

# New baculovirus products tested in the field

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Andermatt Biocontrol AG

ABIM Lucerne, 23. October 2007

# Baculovirus products of Andermatt Biocontrol

## Products

**MADEX®** *Cydia pomonella* GV

**CAPEX®** *Adoxophyes orana* GV



## New products

**CRYPTEX®** *Cryptophlebia leucotreta* GV

**MADEX Plus®** *Cydia pomonella* GV

**HELICOVEX®** *Helicoverpa armigera* NPV

**SPEXIT®** *Spodoptera exigua* NPV

**LITTOVIR®** *Spodoptera littoralis* NPV

# Baculovirus products of Andermatt Biocontrol

## Products

**MADEX®** *Cydia pomonella* GV

**CAPEX®** *Adoxophyes orana* GV



## New products

**CRYPTEX®** *Cryptophlebia leucotreta* GV

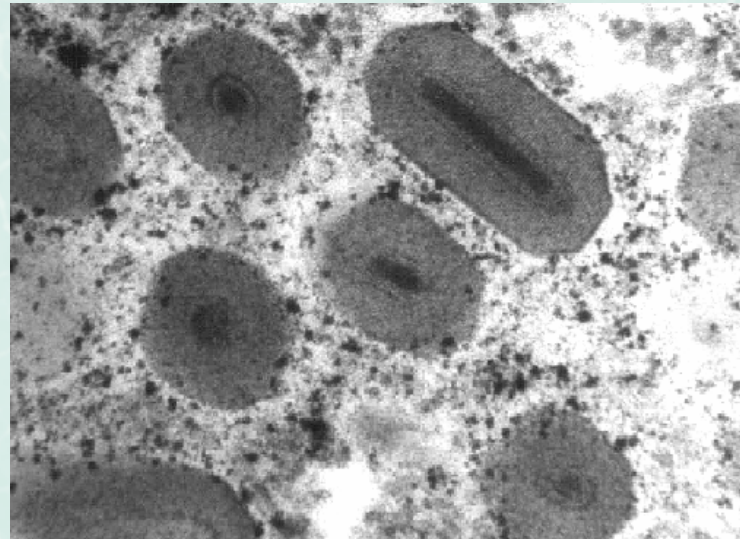
**MADEX Plus®** *Cydia pomonella* GV

**HELICOVEX®** *Helicoverpa armigera* NPV

**SPEXIT®** *Spodoptera exigua* NPV

**LITTOVIR®** *Spodoptera littoralis* NPV

# MADEX: *Cydia pomonella* GV against codling moth



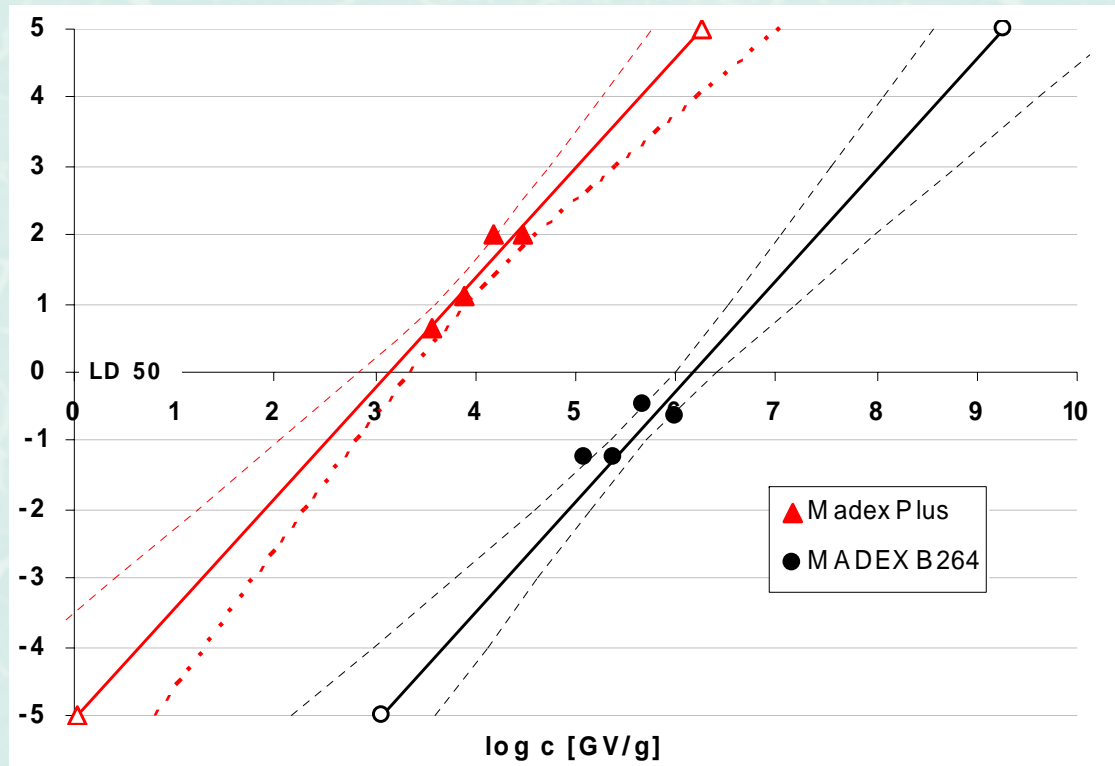
## Resistance against CpGV-M

- CpGV: commercialised baculovirus used in organic and integrated apple production
- Since 3 years, observation of resistant populations of codling moths in isolated organic production orchards (GER, F, CH, I, NL)
- Resistance towards commercialised strain CpGV-M (Mexicain strain)
- Resistant larvae 1000fold less susceptible towards CpGV-M
- „Sustain CpGV“

## Development of MADEX Plus

- Efforts in R&D at Andermatt Biocontrol since first observations on CpGV resistance
- Development of MADEX Plus in 2006  
New genotype mixtures by conventional selection processes
- 2006: First field trials with MADEX Plus
- 2007: Field trials with MADEX Plus and MADEX I12
  - MADEX Plus: CpGV genotype mixture selected by Andermatt Biocontrol
  - MADEX I-12: Iranian CpGV isolate

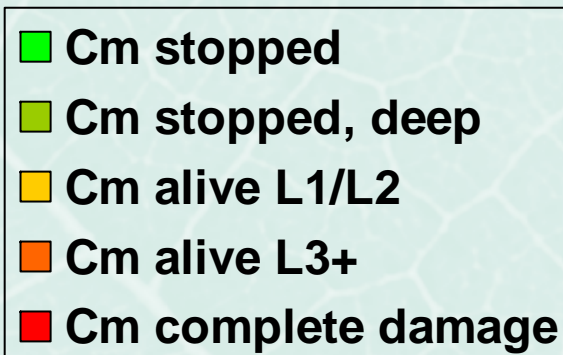
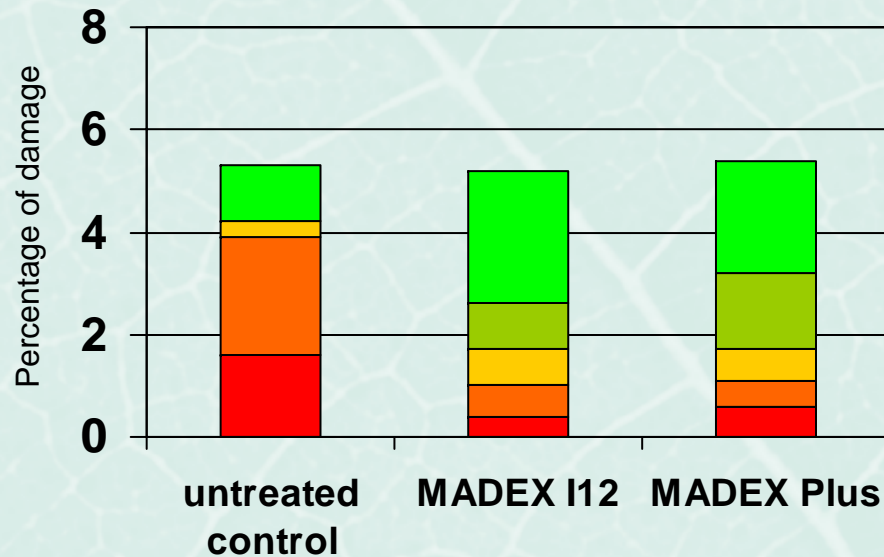
# Development of MADEX Plus Bioassay results



