

References:

1. Adeleke B. S., Babalola O. O., & Glick B. R. (2021). Plant growth-promoting root-colonizing bacterial endophytes. *Rhizosphere*, 20, 100433. <https://doi.org/10.1016/j.rhisph.2021.100433>.
2. Ahkami, A. H., White, R. A. III, Handakumbura, P. P. & Jansson, C. (2017). Rhizosphere engineering: Enhancing sustainable plant ecosystem productivity. *Rhizosphere*. 3, 233–243, <https://doi.org/10.1016/j.rhisph.2017.04.012>
3. Ahkami, A. H., White, R. A., Handakumbura, P. P., & Jansson, C. (2017). Rhizosphere engineering: Enhancing sustainable plant ecosystem productivity. *Rhizosphere*, 3, 233–243. <https://doi.org/10.1016/j.rhisph.2017.04.012>
4. Ahmed, E., & Holmström, S. J. (2014). The effect of soil horizon and mineral type on the distribution of siderophores in soil. *Geochimica Et Cosmochimica Acta*, 131, 184–195. <https://doi.org/10.1016/j.gca.2014.01.031>
5. Aktar, W., Sengupta, D., & Chowdhury, A. (2009). Impact of pesticides use in agriculture: their benefits and hazards. *Interdisciplinary Toxicology*, 2(1), 1-12. <https://doi.org/10.2478/v10102-009-0001-7>
6. Ali, M. P. (2014). "Pesticide overuse: Stop killing the beneficial agents." *Journal of Environmental and Analytical Toxicology*, 4(223). <https://doi.org/10.4172/2161-0525.1000223>
7. Alloway, B. J. (2004). *Zinc in Soil and Crop Nutrition*. Belgium: International Zinc Association.
8. Alloway, B. J. (2008). *Zinc in Soils and Plant Nutrition*. Belgium: International Zinc Association.
9. Almeida, D.S., Delai, L.B., Sawaya, A.C.H.F. & Rosolem C. A. (2020). Exudation of organic acid anions by tropical grasses in response to low phosphorus availability. *Scientific Reports*, 10, 16955. <https://doi.org/10.1038/s41598-020-73398-1>
10. Alori, E. T., Glick, B. R., & Babalola, O. O. (2017). Microbial Phosphorus Solubilization and Its Potential for Use in Sustainable Agriculture. *Frontiers in Microbiology*, 8. <https://doi.org/10.3389/fmicb.2017.00971>

11. Alper, H., & Stephanopoulos, G., (2004). Metabolic engineering challenges in the post-genomic era. *Chemical Engineering Science*, 59(22–23), 5009-5017. <https://doi.org/10.1016/j.ces.2004.09.027>
12. Andrews, S. C., Robinson, A. K., & Rodríguez-Quñones, F. (2003). Bacterial iron homeostasis. *FEMS Microbiology Reviews*, 27(2-3), 215–237. [https://doi.org/10.1016/s0168-6445\(03\)00055-x](https://doi.org/10.1016/s0168-6445(03)00055-x)
13. Anjanadevi, I. P., John, N. S., John, K. S., Jeeva, M. L., & Misra, R. S. (2015). Rock inhabiting potassium solubilizing bacteria from Kerala, India: characterization and possibility in chemical K fertilizer substitution. *Journal of Basic Microbiology*, 56(1), 67–77. <https://doi.org/10.1002/jobm.201500139>
14. Arai, Y., & Sparks, D. (2007). Phosphate reaction dynamics in soils and soil components: A multiscale approach. *Advances in Agronomy*. 94. 135-179. [https://doi.org/10.1016/S0065-2113\(06\)94003-6](https://doi.org/10.1016/S0065-2113(06)94003-6)
15. Arkhipova, T. N., Prinsen, E., Veselov, S. U., Martinenko, E. V., Melentiev, A. I., & Kudoyarova, G. R. (2007). Cytokinin producing bacteria enhance plant growth in drying soil. *Plant and Soil*, 292(1-2), 305–315. <https://doi.org/10.1007/s11104-007-9233-5>
16. Arnauteli, S., Matoz Fernandez, D. A., Porter, M., Kalamara, M., Abbott, J., Macphee, C., Davidsonm, F., & Stanley-Wall, N. R. (2019) Pulcherrimin formation controls growth arrest of the *Bacillus subtilis* biofilm. *Proceedings of the National Academy of Science USA* 116(27), 13553–13562. <https://doi.org/10.1073/pnas.1903982116>
17. Asai, K., Baik, S. H., Kasahara, Y., Moriya, S. & Ogasawara, N. (2000). Regulation of the transport system for C₄-dicarboxylic acids in *Bacillus subtilis*. *Microbiology* 146(2), 263-271. <https://doi.org/10.1099/00221287-146-2-263>
18. Asea, P., Kucey, R., & Stewart, J. (1988). Inorganic phosphate solubilization by two *Penicillium* species in solution culture and soil. *Soil Biology and Biochemistry*, 20(4), 459–464. [https://doi.org/10.1016/0038-0717\(88\)90058-2](https://doi.org/10.1016/0038-0717(88)90058-2)
19. Bais, H. P., Fall, R., & Vivanco, J. M. (2004). Biocontrol of *Bacillus subtilis* against infection of *Arabidopsis* roots by *Pseudomonas syringae* is facilitated

- by biofilm formation and surfactin production. *Plant physiology*, 134(1), 307–319. <https://doi.org/10.1104/pp.103.028712>
20. Bais, H. P., Weir, T. L., Perry, L. G., Gilroy, S., & Vivanco, J. M. (2006). The role of root exudates in rhizosphere interactions with plants and other organisms. *Annual Review of Plant Biology*, 57: 233–266, <https://doi.org/10.1146/annurev.arplant.57.032905.105159>
21. Bakker, P. A. H. M., Pieterse, C. M. J., & Van Loon, L. C. (2007). Induced systemic resistance by fluorescent *Pseudomonas* spp. *Phytopathology*. 97(2), 239–243. <https://doi.org/10.1094/PHYTO-97-2-0239>
22. Baliah V. D., Chandrasehar, G., & Selvam, P. N. (2018). *Pseudomonas fluorescens*: A Plant-Growth-Promoting Rhizobacterium (PGPR) with potential role in biocontrol of pests of crops, Editor(s): Ram Prasad, Sarvajeet S. Gill, Narendra Tuteja, *Crop Improvement Through Microbial Biotechnology*, Elsevier, 221-243, <https://doi.org/10.1016/B978-0-444-63987-5.00010-4>
23. Barber, S. A. (1995). *Soil Nutrient Bioavailability: A Mechanistic Approach* (2nd ed.), Wiley, New York
24. Barea, J. M., Pozo, M. J., Azcón, R., & Azcón-Aguilar, C. (2005). Microbial co-operation in the rhizosphere. *Journal of Experimental Botany*, 56(417), 1761–1778. <https://doi.org/10.1093/jxb/eri197>
25. Beauregard, P. B., Chai, Y., Vlamakis, H., Losick, R., & Kolter, R. (2013). *Bacillus subtilis* biofilm induction by plant polysaccharides. *Proceedings of the National Academy of Sciences of the United States of America*, 110(17), E1621–E1630. <https://doi.org/10.1073/pnas.1218984110>
26. Belitsky, B. R., & Sonenshein, A. L. (2013). Genome-wide identification of *Bacillus subtilis* CodY-binding sites at single-nucleotide resolution. *Proceedings of the National Academy of Sciences of the USA*, 110(17), 7026–7031. <https://doi.org/10.1073/pnas.1300428110>
27. Benson, D. R., Silvester, W. B., (1993). Biology of *Frankia* strains, actinomycete symbionts of actinorhizal plants. *Microbiology Reviews*, 57, 293–319.

