Efficacy and necessity of seed treatments for a sustainable use

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European Commission

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Farm to Fork Strategy

Emphasis on IPM

- encouragement of the use of alternative control techniques
- 50% reduction chemical pesticides
- 50% reduction more hazardous pesticides (candidates for substitution)

in 2030

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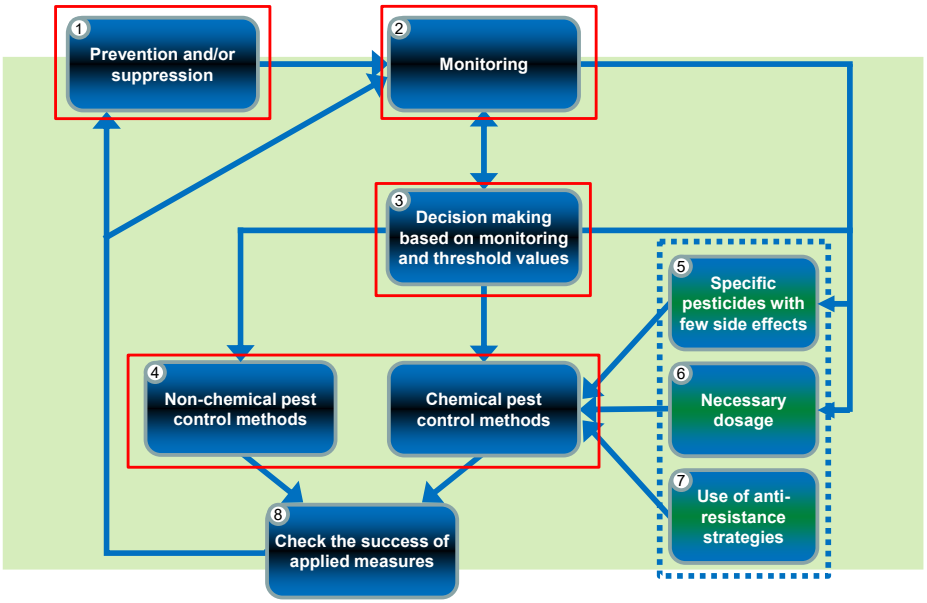
General principles of IPM



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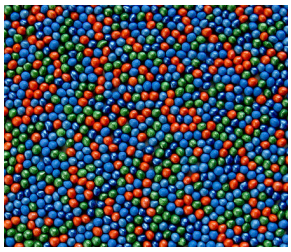
IPM based seed treatments

- Fungi- and insecticides → prevent plant loss
- Insurance (≠IPM)
- Based on expectation rather than observation



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Causes of seedlings damping-off

pythium

rhizoctonia

pleospora

aphanomyces

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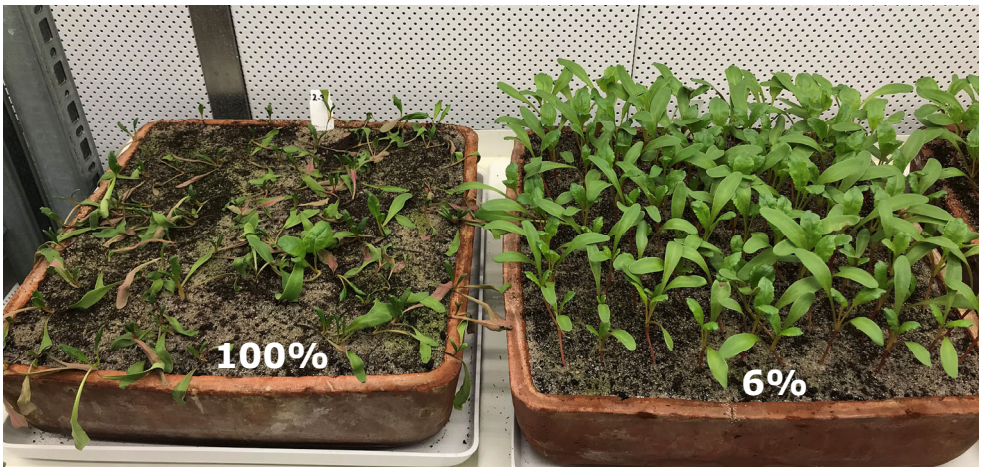
Plant loss caused by aphanomyces



untreated control vs 14g hymexazol

IRS climate room trial, 2019

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Plant loss caused by aphanomyces

