

1st COST CONFERENCE
and
**MANAGEMENT
COMMITTEE MEETING**
COST Action FA1404 (COREMI)

28th - 29th May
2015
FOGGIA, Italy

**LESSONS TO BE LEARNED
FROM IPM IN HORTICULTURE**
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Directive 2009/128/EC on Integrated Pest Management (IPM)

The directive establishes a framework to achieve a **sustainable use of pesticides** by reducing the risks and impacts of pesticide use on **human health** and the **environment** and promoting the use of integrated pest management and of alternative approaches or techniques such as **non-chemical alternatives** to pesticides.

Remark:

In horticulture, IPM is motivated, not just by environmental or human health concerns, but mainly by **economic and practical reasons** like resistance management or protection of introduced pollinators.

IPM definition (FAO/EU)

Integrated Pest Management (IPM) means the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that **discourage the development of pest populations** and keep pesticides and other interventions to levels that are **economically** and **ecologically** justified and **reduce or minimize risks to human health and the environment**. IPM emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystems and **encourages natural pest control** mechanisms.

National Action Plan (NAP): what is needed to implement IPM

1. Training and authorization of professional users of pesticides
2. Restrictions for sales of pesticides
3. Information on the risks of pesticides
4. Inspection of pesticide application equipments
5. Prohibition of aerial pesticide sprayings
6. Protection of aquatic environments and drinking water sources
7. Restricted use of pesticides in public areas
8. Measures to prohibit dangers of pesticide handling to people and environment
9. Measures to promote low-pesticide input pest management: IPM and organic farming
10. Harmonised risk indicators shall be established

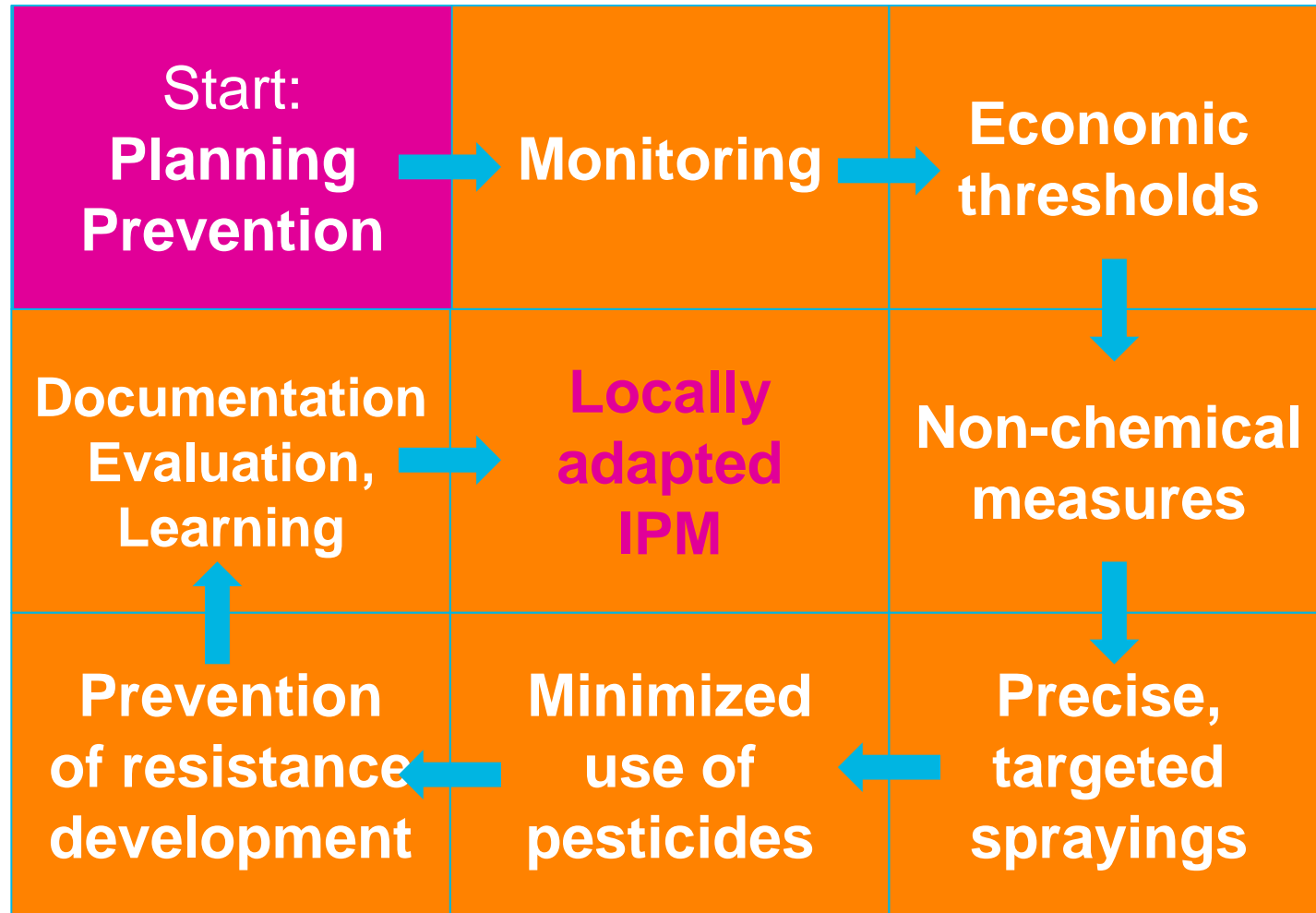
From NAP framework to practical IPM – how to proceed?