28. Berendsen, R. L., Verk, M. C. V., Stringlis, I. A., Zamioudis, C., Tommassen, J., Pieterse, C. M. J., & Bakker, P. A. H. M. (2015). Unearthing the genomes of plant-beneficial *Pseudomonas* model strains WCS358, WCS374 and WCS417. *BMC Genomics*, 16(1). <https://doi.org/10.1186/s12864-015-1632-z>
29. Bergara, F., Ibarra, C., Iwamasa, J., Patarroyo, J. C., Aguilera, R., & Márquez-Magaña, L. M. (2003). CodY is a nutritional repressor of flagellar gene expression in *Bacillus subtilis*. *Journal of bacteriology*, 185(10), 3118–3126. <https://doi.org/10.1128/jb.185.10.3118-3126.2003>
30. Bhardwaj, D., Ansari, M., Sahoo, R., & Tuteja, N. (2014). Biofertilizers function as key player in sustainable agriculture by improving soil fertility, plant tolerance and crop productivity. *Microbial Cell Factories*, 13,66 <https://doi.org/10.1186/1475-2859-13-66>
31. Boersma, L., & Sparks, D. L. (1987). Kinetics of Soil Chemical Processes: Past Progress and Future Needs. *Future Developments in Soil Science Research ACSESS Publications*. <https://doi.org/10.2136/1987.futuredevelopmentssoil.c8>
32. Borriss, R. (2013). Comparative analysis of the complete genome sequence of the plant growth-promoting Bacterium *Bacillus amyloliquefaciens* FZB42. *Molecular Microbial Ecology of the Rhizosphere*, 883–898. <https://doi.org/10.1002/9781118297674.ch83>
33. Branda, S. S., Chu, F., Kearns, D. B., Losick, R., Kolter, R. (2006). A major protein component of the *Bacillus subtilis* biofilm matrix. *Molecular Microbiology*, 59, 1229–1238. <https://doi.org/10.1111/j.1365-2958.2005.05020.x>
34. Branda, S. S., González-Pastor, J. E., Ben-Yehuda, S., Losick, R., & Kolter, R. (2001). Fruiting body formation by *Bacillus subtilis*. *Proceedings of the National Academy of Sciences of the United States of America*, 98(20), 11621–11626. <https://doi.org/10.1073/pnas.191384198>
35. Brannen, P., & Kenney, D. (1997). Kodiak-A successful biological-control product for suppression of soil-borne plant pathogens of cotton. *Journal of*

- Industrial Microbiology and Biotechnology, 19, 169–171.
<https://doi.org/10.1038/sj.jim.2900439>
36. Bulgarelli, D., Schlaeppi, K., Spaepen, S., Themaat, E. V. L. V., & Schulze-Lefert, P. (2013). Structure and Functions of the Bacterial Microbiota of Plants. *Annual Review of Plant Biology*, 64(1), 807–838.
<https://doi.org/10.1146/annurev-arplant-050312-120106>
37. Burrage, A. M., Vanderpool, E., & Kearns, D. B. (2018). Assembly order of flagellar rod subunits in *Bacillus subtilis*. *Journal of bacteriology*, 200(23), e00425-18. <https://doi.org/10.1128/JB.00425-18>
38. Cairns, L. S., Hobley, L., & Stanley-Wall, N. R. (2014). Biofilm formation by *Bacillus subtilis*: new insights into regulatory strategies and assembly mechanisms. *Molecular microbiology*, 93(4), 587–598.
<https://doi.org/10.1111/mmi.12697>
39. Cao, H., van Heel, A. J., Ahmed, H., Mols, M., & Kuipers, O. P. (2017). Cell surface engineering of *Bacillus subtilis* improves production yields of heterologously expressed α -amylases. *Microbial cell factories*, 16(1), 56.
<https://doi.org/10.1186/s12934-017-0674-0>
40. Cassán, F., Perrig, D., Sgroy, V., Masciarelli, O., Penna, C., & Luna, V. (2009). *Azospirillum brasilense* Az39 and *Bradyrhizobium japonicum* E109, inoculated singly or in combination, promote seed germination and early seedling growth in corn (*Zea mays* L.) and soybean (*Glycine max* L.). *European Journal of Soil Biology*, 45(1), 28–35. <https://doi.org/10.1016/j.ejsobi.2008.08.005>
41. Cawoy, H., Bettiol, W., Fickers, P., & Ongena, M. (2011). “*Bacillus*-based biological control of plant diseases,” in *Pesticides in the Modern World - Pesticides Use and Management*, ed Margarita Stoytcheva (InTech Academic Press), 273–302, <https://doi.org/10.5772/17184>
42. Celikkol Erbas, B., & Guven Solakoglu, E. (2017). In the Presence of Climate Change, the Use of Fertilizers and the Effect of Income on Agricultural Emissions. *Sustainability*, 9(11), 1989. <http://doi.org/10.3390/su9111989>

43. Chai, Y., Chu, F., Kolter, R., & Losick, R. (2008). Bistability and biofilm formation in *Bacillus subtilis*. *Molecular microbiology*, 67(2), 254–263. <https://doi.org/10.1111/j.1365-2958.2007.06040.x>
44. Chai, Y., Norman, T., Kolter, R., & Losick, R. (2010). An epigenetic switch governing daughter cell separation in *Bacillus subtilis*. *Genes & development*, 24(8), 754–765. <https://doi.org/10.1101/gad.1915010>
45. Chen, X., Koumoutsis, A., Scholz, R., Schneider, K., Vater, J., Süßmuth, R., et al. (2009). Genome analysis of *Bacillus amyloliquefaciens* FZB42 reveals its potential for biocontrol of plant pathogens. *Journal of Biotechnology*, 140(1-2), 27–37. <https://doi.org/10.1016/j.jbiotec.2008.10.011>
46. Chen, Y., Cao, S., Chai, Y., Clardy, J., Kolter, R., Guo, J. H., & Losick, R. (2012). A *Bacillus subtilis* sensor kinase involved in triggering biofilm formation on the roots of tomato plants. *Molecular microbiology*, 85(3), 418–430. <https://doi.org/10.1111/j.1365-2958.2012.08109.x>
47. Choudhary, D. K., Prakash, A., & Johri, B. N. (2007). Induced systemic resistance (ISR) in plants: mechanism of action. *Indian Journal of Microbiology*, 47(4), 289–297. <https://doi.org/10.1007/s12088-007-0054-2>
48. Chubukov, V., Uhr, M., Le Chat, L., Kleijn, R. J., Jules, M., Link, H., Aymerich, S., Stelling, J., & Sauer, U. (2013). Transcriptional regulation is insufficient to explain substrate-induced flux changes in *Bacillus subtilis*. *Molecular systems biology*, 9, 709. <https://doi.org/10.1038/msb.2013.66>
49. Costerton, J. W., & Lappin-Scott, H. M. (1995). Introduction to microbial biofilms, p. 1-11. *In* H. M. Lappin-Scott and J. W. Costerton (ed.), *Microbial biofilms*. Cambridge University Press, Cambridge, United Kingdom.
50. Cui, K., & Shoemaker, S. P. (2018). Public perception of genetically-modified (GM) food: A Nationwide Chinese Consumer Study. *Npj Science of Food*, 2(1). <https://doi.org/10.1038/s41538-018-0018-4>
51. Cui, W., Han, L., Suo, F., Liu, Z., Zhou, L. & Zhou, Z. (2018). Exploitation of *Bacillus subtilis* as a robust workhorse for production of heterologous proteins and beyond. *World Journal of Microbiology and Biotechnology*. 34, 145. <https://doi.org/10.1007/s11274-018-2531-7>

52. Cunningham, J. E., & Kuiack, C. (1992). Production of citric and oxalic acids and solubilization of calcium phosphate by *Penicillium bilaii*. *Applied and Environmental Microbiology* 58(5), 1451–1458.
53. Dauner, M., Sonderegger, M., Hochuli, M., Szyperski, T., Wüthrich, K., Hohmann, H. P., Sauer, U., & Bailey, J. E. (2002). Intracellular carbon fluxes in riboflavin-producing *Bacillus subtilis* during growth on two-carbon substrate mixtures. *Applied and environmental microbiology*, 68(4), 1760–1771. <https://doi.org/10.1128/aem.68.4.1760-1771.2002>
54. Delgadoillo, J., Lafuente, A., Doukkali, B., Redondo-Gómez, S., Mateos-Naranjo, E., & Caviedes, M. et al. (2014). Improving legume nodulation and Cu rhizostabilization using a genetically modified rhizobia. *Environmental Technology*, 36(10), 1237-1245. <https://doi.org/10.1080/09593330.2014.983990>
55. Dessaux, Y., Grandclement, C., & Faure, D., (2016). Engineering the rhizosphere. *Trends in Plant Science*. 21, 266–278. <https://doi.org/10.1016/j.tplants.2016.01.002>
56. Diesterhaft, M.D. & Freese, E. (1973). Role of pyruvate carboxylase, phosphoenolpyruvate carboxykinase, and malic enzyme during growth and sporulation of *Bacillus subtilis*. *Journal of Biological Chemistry*, 248(17), 6062–6070.
57. Dixon, R., & Kahn, D. (2004). Genetic regulation of biological nitrogen fixation. *Nature Reviews Microbiology*, 2(8), 621–631. <https://doi.org/10.1038/nrmicro954>
58. Doan, T., Servant, P., Tojo, S., Yamaguchi, H., Lerondel, G., Yoshida, K., Fujita, Y., & Aymerich, S. (2003). The *Bacillus subtilis* *ywkA* gene encodes a malic enzyme and its transcription is activated by the YufL/YufM two component system in response to malate. *Microbiology* 149(9), 2331–2343. <https://doi.org/10.1099/mic.0.26256-0>
59. Dong, H., & Zhang, D. (2014). Current development in genetic engineering strategies of *Bacillus* species. *Microbial. Cell Factories*, 13, 63. <https://doi.org/10.1186/1475-2859-13-63>

