

Phillip Simon Wharton

35 Plant Biology Building, Michigan State University, East Lansing, MI 48824

tel: (517) 355 4754

pswharton@gmail.com

RESEARCH INTERESTS

Host/pathogen interactions, plant cell biology and microscopy, phenolic biochemistry and genetics of the metabolism of secondary plant products in disease interactions.

EDUCATION

Ph.D. University of Reading, UK. (July 1997). Major: plant disease resistance. Areas of emphasis: epidemiology and disease management, host-pathogen interactions, cell biology, biochemistry and metabolism of host defense compounds, cytochemistry, plant anatomy.

BSc. University of Reading, UK, with Honors. 1993. Major: Biological Sciences. Areas of emphasis: botany, microbiology and zoology.

CURRENT RESEARCH ACTIVITIES

Department of Plant Pathology, Michigan State University, East Lansing, MI. Supervisor Dr. William Kirk.

My current research activity is focused on the epidemiology, biology and host-pathogen interactions of fungal diseases on potato and sugar beet in Michigan, with an emphasis on *Phytophthora infestans* (on potato) and *Rhizoctonia solani* (on potato and sugar beet).

Current Projects:

“Developing prediction and control systems for control of Rhizoctonia diseases in potato and sugar beet.”

The objectives of this project are to determine optimal conditions for pathogen growth and disease initiation, and to study the systematics of fungicide x temperature interactions in controlled environment and field experiments in order to develop more effective and economical methods to control this pathogen (Research Publication 3).

“New and up-to-date printed and electronic resources for potato disease management.”

The goals of this project are to use video and DVD production technologies along with up-to-date printed fact sheets and electronic resources to extend information on all aspects of potato production directly to growers (see Extension Publications).

“Evaluation of the role of host resistance and the physiological properties of tubers in relation to Potato Late Blight disease resistance.”

The objectives of this project are to a) determine the importance of the tuber skin (periderm) in resistance to infection by *P. infestans*, and b) determine whether or not resistance in MSU potato varieties identified as tuber late blight resistant, is due to mechanical characteristics of the periderm or biochemical host defense mechanisms that occur in the underlying tissue in a range of cultivars with different levels of foliar and tuber resistance.

RESEARCH EXPERIENCE

Department of Plant Pathology, Michigan State University, East Lansing, MI. Aug 2001 to Dec 2003. Supervisor Dr. Annemiek Schilder.

Postdoctoral Research Associate. Research Emphasis: Biology and host-pathogen interactions of fungal pathogens of small fruit crops in Michigan, with an emphasis on blueberry anthracnose, mummy berry disease, and *Phomopsis* cane and leaf spot of blueberry.

2002-Dec 2003:

“A multi-faceted approach to the management of blueberry pests and diseases.”

The overall goal of this project was to diversify management options for blueberry pests, diseases, and post-harvest contaminants in Michigan. (Research Publications 2, 5)

“Up-to-date printed and electronic resources for blueberry health management.”

This project was formulated to provide Michigan blueberry growers and others interested in blueberry cultivation with, reliable and up-to-date information on the identity, biology and life-cycles, and current control methods for pests and diseases, as well as beneficial organisms, weeds and abiotic disorders of blueberries. (see Extension Publications)

2001-2002:

“Sustainable Grape Production in Michigan with Less Pesticide and Fertilizer.”

The objectives of this project were to 1) Define the influence of foliar damage on CO₂ assimilation and partitioning at specific vine phenophases. 2) Determine economic injury thresholds for key foliar pests. 3) Develop accurate less wasteful nitrogen application regimes.

Department of Horticulture, Michigan State University, East Lansing, MI. Sept. 1999 to Aug 2001. Supervisor: Dr. Amy Iezzoni. Co-supervisor: Dr. Alan L. Jones (retired 2002).

Postdoctoral Research Associate. Research Emphasis: Biology and host-pathogen interactions of *Blumeriella jaapii* and cherry varieties in Michigan.

Sept. 1999-Aug 2001.

*“Identification and characterization of cherry selections resistant to cherry leaf spot (*Blumeriella jaapii*).”* (Research Publications 4, 6, 8)

- Collected and setup a single spore isolate collection of *B. jaapii* isolates from various *Prunus* hosts.
- Developed new methods for culturing *B. jaapii* isolates to increase its growth and sporulation rates for inoculum production.
- Documented the infection process of *B. jaapii* in susceptible and resistant cherry selections using conventional light and laser scanning confocal microscopy and cytochemical techniques.
- Developed a novel detached leaf disk assay for rapidly screening cherry seedlings for resistance to cherry leaf spot.
- Carried out screening trials to identify cherry germplasm which is resistant to cherry leaf spot. Three resistant cherry selections have so far been identified.

