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Bioprospection and extracts chemical characterization of plant growth promoting bacteria and antagonists of agricultural pests.

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According to FAO (Food and Agriculture Organization of the United Nations), up to 40 percent of the world's crops are lost every year due to damage caused by agricultural pests[1]. Agricultural losses directly affect food security, this situation is exacerbated by population growth and the biofuels demand. On the other hand, the chemical fertilizers and pesticides currently widely used to minimize these losses have been less efficient, given the pathogens-resistance. In addition, known and worrying consequences for human and environmental health are leading to increasing bans on these substances and a decrease in new registrations.
Faced this, more sustainable agricultural management, and pest control techniques, previously applied only to organic farming, have been the focus of research and investment in conventional agriculture as well. Products of biological origin (vegetable, microbial or animal) called bioinputs, capable of acting to promote plant growth and resistance in addition to controlling pests are a technological bet.
In the present work, 11 bacteria previously identified as fungal pathogen antagonist were used (genus: *Streptomyces, Kitasatospora, Alcaligenes, Achromobacter, Pseudomonas, Stenotrophomonas, Brevibacillus* and *Paenibacillus*). These strains are part of EMBRAPA's Agricultural and Environmental Importance Microorganisms' Collection and were obtained from a previous study of the microbial composition and functionality of wild and domesticated beans rhizosphere, from a high biodiversity soil (Amazonian Dark Earth-ADE)[2]. For the chemical characterization of potential antifungal metabolites, a screening was first performed through co-cultures to identify the best antagonists against seven agricultural pathogens (*Colletotrichum truncatum, Corynespora cassiicola, Fusarium oxysporum, Fusarium solani, Macrophomina faseolina, Rhizoctonia solani* and *Sclerotinia sclerotiorum*). Of the 77 combinations tested, at least 44 (57%) showed potential antagonism, especially CMAA1398 (*Brevibacillus*) and CMAA1399 (*Paenibacillus*), inhibiting all tested fungi strains. Now, the CMAA1399 extract is under characterization by mass spectrometry to identify the metabolites involved in the inhibition.
Other culture-dependent growth promotion tests[3] were applied to the same collection, determining that the CMAA1398, CMAA1404 (*Pseudomonas*) and CMAA1406 (*Kitasatospora*) strains are phosphate solubilizers and the CMAA1399 and CMAA1400 (*Alcaligenes*) strains are Indole Acetic Acid – IAA producers.

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