60. Dutta, J., & Thakur, D. (2017). Evaluation of multifarious plant growth promoting traits, antagonistic potential and phylogenetic affiliation of rhizobacteria associated with commercial tea plants grown in Darjeeling, India. *PLOS ONE*, 12(8), e0182302. <https://doi.org/10.1371/journal.pone.0182302>
61. Earl, A. M., Losick, R., & Kolter, R. (2007). *Bacillus subtilis* genome diversity. *Journal of bacteriology*, 189(3), 1163–1170. <https://doi.org/10.1128/JB.01343-06>
62. Emmert, E. A., & Handelsman, J. (1999). Biocontrol of plant disease: a (Gram-) positive perspective. *FEMS Microbiology Letters*, 171(1), 1–9. <https://doi.org/10.1111/j.1574-6968.1999.tb13405.x>
63. Erable, B., Duteanu, N. M., Ghangrekar, M. M., Dumas, C. & Scott, K. (2010). Application of electro-active biofilms. *Biofouling* 26(1), 57–71, <https://doi.org/10.1080/08927010903161281>
64. FAO. 2017. *The future of food and agriculture – Trends and challenges*. Rome
65. Figueiredo, M., Burity, H., Martínez, C., & Chanway, C. (2008). Alleviation of drought stress in the common bean (*Phaseolus vulgaris* L.) by co-inoculation with *Paenibacillus polymyxa* and *Rhizobium tropici*. *Applied Soil Ecology*, 40(1), 182-188. <https://doi.org/10.1016/j.apsoil.2008.04.005>
66. Finkel, O. M., Castrillo, G., Paredes, S. H., González, I. S., & Dangl, J. L. (2017). Understanding and exploiting plant beneficial microbes. *Current Opinion in Plant Biology*, 38, 155–163. <https://doi.org/10.1016/j.pbi.2017.04.018>
67. Fong, S. S., (2014). Computational approaches to metabolic engineering utilizing systems biology and synthetic biology. *CSBJ* 11(18), 28-34, <https://doi.org/10.1016/j.csbj.2014.08.005>
68. Frossard, E., Brossard, M., Hedley, M. J., & Metherell, A. (1995). Reactions controlling the cycling of P in soils. In: Tiessen H (ed) *Phosphorus cycling in terrestrial and aquatic ecosystems: a global perspective*. SCOPE/Wiley, New York, pp 107–137
69. Fujita, M., González-Pastor, J. E., & Losick, R. (2005). High- and low-threshold genes in the Spo0A regulon of *Bacillus subtilis*. *Journal of*

- bacteriology, 187(4), 1357–1368. <https://doi.org/10.1128/JB.187.4.1357-1368.2005>
70. Fujita, Y. (2009). Carbon catabolite control of the metabolic network in *Bacillus subtilis*. *Bioscience Biotechnology and Biochemistry*, 73(2), 245–259, <https://doi.org/10.1271/bbb.80479>
71. Gamalero, E., and Glick, B. R. (2011). Mechanisms used by plant growth-promoting bacteria. In *Bacteria in Agrobiolgy: Plant Nutrient Management*. Maheshwari, D.K. (ed.). Berlin, Heidelberg, Germany: Springer Verlag, 17–46. https://doi.org/10.1007/978-3-642-21061-7_2
72. Geddes, B. A., Ryu, M.-H., Mus, F., Costas, A. G., Peters, J. W., Voigt, C. A., & Poole, P. (2015). Use of plant colonizing bacteria as chassis for transfer of N₂ -fixation to cereals. *Current Opinion in Biotechnology*, 32, 216–222. <https://doi.org/10.1016/j.copbio.2015.01.004>
73. Glick B. R. (2020) *Beneficial Plant-Bacterial Interactions*, 2nd Edn., Springer.
74. Glick, B. R. (1995). The enhancement of plant growth by free-living bacteria. *Canadian Journal of Microbiology*, 41(2), 109–117. <https://doi.org/10.1139/m95-015>
75. Glick, B. R. (2012). Plant Growth-Promoting Bacteria: Mechanisms and Applications. *Scientifica*, 2012, 1–15. <https://doi.org/10.6064/2012/963401>
76. Glick, B. R. (2014). Bacteria with ACC deaminase can promote plant growth and help to feed the world. *Microbiological Research*, 169(1), 30–39. <https://doi.org/10.1016/j.micres.2013.09.009>
77. Global nutrition report (2018). globalnutritionreport.org/the-report/technical-notes. 2018 Nutrition country profile | globalnutritionreport.org
78. Goldstein, A. H. (1996). Involvement of the quinoprotein glucose dehydrogenase in the solubilization of exogenous phosphates by Gram-negative bacteria. In *Phosphate in Microorganisms: Cellular and Molecular Biology*. Eds. A Torriani-Gorini, E Yagil and S Silver. pp. 197–203. ASM Press, Washington, DC.

79. Gonzalez-Pastor, J. E. (2011). Cannibalism: a social behavior in sporulating *Bacillus subtilis*. *FEMS Microbiology Reviews*, 35(3), 415–424, <https://doi.org/10.1111/j.1574-6976.2010.00253.x>
80. Good, A., & Beatty, P. (2011). Fertilizing Nature: A Tragedy of Excess in the Commons. *Plos Biology*, 9(8), e1001124. <https://doi.org/10.1371/journal.pbio.1001124>
81. Gorke, B. & Stulke, J. (2008). Carbon catabolite repression in bacteria: many ways to make the most out of nutrients. *Nature Reviews Microbiology*, 6, 613–624, <https://doi.org/10.1038/nrmicro1932>
82. Gouda, S., Kerry, R. G., Das, G., Paramithiotis, S., Shin, H.S., & Patra, J. K. (2018). Revitalitaion of plant growth promoting rhizobacteria for sustainable development in agriculture. *Microbiol Res.* 206, 131–140. <https://doi.org/10.1016/j.micres.2017.08.016>
83. Grady, E. N., Macdonald, J., Liu, L., Richman, A., & Yuan, Z.-C. (2016). Current knowledge and perspectives of Paenibacillus: a review. *Microbial Cell Factories*, 15(1). <https://doi.org/10.1186/s12934-016-0603-7>
84. Guetsky, R., Shtienberg, D., Elad, Y., Fischer, E., & Dinoor, A. (2002). Improving Biological Control by Combining Biocontrol Agents Each with Several Mechanisms of Disease Suppression. *Phytopathology*, 92(9), 976–985. <https://doi.org/10.1094/phyto.2002.92.9.976>
85. Gupta, P. K. (2007). Metabolic engineering for over production of metabolites. *Elements of Biotechnology*, 458–470
86. Gurung, N., Ray, S., Bose, S., Rai, V. (2013). A broader view: microbial enzymes and their relevance in industries, medicine, and beyond. *BioMed Research Interntional*, 1-18, <https://doi.org/10.1155/2013/329121>
87. Guttenplan, S. B., Shaw, S., & Kearns, D. B. (2013). The cell biology of peritrichous flagella in *Bacillus subtilis*. *Molecular microbiology*, 87(1), 211–229. <https://doi.org/10.1111/mmi.12103>
88. Gyaneshwar, P., Parekh, L., Archana, G., Poole, P., Collins, M., Hutson, R., & Kumar, G. (1999). Involvement of a phosphate starvation inducible glucose dehydrogenase in soil phosphate solubilization by *Enterobacter asburiae*.

- FEMS Microbiology Letters, 171(2), 223–229. <https://doi.org/10.1111/j.1574-6968.1999.tb13436.x>
89. Hakim, S., Naqqash, T., Nawaz, M. S., Laraib, I., Siddique, M. J., Zia, R., Mirza, M. S., & Imran, A. (2021). Rhizosphere engineering with plant growth-promoting microorganisms for agriculture and ecological sustainability. *Frontiers in Sustainable Food Systems*, 5, 16. <https://doi.org/10.3389/fsufs.2021.617157>
 90. Halan, B., Buehler, K., & Schmid, A. (2012). Biofilms as living catalysts in continuous chemical syntheses. *Trends Biotechnology*. 30(9), 453–465, <https://doi.org/10.1016/j.tibtech.2012.05.003>
 91. Hamoen, L. W., Venema, G. & Kuipers, O. P. (2003). Controlling competence in *Bacillus subtilis*: shared use of regulators. *Microbiology* 149, 9–17, <https://doi.org/10.1099/mic.0.26003-0>
 92. Henke, S. K., & Cronan, J. E. (2014). Successful conversion of the *Bacillus subtilis* BirA Group II biotin protein ligase into a Group I ligase. *PloS one*, 9(5), e96757. <https://doi.org/10.1371/journal.pone.0096757>
 93. Higgins, D., & Dworkin, J. (2012). Recent progress in *Bacillus subtilis* sporulation. *FEMS microbiology reviews*, 36(1), 131–148. <https://doi.org/10.1111/j.1574-6976.2011.00310.x>
 94. Hohmann, H. P., van Dijl, J. M., Krishnappa, L. & Pragai, Z. (2017) Host organisms: *Bacillus subtilis*. In *Industrial Biotechnology: Microorganisms*. Wittmann, C. and Liao, J.C. (eds.). Weinheim, Germany: Wiley-VCH Verlag GmbH & Co., 221–297. <https://doi.org/10.1002/9783527807796.ch7>
 95. Hölscher, T., Bartels, B., Lin, Y. C., Gallegos-Monterrosa, R., Price-Whelan, A., Kolter, R., Dietrich, L., & Kovács, Á. T. (2015). Motility, chemotaxis and aerotaxis contribute to competitiveness during bacterial pellicle biofilm development. *Journal of molecular biology*, 427(23), 3695–3708. <https://doi.org/10.1016/j.jmb.2015.06.014>
 96. <http://www.fao.org/india/fao-in-india/india-at-a-glance/en/>
 97. <http://www.worldbank.org/en/news/feature/2012/05/17/india-agriculture-issues-priorities>