Department of Botany and Plant Pathology, Purdue University, West Lafayette, IN, 47907. Sep. 1997 to 1999. Supervisor: Dr. Ralph Nicholson.

Postdoctoral Research Associate Project Title: “Biosynthetic pathways involved in the production of sorghum phytoalexins.” (Research Publications 10, 11)

- Documented the temporal synthesis of sorghum 3-deoxyanthocyanidin phytoalexins after fungal inoculation using photodiode array-HPLC.
- Developed a bioassay for the uptake of L-[U-¹⁴C]-phenylalanine in sorghum mesocotyls which was used to identify the intermediates and pathways involved in the biosynthesis of sorghum phytoalexins using a combination of HPLC/radioisotope detection, autoradiography and mass spectrometry.
- Provided technical support and training for people wishing to use the ultra-centrifuges, UV spectrophotometer and HPLC machine in the lab; performed routine maintenance of Beckman HPLC machine; replaced defective parts and wrote scripts to automate data collection.

Department of Cell Biology, IACR-Long Ashton Research Station, University of Bristol, BS18 9AF UK. 1995 to 1997. Advisor: Dr. Richard O’Connell. Department of Agriculture, University of Reading, Reading, Berkshire, UK. 1993 to 1995. Co-Advisor: Dr. Angela Julian.

Postgraduate Student. Thesis Title: “A cytological study of the fungal infection process and host responses in sorghum anthracnose.” (Research Publications 7, 8, 12, 13, 14)

At Long Ashton:

- Developed methods to localize the infection of *C. sublineolum* on sorghum so that individual infection sites (approx. 15 µm in diameter) could be identified and sectioned for transmission electron microscopy.
- Documented the host/pathogen interactions between *C. sublineolum* and sorghum at the sub-cellular level using scanning and transmission electron microscopy.
- Studied the germination and adhesion of *C. sublineolum* germlings on artificial surfaces using transmission electron and fluorescence microscopy. Extracellular matrices associated with *C. sublineolum* germlings were visualized and chemically characterized using a range of cytochemical techniques (e.g. cryo-fixation/freeze substitution, negative staining, immunofluorescence using fluorescein-conjugated lectins and monoclonal antibodies, immunogold labeling and anionic colloidal gold labeling).

At Reading:

- Setup a single spore isolate collection of *C. sublineolum* isolates from different cultivars of sorghum from around the world.
- Carried out disease screening trials to identify cultivars of sorghum that were resistant to *C. sublineolum*. One resistant, one susceptible and one differentially resistant cultivar were selected for further study.
- Characterized the infection process of *Colletotrichum sublineolum* on *Sorghum bicolor* at the cellular level using Phase Contrast and Normarski DIC light microscopy in combination with plasmolysis and vital staining techniques.

TEACHING EXPERIENCE

Guest Lecturer, Michigan State University. Course: PLP 881, Biochemical and molecular bases of host-pathogen interactions. Give the class on mechanisms of infection by plant pathogenic fungi.

Demonstrator, Purdue University. Course: BTNY 607, Physiology and biochemistry of host parasite interactions. Wrote lab protocol and demonstrated the use of HPLC for the extraction and analysis of anthocyanins.

Graduate Student Advisor, Purdue University. Taught the principles of phenolic biochemistry and methods used to extract, isolate and identify phenolic compounds using thin layer chromatography, HPLC and mass spectrometry. Advised on the use of these techniques in research projects.

Lab Assistant, University of Reading. Course: Undergraduate botany, Introduction to plant genetics. Set up experiments, supervised students and helped them with experiments and homework.

OTHER SKILLS

Webmaster and Systems Administrator for:

Michigan Potato Diseases: <http://www.potatodiseases.org>.

Sorghum Anthracnose.org: <http://www.sorghumanthracnose.org>.

I am responsible for all aspects of the operation of these sites, from systems administration and maintenance of the server hosting them to web design and internet security. As such I am proficient with the configuration, operation and maintenance of Apache, DNS (BIND 8), Sendmail, Samba, Netatalk, SQL databases, and other such Unix server software.

Photography and Electronic Publishing

Competent in the development and printing of 35mm and 120mm film for both normal photography and light and electron microscopy. Adept in the use of computer hardware and software (Adobe Photoshop™, Illustrator™, InDesign™ and PageMaker™) used in the digital production of photographic plates and figures for publication in scientific journals and extension bulletins.

