European demands on IPM:

The current state of the sugar beet crop in the Netherlands

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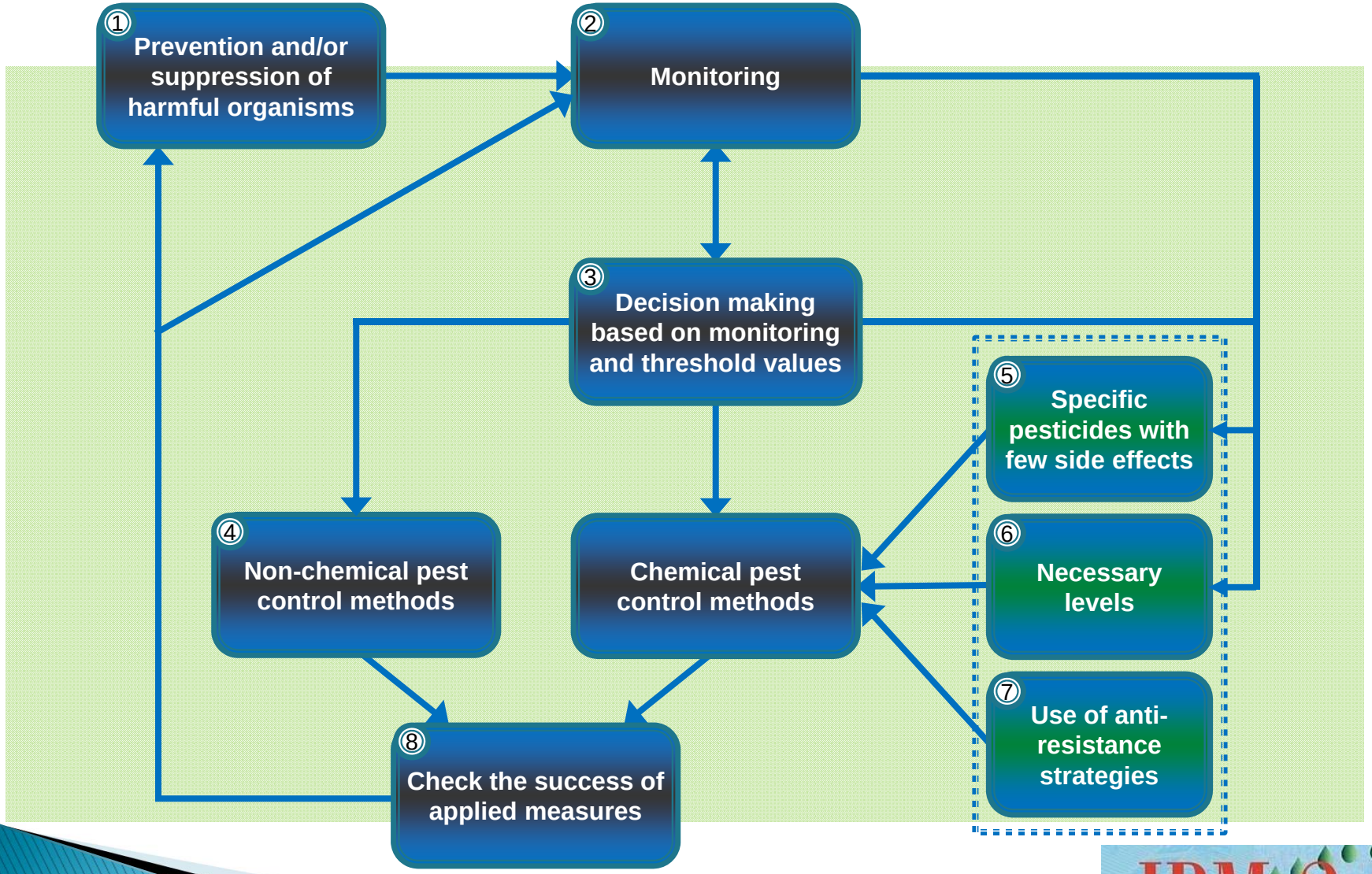
General principles of IPM



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1. Prevention and/or suppression of harmful organisms

1a. Crop rotation

prevent problems with:

- rhizoctonia (*R. solani)*
- nematodes
- *Verticillium dahliae*
- weeds

rhizoctonia root rot

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1b. Green manure crops

prevent problems with:

