

IPM in Brassica vegetables and oilseed rape: challenges and opportunities

EIP focus group IPM in Brassica

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The European Innovation Partnership (EIP) „Agricultural Productivity and Sustainability“

Demand driven innovation under the EIP-AGRI



European Innovation Partnership

Rural Development

- **Funding for setting up of an "Operational Group"**: farmers, advisors, agribusiness, researchers, NGOs, etc. planning an innovation project (Art 35)
- **Project funding** for the Operational Group's project (Art 35). This co-operation could be combined with other measures (investment, knowledge transfer, advice)
- Supporting **innovation support services**



Horizon 2020

- Research projects, including on-farm experiments to provide the knowledge base for innovative actions
- Interactive innovation formats such as **multi-actor projects and thematic networks** genuinely involving farmers, advisors, enterprises,.... "all along the project"

Focus groups

(Focus groups form part of the **networking function** of the EIP: up to 20 experts - typically: scientists, farmers, advisors)

Focus on practical knowledge in a particular field, and where to get that knowledge, organised in 4 strands:

1. Take stock of the state of the art of practice (list of best practices), listing problems and opportunities
2. Take stock of the state of the art of research, summarizing possible solutions to the problems listed (incl. list of useful projects with the contacts)
3. Identify needs from practice: dissemination and propose further research where needed
4. Propose priorities for innovative actions, e.g. list of ideas for future interactive OG projects

Focus Groups 2013 - 2014

May 2013

1. Organic farming - optimizing arable yields
2. Protein crops
3. Animal husbandry – reduction of antibiotics use in the pig sector

Sept 2013

4. Genetic resources co-operation models
5. Soil organic matter content in Mediterranean regions
6. **Integrated pest management (IPM) – Brassica**

March 2014

7. High Nature Value (HNV) farming profitability
8. Mainstreaming precision farming
9. Profitability of permanent grassland
10. Fertiliser efficiency – focus on horticulture in open field

September 2014

11. Soil-borne diseases
12. Ecological Focus Areas
13. Short food supply chains

Tasks of the focus group IPM in Brassica

- Identify (types of) pests and diseases relevant for Brassica for different EU regions;
- Compare methods between different specialty crops and, particularly, between specialty crops and rapeseed;
- Compare existing IPM methods from the cost-effectiveness point of view.
- List ongoing IPM experiments for Brassica
- List existing IPM practices for Brassica and indicate where improvement is needed
- Needs for further research
- Priorities for innovative actions

Integrated Pest Management (IPM)

- Broad-based approach in which all available pest control techniques are considered in order to grow a healthy crop with the least possible disruption to agro-ecosystems.
- IPM is based on accurate pest identification and typically includes regular crop monitoring to determine if, when and what treatments are needed for effective control.
- Emphasis is given to preventive measures
- Preference for non-chemical control measures
- Chemical pesticides selected for minimal harm to people and environment + anti-resistance strategies
- General principles: Directive 2009/128/EC, Annex III

Most important Brassica species in Europe

Oilseeds – 6 million ha

- Oilseed rape (*B. napus*)
- Turnip rape (*B. rapa*)

Brassica vegetables – 430 000 ha

- White cabbage
- Cauliflower
- Broccoli

Diseases of oilseed rape

Type of diseases

- Soil borne or surviving on crop debris
- Their importance increases due to narrow rotations and tendency to no-tillage
- Similar diseases throughout Europe



Club root
Plasmodiophora



White mould
Sclerotinia



Verticillium
wilt



Phoma stem
canker/black leg



Light leaf spot
Pyrenopeziza

Current control strategies

- Resistant varieties
- Fungicides
- Very little IPM (farmers have no incentives)

Problems

- Newly emerging diseases (mainly in the UK)
 - White leaf spot
 - Olpidium brassicae
- Resistance is not stable
 - Clubroot/Black leg/Light leaf spot
- Fungi become resistant to fungicides
 - Sclerotinia
 - Pyrenopeziza (Light leaf spot)

Pests of oilseed rape

At emergence and young plants

- Cabbage root fly (Delia)
- Flea beetle (Phyllotreta)
- Cabbage stem flea beetle (Psylliodes)
- Cabbage stem weevil (Ceutorhynchus)



Flower buds

- Pollen beetle (Meligethes)



Flowering

- Cabbage seed weevil



Pods

- Brassica pod midge (Dasineura)
- Cabbage aphid (Brevicoryne)



Current control strategies

- Insecticides
 - Seed treatments with neonicotinoids
 - Foliar sprays, mainly with pyrethroids

Problems

- Recent ban on neonicotinoid seed treatments in oilseed rape
- Resistance to pyrethroids in pollen beetle and stem flea beetle

Opportunities for biocontrol in oilseed rape

Available

- Biological control of Sclerotinia
- Not widely used because considered too expensive and complicated to apply

Needs

- (Alternative) control strategies for Clubroot/Blackleg/Light leaf spot/Verticillium wilt
- Alternative control strategies for insect pests, mainly pollen beetle (entomopathogenic fungi?) and stem flea beetle
- Seed treatments

Diseases on Brassica vegetables

Types of diseases

- Large differences in key diseases among crops and regions
- Club root key problem in most European countries
- Leaf pathogens

downy mildew: mainly in nurseries

Alternaria: mainly in Southern countries

Mycosphaerella: key problem on cauliflower in France

Xanthomonas: widely occurring

Viruses: mainly in the UK



Downy mildew



Alternaria



Mycosphaerella



Xanthomonas

- Postharvest pathogens: problematic in some countries

Emerging diseases

- Fusarium avenaceum on cabbage in Poland
- Light leaf spot

Control strategies

- More IMP than in OSR (certification schemes drive IPM)
- Resistant varieties used when available
- Fungicides widely used because cheap and effective
- Biological control regularly applied against Sclerotinia and Rhizoctonia (Contans, Trichoderma)

Opportunities for biocontrol products

Problems

- Fungicide resistance
 - Sclerotinia and Pyrenopeziza
- Not many fungicides registered for minor crops
- Limited choice in resistant varieties
- Clubroot resistance not stable

Needs

- Products that can be used at the last stages of vegetable production

Opportunities

- Application of biocontrol agents in nurseries

Pests on Brassica vegetables

Major pests

- Cabbage root fly
- Lepidopteras
- Spodopteras in Southern countries
- Aphids
- Swede midge (Contarinia)



Oilseed rape pests

- Oilseed rape serves as a green bridge for pests (and diseases) in Brassica
- Pollen beetle, cabbage root fly, white fly

Slugs

Control strategies

- Biological control
 - Bacillus thuringiensis against Lepidoptoras and Spodoptera
- Insecticides
 - Spinosad seed treatments/ drenches against cabbage root fly
 - Pyrethroids
- Naturally occurring parasitoids
 - Control aphids

Problems

- Presence of oilseed rape
- Insecticides
 - Broadspectrum insecticides such as pyrethroids and Spinosad have side-effects on beneficials
 - Resistance against pyrethroids in white fly and Spodoptera

Opportunities for biocontrol against Brassica pests

Needs

- Alternative control strategies with less side effects on beneficials (mainly for cabbage root fly)
- Effective control strategies for white fly
- Effective control strategies for slugs

Acknowledgments

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