- Efficacy of MADEX and MADEX Plus on resistant codling moth larvae

	LD50 [GV/g]	LD50 95% lower limit	LD50 95% upper limit	RP relative potency	RP 95% lower limit	RP 95% upper limit
Madex Plus	1'383	690	2'228	1'060	516	3'086
MADEX B264	1'465'300	977'420	2'502'700	1.0	0.6	1.7

# TRIAL 1: Germany (Lake of Constance) (end of first generation)

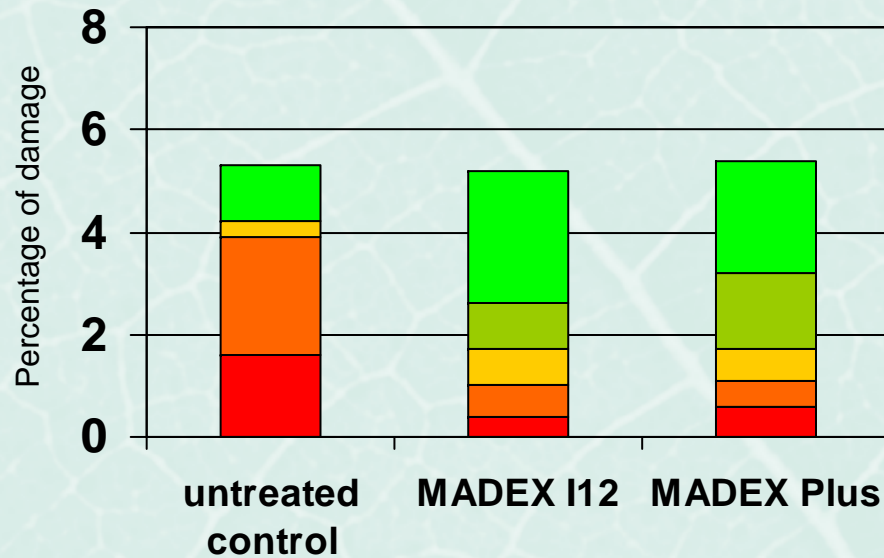


Data by Andermatt Biocontrol, Biofa (D); Sustain CpGV

- MADEX Plus, MADEX I12
- Apple cultivars (Santana, Sansa, Discovery)
- Proved resistance towards CpGV-M
- Assessment of percentage of damage on 1000 apples:
  - **25.6.07** (end of 1st generation)
  - 24.7.07 (pre-harvest)
- Population of diapausing larvae not yet assessed



# TRIAL 1: Germany (Lake of Constance) (end of first generation)

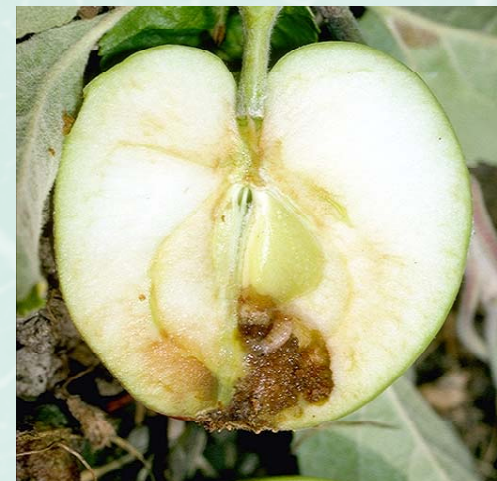


- Cm stopped
- Cm stopped, deep
- Cm alive L1/L2
- Cm alive L3+
- Cm complete damage

