

Controlling *Balaninus nucum*, the hazelnut borer

Biological control
with
nematop®

nematop®
is manufactured by



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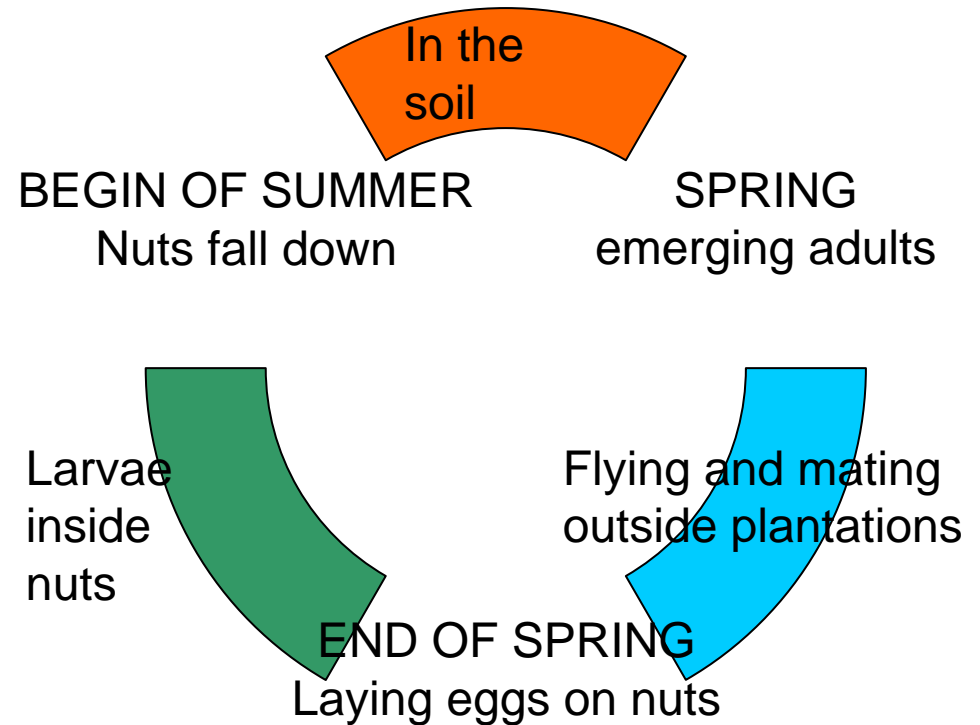
Hazelnuts Borer a very harmful pest



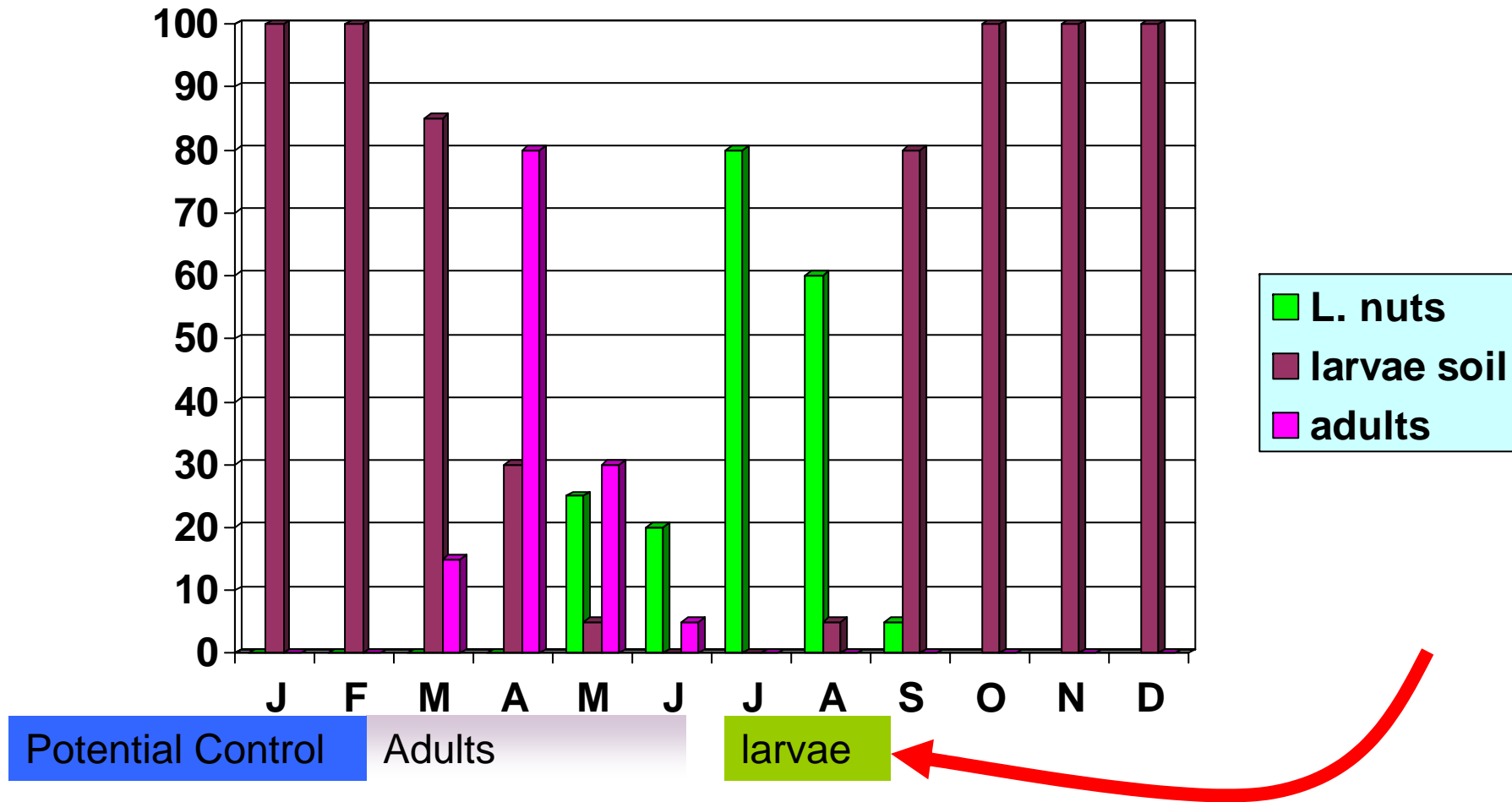
- Up to 80% losses
- Expanding fast
- Mating outside plantations
- Larvae protected in the nuts or in the soil
- Few/no available authorised insecticides