What are the “measures to promote low-pesticide input pest management”?

What could be applied in layer houses to control the poultry red mite?

- ✓ Examples and comparisons with current IPM in horticulture in northern Europe
- ✓ Applications for management of poultry red mite

IPM elements applied in horticulture



IPM elements: horticulture / poultry (PRM)

Horticulture

Start: Planning & Prevention

Poultry (PRM)

- ✓ Soil improvement, new substrates, crop rotation
- ✓ Avoid sources of infestation, e.g. alternative cultivated and weed host plants of pests
- ✓ Healthy, certified plant/seed materials
- ✓ Other preventive methods: logistics, removing plant waste, use of insect nets, etc.
- ✓ **Hazard analysis of critical check points HACCP**
- ✓ Construction of layer houses: avoiding mite-friendly structures (crevices, cavities, loose joints, etc.)
- ✓ Cleaning, disinfection, heating
- ✓ Eliminate sources of infestation, e.g. bird nests
- ✓ Healthy, mite-free new flock
- ✓ Other preventive methods: logistics, inspections, sanitation
- ✓ **Hazard analysis of critical check points HACCP**

IPM elements: horticulture / poultry (PRM)

Horticulture

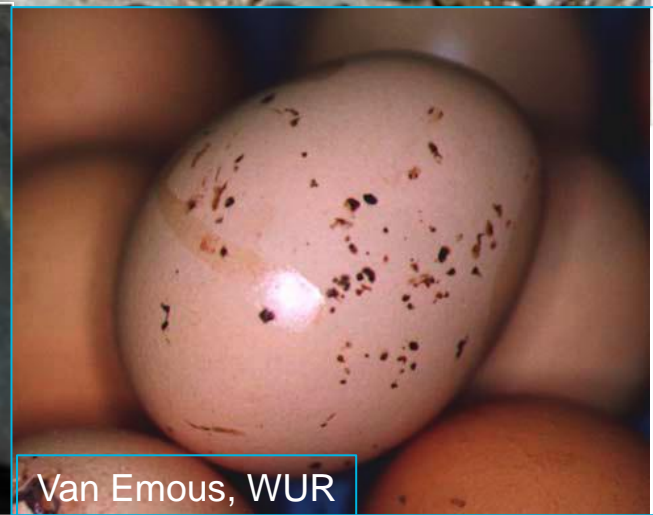
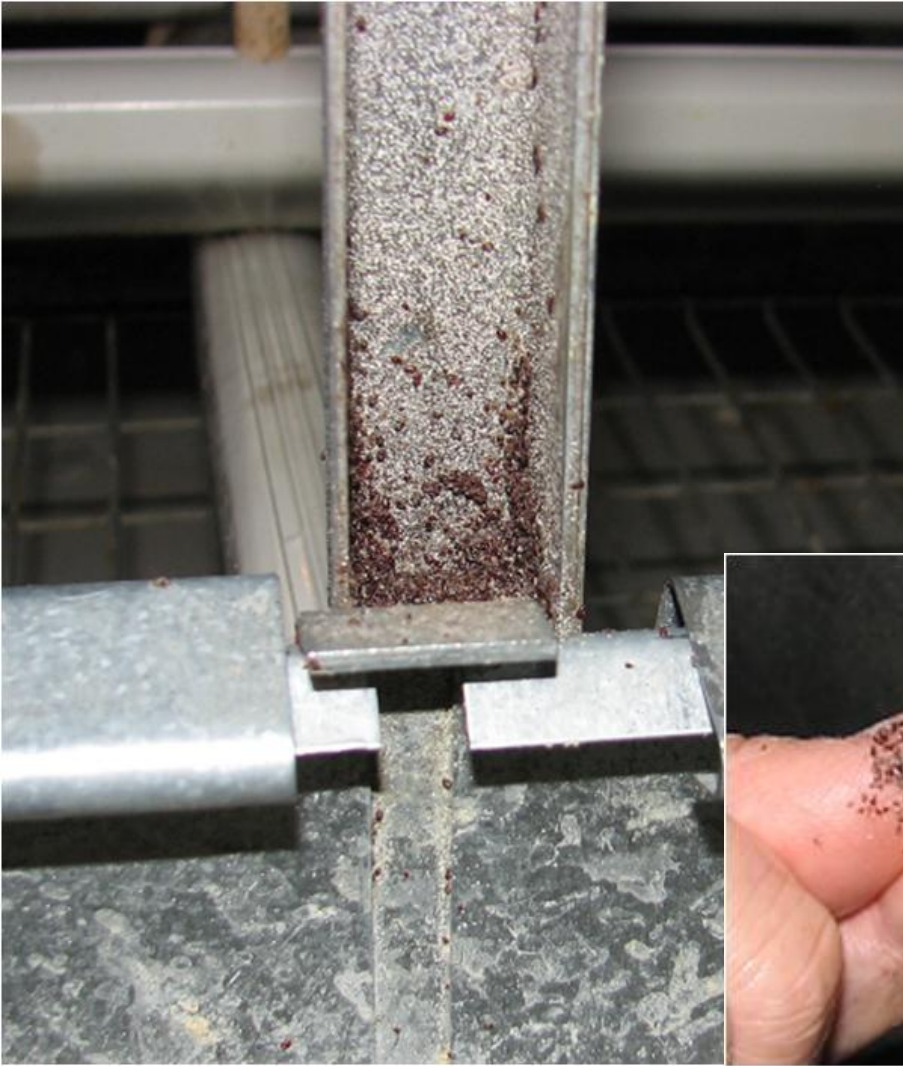
Monitoring

- ✓ Monitoring plan for various pests – key pests
 - ✓ Visual observation of pests and symptoms
 - ✓ Tapping net samples from vegetation
 - ✓ Inspection of leaf samples
 - ✓ Traps: glued traps, pheromone traps, traps with attractive odours, light traps
 - ✓ Soil samples: nematodes, soil born fungi
-
- ✓ Monitoring plan for PRM
 - ✓ Visual observation: PRM hiding places, blood spots in eggs, wellness of hens
 - ✓ Traps set up in strategic places
 - ✓ Attractive traps? Pheromones?
 - ✓ Automated mite counter? (Mul et al. 2013)

Poultry (PRM)

