endure

diversifying crop protection

FOOD QUALITY AND SAFETY

SIXTH FRAMEWORK PROGRAMME

ACTA

Agroscope Changins-Wädenswil Research Station ACW
Agroscope Liebefeld-Posieux Research Station ALP
Agroscope Reckenholz-Tänikon Research Station ART

Consiglio Nazionale delle Ricerche

Danish Agricultural Advisory Service

bba Biologische Bundesanstalt für Land- und Forstwirtschaft

CIRAD

IBMA International Biocontrol agent Manufacturers' Association

IHAR

INRA

INRA Transfert Filiale de l'INRA

Universitat de Lleida

ROTHAMSTED RESEARCH

Scuola Superiore Sant'Anna di Studi Universitari e di Perfezionamento

Szent István University

WAGENINGEN UR For quality of life

RA22 Innovative technologies

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

Carolien Zijlstra, PRI

November 2010, Paris

RA22 Innovative technologies

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

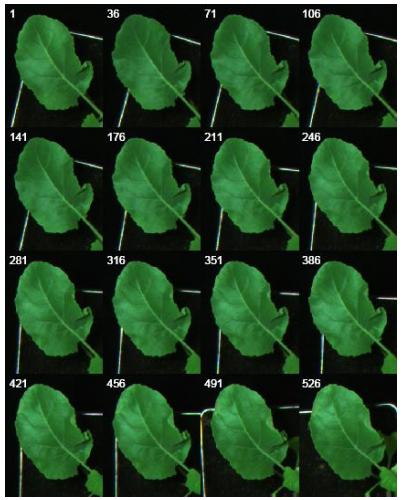
Examples

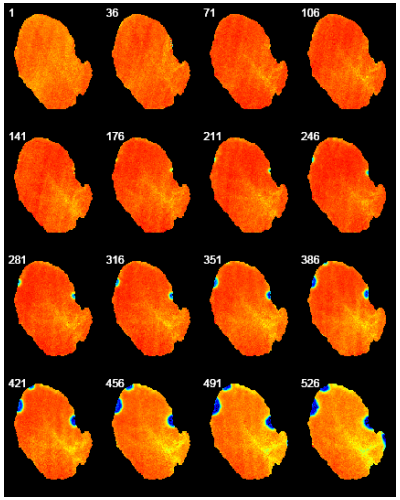
- Vision techniques
- Detecting volatiles
- Detecting sounds
- Sensors
- Molecular and serological techniques

