ISOLATION, SELECTION AND MOLECULAR IDENTIFICATION OF ORGANIC FIBROUS WASTE DEGRADING MICROORGANISMS FROM ENVIRONMENTAL HABITATS

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Abstract:

The long-awaited food security and sovereignty stated in the Constitution and laws of Ecuador, is leading to generate alternative practices that reduce the foreign technological dependence. For this reason, it is essential to make use of the biological diversity and enhance the agro-ecological processes. In this regard, the production of compost using agricultural waste, is an alternative for producing organic fertilizers that contributes to implement an efficient and sustainable agricultural model. This study aimed to isolate, select, and identify filamentous fungi and bacteria capable of degrading fibrous organic waste. For sampling, five environments were considered: organic farming, conventional farming, artificial forest, sugarcane area, and compost piles. Isolation of micro-organisms was realized in Petri dishes with nutrient agar and Sabouraud agar (modified with cellulose) medium, for bacteria and filamentous fungi respectively. The selection criteria of the isolations was based on the ability of the microorganisms to grow at different temperatures (50 and 70 °C), pH (3, 5, 7, 9) and their ability to form halos in carboxymethyl cellulose (CMC). Identification of selected microorganisms was obtained with the partial-sequence 16S rDNA of bacterial and the ITS-5.8S rDNA of fungal fragment. A total of 90 bacterial and 131 fungal isolates were obtained, from the physiological and metabolic variables above mentioned 48 fungi and 30 bacteria were selected. The fungal strain AO.8 and bacteria strain AO.19 on organic farming showed the best result displaying the most stable growth at different pH and temperature levels, and the greatest halo of degradation on CMC. According to the phylogenetic analysis AO.19 belongs to the group *Bacillus cereus* sensu lato (specifically with *B*. *thuringiensis*, *B. cereus* and *B. toyonensis*) and the strain AO.8 was identified as *Trichoderma longibrachiatum*. The selection and detection of isolates based on good metabolic capacity and adapted to local environmental conditions, constitute the initial scientific basis for developing indigenous starter cultures. Inoculation of these microorganisms at the beginning of the process of composting of agricultural waste, would optimize and accelerate the process of obtaining organic fertilizers.

Keywords: *Bacillus*, Compost, Organic agriculture, *Trichoderma*, Starter cultures.