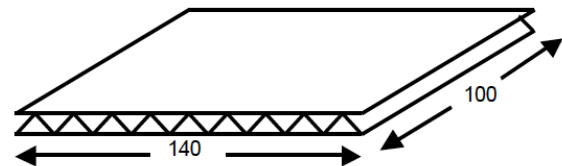
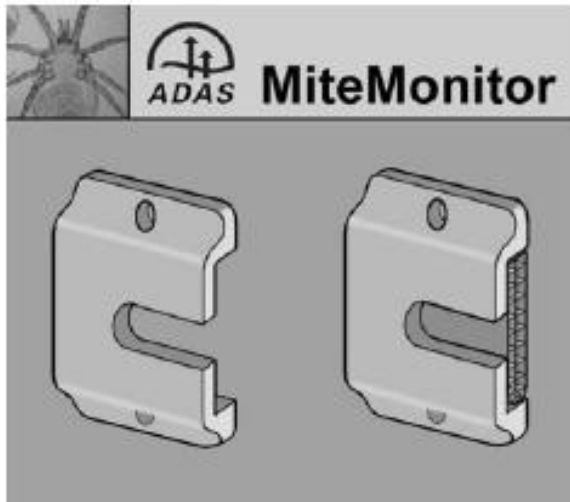
IPM elements: Monitoring (PRM)

- ✓ Visual monitoring: check of hiding places, blood traces in eggs



IPM elements: Monitoring (PRM)

- ✓ Corrugated cardboard in special holders
- ✓ Corrugated cardboard inside tubes under the perch
