Biological Control of *Hylobius abietis* in Nurseries/Forests Using indigenous Nematodes & Fungi

Dr Minshad Ansari - CEO
Stephen Ford - CTO

Bionema
Founded on Research – Focused on Nature

Challenges

- *Hylobius abietis* can kill 50-100% of seedlings.
- €200 million annual loss for European countries.
- Chemical insecticides are increasingly restricted and have limited effect.
- Urgent need for sustainable and effective alternatives.

Objectives of This Talk

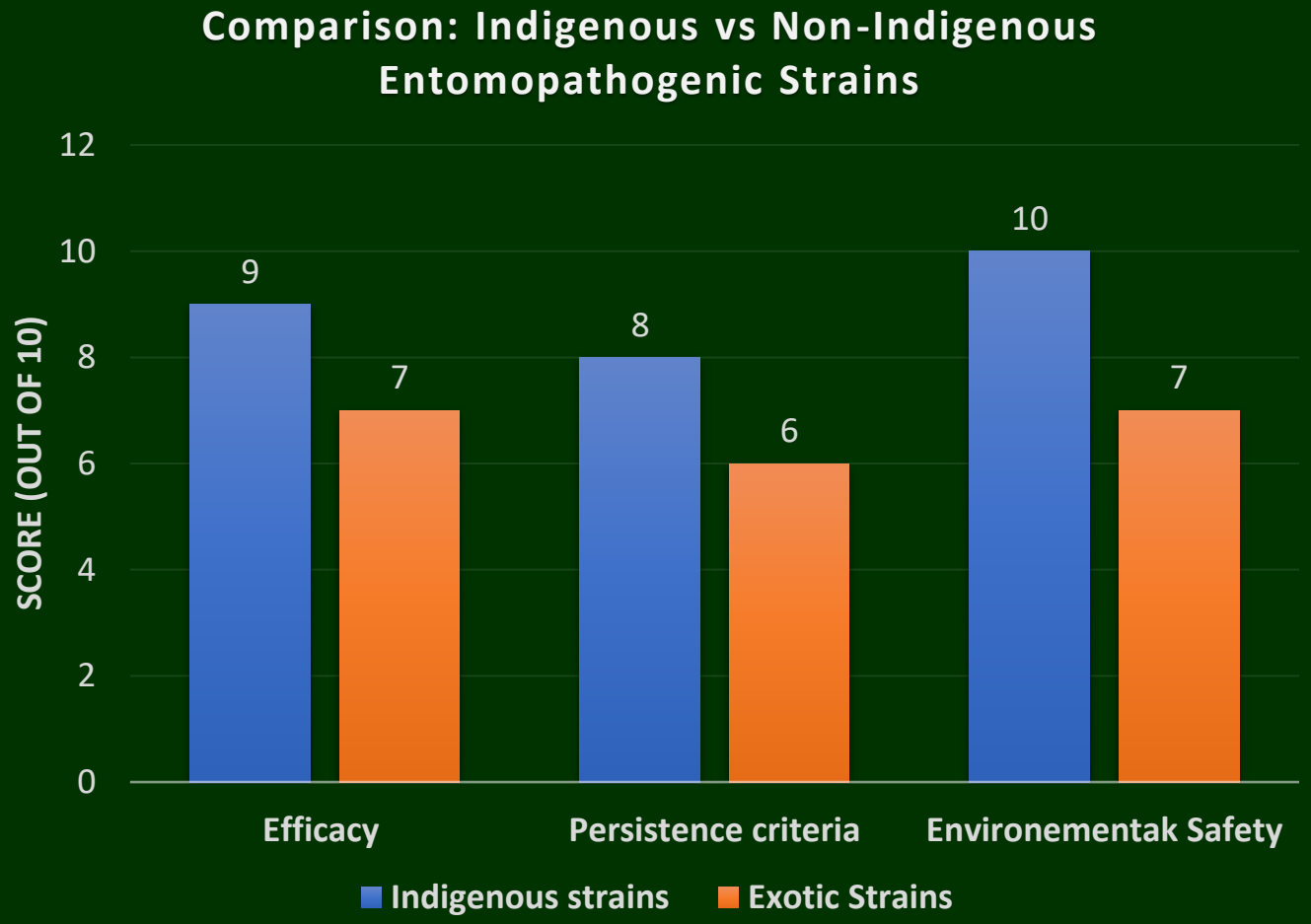
The talk will introduce Indigenous biocontrol agents, including entomopathogenic nematodes (EPN) and fungi:

