

How research works for biocontrol technologies?

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Who are EUVRIN?

- ▶ European Vegetable Research Institutes Network
- ▶ Informal, voluntary organization of research institutes or departments that specialize in research, development, and extension on vegetable production
- ▶ Outdoor and protected vegetable production
- ▶ No outside funding. Admin support:



Aims of EUVRIN

- ▶ Establish and improve cooperation between vegetable R&D institutes and teams within Europe
- ▶ Promote the exchange of information on vegetable research and development
- ▶ Enhance and facilitate coordinated research, development and technology transfer, focused on aiding sustainable vegetable production
- ▶ Enhance joint bids for funding of R&D in European, International, programmes
- ▶ Conduct surveys on the changing priorities in Vegetable R&D within the participant countries
- ▶ Establish and update a research agenda and communicate it to national, European and international authorities
- ▶ *Several working groups...*

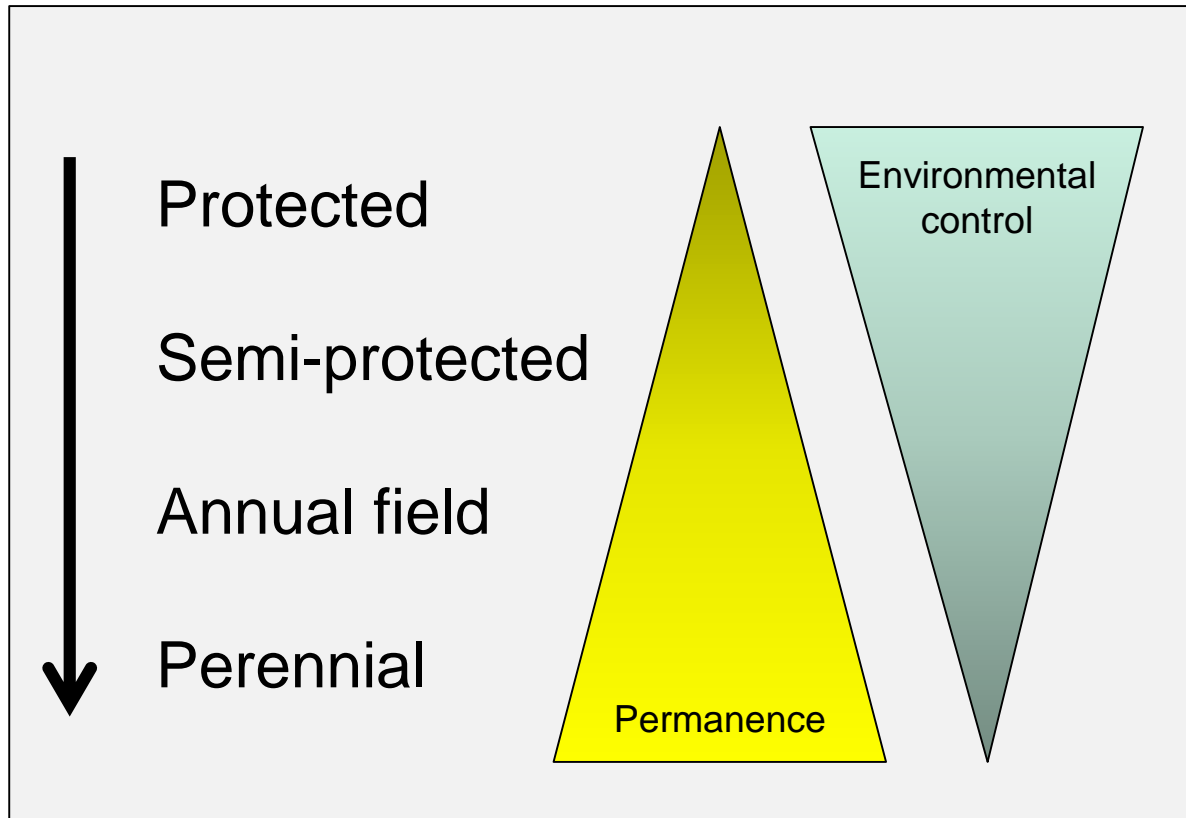
EUVRIN IPM Working Group

- ▶ Annual meetings in different locations
 - Exchange ideas and information
 - Visit facilities
 - Break-out groups

- ▶ Some of us are also IOBC WPRS members!



