

Publication list - Marie Spohn

Last update: July 2025

In total, I have published 96 peer-reviewed publications, of which 39 as first author, 30 as last/senior author and 27 as co-author. I publish regularly in the leading journals in my field (for example, Soil Biology and Biochemistry), and have published in journals with a broad scope, such as PNAS, Nature Communications, and Global Change Biology. According to Google Scholar, my H factor is 47.

Peer-reviewed publications

2025

1. Fay, P. A., Gherardi, L. A., Yahdjian, L., Adler, P. B., Bakker, J. D., Bharath, S., ..., **Spohn, M.**, ... & Wheeler, G. R. (2025). Multiple nutrient interactions govern the global grassland biomass-precipitation relationship. PNAS, 122(15), e2410748122.
2. Gherseen, S., Manzoni, S., **Spohn, M.**, Lindahl, B.: Modelling mycelial responses to nitrogen limitation during litter decomposition. Soil Biology and Biochemistry, 109899.
3. Packard, E. E., Pérez-Izquierdo, L., Clemmensen, K. E., Dahlberg, A., **Spohn, M.**, Stendahl, J., & Lindahl, B. D. (2025). Ectomycorrhizal decomposers and their niche(s) in boreal forests. Functional Ecology, 1-17.
4. Sarangi, V., & **Spohn, M.** (2025). A Novel Method to Determine the Carbon Isotopic Composition of Inositol Hexaphosphate (Phytate) in Soil by Gas Chromatography–Combustion–Isotope Ratio Mass Spectrometry. Rapid Communications in Mass Spectrometry, 39(9), e9998.
5. **Spohn, M.** & Wanek, W. (2025). Quantifying element fluxes using radioisotopes. New Phytologist, 245(2).
6. **Spohn, M.** (2025). Interactions of nitrogen and phosphorus in plant nutrition - Analysis of a 60-years old field experiment. Plant and Soil, 510, 275–289.
7. **Spohn, M.**, Bagchi, S., Bakker, J. D., Borer, E. D., Carbutt, C., Catford, J. A., Dickman, C. R., ... & Seabloom, E. W. (2025). Unimodal relationships between plant biomass and the environment in global grasslands. Communications Biology, 8(1), 97.
8. Tian, Y., **Spohn, M.**: A method to isolate soil organic phosphorus from other soil organic matter to determine its carbon isotope ratio. Soil Biology and Biochemistry, 109911.
9. Vázquez, E., & **Spohn, M.** (2025). Non-symbiotic N₂ fixation is less sensitive to changes in temperature than carbon mineralization in Northern forest soils. Geoderma, 453, 117128
10. Zhang, P, E Seabloom, Foo J., MacDougall, A., Harpole, W., Adler, P., ..., **Spohn, M.**, ..., & Borer, E. (2025). Dominant species predict plant richness and biomass in global grasslands. Nature Ecology and Evolution, 9(6), 924-936.

2024

11. **Spohn, M.** (2024). Preferential adsorption of nitrogen-and phosphorus-containing organic compounds to minerals in soils: A review. Soil Biology and Biochemistry, 109428.

12. **Spohn, M.**, & Stendahl, J. (2024). Soil carbon and nitrogen contents in forest soils are related to soil texture in interaction with pH and metal cations. *Geoderma*, 441, 116746.

2023

13. Andrade-Linares, D. R., Schwerdtner, U., Schulz, S., Dannenmann, M., **Spohn, M.**, Baum, C., ... & Schlöter, M. (2023). Climate change and management intensity alter spatial distribution and abundance of P mineralizing bacteria and arbuscular mycorrhizal fungi in mountainous grassland soils. *Soil Biology and Biochemistry*, 186, 109175.
14. Scheibe, A., Sierra, C., & **Spohn, M.** (2023). Recently fixed carbon fuels microbial activity several meters below the soil surface. *Biogeosciences*, 20(4), 827-838.
15. **Spohn, M.**, & Berg, B. (2023). Import and release of nutrients during the first five years of plant litter decomposition. *Soil Biology and Biochemistry*, 176, 108878.
16. **Spohn, M.**, & Stendahl, J. (2023). Spatial patterns of nitrogen isotope ratios in forest soils are related to latitude and soil phosphorus concentration. *Biogeochemistry*, 165(1), 43-56.
17. **Spohn, M.**, Bagchi, S., Biederman, L. A., Borer, E. T., Bråthen, K. A., Bugalho, M. N., ... & Yahdjian, L. (2023). The positive effect of plant diversity on soil carbon depends on climate. *Nature Communications*, 14(1), 6624.
18. **Spohn, M.**, Braun, S., & Sierra, C. A. (2023). Continuous decrease in soil organic matter despite increased plant productivity in an 80-years-old phosphorus-addition experiment. *Communications Earth & Environment*, 4(1), 251.
19. Vázquez, E., Borer, E. T., Bugalho, M. N., Caldeira, M. C., McCulley, R. L., Risch, A. C., ... & **Spohn, M.** (2023). The synergistic response of primary production in grasslands to combined nitrogen and phosphorus addition is caused by increased nutrient uptake and retention. *Plant and Soil*, 490(1), 371-385.