- rhizoctonia (*R. solani*)
- nematodes
- (weeds)

by growing (resistant)varieties of:

- oilseed radish (*Raphanus sativus* subsp. *Oleiferus)*
- white mustard (*Sinapis alba*)

oilseed radish

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1c. Resistant/tolerant cultivars

reduce damage from:

- rhizomania (BNYVV)
- rhizoctonia (*R. solani*)
- beet cyst nematodes (*Heterodera schachtii and H. betae*)

rhizoctonia cultivar testing

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2. Monitoring

2a. Soil sampling

- beet cyst nematodes (*H. schachtii* and *H. betae*)
- other nematodes
- leatherjackets (larva of the crane fly, *Tipulidae*)
- soil nutrient status

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2b. Field monitoring

- weeds (stage and species)
- aphids (*Myzus persicae* and *Aphis fabae*)
- beet leaf miner (*Pegomya betae*)
- foliar diseases

Larva of gall midge

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3. Decision making based on monitoring and threshold values

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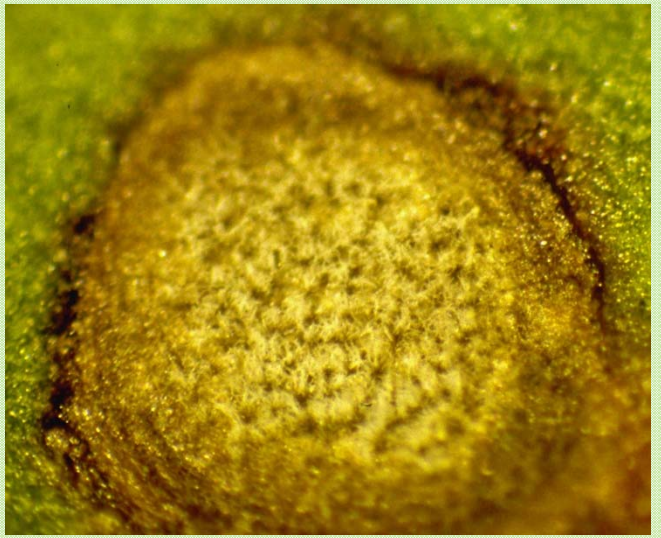
3a. Threshold values

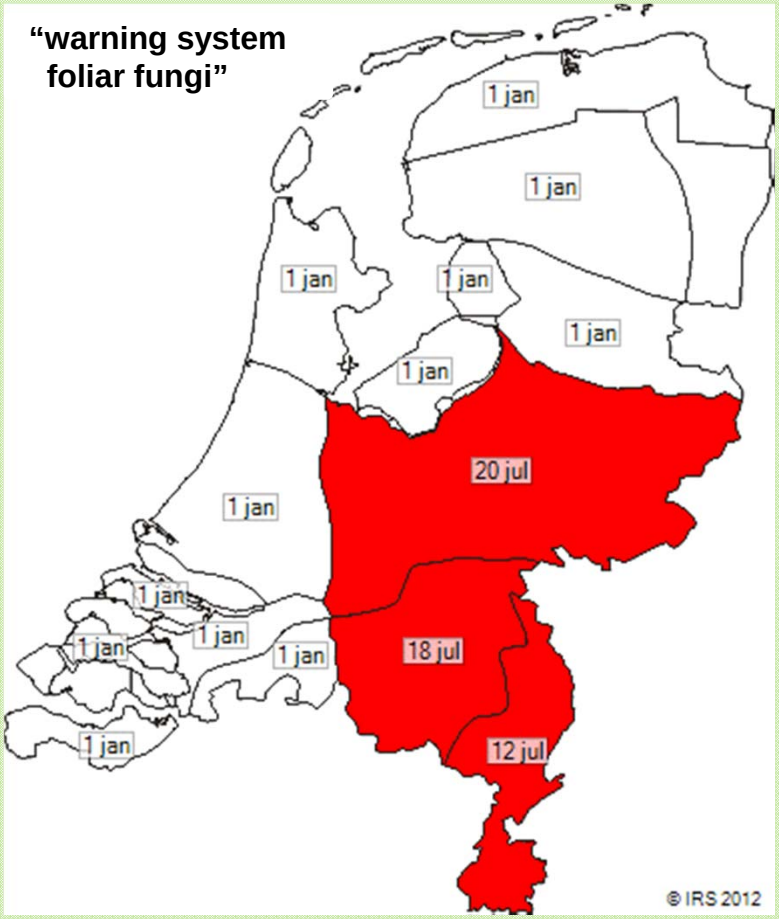
- **nematodes**
  - beet cyst nematode (*H. schachtii and H. betae*)
  - root knot nematode
  - free living nematode
- **several insect species**
  - green peach aphid (*M. persicae*)
  - black bean aphid (*A. fabae*)
  - beet leaf miner (*P. betae*)
- **foliar diseases**
  - cercospora leaf spot (*Cercospora beticola*)