Diversity of cropping systems - vegetables



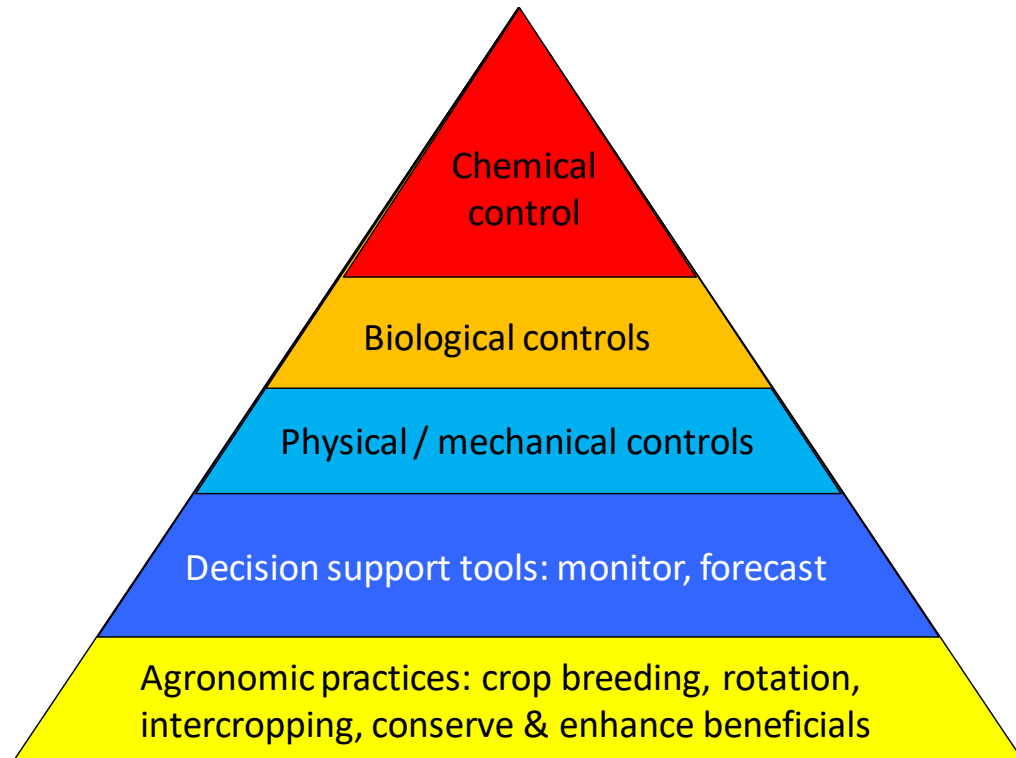
Quality is paramount!

Contaminants are unacceptable - even if beneficial insects!



Research addresses the IPM pyramid

Informed by grower needs conveyed to researchers and sometimes by workshops or focus groups e.g. *EIP-AGRI Focus Groups*



Biocontrol in greenhouses

- ▶ Protected, high value
- ▶ System developed to accommodate pollinators and avoid insecticide resistance
- ▶ **Inundative/inoculative biocontrol**
- ▶ Well-developed system, especially in tomato, but need to adapt when new problem arrives e.g. *Tuta absoluta* in late 2000s; *Nezara viridula* in early 2010s
- ▶ Biocontrol agents can need management e.g. *Macrolophus*
- ▶ Current 'new' threats include –Tomato Brown Rugose Fruit Virus (*ToBRFV*), Brown marmorated stink bug (*Halyomorpha halys*), potato & tomato psyllid
- ▶ *But* biopesticides are not always used optimally



AMBER project - **A**pplication & **M**anagement of **B**iopesticides for **E**fficacy and **R**eliability (led by Dave Chandler, Warwick UK)

