

# Research project: Nema-Sens

## Apple codling moth control with EPN: climatic parameters for optimal timing of EPN application

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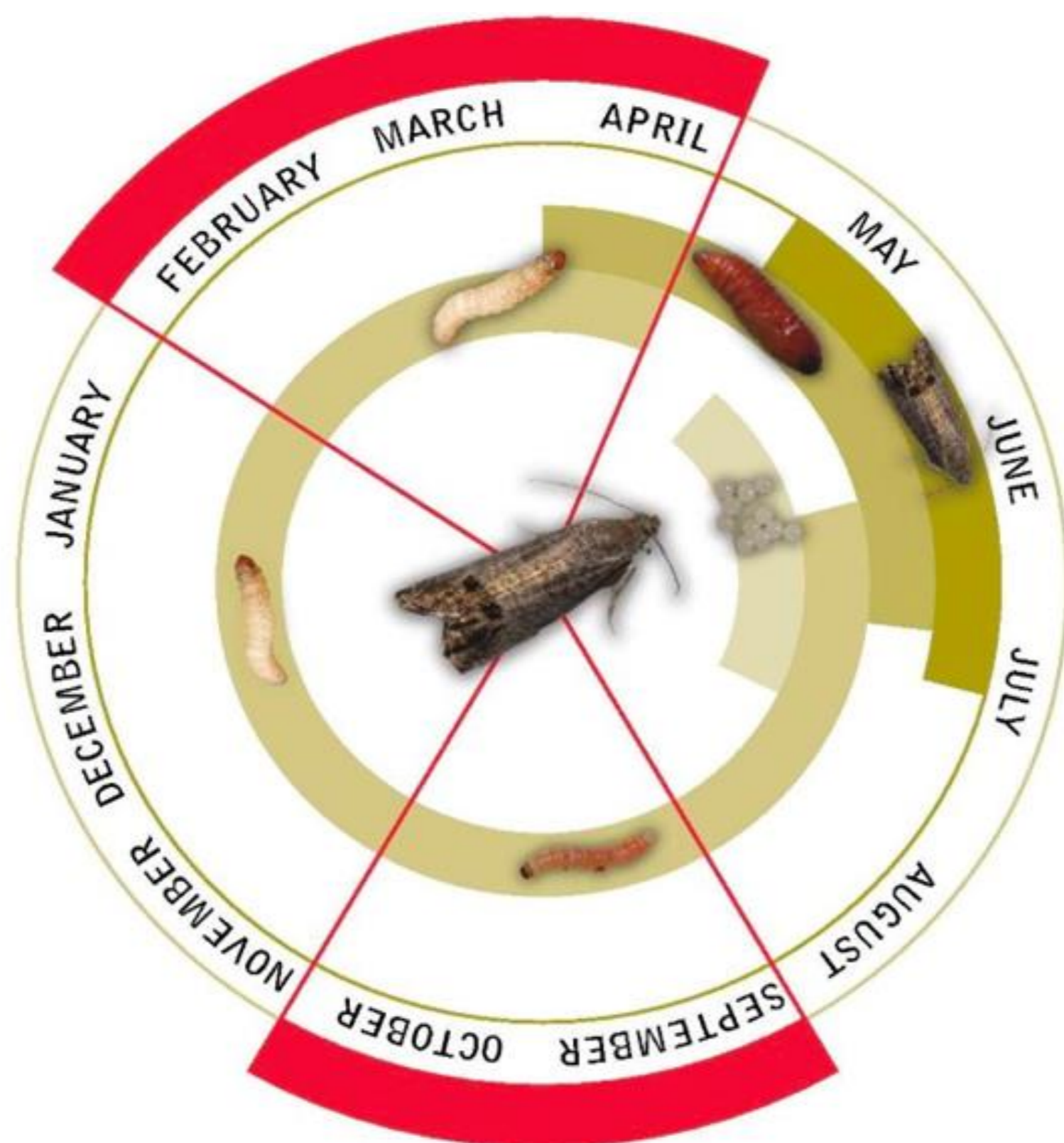
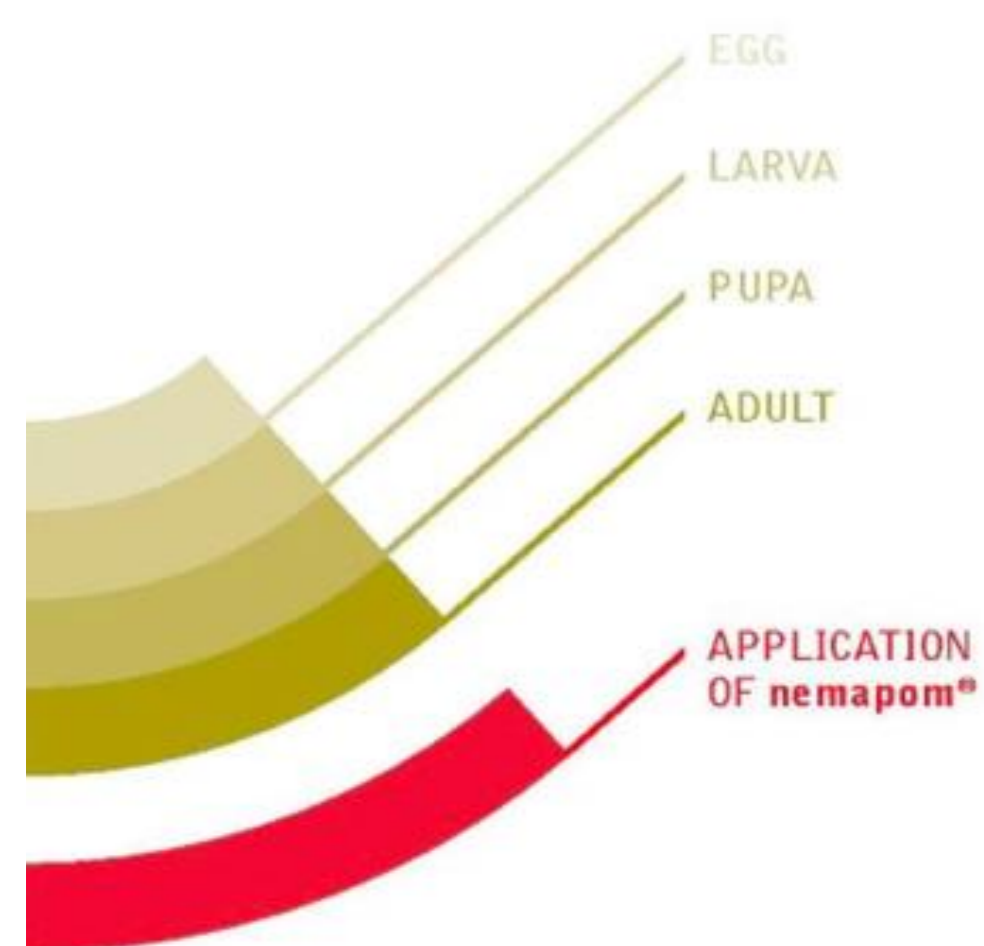
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### Codling moth (*Cydia pomonella*)

