

## **Open Discussion Notes**

### **Questions on *Spongospora* and Powdery Scab**

#### **How long do sporosori survive?**

Literature suggests at least 14 years

Some crops reduce infestation of soils (Brassicas, Datura)

Resting spore germination stimulated by wheat, Datura

Bait crops (e.g. tomato, *Solanum sisymbriifolium* has been used to stimulate hatch of potato cyst nematode eggs, so could possibly stimulate germination of *Sss* resting spores)

Recent research where germination has been assessed in bioassays indicates between 2 and 50% of resting spores in sporosori are released.

#### **Relative importance of seed tuber and soil inoculum**

Seed tuber inoculum transmits pathogen to disease-free fields.

Soil inoculum potentially causes much more severe powdery scab.

#### **Zoospore behavior**

Diriwächter suggested zoospores survive for at least 2 hours.

Zoospores could swim for at least 0.5 m (Ueli Merz).

Irrigation water could transmit sporosori and zoospores.

Scottish irrigation recommendations during tuber set period, small amounts of irrigation (12-18 mm rather than normal 25 mm).

Tuber initiation over a 2-4 week period.

Drip irrigation could be used to apply pesticide (e.g. fluazinam) at critical period.

#### **When does infection occur?**

Root infection occurs very early in plant growth, (within a few hours after inoculation in bioassays and within 1 week in pot experiments).

#### **What are the mechanisms of plant resistance?**

Likely to operate at the stage of zoospore infection of root or stolon epidermis cells, or entry of zoospores to lenticels.

Zoosporangium development may be inhibited.

Release of secondary zoospores may be reduced.

Zoosporangium development and sporosorus development (in root and stolon galls and in tuber lesions) are different life cycle stages, and may be affected by different host resistance mechanisms.

Zoospore infection is through host root and stolon membranes.

There is some relationship between root infection and tuber infection, but this is not consistent. Cv. Swift is an extreme example, which is almost immune to tuber infection but gets severe root galling. Cv. Russet Burbank is moderately resistant to tuber infection but gets severe root galling.

Why are cultivars with russet tubers less susceptible to tuber infection? Is this simply because lesions are less visually obvious?

#### **The *Spongospora* life cycle**

Still to be fully outlined, particularly relating to sexual reproduction.

## **Cultivars and resistance**

Comparisons between russet skinned cultivars and non-russet cultivars.

Is tuber skin thickness a factor in resistance?

Suberisation period; is this related to tuber resistance?

Can penetrometer measurements be used to predict tuber resistance?

Can root, stolon or tuber DNA content be used to predict tuber resistance (to root or tuber disease).

## **Potential future research projects**

1. Expand collaborative project to monitor effects of climate (temperature and rainfall) on root galling and tuber powdery scab.  
[European trials completed]  
Co-ordinated trials.  
Countries include: Switzerland, South Africa, Israel and Sri Lanka.  
Common cultivars (Netherlands supplied cultivars), e.g. Nicola, Valor, Agria.  
Protocol used for European/Australian trials to be provided by Ueli Merz.
2. More Sss collections from different regions to be sent to Rebecca Gau for genetic characterisation.
3. Irrigation sequencing for reducing powdery scab on susceptible cultivars.
4. Timing of infection and exploring mechanisms of resistance (possible PhD project with Jacquie van der Waals).
5. Green fluorescent protein marker into Sss.
6. Integrated disease management for powdery scab [this approach has already been widely suggested, incorporating several disease control strategies into best practice for growers]
7. Methods for controlling/preventing root galling.
8. Effects of micronutrients on host resistance, on Sss, and on the structure rhizosphere microbial community (use of metabolic profiling techniques).
9. Can soil samples routinely taken for nematodes be used for detection of Sss, using PCR techniques? SASA (Scotland) currently charge £138 per sample. Could the Scottish service be used internationally?
10. Survival of Sss in sludge, compost or irrigation water, and these as sources of crop infection.
11. Soil factors affecting Sss and powdery scab. Do suppressive soils exist, and if so, what are their characteristics? Information from the Australian MASH trials.
12. Trap crops/Rotation crops. Do they provide a possible powdery scab management strategy? What are the mechanisms (direct toxicity to Sss or stimulators of resting spore germination).

## **Outputs from the 13<sup>th</sup> European Powdery Scab Workshop**

All participants committed to providing an Abstract (approx. 400 words) of their presentations, to Ueli Merz by 31 July 2011.

PowerPoint presentations can be presented on the Spongospora website (individuals can choose this option)

## **Next Workshop**

Possibly, this will be held in South Africa in 2014 or 2015.