## ENZYMATIC ACTIVITY OF NITROGEN-FIXING SOIL BACTERIA

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Soil is a medium for more than 100 enzymes. During soil deterioration the change of enzymes occurs much sooner than of other parameters in the soil so they are considered the best indicators of soil health. These enzymes play a vital role in supporting soil ecology and health by direct agents of the biological catabolism of soil organic and mineral components. Enzymatic activities in the soil are mainly of microbial origin. In a number of potential bacterial enzymes that play an important role in maintaining soil health, some of the important ones are protease, lipase, cellulase, amylase and urease [1].

The aim of this work was the study of enzymatic activity in nitrogen-fixing bacteria, such as protease, lipase, cellulose, amylase and urease. The bacteria used in the experiments were *Agrobacterium* sp. strain M-1 (MN717167) and *Agrobacterium* sp. strain Y-2 (MN721294), previously isolated by us from saline soils of the villages Mrgashat and Yeghegnut of Armenia, respectively [2].

Proteolytic activity of nitrogen-fixing strains was determined using Skim Milk Agar, lipolytic activity - by Burk's Agar with 2% Tween 80, cellulolytic activity - by Cellulose Congo Red Agar. Bacterial suspension ($10^{7}$-$10^{8}$ CFU/ml) was added into punch holes in the agar and plates were incubated at 30 °C during 3-7 days. Enzymatic activity was detected by clear zones around holes.

In case of amylolytic activity Starch Agar was used. A fresh colony of bacteria was streaked on the surface of the agar by double streak and was incubated for 3-5 days at 30 °C. Then the surface of the agar was flooded with Gram's iodine solution. A clear zone surrounding the bacterial growth confirmed the hydrolysis of starch.

Urease activity was investigated by using Urea broth. The cultures were inoculated separately into test tubes and incubated at 30 °C for 4 days. The appearance of a deep pink color indicated a positive result.

The results of the experiments presented in Table 1 show the presence of a fairly wide range of enzymes in cultures *Agrobacterium* sp. strain M-1 and *Agrobacterium* sp. strain Y-2.

**Table 1. Enzymatic activity of nitrogen-fixing bacteria**

| Nitrogen-fixing bacteria | Enzymatic activity | | | | |
|---|---|---|---|---|---|
| | Protease | Lipase | Cellulase | Amylase | Urease |
| *Agrobacterium* sp. strain M-1 | - | + | + | + | + |
| *Agrobacterium* sp. strain Y-2 | + | + | + | + | + |

Therefore, it can be assumed that the use of *Agrobacterium* sp. strain M-1 and *Agrobacterium* sp. strain Y-2 with a variety of enzymatic activities can provide the soil with the enzymes necessary for the normal course of global carbon and nutrient cycles.

### References

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