The codling moth is one of the most important insect pests in apple growing. For overwintering, the larvae leave the apple and seek out hiding places under the bark or in the ground and spin themselves into a cocoon.

The product nemapom® contains entomopathogenic nematodes *Steinernema feltiae* for the biological control of overwintering larvae of the apple codling moth *Cydia pomonella*. **Nematodes are sprayed in autumn or spring on the tree bark.**

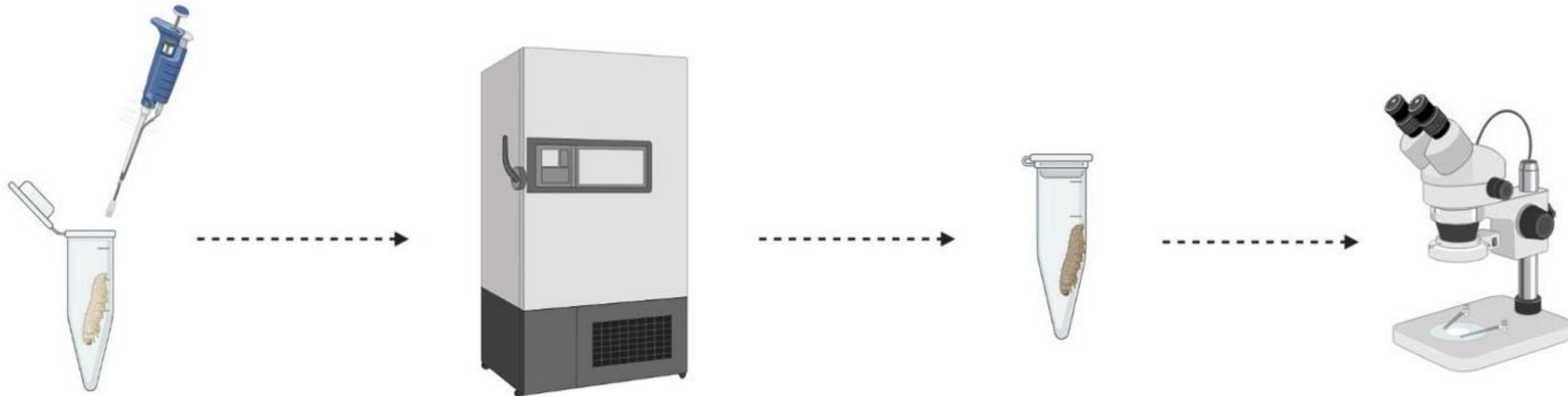
However, the control success in the trunk area is very much dependent on the prevailing microclimatic conditions.

