

## PLANT GROWTH PROMOTING RHIZOBACTERIA IMPROVES GROWTH IN ALOE VERA

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**Abstract:** Sustainable agriculture involves the use of biofertilizers and biopesticides to reduce the application of chemical fertilizers. Microbial consortium-based sustainable and economic nutrient package for *Aloe vera* has been developed to reduce reliance on chemical fertilizers. Consortium includes *Acinetobacter radioresistens* SMA4, *Bacillus thuringiensis* SMA5, *Brevibacterium frigoritolerans* SMA23 and *Pseudomonas fulva* SMA24. In the earlier studies all these four bacterial strains have been found to possess multiple plant growth promoting attributes. Consortium used in this study increased all biometric parameters in *Aloe vera* such as plant biomass, root weight, shoot weight and gel content. Increase in aloin content was also observed in this study in plants treated with PGPR.

**Keywords:** *Aloe vera*, Consortium, PGPR, Aloin, Biofertilizer

### REFERENCES

- Biswas, J C., Ladha, J.K. and Dazzo, F.B.** (2000). Rhizobial inoculation influences seedling vigor and yield of rice. *Agron. J.*, **92**: 880-886.
- Chauhan, O.P., Raju, P.S., Khanum, F. and Bawa, A.S.** (2007). *Aloe vera*-Therapeutic and food applications. *Ind. Food Indus.*, **26**: 43-51.
- Chen, Z., Ma, S. and Liu, L.L.** (2008). Studies on phosphorus solubilizing activity of a strain of phosphobacteria isolated from chestnut type soil in China. *Biores. Technol.*, **99**: 6702-6707.
- Dureja, H., Kaushik, D., Kumar, N. and Sardana, S.** (2005). *Aloe vera*. *The Indian Pharmacist* IV, 9-13.
- Glick, B.R.** (2012). Plant growth-promoting bacteria: mechanisms and applications. *Scientifica*, 1-15. Article ID 963401. <http://dx.doi.org/10.6064/2012/963401>.
- Groom, Q.J. and Reynolds T.** (1987). Barbaloin in *Aloe* species. *Planta Med.* **53**:345-8.
- Hilali, A., Przrost, D., Broughton, W. J. and Antoun, A.** (2000). Potential use of *Rhizobium leguminosarum* bv. *trifolii* as plant growth promoting rhizobacteria with wheat. Abstract: *17th North American Conf. on Symbiotic Nitrogen Fixation*. Laval University, Quebec, Canada.
- Jeffries, P., Gianinazzi, S., Perotto, S., Turnau, K. and Barea, J.J.M.** (2003). The contribution of arbuscular mycorrhizal fungi in sustainable maintenance of plant health and soil fertility. *Biol. Fertil. Soils*, **37**: 1-16.
- Gupta, M., Bisht, S., Singh, S., Gulati, A. and Tewari, R.** (2014). Enhanced biomass and steviol glycosides in *Stevia rebaudiana* treated with phosphate-solubilizing bacteria and rock phosphate. *Plant Growth Regul.*, **65**:447-449
- Hynes, R.K., Leung, G.C., Hirkala, D.L. and Nelson, L.M.** (2008). Isolation, selection, and characterization of beneficial rhizobacteria from pea, lentil and chickpea grown in Western Canada. *Can. J. Microbiol.*, **54**: 248-258.
- Ishii, Y., Tanizawa, H. and Takino, Y.** (1990). Studies of aloe III Mechanism of cathartic effect. *Chem. Pharm. Bull.*, **38**:197-200.
- Khalid, A., Arshad, M., Zahir, Z.A.** (2004). Screening plant growth promoting rhizobacteria for improving growth and yield of wheat. *J. Appl. Microbiol.*, **96**: 473-480.
- Mamta, G., Bisht, S., Singh, B., Gulati, A. and Tewari, R.** (2011). Enhanced biomass and steviol glycosides in *Stevia rebaudiana* treated with phosphate-solubilizing bacteria and rock phosphate. *Plant Growth Regul.*, **65**:449-57.
- Meena and Saharan B.S.** (2014). Optimization of Cultural Conditions of *Pseudomonas fulva* SMA 24 from *Aloe vera* Rhizosphere for Phosphate Solubilization. *Annals Biol.*, **30**(4): 608-12.
- Meena, Nayantara and Saharan B.S.** (2017). In vitro study on biological control of *Fusarium oxysporum* causing leaf rot disease on *Aloe vera* plant by rhizobacteria *Acinetobacter radioresistens* SMA4. *Trends Biosci.*, **10**(29): 6167-69
- Nautiyal, C.S., Govindarajan, R., Lavania, M. and Pushpangadan, P.** (2008). Novel mechanisms of modulating natural antioxidants in functional foods: Involvement of plant growth promoting rhizobacteria NRRL B-30488. *J. Agric. Food Chem.*, **56**: 4474-4481.
- Okamura, N., Asai, M., Hine, N. and Yagi, A.** (1996). High-performance liquid chromatographic determination of phenolic compounds in *Aloe* species. *J. Chromatogr.*, **746**:225-31

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- Pandey, D.K. and Banik, R.M.** (2009). The influence of dual inoculation with *Glomus Mossae* and *Azotobacter* on growth and barbaloin content of *Aloe Vera*. *Am-Eurasian J. Sustain Agric.*, **3**: 703-14.
- Park, M.K., Park, J.H., Kim, N.Y., Shin, Y.G., Chou, Y.S. and Lee, J.G.** (1998). Analysis of 13 phenolic compounds in *Aloe* species by high performance liquid chromatography. *Phytochem Anal*, **9**:186-91.
- Park, Y.I. and Jo, T.H.** (2006). Perspective of industrial application of *Aloe vera*. In: *New perspectives on Aloe* (Park, Y. I. and Lee, S. K., ed.), Springer Verlag, New York, USA. 191-200. ISBN-0387317996.
- Rajendran, A., Narayanan, V. and Gnanavel, I.** (2007). Separation and characterization of the phenolic anthraquinones from *Aloe vera*. *J. Appl. Sci. Res.*, **3**:1407-15.
- Tawaraya, K., TurJaman, M. and Ekamawanti, H.A.** (2007). Effect of arbuscular mycorrhizal colonization on nitrogen and phosphorus uptake and growth of *Aloe vera*. *Hortscience*, **42**:1737-9.
- Van V.T., Berge, O., Ke, S.N., Balandreau, J. and Heulin, T.** (2000). Repeated beneficial effects of rice inoculation with a strain of *Burkholderiavietnamiensis* on early and late yield components in low fertility sulphate acid soils of Vietnam. *Plant Soil*, **218**:273-284
- Vogler, B.K. and Ernst, E.** (1999). *Aloe vera*: a systematic review of its clinical effectiveness. *British J. Gen. Pract.*, **49**: 823-828.