Inhibitory and Stimulatory Use of Biofumigant Extracts for Control of *Globodera pallida*
Globodera pallida

- Sedentary, endoparasitic
- Host range within *Solanum* genus
- Up to 80% yield loss
- Can remain dormant for 30+ years

Credit: Ulrich Zunke, University of Hamburg
Life Cycle of *G. pallida*
Control of *G. pallida*

- **Soil Fumigation**
  - Methyl bromide
    - Use halted in 2015
- **Drawbacks**
  - Toxicity
  - Persistence in soil

Credit: L.M. Dandurand
Mustard Seed Meal as a Biofumigant

• Excess OM from oil pressing

• Contains glucosinolates
  – *Brassica juncea*
    • Sinigrin
  – *Sinapis alba*
    • Sinalbin

Credit: M. Morra
Glucosinolates

Credit: Matthew Morra
Seed Meal Extracts

Credit: M. Morra
Lab Trials

• Magenta Vessel Biofumigation
  – 2-week exposure
  – Hatching, egg count, and viability assays
  – Greenhouse reproduction bioassay
Seed Meal Extract Hatching Assay

- **Bare Soil + PRD**
- **Bare Soil + Soil Extract**
- 0.6 t/ha
- 1.1 t/ha
- 1.7 t/ha
- 2.2 t/ha

G. pallida Hatch (%)

Legend:
- Blue bar for **Bare Soil + PRD**
- Red bar for **Bare Soil + Soil Extract**
- Light blue bar for 0.6 t/ha
- Orange bar for 1.1 t/ha
- Purple bar for 1.7 t/ha
- Green bar for 2.2 t/ha
Eggs/g Soil

Reproduction Bioassay

- Bare Soil
- 0.6 t/ha
- 1.1 t/ha
- 1.7 t/ha
- 2.2 t/ha
Field Trials

• 2016
  – Effectiveness of *B. juncea* in field
  – 2.2 t/ha

• 2017
  – Effective rate of *B. juncea*
  – Spring and fall trials
  – 0.6 t/ha and 2.2 t/ha
Field 2016 Hatching

G. pallida Hatch (%)

- Bare Soil + PRD
- Bare Soil + Soil Extract
- Biofumigant
**S. alba Lab Hatching Assay**

- **S. alba Hydrolysis Product + PRD**
- **S. alba Meal + PRD**
- **Bare Soil + PRD**
- **S. alba Meal + Soil Extract**
- **Bare Soil + Soil Extract**

The diagram shows the hatching percentage of *G. pallida* under different conditions. The highest hatching percentage is observed for the **S. alba Hydrolysis Product + PRD** treatment, followed by the **S. alba Meal + PRD** treatment. The **Bare Soil + PRD** and **S. alba Meal + Soil Extract** treatments have significantly lower hatching percentages.
Summary

• **B. juncea**
  – 100% eradication at 2.2 t/ha

• **S. alba**
  – Enhanced hatch in conjunction with PRD
  – Effective at 1 umol/mL
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