Innovative biological/alternative control

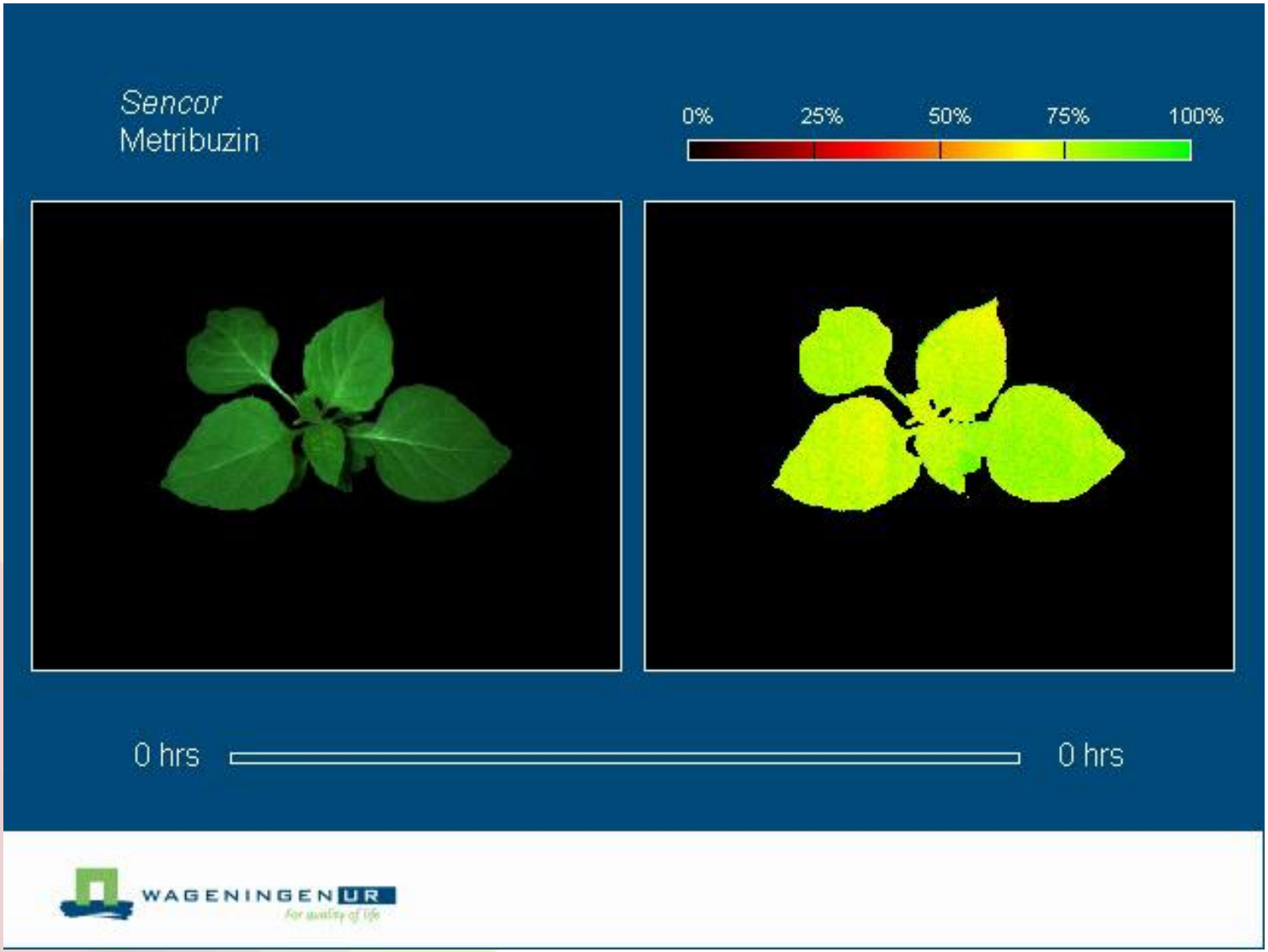
Innovative precision application techniques

Innovative techniques for monitoring: vision



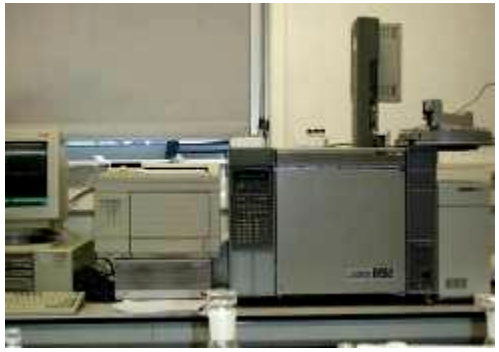


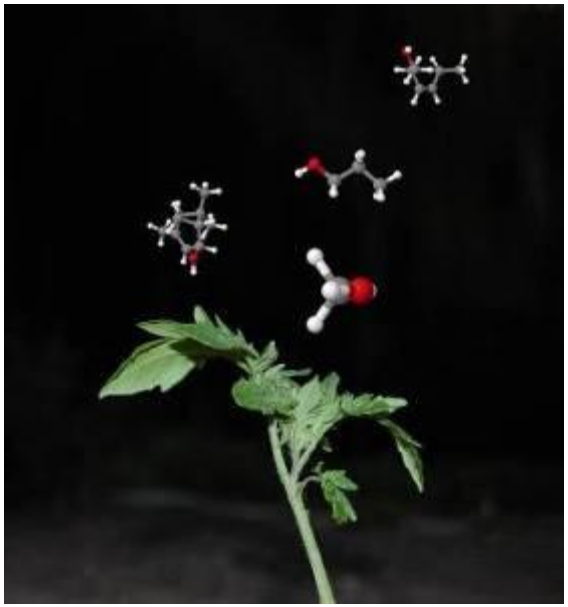
Innovative techniques for monitoring: vision