98. Huang, K., Chen, C., Shen, Q., Rosen, B., & Zhao, F. (2015). Genetically Engineering *Bacillus subtilis* with a heat-resistant arsenite methyltransferase for bioremediation of arsenic-contaminated organic waste. *Applied and Environmental Microbiology*, 81(19), 6718-6724. <https://doi.org/10.1128/aem.01535-15>
99. Idris, E. E., Iglesias, D. J., Talon, M., & Borriss, R. (2007). Tryptophan-dependent production of Indole-3-Acetic Acid (IAA) affects Level of plant Growth promotion by *Bacillus amyloliquefaciens* FZB42. *Molecular Plant-Microbe Interactions*, 20(6), 619–626. <https://doi.org/10.1094/mpmi-20-6-0619>
100. Ikeda, A. C., Bassani, L. L., Adamoski, D., Stringari, D., Cordeiro, V. K., Glienke, C., et al., (2012). Morphological and genetic characterization of endophytic bacteria isolated from roots of different maize genotypes. *Microbial Ecology*, 65(1), 154–160. <https://doi.org/10.1007/s00248-012-0104-0>
101. Jones, K. M., Kobayashi, H., Davies, B. W., Taga, M. E., & Walker, G. C. (2007). How rhizobial symbionts invade plants: the *Sinorhizobium-Medicago* model. *Nature Reviews Microbiology*, 5(8), 619–633. <https://doi.org/10.1038/nrmicro1705>
102. Jurlin-Castelli, C., Mani, N., Nakano, M. M., & Sonenshein, A. L. (2000). CcpC, a novel regulator of the LysR family required for glucose repression of the *citB* gene in *Bacillus subtilis*. *Journal of Molecular Biology*, 295(4), 865–878, <https://doi.org/10.1006/jmbi.1999.3420>
103. Jurewicz, J., & Hanke, W. (2008). Prenatal and Childhood Exposure to Pesticides and Neurobehavioral Development: Review of Epidemiological Studies. *International Journal of Occupational Medicine and Environmental Health*, 21(2). <https://doi.org/10.2478/v10001-008-0014-z>
104. K. von Grebmer, J. Bernstein, L. Hammond, F. Patterson, A. Sonntag, L. Klaus, J. Fahlbusch, O. Towey, C. Foley, S. Gitter, K. Ekstrom, and H. Fritschel. 2018. *2018 Global Hunger Index: Forced Migration and Hunger*. Bonn and Dublin: Welthungerhilfe and Concern Worldwide.

105. Kabata-Pendias, A., & Pendias, H. (2001). Trace Elements in Soils and Plants. London: CRC Press. <https://doi.org/10.1201/9781420039900>
106. Kabisch, J., Pratzka, I., Meyer, H., Albrecht, D., Lalk, M., Ehrenreich, A., & Schweder, T. (2013). Metabolic engineering of *Bacillus subtilis* for growth on overflow metabolites. *Microbial cell factories*, 12, 72. <https://doi.org/10.1186/1475-2859-12-72>
107. Kamilova, F., Kravchenko, L. V., Shaposhnikov, A. I., Azarova, T., Makarova, N., & Lugtenberg, B. (2006). Organic acids, sugars, and 1-tryptophane in exudates of vegetables growing on stonewool and their effects on activities of rhizosphere bacteria. *Molecular Plant-Microbe Interactions*, 19(3), 250–255 <https://doi.org/10.1094/mpmi-19-0250>
108. Kamran, S., Shahid, I., Baig, D. N., Rizwan, M., Malik, K. A., & Mehnaz, S. (2017). Contribution of Zinc Solubilizing Bacteria in Growth Promotion and Zinc Content of Wheat. *Frontiers in Microbiology*, 8. <https://doi.org/10.3389/fmicb.2017.02593>
109. Kang, S. M., Radhakrishnan, R., Lee, K. E., You, Y. H., Ko, J. H., Kim, J. H., et al. (2015). Mechanism of plant growth promotion elicited by *Bacillus* sp.LKE15 in oriental melon. *Acta Agriculturae Scandinavica, Section. B Soil and Plant Sciences*, 65(7), 637–647, <https://doi.org/10.1080/09064710.2015.1040830>
110. Kasim, W.A., Gaafar, R. M., Abou-Ali, R. M., Omar M. N., & Hewait, H. M. (2016). Effect of biofilm forming plant growth promoting rhizobacteria on salinity tolerance in barley. *Annals of Agricultural Sciences*, 61(2), 217–227. <https://doi.org/10.1016/j.aos.2016.07.003>
111. Kearns, D. B., & Losick, R. (2005). Cell population heterogeneity during growth of *Bacillus subtilis*. *Genes & development*, 19(24), 3083–3094. <https://doi.org/10.1101/gad.1373905>
112. Kearns, D.B., Chu, F., Rudner, R., & Losick, R. (2004) Genes governing swarming in *Bacillus subtilis* and evidence for a phase variation mechanism controlling surface motility. *Molecular Microbiology* 52(2), 357–369, <https://doi.org/10.1111/j.1365-2958.2004.03996.x>

113. Khan, M. S., Zaidi, A., & Wani, P. A. (2009). Role of Phosphate Solubilizing Microorganisms in Sustainable Agriculture - A Review. *Sustainable Agriculture*, 551–570. https://doi.org/10.1007/978-90-481-2666-8_34
114. Kilian, M., Steiner, U., Krebs, B., Junge, H., Schmiedeknecht, G., & Hain, R. (2000). FZB24® *Bacillus subtilis* – mode of action of a microbial agent enhancing plant vitality. *Pflanzenschutz Nachr. Bayer*. 1, 72–93.
115. Kim, H. J., Jourlin-Castelli, C., Kim, S. I., & Sonenshein, A.L. (2002). Regulation of the *Bacillus subtilis ccpC* gene by CcpA and CcpC. *Molecular Microbiol* 43(2), 399–410, <https://doi.org/10.1046/j.1365-2958.2002.02751.x>
116. Kim, H. J., Kim, S. I., Ratnayake-Lecamwasam, M., Tachikawa, K., Sonenshein, A. L., & Strauch, M. (2003). Complex regulation of the *Bacillus subtilis* aconitase gene. *Journal of bacteriology*, 185(5), 1672–1680. <https://doi.org/10.1128/jb.185.5.1672-1680.2003>
117. Kleijn, R. J., Buescher, J. M., Le Chat, L., Jules, M., Aymerich, S., & Sauer, U. (2010). Metabolic fluxes during strong carbon catabolite repression by malate in *Bacillus subtilis*. *The Journal of biological chemistry*, 285(3), 1587–1596. <https://doi.org/10.1074/jbc.M109.061747>
118. Kloepper, J. W., Ryu, C.-M., & Zhang, S. (2004). Induced Systemic Resistance and Promotion of Plant Growth by *Bacillus* spp. *Phytopathology*, 94(11), 1259–1266. <https://doi.org/10.1094/phyto.2004.94.11.1259>
119. Kobayashi K. (2007). *Bacillus subtilis* pellicle formation proceeds through genetically defined morphological changes. *Journal of bacteriology*, 189(13), 4920–4931. <https://doi.org/10.1128/JB.00157-07>
120. Kobayashi, T., & Nishizawa, N. K. (2012). Iron Uptake, Translocation, and Regulation in Higher Plants. *Annual Review of Plant Biology*, 63(1), 131–152. <https://doi.org/10.1146/annurev-arplant-042811-105522>
121. Kolodkin-Gal, I., Elsholz, A. K., Muth, C., Girguis, P. R., Kolter, R., & Losick, R. (2013). Respiration control of multicellularity in *Bacillus subtilis* by a complex of the cytochrome chain with a membrane-embedded histidine

