



ISPP

International Society for Plant Pathology

(Dr Greg Johnson, President 2013-2018)

July 2018 Committee Report to the ISPP Executive and Council ISPP Committee on Rhizoctonia

Please complete your report using this proforma

Return the completed report by email to Peter Williamson, Business Manager, ISPP (business.manager@isppweb.org) by 15 June 2018

Subject Matter Committee: International Rhizoctonia Subject Matter Committee (IRSMC)

Established: 1993

Web Address for SMC: <http://rsolani.org/home/> (currently under revision)
<https://ncslg.cals.ncsu.edu/irsc/>

Name of Person Preparing Report: Marc A. Cubeta

Nominated Officers:

Immediate Past Chair: Suha Jabaji, McGill University, Montreal, Canada.
Chair: Marc A. Cubeta, North Carolina State University, Raleigh, NC, USA.
Paulo Ceresini - University of São Paulo State, Sao Paulo, Brazil.
Rita Grosch - Institute of Vegetable and Ornamental Crops, GroSsbeeren, Germany.
Takeshi Toda - Akita Prefectural University, Akita, Japan.
Honglian Li - Henan Agricultural University, Zhengzhou, Henan, China.
Ning Zhang – Rutgers University, New Brunswick, NJ, USA.

Current membership - ~300 member

Website managers: Stephen Neate, University of Southern Queensland, Institute for Agriculture and the Environment, Centre for Crop Health, Toowoomba, Queensland, 4350, Australia.

About the IRSMC: The International *Rhizoctonia* Committee was established in Montreal in 1993 to promote exchange of research information related to beneficial and disease causing fungi in the *Rhizoctonia* species complex and to encourage international collaborative interaction and projects among colleagues working on various aspects of *Rhizoctonia* research.

Committee Meetings: Short meetings are conducted with some members once a year via either Skype or email. Additionally, during ICPP meetings, committee members meet during their satellite meetings and discuss issues dealing with finance, future meetings and research topics.

Committee Activities: The committee is actively engaged in discussing nomenclatural issues related to the one fungus one name concept to provide recommendations to the Rhizoctonia community. The nomenclatural taxonomic working group consists of the following members; Joost Stalpers, Scott Redhead, Amy Rossman, Marc Cubeta, Roland Kirschner, Gitta Lange, Karl-Henrik Larsson, Lorelei Norvell, Franz Oberwinkler (deceased), and Peter Roberts. A meeting for the working group has tentatively been scheduled at the International Mycological Congress in San Juan, Puerto Rico in July 2018 to develop a white paper document entitled “Competing sexual-asexual generic names in the Agaricomycotina, Basidiomycota with recommendations for use” that will be submitted to IMA Fungus journal for publication in fall 2018. Members of the committee are developing an “omics platform” to provide a portal to access genomic, metabolomics, proteomic, and transcriptomics data for the Rhizoctonia community. Members of the committee have tentatively agreed to develop an online American Phytopathological Society Press publication for Rhizoctonia research protocols.

Subject Matter Committee focus issues:

Administration:

- Focus on recruiting young researchers who are passionate and can serve and lead the International Rhizoctonia Subject Matter Committee (IRSMC).
- Working on updating and reconstructing the IRSMC website.

Science based research:

- Developing a conceptual framework and experimental tools to better delineate and identify species and lineages of Rhizoctonia fungi.
- Developing improved and novel strategies for managing Rhizoctonia diseases.

Publications (selected from last 5 years):

Genzel, F., Franken, P., Witzel, K., and Grosch, R. 2018. Systemic induction of salicylic acid-related plant defences in potato in response to *Rhizoctonia solani* AG3PT. *Plant Pathology* 67(2), 337-348, doi: 10.1111/ppa.12746.

Samsatly, J., Copley T.R., and Jabaji, S. 2018. Antioxidant genes of plants and fungal pathogens are distinctly regulated during disease development in different *Rhizoctonia solani* pathosystems. *PlosOne* doi.org/10.1371/journal.pone.0192682

Sandmann, M., Grosch, R., and Graefe, J. 2018. Early detection of *Rhizoctonia solani* infections of lettuce seedlings (*Lactuca sativa* var. *capitata*) using various features from fluorescence, thermography and NDVI imaging. *Plant Disease* (accepted).

Schreiter, S., Babin, D., Smalla, K., and Grosch, R. 2018. Rhizosphere competence and biocontrol effect of *Pseudomonas* sp. RU47 independent from plant species and soil type at the field scale. *Frontier in Microbiology*, doi:10.3389/fmicb.2018.00097.