cercospora spot

3b. Online decision support tools

- weed identification
- herbicide combinations
- cultivar choice
- necessity of liming
- warning system for foliar diseases



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4. Non-chemical pest control

Mechanical weeding

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5. Environmental calculation tool for pesticide use

- developed by Dutch consultancy CLM
- risks for beneficial organisms included
- environmental values included in our advices

Input		Output – environmental effects			
Pesticide	Dose (kg/ha of l/ha)	Active matter (kg/ha)	EIP water life	EIP ground life	EIP ground water
PERFEKTHION	0.25	0.10	0	16	0
PIRIMOR	0.40	0.20	44	212	1
CALYPSO	0.25	0.12	3	48	0

http://www.milieumeetlat.nl/index.en

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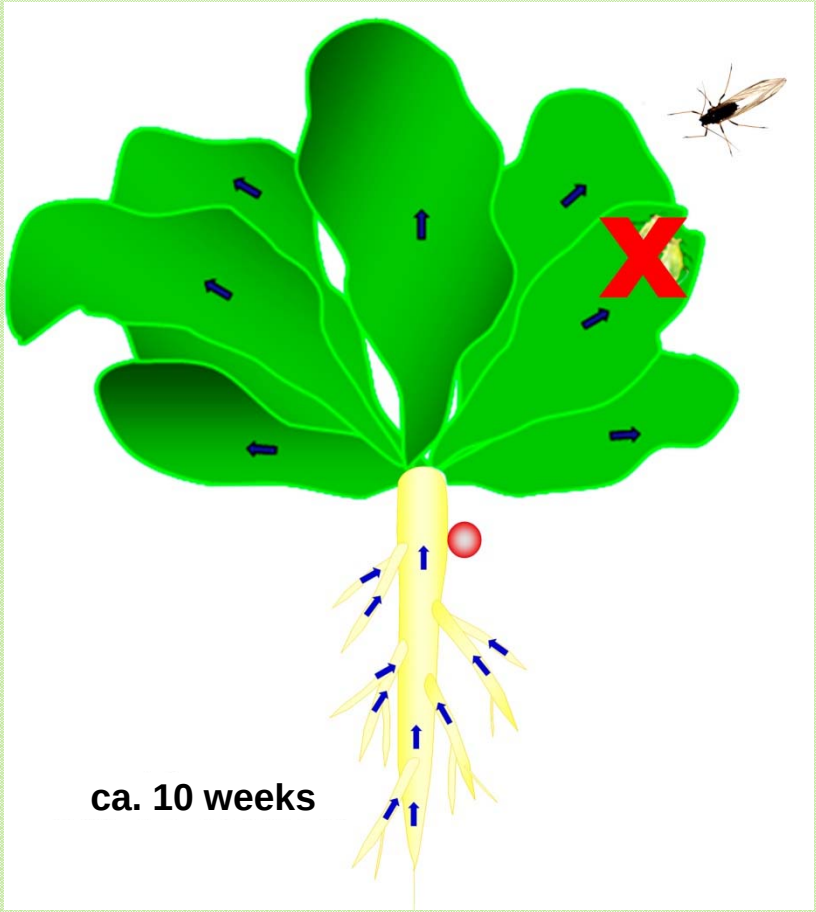
6. Necessary levels

- weed control with Low Dosage System (LDS)
- insect control using seeds with insecticides



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7. Anti-resistance strategies

- use pesticides with different mechanisms
- use pesticides when needed and only the necessary level
- complementary strategies
  - crop rotation
  - green manure crops
  - mechanical weed control