Data by Andermatt Biocontrol, Biofa (D); Sustain CpGV

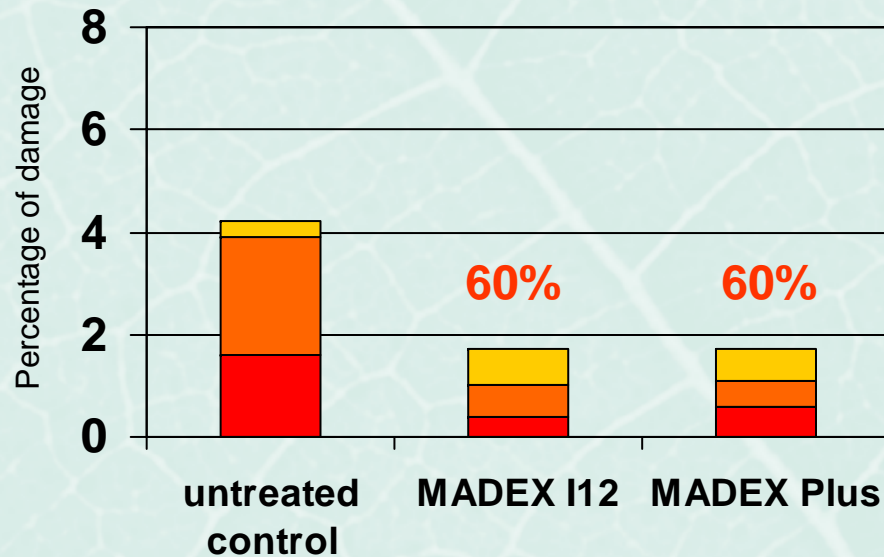


● stopped






● active

# TRIAL 1: Germany (Lake of Constance) (end of first generation)



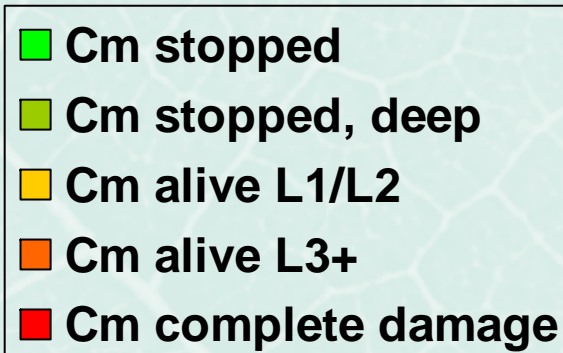
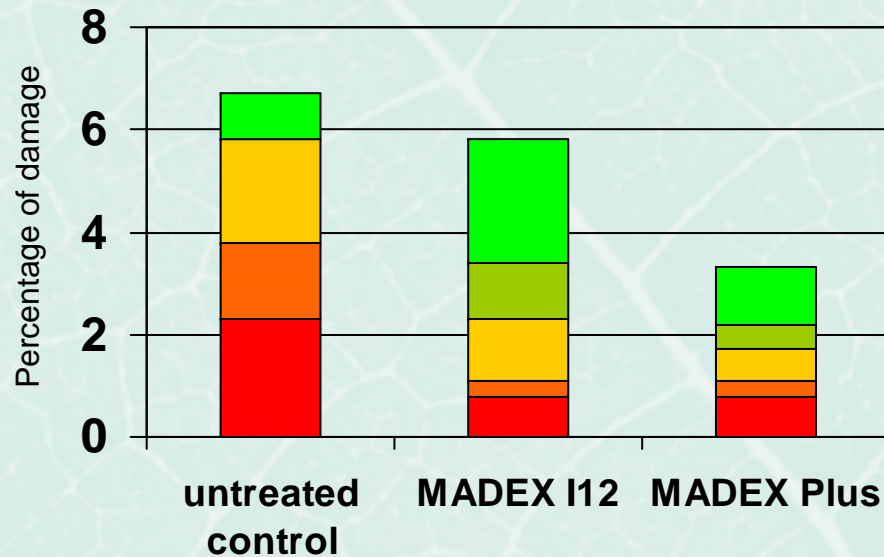
## ACTIVE DAMAGE:

-  Cm alive L1/L2
-  Cm alive L3+
-  Cm complete damage

- MADEX Plus, MADEX I12
- Apple cultivars (Santana, Sansa, Discovery)
- Proved resistance towards CpGV-M
- Assessment of percentage of damage on 1000 apples :
  - **25.6.07** (end of 1st generation)
  - 24.7.07 (pre-harvest)
- Population of diapausing larvae not yet assessed

Data by Andermatt Biocontrol, Biofa (D); Sustain CpGV

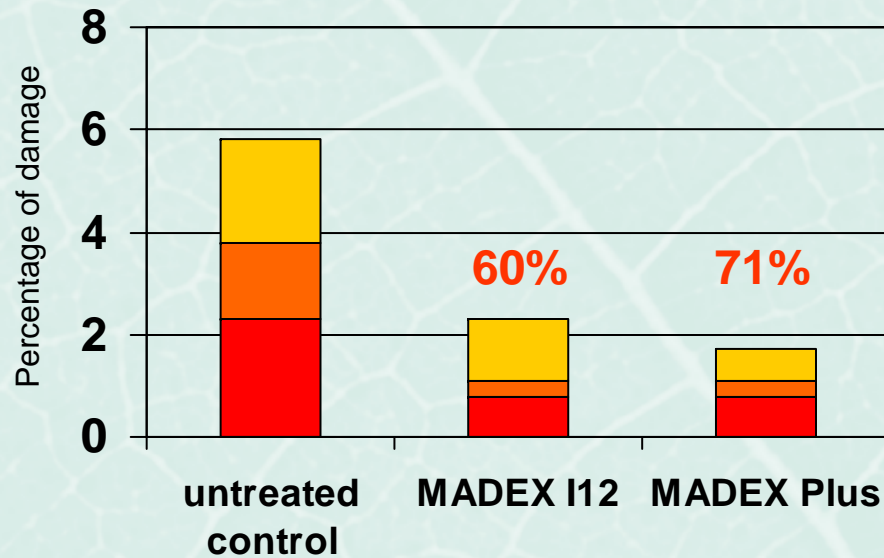
# TRIAL 1: Germany (Lake of Constance) (pre-harvest assessment)






Data by Andermatt Biocontrol, Biofa (D); Sustain CpGV

- MADEX Plus, MADEX I12
- Apple cultivars (Santana, Sansa, Discovery)
- Proved resistance towards CpGV-M
- Assessment of percentage of damage on 1000 apples :
  - 25.6.07 (end of 1st generation)
  - **24.7.07 (pre-harvest)**
- Population of diapausing larvae not yet assessed

# TRIAL 1: Germany (Lake of Constance) (pre-harvest assessment)



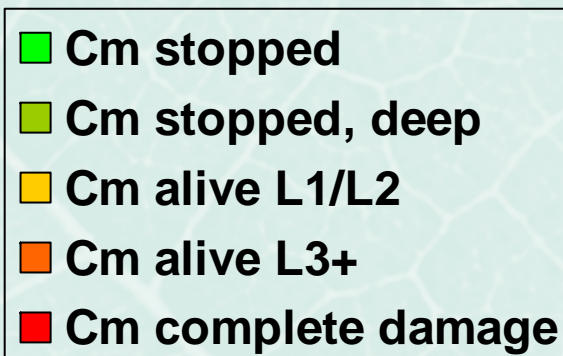
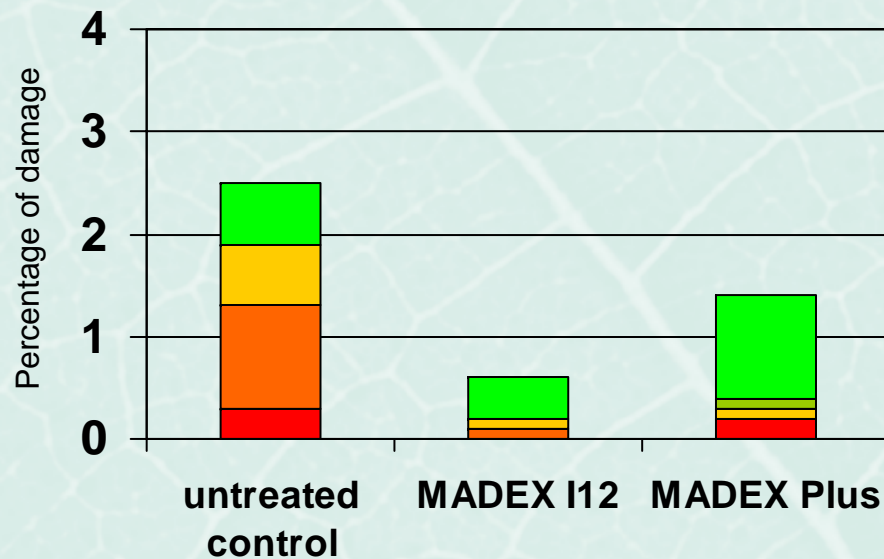
## ACTIVE DAMAGE:

-  Cm alive L1/L2
-  Cm alive L3+
-  Cm complete damage

- MADEX Plus, MADEX I12
- Apple cultivars (Santana, Sansa, Discovery)
- Proved resistance towards CpGV-M
- Assessment of percentage of damage on 1000 apples :
  - 25.6.07 (end of 1st generation)
  - **24.7.07 (pre-harvest)**
- Population of diapausing larvae not yet assessed