2022

20. Pastore, G., Weig, A. R., Vázquez, E., & **Spohn, M.** (2022). Weathering of calcareous bedrocks is strongly affected by the activity of soil microorganisms. *Geoderma*, 405, 115408.
21. Scheibe, A., & **Spohn, M.** (2022). N₂ fixation per unit microbial biomass increases with aridity. *Soil Biology and Biochemistry*, 172, 108733.
22. Schwerdtner, U., & **Spohn, M.** (2022). Plant species interactions in the rhizosphere increase maize N and P acquisition and maize yields in intercropping. *Journal of Soil Science and Plant Nutrition*, 22(3), 3868-3884.
23. Schwerdtner, U., Lacher, U., & **Spohn, M.** (2022). Lupin causes maize to increase organic acid exudation and phosphorus concentration in intercropping. *Journal of Sustainable Agriculture and Environment*, 1(3), 191-202.
24. Schwerdtner, U., Lacher, U., & **Spohn, M.** (2022). Soy and mustard effectively mobilize phosphorus from inorganic and organic sources. *Nutrient Cycling in Agroecosystems*, 124(2), 211-226.
25. Seuss, I., Scheibe, A., & **Spohn, M.** (2022). N₂ fixation is less sensitive to changes in soil water content than carbon and net nitrogen mineralization. *Geoderma*, 424, 115973.

26. **Spohn, M.**, & Stendahl, J. (2022). Carbon, nitrogen, and phosphorus stoichiometry of organic matter in Swedish forest soils and its relationship with climate, tree species, and soil texture. *Biogeosciences*, 19(8), 2171-2186.
27. **Spohn, M.**, Diáková, K., Aburto, F., Doetterl, S., & Borovec, J. (2022). Sorption and desorption of organic matter in soils as affected by phosphate. *Geoderma*, 405, 115377.
28. Tuyishime, J. M., Adediran, G. A., Olsson, B. A., **Spohn, M.**, Hillier, S., Klysubun, W., & Gustafsson, J. P. (2022). Phosphorus abundance and speciation in acid forest Podzols—Effect of postglacial weathering. *Geoderma*, 406, 115500.
29. Tuyishime, J. M., Adediran, G. A., Olsson, B. A., Zetterberg, T. S., Högbom, L., **Spohn, M.**, ... & Gustafsson, J. P. (2022). Phosphorus speciation in the organic layer of two Swedish forest soils 13–24 years after wood ash and nitrogen application. *Forest Ecology and Management*, 521, 120432.
30. Vázquez, E., Schleuss, P. M., Borer, E. T., Bugalho, M. N., Caldeira, M. C., Eisenhauer, N., ... & **Spohn, M.** (2022). Nitrogen but not phosphorus addition affects symbiotic N₂ fixation by legumes in natural and semi-natural grasslands located on four continents. *Plant and Soil*, 478(1-2), 689-707.

