MAY10

Pathogen of the month – May 2011

Phytophthora nicotianae

Breda de Haan

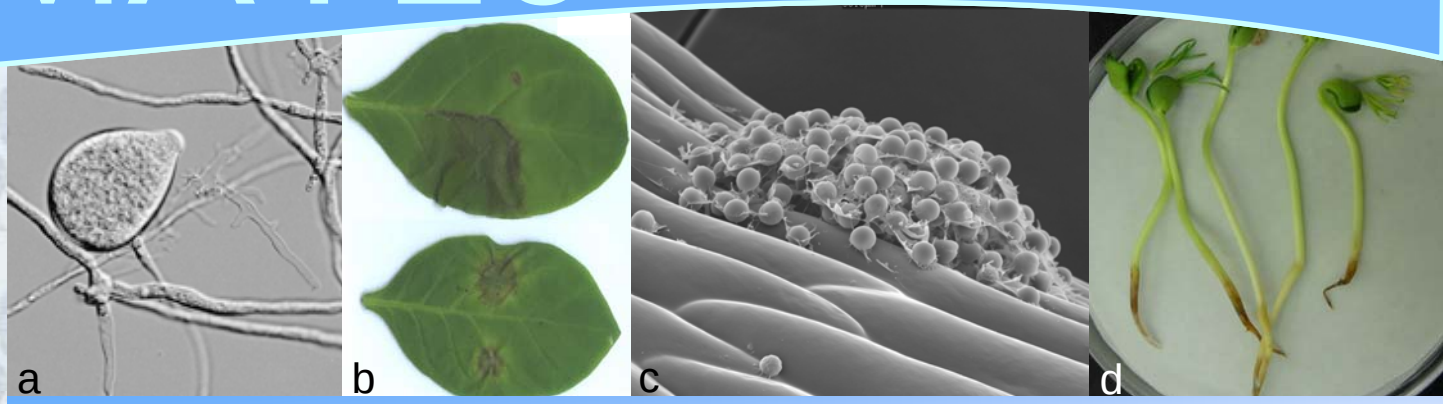

Fig. 1. Sporangium (a); tobacco leaf blight (b); cysts on a tobacco leaf surface (c); *P. nicotianae* root rot of lupin (d). Photo credits: a Ambikapathy, Marshall, Hocart & Hardham (2002) Fungal Genetics and Biology 35, 287-299, b and d, Victoria Ludowici, c Adrienne Hardham.

Diseases: *Phytophthora* crown, fruit, bud and root rots, leaf and seedling blight and stem cankers. **Classification**:D: Eukaryota, K: Stramenopila, C: Oomycota, O: Peronosporales, F: Pythiaceae.

Phytophthora nicotianae is an important soil borne pathogen of herbaceous and woody plants. It is found in tropical, subtropical and temperate regions and was first isolated in Australia from *Primula* species in 1927 by Brittlebank and Fish.

The Pathogen: *P. nicotianae* was first isolated in Indonesia from tobacco in 1896. Since then there have been numerous synonyms for this pathogen as the original description was inaccurate. In 1993 Hall redescribed and neotypified the species under the name *P. nicotianae* but many researchers still use *P. parasitica*.

The pathogen is a heterothallic species and forms aplerotic oospores from amphigynous antheridia and septate oogonia on lima bean agar. The sporangia are noncaduous and spherical, ovoid and ellipsoid with 1 to 3 sharp papillae. Chlamydospores are either intercalary or terminal and spherical in shape. Mycelia are generally arachnoid.

Distribution: *P. nicotianae* has a cosmopolitan distribution both within Australia and throughout the world.

Host Range: The pathogen infects plants from approximately 90 different families and different isolates have distinct host ranges. This pathogen infects a number of important agricultural and horticultural crops including members of the Nightshade family, cotton, citrus, a number of tropical fruit crops (e.g. coconut and pineapple), ornamentals such as petunia and some *Banksia* and Eucalypt species.

Impact: Although *P. nicotianae* infects native species it is not regarded as an important ecological pathogen. It is an important pathogen in many Australian plant industries. Yield losses can be up to 15% in citrus and 6% in tobacco enterprises. In 1993 the Australian tomato industry lost an estimated $5 million because of this pathogen.

Detection and control: Baiting is an effective method of isolating *P. nicotianae* from soil. Identification based on morphology is possible. SSCP fingerprinting and ITS sequencing can also be used for identification from pure cultures.

Control of *P. nicotianae* is similar to control of other *Phytophthora* spp. with prevention, hygiene and cultural control being arguably the most successful control methods. Crop rotation is effective for annual crops but can be difficult to implement because of the wide host range of the pathogen. Both metalaxyl and phosphonate are effective, however, metalaxyl tolerant strains have been reported in tobacco.

Further reading : Ambikapathy, Marshall, Hocart & Hardham (2002) Fungal Genetics and Biology 35, 287-299.
Cahill (1993) Review of *Phytophthora* diseases in Australia. Canberra, RIRDC, Report series No 93/94
Erwin & Ribeiro (1996) *Phytophthora* diseases worldwide. St Paul, USA, APS Press.
Gallegly & Hong (2008) *Phytophthora* Identifying Species by Morphology and DNA Fingerprints. St Paul, USA, APS Press.
Hall (1993) Mycological Research 97, 559-574.
van Jaarsveld, E., Wingfield, M. J., and Drenth, A. 2002. Plant Disease 86, 362-366.

Key Contacts: Your local department of agriculture, DAFF, Biosecurity Australia, Victoria Ludowici, PhD candidate Australian National University, Phone: 6125 9782, Email: victoria.ludowici@anu.edu.au