Protected edible & ornamental crops

Identify where biopesticides being used sub-optimally

Develop management practices to improve biopesticide performance, grower confidence & uptake

1. Making spray application more effective: Improve grower current practices (e.g. tank washing); encourage use of reduced water volumes for more efficient spraying.
2. Biofungicide performance: use knowledge on biofungicide persistence to improve timing of application.
3. Bioinsecticide performance: use pest population models to identify optimum biopesticide application strategy.
4. Knowledge exchange: workshops on biopesticides in IPM, biopesticide application.



Biocontrol in outdoor crops – considerable challenge!

Lower value crops, no physical barriers, no environmental control

Research focuses on:

Conservation biocontrol

Hannah McGrath PhD



Waitrose



Biopesticides – including microbials and nematodes

C-IPM  Coordinated Integrated
Pest Management in Europe

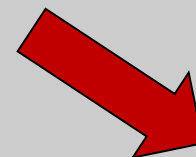


Minimising impact of insecticides and other treatments on natural enemies

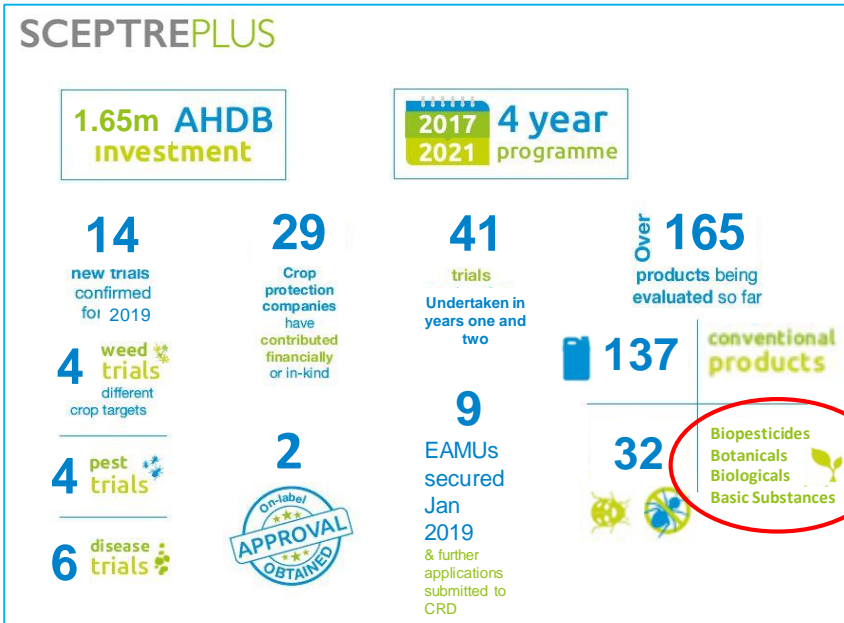
SCEPTREPLUS



New tools and approaches



New 'tools' and approaches



H2020 – SMARTPROTECT

Thematic network focusing on cross regional knowledge sharing of SMART IPM solutions for farmers and advisors.

Aim:

- Stimulate knowledge flow in the regional AKISs (Agriculture Knowledge and Innovation Systems) across the EU
- Spread the innovative potential of advanced methodologies for IPM to the EU regions in vegetable production
- 16 partners from 12 EU countries; Inagro (B) is Lead Partner'; Duration: Jan 2020 – Dec 2022



New approaches



Exploration of soil microflora for plant protection

3 projects: *AGROFILM*, *CORAL*, *BOUSSOLE*

AGROFILM (2015-2019) : For an efficient and sustainable control of the *Agrobacterium rhizogenes* hairy roots in tomato greenhouses

- Understand biofilm development → importance of the Quorum Sensing (QS, molecular way of communication & perception by bacteria)
- Find molecules preventing the development of the biofilm → screen for antagonists showing anti-QS properties
- From 1,600 isolates, found 3 anti-QS and anti-biofilm strains as good candidates for new biocontrol products