- ✓ Corrugated transparent plastic board



IPM elements: Monitoring (PRM)

A new trap for the first findings at low PRM population

Velcro trap ('Luke model')

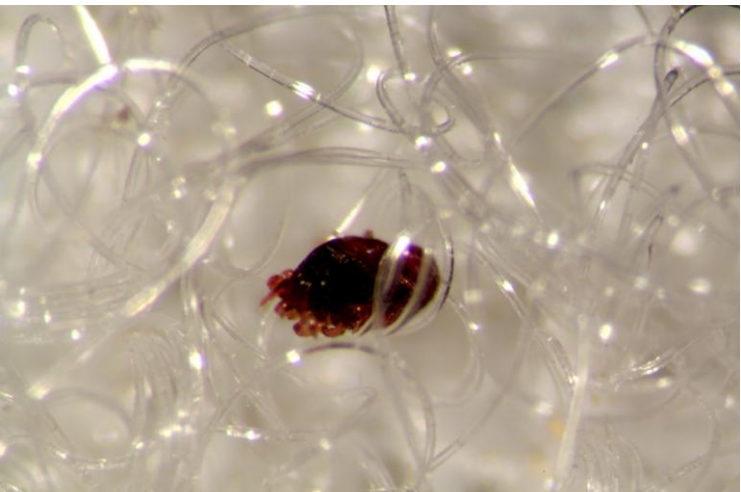
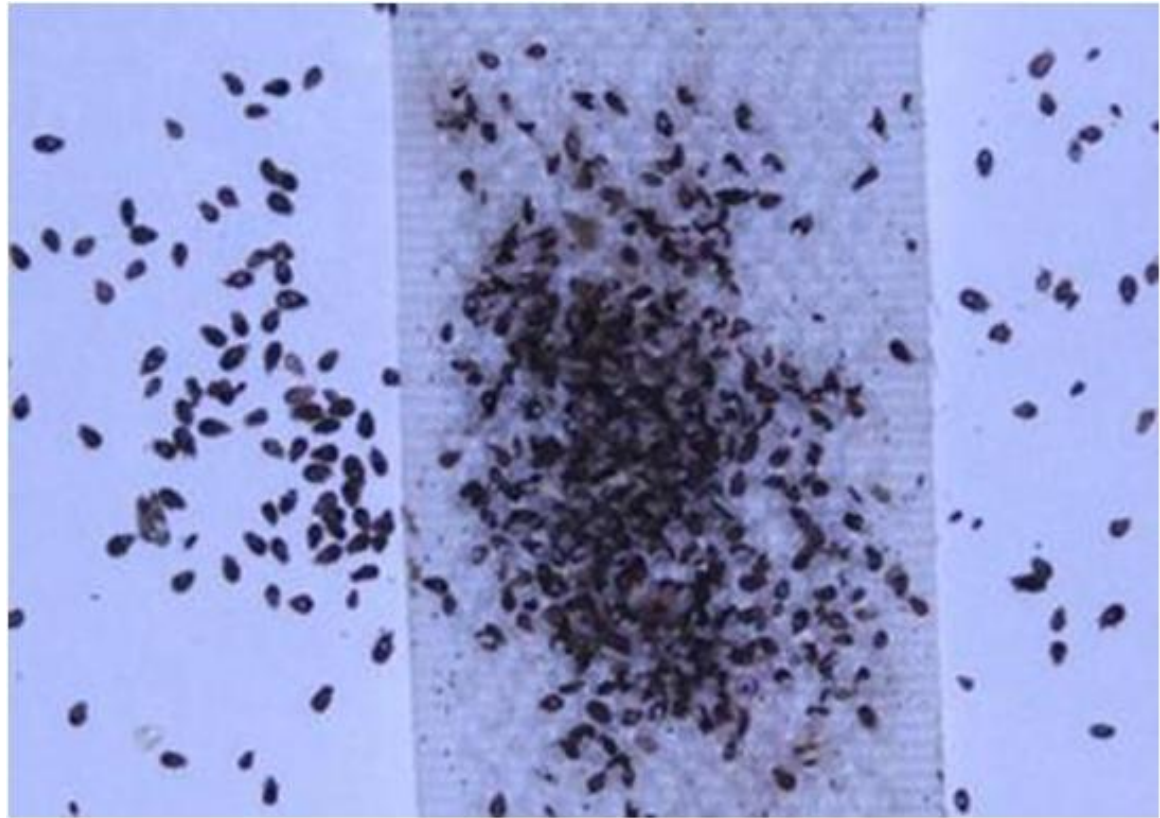
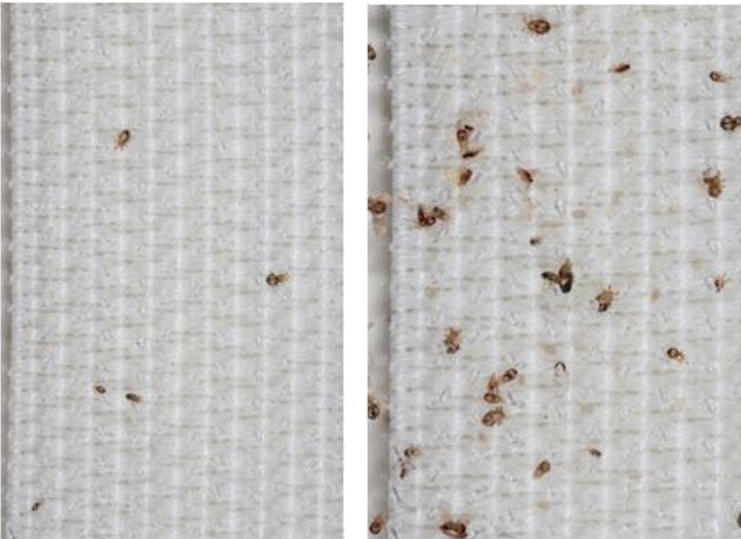
Use either hook
or loop side



