GREEN LAB

biobest®

Research for sustainable crop management

The facility for your Side effect & Compatibility testing

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Why Biobest Green Lab?

Green Lab offers producers of crop protection products (chemical and biological) the possibility to screen the IPM-compatibility of their products

- The use of selective, IPM-compatible products is becoming more and more important
- Fewer residues are tolerated on fruits and vegetables (Maximum Residue Level)
- This creates pressure to reduce applications

Why Biobest Green Lab?

Biobest Green Lab is the best placed facility to test the compatibility of your crop protection products with beneficials used in biocontrol and pollination

- We have more than 15 years of experience with side-effect trials

- We have extensive knowledge about behaviour and performance of beneficial organisms in different crops

- We offer the possibility to conduct trials in our greenhouses in Belgium as well as under Mediterranean conditions (Spain)

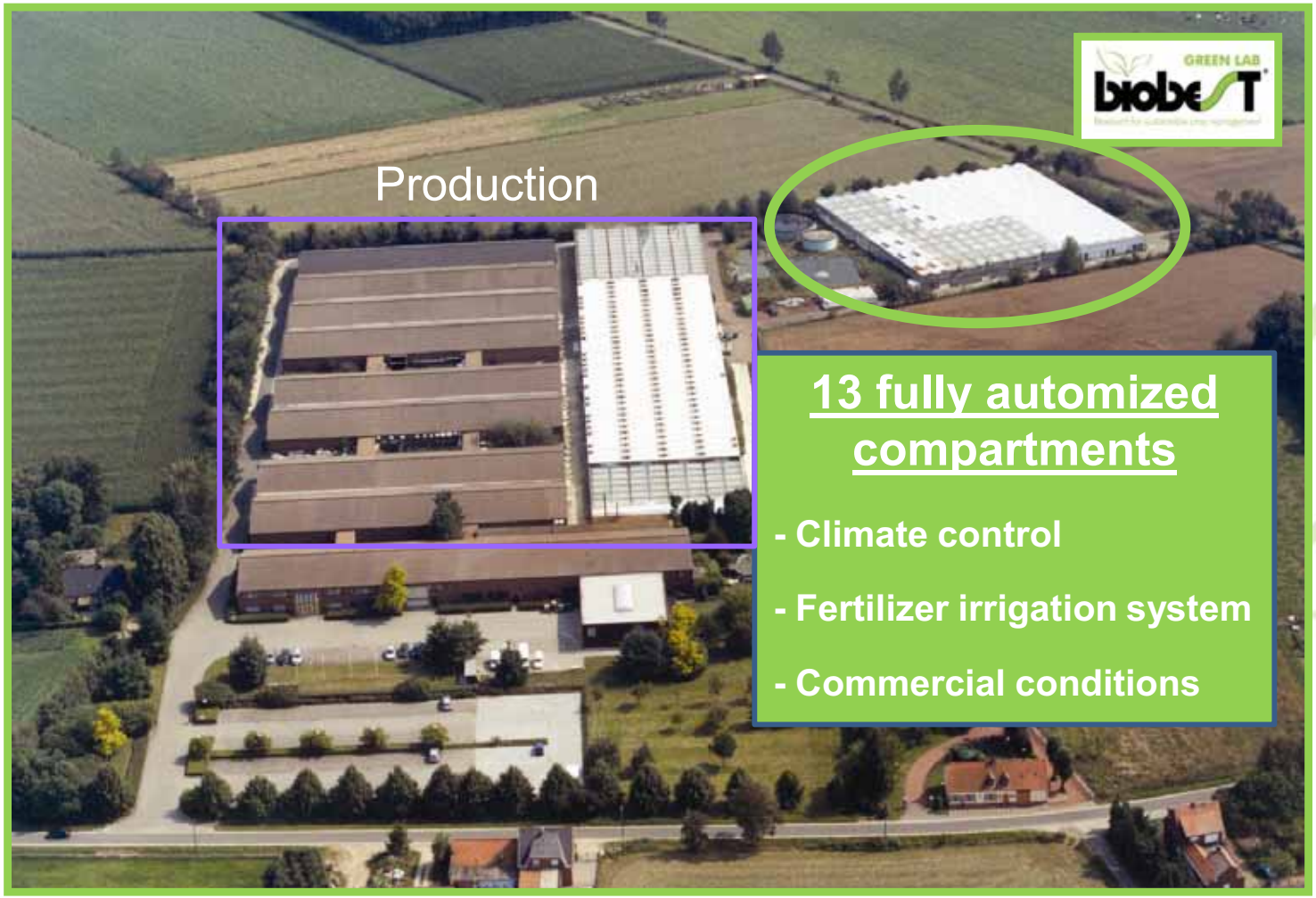
Why Biobest Green Lab?

