

## List of publications

### Peer reviewed articles in international journals and book chapters

90. Bösch Y, Pold G, Saghai A, Karlsson M, Jones C, Hallin S (2023) Distribution and environmental drivers of fungal denitrifiers in global soils. *Microbiology Spectrum* **11**:e00061-23.
89. Himmelstrand K, Brandström Durling M, Karlsson M, Stenlid J, Olson Å (2023) Multiple rearrangements and low inter and intra species mitogenome sequence variation in the *Heterobasidion annosum* s.l. species complex. *Frontiers in Microbiology* **14**:1159811.
88. Stenberg J, Becher P, Jonsson M, Karlsson M, Sundh I, Viketoft M (2023) Political deafness may impede transition to biological control. *Trends in Plant Science* **28**:498-500.
87. Kälin C, Kolodinska Brantestam A, Arvidsson A, Dubey M, Elfstrand M, Karlsson M (2023) Evaluation of pea genotype PI180693 partial resistance towards aphanomyces root rot in commercial pea breeding. *Frontiers in Plant Science* **14**:1114408.
86. Piombo E, Guaschino M, Funck Jensen D, Karlsson M, Dubey M (2023) Insights into the ecological generalist lifestyle of *Clonostachys* fungi through analysis of their predicted secretomes. *Frontiers in Microbiology* **14**:1112673.
85. Kälin C, Berlin A, Kolodinska Brantestam A, Dubey M, Arvidsson A, Riesinger P, Elfstrand M, Karlsson M (2022) Genetic diversity of the pea root pathogen *Aphanomyces euteiches* in Europe. *Plant Pathology* **71**:1570–1578.
84. Piombo E, Vetukuri R, Sundararajan P, Kushwaha S, Funck Jensen D, Karlsson M, Dubey M (2022) Comparative small RNA and degradome sequencing provide insights into antagonistic interactions in the biocontrol fungus *Clonostachys rosea*. *Applied and Environmental Microbiology* **88**:e00643-22.
83. Bösch Y, Jones C, Finlay R, Karlsson M, Larsbo M, Keller T, Hallin S (2022) Minimizing tillage modifies fungal denitrifier communities, increases denitrification rates and enhances the genetic potential for fungal relative to bacterial denitrification. *Soil Biology and Biochemistry* **170**:108718.
82. Mesny F, Miyauchi S, Thiergart T, Pickel B, Atanasova L, Karlsson M, Hüttel B, Barry K, Haridas S, Drula E, Henrissat B, Kohler A, Grigoriev I, Martin F, Hacquard S (2021) Genetic determinants of endophytism in the *Arabidopsis* root mycobiome. *Nature Communications* **12**:7227.
81. Piombo E, Vetukuri R, Broberg A, Kalyandurg P, Kushwaha S, Funck Jensen D, Karlsson M, Dubey M (2021) The role of Dicer-dependent RNA interference in regulating mycoparasitic interactions. *Microbiology Spectrum* **9**:e01099-21.
80. Funck Jensen D, Dubey M, Jensen B, Karlsson M (2021) *Clonostachys rosea* for the control of plant diseases. In: Köhl J, Ravensberg W (eds) *Microbial bioprotectants for plant disease management*. BDS Publishing, 429-471.
79. Elfstrand M, Chen J, Cleary M, Halecker S, Ihrmark K, Karlsson M, Davydenko K, Stenlid J, Stadler M, Brandström Durling M (2021) Comparative analyses of the *Hymenoscyphus fraxineus* and *Hymenoscyphus albidus* genomes reveals potentially adaptive

differences in secondary metabolite and transposable element repertoires. *BMC Genomics* **22**:503.

78. Mgbeahuruike A, Ejiofor T, Ashang M, Ojiako C, Obasi C, Ezema C, Okoroafor O, Mwanza M, Karlsson M, Chah K (2021) Reduction of the adverse impacts of fungal mycotoxin on proximate composition of feed and growth performance in broilers by combined adsorbents. *Toxins* **13**:430.

77. Broberg M, Simaan H, Shmoish M, Rabner A, Karlsson M, Horwitz B (2021) Ferulic acid, an abundant maize phenolic, regulates ABC and MFS transporter gene expression in the maize pathogen *Cochliobolus heterostrophus*. *Journal of Plant Diseases and Protection* **128**:1383-1391.