Life cycle

- Adults emerging from soil early in Spring (April)
- Mating in wild area
- The females fly back to hazelnuts and lay eggs inside young immature nuts
- Eggs hatch soon and larvae develop inside the nuts
- When larvae are mature, the nuts fall down (August)
- Larvae immediately leave the nuts and find a protected place in the soil, more or less deep



Life cycle – Control strategy



CONTROL STRATEGY

- Usually, several chemical insecticides are sprayed over the trees before and during egg laying:
Due to the nature of the insecticides used, this method leads to toxicological hazards for humans and disturbs the biodiversity in the plantations
- In the frame of an intensive scientific programme over years (european project COST 850 www.cost850.ch), a new safer and better performing control strategy has been developed in order to biologically control the larvae in the soil
- This strategy is based on the use of NEMATOP

Efficacy surviving trial (in tubes) Floirac , France

e-nema1



Folie 6

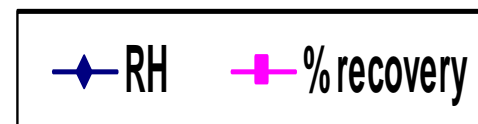
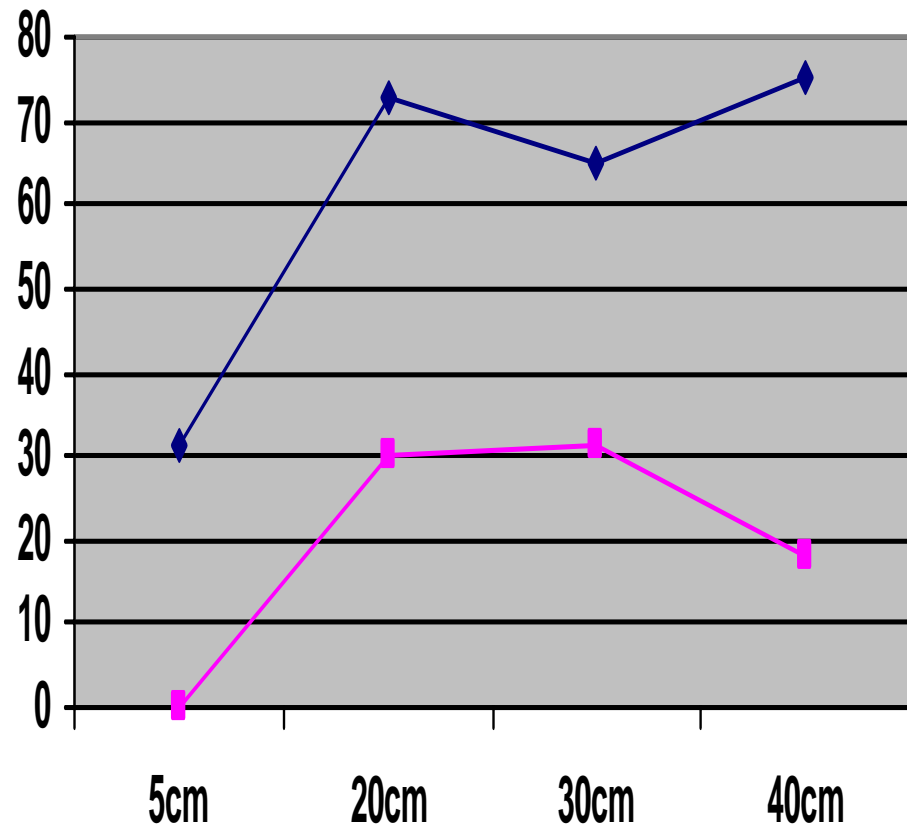
e-nema1