Data by Andermatt Biocontrol, Biofa (D); Sustain CpGV

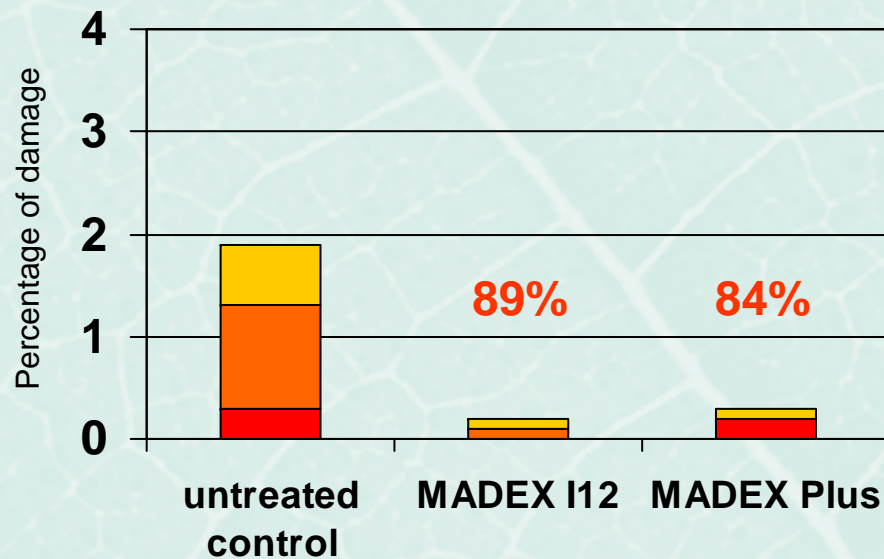
## TRIAL 2: Germany (end of first generation)






Data by Andermatt Biocontrol, Biofa (D); Sustain CpGV

- MADEX Plus, MADEX I12
- Apple cultivars (Topaz)
- Proved resistance towards CpGV-M
- 12.5/22.5/30.5./9.6 (100 ml each) / 18.6 (50 ml each)
- 2 damage assessment on 1000 apples:
  - **21.6.07** (end of 1st generation)
  - 3.9.07 (pre-harvest)
- Population of diapausing larvae not yet assessed

## TRIAL 2: Germany (end of first generation)



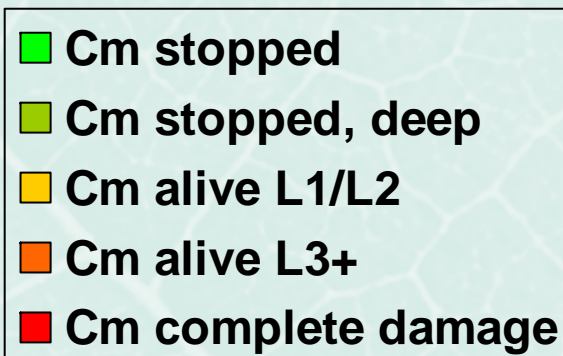
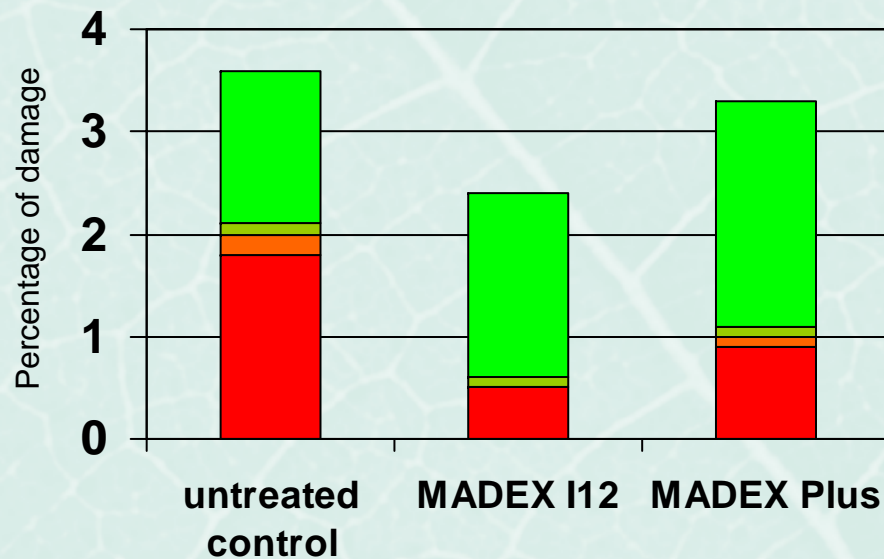
### ACTIVE DAMAGE:

-  Cm alive L1/L2
-  Cm alive L3+
-  Cm complete damage

- MADEX Plus, MADEX I12
- Apple cultivars (Topaz)
- Proved resistance towards CpGV-M
- 12.5/22.5/30.5./9.6 (100 ml each) / 18.6 (50 ml each)
- Assessment of percentage of damage on 1000 apples :
  - **21.6.07** (end of 1st generation)
  - 3.9.07 (pre-harvest)
- Population of diapausing larvae not yet assessed

Data by Andermatt Biocontrol, Biofa (D); Sustain CpGV

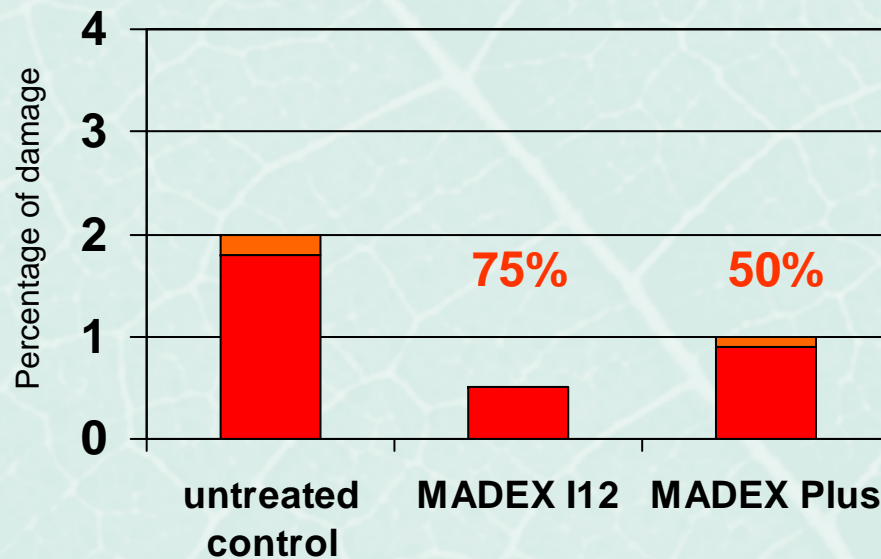
## TRIAL 2: Germany (pre-harvest assessment)






- MADEX Plus, MADEX I12
- Apple cultivars (Topaz)
- Proved resistance towards CpGV-M
- 12.5/22.5/30.5./9.6 (100 ml each) / 18.6 (50 ml each)
- Assessment of percentage of damage on 1000 apples :
  - 21.6.07 (end of 1st generation)
  - **3.9.07** (pre-harvest)
- Population of diapausing larvae not yet assessed