- kinase. *Genes & development*, 27(8), 887–899.
<https://doi.org/10.1101/gad.215244.113>
122. Konkol, M. A., Blair, K. M., & Kearns, D. B. (2013). Plasmid-encoded ComI inhibits competence in the ancestral 3610 strain of *Bacillus subtilis*. *Journal of Bacteriology*, 195(18), 4085–4093.
<https://doi.org/10.1128/JB.00696-13>
123. Kosegarten, H., Grolig, F., Esch, A., Glüsenkamp, K.-H., & Mengel, K. (1999). Effects of NH_4^+ , NO_3^- and HCO_3^- on apoplast pH in the outer cortex of root zones of maize, as measured by the fluorescence ratio of fluorescein boronic acid. *Planta*, 209(4), 444–452. <https://doi.org/10.1007/s004250050747>
124. Kramer, J., Özkaya, Ö. & Kümmerli, R. (2020). Bacterial siderophores in community and host interactions. *Nature Reviews Microbiology* 18, 152–163, <https://doi.org/10.1038/s41579-019-0284-4>
125. Kucey, R.M.N., Janzen, H.H., & Leggett, M.E. 1989. Microbially mediated increases in plant-available phosphorus. *Ad. Agronomy* 42, 199-228.
126. Kuiper, I., Lagendijk, E. L., Bloemberg, G. V., & Lugtenberg, B. J. J. (2004). Rhizoremediation: A beneficial plant-microbe interaction. *Molecular Plant-Microbe Interactions*, 17(1), 6–15.
<https://doi.org/10.1094/mpmi.2004.17.1.6>
127. Kumari, P. M. R., & Ranjitha K. B. D. (2015). A critical review on plant growth promoting rhizobacteria. *Journal of Plant Pathology & Microbiology*, 06(04). 1-4. <https://doi.org/10.4172/2157-7471.1000266>
128. Lerondel, G., Doan, T., Zamboni, N., Sauer, U., & Aymerich, S. (2006). YtsJ has the major physiological role of the four paralogous malic enzyme isoforms in *Bacillus subtilis*. *Journal of bacteriology*, 188(13), 4727–4736.
<https://doi.org/10.1128/JB.00167-06>
129. Lessard, P. (1996). Metabolic engineering, the concept coalesces. *Nature Biotechnology*, 14:1654–1655, <https://doi.org/10.1038/nbt1296-1654>
130. Liang, W., Ma, X., Wan, P., & Liu, L. (2018). Plant salt-tolerance mechanism: A review. *Biochemical and Biophysical Research Communications*, 495(1), 286–291. <https://doi.org/10.1016/j.bbrc.2017.11.043>

131. Liu, W., Xu, X., Wu, X., Yang, Q., Luo, Y., & Christie, P. (2006). Decomposition of silicate minerals by *Bacillus mucilaginosus* in liquid culture. *Environmental Geochemistry and Health*, 28(1-2), 133–140. <https://doi.org/10.1007/s10653-005-9022-0>
132. Liu, Y., Li, J., Guocheng, D., Jian, C., & Long, L. (2017). Metabolic engineering of *Bacillus subtilis* fueled by systems biology: recent advances and future directions. *Biotechnology Advances*, 35(1), 20–30, <https://doi.org/10.1016/j.biotechadv.2016.11.003>
133. Liu, Y., Villalba, G., Ayres, R., & Schroder, H. (2008). Global Phosphorus Flows and Environmental Impacts from a Consumption Perspective. *Journal of Industrial Ecology*, 12(2), 229-247. <https://doi.org/10.1111/j.1530-9290.2008.00025.x>
134. Liu, Y., Zhang, N., Qiu, M., Feng, H., Vivanco, J. M., Shen, Q., & Zhang, R. (2014). Enhanced rhizosphere colonization of beneficial *Bacillus amyloliquefaciens* SQR9 by pathogen infection. *FEMS Microbiology Letters*, 353(1), 49–56. <https://doi.org/10.1111/1574-6968.12406>
135. Logan, B. E. (2009). Exoelectrogenic bacteria that power microbial fuel cells. *Nature Reviews Microbiology*. 7(5), 375–381, <https://doi.org/10.1038/nrmicro2113>
136. Loper, J. E, Kobayashi, D. Y, & Paulsen, I. T. (2007). The genomic sequence of *Pseudomonas fluorescens* Pf-5: Insights into biological control. *Phytopathology* 97:233-238.
137. López, D., Vlamakis, H., & Kolter, R. (2010). Biofilms. *Cold Spring Harbor perspectives in biology*, 2(7), a000398. <https://doi.org/10.1101/cshperspect.a000398>
138. López, D., Vlamakis, H., Losick, R., & Kolter, R. (2009). Paracrine signaling in a bacterium. *Genes & development*, 23(14), 1631–1638. <https://doi.org/10.1101/gad.1813709>
139. Lucht, J. M. (2015). Public acceptance of plant biotechnology and GM crops. *Viruses*. 7(8), 4254–4281. <https://doi.org/10.3390/v7082819>

140. Lugtenberg, B., & Kamilova, F. (2009). Plant-Growth-Promoting Rhizobacteria. *Annual Review of Microbiology*, 63(1), 541–556., <https://doi.org/10.1146/annurev.micro.62.081307.162918>
141. Ma, W., Guinel, F., & Glick, B. (2003). *Rhizobium leguminosarum* biovar *viciae* 1-aminocyclopropane-1-carboxylate deaminase promotes nodulation of pea plants. *Applied and Environmental Microbiology*, 69(8), 4396-4402. <https://doi.org/10.1128/aem.69.8.4396-4402.2003>
142. Macnab, R. M. (1996). Flagella and motility. *Escherichia coli* and *Salmonella typhimurium*: Cellular and Molecular Biology, 2nd edn (Neidhart FC, ed.), pp. 123–145. American Society of Microbiology, Washington, DC.
143. Maghari B. M., & Ardekani, A. M. (2011). Genetically modified foods and social concerns. *Avicenna Journal of Medical Biotechnology*. 3(3), 109–17.
144. Mah, T. F. & O’Toole, G. A. (2001). Mechanisms of biofilm resistance to antimicrobial agents. *Trends Microbiology* 9(1), 34–39, [https://doi.org/10.1016/S0966-842X\(00\)01913-2](https://doi.org/10.1016/S0966-842X(00)01913-2)
145. Malinovskaya, I. M., Kosenko, L.V., Votselko, S.K., Podgorskii, V.S., (1990). Role of *Bacillus mucilaginosus* polysaccharide in degradation of silicate minerals. *Microbiology* 59, 49–55
146. Manabe, K., Kageyama, Y., Morimoto, T., Shimizu, E., Takahashi, H., Kanaya, S., Ara, K., Ozaki, K., & Ogasawara, N. (2013). Improved production of secreted heterologous enzyme in *Bacillus subtilis* strain MGB874 via modification of glutamate metabolism and growth conditions. *Microbial cell factories*, 12, 18. <https://doi.org/10.1186/1475-2859-12-18>
147. Manfredini, A., Malusà, E., Costa, C., Pallottino, F., Mocali, S., Pinzari, F., & Canfora, L. (2021). Current Methods, Common Practices, and Perspectives in Tracking and Monitoring Bioinoculants in Soil. *Frontiers in microbiology*, 12, 698491. <https://doi.org/10.3389/fmicb.2021.698491>
148. Marciniak, B. C., Pabijaniak, M., de Jong, A., Dühring, R., Seidel, G., Hillen, W., & Kuipers, O. P. (2012). High- and low-affinity cre boxes for CcpA binding in *Bacillus subtilis* revealed by genome-wide analysis. *BMC genomics*, 13, 401. <https://doi.org/10.1186/1471-2164-13-401>

149. Markowiak, P., & Śliżewska, K. (2017). Effects of Probiotics, Prebiotics, and Synbiotics on Human Health. *Nutrients*, 9(9), 1021. <https://doi.org/10.3390/nu9091021>
150. Masalha, J., Kosegarten, H., Elmaci, O., & Mengel, K. (2000). The central role of microbial activity for iron acquisition in maize and sunflower. *Biology and Fertility of Soils*, 30(5-6), 433–439. <https://doi.org/10.1007/s003740050021>
151. McDougald, D., Rice, S. A., Barraud, N., Steinberg, P. D. & Kjelleberg, S. (2012). Should we stay or should we go: mechanisms and ecological consequences for biofilm dispersal. *Nature Reviews Microbiolog.* 10, 39–50, <https://doi.org/10.1038/nrmicro2695>
152. Mengel, K. (1994). Iron availability in plant tissues-iron chlorosis on calcareous soils. *Plant and Soil*, 165(2), 275–283. <https://doi.org/10.1007/bf00008070>
153. Meyer, F. M., & Stulke, J. (2013). Malate metabolism in *Bacillus subtilis*: distinct roles for three classes of malate-oxidizing enzymes. *FEMS Microbiology Letters*, 339(1), 17–22. <https://doi.org/10.1111/1574-6968.12041>
154. Mithofer, A. (2004). Biotic and heavy metal stress response in plants: evidence for common signals. *FEBS Letters*, 566(1-3), 1–5. [https://doi.org/10.1016/s0014-5793\(04\)00426-0](https://doi.org/10.1016/s0014-5793(04)00426-0)
155. Mo, B., & Lian, B. (2011). Interactions between *Bacillus mucilaginosus* and silicate minerals (weathered adamellite and feldspar): Weathering rate, products, and reaction mechanisms. *Chinese Journal of Geochemistry*, 30(2), 187–192. <https://doi.org/10.1007/s11631-011-0500-z>
156. Morimoto, T., Kadoya, R., Endo, K., Tohata, M., Sawada, K., Liu, S., Ozawa, T., Kodama, T., Kakeshita, H., Kageyama, Y., Manabe, K., Kanaya, S., Ara, K., Ozaki, K., & Ogasawara, N. (2008). Enhanced recombinant protein productivity by genome reduction in *Bacillus subtilis*. *DNA research* 15(2), 73–81. <https://doi.org/10.1093/dnares/dsn002>