Innovative techniques for monitoring: volatiles

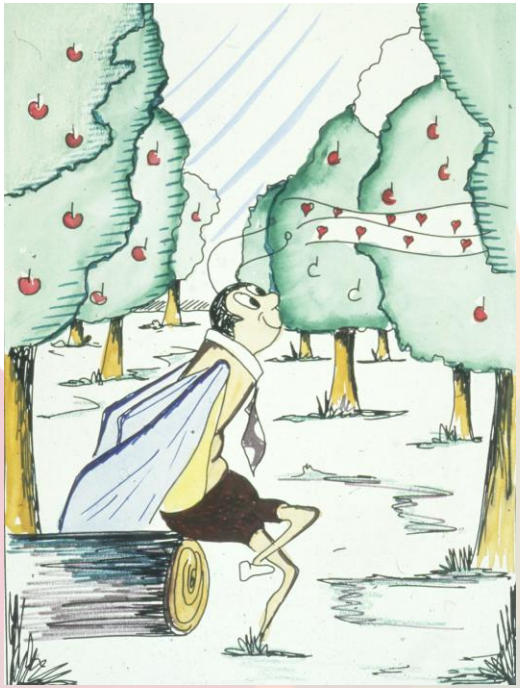
- **All (!) plants produce volatiles when they are attacked by fungi or insects:**
  - Quantitative: the heavier the attack the more is produced
  - Qualitative: specific products are produced
- **These volatiles can be measured using GC-MS/e-noses**





Innovative techniques for monitoring: volatiles

principles of sex pheromones

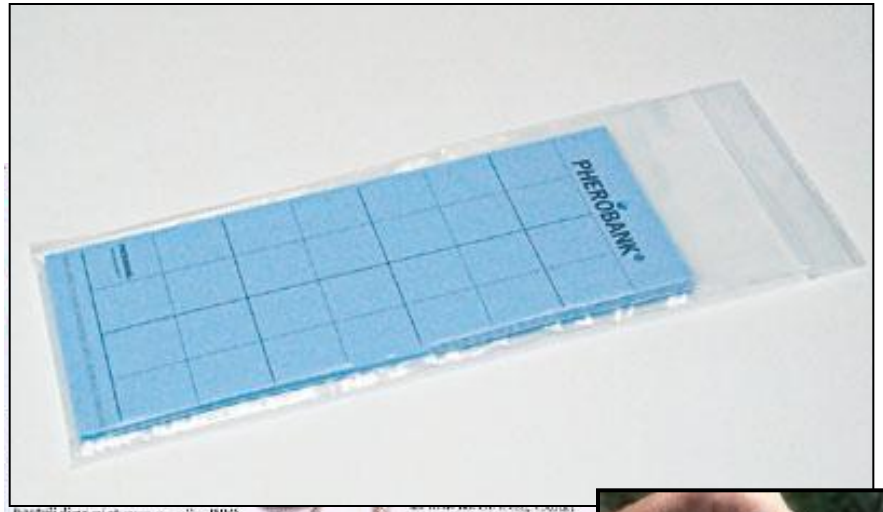


detecting

source locating

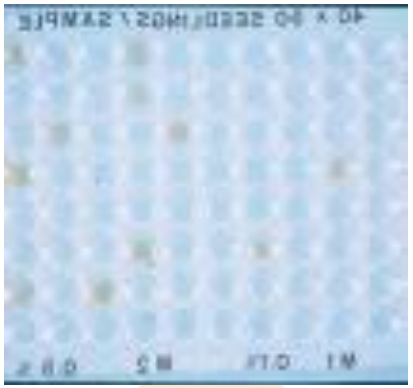
landing

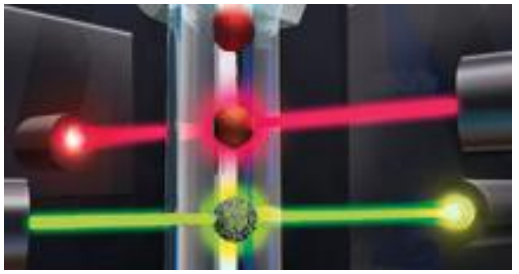
Innovative techniques for monitoring: volatiles

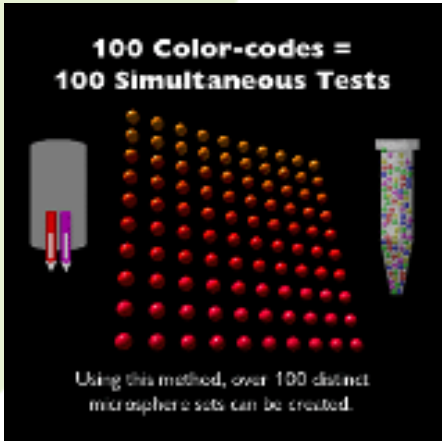



bestrijding niet mee en zijn PPO.
gy en PRI op zoek naar een andere
aanpak. Met is een geleide bestrijding
geworden, waarmee niet de ritnaald maar
de kniptor wordt opgespoord en bestreden.