IPM elements: Monitoring (PRM)

A new trap to help the first findings at low PRM population

- ✓ Both hook and loop sides can be used



IPM elements: horticulture / poultry (PRM)

Horticulture

Economic thresholds

- ✓ Density of a pest at which a control treatment will provide an economic return
- ✓ Depending a lot of the type of injury/insect/mite
- ✓ Action Threshold; Economic Injury Level EIL
- ✓ Difficult to present a numeric threshold applicable in various circumstances
- ✓ Standardized monitoring methods are needed

- ✓ Zero tolerance in most cases
- ✓ No threshold values in practice
- ✓ First observation most important
- ✓ Action needed immediately when observed – not to wait for ‘economic injury level’

Poultry (PRM)

IPM elements: horticulture / poultry (PRM)

Horticulture

Non-chemical control measures

Poultry (PRM)

- ✓ Resistant varieties
 - ✓ Preventive methods
 - ✓ Classical biological control
 - ✓ Conservation, maintaining biodiversity
 - ✓ Active biological control: spreading of entomopathogenic fungi, bacteria and viruses, parasitic nematodes, parasitoid insects, predaceous insects and mites
-
- ✓ PRM-resistant hen breeds?
 - ✓ Primary method: **prevention**
 - ✓ Plant derived acaricides/repellents
 - ✓ Other types 'soft chemicals'
 - ✓ Cleaning, heat treatment
 - ✓ Biological control attempts: spreading of predatory mites, application of entomopathogenic fungi

