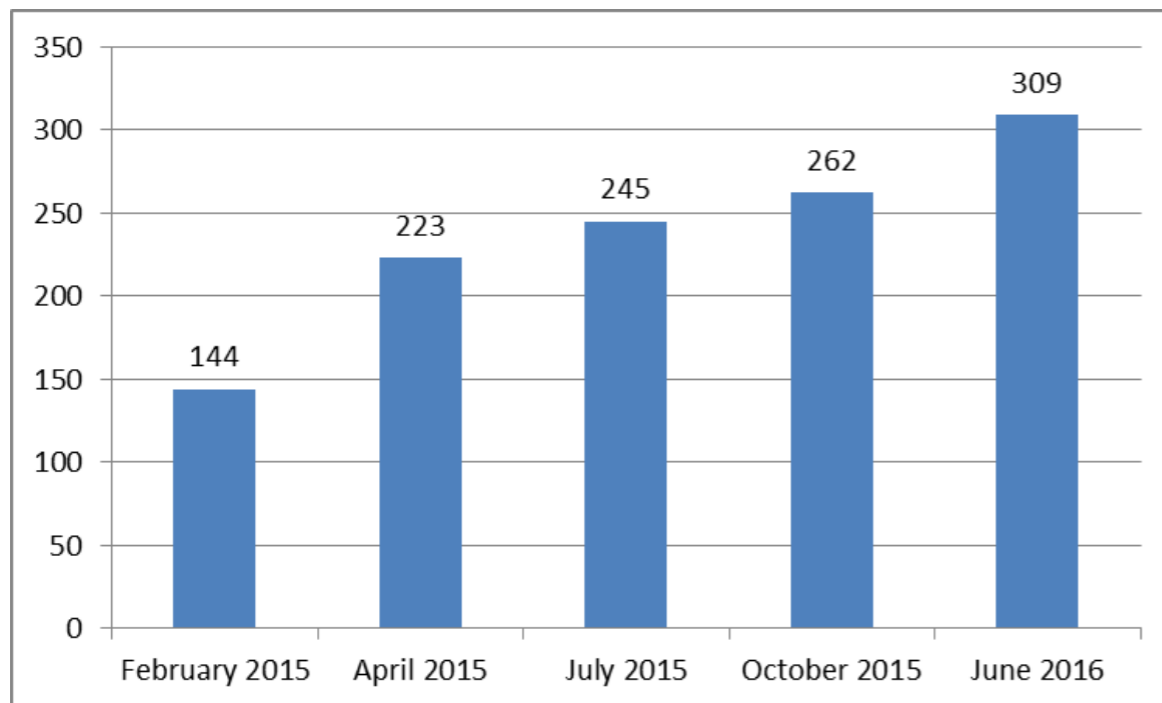
➔ Visitors come via:

- ➔ Search machines: 59%
- ➔ Referral sites: 21%
- ➔ Direct: 15%
- ➔ E-mail + Social media: 5%

# BIOCOMES newsletters

## Editions 1 - 6

### Number of subscribers



### Subscribers come from:

1. Netherlands (28%)
2. US (17%)
3. Belgium, Germany (12%)



### Preferred articles:

1. Updates
2. Slide shares
3. Company interviews





Thank you for your attention and learn more about BIOCOMES on [www.biocomes.eu](http://www.biocomes.eu)



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