Data by Andermatt Biocontrol, Biofa (D); Sustain CpGV

## TRIAL 2: Germany (pre-harvest assessment)



### ACTIVE DAMAGE:

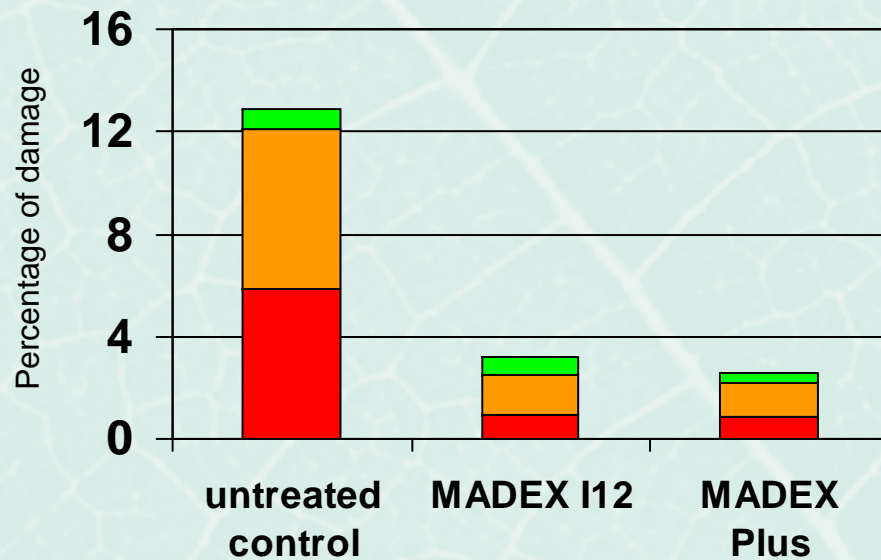
-  Cm alive L1/L2
-  Cm alive L3+
-  Cm complete damage

- MADEX Plus, MADEX I12
- Apple cultivars (Topaz)
- Proved resistance towards CpGV-M
- 12.5/22.5/30.5./9.6 (100 ml each) / 18.6 (50 ml each)
- Assessment of percentage of damage on 1000 apples :
  - 21.6.07 (end of 1st generation)
  - **3.9.07** (pre-harvest)
- Population of diapausing larvae not yet assessed

Data by Andermatt Biocontrol, Biofa (D); Sustain CpGV



## TRIAL 3: Italy, Villafranca di Forlì (FC) Small-plot trial on pears



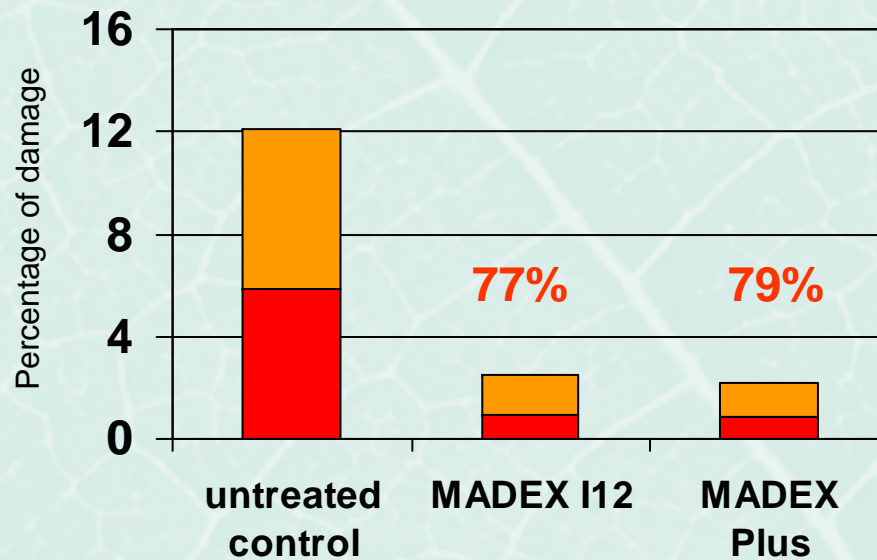
■ % superficial damage, Cm stopped  
■ % superficial damage, Cm active  
■ % deep damage

Data by Intrachem Bio, Italy; Sustain CpGV

- 4 repl. of 5 trees/treatment
- MADEX Plus, MADEX I12
- Pear cultivar (William)
- Proved resistance towards CpGV-M
- 5 appl (2.5/9.5/16.5/23.5/31.5)
- Assessment of percentage of damage
  - **11.6.07** (end of 1st generation)
- Population of diapausing larvae not yet assessed

# TRIAL 3: Italy, Villafranca di Forlì (FC)

## Small-plot trial on pears



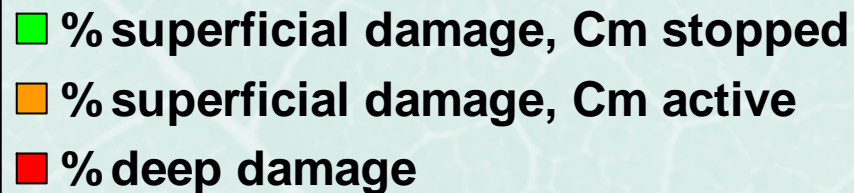
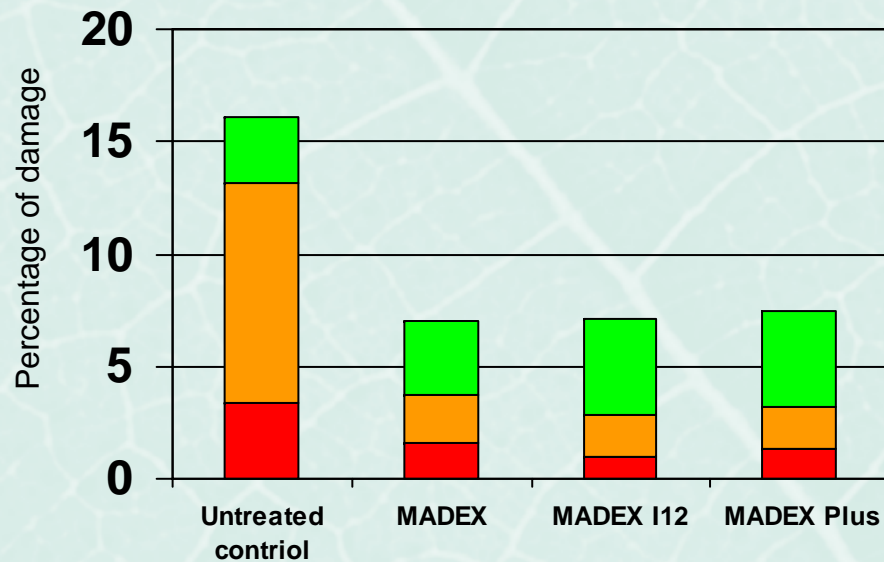
### ACTIVE DAMAGE:

- % superficial damage, Cm active
- % deep damage

Data by Intrachem Bio, Italy; Sustain CpGV

- 4 repl. of 5 trees/treatment
- MADEX Plus, MADEX I12
- Pear cultivar (William)
- Proved resistance towards CpGV-M
- 5 appl (2.5/9.5/16.5/23.5/31.5)
- Assessment of percentage of damage
  - **11.6.07** (end of 1st generation)
- Population of diapausing larvae not yet assessed