Further development

- already many integrated measures available

- development of database
- fill gaps in knowledge

- principles and measures integrated in cultivation guide for growers
- presentations and articles for growers and crop advisors
- integrated in certification

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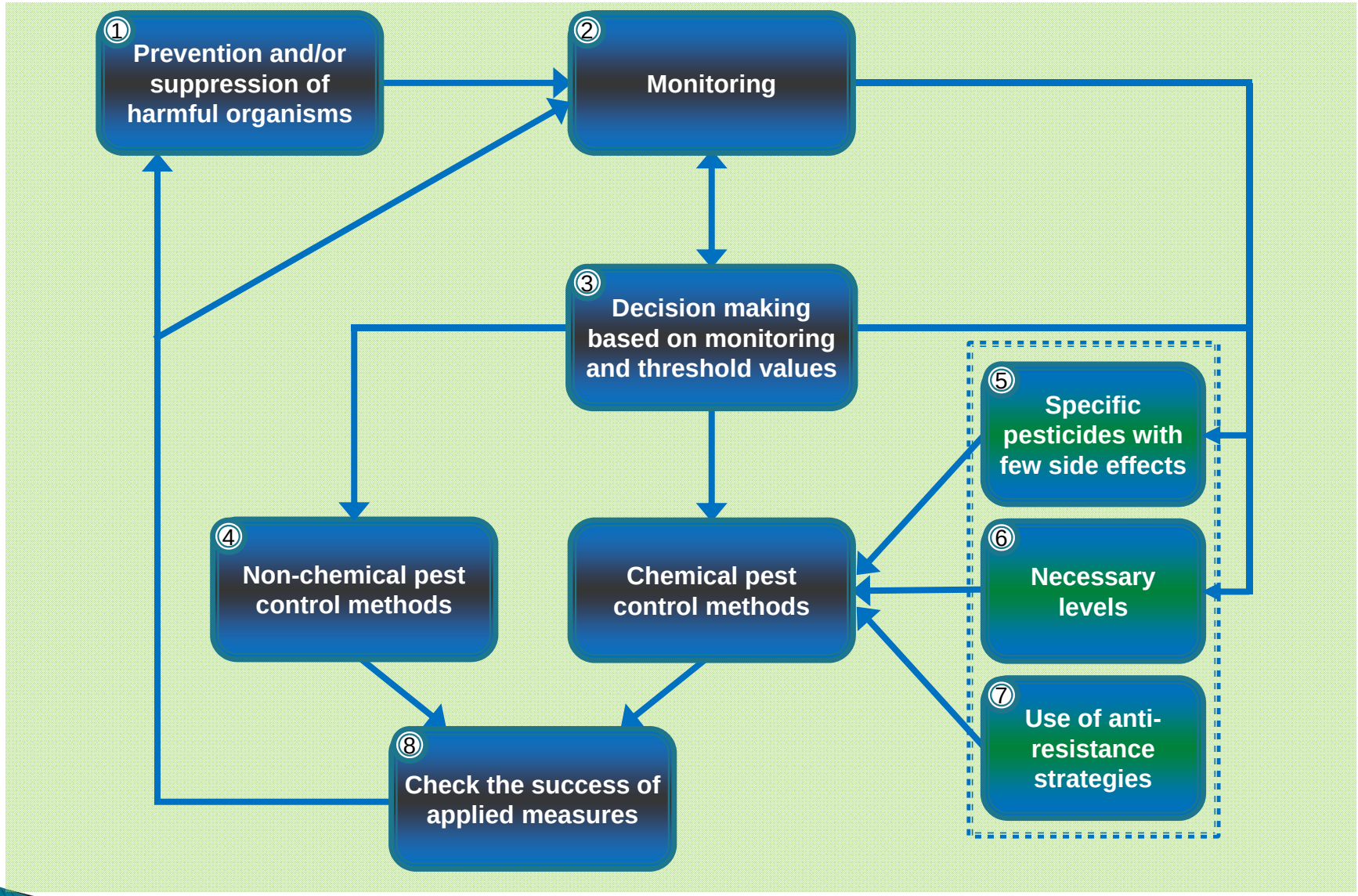

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Growing sugar beet is already IPM-proof in many ways!

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