76. Stenberg J, Sundh I, Becher P, Björkman C, Dubey M, Egan P, Friberg H, Gil J, Funck Jensen D, Jonsson M, Karlsson M, Khalil S, Ninkovic V, Rehmann del Rio G, Vetukuri R, Viketoft M (2021) When is it biological control? A framework of definitions, mechanisms, and classifications. *Journal of Pest Science* **94**:665-676.

75. Ben Amira M, Faize M, Karlsson M, Dubey M, Fraç M, Panek J, Fumanal B, Gousset-Dupont A, Julien J, Chaar H, Auguin D, Mom R, Label P, Venisse J (2021) Fungal X-intrinsic protein aquaporin from *Trichoderma atroviride*: Structural and functional considerations. *Biomolecules* **11**:338.

74. Zapparata A, Baroncelli R, Brandström Durling M, Kubicek C, Karlsson M, Vannacci G, Sarrocco S (2021) Fungal cross-talk: an integrated approach to study distance communication. *Fungal Genetics and Biology* **148**:103518.

73. Ejiofor T, Mgbeahuruike A, Orjiakor C, Ushie A, Nwoko E, Remigius O, Dada T, Mwanza M, Karlsson M (2021) *Saccharomyces cerevisiae*, bentonite and kaolin as adsorbents for reducing the adverse impacts of mycotoxin contaminated feed on broiler histopathology and hemato-biochemical changes. *Veterinary World* **14**:23-32.

72. Dubey M, Funck Jensen D, Karlsson M (2021) Functional characterization of the AGL1 aegerolysin in the mycoparasitic fungus *Trichoderma atroviride* reveals a role in conidiation and antagonism. *Molecular Genetics and Genomics* **296**:131-140.

71. Broberg M, Dubey M, Iqbal M, Gudmundsson M, Ihrmark K, Schroers H, Funck Jensen D, Brandström Durling M, Karlsson M (2021) Comparative genomics highlights the importance of drug efflux transporters during evolution of mycoparasitism in *Clonostachys* subgenus *Bionectria* (Fungi, Ascomycota, Hypocreales). *Evolutionary Applications* **14**:476-497.

70. Tzelepis G, Karlsson M (2021) The fungal chitinases. In: Zaragoza O, Casadevall A (eds) *Encyclopedia of Mycology*. Elsevier, **1**:23-31.

69. Iqbal M, Broberg M, Haarith D, Broberg A, Bushley K, Brandström Durling M, Viketoft M, Funck Jensen D, Dubey M, Karlsson M (2020) Natural variation of root lesion nematode antagonism in the biocontrol fungus *Clonostachys rosea*, and identification of biocontrol factors through genome-wide association mapping. *Evolutionary Applications* **13**:2264-2283.