Green Lab know-how provides information:

- Underpinning the safe use of crop protection products within IPM strategies

- As a part of the service-pack we offer to our customers

Green Lab : A professional approach



13 fully automized compartments

- Climate control
- Fertilizer irrigation system
- Commercial conditions


Fertilizer unit


Compartments


Work Tables

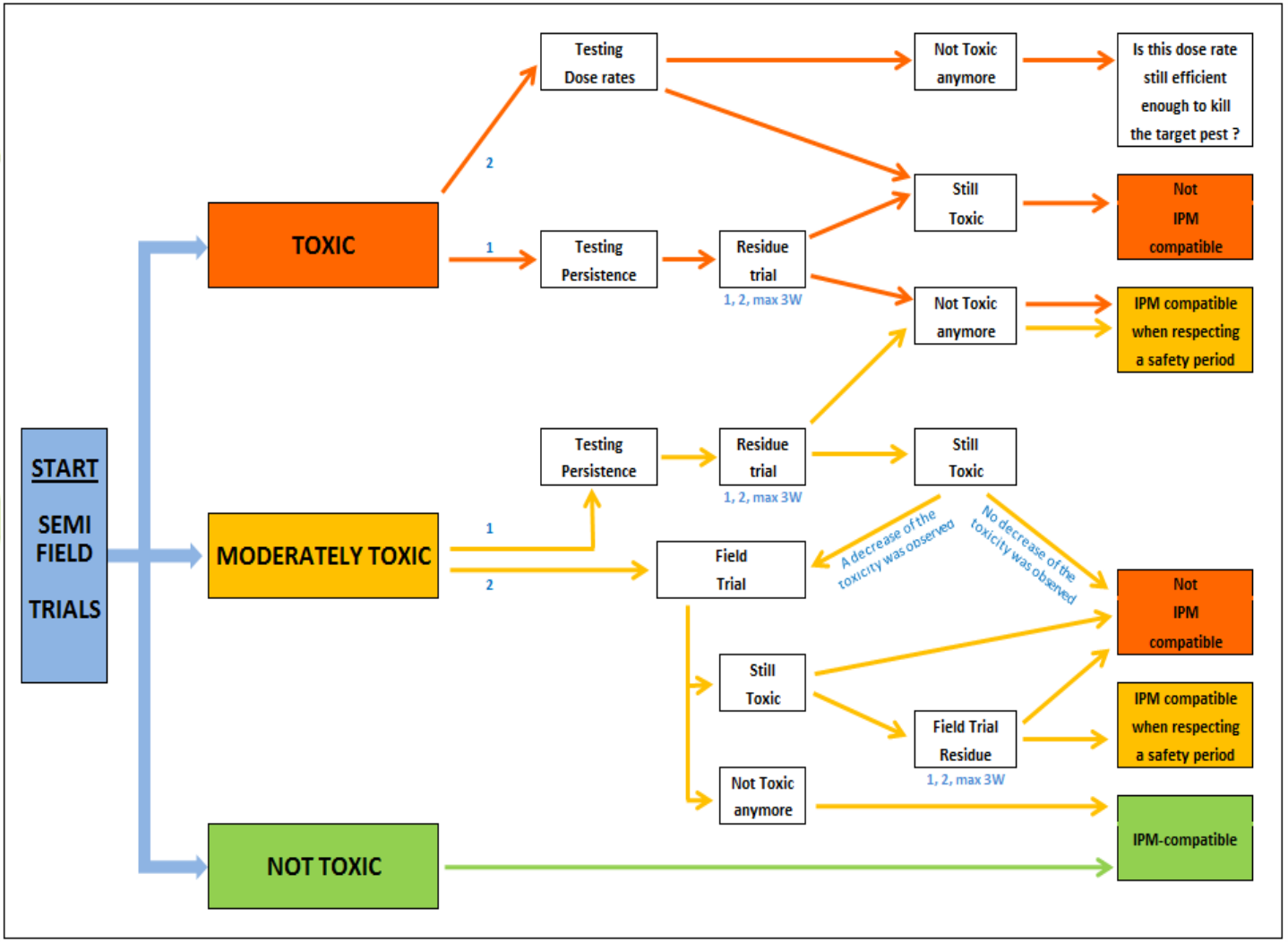
A complete range of research options,
from laboratory tests up to full scale field studies

Lab

Semi-Field

Field

Confidential and detailed research programs
for crop protection products
in all stages of their development



Side effect and compatibility studies
on pollinators and biological control agents

