Results and lessons learnt from field vegetables activity

cabbage

Use your mouse to see tooltips or to link to more information

Background

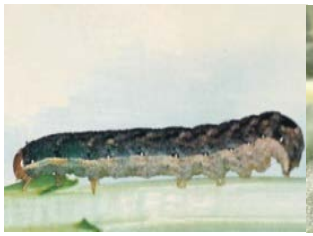
- Cabbages is one of the major field vegetable cultivated in Europe
- On-farm and on-station experiments have been conducted on the main pests and pathogens in Europe.
- Weeds





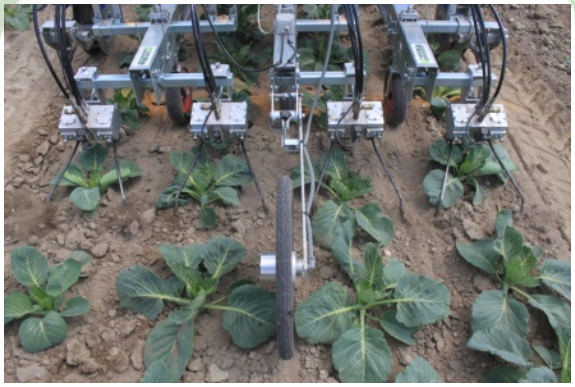

- Insects

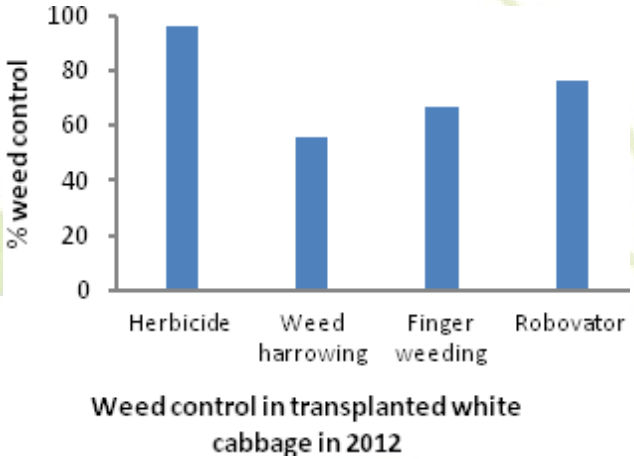




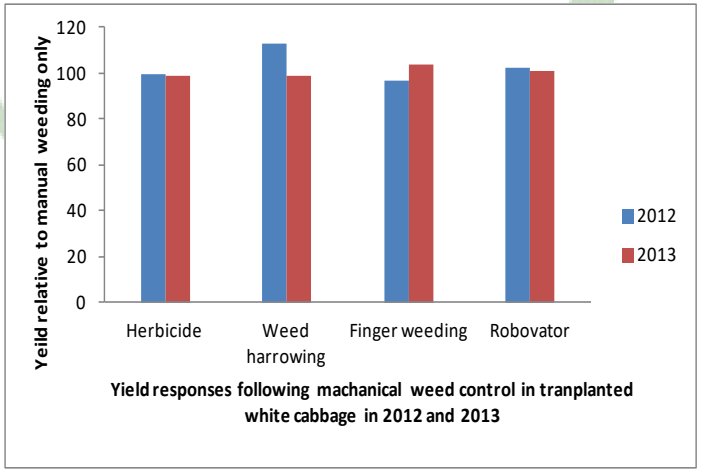
Weeds management

- Use of Robovator in white cabbage





Weed control in transplanted white cabbage in 2012



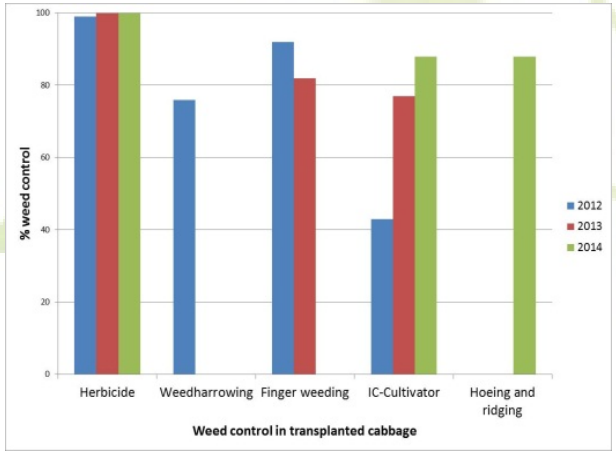
Yield responses following machanical weed control in tranplanted white cabbage in 2012 and 2013

Unfortunately, there were not enough weeds to estimate the weed control effects in 2013

Weeds management

- Use of IC-cultivator in brussels sprout

- Main results



- *Mechanical weed control technically is **very well possible** in cabbage, **with conventional equipment**.*
- ***Intelligent** intra-row weeding is **not** particularly **needed** for a good result, which means such equipment is **not cost-effective** for cabbage growers.*

  Hoeing with an in-row measure like finger weeders or ridging will do the job.

