Plant growth promoting rhizobacteria : Beneficial effects for healthy and sustainable agriculture

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Abstract

Agriculture is increasingly dependent on the use of chemical inputs such as fertilizers, growth regulators and pesticides to increase yield. Continued use of such chemical causes wide spread problems in environmental pollution, animal and human health, destruction of natural biological communities and modifies natural nutrient recycling. One of the promising solutions to substitute these agrochemicals products is the use of bio-resources, including plant growth promoting rhizobacteria (PGPR). The PGPR focused more and more scientific attention in recent decades. These rhizospheric bacteria colonize actively the root system of plants and improve their growth and yield. The PGPR use different mechanisms of action to promote plant growth. These mechanisms were grouped into three clusters according to the PGPR effects on plant physiology. These groups are as follow: (i) Biofertilization including biological fixation of atmospheric nitrogen, phosphate solubilization, siderophores production and exopolysaccharides production; (ii) Phytostimulation including production of indole acetic acid, gibberellins, cytokinins and ethylene; and (ii) Biocontrol including induction of systemic resistance, competition for iron, nutrient and space, production of antibiotics, lytic enzymes, hydrogen cyanide and volatile compounds. In prospect to a healthy and sustainable agriculture, respectful of environment, the PGPR approach revealed as one of the best alternatives.

Image

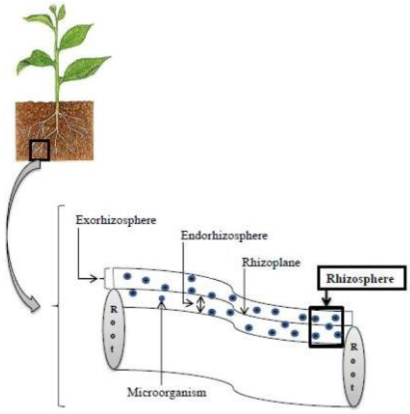


Figure 1. Schematic representation of rhizosphere.

Recent Publications

1. Aguégué R M, Noumavo P A, Dagbénonbakin G, Agbodjato N A, Assogba S, Koda A D, Adjanohoun A, Rivera R, de la Noval Pons B M, Baba-Moussa L (2017). Arbuscular mycorrhizal fertilization of Corn (*Zea mays* L.) cultivated on ferrous soil in Southern Benin. Journal of Agricultural Studies 5:99-115.
2. Assogba S, Noumavo P A, Dagbénonbakin G, Agbodjato N A, Akpodé C, Koda A D, Aguégué R M, Badé F, Adjanohoun A, Falcon Rodriguez A, de la Noval Pons B M, Baba-Moussa L (2017). Improvement of maize productivity (*Zea mays* L.) by mycorrhizal inoculation on ferruginous soil in center of Benin. International Journal of Sustainable Agricultural Research 4:63-76.
3. Noumavo P A, Agbodjato N A, Baba-Moussa F, Adjanohoun A, Baba-Moussa L (2016). Plant Growth Promoting Rhizobacteria (PGPR): Beneficial Effects for Healthy and Sustainable Agriculture. African Journal of Biotechnology 15:1452-15397.
4. Agbodjato N A, Noumavo P A, Adjanohoun A, Agbessi L, Baba-Moussa L (2016). Synergistic Effects of Plant Growth Promoting Rhizobacteria and Chitosan on *in vitro* seeds germination, greenhouse growth and nutrient uptake of maize (*Zea mays L.*). Biotechnology Research International ID 7830182, 11 pages.
5. Noumavo P A, Agbodjato N A, Gachomo E W, Salami H, Baba-Moussa F, Adjanohoun A, Kotchoni S O, Baba-Moussa L (2015). Metabolic and biofungicidal properties of maize rhizobacteria for growth promotion and plant disease resistance. African Journal of Biotechnology 14:811-819.
6. Agbodjato N A, Noumavo PA., Adjanohoun A., Dagbénonbakin G., Atta M., Falcon Rodriguez A., de la Noval Pons B. M., Baba-Moussa L. (2015). Response of Maize (*Zea mays* L.) Crop to Biofertilization with Plant Growth Promoting Rhizobacteria and Chitosan under Field Conditions. *Journal of Experimental Biology and Agricultural Sciences* 3:566-574.
7. Agbodjato N A, Noumavo P A, Baba-Moussa F, Salami H A, Sina H, Sèzan A, Bankolé H, Adjanohoun A, Baba-Moussa L (2015). Characterization of potential plant growth promoting rhizobacteria isolated from maize (*Zea mays* L.) in central and northern Benin (West Africa). Applied and Environmental Soil Science, ID 901656, 9 pages.
8. Noumavo P A, Kochoni E, Didagbé Y O, Adjanohoun A, Allagbé M, Sikirou R, Gachomo E W, Kotchoni S O, Baba-Moussa L (2013). Effect of Different Plant Growth Promoting Rhizobacteria on Maize Seed Germination and Seedling Development. American Journal of Plant Sciences 4:1013-1021.



Biography

Mr. Pacôme NOUMAVO has a PhD in Microbiology and Agri-Food Biotechnology. He is an Assistant Professor in Plant Biology Department of the Faculty of Science and Technology (University of Abomey-Calavi). He is passionate about the substitution of chemical agricultural inputs with biofertilizers, biostimulants and biopesticides. This research is focused on Plant Growth Promoting Rhizobacteria (PGPR) and Arbuscular Mycorrhizal Fungi. Mr. Pacôme NOUMAVO is an ecologist who advocates sustainable agriculture that respects the environment.

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