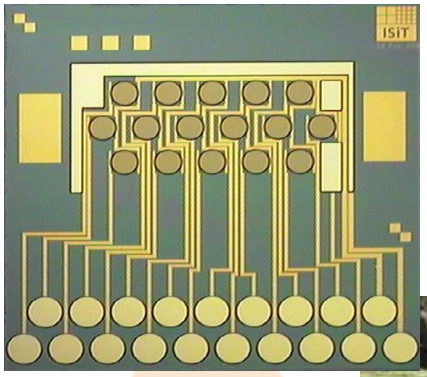
Innovative techniques for monitoring: serological

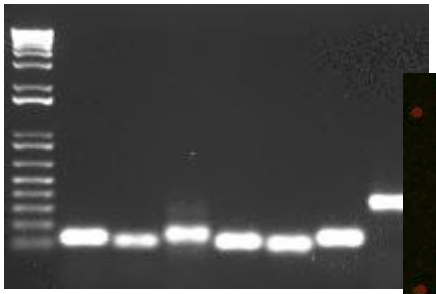


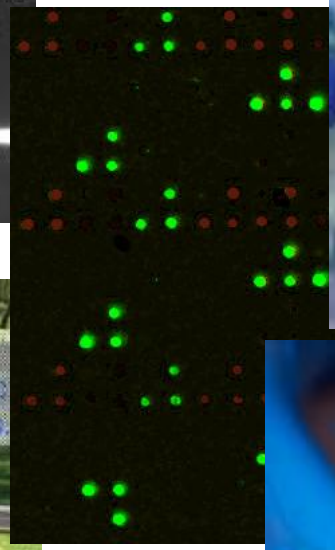


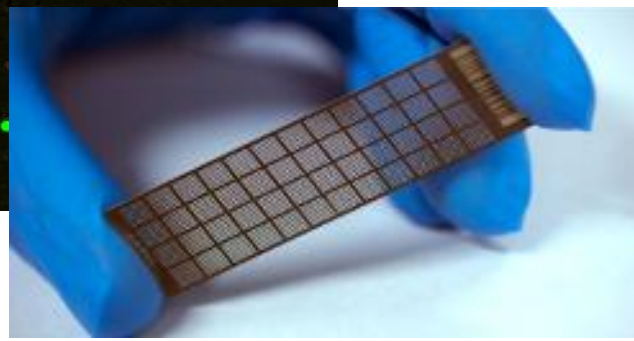


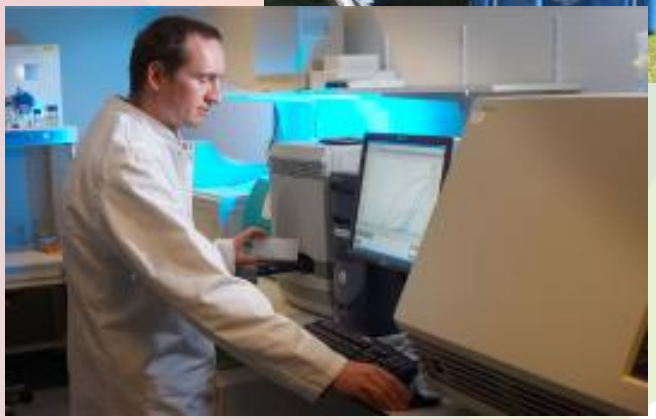
Innovative techniques for monitoring: molecular