## TRIAL 4: Italy, Forlì (FC) Small-plot trial on apples

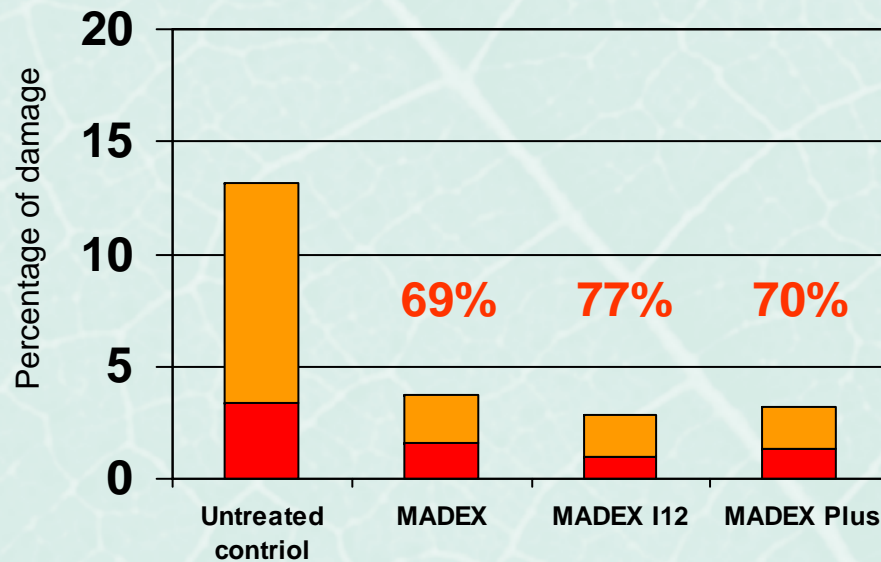


Data by Intrachem Bio, Italy; Sustain CpGV

- 4 repl. of 5 trees/treatment
- MADEX, MADEX Plus, MADEX I12
- Apple cultivar (Commercio)
- No resistance towards CpGV-M
- 5 appl (2.5/9.5/16.5/23.5/31.5)
- Assessment of percentage of damage
  - **11.6.07** (end of 1st generation)
- Population of diapausing larvae not yet assessed

# TRIAL 4: Italy, Forlì (FC)

## Small-plot trial on apples



### ACTIVE DAMAGE:

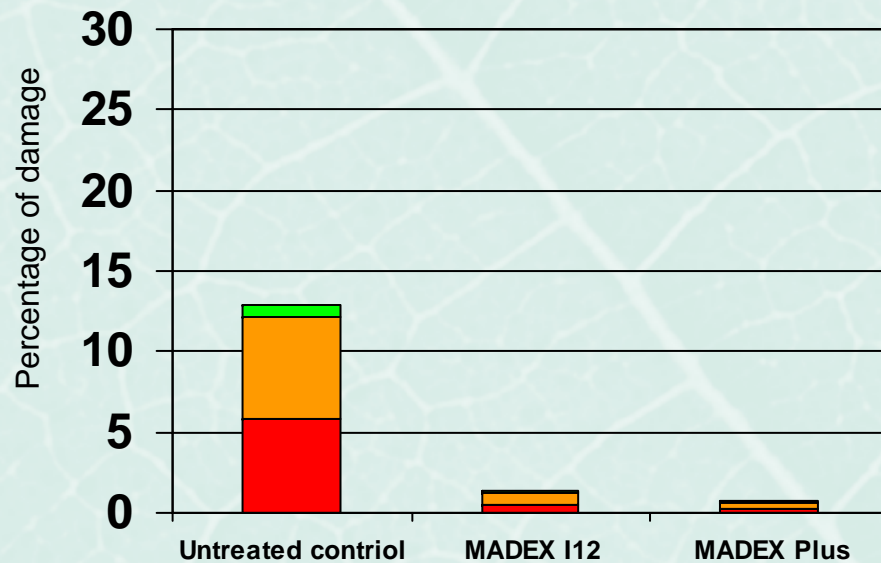
- % superficial damage, Cm active
- % deep damage

Data by Intrachem Bio, Italy; Sustain CpGV

- 4 repl. of 5 trees/treatment
- MADEX, MADEX Plus, MADEX I12
- Apple cultivar (Commercio)
- No resistance towards CpGV-M
- 5 appl (2.5/9.5/16.5/23.5/31.5)
- Assessment of percentage of damage
  - **11.6.07** (end of 1st generation)
- Population of diapausing larvae not yet assessed

# TRIAL 5: Italy, Villafranca di Forlì (FC)

## Large plot trial on pears



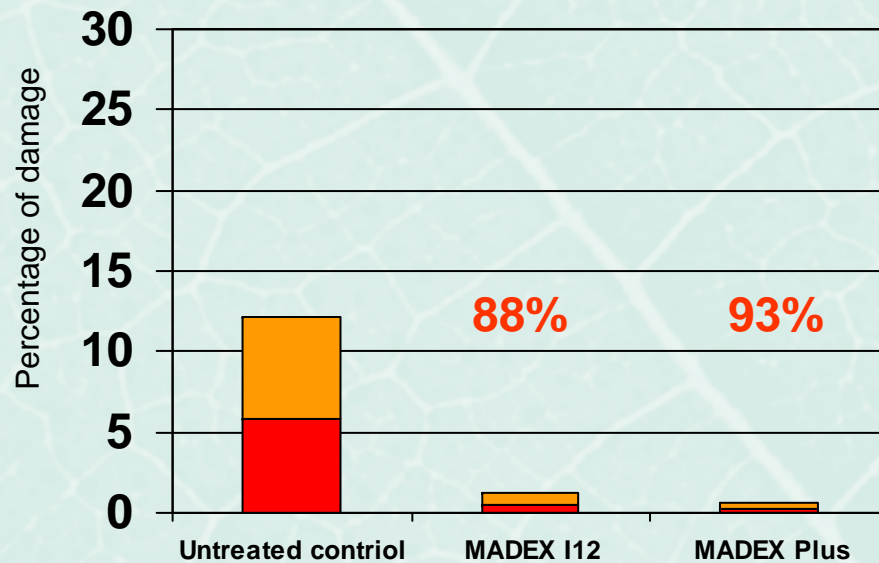
■ % superficial damage, Cm stopped  
■ % superficial damage, Cm active  
■ % deep damage

Data by Intrachem Bio, Italy; Sustain CpGV

- 4000 m<sup>2</sup> per treatment
- MADEX Plus, MADEX I12
- Pear cultivar (William)
- Proved resistance towards CpGV-M
- 8 appl (17.5/26.5/12.6/24.6/30.6/7.7/14.7/21.7)
- Assessment of percentage of damage on 4x500 fruits/plot
  - **11.6.07** (end of 1st generation)
  - 24.7.07 (pre-harvest)
- Population of diapausing larvae not yet assessed

# TRIAL 5: Italy, Villafranca di Forlì (FC)

## Large plot trial on pears



### ACTIVE DAMAGE:

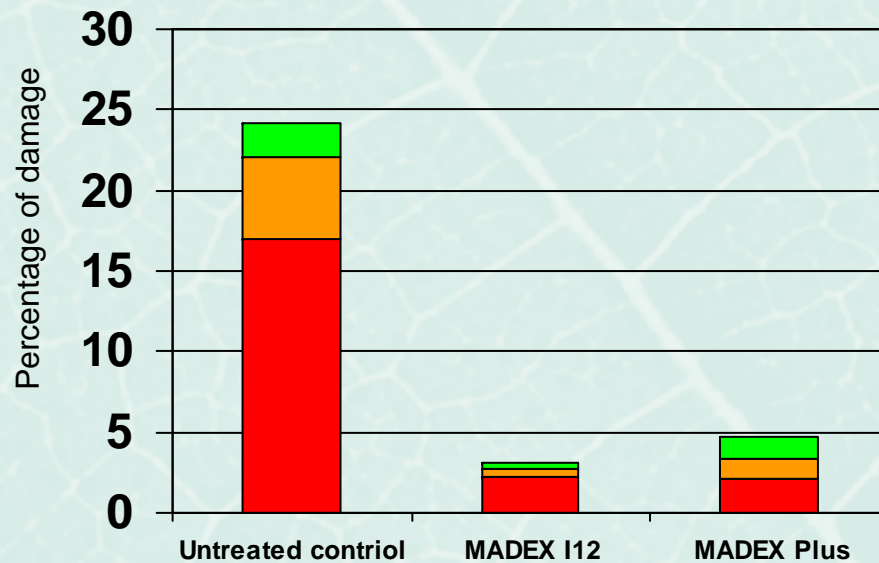
- % superficial damage, Cm active
- % deep damage