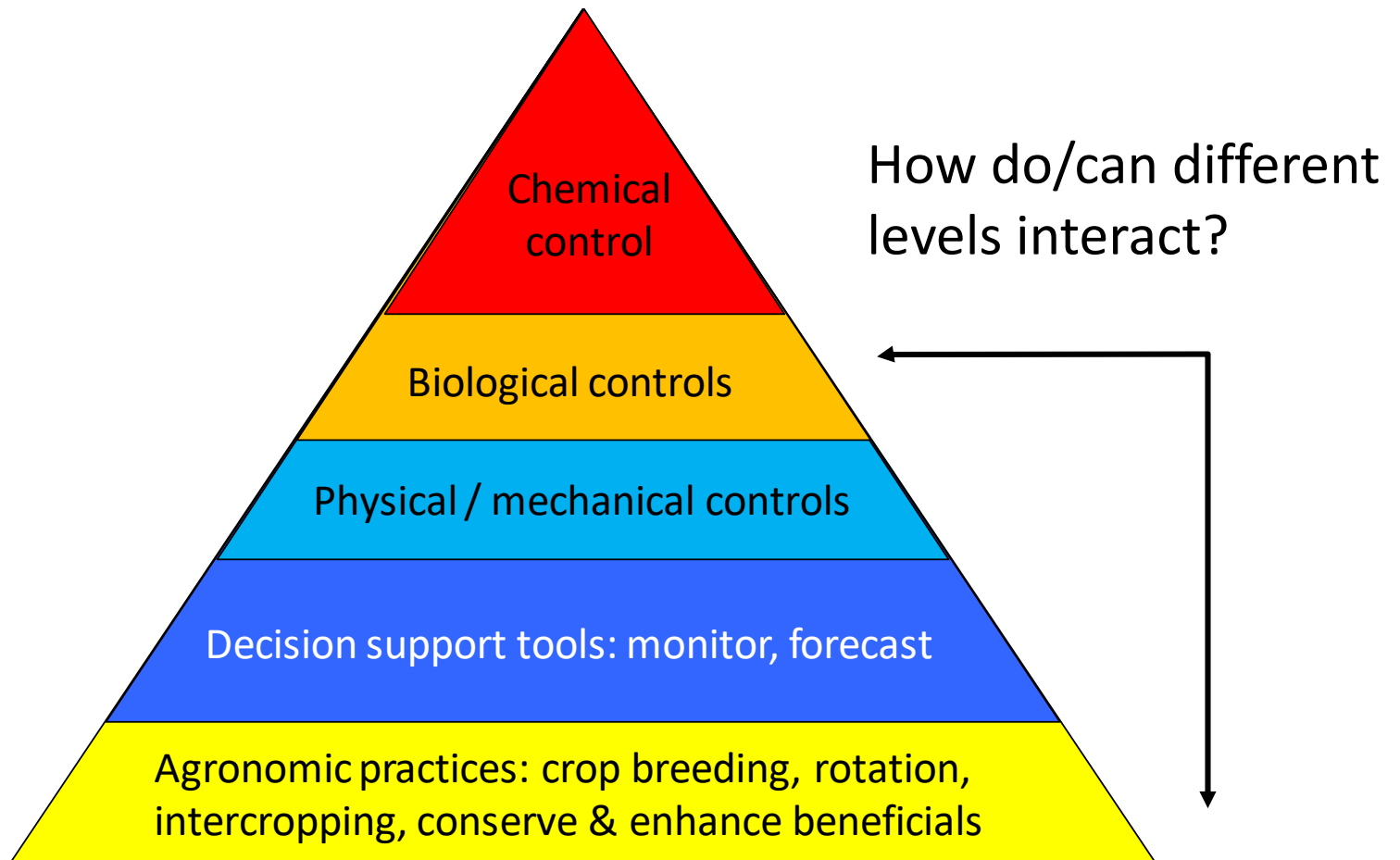
CORAL (2017-2018) : Benefit from the microbial communities to protect *Allium* species against white rot