1. NemaGen® is a next-generation product based on *Steinernema carpocapsae (*BNL1998) or *Heterorhabditis downesi* (BNL1999).
2. Metar®, based on *Metarhizium anisopliae* strain 101.
3. Soil-Jet®, a biocompatible wetting agent

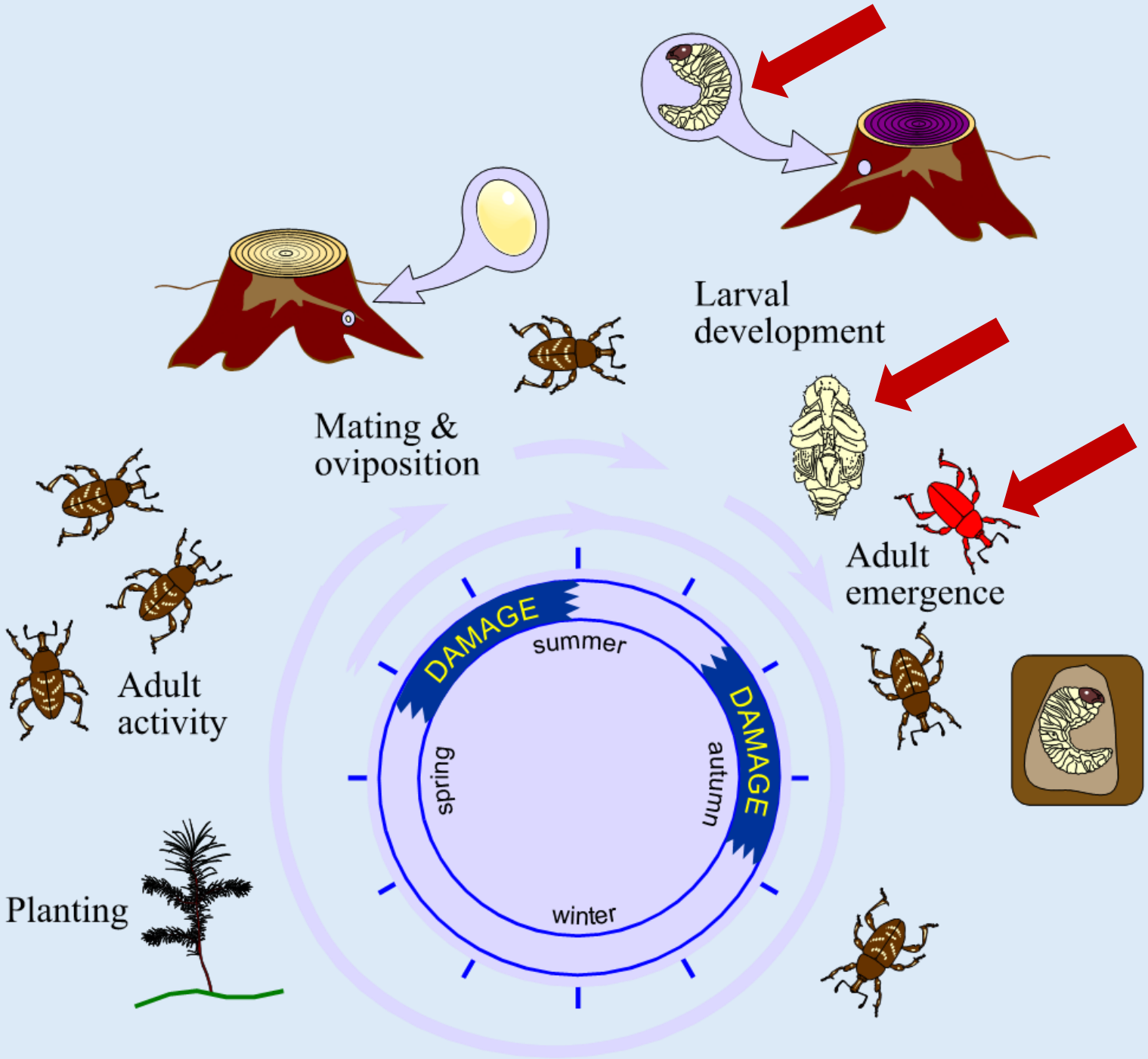
- Field trials and results.