2021

31. Manzoni, S., Chakrawal, A., **Spohn, M.**, & Lindahl, B. D. (2021). Modeling microbial adaptations to nutrient limitation during litter decomposition. *Frontiers in Forests and Global Change*, 64.
32. Michas, A., Pastore, G., Chiba, A., Grafe, M., Clausing, S., Polle, A., Schlöter, M., **Spohn, M.**, & Schulz, S. (2021). Phosphorus Availability Alters the Effect of Tree Girdling on the Diversity of Phosphorus Solubilizing Soil Bacterial Communities in Temperate Beech Forests. *Frontiers in Forests and Global Change*, 4, 696983.
33. Schleuss, P. M., Widdig, M., Biederman, L. A., Borer, E. T., Crawley, M. J., Kirkman, K. P., Seabloom, E.W., Wragg, P.D. & **Spohn, M.** (2021). Microbial substrate stoichiometry governs nutrient effects on nitrogen cycling in grassland soils. *Soil Biology and Biochemistry*, 155, 108168.
34. Schwerdtner, U., & **Spohn, M.** (2021). Interspecific root interactions increase maize yields in intercropping with different companion crops. *Journal of Plant Nutrition and Soil Science*, 184(5), 596-606.
35. **Spohn, M.**, & Holzheu, S. (2021). Temperature controls diel oscillation of the CO₂ concentration in a desert soil. *Biogeochemistry*, 156, 279-292.
36. **Spohn, M.**, Aburto, F., Ehlers, T. A., Farwig, N., Frings, P. J., Hartmann, H., ... & Oelmann, Y. (2021). Terrestrial ecosystems buffer inputs through storage and recycling of elements. *Biogeochemistry*, 156(3), 351-373.
37. Van Sundert, K., Arfin Khan, M. A., Bharath, S., Buckley, Y. M., Caldeira, M. C., Donohue, I., ..., **Spohn, M.**, ... & Vicca, S. (2021). Fertilized graminoids intensify negative drought effects on grassland productivity. *Global Change Biology*, 27(11), 2441-2457.

2020

38. Brucker, E., Kernchen, S., & **Spohn, M.** (2020). Release of phosphorus and silicon from minerals by soil microorganisms depends on the availability of organic carbon. *Soil Biology and Biochemistry*, 143, 107737.
39. Holz, M., Zarebanadkouki, M., Carminati, A., Becker, J. N., & **Spohn, M.** (2020). The effect of root hairs on rhizosphere phosphatase activity. *Journal of Plant Nutrition and Soil Science*, 183(3), 382-388.
40. Klotzbücher, A., Schunck, F., Klotzbücher, T., Kaiser, K., Glaser, B., **Spohn, M.**, ... & Mikutta, R. (2020). Goethite-bound phosphorus in an acidic subsoil is not available to beech (*Fagus sylvatica* L.). *Frontiers in Forests and Global Change*, 3, 94.
41. Meller, S., Frossard, E., **Spohn, M.**, & Luster, J. (2020). Plant nutritional status explains the modifying effect of provenance on the response of beech sapling root traits to differences in soil nutrient supply. *Frontiers in Forests and Global Change*, 3, 535117.
42. Pastore, G., Kernchen, S., & **Spohn, M.** (2020). Microbial solubilization of silicon and phosphorus from bedrock in relation to abundance of phosphorus-solubilizing bacteria in temperate forest soils. *Soil Biology and Biochemistry*, 151, 108050.
43. Pastore, G., Kaiser, K., Kernchen, S., & **Spohn, M.** (2020). Microbial release of apatite-and goethite-bound phosphate in acidic forest soils. *Geoderma*, 370, 114360.
44. Schleuss, P. M., Widdig, M., Heintz-Buschart, A., Kirkman, K., & **Spohn, M.** (2020). Interactions of nitrogen and phosphorus cycling promote P acquisition and explain synergistic plant-growth responses. *Ecology*, 101(5), e03003.
45. **Spohn, M.** (2020). Increasing the organic carbon stocks in mineral soils sequesters large amounts of phosphorus. *Global Change Biology*, 26(8), 4169-4177.
46. **Spohn, M.** (2020). Phosphorus and carbon in soil particle size fractions: A synthesis. *Biogeochemistry*, 147, 225-242.
47. **Spohn, M.**, Müller, K., Höschen, C., Mueller, C. W., & Marhan, S. (2020). Dark microbial CO₂ fixation in temperate forest soils increases with CO₂ concentration. *Global Change Biology*, 26(3), 1926-1935.
48. **Spohn, M.**, Zeißen, I., Brucker, E., Widdig, M., Lacher, U., & Aburto, F. (2020). Phosphorus solubilization in the rhizosphere in two saprolites with contrasting phosphorus fractions. *Geoderma*, 366, 114245.
49. Widdig, M., Heintz-Buschart, A., Schleuss, P. M., Guhr, A., Borer, E. T., Seabloom, E. W., & **Spohn, M.** (2020). Effects of nitrogen and phosphorus addition on microbial community composition and element cycling in a grassland soil. *Soil Biology and Biochemistry*, 151, 108041.
50. Widdig, M., Schleuss, P. M., Biederman, L. A., Borer, E. T., Crawley, M. J., Kirkman, K. P., ... & **Spohn, M.** (2020). Microbial carbon use efficiency in grassland soils subjected to nitrogen and phosphorus additions. *Soil Biology and Biochemistry*, 146, 107815.