157. Mukherjee, S., & Kearns, D. B. (2014). The structure and regulation of flagella in *Bacillus subtilis*. *Annual review of genetics*, 48, 319–340. <https://doi.org/10.1146/annurev-genet-120213-092406>
158. Munson, R. D., Sparks, D. L., & Huang, P. M. (1985). *Physical Chemistry of Soil Potassium*. Potassium in Agriculture ACSESS Publications. <https://doi.org/10.2134/1985.potassium.c9>
159. Mus, F., Crook, M. B., Garcia, K., Garcia Costas, A., Geddes, B. A., Kouri, E. D., et al. (2016). Symbiotic nitrogen fixation and the challenges to its extension to nonlegumes. *Applied Environmental Microbiology* 82, 3698–3710. <https://doi.org/10.1128/AEM.01055-16>
160. Nadeem, S. M., Ahmad, M., Zahir, Z. A., Javaid, A., & Ashraf, M. (2014). The role of mycorrhizae and plant growth promoting rhizobacteria (PGPR) in improving crop productivity under stressful environments. *Biotechnology advances*, 32(2), 429–48. <https://doi.org/10.1016/j.biotechadv.2013.12.005>
161. Naveed, M., Mitter, B., Reichenauer, T. G., Wiczorek, K., & Sessitsch, A. (2014). Increased drought stress resilience of maize through endophytic colonization by *Burkholderia phytofirmans* PsJN and *Enterobacter* sp. FD17. *Environmental and Experimental Botany*, 97, 30–39. <https://doi.org/10.1016/j.envexpbot.2013.09.014>
162. Ngugi, H., Dedej, S., Delaplane, K., Savelle, A., & Scherm, H. (2005). Effect of flower-applied Serenade biofungicide (*Bacillus subtilis*) on pollination related variables in rabbit eye blueberry. *Biological Control*, 33(1), 32–38, <https://doi.org/10.1016/j.biocontrol.2005.01.002>
163. Ngumbi, E., & Kloepper, J. (2016). Bacterial-mediated drought tolerance: Current and future prospects. *Applied Soil Ecology*, 105, 109–125. <https://doi.org/10.1016/j.apsoil.2016.04.009>
164. Nielsen, J., & Keasling, J. D. (2016). Engineering cellular metabolism. *Cell*, 164(6), 1185–1197, <https://doi.org/10.1016/j.cell.2016.02.004>
165. Oldroyd, G. E., & Downie, J. A. (2008). Coordinating Nodule Morphogenesis with Rhizobial Infection in Legumes. *Annual Review of Plant*

Biology, 59(1), 519–546.
<https://doi.org/10.1146/annurev.arplant.59.032607.092839>

166. Owen, D., Williams, A., Griffith, G., & Withers, P. (2015). Use of commercial bio-inoculants to increase agricultural production through improved phosphorous acquisition. *Applied Soil Ecology*, 86, 41–54.
<https://doi.org/10.1016/j.apsoil.2014.09.012>
167. Pandin, C., Le Coq, D., Canette, A., Aymerich, S., & Briandet, R. (2017). Should the biofilm mode of life be taken into consideration for microbial biocontrol agents? *Microbial biotechnology*, 10(4), 719–734.
<https://doi.org/10.1111/1751-7915.12693>
168. Parmar, P., & Sindhu S. (2013). Potassium solubilization by rhizosphere bacteria: influence of nutritional and environmental conditions. *Journal of Microbiology Research*, 3(1):25–31,
<https://doi.org/10.5923/j.microbiology.20130301.04>
169. Parnell, J. J., Berka, R., Young, H. A., Sturino, J. M., Kang, Y., Barnhart, D. M., & Dileo, M. V. (2016). From the lab to the farm: an industrial perspective of plant beneficial microorganisms. *Frontiers in Plant Science*, 7, 1110. <https://doi.org/10.3389/fpls.2016.01110>
170. Patrick, J. E. & Kearns, D. B. (2009). Laboratory strains of *Bacillus subtilis* do not exhibit swarming motility. *Journal of Bacteriology*, 191(22), 7129–7133, Patrick, J. E., & Kearns, D. B. (2009). Laboratory strains of *Bacillus subtilis* do not exhibit swarming motility. *Journal of bacteriology*, 191(22), 7129–7133.
<https://doi.org/10.1128/JB.00905-09>
171. Perrig, D., Boiero, M. L., Masciarelli, O. A., Penna, C., Ruiz, O. A., Cassán, F. D., & Luna, M. V. (2007). Plant-growth-promoting compounds produced by two agronomically important strains of *Azospirillum brasilense*, and implications for inoculant formulation. *Applied Microbiology and Biotechnology*, 75(5), 1143–1150. <https://doi.org/10.1007/s00253-007-0909-9>
172. Philippot, L., Raaijmakers, J. M., Lemanceau, P., & Putten, W. H. V. D. (2013). Going back to the roots: the microbial ecology of the rhizosphere.

- Nature Reviews Microbiology, 11(11), 789–799.
<https://doi.org/10.1038/nrmicro3109>
173. Piggot, P. J., & Hilbert, D. W. (2004). Sporulation of *Bacillus subtilis*. Current Opinion in Microbiology, 7(6), 579–586,
<https://doi.org/10.1016/j.mib.2004.10.001>
174. Podile, A. R., & Kishore, G. K. (2007). Plant growth-promoting rhizobacteria. In: Gnanamanickam S.S. (eds) Plant-Associated Bacteria. Springer, Dordrecht, 195–230, https://doi.org/10.1007/978-1-4020-4538-7_6
175. Pradhan, N., & Sukla, L. B. (2005). Solubilization of inorganic phosphates by fungi isolated from agriculture soil. African Journal of Biotechnology. 5. 850-854.
176. Quiza, L., St-Arnaud, M., & Yergeau, E. (2015). Harnessing phytomicrobiome signaling for rhizosphere microbiome engineering. Frontiers in Plant Science, 6, 507. <https://doi.org/10.3389/fpls.2015.00507>
177. Raaijmakers, J. M, Leeman, M., Van Oorschot, MPM., Van der Sluis, I., Schippers, B., & Bakker, PAHM. (1995). Dose-Response Relationships in Biological Control of Fusarium Wilt of Radish by *Pseudomonas* spp. Phytopathology, 85(10), 1075. <https://doi.org/10.1094/phyto-85-1075>
178. Radhakrishnan, R., Hashem, A., & AbdAllah, E. F. (2017) *Bacillus*: a biological tool for crop improvement through bio-molecular changes in adverse environments. Frontiers in Physiology. 8, 667. <https://doi.org/10.3389/fphys.2017.00667>
179. Radhakrishnan, R., Kang, S. M., Baek, I. Y., & Lee, I. J. (2014). Characterization of plant growth-promoting traits of *Penicillium* species against the effects of high soil salinity and root disease. Journal of Plant Interaction, 9(1), 754–762. <https://doi.org/10.1080/17429145.2014.930524>
180. Rahmer, R., Morabbi Heravi, K., & Altenbuchner, J. (2015). Construction of a Super-Competent *Bacillus subtilis* 168 using the P mtlA -comKS Inducible Cassette. Frontiers in microbiology, 6, 1431. <https://doi.org/10.3389/fmicb.2015.01431>

