Soil moisture and temperature conditions affect survival and sporulation capacity of rhododendron leaf disks infested by *Phytophthora ramorum*

**Obj. 1: Determine the affect of chilling upon sporulation**

Leaf disk inoculum was incubated in saturated soil (0 kPa) at 20°C for three weeks, which had the effect of reducing sporulation capacity relative to the pre-incubation sporulation and controls maintained at 4°C. Inoculum was then placed at either 4 or 20°C. Disks were retrieved and assessed for sporulation capacity at 196 days after the exposure of a subset of this inoculum to 4°C.

**Obj. 2: Determine how moisture & temperature affect sporulation & survival**

To test how incubation at different temperatures and moisture levels affects sporulation, leaf disk inoculum was packed into capsules containing soil at matric potentials of 0, -40, and -400 kPa. Capsules of each moisture level were placed in growth chambers set at an average temperature of 6, 14, 20, or 28°C in a randomized split-plot design. Six replicates per moisture level per temperature were removed at 2, 6, 12, and 18 weeks post-incubation to assess for survival and sporulation potential.

**Obj. 3: Determine how prior moisture & temperature conditions affect sporulation response to chilling**

At the time of the 18-week assessment for Obj. 2, capsules containing inoculum incubated at each temperature: moisture combination were collectively moved to 4°C for 49 days. The period 49 days was selected for its ability to maximize sporulation capacity for inoculum initially incubated at 20°C at 14°C (see Obj. 1).

**Field Observations**

- Sporulation capacity from buried inoculum declined over time; this decline was greater for shallow inoculum exposed to warmer temperatures.
- Sporulation capacity for inoculum at both depths increased in the autumn/winter.
- This increase corresponded to the period of greatest recovery of *P. ramorum* from leaf baits placed at the soil surface.

**General Methods**

- Produce inoculum
- Expose to variable temp. & moisture treatments
- Recover & induce sporulation at 20°C
- Assess survival & sporulation

- Inoculum moved from 20°C to 4°C produced significantly more sporangia than the constant 20°C treatment 14 (trial 1) or 7 (trial 2) days after exposure to colder temperatures.
- Maximum sporulation from the 20°C to 4°C treatment was observed 49 days post-exposure in both trials.

**Main Conclusions**

- Exposure to moderate temperatures & moisture regimes (such as experienced in soil) rapidly reduces sporulation potential from leaf material infested with *P. ramorum*; however,
- Sporulation potential increases post-exposure to cooler temperatures, especially for inoculum incubated at 20°C.
- Onset of cooler temperatures in autumn and winter may initiate the development of new *P. ramorum* epidemics from soilborne sources.