Languages: Written French and basic conversational French, Spanish and Swedish

GRANT WRITING HISTORY

Funded

1. *“Effect of host pathogen interactions on the competitive fitness of different genotypes of Phytophthora infestans on foliage and tubers.”* Michigan State University Project GREEN, 2005. Co-PI’s Drs. William Kirk and David Douches. Funded \$45,000 a year for 2 years.
2. *“Up-to-date printed and electronic resources for potato health management.”* Michigan State University Project GREEN, 2005. Co-PI Dr. William Kirk. Funded \$7,000 for 1 year.
3. *“Evaluation and comparison of biofungicides and fungicides for the control of post harvest potato tuber diseases.”* IR-4/EPA Biopesticide Demonstration Grant, 2005. Co-PI Dr. William Kirk. Funded \$11,000 a year for 2 years.
4. *“Efficacy and Compatibility of Biofungicides with Commonly Used Soil Fungicides in Production of Herbaceous Perennials.”* IR-4/EPA Biopesticide Demonstration Grant, 2005. Co-Pi’s Dr. William Kirk and Diane E. Brown-Rytlewski. Funded \$12,500 a year for 2 years.

5. “*Integration of Measures to Limit Volunteer Potato Tuber Survival for Indirect Control of Potato Late Blight in Michigan.*” Michigan Potato Industry Commission Award, 2005. Co-PI Dr. William Kirk. Funded for 1 year at \$5,000.
6. “*Managing late blight of potatoes in the north central region by combining host plant resistance with reduced fungicide applications.*” Michigan Potato Industry Commission Award, 2005. Co-PI Dr. William Kirk. Funded for 1 year at \$5,000.
7. “*Crop Protection issues for high impact sugar beet diseases Rhizoctonia root and crown rot and Cercospora leaf spot.*” Michigan Sugarbeet Advancement Award, 2005. Co-PI Dr. William Kirk. Funded for 1 year at \$14,000.
8. “*Developing prediction and control systems for control of Rhizoctonia diseases in potato and sugar beet.*” Michigan State University Project GREEN Award, 2004. Co-PI Dr. William Kirk. Funded for 2 years at \$15,000 per annum.
9. “*New and up-to-date printed, video and electronic resources for potato management.*” Michigan State University Project GREEN Award, 2004. Co-PI’s Dr. William Kirk and Sieglinde Snapp. Funded for 1 year at \$15,700.
10. “*Evaluation of the role of host resistance and the physiological properties of tubers in relation to Potato Late Blight disease resistance.*” Michigan State University Project GREEN Award, 2004. Co-PI Dr. William Kirk. Funded for 1 year at \$16,000.
11. “*Up-to-date printed and electronic resources for blueberry health management.*” Michigan State University Project GREEN Award, 2002. Co-PI Dr. Annemiek Schilder. Funded, at \$25,000 a year for 3 years.
12. “*A multi-faceted approach to the management of blueberry pests and diseases.*” Michigan State University Project GREEN Award, 2002. Co-PI Dr. Annemiek Schilder. Funded, at \$50,000 a year for 3 years.

Not Funded

1. “*Integration of measures to limit volunteer potato tuber survival for indirect control of potato late blight in the North Central Region.*” USDA-CSREES/NCR-IPM 2004. Co-PI’s Drs. William Kirk and Sieglinde Snapp.
2. “*Host-pathogen interactions between Phytophthora infestans and potato tubers.*” USDA-NRI, 2004. Co-PI Drs. William Kirk and David Douches.
3. “*Evaluation of the bio-fungicide Trichoderma harzianum for the control of soilborne pathogens in container grown herbaceous perennials.*” IR-4/EPA Biopesticide Demonstration Grant, 2004. Co-PI’s Dr. William Kirk and Diane E. Brown-Rytlewski.
4. “*Understanding host-pathogen interactions between Colletotrichum species and small fruit crops.*” USDA-NRI, 2003. Co-PI’s Drs. Annemiek Schilder and James Hancock.
5. “*Towards ecologically sound management of blueberry anthracnose based on an understanding of host-pathogen interactions.*” USDA-NRI, 2002. Co-PI’s Drs. Annemiek Schilder and James Hancock.

HONORS AND AWARDS

1. Micrograph on the front cover of *Plant Disease*, April 2005 issue.
2. Second prize in the Olympus Inc. Bioscapes International Digital Imaging competition 2004.
3. Micrograph on the front cover of *Anales del Jardín Botánico de Madrid* issue 1 vol. 61, 2004.
4. Micrograph on the front cover of the journal *Phytopathology*, Feb 2001 issue.
5. APSnet “Image of the Week”, illustrating sporulation of *Blumerilla jaapii* on tart cherry leaves. American Phytopathological Society website.