181. Rattan, R. K., & Shukla, L. M. (1991). Influence of different zinc carriers on the utilization of micronutrients by rice. *Journal of Indian Society for Soil Science*. 39, 808–810.
182. Reynolds, P., Von Behren, J., Gunier, R., Goldberg, D., Hertz, A., & Harnly, M. (2002). Childhood cancer and agricultural pesticide use: an ecologic study in California. *Environmental Health Perspectives*, 110(3), 319-324. <https://doi.org/10.1289/ehp.02110319>
183. Richardson, A. E. (2001). Prospects for using soil microorganisms to improve the acquisition of phosphorus by plants. *Australian Journal of Plant Physiology*. 28(9), 897-906. <https://doi.org/10.1071/PP01093>
184. Rosenkrantz, M. S., Dingman, D. W., & Sonenshein, A. L. (1985). *Bacillus subtilis citB* gene is regulated synergistically by glucose and glutamine. *Journal of bacteriology*, 164(1), 155–164.
185. Rudrappa, T., Czymbek, K. J., Paré, P. W., & Bais, H. P. (2008). Root-secreted malic acid recruits beneficial soil bacteria. *Plant physiology*, 148(3), 1547–1556. <https://doi.org/10.1104/pp.108.127613>
186. Ryan, P.R., Dessaux, Y., Thomashow, L.S., & Weller, D.M., 2009. Rhizosphere engineering and management for sustainable agriculture. *Plant Soil*, 321, 363–383. <https://doi.org/10.1007/s11104-009-0001-6>
187. Saha, M., Sarkar, S., Sarkar, B., Sharma, B., Bhattacharjee, S., & Tribedi, P. (2015). Microbial siderophores and their potential applications: a review. *Environmental Science and Pollution Research*, 23(5), 3984-3999. <https://doi.org/10.1007/s11356-015-4294-0>
188. Saha, R., Saha, N., Donofrio, R. S., & Bestervelt, L. L. (2012). Microbial siderophores: a mini review. *Journal of Basic Microbiology*, 53(4), 303–317. <https://doi.org/10.1002/jobm.201100552>
189. Sanborn, M., Kerr, K. J., Sanin, L. H., Cole, D. C., Bassil, K. L., & Vakil, C. (2007). Non-cancer health effects of pesticides: systematic review and implications for family doctors. *Canadian family physician Medecin de famille canadien*, 53(10), 1712–1720.

190. Sánchez-Bayo, F. (2011). Impacts of agricultural pesticides on terrestrial ecosystems. <https://doi.org/10.2174/978160805121210063>
191. Santi, C., Bogusz, D., & Franche, C. (2013). Biological nitrogen fixation in non-legume plants. *Annals of Botany*, 111(5), 743–767. <https://doi.org/10.1093/aob/mct048>
192. Santoyo, G., Orozco-Mosqueda, M. D. C., & Govindappa, M. (2012). Mechanisms of biocontrol and plant growth-promoting activity in soil bacterial species of *Bacillus* and *Pseudomonas*: a review. *Biocontrol Science and Technology*, 22(8), 855–872. <https://doi.org/10.1080/09583157.2012.694413>
193. Saravanan, V. S., Subramoniam, S. R. & Raj, S. A. (2003). Assessing *in vitro* solubilization potential of different zinc solubilizing bacterial (ZSB) isolates. *Brazilian Journal of Microbiology*. 34: 121–125. <https://doi.org/10.1590/S1517-83822004000100020>
194. Savci, S. (2012). An Agricultural Pollutant: Chemical Fertilizer. *International Journal of Environmental Science and Development*, 73-80. <https://doi.org/10.7763/ijesd.2012.v3.191>
195. Schultz, D., Wolynes, P. G., Ben Jacob, E., & Onuchic, J. N. (2009). Deciding fate in adverse times: sporulation and competence in *Bacillus subtilis*. *Proceedings of the National Academy of Sciences of the United States of America*, 106(50), 21027–21034. <https://doi.org/10.1073/pnas.0912185106>
196. Selvakumar, G., Panneerselvam, P., & Ganeshamurthy, A.N. (2012). Bacterial mediated alleviation of abiotic stress in crops D.K. Maheshwari (Ed.), *Bacteria in Agrobiolgy: Stress Management*, Springer-Verlag, Berlin Heidelberg, pp. 205-224
197. Servant, P., Le Coq, D., Aymerich, S. (2005). CcpN (YqzB), a novel regulator for CcpA-independent catabolite repression of *Bacillus subtilis* gluconeogenic genes. *Molecular Microbiology*, 55(5), 1435-1451, <https://doi.org/10.1111/j.1365-2958.2005.04473.x>
198. Setiawati, T. & Mutmainnah, L. (2016). Solubilization of potassium containing mineral by microorganisms from sugarcane rhizosphere. *Agriculture*

- and Agricultural Science Procedia, 9, 108-117, <https://doi.org/10.1016/j.aaspro.2016.02.134>
199. Setten, L., Soto, G., Mozzicafreddo, M., Fox, A., Lisi, C., & Cuccioloni, M. et al. (2013). Engineering *Pseudomonas protegens* Pf-5 for nitrogen fixation and its application to improve plant growth under nitrogen-deficient conditions. Plos ONE, 8(5), e63666. <https://doi.org/10.1371/journal.pone.0063666>
200. Shafi, J., Tian, H., & Ji, M. (2017). *Bacillus* species as versatile weapons for plant pathogens: a review. Biotechnology & Biotechnological Equipment, 31(3), 446–459. <https://doi.org/10.1080/13102818.2017.1286950>
201. Shivers, R. P., & Sonenshein, A. L. (2005). *Bacillus subtilis* *ilvB* operon: an intersection of global regulons. Molecular Microbiology, 56(6), 1549–1559, <https://doi.org/10.1111/j.1365-2958.2005.04634.x>
202. Shivers, R. P., Dineen, S. S., & Sonenshein, A. L. (2006). Positive regulation of *Bacillus subtilis* *ackA* by CodY and CcpA: establishing a potential hierarchy in carbon flow. Molecular microbiology. 62(3), 811–822, <https://doi.org/10.1111/j.1365-2958.2006.05410.x>
203. Singh, R., Paul, D., & Jain, R. K. (2006). Biofilms: implications in bioremediation. Trends Microbiology. 14(9), 389–397, <https://doi.org/10.1016/j.tim.2006.07.001>
204. Smith, D. R., & Chapman, M. R. (2010). Economical evolution: microbes reduce the synthetic cost of extracellular proteins. mBio, 1(3), e00131-10. <https://doi.org/10.1128/mBio.00131-10>
205. Sonenshein, A. L. (2007). Control of key metabolic intersections in *Bacillus subtilis*. Nature Reviews Microbiology, 5, 917–927, <https://doi.org/10.1038/nrmicro1772>
206. Srivastava, S., Kausalya, M. T., Archana, G., Rupela, O. P., & Kumar, G. N. (2006). Efficacy of organic acid secreting bacteria in solubilization of rock phosphate in acidic alfisols. In Velazquez E, Rodriguez-Barrueco C, editors. Developments in Plant and Soil Sciences. Springer 117–124. https://doi.org/10.1007/978-1-4020-5765-6_16

207. Srivastava, S., Tripathi, R. D., & Dwivedi, U. N. (2004). Synthesis of phytochelatins and modulation of antioxidants in response to cadmium stress in *Cuscuta reflexa* – an angiospermic parasite. *Journal of Plant Physiology*, 161(6), 665–674. <https://doi.org/10.1078/0176-1617-01274>
208. Stamenković, S., Beškoski, V., Karabegović, I., Lazić, M., & Nikolić, N. (2018). Microbial fertilizers: A comprehensive review of current findings and future perspectives. *Spanish Journal of Agricultural Research*, 16(1). <https://doi.org/10.5424/sjar/2018161-12117>
209. Steenhoudt, O., & Vanderleyden, J. (2000). *Azospirillum*, a free-living nitrogen-fixing bacterium closely associated with grasses: genetic, biochemical and ecological aspects. *FEMS Microbiology Reviews*, 24(4), 487–506. <https://doi.org/10.1111/j.1574-6976.2000.tb00552.x>
210. Stephanopoulos, G., (2012). Synthetic Biology and Metabolic Engineering. *ACS Synthetic Biology*. 1, 514-525, <https://doi.org/10.1021/sb300094q>
211. Stevenson, F.J., & Cole, M.A., (1999). *Cycles of Soil: Carbon, Nitrogen, Phosphorus, Sulfur, Micronutrients*. Wiley, New York.
212. Sun, X., Shen, X., Jain, R., et al. (2015). Synthesis of chemicals by metabolic engineering of microbes. *Chemical Society Reviews*, 44, 3760–3785, <https://doi.org/10.1039/C5CS00159E>
213. Tan, I. S., & Ramamurthi, K. S. (2014). Spore formation in *Bacillus subtilis*. *Environmental microbiology reports*, 6(3), 212–225. <https://doi.org/10.1111/1758-2229.12130>
214. Tavallali, V., Rahemi, M., Eshghi, S., Kholdebarin, B., & Ramezani, A. (2010). Zinc alleviates salt stress and increases antioxidant enzyme activity in the leaves of pistachio (*Pistacia vera* L. 'Badami') seedlings. *Turkish Journal of Agriculture and Forestry*. 34, 349–359. <https://doi.org/10.3906/tar-0905-10>
215. Temme, K., Zhao, D., & Voigt, C. (2012). Refactoring the nitrogen fixation gene cluster from *Klebsiella oxytoca*. *Proceedings of the National Academy of Sciences*, 109(18), 7085-7090. <https://doi.org/10.1073/pnas.1120788109>