***No yield effects** were found in the experiments.*

Weeds management
Sustainability

Country	System	Sustainability			
		Economic	Environmental	Social	Overall
	CON	H	M	M	M
	ADV	M	M	M	M
	INN	L	H	H	M
	CON	H	VL	L	
	ADV	M	M	H	
	INN				

Results of DEXiPM calculations experiments.
Comparison of conventional (CON), advanced (ADV), and innovative (INN) weed control (VL = very low, L = low, M = medium, H = high, VH = very high).

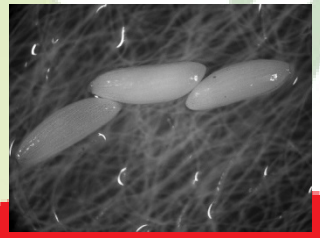
Labour demand is an important factor as farm size increases, and therefore the perceived weather risk of non-chemical measures

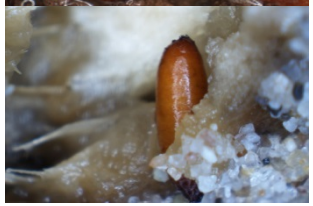
Weeds management
Main conclusions

- ***Transplants*** *of white cabbage need to be of a* ***good quality*** *for intelligent weeding to work properly.*
- *The stems of cabbage transplants are often bended which means that the hoe blades of the robotic weeder need to keep a* ***safe distance from the stems****, implying a less than optimal usage of the equipment.*
- *The size of this untreated zone in close proximity to the transplants determines the* ***demand for manual weeding*** *of residual weeds. It is essential to minimize that zone to lower the overall costs for weed control.*
- *The purchase* ***costs for intelligent*** *weeders are still* ***high*** *and need to be reduced in the future.*
- *The non-intelligent mechanical weeders can be useful but* ***training and guidance are still required*** *for successful employment.*

Cabbage root fly

Delia radicum L. life cycle





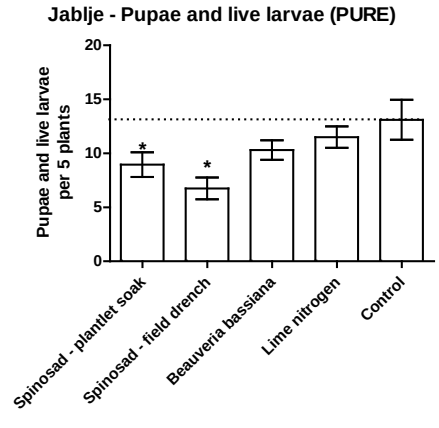
Cabbage root fly
Damages

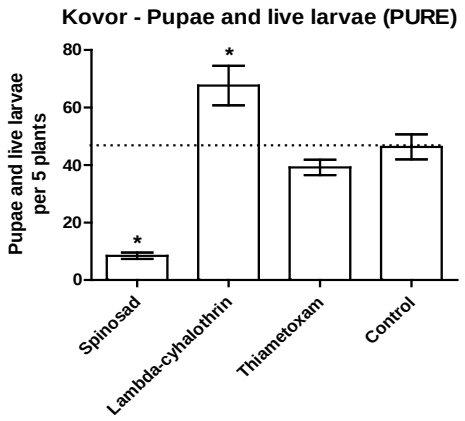
- *Cabbage root fly oviposition*

- Cabbage root fly damage to broccoli.

Cabbage root fly

- *The use of **biological insecticide** (spinosad) resulted in a pest reduction **equal** to one of broad spectrum insecticides (thiametoxam).*
- *Some **broad spectrum insecticides** (lambda-cychalotrin) resulted in an **increase of pest pressure**, probably due to **elimination of pest's natural enemies**.*



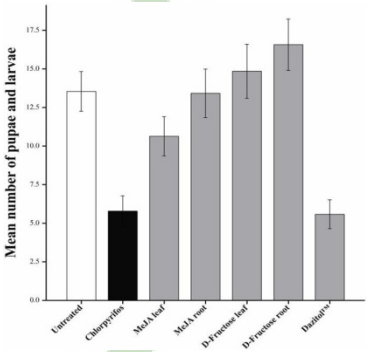


- *Treatments with PERLKA (lime nitrogen), Naturalis (entomopathogenic fungus* Beauveria bassiana*) or straw did **not achieve** sufficient pest control.*