Why Indigenous Biological Control?

- ✓Indigenous EPNs/fungi are better adapted to local climates.
- ✓Safe for non-target organisms.
- ✓Enhance persistence and efficacy.

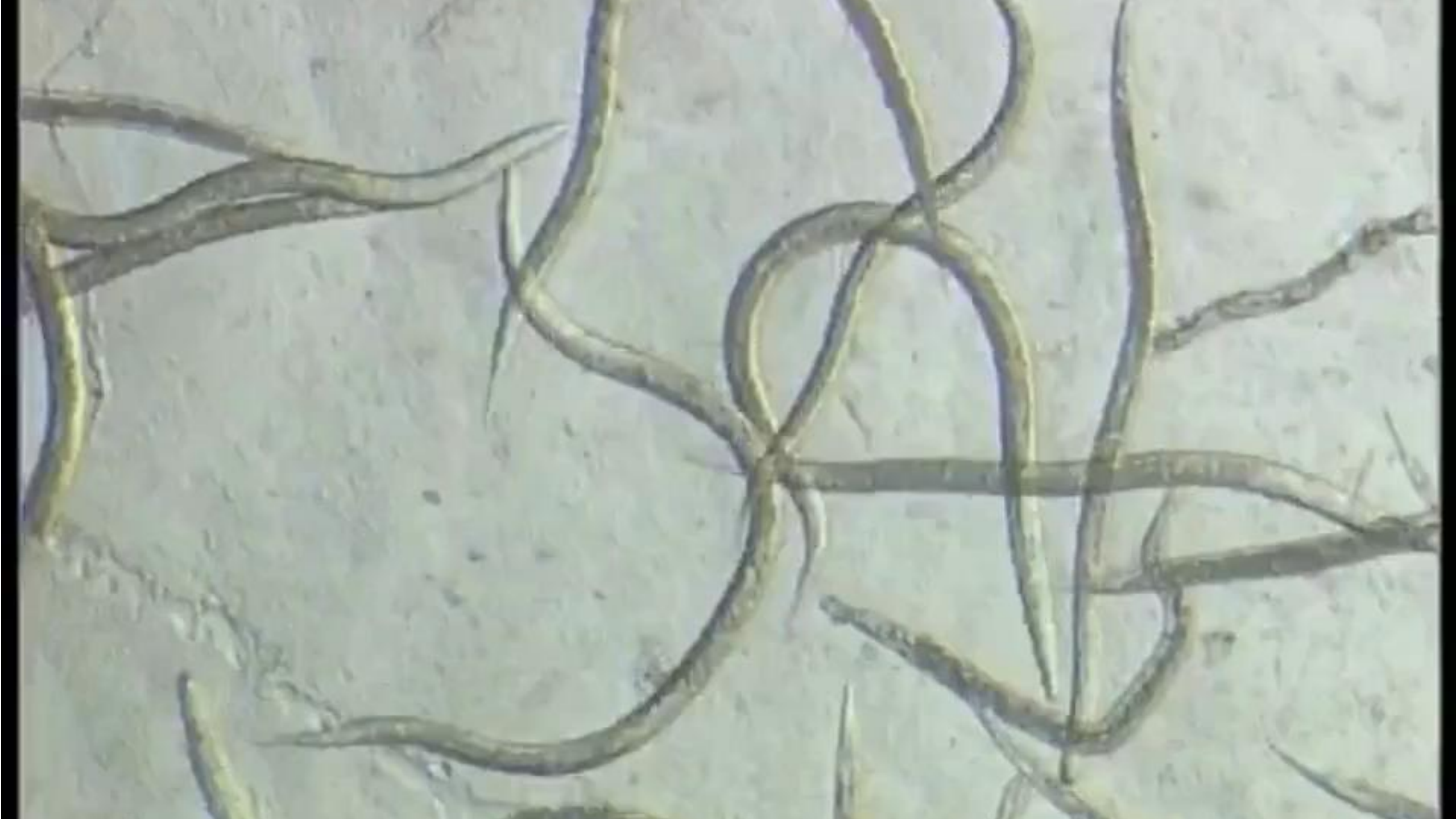


Life Cycle of *Hylobius abietis* 1-3 years