Verwaaijen, B., Wibberg, D., Nelkner, J., Gordin, M., Rupp, O., Winkler, A., Bremges, A., Blom, J., Grosch, R., Pühler, A., and Schlüter, A. 2018. Assembly of the *Lactuca sativa*, L. cv. Tizian draft genome sequence reveals differences within Major Resistance Complex as compared to the cv. Salinas reference genome. *Journal of Biotechnology* 267:12-18.

Antweiler, K., Schreiter, S., Keilwagen, J., Baldrian, P., Kropf, S., Smalla, S., Grosch, R., and Heuer, H. 2017. Statistical test for tolerability of effects of an antifungal biocontrol strain on fungal communities in three arable soils. *Microbial Biotechnology*, doi: 10.1111/1751-7915.12595.

Copley, T.R., Bayen, S., and Jabaji, S. 2017. Biochar amendment modifies expression of soybean and *Rhizoctonia solani* genes leading to increased severity of Rhizoctonia foliar blight. *Frontiers in Plant Science*: doi.org/10.3389.

Misawa, T., Kayamori, M., Kurose, D., Sasaki, J., and Toda, T. 2017. First report of Rhizoctonia disease of lily caused by *Rhizoctonia solani* AG-11 in Japan. *Journal of General Plant Pathology* 83: 406-409.

Sun B., Chen, O., He, X., Shi, Y., Ding, S., and Li, H. 2017. A new multiplex polymerase chain reaction assay for simultaneous detection of five soil-borne fungal pathogens in winter wheat. *Journal of Plant Diseases and Protection* 11:1-6.

Verwaaijen, B., Wibberg, D., Kröber, M., Winkler, A., Zrenner, R., Bednarz, H., Niehaus, K., Grosch, R., Pühler, A., and Schlüter, A. 2017. The *Rhizoctonia solani* AG1-IB (isolate 7/3/14) transcriptome during interaction with the host plant lettuce (*Lactuca sativa* L.). *PLoS ONE* 12(5): e0177278. doi: [org/10.1371/journal.pone.0177278](https://doi.org/10.1371/journal.pone.0177278).

Wibberg, D., Genzel, F., Verwaaijen, B., Blom, J., Rupp, O., Goesmann, A., Zrenner, R., Grosch, R., Pühler, A., and Schlüter, A. 2017. Draft genome sequence of the potato pathogen *Rhizoctonia solani* AG3-PT isolate Ben3. *Archive Microbiology* doi: 10.1007/s00203-017-1394-x.

Windisch, S., Bott, S., Ohler, M.A., Mock, H.-P., Lippmann, R., Grosch, R., Smalla, K., and Neumann, G. 2017. *Rhizoctonia solani* and bacterial inoculants stimulate root exudation of antifungal compounds in lettuce in a soil-type specific manner. *Agronomy* 7, 44, doi:10.3390/agronomy7020044.

Copley, T.R., Aliferis, K.A., Kliebenstein, D.J., and Jabaji, S. 2016. Integration of RNAseq with ¹H NMR metabolomics reveals soybean's primary metabolism regulation in response to Rhizoctonia. *BMC Plant Biology* 17:84.

<https://doi.org/10.1186/s12870-017-1020->

Obasa, K., White, F.F., Fellers, J. Kennelly, M., Liu, S., Katz, B., Tomich, J., Moore, D., Shinogle, H., and Kelley, K. 2017. A dimorphic and virulence-enhancing endosymbiont bacterium discovered in *Rhizoctonia solani*. *Phytobiomes* 1:14-23.

Gonzalez, D, Rodriguez-Carres, M., Boekhout, T., Stalper, J., Kurame, E.E., Nakatani, A.K., Vilgalys, R., and Cubeta, M.A. 2016. Phylogenetic relationships of *Rhizoctonia* fungi within the Cantharellales. *Fungal Biology* 120:603-619.

Jiang, Jr.-H., Tam, S.-L., Toda, T., and Chen, C. 2016. Controlling *Rhizoctonia* damping-off of Chinese mustard by using endomycorrhizal *Rhizoctonia* isolated from orchid mycorrhizae. *Plant Disease* 99: 85-91.