Cabbage root fly

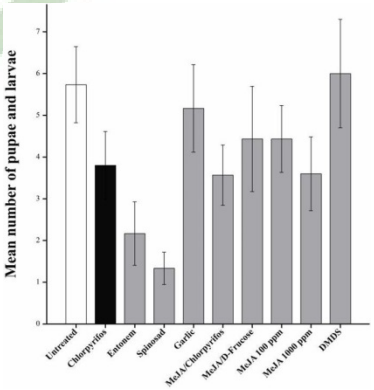
- *Results from on-farm field experiment showed that Chlorpyrifos (Dursban WG) **significantly reduced** cabbage root fly feeding damage and the number of pupae/larvae recovered compared with untreated controls.*

*MeJA leaf and D-Fructose **leaf treatments** **marginally**, but not significantly, **reduced** larval damage compared with untreated plants. Only MeJA **leaf treated plants** **significantly reduced** the number of pupae/larvae, but numbers were still significantly higher than plants treated with Chlorpyrifos.*



- *Numbers of cabbage root fly pupae/larvae recovered at the end of field experiment in 2012 were lower than 2011. The **lack of significant differences** between treated and control plants for cabbage root fly larval root damage potentially reflected the low number of eggs and consequently larvae present.*

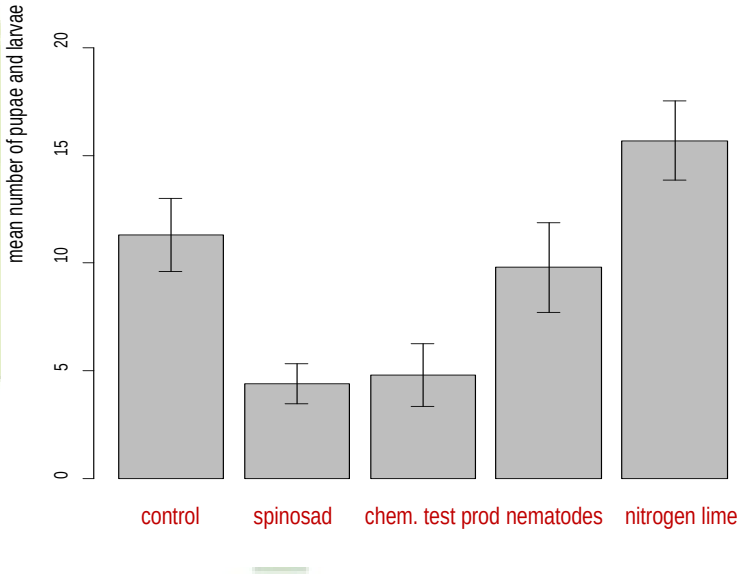
*Despite this, results demonstrated that Entonem (Steinernema feltiae Filipjev), Spinosad (Tracer®), and a combination of the elicitor MeJA and reduced rate Chlorpyrifos showed **some efficacy** for controlling cabbage root fly larvae.*



*At the concentrations tested, Garlic, MeJA on its own, DMDS (dimethyl disulfide), D-Fructose on its own and in combination, and Dazitol™ treatments were either **inconsistent** or **reduced yield** (phytotoxic) in comparison to plants treated with Chlorpyrifos and untreated control plants.*

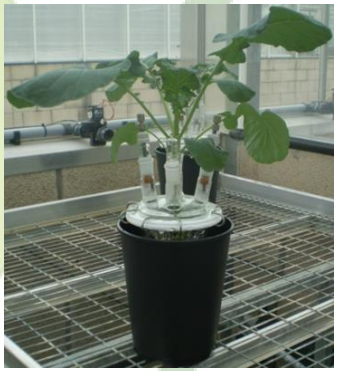
Cabbage root fly

- *The application of spinosad and the chemical test product (not yet registered) resulted in a **reduction** of pupae and larvae by **50 %**. Compared to the control nematodes had only **slight pupae reducing properties**, whereas with nitrogen lime even more pupae and larvae were found.*