Launch of Nex-Gen NemaGen®

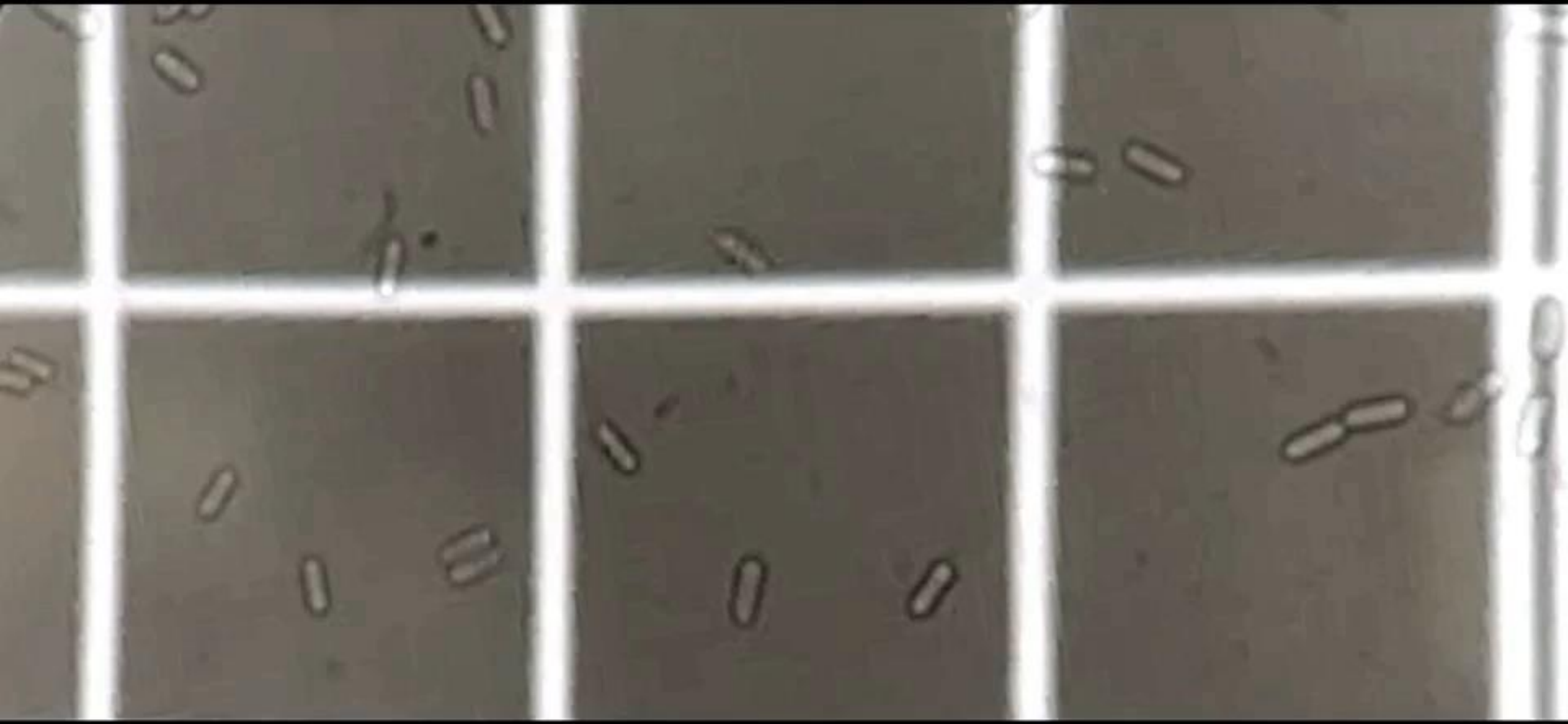
- BTME in January 2025.
- Longer shelf life, higher virulence and improved soil penetration.
- Effectively control weevils, chafer, leatherjackets, caterpillars etc.
- Proven field efficacy