14g hymexazol vs untreated control

Field trial Vredepeel (NL), 2021

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Aphanomyces

hymexazol (g a.i./unit)		relative plant numbers*	
target rate	analysed rate	Drouwenermond (3 June 1988)	Vredepeel (17 May 1988)
0	-	100 a	100 a
8	9	113 b	111 b
15	13	121 b	108 b
20	14	133 c	115 b
30	27	-	114 b

*** Plant numbers for untreated seeds = 100**
P=0.05

Modified from Heijbroek & Huijbregts (1995)

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Fungicide efficacy on seedlings

seed treatment	aphanomyces	rhizoctonia	pythium	pleospora (phoma)
Thiram*	-	-	++	++
Tachigaren	+++	-	++	-
Vibrance SB*	-	++(+)	++	+++
Rampart	-	+++	-	+++
Chitosan	-	-	-	-

Efficacy: - = none; + = moderate; ++ = good; +++ = very good
*** not registered in EU**

Thiram	–	thiram
Tachigaren	–	hymexazol
Vibrance SB	–	fludioxonil, sedaxane, metalaxyl-M
Rampart	–	penthiopyrad

IRS-trials (climate room & field)

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Fungicide efficacy on seedlings

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Thiram*	-	-	++	
Tachigaren	+++	-	++	
Vibrance SB*	-	++(+)	++	
Rampart	-	+++	-	
Chitosan	**-**	**-**	**-**	**-**

Efficacy: - = none; + = moderate; ++ = good; +++ = very good

- elicitor of defense mechanism

IRS-trials (climate room & field)

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Fungicide efficacy on seedlings

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IRS-trials (climate room & field)

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Necessity of fungicide seed treatments in NL

- **Currently NL: hymexazol as a standard**
- **Aphanomyces**
  - very good efficacy
  - severe plant loss on sandy soils! (39% of area)
- **Pythium**

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Necessity of fungicide seed treatments in NL

- **Rhizoctonia → tolerant cultivars**
  - < 6-8 leaf-stage not protected
  - needs warm soil conditions

- **Pleospora**
  - second year without seed treatment, so far no severe plant loss

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Soil pests causing plant loss

springtails

millipedes

pygmy beetles

centipedes

leatherjackets

wireworms

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Plant loss caused by pygmy mangold beetles

untreated control vs 12g tefluthrin

Field trial Zeewolde (NL), 2020

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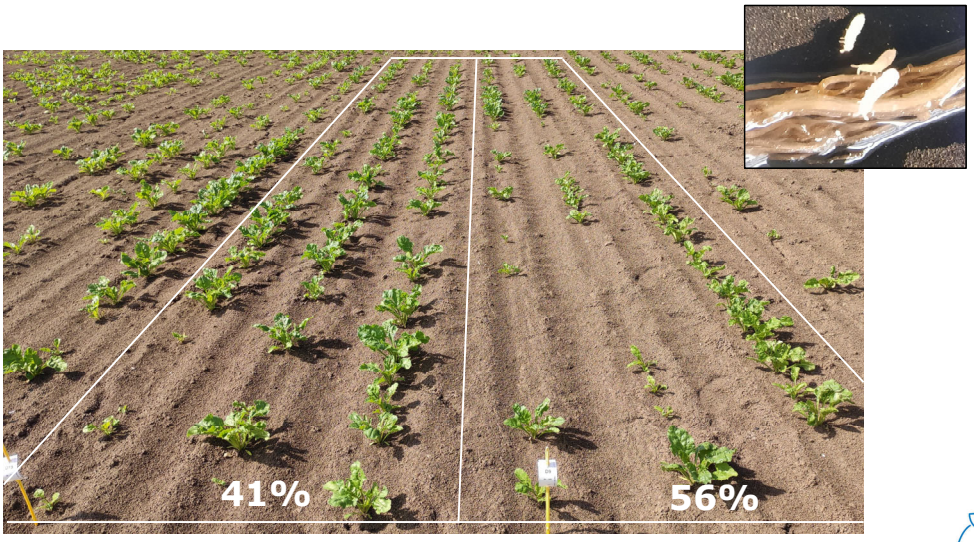
Plant loss caused by springtails