What do you mean by survival? If survival of nematodes then you should better term it persistence: Efficacy and persistence of nematodes.
Otherwise only call it efficacy trial

Arne Peters; 24.09.2007

Position of larvae in the soil in relation to soil moisture

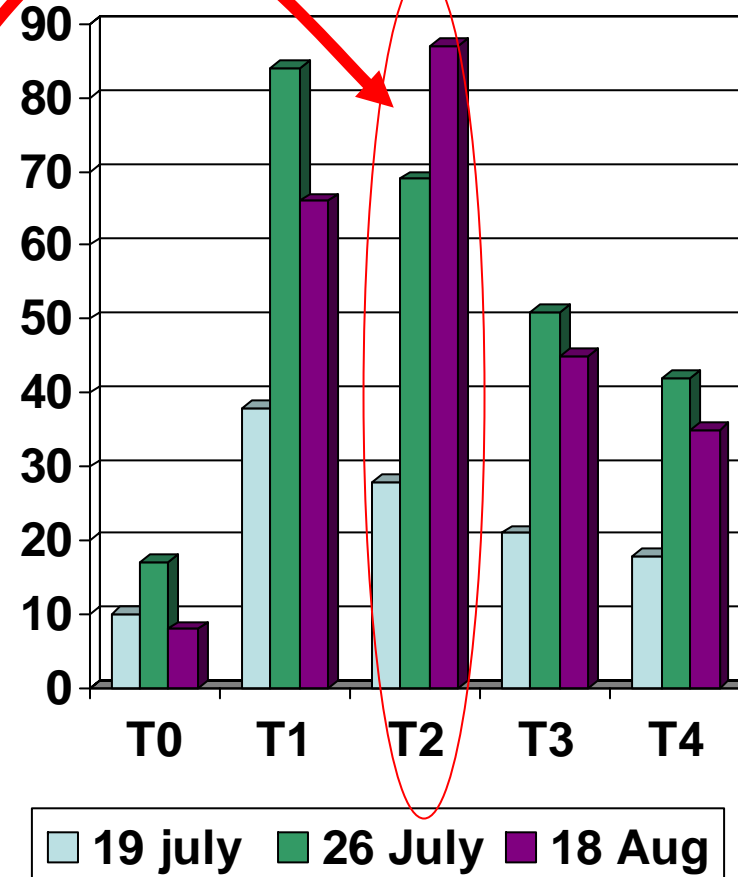
- If the soil moisture is kept high (irrigation)
- Insect larvae remain at the upper soil level (between 10 and 35 cm)



Nematop - rate of application

(en Baylac – Floirac 2005)

- % dead larvae
- T0 : irrigation 100%
no Nemaplus
- T1: Full irrigation
Nematop: 500'000
1 treatment
- T2: Full irrigation
Nematop: 250'000
2 treatments
- T3: ½ irrigation
Nematop: 500'000
1 treatment
- T4: ½ irrigation
Nematop: 250'000
1 treatment