68. Kadoon A, Mgbeahuruike A, Karlsson M, Chah K (2020) Identification, antifungal susceptibility and phylogenetic comparison of fungal community in a poultry environment in Nigeria. *International Journal of Poultry Science* **19**:548-556.
67. Dubey M, Broberg M, Funck Jensen D, Karlsson M (2020) LysM proteins regulate fungal development and contribute to hyphal protection and biocontrol traits in *Clonostachys rosea*. *Frontiers in Microbiology* **11**:679.
66. Iqbal M, Dubey M, Broberg A, Viketoft M, Funck Jensen D, Karlsson M (2019) Deletion of the non-ribosomal peptide synthetase gene *nps1* in the fungus *Clonostachys rosea* attenuates antagonism and biocontrol of plant pathogenic *Fusarium* and nematodes. *Phytopathology* **109**:1698-1709.
65. Tzelepis G, Karlsson M (2019) Killer toxin-like chitinases in filamentous fungi: Structure, regulation and potential roles in fungal biology. *Fungal Biology Reviews* **33**:123-132.
64. Broberg M, Dubey M, Sun M, Ihrmark K, Schroers H, Li S, Funck Jensen D, Brandström Durling M, Karlsson M (2018) Out in the cold: Identification of genomic regions associated with cold tolerance in the biocontrol fungus *Clonostachys rosea* through genome-wide association mapping. *Frontiers in Microbiology* **9**:2844.
63. Iqbal M, Dubey M, Gudmundsson M, Viketoft M, Funck Jensen D, Karlsson M (2018) Comparative evolutionary histories of fungal proteases reveal gene gains in the mycoparasitic and nematode-parasitic fungus *Clonostachys rosea*. *BMC Evolutionary Biology* **18**:171.
62. Atanasova L, Dubey M, Grujić M, Gudmundsson M, Lorenz C, Sandgren M, Kubicek C, Funck Jensen D, Karlsson M (2018) Evolution and functional characterization of pectate lyase PEL12, a member of a highly expanded *Clonostachys rosea* polysaccharide lyase 1 family. *BMC Microbiology* **18**:178.
61. Fatema U, Broberg A, Funck Jensen D, Karlsson M, Dubey M (2018) Functional analysis of polyketide synthase genes in the biocontrol fungus *Clonostachys rosea*. *Scientific Reports* **8**:15009.
60. Mgbeahuruike A, Ejioffor T, Christian O, Shoyinka V, Karlsson M, Nordkvist E (2018) Detoxification of aflatoxin-contaminated poultry feeds by three adsorbents, bentonite, activated charcoal and fuller's earth. *Journal of Applied Poultry Research* **27**:461-471.
59. Schmidt R, Brandström Durling M, de Jager V, Menezes R, Nordkvist E, Svatoš A, Dubey M, Lauterbach L, Dickschat J, Karlsson M, Garbeva P (2018) Deciphering the genome and secondary metabolome of the plant pathogen *Fusarium culmorum*. *FEMS Microbiology Ecology* **94**:fiy078.
58. Nygren K, Dubey M, Zapparata A, Iqbal M, Tzelepis G, Brandström Durling M, Funck Jensen D, Karlsson M (2018) The mycoparasitic fungus *Clonostachys rosea* responds with both common and specific gene expression during interspecific interactions with fungal prey. *Evolutionary Applications* **11**:931-949.
57. Borisova A, Eneyskaya E, Jana S, Badino S, Kari J, Amore A, Karlsson M, Hansson H, Sandgren M, Himmel M, Westh P, Payne C, Kulminskaya A, Ståhlberg J (2018) Correlation of structure, function and protein dynamics in GH7 cellobiohydrolases from *Trichoderma atroviride*, *T. reesei* and *T. harzianum*. *Biotechnology for Biofuels* **11**:5.

56. Iqbal M, Dubey M, McEwan K, Menzel U, Andersson Franko M, Viketoft M, Funck Jensen D, Karlsson M (2018) Evaluation of *Clonostachys rosea* for control of plant-parasitic nematodes in soil and in roots of carrot and wheat. *Phytopathology* **108**:52-59.
55. Karlsson M, Atanasova L, Funck Jensen D, Zeilinger S (2018) Necrotrophic mycoparasites and their genomes. In: Heitman J, Howlett B, Crous P, Stukenbrock E, James T, Gow N (eds) *The Fungal Kingdom*. ASM Press, Washington DC, 1005-1026. Selected for rapid publication in *Microbiology Spectrum* **5**:FUNK-0016-2016.
54. Tzelepis G, Karlsson M, Suzuki T (2017) Deglycosylating enzymes acting on *N*-glycans in fungi; Insights from a genome survey. *Biochimika et Biophysica Acta – General Subjects* **1861**:2551-2558.
53. Stenlid J, Elfstrand M, Cleary M, Ihrmark K, Karlsson M, Davydenko K, Brandström Durling M (2017) Genomes of *Hymenoscyphus fraxineus* and *Hymenoscyphus albida* encode surprisingly large cell wall degrading potential, balancing saprotrophic and necrotrophic signatures. *Baltic Forestry* **23**:41-51.
52. Funck Jensen D, Karlsson M, Lindahl B (2017) Fungal-fungal interactions: From natural ecosystems to managed plant production with emphasis on biological control of plant diseases. In: Dighton J, White J (eds) *The Fungal Community: Its Organization and Role in the Ecosystem*. CRC Press, Taylor & Francis Group, Boca Raton, 549-562.
51. Karlsson M, Stenlid J, Lindahl B (2016) Functional differentiation of chitinases in the white-rot fungus *Phanerochaete chrysosporium*. *Fungal Ecology* **22**:52-60.
50. Kamou N, Dubey M, Tzelepis G, Menexes G, Papadakis E, Karlsson M, Lagopodi L, Funck Jensen D (2016) Investigating the compatibility of the biocontrol agent *Clonostachys rosea* IK726 with prodigiosin-producing *Serratia rubidaea* S55 and phenazine-producing *Pseudomonas chlororaphis* ToZa7. *Archives of Microbiology* **198**:369–377.
49. Funck Jensen D, Karlsson M, Sarrocco S, Vannacci G (2016) Biological control using microorganisms as an alternative to disease resistance. In: Collinge DB (ed) *Plant Pathogen Resistance Biotechnology*. Wiley, New York and London, 341-363.
48. Dubey M, Funck Jensen D, Karlsson M (2016) The ABC transporter ABCG29 is involved in H<sub>2</sub>O<sub>2</sub> tolerance and biocontrol traits in the fungus *Clonostachys rosea*. *Molecular Genetics and Genomics* **291**:677-686.
47. de Vries S, Nemesio-Gorriz M, Blair P, Karlsson M, Mukhtar S, Elfstrand M (2015) Heterotrimeric G-proteins in *Picea abies* and their regulation in response to *Heterobasidion annosum* s.l. infection. *BMC Plant Biology* **15**:287.
46. Hosseini S, Elfstrand M, Heyman F, Funck Jensen D, Karlsson M (2015) Deciphering common and specific transcriptional immune responses in pea towards the oomycete pathogens *Aphanomyces euteiches* and *Phytophthora pisi*. *BMC Genomics* **16**:627.
45. Schwelm A, Fogelqvist J, Knaust A, Jülke S, Lilja T, Dhandapani V, Bonilla-Rosso G, Karlsson M, Shevchenko A, Choi S, Kim H, Park J, Lim Y, Ludwig-Müller J, Dixelius C (2015) The genome sequence of the plant pathogenic rhizarian *Plasmodiophora brassicae* reveals insights in its biotrophic life cycle and the origin of chitin synthesis. *Scientific Reports* **5**:11153.

