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New frontiers in sustainable agriculture can be found in consortia of bacteria or fungi

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Researchers at Federal University of Lavras (UFLA)Â report that the use of microbial consortia offers significant benefits for plant growth, surpassing traditional inoculation methods with single species. Recent studies have revealed that the combination of microorganisms likeÂ *Bradyrhizobium*Â andÂ *Pseudomonas oryzihabitansÂ* increased soybean yield by 11% in comparison with individually treated plants. The approach also promoted more robust root growth and better nutrient accumulation.

Based on a comprehensive literature review, researchers report researcher at the Federal University of Lavras (UFLA) Peterson Nunes explains,Â consortia involving four mycorrhizal fungi (*Funneliformis constrictum, F. mosseae*,Â *Gigaspora margarita*Â andÂ *Rhizophagus irregularis*) and the fungusÂ Â *Beauveria bassiana*, found in the soil, significantly improved cotton growth.Â Those combinations not only increased protein and carbohydrate contents in plants, but they also reduced the growth of a pest, the caterpillarÂ *Spodoptera littoralis*.

The synergy between different strains of *Beauveria* resulted in 100% mortality of another pest, the moth *Plutella xylostella*. By the same token, a consortium of two strains of *B. bassiana* showed higher efficienct against *Duponchelia fovealis* caterpillar larvae.

Additional studies indicates that microbial consortia can be effective in mitigating abiotic stresses, including those caused by heavy metals, water deficit and soil salinization.

For theÂ Embrapa EnvironmentÂ analystÂ Gabriel Mascarin, os micrÃ³bios benÃ©ficos tÃªm um papel crucial na agricultura moderna, atuando como biopesticidas, bioestimulantes e biofertilizantes. Eles tambÃ©m contribuem para a saÃºde e sustentabilidade das culturas, alinhando-se com os princÃpios da agricultura regenerativa.

The use of microbial consortia is gaining recognition due to their many potential advantages, such as their stability under different environmental conditions and reduced application costs. The approach also increases microbial biodiversity in plants' rhizosphere and phyllosphere (which refer to the environments near the plant roots and above the ground, respectively), contributing to a more balanced ecosystem.Â Recent studies have indicated that microbial consortia can even help to reduce traces of pesticides. A consortium ofÂ *Aspergillus versicolor*Â and bacteria that had been isolated from sewage sludge showed higher efficiency in the degradation of carbendazim and thiamethoxam molecules. Likewise, a consortium made ofÂ *Pseudomonas plecoglossicida*Â and twoÂ *Pseudomonas aeruginosaÂ* isolates degraded organophosphate insecticides more efficiently than when they were individually applied.The combination of differentÂ microorganisms also demonstrate benefits in controlling plant diseases and promoting growth.Â In tests with chickpeas, the combination ofÂ *Purpureocillium lilacinum*Â andÂ *Rhizobium*Â sp. provided superior protection against the nematodeÂ *Meloidogyne*Â *javanica*Â and promoted vigorous plant growth.