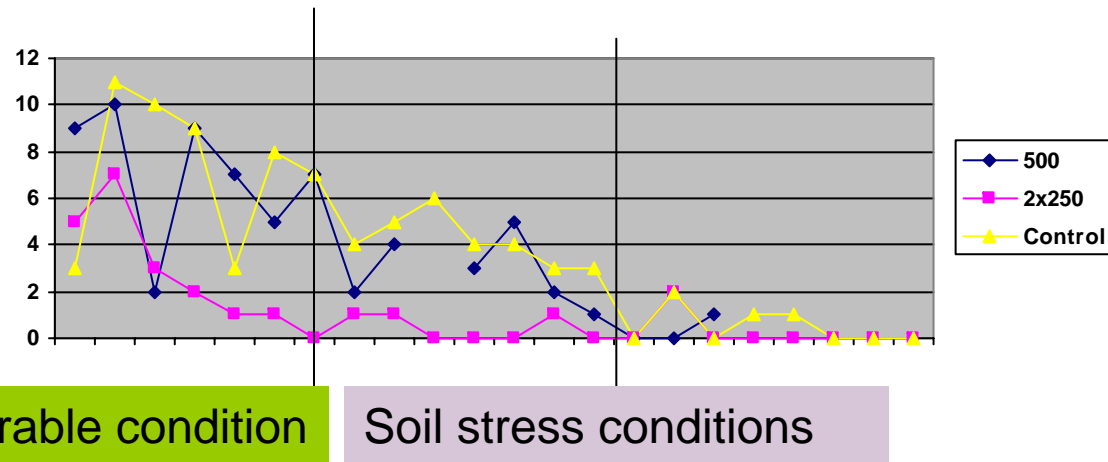
Field Efficacy Trials

Carennac, France

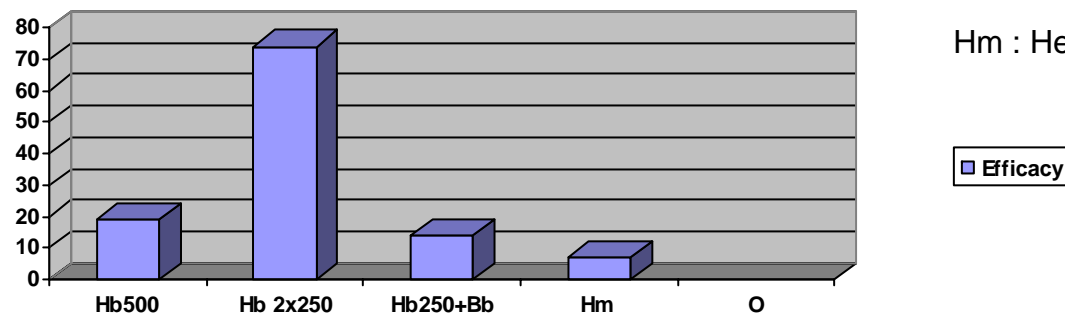


Carennac Trial 2006

- Survival of larvae in the soil over time



- Efficacy



Hb : Nematop
 Bb : Beauveria brogniarti
 Hm : Heterorhabditis megidis

NEMATOP Use Recommendation

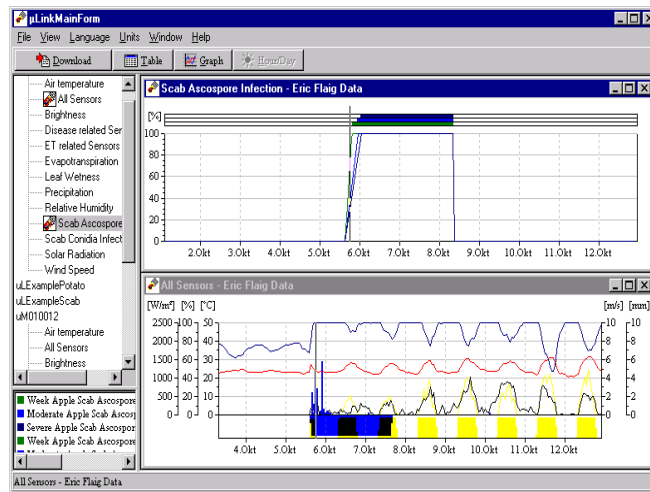
- To be mixed with water
- 2 applications over the soil
- Rate of application: 250'000 nematodes/m²
- First application end of July (when nuts start to fall down)
- Second application mid August
- Spray over 1.50 m on each side of the plantation line
- Irrigate the soil before and after the application, or mixing NEMATOP to the irrigation water



NEMATOP® to be used at the right time under correct soil moisture condition

- Assistance with weather station (forecasting modeles)
- Irrigation: on time

Disease or Insect simulation outputs can be viewed simultaneously with the climate data



NEMATOP®

- High level of insect control
- Highly specific
- Safe to human
- No risk of contamination
- Environmentally friendly
- No residues
- Sustainable
- Safeguard the economy of production

NEMATOP®

- A powder containing the Entomopathogenic Nematode *Heterorhabditis bacteriophora*
- To be mixed with water
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- Rate of application: 250'000 nematodes/m²
- First application end of July (when nuts start to fall down)
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NEMATOP®

the biological control
of
Hazelnuts Borers



to enter into a new
technology age

- Sustainable
- Effective
- ensuring profits