- Soil sampling of contaminated and non-contaminated fields
- Soil physicochemical analysis and microflora characterization through metabarcoding (high through-put sequencing of micro-organisms)
- Determine the suppressive properties of non-contaminated soils
- Establish strain library of bacteria and fungi and setup of a screening process

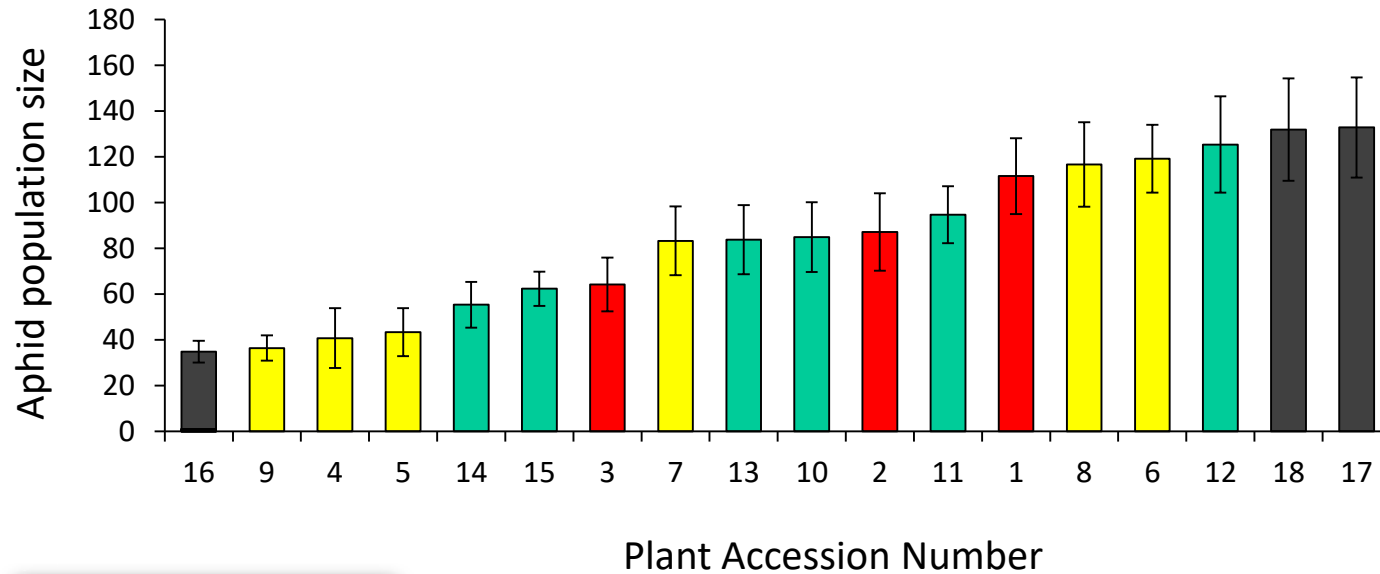


BOUSSOLE (2019-2021) : Soil biodiversity characterization of vegetable crops through bioindicators → links between biodiversity and cultural practices ?