IPM elements: Biological control (PRM)

Candidate biocontrol agents (predatory mites):

- *Androlaelaps casalis*, *Cheyletus eruditus*



Androlaelaps casalis (AP-PI , France)



Cheyletus eruditus (AP-PI , France)

IPM elements: Biological control (PRM)

Candidate biocontrol agents (predatory mites):

- *Hypoaspis aculeifer*, *Stratiolaelaps scimitus* (*Hypoaspis miles*)



Jarmo Holopainen

Hypoaspis aculeifer



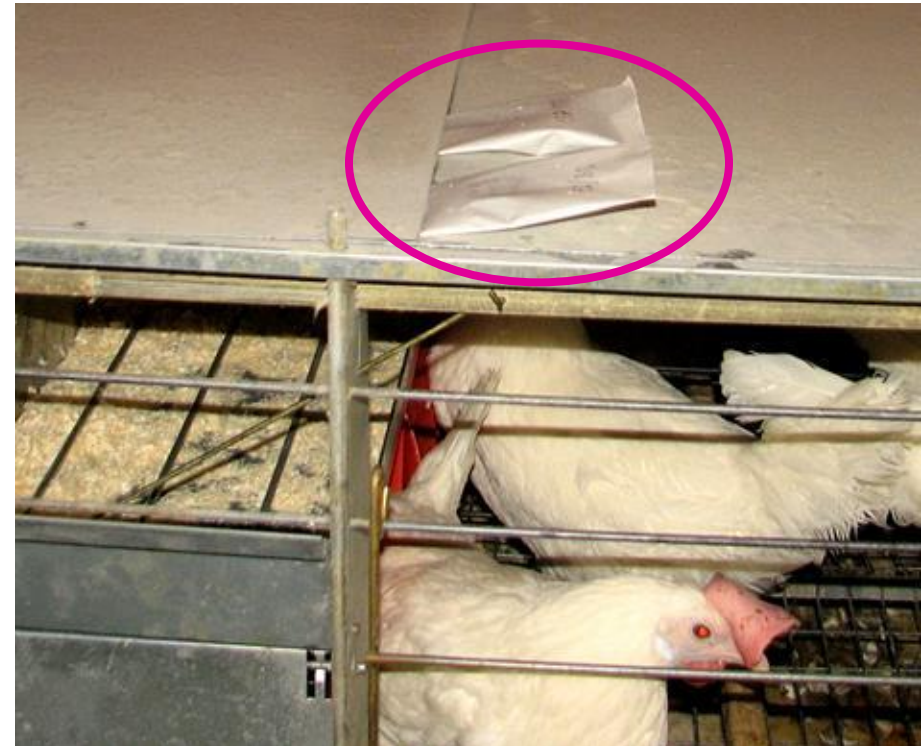
Jarmo Holopainen

Stratiolaelaps scimitus

IPM elements: Biological control (PRM)

Methods of introduction of predatory mites

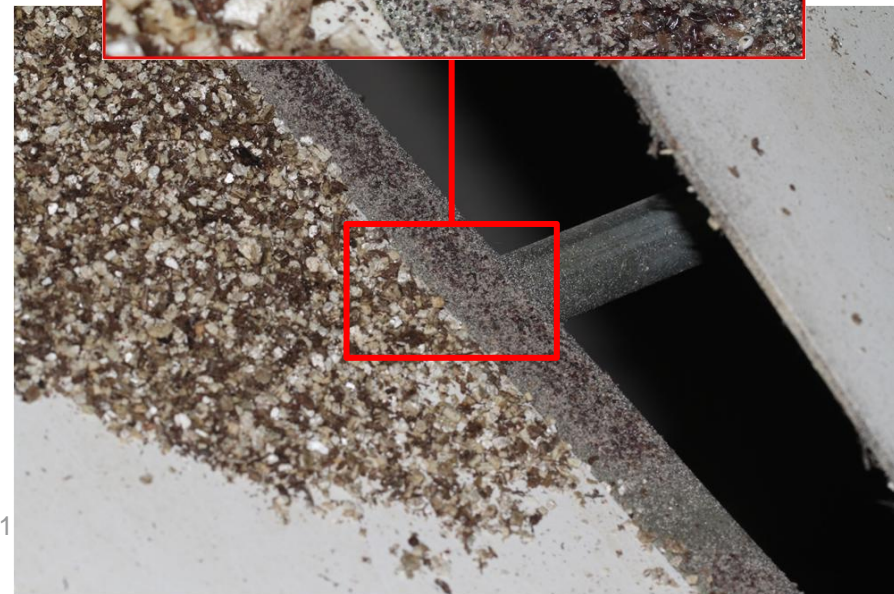
- Slow release sachets, used in greenhouses