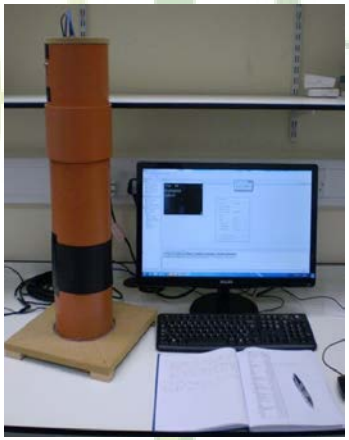
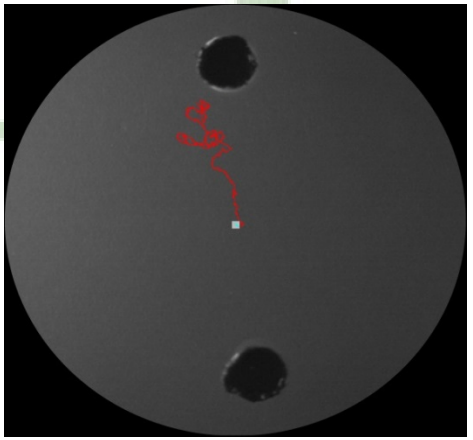


Cabbage root fly
Innovative methods

- *Root volatiles analysis revealed marked **differences in the emission rates** of volatile compounds detected before and after mechanical and cabbage root fly larval feeding damage.*



- *EthoVision® bioassay results revealed that newly hatched cabbage root fly larvae were **significantly attracted** to host plant root volatiles. A major volatile constituent of broccoli roots, DMDS, was attractive to larvae, but toxic at the highest dose tested*

Cabbage root fly
main conclusions

- *Current recommendation to farmers is the **drench of plants** with spinosad shortly before planting.*

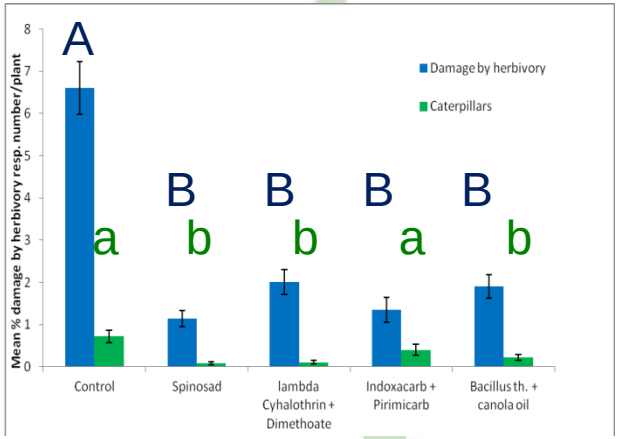
  Despite the positive results, in some countries (Slovenia) this substance is not registered for cabbage root fly control.

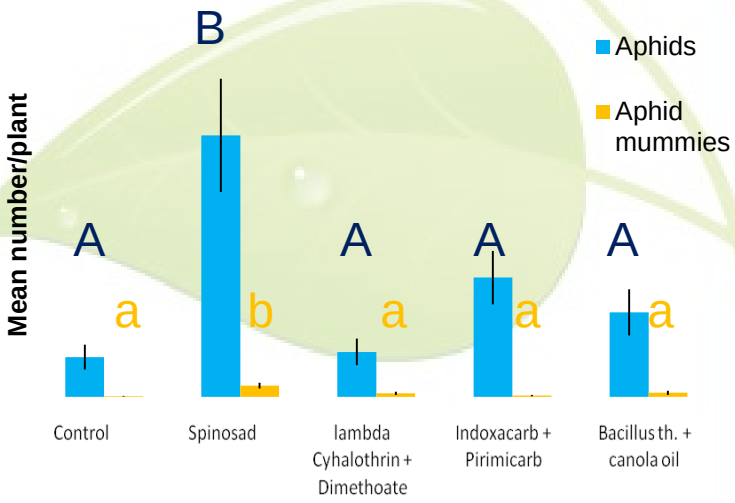
  Therefore action is needed to facilitate the registration process to enable such pest control.

- *Additionally, more research is needed **to find alternative products** for cabbage root fly control, as some reports exist that **spinosad can harm non-target organisms**.*

Aphids and caterpillars

- *Insect pest infestation was **very low** in the last years.*
  *At harvest **all plant protection products reduced** the number of caterpillars as well as damage by herbivory considerably.*





*In 2012 numbers of aphids at harvest were **lowest** in the **untreated control**.*
***Higher numbers** of aphids and parasitized aphids were found on plants treated with plant protection products and especially when **spinosad** was used against caterpillars.*
*This result could indicate that **insecticides may harm aphid predating insects**.*
However this finding needs to be confirmed.