Chowdhury, SP., Uhl, J., Grosch, R., Alquéres, A., Pittroff, S., Dietel, K., Schmitt-Kopplin, P., Borriss, B., and Hartmann, A. 2015. Cyclic lipopeptides of *Bacillus amyloliquefaciens* subsp. *plantarum* colonizing the lettuce rhizosphere enhance plant defence responses towards the bottom rot pathogen *Rhizoctonia solani*. *Molecular Plant-Microbe Interactions* 28(9), 984-95.doi.org/10.1094/MPMI-03-15-0066-R.

Chamoun, R, Aliferis KA, and Jabaji, S. 2015. Identification of signatory secondary metabolites during mycoparasitism of *Rhizoctonia solani* by *Stachybotrys elegans*. *Frontiers in Microbiology*. 6:353. doi: 10.3389/fmicb.2015.00353.

Chamoun, R., Samsatly, J., Pakala, S., Cubeta, M.A., and Jabaji, S. 2015. Suppression subtractive hybridization and comparative expression of a pore-forming toxin and glycosyl hydrolase genes in *Rhizoctonia solani* during potato sprout infection. *Molecular Genetics and Genomics*: (DOI: 10.1007/s00438-014-0962-x).

Copley, T.R., Aliferis, K.A., and Jabaji, S. 2015. Maple bark biochar affects *Rhizoctonia solani* metabolism and increases damping-off severity. 2015. *Phytopathology*, 105(10): 1334-1346. <http://dx.doi.org/10.1094/PHYTO-08-14-0231-R>.

Gkarmiri, K., Finlay, R.D., Alström, S., Thomas, E., Cubeta, M.A., and Högberg, N. 2015 Transcriptomic analyses of changes in gene expression in the fungal pathogen *Rhizoctonia solani* AG-3 in response to the bacterial antagonists *Serratia proteamaculans* and *Serratia plymuthica*. *BMC Genomics* 16:630 DOI 10.1186/s12864-015-1758-z.

Hiroyuki, S., Toda, T., Sato, E., Tomioka, K., Murakami, H., Amemiya, R., Hirako, N., Nakata, M., Hyakumachi, M., and Tsushima, S. 2015. *Rhizoctonia* blight of turnip green caused by *Rhizoctonia solani* AG-4 HG-III. *Journal of General Plant Pathology* 81: 454-456.

Jiang, Jr.-H., Lee, Y-I., Cubeta, M.A., and Chen, L-C. 2015. Characterization and colonization of endomycorrhizal *Rhizoctonia* fungi in the medicinal herb *Anoectochilus formosanus* (Orchidaceae). *Mycorrhiza* DOI 10.1007/s00572-014-0616-1.

Samsatly, J., Chamoun, R., Glück-Thaler, E., and Jabaji, S. 2015. Genes of the de novo and salvage biosynthesis pathways of vitamin B6 are regulated under oxidative stress in the plant pathogen *Rhizoctonia solani*. *Frontiers in Microbiology*, doi:10.3389/fmicb.2015.00353.

Sun, B., Chen, O., Yuan, H., Shi, Y., and Honglian, L. 2015. Establishment of SYBR Green I Real-Time PCR for quantitatively detecting *Rhizoctonia cerealis* in winter wheat. *Scientia Agricultura Sinica* 48(1):55-62.

Wibberg, D., Rupp, O., Blom, J., Jelonek, L., Kröber, M., Verwaaijen, B., Goesmann, A., Albaum, S., Grosch, R., Pühler, A., and Schlüter, A. 2015. Development of a *Rhizoctonia solani* AG1-IB Specific Gene Model Enables Comparative Genome Analyses between Phytopathogenic *R. solani* AG1-IA, AG1-IB, AG3 and AG8 Isolates. *PLoS ONE* doi:10.1371/journal.pone.0144769.

Wibberg, D., Rupp, O., Jelonek, L., Kröber, M., Verwaaijen, B., Blom, J., Winkler, A., Goesmann, A., Grosch, R., Pühler, A., and Schlüter, A. 2015. Improved genome sequence of the phytopathogenic fungus *Rhizoctonia solani* AG1-IB 7/3/14 as established by deep mate-pair sequencing on the MiSeq (Illumina) system. *Journal of Biotechnology* 203, 19-21, doi:10.1016/j.jbiotec.2015.03.005.

Aliferis, K.A., Faubert, D., and Jabaji, S. 2014. A metabolic profiling strategy for the dissection of plant defense against fungal pathogens. *PLoS One*, DOI: 10.1371/journal.pone.0111930.