2019

51. Brucker, E., & **Spohn, M.** (2019). Formation of soil phosphorus fractions along a climate and vegetation gradient in the Coastal Cordillera of Chile. *Catena*, 180, 203-211.

52. Holz, M., Zarebanadkouki, M., Carminati, A., Hovind, J., Kaestner, A., & **Spohn, M.** (2019). Increased water retention in the rhizosphere allows for high phosphatase activity in drying soil. *Plant and Soil*, 443, 259-271.
53. Schleuss, P. M., Widdig, M., Heintz-Buschart, A., Guhr, A., Martin, S., Kirkman, K., & **Spohn, M.** (2019). Stoichiometric controls of soil carbon and nitrogen cycling after long-term nitrogen and phosphorus addition in a mesic grassland in South Africa. *Soil Biology and Biochemistry*, 135, 294-303.
54. **Spohn, M.**, & Schleuss, P. M. (2019). Addition of inorganic phosphorus to soil leads to desorption of organic compounds and thus to increased soil respiration. *Soil Biology and Biochemistry*, 130, 220-226.
55. Widdig, M., Schleuss, P. M., Weig, A. R., Guhr, A., Biederman, L. A., Borer, E. T., ... & **Spohn, M.** (2019). Nitrogen and phosphorus additions alter the abundance of phosphorus-solubilizing bacteria and phosphatase activity in grassland soils. *Frontiers in Environmental Science*, 7, 185.

2018

56. Bernhard, N., Moskwa, L. M., Schmidt, K., Oeser, R. A., Aburto, F., Bader, M. Y., ... **Spohn, M.**, & Kühn, P. (2018). Pedogenic and microbial interrelations to regional climate and local topography: New insights from a climate gradient (arid to humid) along the Coastal Cordillera of Chile. *Catena*, 170, 335-355.
57. Gavrichkova, O., Liberati, D., de Dato, G., Abou Jaoudé, R., Brugnoli, E., De Angelis, P., Guidolotti, G., Spohn, M., Pausch, J., Tian, J., & Kuzyakov, Y. (2018). Effects of rain shortage on carbon allocation, pools and fluxes in a Mediterranean shrub ecosystem—a ¹³C labelling field study. *Science of the Total Environment*, 627, 1242-1252.
58. George, T. S., Giles, C. D., Menezes-Blackburn, D., Condron, L. M., Gama-Rodrigues, A. C., Jaisi, D., ... **Spohn, M.**, ... & Haygarth, P. M. (2018). Organic phosphorus in the terrestrial environment: a perspective on the state of the art and future priorities. *Plant and Soil*, 427, 191-208.
59. Heuck, C., Smolka, G., Whalen, E. D., Frey, S., Gundersen, P., Moldan, F., ... & **Spohn, M.** (2018). Effects of long-term nitrogen addition on phosphorus cycling in organic soil horizons of temperate forests. *Biogeochemistry*, 141, 167-181.
60. Nassal, D., **Spohn, M.**, Eltlbany, N., Jacquioud, S., Smalla, K., Marhan, S., & Kandeler, E. (2018). Effects of phosphorus-mobilizing bacteria on tomato growth and soil microbial activity. *Plant and Soil*, 427, 17-37.
61. Oeser, R. A., Stroncik, N., Moskwa, L. M., Bernhard, N., Schaller, M., Canessa, R., ... **Spohn, M.**, ... & von Blanckenburg, F. (2018). Chemistry and microbiology of the Critical Zone along a steep climate and vegetation gradient in the Chilean Coastal Cordillera. *Catena*, 170, 183-203.
62. **Spohn, M.**, & Sierra, C. A. (2018). How long do elements cycle in terrestrial ecosystems?. *Biogeochemistry*, 139, 69-83.
63. **Spohn, M.**, Zavišić, A., Nassal, P., Bergkemper, F., Schulz, S., Marhan, S., ... & Polle, A. (2018). Temporal variations of phosphorus uptake by soil microbial biomass and young beech trees in two forest soils with contrasting phosphorus stocks. *Soil Biology and Biochemistry*, 117, 191-202.