IPM elements: Biological control (PRM)

Methods of introduction of predatory mites

- ✓ Slow release tubes (*Stratiolaelaps scimitus*)
- ✓ Release as loose materials, on the roof of nests



IPM elements: Biological control (PRM)

Methods of introduction of predatory mites

- Cardboard box (*Stratiolaelaps scimitus*, Bioplanet, Italy)



Marco Manegatti



Marco Manegatti

IPM elements: Biological control (PRM)

Conclusions of using the predatory mite *S. scimitus*

- ✓ Abundant introductions of *S. scimitus* can limit the growth of PRM population in various environments
- ✓ However, in most conditions *S. scimitus* was not able to reproduce or colonise in the henhouse
- ✓ Repeated introductions are needed, e.g. every 2-3 weeks
- ✓ Early detection of PRM is essential for timing of introductions
- ✓ *S. scimitus* does not stay and reproduce in higher structures – it prefers more humid conditions
- ✓ Construction and structures of layer house devices influence PRM population growth and success of biological control

IPM elements: horticulture / poultry (PRM)

Horticulture

- ✓ Timing of sprayings based on monitoring results
- ✓ Timing of introduction of biocontrol agents
- ✓ Development stage of target pests
- ✓ Local, focused sprayings, hot spots
- ✓ Outdoor: avoiding windy weather conditions, use of wind-safe nozzles

Precise and targeted control actions

- ✓ Timing of control actions
 - Sprayings, distributions of chemicals
 - Introductions of biocontrol agents
 - Repetition of control measures
 - Cleaning and mechanical control
 - Heat treatments: soon after emptying the house
- ✓ Localized control: hiding places, hot spots

Poultry (PRM)

IPM elements: horticulture / poultry (PRM)

Horticulture

Minimized use of pesticides

- ✓ Good spraying equipments for each crop
- ✓ Right nozzle type for each target
- ✓ Lowest effective dose (notice the risk of resistance development)
- ✓ Adjusted amount of solution according to plant size
- ✓ Use of surface tension adjuvants when appropriate
- ✓ Focused sprayings

- ✓ Spreading of acaricides on right places

Poultry (PRM)

IPM elements: horticulture / poultry (PRM)

Horticulture

Prevention of resistance development

Poultry (PRM)

- ✓ Follow the instructions concerning repetitive sprayings
- ✓ Use sufficient doses and concentrations
- ✓ Use available alternative control measures
- ✓ Avoiding consecutive applications of pesticides of the same mode of action (IRAC, FRAC, HRAC codes)
- ✓ Observe and register lack in effectiveness
- ✓ Changing acaricides when appropriate
- ✓ Use of alternative measures instead of acaricides
- ✓ Avoiding consecutive applications of acaricides of the same mode of action, follow label instructions
- ✓ Observe and register lack in effectiveness

IPM elements: horticulture / poultry (PRM)