The Nema-Sens project aims to define ranges of the parameters humidity, bark moisture and temperature at which the insect-pathogenic nematodes survive on the bark and subsequently find, penetrate and kill these pests.

### At what temperature activity of *Steinernema feltiae* against codling moth starts?

Inoculation: 100 DJs per codling moth larva

Incubation time before dissection: 2h, 4h, 6h, 24h, 48h, 72h, 96h und 120h



Incubation at 5, 6, 7.5 and 8°C

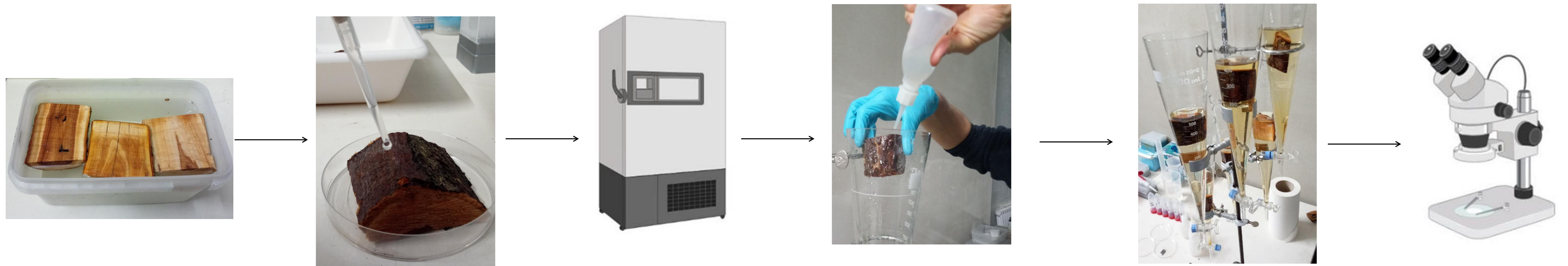
Codling moth dissected and penetrated nematodes counted

➤ Low temperature activity of *S. feltiae* was tested in incubators at 5, 6, 7.5 and 8°C

➤ In previous tests, no activity was recorded at 4°C

➤ *Steinernema feltiae* infected and killed *C. pomonella* larvae at temperatures as low as 5°C. Although the time to kill the insect larvae was 14 days, this low temperature activity is advantageous as the larvae overwinter in the bark for several months

### How to investigate the survival of *Steinernema feltiae* applied on bark?



Bark pieces (6 cm x 6 cm) were soaked for 30 min in water

Inoculation: 1000 DJs per bark piece Bark pieces previously sprayed with an adjuvant

Incubation under controlled humidity and temperature in climatic chamber

Bark pieces rinsed with 100 ml of water

Bark pieces let to soak on Baermann funnel

Nematodes counted after 24 hours incubation in funnel

- To investigate the survival on bark, we developed a bark spraying assay and collected the nematodes after incubation at controlled conditions
- Two and four hours after spraying, 85% and 51% of the nematodes had survived on bark, respectively
- This method can give us insight how harsh temperature- and humidity conditions will affect their survival

### Developing a decision support system

- We are performing field trials, in which we closely monitor the climatic parameters with weather stations and developed a bark humidity sensor
- The overall objective is to provide an advisory service that uses weather forecasts to help fruit growers and hobby gardeners decide on the best time to control codling moth with nematodes. The project is supported by funds of the Federal Ministry of Food and Agriculture (BMEL)