2017

64. Dietrich, K., **Spohn, M.**, Villamagua, M., & Oelmann, Y. (2017). Nutrient addition affects net and gross mineralization of phosphorus in the organic layer of a tropical montane forest. *Biogeochemistry*, 136, 223-236.
65. Dinh, M. V., Guhr, A., **Spohn, M.**, & Matzner, E. (2017). Release of phosphorus from soil bacterial and fungal biomass following drying/rewetting. *Soil Biology and Biochemistry*, 110, 1-7.
66. Jeong, G., Choi, K., **Spohn, M.**, Park, S. J., Huwe, B., & Ließ, M. (2017). Environmental drivers of spatial patterns of topsoil nitrogen and phosphorus under monsoon conditions in a complex terrain of South Korea. *PLoS One*, 12(8), e0183205.
67. **Spohn, M.**, & Widdig, M. (2017). Turnover of carbon and phosphorus in the microbial biomass depending on phosphorus availability. *Soil Biology and Biochemistry*, 113, 53-59.
68. Zederer, D. P., Talkner, U., **Spohn, M.**, & Joergensen, R. G. (2017). Microbial biomass phosphorus and C/N/P stoichiometry in forest floor and A horizons as affected by tree species. *Soil Biology and Biochemistry*, 111, 166-175.

2016

69. Bergkemper, F., Bünemann, E. K., Hauenstein, S., Heuck, C., Kandeler, E., Krüger, J., ... & Schulz, S. (2016). An inter-laboratory comparison of gaseous and liquid fumigation based methods for measuring microbial phosphorus (P_{mic}) in forest soils with differing P stocks. *Journal of microbiological methods*, 128, 66-68.
70. Dinh, M. V., Schramm, T., **Spohn, M.**, & Matzner, E. (2016). Drying–rewetting cycles release phosphorus from forest soils. *Journal of Plant Nutrition and Soil Science*, 179(5), 670-678.
71. Heuck, C., & **Spohn, M.** (2016). Carbon, nitrogen and phosphorus net mineralization in organic horizons of temperate forests: stoichiometry and relations to organic matter quality. *Biogeochemistry*, 131, 229-242.
72. Hofmann, K., Heuck, C., & **Spohn, M.** (2016). Phosphorus resorption by young beech trees and soil phosphatase activity as dependent on phosphorus availability. *Oecologia*, 181, 369-379.
73. **Spohn, M.** (2016). Element cycling as driven by stoichiometric homeostasis of soil microorganisms. *Basic and Applied Ecology*, 17(6), 471-478.
74. **Spohn, M.**, Klaus, K., Wanek, W., & Richter, A. (2016). Microbial carbon use efficiency and biomass turnover times depending on soil depth—Implications for carbon cycling. *Soil Biology and Biochemistry*, 96, 74-81.
75. **Spohn, M.**, Novák, T. J., Incze, J., & Giani, L. (2016). Dynamics of soil carbon, nitrogen, and phosphorus in calcareous soils after land-use abandonment—A chronosequence study. *Plant and Soil*, 401, 185-196.
76. **Spohn, M.**, Pötsch, E. M., Eichorst, S. A., Wobken, D., Wanek, W., & Richter, A. (2016). Soil microbial carbon use efficiency and biomass turnover in a long-term fertilization experiment in a temperate grassland. *Soil Biology and Biochemistry*, 97, 168-175.
77. Zavišić, A., Nassal, P., Yang, N., Heuck, C., **Spohn, M.**, Marhan, S., ... & Polle, A. (2016). Phosphorus availabilities in beech (*Fagus sylvatica* L.) forests impose habitat filtering on

ectomycorrhizal communities and impact tree nutrition. *Soil Biology and Biochemistry*, 98, 127-137.