Each capsule contains 2000 nematodes selected for its infectivity...

Metar®101

1. A broad host range.
2. Produce high spore yield.
3. Fast kill.
4. Formulation: GR, SC, and microencapsulation for soil and foliar applications.



Metar®101 effectively infects *Hylobius abietis* larvae at depths of up to 30 cm in the stump.

Forest Field Trials and Sites

- **Site**: Clear-felled 15–18-month-old Sitka spruce.
- **Design**: 5 blocks × 5 stumps per plot (25 stumps/treatment).
- **Treatments**:
  - NemaGen® (3 million/stump) ± 2 L Soil-Jet® (wetting agent) in 500ml of water/stump.
  - Metar®101 (1×10^{11}, 1×10^{12} and 1×10^{13} spores/ha + 2 L Soil-Jet® in 500ml of water/stump.
- **Assessment**: 4 weeks post-application for larval mortality.

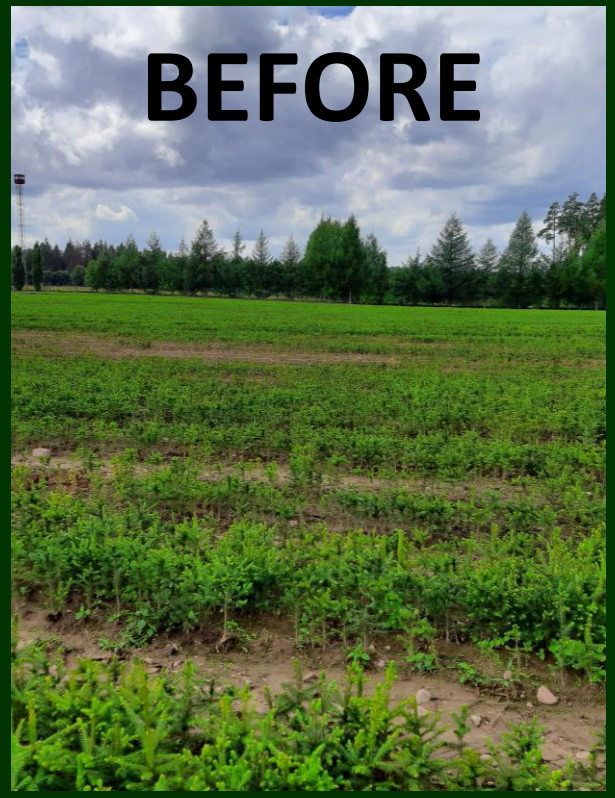
Twyi Forest
Wales
1000 stumps treated

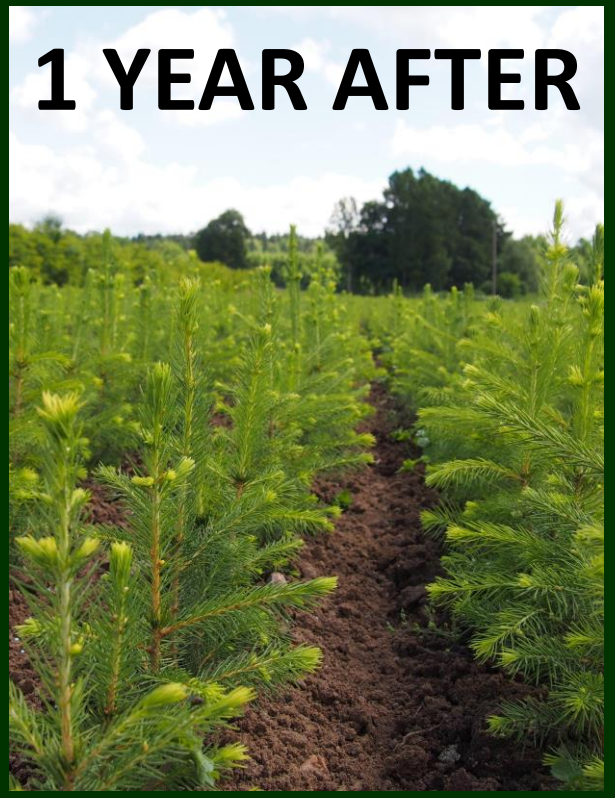

Cum Berwyn
Wales
June 2017
1000 stumps treated

Mid Wales, June 2016-2017
1000 stumps treated

Cyfoeth Naturiol Cymru
Natural Resources Wales

Nurseries Application
Lithuania-2023-2024
Target: May Beetle, *Melolontha melolontha*





Application in Forest Nurseries

- NemaGen®: 5.0 billion/ha + 2 L Soil-Jet® via drip irrigation.
- Metar®101 SC: 10^{12} spores /ha.

NemaGen®and Metar® Application in Wales Forest