Pollinators

1. Laboratory trials
2. Semi-Field trials

& Biological control agents

1. Laboratory trials
2. Semi-Field trials
3. Field trials

Side effect and compatibility studies
on pollinators and biological control agents

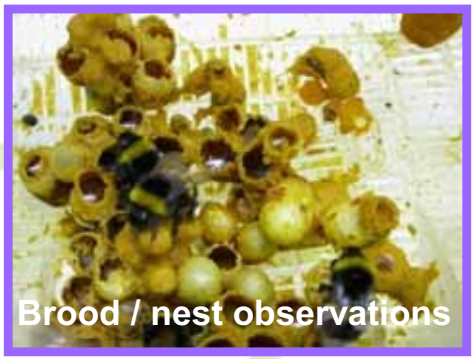
Bumblebee research at laboratory level

Characteristics

Side effect and compatibility studies
on pollinators and biological control agents

Bumblebee research at semi-field level

Characteristics



Side effect and compatibility studies
on pollinators and biological control agents

Research with bio-control agents at semi-field level

Characteristics

Side effect and compatibility studies
on pollinators and biological control agents

Research with bio-control agents at field level


Larger plants to create the right micro-climate


Bigger trial set-up with multiple repetitions per test-object


Commercial conditions

Characteristics

Commercial release systems


Natural or alternative food sources


Commercial spraying technique
Assessments via leaf samples

Informed and objective advice for the positioning of crop protection products within IPM strategies

Trial Protocol:

Macrolophus c

Direct toxicity of Test C
Macrolophus caligino
methods and/or diffe
compounds.

Trial Code
Macrca09-01A

Producer Tes
Company X
Trial Street Nb
Research Villag

1 List of ex
Direct toxicit
predator Mc
1. Wat
2. Acta
3. Act

TRIAL REPORT

Beneficial : *Macrolophus caliginosus*

Trial Code : Macrca09-01A - A.1.1.T1.Mc

Date Report : 15/10/2009

Content

1. Trial Protocol (Word document)
2. Trial Report Specific information (Excel document)
3. Conclusions and Recommendations (Word document)
4. Climate Data (BoxCar Pro document)
5. Statistical analysis

Results - Time line

Amblyseius swirskii

Macrolophus caliginosus
Field

```
$STATISTICS
$STATISTICS$LOWER
 [1] 40.66876932 36.1
0.31570692  0.1360488
23.55617019 24.049277
0.41372182  0.1665270

$STATISTICS$AVERAGES
 [1] 52.10 45.95 37.7
30.10 31.40  1.50  0.

$STATISTICS$UPPER
 [1] 63.5312307 55.74
1.2842931  0.9639512
38.7507221  2.2038211
0.9304275  0.9007144


$GLOBAL_COMPARISON
                Df Su
Treatment       11 19
Leaf             1
Treatment:Leaf  11
Residuals      456  7
---
Signif. codes:  0 '**

$MULTIPLE_COMPARISON
  Tukey multiple comp
    95% family-wise c

Fit: aov(formula = Re

$Treatment
```

3. Conclusions & Recommendations

Macrca09-01A

In this trial a "field model" approach is followed. In comparison to the semi-field tests, this is reflected in the following elements of the experimental design:

- Smallest experimental units are small plots of 12 plants each, with each experimental object consisting of 4 plots. The semi-field models use single plants as the smallest experimental unit with 10 replicates.
- Establishment of a significant population of *Macrolophus caliginosus* consisting of all stages, based on several introductions prior to chemical treatment.
- Chemical treatments not based on spraying till run-off but using a controlled spray volume, whereby a well known amount of active ingredient per plant will be applied.

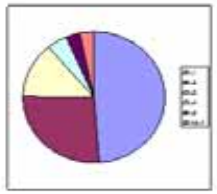
Tomato plants were appr. 1 to 1.50m high at the time of application of the chemicals. *Ephestia* eggs were provided in sufficient quantities such as to provide a non-limiting food source for the *Macrolophus caliginosus* population.

The *Macrolophus caliginosus* population was assessed 7 days after application.

