

# Isolation of bacteria to accelerate the degradation of plant residues

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The increase of agricultural production leads to a large generation of second-generation feedstock, composed by organic matter and nutrients. Such lignocellulosic feedstock does not have an adequate and sustainable destination, with the composting process being the main form of reuse. However, natural processes (as biodegradation and biotransformation) slowly degrade this lignocellulosic biomass. Thus, the present project proposed to investigate, *in vitro*, the decomposition of lignocellulosic wastes (especially those remaining in the field after harvesting) using microorganisms with cellulosic potential. Bacteria were isolated from an organic compound matrix on plates with culture medium containing carboxymethylcellulose (CMC) as the carbon source. The plates were incubated at 30, 40 and 50 °C and the isolated colonies were transferred to another plate containing CMC medium. Isolates that grew and produced a clear zone (cellulase assay using Congo Red dye) were considered as potential candidates for cellulosic matrix degradation. These isolates were inoculated in test tubes containing liquid CMC medium. An aliquot of the culture was taken, inoculated into test tubes containing, in addition to corn straw powder, mineral medium containing sources of N and P, and these were incubated (under agitation) for 7 days at their respective isolation temperatures. Forty-five bacterial isolates were obtained, of which 38 showed a positive result for carboxymethylcellulose degradation (ten isolated at 30 °C, eighteen isolated at 40 °C and ten isolated at 50 °C). In addition, it was possible to observe the degradation of the straw in the tubes through the evaluation of the average mass loss. From the results obtained, it is possible to realize that some isolates contributed to the acceleration of the degradation process in liquid medium. To optimize this process, it would be necessary to evaluate different combinations of parameters, including the addition of macro and micronutrients. Therefore, more studies will be carried out to simulate straw biodegradation in the field to obtain a more accurate data of the degradation potential of these microorganisms.

**Key words:** Cellulolytic bacteria; Straw waste; Biodegradation.

## Isolamento de bactérias para aceleração da degradação de resíduos vegetais

Resíduos lignocelulósicos são abundantemente gerados no setor agrícola. O objetivo deste trabalho foi avaliar a degradação desse material em subprodutos de valor agregado (como adubos). Para isso, foi avaliado, *in vitro*, a aceleração da decomposição de resíduos lignocelulósicos (palhada). Inicialmente, 45 isolados bacterianos foram obtidos a partir do isolamento de uma matriz orgânica. Destes, 38 apresentaram resultado positivo para degradação de carboximetilcelulose. Além disso, alguns dos isolados contribuíram para a aceleração do processo de degradação de palha em meio líquido. Assim, serão realizados mais estudos para otimizar as condições de degradação da palhada em campo.

**Palavras-chave:** Bactérias celulolíticas; Resíduos de palha; Biodegradação.