6. Final Year Prize in Biological Sciences for the top senior in the class, University of Reading, 1993.

INVITED TALKS

1. “Developing prediction and management systems for the control of *Rhizoctonia* diseases in potato and sugarbeet.” 35th Annual Sugarbeet Research Reporting Session. January 2005, Fargo, ND.
2. “*Sorghum anthracnose: Lessons learned from a closely-related pathosystem.*” Biology and Management of Turfgrass Anthracnose. American Phytopathological Society 2003 Annual Meeting Special Symposium, Charlotte NC.

RESEARCH PUBLICATIONS

1. WHARTON, P.S., AND SCHILDER, A.M.C., 2005. Effect of temperature on the longevity of and ascospore discharge by apothecia of *Monilinia vaccinii-corymbosi*. *Plant Disease*, **89**:397-404
2. WHARTON P.S., AND IEZZONI, A., 2005. Development of a protocol for screening cherry germplasm for resistance to cherry leaf spot. *Acta Horticulturae* No. **667**: 509-514.
3. WHARTON, P.S, AND DIÉGUEZ-URIBEONDO, J. 2004. The biology of *Colletotrichum acutatum*. *Anales del Jardín Botánico de Madrid*, **61**:3-22.
4. WHARTON, P.S., IEZZONI, A., AND JONES, A.L., 2003. Screening cherry germplasm for resistance to leaf spot. *Plant Disease*, **87**: 471-477.
5. HUTCHISON, K.A., GREEN, J.R., WHARTON, P.S., AND O’CONNELL, R.J., 2002. Identification and localization of glycoproteins in the extracellular matrices around germ-tubes and appressoria of *Colletotrichum* species. *Mycological Research*, **106**(6): 729-736.
6. WHARTON, P.S., JULIAN, A.M., AND O’CONNELL, R.J. 2001. Ultrastructure of the infection of *Sorghum bicolor* by *Colletotrichum sublineolum*. *Phytopathology*, **91**(2): 149-158.
7. WHARTON, P.S., AND NICHOLSON, R.L. 2000. Temporal synthesis and incorporation of [¹⁴C]-phenylalanine into the sorghum 3-deoxyanthocyanidin phytoalexins and the anthocyanin, cyanidin 3-dimalonyl glucoside. *New Phytologist*, **145**(3), 457-469.
8. WHARTON, P.S., AND JULIAN, A.M., 1996. A cytological study of compatible and incompatible interactions between *Sorghum bicolor* and *Colletotrichum sublineolum*. *New Phytologist*, **134**, 25-34.

Posters/ Meeting Abstracts

1. WHARTON, P. S., BERRY, D., AND KIRK, W. W., 2005. Evaluation of seed piece fungicides for control of seed-transmitted *Fusarium* dry rot of potatoes. *Phytopathology*, **95**:S110.
2. WHARTON, P. S., BERRY, D., KIRK, W. W., SCHAFER, R., AND TUMBALAM, P., 2005. Managing *Rhizoctonia* diseases of potato with optimized fungicide applications and varietal susceptibility. *Phytopathology*, **95**:S111
3. WHARTON, P. S., BERRY, D., AND KIRK, W. W., 2004. Developing prediction and management systems for the control of *Rhizoctonia* diseases in potato and sugarbeet. *Phytopathology*, **94**:S109.
4. WHARTON, P.S., AND SCHILDER, A.M.C., 2003. Infection and colonization of blueberry fruit by *Colletotrichum acutatum*. *Phytopathology*, **93**:S90.

5. **WHARTON, P.S., IEZZONI, A., AND JONES, A., 2000.** Screening cherry germplasm for resistance to leaf spot. *Michigan State Horticultural Society Annual Meeting*. **Meeting Poster**.
6. **WHARTON, P.S., AND NICHOLSON, R.L. 1998.** Determination of the temporal synthesis of sorghum phytoalexins using photodiode array-HPLC. *Phytopathology*, **88**:S96.
7. **WHARTON P. S., O'CONNELL, R. J., AND JULIAN A. M., 1996.** Characterization of the components of extracellular matrices around infection structures of *Colletotrichum sublineolum*. *The Proceedings of the Sixth International Fungal Spore Conference, Universität Konstanz, Germany*. **Meeting Abstract**, pp. 129.
8. **WHARTON, P.S., AND JULIAN, A.M., 1994.** Compatible and incompatible interactions between *Sorghum bicolor* and *Colletotrichum sublineolum*. *Histologie, ultrastructure et cytologie moleculaire des interactions plantes-microorganismes, Société Française de Phytopathologie, Montpellier, France*. **Meeting Abstract**.