NemaGen® and various doses of Metar®101 were applied in 500 ml of water around the stump.

Trial Assessment

- Four weeks after, stumps were hacked and bark peeled from top to bottom (~30 cm).
- The number of live and dead larvae/adults/pupae was counted to evaluate efficacy.

NemaGen® (1245 & BNL501) effectively reaches and kills *Hylobius abietis* larvae up to 40 cm deep inside the stump.

NemaGen® (*Steinernema carpocapsae*) kills larvae, pupae and immature adults in stumps.

NemaGen® (*Heterorhabditis downesi*) kills larvae, pupae and immature adults in stumps.

Efficacy of NemaGen®
Soil-Jet® improves efficacy from 20-30%

+

Efficacy (%) of Metar®101
Soil-Jet® improves efficacy from 10-15%

+

Key Results & Product Performance

- **NemaGen®** achieved 65-68% larval mortality without Soil-Jet®.
- With **Soil-Jet®**, NemaGen® efficacy increased to **88-95%,** a **20-30%** improvement.
- **Metar®101:**
  - Medium dose: up to **76% mortality**.
  - High dose: up to **95% mortality.**
  - Soil-Jet® improved efficacy by an additional **10-15%.**
- Standard *Metarhizium* product: only 54.5% mortality.

Indigenous strains performed better than non-indigenous.

Conclusions & Next Steps

- NemaGen® is commercially available.
- Metar®101 is pending regulatory approval.

Let’s collaborate to make forestry more sustainable together!