Innovative biological / alternative control

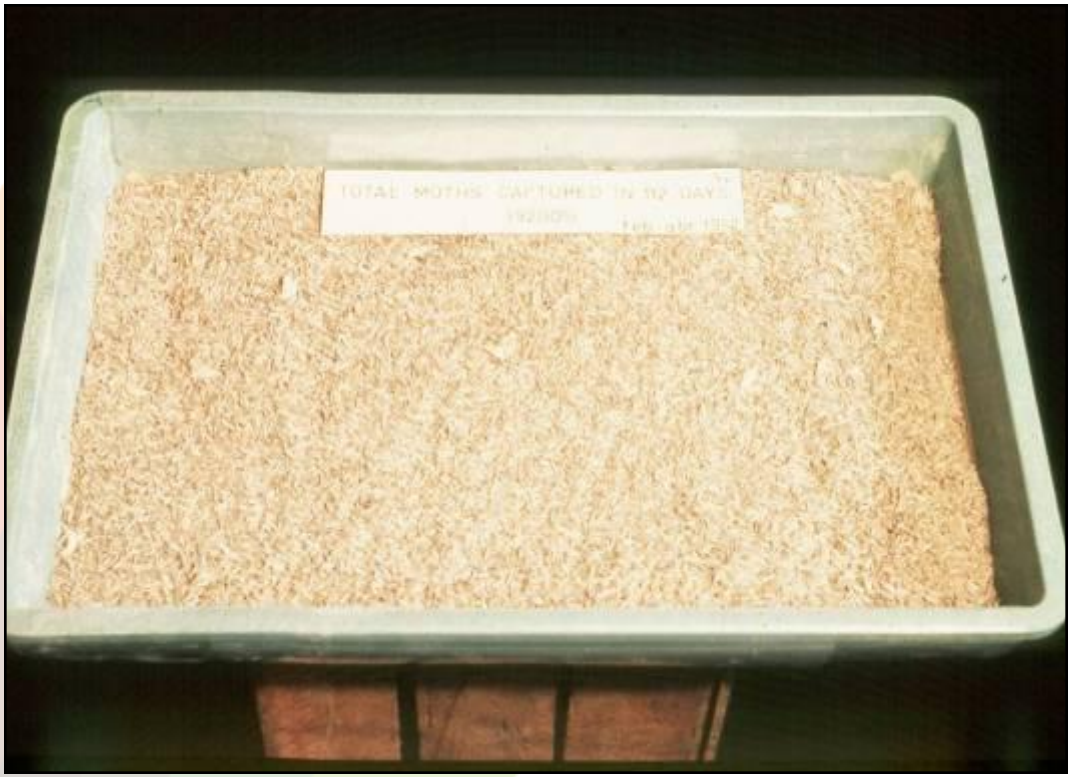
- Use vacuum cleaner: developed to suck up insects
- Laser beam killing
- UV treatment
- Biological control agents (Trichogramma against ECB)
- Stimulation of AMF
- Control of weeds by burning, high pressure air, finger hoeing
- Control using pheromones:
  - Mating disruption
  - Mass trapping
  - Lure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

