



Screening of thermophilic aerobic microorganisms isolated in thermal spring

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Introduction

The enzymes have an important impact on biotechnological industries, helping the optimization time and the quality in production. Thermostable enzymes are suitable for industrial processes where catalytic ability is not affected by high temperature. Some enzymes to proteases, cellulases, xylanases, pectinases are required in the detergent, food starch, textile, leather, paper and pharmaceuticals industries (1).

The thermostable enzyme produced by thermophilic microorganism can be found in hot springs, fumaroles, volcanic areas and marine hydrothermal systems with a range of 45-90 °C (2,3).

In this work, we isolated aerobic microorganisms and detected enzymes with important biotechnological approach from thermal spring Tlacotalpilco, Hidalgo.

Methods

Microorganisms were isolated from five samples of the soil taken from thermal spring, which were pre-enriched with malt extract broth for 6 days at 50°C. Then microorganisms were inoculated in Petri plates with ISP9-Agar, Nutritive Agar and PDA incubated for 3 days at 50°C. Then was characterized the microscopic and macroscopic morphology to select different species.

To determine the cellulases (cel; Ponce Noyola, T., & Pérez Avalos, O. (2002), xylanases (xyl; Ponce Noyola, T., & Pérez Avalos, O. 2002), pectinases (pec; Arroyo, 2002) and proteases (prot; Alquisira Paez, 2003) activities, this were prepared Kirt-Agar medium for fungi and minimal medium for bacteria using as carbon source: carboxymethyl cellulose, xylan, pectin, skim milk, respectively.

Results

The numbers of microorganisms isolated were: 1 fungal strain, 9 non-filamentous bacteria strain and 2 actinomycetes strain from soil samples that were grown at 50°C. All of them had some of the activities studied. The results are shown in Table 1.

Table 1. Qualitative determination of enzyme activity for strains isolated from thermal spring (at 50 °C / 3 days).

Microorganisms	Type	Cel	Xyl	Pec	Prot
AVR-1	Fungal	+	++	++	+
AVR-2	Act	++	++	+	±
MAVR-1	Bact	++	+	++	-
MAVR-2	Bact	++	+	++	+
MAVR-3	Bact	++	-	-	+
MAVR-4	Bact	±	-	-	+
MAVR-5	Bact	±	-	-	++
MAVR-6	Bact	++	+	++	-
MAVR-7	Act	++	+	++	-

++ Maximum enzyme activity.; + moderate activity; ± minimum activity; - no activity.

The fungal and the non-filamentous bacteria MAVR-2 have all of the activities analyzed and the strains MAVR-4 and MAVR5 don't show important activities so they weren't selected for other studies.

Conclusions

We isolated 9 microorganisms at 50°C: one fungal, two actinomycetes and six non-filamentous bacteria and we selected the fungal strain and the bacteria MAVR-2 because they present all the activities analyzed.

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