2015

78. Guhr, A., Borken, W., **Spohn, M.**, & Matzner, E. (2015). Redistribution of soil water by a saprotrophic fungus enhances carbon mineralization. *Proceedings of the National Academy of Sciences*, 112(47), 14647-14651.
79. Heuck, C., Weig, A., & **Spohn, M.** (2015). Soil microbial biomass C: N: P stoichiometry and microbial use of organic phosphorus. *Soil Biology and Biochemistry*, 85, 119-129.
80. Huang, W., & **Spohn, M.** (2015). Effects of long-term litter manipulation on soil carbon, nitrogen, and phosphorus in a temperate deciduous forest. *Soil Biology and Biochemistry*, 83, 12-18.
81. Kruse, J., Abraham, M., Amelung, W., Baum, C., Bol, R., Kühn, O., ... **Spohn, M.** ... & Leinweber, P. (2015). Innovative methods in soil phosphorus research: A review. *Journal of Plant Nutrition and Soil Science*, 178(1), 43-88.
82. **Spohn, M.** (2015). Microbial respiration per unit microbial biomass depends on litter layer carbon-to-nitrogen ratio. *Biogeosciences*, 12(3), 817-823.
83. **Spohn, M.**, & Chodak, M. (2015). Microbial respiration per unit biomass increases with carbon-to-nutrient ratios in forest soils. *Soil Biology and Biochemistry*, 81, 128-133.
84. **Spohn, M.**, Treichel, N. S., Cormann, M., Schlöter, M., & Fischer, D. (2015). Distribution of phosphatase activity and various bacterial phyla in the rhizosphere of *Hordeum vulgare* L. depending on P availability. *Soil Biology and Biochemistry*, 89, 44-51.

2014 and 2013

85. Novák, T. J., Incze, J., **Spohn, M.**, Gliná, B., & Giani, L. (2014). Soil and vegetation transformation in abandoned vineyards of the Tokaj Nagy-Hill, Hungary. *Catena*, 123, 88-98.
86. **Spohn, M.**, Babka, B., & Giani, L. (2013). Changes in soil organic matter quality during sea-influenced marsh soil development at the North Sea coast. *Catena*, 107, 110-117.
87. **Spohn, M.**, Carminati, A., & Kuzyakov, Y. (2013). Soil zymography—a novel in situ method for mapping distribution of enzyme activity in soil. *Soil Biology and Biochemistry*, 58, 275-280.
88. **Spohn, M.**, Ermak, A., & Kuzyakov, Y. (2013). Microbial gross organic phosphorus mineralization can be stimulated by root exudates—a ³³P isotopic dilution study. *Soil Biology and Biochemistry*, 65, 254-263.
89. **Spohn, M.**, & Kuzyakov, Y. (2013). Distribution of microbial-and root-derived phosphatase activities in the rhizosphere depending on P availability and C allocation—Coupling soil zymography with ¹⁴C imaging. *Soil Biology and Biochemistry*, 67, 106-113.
90. **Spohn, M.**, & Kuzyakov, Y. (2013). Phosphorus mineralization can be driven by microbial need for carbon. *Soil Biology and Biochemistry*, 61, 69-75.

91. **Spohn, M.**, & Kuzyakov, Y. (2014). Spatial and temporal dynamics of hotspots of enzyme activity in soil as affected by living and dead roots—a soil zymography analysis. *Plant and Soil*, 379, 67-77.

2012 and earlier

92. **Spohn, M.**, & Giani, L. (2012). Carbohydrates, carbon and nitrogen in soils of a marine and a brackish marsh as influenced by inundation frequency. *Estuarine, Coastal and Shelf Science*, 107, 89-96.
93. **Spohn, M.**, & Giani, L. (2011). Impacts of land use change on soil aggregation and aggregate stabilizing compounds as dependent on time. *Soil Biology and Biochemistry*, 43(5), 1081-1088.
94. **Spohn, M.**, & Giani, L. (2011). Total, hot water extractable, and oxidation-resistant carbon in sandy hydromorphic soils-analysis of a 220-year chronosequence. *Plant and Soil*, 338, 183-192.
95. **Spohn, M.**, & Giani, L. (2010). Water-stable aggregates, glomalin-related soil protein, and carbohydrates in a chronosequence of sandy hydromorphic soils. *Soil Biology and Biochemistry*, 42(9), 1505-1511.
96. **Spohn, M.**, & Rillig, M. C. (2012). Temperature- and moisture-dependent soil water repellency induced by the basidiomycete *Agaricus bisporus*. *Pedobiologia*, 55(1), 59-61.