44. Tzelepis G, Dubey M, Funck Jensen D, Karlsson M (2015) Identifying glycoside hydrolase family 18 genes in the mycoparasitic fungal species *Clonostachys rosea*. *Microbiology* **161**:1407-1419.
43. Abd El Daim I, Häggblom P, Karlsson M, Stenström E, Timmusk S (2015) *Paenibacillus polymyxa* A26 sfp-type phosphopantetheinyl transferase inactivation limits bacterial antagonism against *Fusarium graminearum* but not of *F. culmorum*. *Frontiers in Plant Science* **6**:368.
42. Karlsson M, Brandström-Durling M, Choi J, Kosawang C, Lackner G, Tzelepis G, Nygren K, Dubey M, Kamou N, Levasseur A, Zapparata A, Wang J, Amby D, Jensen B, Sarrocco S, Panteris E, Lagopodi A, Pöggeler S, Vannacci G, Collinge D, Hoffmeister D, Henrissat B, Lee Y, Funck Jensen D (2015) Insights on the evolution of mycoparasitism from the genome of *Clonostachys rosea*. *Genome Biology and Evolution* **7**:465-480.
41. Hosseini S, Resjö S, Liu Y, Brandström-Durling M, Heyman F, Levander F, Liu Y, Elfstrand M, Funck Jensen D, Andreasson E, Karlsson M (2015) Comparative proteomic analysis of hyphae and germinating cysts of *Phytophthora pisi* and *Phytophthora sojae*. *Journal of Proteomics* **117**:24-40.
40. Van der Nest M, Olson Å, Karlsson M, Lind M, Dalman K, Brandström-Durling M, Elfstrand M, Wingfield B, Stenlid J (2014) Gene expression associated with intersterility in *Heterobasidion*. *Fungal Genetics and Biology* **73**:104-119.
39. Hansson D, Wubshet S, Olson Å, Karlsson M, Staerk D, Broberg A (2014) Secondary metabolite comparison of the species within the *Heterobasidion annosum* s.l. complex. *Phytochemistry* **108**:243-251.
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37. Tzelepis G, Hosomi A, Hossain T, Hirayama H, Dubey M, Funck Jensen D, Suzuki T, Karlsson M (2014) Endo- $\beta$ -*N*-acetylglucosamidases (ENGases) in the fungus *Trichoderma atroviride*: Possible involvement of the filamentous fungi-specific cytosolic ENGase in the ERAD process. *Biochemical and Biophysical Research Communications* **449**:256-261.
36. Dubey M, Funck Jensen D, Karlsson M (2014) An ATP-binding cassette pleiotropic drug transporter protein is required for xenobiotic tolerance and antagonism in the fungal biocontrol agent *Clonostachys rosea*. *Molecular Plant-Microbe Interactions* **27**:725-732.
35. Dubey M, Funck Jensen D, Karlsson M (2014) Hydrophobins are required for conidial hydrophobicity and plant root colonization in the fungal biocontrol agent *Clonostachys rosea*. *BMC Microbiology* **14**:18.
34. Kosawang C, Karlsson M, Véléz H, Have Rasmussen P, Collinge DB, Jensen B, Funck Jensen D (2014) Zearalenone detoxification by zearalenone hydrolase is important for the antagonistic ability of *Clonostachys rosea* against mycotoxigenic *Fusarium graminearum*. *Fungal Biology* **118**:364-373.
33. Kosawang C, Karlsson M, Funck Jensen D, Dilokpimol A, Collinge DB (2014) Transcriptomic profiling to identify genes involved in *Fusarium* mycotoxin deoxynivalenol