216. Thykaer, J., & Nielsen, J. (2003). Metabolic engineering of beta-lactam production. *Metabolic Engineering* 5(1): 56–69, [https://doi.org/10.1016/S1096-7176\(03\)00003-X](https://doi.org/10.1016/S1096-7176(03)00003-X)
217. Tonelli, M. L., Taurian, T., Ibanez, F., Angelini, J., & Fabra, A. (2010). Selection and in vitro characterization of biocontrol agents with potential to protect peanut plants against fungal pathogens. *Journal of Plant Pathology*, 92, 73–82. <http://dx.doi.org/10.4454/jpp.v92i1.16>
218. U.S. Geological Survey, Mineral Commodity Summaries, January 2018
219. Van Dijk J. M., & Hecker M. (2013). *Bacillus subtilis*: from soil bacterium to super-secreting cell factory. *Microbial Cell Factories*, 12:3. <https://doi.org/10.1186/1475-2859-12-3>
220. Van Dillewijn, P., Soto, M., Villadas, P., & Toro, N. (2001). Construction and environmental release of a *Sinorhizobium meliloti* strain genetically modified to be more competitive for alfalfa nodulation. *Applied and Environmental Microbiology*, 67(9), 3860-3865. <https://doi.org/10.1128/aem.67.9.3860-3865.2001>
221. Vandana, U. M., Chopra, A., Choudhury, A., Adapa, D., & Mazumder, P. B. (2018). Genetic diversity and antagonistic activity of plant growth promoting bacteria, isolated from tea-rhizosphere: a culture dependent study. *Biomedical Research*, 29(4), 853-864, <https://doi.org/10.4066/biomedicalresearch.29-18-428>
222. Vejan, P., Abdullah, R., Khadiran, T., Ismail, S., & Boyce, A. N. (2016). Role of plant Growth promoting rhizobacteria in agricultural sustainability— A Review. *Molecules*, 21(5), 573. <https://doi.org/10.3390/molecules21050573>
223. Velivelli, S. L. S., Sessitsch, A., & Prestwich, B. D. (2014). The Role of Microbial Inoculants in Integrated Crop Management Systems. *Potato Research*, 57(3-4), 291–309. <https://doi.org/10.1007/s11540-014-9278-9>
224. Vemuri, G. N., & Aristidou, A. A. (2005). Metabolic engineering in the -omics era: elucidating and modulating regulatory networks. *Microbiology and Molecular Biology Reviews*, 69, 197-216, <https://doi.org/10.1128/MMBR.69.2.197-216.2005>

225. Vitousek, P., Aber, J., Howarth, R., Likens, G., Matson, P., & Schindler, D. et al. (1997). Technical Report: Human Alteration of the Global Nitrogen Cycle: Sources and Consequences. *Ecological Applications*, 7(3), 737. <https://doi.org/10.2307/2269431>
226. Vlamakis, H., Aguilar, C., Losick, R., & Kolter, R. (2008). Control of cell fate by the formation of an architecturally complex bacterial community. *Genes & development*, 22(7), 945–953. <https://doi.org/10.1101/gad.1645008>
227. Vlamakis, H., Chai, Y., Beaugregard, P., Losick, R., & Kolter, R. (2013). Sticking together: building a biofilm the *Bacillus subtilis* way. *Nature reviews. Microbiology*, 11(3), 157–168. <https://doi.org/10.1038/nrmicro2960>
228. Vurukonda, S. S. K. P., Vardharajula, S., Shrivastava, M., & Skz, A. (2016). Enhancement of drought stress tolerance in crops by plant growth promoting rhizobacteria. *Microbiological Research*, 184, 13–24. <https://doi.org/10.1016/j.micres.2015.12.003>
229. Wang, J., Guleria, S., Koffas, M. & Yan, Y. (2016). Microbial production of value-added nutraceuticals. *Current Opinion in Biotechnology*. 37, 97-104, <https://doi.org/10.1016/j.copbio.2015.11.003>
230. Wang, L., Zhang, L., Liu, Z., Zhao, D., Liu, X., Zhang, B., et al. (2013). A minimal nitrogen fixation gene cluster from *Paenibacillus* sp. WLY78 enables expression of active nitrogenase in *Escherichia coli*. *PLoS Genetics*, 9(10): e1003865. <https://doi.org/10.1371/journal.pgen.1003865>
231. Wang, X., Yang, J., Chen, L., Wang, J., Cheng, Q., Dixon, R., & Wang, Y. (2013). Using synthetic biology to distinguish and overcome regulatory and functional barriers related to nitrogen fixation. *Plos ONE*, 8(7), e68677. <https://doi.org/10.1371/journal.pone.0068677>
232. Warner, J. B., Krom, B. P., Magni, C., Konings, W. N., & Lolkema, J. S. (2000). Catabolite repression and induction of the Mg²⁺-citrate transporter CitM of *Bacillus subtilis*. *Journal of bacteriology*, 182(21), 6099–6105. <https://doi.org/10.1128/jb.182.21.6099-6105.2000>
233. Wei, Y., Guffanti, A. A., Ito, M. & Krulwich, T. A. (2000). *Bacillus subtilis* *YqkI* is a novel malic/Na⁺-lactate antiporter that enhances growth on malate at

- low proton motive force. *Journal of Biological Chemistry*, 275(39), 30287-30292, 10.1074/jbc.M001112200
234. Wenzl, P., Chaves, A. L., Patiño, G. M., Mayer, J. E. & Rao, I. M. (2002). Aluminum stress stimulates the accumulation of organic acids in root apices of *Brachiaria* species. *Journal of plant nutrition and soil science*. 165, 582–588 [https://doi.org/10.1002/1522-2624\(200210\)165:5<582::AID-JPLN582>3.0.CO;2-W](https://doi.org/10.1002/1522-2624(200210)165:5<582::AID-JPLN582>3.0.CO;2-W)
235. Winding, A., Binnerup, S. J., & Pritchard, H. (2004). Non-target effects of bacterial biological control agents suppressing root pathogenic fungi. *FEMS Microbiology Ecology*, 47(2), 129–141. [https://doi.org/10.1016/s0168-6496\(03\)00261-7](https://doi.org/10.1016/s0168-6496(03)00261-7)
236. Wu, S.C., Yeung, J.C., Duan, Y., Ye, R., Szarka, S.J., Habibi, H.R., & Wong, S. L. (2002). Functional production and characterization of a fibrin-specific single-chain antibody fragment from *Bacillus subtilis*: effects of molecular chaperones and a wall-bound protease on antibody fragment production. *Applied and Environmental Microbiology* 68(7), 3261–3269, <https://doi.org/10.1128/aem.68.7.3261-3269.2002>
237. Wu, X. C., Lee, W., Tran, L., & Wong, S. L. (1991). Engineering a *Bacillus subtilis* expression-secretion system with a strain deficient in six extracellular proteases. *Journal of bacteriology*, 173(16), 4952–4958. <https://doi.org/10.1128/jb.173.16.4952-4958.1991>
238. Yadav, K., Kumar, C., Archana, G., & Kumar, G. N. (2014). *Pseudomonas fluorescens* ATCC 13525 containing an artificial oxalate operon and *Vitreoscilla* hemoglobin secretes oxalic acid and solubilizes rock phosphate in acidic alfisols. *PLoS ONE* 9(4): e92400. <https://doi.org/10.1371/journal.pone.0092400>
239. Yadav, V. G., De Mey, M., Lim, C. G., Ajikumar, P. K., & Stephanopoulos, G. (2012). The future of metabolic engineering and synthetic biology: towards a systematic practice. *Metabolic Engineering*, 14(3), 233–241. <https://doi.org/10.1016/j.ymben.2012.02.001>

240. Zhang, X. Z., & Zhang, Y.H.P. (2011). Simple, fast and high-efficiency transformation system for directed evolution of cellulase in *Bacillus subtilis*. *Microbial biotechnology*, 4(1), 98–105. <https://doi.org/10.1111/j.1751-7915.2010.00230.x>
241. Zhang, X., Huang, Y., Harvey, P., Ren, Y., Zhang, G., Zhou, H., & Yang, H. (2011). Enhancing plant disease suppression by *Burkholderia vietnamiensis* through chromosomal integration of *Bacillus subtilis* chitinase gene *chi113*. *Biotechnology Letters*, 34(2), 287-293. <https://doi.org/10.1007/s10529-011-0760-z>
242. Zhou, J., Jiang, X., Wei, D., Zhao, B., Ma, M., & Chen, S. et al. (2017). Consistent effects of nitrogen fertilization on soil bacterial communities in black soils for two crop seasons in China. *Scientific Reports*, 7(1). <https://doi.org/10.1038/s41598-017-03539-6>
243. Zhu, B., & Stülke, J. (2018). SubtiWiki in 2018: from genes and proteins to functional network annotation of the model organism *Bacillus subtilis*. *Nucleic acids research*, 46(D1), D743–D748. <https://doi.org/10.1093/nar/gkx908>
244. Zhuang, X., Chen, J., Shim, H., & Bai, Z. (2007). New advances in plant growth-promoting rhizobacteria for bioremediation. *Environment International*, 33(3), 406–413. <https://doi.org/10.1016/j.envint.2006.12.005>