Innovative biological / alternative control

Mating disruption

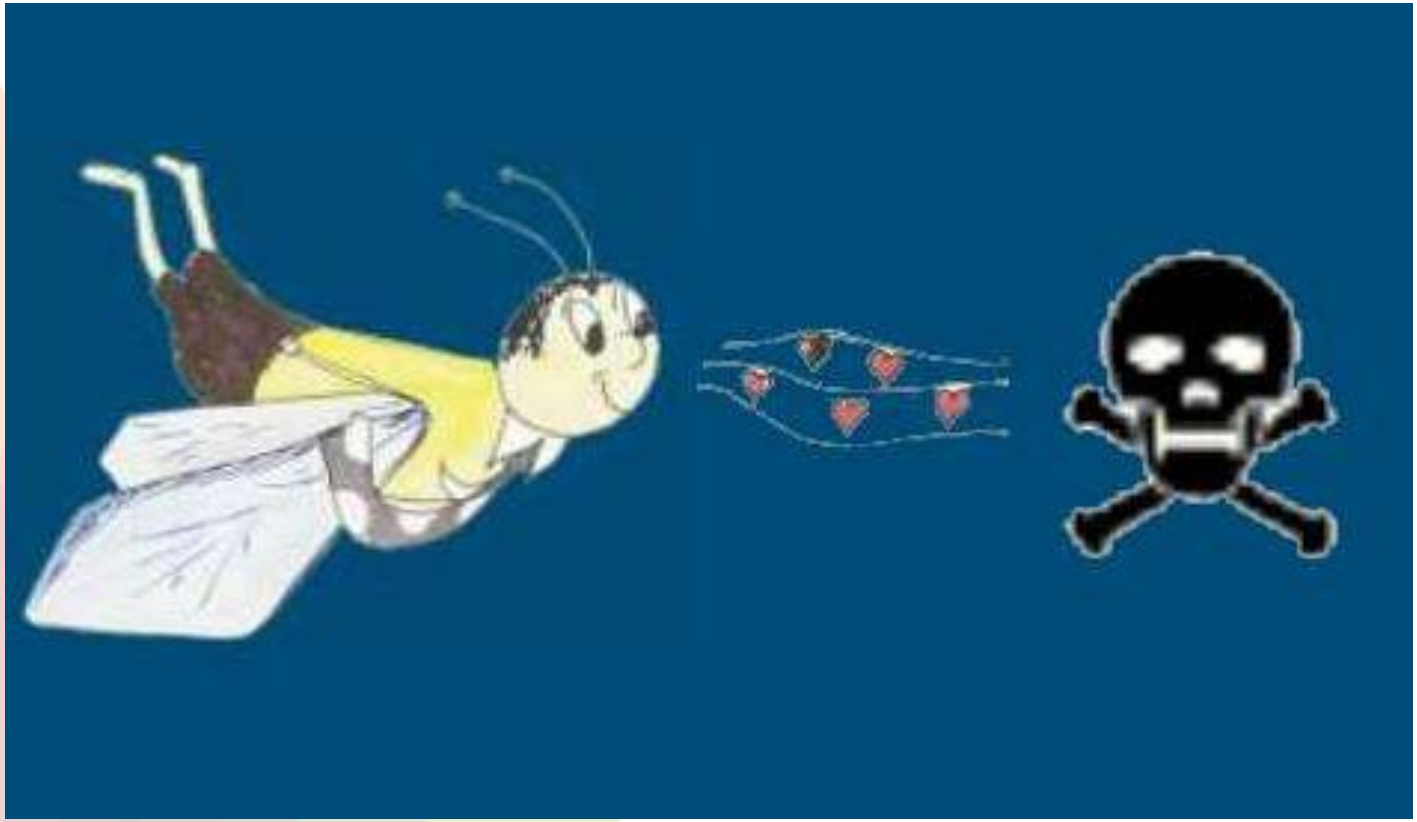
Innovative biological / alternative control

Mass trapping



Innovative biological / alternative control

Lure and kill



Innovative precision application techniques

Spray application

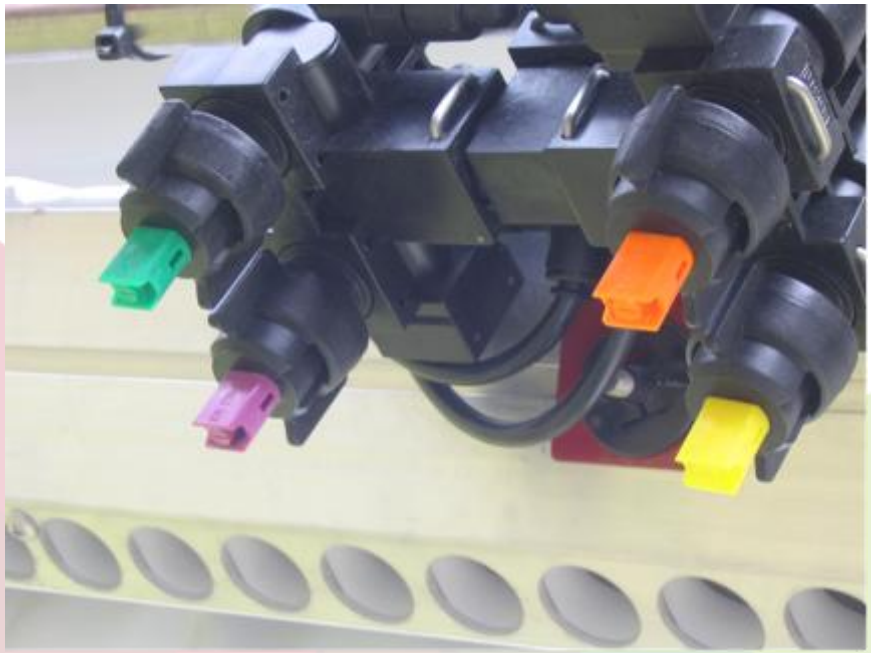
With high precision to reduce the spread of agrochemicals to the surroundings while obtaining good biological efficacy:

Examples:

- Pesticides can be automatically applied using programmed spray volumes and required doses of pesticides in combination with a GPS system an 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

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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.**