Environmental sustainability

- Acute risk

very low risk	low risk	medium risk	high risk
ETR<0.01	0.01<ETR<0.1	0.1<ETR<1.0	ETR>1.0

Conventional

	aquatic						terrestrial		non-target organism	Groundwater
	Aquatic	Algae	Daphnia	Fish	Lemna	Chironomus	Terrestrial	Earthworm	Bee	
complete strategy	0,623091	0,000688	0,623091	0,358277	0,000083	0,452894	0,320556	0,015361	0,320556	0
alpha-cypermethrin	0,275342	0,000688	0,275342	0,051627	0	0	0,027166	0,00006	0,027166	0
dimethoate	0,001792	0,00004	0,001792	0,000119	0	0	0,14247	0,015361	0,14247	0
lambda-cyhalothrin	0,623091	0,000119	0,623091	0,358277	0	0,095541	0,004339	0,000014	0,004339	0
pirimicarb	0,167562	0,000014	0,167562	0,000032	0	0,000168	0,010139	0,001284	0,010139	0
spinosad	0,000117	0,000013	0,000063	0,000117	0,000083	0	0,320556	0,000065	0,320556	0
thiacloprid	0,452894	0,000028	0,000012	0,000046	0,000009	0,452894	0,001234	0,000363	0,001234	0

Advanced

	aquatic						terrestrial		non-target organism	Groundwater
	Aquatic	Algae	Daphnia	Fish	Lemna	Chironomus	Terrestrial	Earthworm	Bee	
complete strategy	0,167562	0,003145	0,167562	0,000519	0,004151	0,000168	0,320556	0,001284	0,320556	0
indoxacarb	0,004151	0,003145	0,000692	0,000519	0,004151	0	0,023419	0,00002	0,023419	0
pirimicarb	0,167562	0,000014	0,167562	0,000032	0	0,000168	0,010139	0,001284	0,010139	0
spinosad	0,000117	0,000013	0,000063	0,000117	0,000083	0	0,320556	0,000065	0,320556	0

- During on-farm trials in 2014 insecticides were sprayed 10 times on the conventional part of the field compared to five applications on the field sprayed only when thresholds were exceeded.
- On conventional fields two more treatments were applied against caterpillars, one against aphids and two against thrips.
- Data about cost-benefit-efficacy are not yet available since cabbage heads are still in the cold warehouse.

Environmental sustainability

- Chronic risk

very low risk	low risk	medium risk	high risk
ETR<0.1	0.1<ETR<1	1<ETR<10	ETR>10

Conventional

	aquatic						terrestrial		non-target organism	Groundwater
	Aquatic	Algae	Daphnia	Fish	Lemna	Chironomus	Terrestrial	Earthworm	Bee	
complete strategy	59,71184	0,000866	59,71184	2,469489	0,00069	1,384257	1,428681	0,074171	1,428681	0
alpha-cypermethrin	2,203779	0,000661	2,203779	2,203779	0	0	0,162127	0,000296	0,162127	0
dimethoate	0,06564	0,00008	0,06564	0,006564	0	0	0,139571	0,064604	0,139571	0
lambda-cyhalothrin	56,92513	0,000113	56,92513	0,450847	0	0,867014	0,038296	0,000166	0,038296	0
pirimicarb	1,937315	0,000035	1,937315	0,000121	0	0,000174	0,077791	0,012279	0,077791	0
spinosad	0,849391	0,00017	0,849391	0,000609	0,000689	0	1,312594	0,000066	1,312594	0
thiacloprid	0,678236	0,000057	0,000068	0,001404	0,000014	0,678236	0,009492	0,009492	0,001217	0

Advanced

	aquatic						terrestrial		non-target organism	Groundwater
	Aquatic	Algae	Daphnia	Fish	Lemna	Chironomus	Terrestrial	Earthworm	Bee	
complete strategy	2,788597	0,022624	2,788597	0,00206	0,029837	0,000174	1,3904	0,012348	1,3904	0
indoxacarb	0,029837	0,022604	0,003978	0,001989	0,029837	0	0,071151	0,000028	0,071151	0
pirimicarb	1,937315	0,000035	1,937315	0,000121	0	0,000174	0,077791	0,012279	0,077791	0
spinosad	0,849391	0,00017	0,849391	0,000609	0,000689	0	1,312594	0,000066	1,312594	0

Aphids and caterpillars
main conclusions

- *Spraying plant protection products **after control thresholds are exceeded** is a very good option for reducing the amount of insecticides.*

  ***Biological and selective insecticides** performed as well as broad spectrum insecticides.*

- *However an **adaption of thresholds** is needed to the respective farm due to occurrence of insect pests, environmental conditions, production goals and market demands.*

  Furthermore the establishment of control thresholds for all pests of one crop is important.

For more information

Download the following documents

- the BOOKLET
- the IPM guidelines

Go to the field visits