Controlling Balaninus nucum, the hazelnut borer

Biological control with nematop ®

nematop ® is manufactured by

Bernard J. Blum
AGROMETRIX ICM, Basle, Switzerland
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 in the soil.
Life cycle – Control strategy

![Graph showing life cycle stages and control strategy.]

- **Potential Control**
- **Adults**
- **Larvae**

Legend:
- Green: L. nuts
- Purple: Larvae soil
- Pink: Adults
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](http://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
What do you mean by survival? If survival of nematodes then you should better term it persistence: Efficacy and persistence of nematods. Otherwise only call it efficacy trial.

Anne 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

![Graph showing survival of larvae over time](image)

- Efficacy

- ![Efficacy chart](image)

  - 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 models)
- Irrigation: on time
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
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the biological control of Hazelnuts Borers to enter into a new technology age

• Sustainable
• Effective
• ensuring profits