Innovative diagnostic tools and precision spraying

Exploitation of innovative technologies for implementing crop protection strategies.
- Putting the bricks together to build a crop protection system

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**Overview**

Innovative techniques for monitoring environmental data, weeds, beneficials, pests and diseases

- Macro-scale monitoring followed by micro-scale monitoring
- Monitoring in pre-symptomatic phase

**Examples**

- Vision techniques
- Detecting volatiles
- Detecting sounds
- Sensors
- Molecular and serological techniques

**Innovative biological/alternative control**

**Innovative precision application techniques**
Innovative techniques for monitoring: vision
Innovative techniques for monitoring: vision

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for quality of life
Innovative techniques for monitoring: volatiles

All (!) plants produce volatiles when they are attacked by fungi or insects:

  Quantitative: the heavier the attack the more is produced
  Qualitative: specific products are produced

These volatiles can be measured using GC-MS/e-noses
Innovative techniques for monitoring: volatiles

principles of sex pheromones

detecting  source locating  landing
Innovative techniques for monitoring: volatiles
Innovative techniques for monitoring: serological
Innovative techniques for monitoring: molecular

Quality of diagnosis and new diagnostic methods for plant pests; current status and future prospects.
Innovative biological / alternative control

- Use vacuum cleaner: developed to suck up insects
- Laser beam killing
- UV treatment
- Biological control agents (Trichogramma against ECB)
- Stimulation of AMF
- Control of weeds by burning, high pressure air, finger hoeing
- Control using pheromones:
  - Mating disruption
  - Mass trapping
  - Lure and kill
Innovative biological / alternative control

Mating disruption
Mass trapping
Innovative biological / alternative control

Lure and kill
Innovative precision application techniques

Spray application

With high precision to reduce the spread of agrochemicals to the surroundings while obtaining good biological efficacy:

Examples:

- Pesticides can be automatically applied using programmed spray volumes and required doses of pesticides in combination with a GPS system and a spraying robot
- Canopy density dependent spraying
- Precision spraying combined with vision technology (for individual weed plant control)
Innovative precision application techniques

Precision spray technology
Innovative precision application techniques
Conclusions

Innovative monitoring techniques and precision spray techniques have potential for practical use, but still a lot of research is required before they can be implemented in an innovative crop protection system.

Whether the innovative techniques will be implemented in the future depends on several factors such as the context in which the farmer is going to operate i.e. the development of markets, public concern on pesticide use and policy making in general.