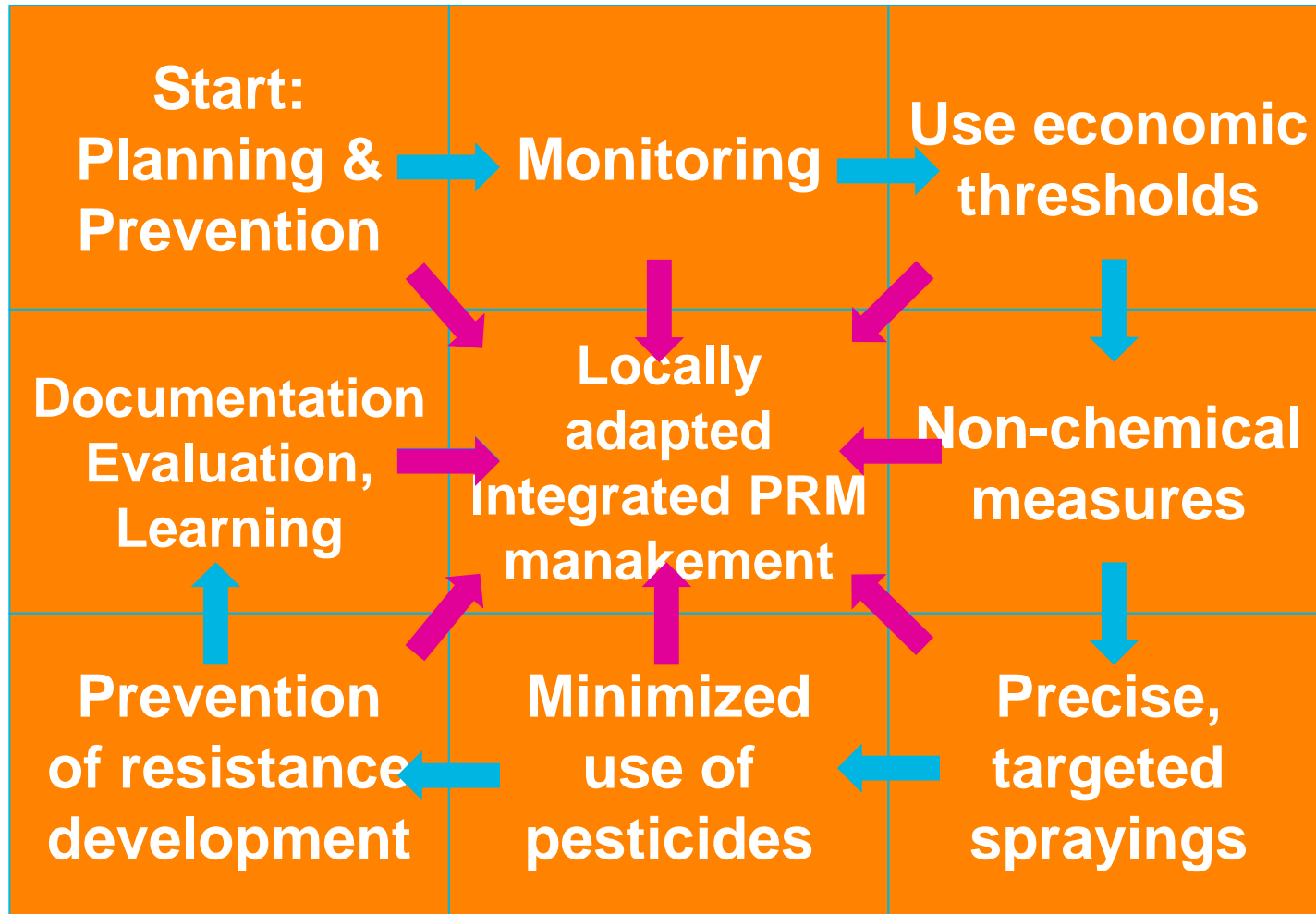
Horticulture

Documentation
Evaluation
Learning

Poultry (PRM)

- ✓ Active notebook, updated data: monitoring results, actions taken, observations etc.
 - ✓ Evaluation of the effectiveness of plant protection actions
 - ✓ Analyses: If unsuccessful, what went wrong? Why?
 - ✓ How to manage next time?
-
- ✓ Active notebook, updated data: monitoring of PRM, actions against PRM
 - ✓ Evaluation of the effect of actions against PRM
 - ✓ Analyses: How did we get PRM in the first place?
 - ✓ How to prevent spreading of PRM? How to keep population low? How to get rid of PRM?

Elements of integrated PRM management



Thank you!