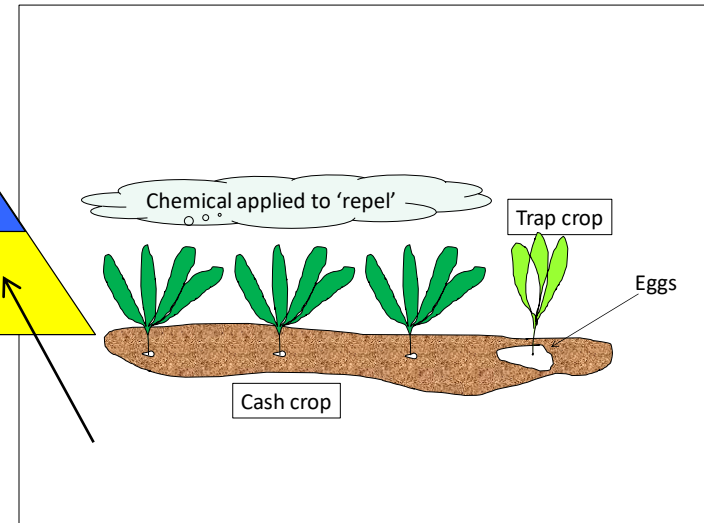
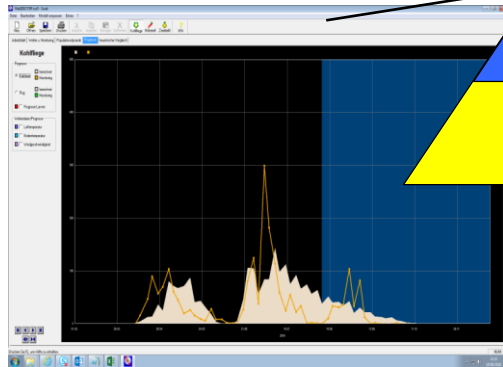
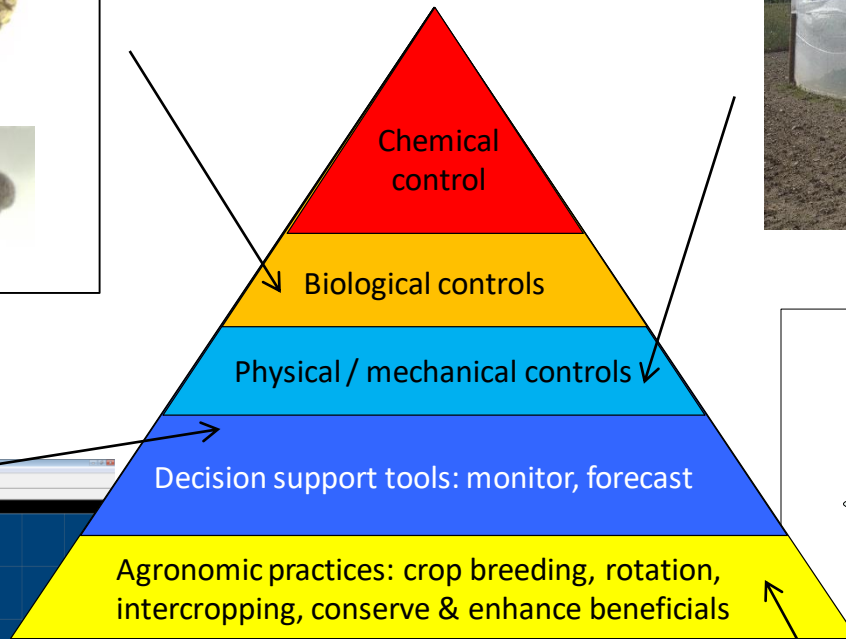
Integration...



An IPM system for aphids on Brassica: combining durable, partial crop resistance with biocontrol



Integrated control of root-feeding fly larvae infesting vegetable crops



EIP-AGRI Focus Group on IPM in *Brassica* EUVRIN break outs

Where are the priorities?

- ▶ Control strategies with less side effects on beneficials. Existing knowledge about side effects could be exploited further
- ▶ New and emerging pests and diseases and climate change
- ▶ Exploiting soil microbiome diversity to prevent/control soil-borne diseases
- ▶ Reliable, cost effective and simple monitoring and decision support systems
- ▶ Very little effort is being made to breed for pest resistance
- ▶ More applied research is needed on plant defence elicitors
- ▶ Need to understand which crops and wild hosts are reservoirs for pests and diseases
- ▶ Functional biodiversity is not easy to implement and manage



Thank you:

- ▶ Colleagues – including Sarah Danan (Vegenov); Rob Jacobson, Hannah McGrath (Reading, Rothamsted Research), Dave Chandler (Warwick)
- ▶ The EUVRIN ‘team’
- ▶ Admin support:
- ▶ Funders
- ▶ Growers
- ▶ For the invitation to speak
- ▶ For listening!