EXTENSION PUBLICATIONS

Fungicide and Nematicide Tests

1. **KIRK, W.W., SCHAFFER, R.L., TUMBABAM, P., BERRY, D.R., WHARTON, P.S.** Evaluation of fungicide programs for potato late blight control, 2004. 60:V077
2. **KIRK, W.W., SCHAFFER, R.L., TUMBABAM, P., BERRY, D.R., WHARTON, P.S.** Evaluation of Tanos fungicide programs for potato late blight control, 2004. 60:V078
3. **KIRK, W.W., SCHAFFER, R.L., TUMBABAM, P., BERRY, D.R., WHARTON, P.S.** Evaluation of Ranman, EBDC and chlorothalonil-based programs for potato late blight control, 2004. 60:V088

Extension Bulletins

1. **WHARTON, P.S., AND KIRK, W.W., 2005.** *White Mold*. In: Michigan Potato Diseases bulletin series; editor **P. S. Wharton**. Michigan State University Extension Bulletin (in press).
2. **WHARTON, P.S., AND KIRK, W.W., 2005.** *Early Blight*. In: Michigan Potato Diseases bulletin series; editor **P. S. Wharton**. Michigan State University Extension Bulletin (in press).
3. **ABU-EL SAMEN, F., WHARTON, P.S., AND KIRK, W.W., 2005.** *Pink Rot*. In: Michigan Potato Diseases bulletin series; editor **P. S. Wharton**. Michigan State University Extension Bulletin (in press).
4. **WHARTON, P.S., KIRK, W. W., BERRY, D., AND SNAPP, S., 2005.** *Rhizoctonia stem canker and black scurf of potato*. In: Michigan Potato Diseases bulletin series; editor **P. S. Wharton**. Michigan State University Extension Bulletin (in press).
5. **KIRK, W. W., WHARTON, P.S., HAMMERSCHMIDT, R., ABU-EL SAMEN, F., AND DOUCHES, D., 2004.** *Late Blight*. In: Michigan Potato Diseases bulletin series; editor **P. S. Wharton**. Michigan State University Extension Bulletin no. E-2945.
6. **WISE, J.C., VANDERPOPPEN, R., AND ISAACS, R., 2004.** *Fruitworms*. In: Michigan Blueberry Facts bulletin series; editor **P.S. Wharton**. Michigan State University Extension Bulletin (in press).
7. **WISE, J.C., VANDERPOPPEN, R., AND ISAACS, R., 2004.** *Blueberry Maggot*. In: Michigan Blueberry Facts bulletin series; editor **P.S. Wharton**. Michigan State University Extension Bulletin (in press).
8. **WISE, J.C., VANDERPOPPEN, R., AND ISAACS, R., 2004.** *Leafrollers*. In: Michigan Blueberry Facts bulletin series; editor **P.S. Wharton**. Michigan State University Extension Bulletin (in press).

9. **WISE, J.C., VANDERPOPPEN, R., AND ISAACS, R., 2004.** *Blueberry Aphid*. In: Michigan Blueberry Facts bulletin series; editor **P.S. Wharton**. Michigan State University Extension Bulletin (in press).
10. **WHARTON, P.S., AND SCHILDER, A.M.C., 2004.** *Mummy Berry*. In: Michigan Blueberry Facts bulletin series; editor **P.S. Wharton**. Michigan State University Extension Bulletin (in press).
11. **ISAACS, R., SZENDREI, Z., AND WISE, J.C., 2003.** *Japanese Beetle*. In: Michigan Blueberry Facts bulletin series; editor **P.S. Wharton**. Michigan State University Extension Bulletin no. E-2845.
12. **WHARTON, P.S., AND SCHILDER, A.M.C., 2003.** *Blueberry Fruit Rot Identification Guide*. In: Michigan Blueberry Facts bulletin series; editor **P.S. Wharton**. Michigan State University Extension Bulletin no. E-2847.

Note: As well as editing the above extension publications I was responsible for the creation and design of all logo's, disease/life cycle illustrations and the page layout of the bulletins.

REFERENCES

Prof. William Kirk, Department of Plant Pathology, Michigan State University, East Lansing, MI 48824. (517) 353 4481. kirkw@msu.edu.

Prof. Amy Iezzoni, Department of Horticulture, Michigan State University, East Lansing, MI 48824. (517) 355 3505. iezzoni@msu.edu.

Mr. Ralph Fogg, Chief Agronomist, Michigan Sugar Company, 2600 S. Euclid, Bay City, MI 48706. (989) 686 1549. ralph.fogg@michigansugar.com.