Data by Intrachem Bio, Italy; Sustain CpGV

- 4000 m<sup>2</sup> per treatment
- MADEX Plus, MADEX I12
- Pear cultivar (William)
- Proved resistance towards CpGV-M
- 8 appl (17.5/26.5/12.6/24.6/30.6/7.7/14.7/21.7)
- Assessment of percentage of damage on 4x500 fruits/plot
  - **11.6.07** (end of 1st generation)
  - 24.7.07 (pre-harvest)
- Population of diapausing larvae not yet assessed

# TRIAL 5: Italy, Villafranca di Forlì (FC)

## Large plot trial on pears



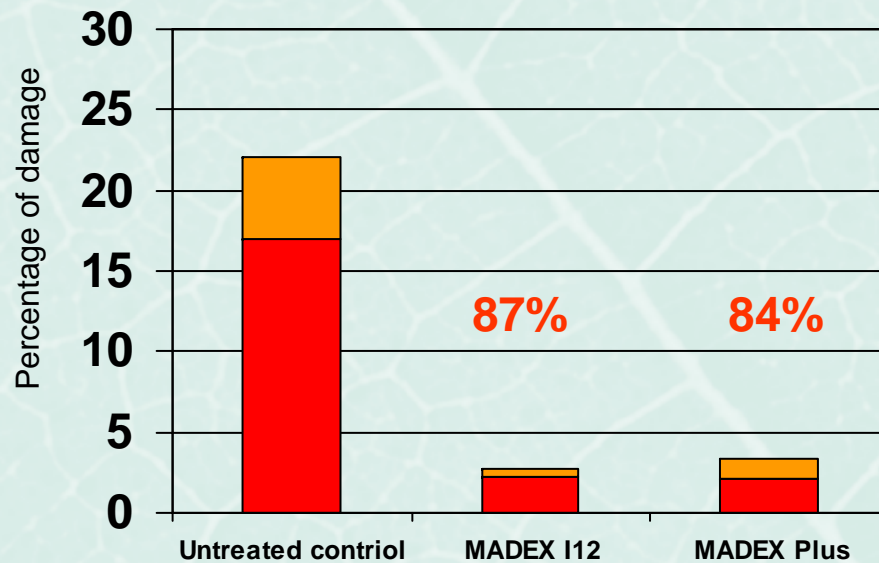
■ % superficial damage, Cm stopped  
■ % superficial damage, Cm active  
■ % deep damage

Data by Intrachem Bio, Italy; Sustain CpGV

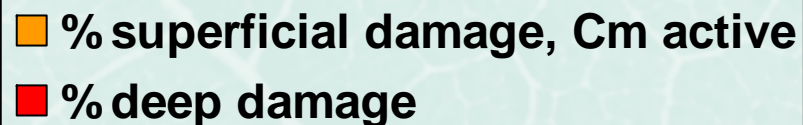
- 4000 m<sup>2</sup> per treatment
- MADEX Plus, MADEX I12
- Pear cultivar (William)
- Proved resistance towards CpGV-M
- 8 appl (17.5/26.5/12.6/24.6/30.6/7.7/14.7/21.7)
- Assessment of percentage of damage on 4x500 fruits/plot
  - 11.6.07 (end of 1st generation)
  - **24.7.07** (pre-harvest)
- Population of diapausing larvae not yet assessed

# TRIAL 5: Italy, Villafranca di Forlì (FC)

## Large plot trial on pears



### ACTIVE DAMAGE:

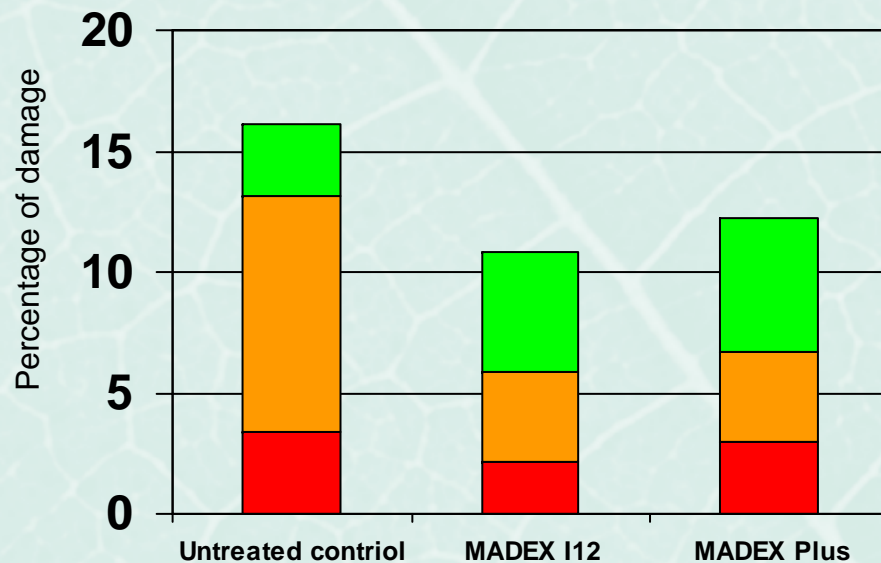


Data by Intrachem Bio, Italy; Sustain CpGV

- 4000 m<sup>2</sup> per treatment
- MADEX Plus, MADEX I12
- Pear cultivar (William)
- Proved resistance towards CpGV-M
- 8 appl (17.5/26.5/12.6/24.6/30.6/7.7/14.7/21.7)
- Assessment of percentage of damage on 4x500 fruits/plot
  - 11.6.07 (end of 1st generation)
  - **24.7.07** (pre-harvest)
- Population of diapausing larvae not yet assessed



## Forlì (end of 1st generation)

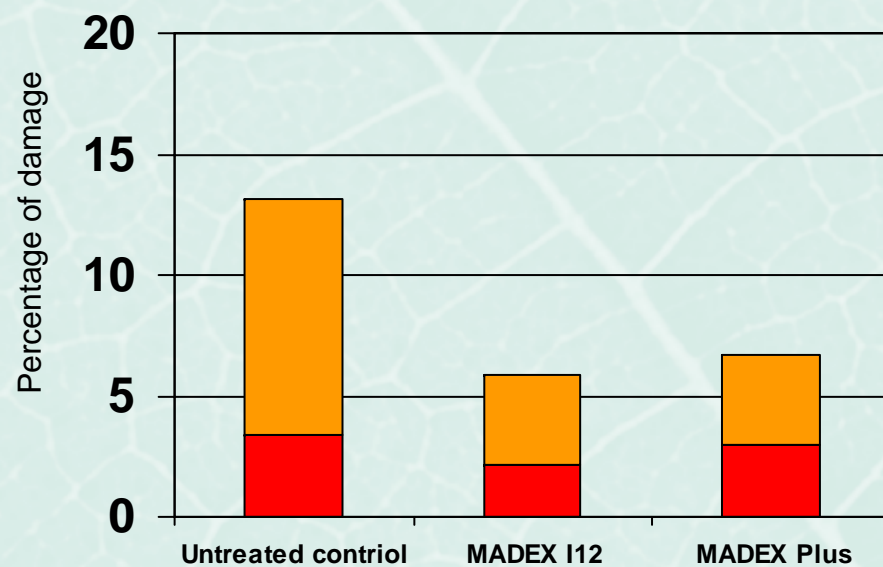


- % superficial damage, Cm stopped
- % superficial damage, Cm active
- % deep damage