Cubeta, M.A., Thomas, E., Dean, R.A., Jabaji, S., Neate, S.M., Tavantzis, S., Toda, T., Vilgalys, R., Bharathan, N., Fedorova-Abrams, N., Pakala, S., Zafar, N., Joardar, V., Losada, L., and Nierman, W.C. 2014. Draft Genome Sequences of the Plant Pathogenic Fungus *Rhizoctonia solani* Anastomosis Group 3 Strain Rhs1AP. *Genome Announc.* 2(5):e1072-14. doi:10.1128/genomeA.01072-14.

Erlacher, A., Cardinale, M., Grosch, R., Grube, M., and Berg, B. 2014. The impact of the pathogen *Rhizoctonia solani* and its beneficial counterpart *Bacillus amyloquifaciens* on the indigenous lettuce microbiome. *Frontiers in Microbiology* 5, Article 175; doi: 10.3389/fmicb.2014.00175.

Losada, L., Pakala, S.B., Fedorova, N.D., Joardar, V., Shabalina, S., Hostetler, J., Pakala, S., Zafar, N., Thomas, E.T., Rodriguez-Carres, M., Dean R.A., Dykstra, M., Vilgalys, R.J., Nierman, W.C., and Cubeta, M.A. 2014. Mobile intron-like elements and novel mitochondrial genome expansion in the soil fungus and potato pathogen *Rhizoctonia solani*. *FEMS Microbiology Letters* 350:1-11 (DOI: 10.1111/1574-6968.12387). Cited as one of 10 articles to exemplify visualization in microbiology.

Schreiter, S., Ding, G.-Ch., Grosch, R., Kropf, S., Antweiler, K., and Smalla, K. 2014. Soil type-dependent effects of a potential biocontrol inoculant on indigenous bacterial communities in the rhizosphere of field grown lettuce. *FEMS Microbiol Ecol* 90(3), 718-30. doi:10.1111/1574-6941.12430.

Schreiter, S., Sandmann, M., Smalla, K., and Grosch, R. 2014. Soil type dependent rhizosphere competence and biocontrol of two bacterial inoculant strains and their effects on the rhizosphere microbial community of field-grown lettuce. PLoS ONE doi:10.1371/journal.pone.0103726.

Wibberg, D., Jelonek, L., Rupp, O., Goesmann, A., Grosch, R., Pühler, A., and Schlüter, A. 2014. Transcriptome analysis of the phytopathogenic fungus *Rhizoctonia solani* AG1-IB 7/3/14 applying high-throughput sequencing of expressed sequence tags (ESTs). Fungal Biology 118, 800-813; doi: 10.1016/j.funbio.2014.06.007.

Aliferis, K.A., Cubeta, M.A., and Jabaji, S. 2013. Chemotaxonomy of fungi in the *Rhizoctonia solani* species complex performing GC/MS metabolite profiling. Metabolomics 9(1): 159-169.

Bartz, F.E., Danehower, D.A., Glassbrook, N., and Cubeta, M.A. 2013. Modulation of the phenylacetic acid metabolic complex by quinic acid alters the disease-causing activity of *Rhizoctonia solani* on tomato. Phytochemistry 75: <http://dx.doi.org/10.1016/j.phytochem.2012.09.018>.

Ferrucho, R.L., Garcia-Dominguez, C., Ramirez-Escobar, U.M., McDonald, B. A., Cubeta, M.A., and P.C. Ceresini, P.C. 2013. The population genetic structure of *Rhizoctonia solani* AG-3PT from potatoes in the Colombian Andes. Phytopathology 103:862-869.

Grosch, R., Dealtry, S., Schreiter, S., Berg, G., Mendonça-Hagler, L., and Smalla, K. 2013. Impact of individual and combined antagonist application towards *Rhizoctonia solani* on lettuce and on indigenous microbial rhizosphere community. IOBC-WPRS Bulletin 86, 15-22.

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Misawa, T. and Toda, T. 2013. First report of black scurf on carrot caused by binucleate *Rhizoctonia* AG-U. Journal of General Plant Pathology 79:86–88.

Wibberg, D., Jelonek, L., Rupp, O., Hennig, M., Eikmeyer, F., Goesmann, A., Hartmann, A., Borriss, R., Grosch, R., Pühler, A., and Schlüter, A. 2013. Establishment and interpretation of the genome sequence of the phytopathogenic fungus *Rhizoctonia solani* AG1-IB isolate 7/3/14. Journal of Biotechnology 167 (2):142-155. doi.org/10.1016/j.jbiotec.2012.12.010.

Additional Comments: N/A

Submitted by: Marc A. Cubeta

Date: May 31, 2018