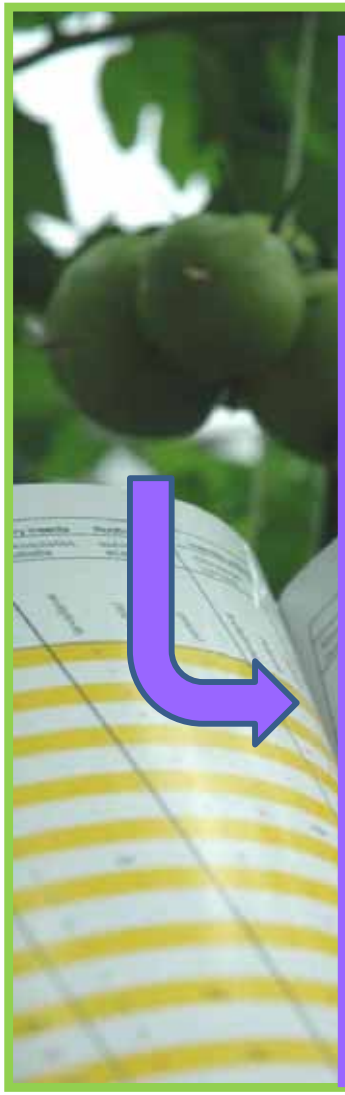
The control (spray) and non-toxic standards (spray and drench) demonstrate that a large and mixed population of *Macrolophus caliginosus* had been successfully established on all plants.

For each plot, 10 plants were evaluated by removing 2 complete compounded leaves and by counting all stages of *Macrolophus caliginosus* present. In the control, the average number of mobile stages per plot amounted to 450.

The distribution of stages in the control is shown in the pie graph below, indicating that approximately half (48 %) of all individuals were L1 larvae, approximately one quarter (26 %) L2.



Establishing reliable and relevant IOBC/WPRS classifications



Active ingredient Actieve stof Matiere active	Application/Toepassing	Bumblebees Hommels Bourdons		Predatory mite - Roofmijten - Acariens prédateurs										Predatory insects - Roofinsecten - Insectes prédateurs																	
				Amblyseius californicus		Amblyseius cucumeris		Amblyseius degenerans		Phytoseiulus persimilis		Hypoaspis miles Hypoaspis acul.		Aphidoletes aphi-dim. Feltiella acar.			Chrysopa Carnea			Coleoptera (1)			Atheta		
INSECTICIDES/ACARICIDES		Kolonie/Colony	Persist.(5)	Nymph(e)/Adult(e)	Persist.	Nymph(e)/Adult(e)	Persist.	Nymph(e)/Adult(e)	Persist.	Nymph(e)/Adult(e)	Persist.	Nymph(e)/Adult(e)	Persist.	Larva/Larvae	Adult(e)	Persist.	Larva/Larvae	Adult(e)	Persist.	Larva/Larvae	Adult(e)	Persist.	Larva/Larvae	Adult(e)	Persist.
propoxur	☺	s	-	-										-	-	-	4	4	>6w	-	4	>6w	-		
pymethrozine	😐	s	-	1										1	1	-	1	1	-	1	1	-	-		
pymethrozine	☹	i	-	1										1	1	-	1	1	-	1	1	-	-		
pyrethrine (+ P.B.O.)	☹	s	24h	4										-	4	>1w	1	2	1w	-	4	>2w	-		
pyridaben	☺	s	48h	4										4	-	-	1	1	-	3	1	-	-		
pyriproxifen	☺	s	-	1										-	-	-	1	1	-	3	1	3d	-		
rape seed oil	😐	s	-	-										-	-	-	1	-	-	1	-	-	-		
resmethrin	☹	s	12h	-										1	2	-	1	-	-	-	-	1w	-		
rotenon	☹	s	12h	-										-	-	-	2	4	-	-	-	-	-		
spinosad		s	24h	1										1	1	-	1	1	-	1	1	-	-		
spirodiclofen	😐	s	-	-										-	-	-	-	1	1	-	1	1	-		
sp		s	-	x	-	x	-	x	-	x	-	x	-	x	x	-	x	x	-	x	x	-	-		
sulfotep	😐	f	-	-	-	4	>6w	4	>6w	3	3d	2	-	4	-	>8w	-	4	-	-	-	-	-		
tau-fluvalinaat	☹	s	24h	4	-	4	-	4	-	4	-	4	-	-	-	-	2	2	-	4	4	-	-		
tebufenozide	☹	s	-	1	-	1	-	1	-	2	-	1	-	-	-	-	-	1	-	-	-	-	-		
tebufenpyrad	☺	s	12h	1	-	2	-	4	-	4	-	1	-	4	-	-	-	2	-	-	4	-	-		
teflubenzuron	☺	s	-	1	-	1	-	1	-	1	-	1	-	-	-	-	4	3	-	3	2	-	-		
tetrachlorvinphos	☹	s	-	-	-	4	>6w	4	>6w	2	3d	2	-	-	4	-	2	2	-	-	-	-	-		
tetradifon	😐	s	-	-	-	1	-	1	-	1	-	2	-	-	1	-	1	1	-	-	1	-	-		

Advice

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Thank You!

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