12g tefluthrin vs untreated

Field trial Elst (NL), 2022

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Efficacy on soil pests

seed treatment	Mean plant establishment (%)				
	Atomaria			Onychiurus	Agriotes
	B2	NL1	KWS2	SP3	Y1
untreated	75	1	44	55	53
12g tefluthrin	87	63	95	78	55



Modified from Wauters & Dewar (1995)

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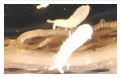
Insecticide efficacy

	pest	Force (tefluthrin)	Vydate 10G* (oxamyl)	Belem (cypermethrin)
	pygmy beetles	++	+	-/+
	wireworms	++	+	
	centipedes	++	++	
	millipedes	++	+	
	springtails	+	++	
	leatherjackets	+	+	

Efficacy: - = none; + = moderate; ++ = good; +++ = very good
*** Only in NL**

IRS trials; Hermann et al. (2001), Wauters & Dewar (1995), Huijbregts et al. (1995)

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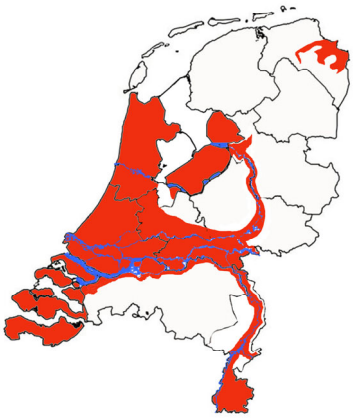
Necessity of insecticide seed treatments in NL

- **NL principle: 'only when necessary'**



Force advised in red regions

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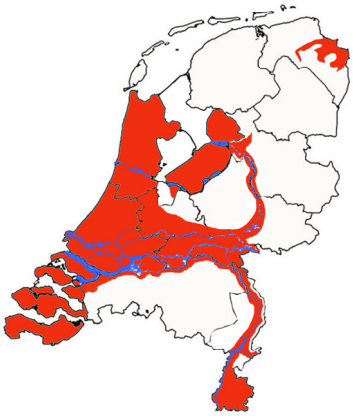
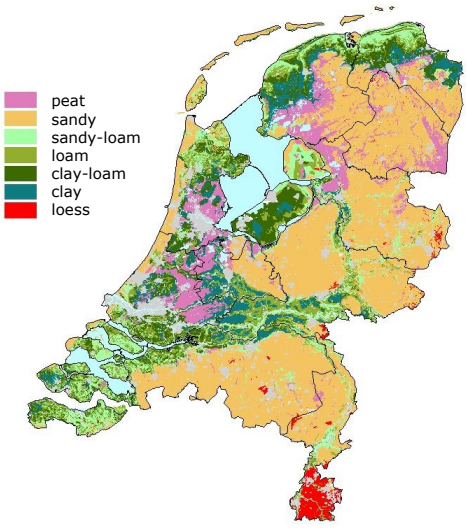
Necessity of insecticide seed treatments

- **NL principle:** ,'





'egions

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Future perspective

- **Usage based on necessity rather than availability**
- **New (low risk) fungi- and insecticides?**
- **Reduction of active ingredients → Farm to Fork**

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