and zearalenone tolerance in the mycoparasitic fungus *Clonostachys rosea*. *BMC Genomics* **15**:55.

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31. Tzelepis G, Melin P, Stenlid J, Funck Jensen D, Karlsson M (2014) Functional analysis of the C-II subgroup killer toxin-like chitinases in the filamentous ascomycete *Aspergillus nidulans*. *Fungal Genetics and Biology* **64**:58-66.

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29. Hosseini S, Heyman F, Olsson U, Broberg A, Funck Jensen D, Karlsson M (2014) Zoospore chemotaxis of closely related legume-root infecting *Phytophthora* species towards host isoflavones. *Plant Pathology* **63**:708-714.

28. Dubey M, Broberg A, Funck Jensen D, Karlsson M (2013) Role of the methylcitrate cycle in growth, antagonism and induction of systemic defence responses in the fungal biocontrol agent *Trichoderma atroviride*. *Microbiology* **159**:2492-2500.

27. Strandberg R, Tzelepis G, Johannesson H, Karlsson M (2013) Coexistence and expression profiles of two alternative splice variants of the pheromone receptor gene *pre-1* in *Neurospora crassa*. *Archives of Microbiology* **195**:773-780.

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21. Hansson D, Menkis A, Olson Å, Stenlid J, Broberg A, Karlsson M (2012) Biosynthesis of fomannoxin in the root rotting pathogen *Heterobasidion occidentale*. *Phytochemistry* **84**:31-39.

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19. Tzelepis G, Melin P, Funck Jensen D, Stenlid J, Karlsson M (2012) Functional analysis of glycoside hydrolase family 18 and 20 genes in *Neurospora crassa*. *Fungal Genetics and Biology* **49**:717-730.
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16. Mgbeahuruike A, Karlsson M, Asiegbu F (2012) Differential expression of two hydrophobin genes (*Pgh1* and *Pgh2*) from the biological control agent *Phlebiopsis gigantea*. *Fungal Biology* **116**:620-629.
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14. Mgbeahuruike A, Sun H, Fransson P, Kasanen R, Daniel G, Karlsson M, Asiegbu F (2011) Screening of *Phlebiopsis gigantea* isolates for traits associated with biocontrol of the conifer pathogen *Heterobasidion annosum*. *Biological Control* **57**:118-129.
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### **Proceedings and other reports**

11. Jensen B, Jørgensen H, Collinge D, Jensen D, Dubey M, Karlsson M, Heick T, Jørgensen L (2022) Microbial biocontrol agents in IPM strategies – reducing pesticide use in wheat and lowering the risk of fungicide resistance. The Danish Environmental Protection Agency, Pesticide research no. 211, 1-85.
10. Nygren K, Dubey M, Durling M, Funck Jensen D, Karlsson M (2016) Genome and transcriptome analyses of the mycoparasite *Clonostachys rosea* highlights mycotoxin tolerance as a key biocontrol trait. *IOBC/wprs Bulletin* vol. 117:37-40, *Biological control of fungal and bacterial plant pathogens*.



9. Samils N, Karlsson M, Assefa T, Funck Jensen D (2016) Biological control against postharvest diseases on potato tubers. *IOBC/wprs Bulletin* vol. 115:241-242, *Biological control of fungal and bacterial plant pathogens*.
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## **Patents**

- BCA control of STB (2019) Biological control of septoria tritici blotch.