154. Cellulose from sugarcane bagasse as a potential prebiotic agent

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Organic farming practices have been slowly replacing intensive agriculture with the use of plant growth promoting bacteria as key factor, as these bacteria interact effectively with plants and increase crop yields. However, despite the potential of bioinoculants, its usage in agriculture is still limited as their efficacy also depends upon other abiotic factors such as the soil type and its nutrients. A novel approach to bypass this limitation is the introduction of prebiotic agents to increase the richness of the soil and thus promote bacterial growth (Arif et., al 2020). Among the possible alternatives for soil supplementation, cellulose constitutes one of the best choices, as it is a renewable carbon source, widely abundant in nature and for which a great number of microorganisms produce enzymes. The aim of this work is to evaluate the prebiotic potential of cellulose, extracted from sugarcane bagasse, as prebiotic agent. To that end, cellulose was firstly extracted from sugarcane bagasse through an optimized procedure comprising an alkaline extraction with sodium hydroxide followed by a bleaching process with hydrogen peroxide. The capacity to promote the growth (prebiotic effect) of three soil representative microorganisms and nitrogen fixators i.e., *Rhodococcus* sp. EC35, *Pseudomonas azotoformans* and *Chryseobacterium humi* was evaluated for two cellulose extracts (i.e., raw cellulose and cellulose pulp) obtained from sugarcane bagasse. The results showed that the extraction process yielded ca. 63% and 42% for raw cellulose and cellulose pulp, respectively, being both extracts effective as prebiotic agents for the target microorganisms. Growth rates of 38 and 68% for *Rhodococcus sp*., and of 67 and 84% for *C. humi* was found for cellulose pulp and raw cellulose, respectively. On the other hand, for *P. azotoformans*, raw cellulose had no impact upon the growth rate, while cellulose pulp lead to a small decrease (*ca*. 7%). When comparing this data with the obtained for a standard cellulose from Sigma, it was possible to observe that the commercial cellulose was, in general, less effective as an environmental prebiotic as it only exhibited significant effects in the growth of *C. humi*. These results showed the potential of sugarcane bagasse as source of a natural bioinocula with prebiotic effect, thus potentiating the valorization of an industrial byproduct with low commercial value into a product with biological effect on soils supplementation.