ISOLATION OF NATIVE MICROORGANISMS FROM SAMALAYUCA, CHIHUAHUA DESERT WITH ENZYMATIC ACTIVITIES OF BIOTECHNOLOGICAL IMPORTANCE

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Introduction. The deserts are ecosystems where rainfall is scarce and the temperature undergoes drastic changes daily; soils are composed of sand particles and high concentrations of salts are usually found (1); therefore, there are few organisms that can survive on this habitat. However, some microorganisms have developed strategies to survive in such extreme conditions; one of these strategies is the production of enzymes, which can help them on the assimilation of complex substances as nutrients, including biopolymers like carbohydrates proteins or tannic acids. (2).

The objective of this project was to isolate microorganisms from conditions of low water activity, from Samalayuca, Chihuahua desert soil samples, and to determine their enzymatic capabilities, including production of amylase, protease and/or tannase enzymes.

Methods. Soil samples were taken in Samalayuca, Chihuahua in six different places at two depths in two occasions (April 2010 and July 2011). Physicochemical characterization of soil samples were done according to standard procedures (3, 4). For the isolation of microorganisms, four different culture media were formulated, with modification on glucose and NaCl concentration, with the consequent modification of final water activity. Soil samples were inoculated by spreading a soil solution (10% w/V) on top of agar plates and incubating at room temperature under aerobic conditions. Distinctive colonies were restreaked into Potato Dextrose agar (PDA) to obtain pure cultures. Isolates were tested on their ability for enzymatic production by inoculation in PDA + skimmed milk (10% w/v) for protease, Starch (1%) PDA for amylase and M9 + 1% tannic acid for tannase production. Amylase activity was observed by adding iodine to the plate once the microorganism was grown.

Results. Soil samples were sand, with low water activity and high water conductivity capacity. Of the twelve samples collected, a total of 86 microorganisms were obtained (85 molds and 1 actinomycete). No bacterial strains were isolated, and the main reason for this result, was the low water activity of the formulated media used (Table 1). From the total number of samples, 47 were obtained from samples taken in 2010 and 39 from samples taken in 2011. Table 1 shows the distribution of isolates according to the culture conditions used.

There was a preference of isolation of microorganisms from samples taken from the upper layer of soil, although in the desert, this is difficult to assess, since soil turnover is constant.

Table 1. Distribution of isolated by culture media

Basal culture media	NaCl (M)	$C_6H_{12}0_6$ (M)	Water activity	Isolated
M9	0.5	2	0.9547	45
M9	0.5	3	0.926	26
M9	2	0.5	0.922	14
M9	3	0.5	0.872	1

Regarding enzyme production, eight microorganisms (9.3%) were positives for protease, 25 (29.07%) were positive to amylase and 72 (83.72%) could grow on tannin acid as sole carbon source. The high number of mold strains that were capable of growing in tannic acid as sole carbon sources needs further study, since the growth itself cannot be considered as a reason for tannase production.

Conclusions. Culture conditions selected for molds present in soil samples from desert of Samalayuca, Chihuahua. Molds were capable of producing enzymes of biotechnological importance like protease, amylase and tannase.

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