Bionema

Founded on research – focused on nature

Join the Biocontrol Revolution

Contact: info@bionema.com
or Dr Minshad Ansari
m.a.ansari@bionema.com
s.ford@bionema.com

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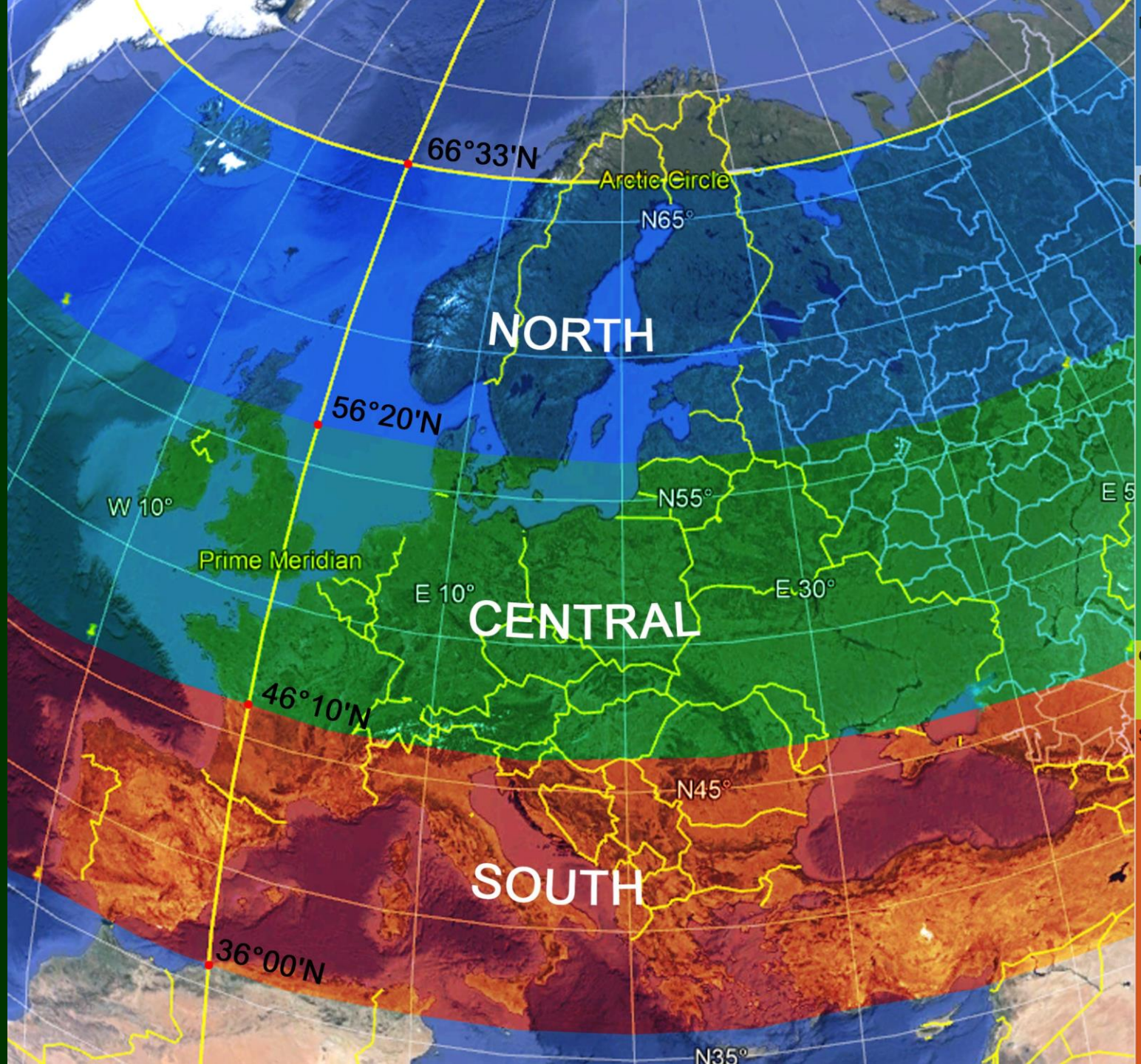

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More Northern

More Southern