Data by Intrachem Bio, Italy; Sustain CpGV

- 5000 m<sup>2</sup> per treatment
- MADEX Plus, MADEX I12
- Apple cultivar (Commercio)
- Proved resistance towards CpGV-M
- 16 appl (17.5/26.5/12.6/  
24.6/30.6/7.7/14.7/21.7)
- Assessment of percentage of damage on 4x500 fruits/plot
  - 11.6.07 (end of 1st generation)
  - **2.8.07 (pre-harvest)**
- Population of diapausing larvae not yet assessed

## Forlì (end of 1st generation)

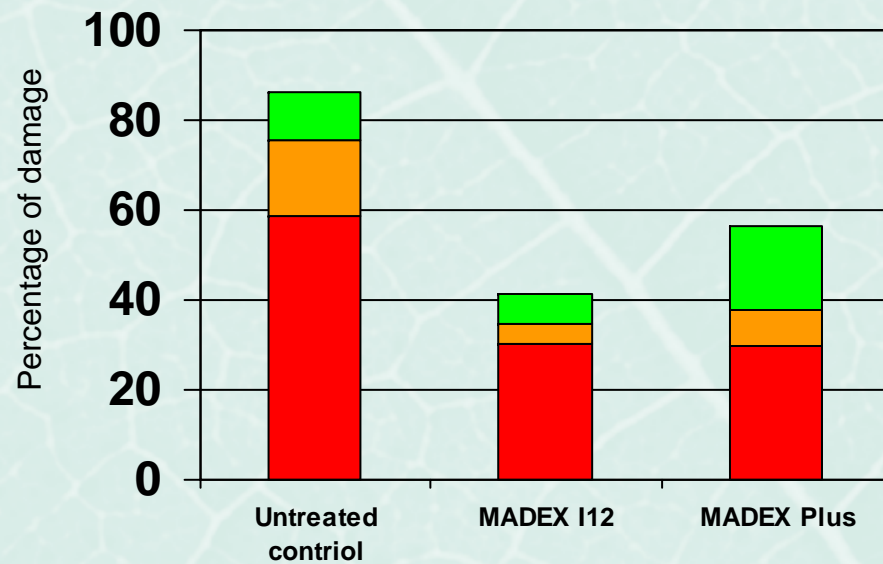


### ACTIVE DAMAGE:

- % superficial damage, Cm active
- % deep damage

Data by Intrachem Bio, Italy; Sustain CpGV

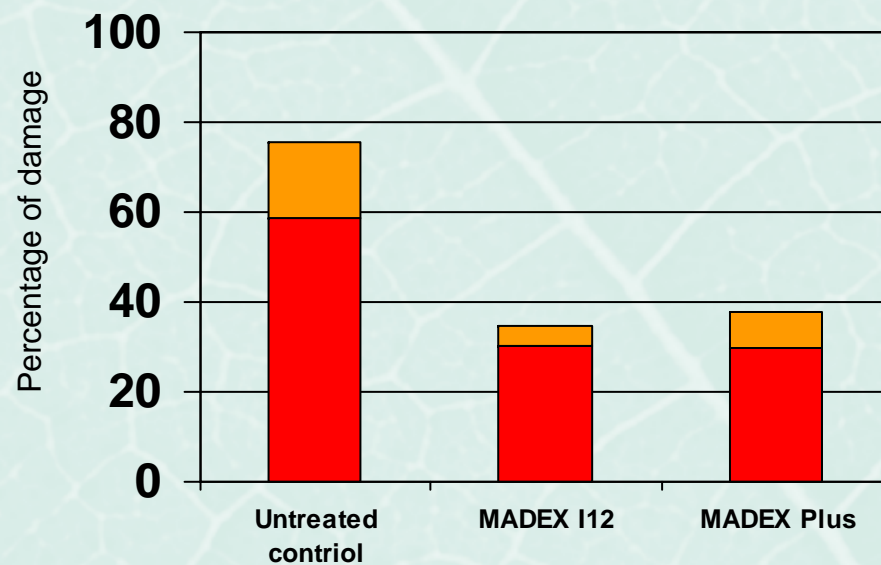
# Forlì (pre-harvest assessment)





- % superficial damage, Cm stopped
- % superficial damage, Cm active
- % deep damage

Data by Intrachem Bio, Italy; Sustain CpGV

# Forlì (pre-harvest assessment)



## ACTIVE DAMAGE:

-  % superficial damage, Cm active
-  % deep damage

Data by Intrachem Bio, Italy; Sustain CpGV

# Conclusions

- It is possible to break CpGV resistance
- Andermatt Biocontrol is able to select new genotype mixtures to develop new active products also in the future.
- Both MADEX Plus and MADEX I12 are effective against both CpGV-M resistant and CpGV-M sensible CM populations
- Registration of MADEX Plus  
(New active ingredient, inclusion on Annex 1, national registrations)

# Outlook



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Eidgenössisches Volkswirtschaftsdepartement  
**Bundesamt für Landwirtschaft BLW**  
Sektion Pflanzenschutzmittel

## Bewilligung

für das Inverkehrbringen von Pflanzenschutzmitteln gemäss Artikel 4 - 29 der Pflanzenschutzmittel-Verordnung.

Gestützt auf die Verordnung vom 18. Mai 2005 über das Inverkehrbringen von Pflanzenschutzmitteln (Pflanzenschutzmittel-Verordnung, SR 916.161) wird verfügt:

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Firma:	Andermatt Biocontrol AG, Stahlermatten 6, 6146 Grossdietwil (CH)	Produkt-Nr./Version:	7780/1
Erstgesuch:	31.12.2009	Eidg. Kontroll.-Nr.:	<b>W 6475</b>
Handelsbezeichnung:	<b>Madex Plus</b>		
Sachbezeichnung:	Organismen (Insektoviren)		
Formulierung:	SC-Suspensionskonzentrat		
Wirkstoffgehalt:	Apfelwicklergranulose-Virus [min. 3 x 10 <sup>13</sup> Granula/l]		
IUPAC-Name:	Entomopathogenes Virus / virus entomopathogène / virus entomopatogeno		

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### Bewilligt bis 31.10.2017

Anwendungsgebiet	Schaderreger/Wirkung	Anwendung unter Einhaltung von	(*)
<b>Obstbau</b>			
allg.	Apfelwickler	Konzentration: 0.006 % Aufwandmenge: 0.1 l/ha Wartefrist: 1 Woche(n)	1, 2, 3

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Thank you very much for your attention



[www.biocontrol.ch](http://www.biocontrol.ch)