Cellulose-destructing soil micromycetes of Uzbekistan and influence of some factors on cellulolytic activity and saccharifying ability of *Trichoderma harzianum*

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Cellulose degradation by soil fungi can provide with valuable products such as sugar and proteins that can be used in husbandry or food industries. 1897 strains of soil fungi of 146 species belonging to 35 genera and four subkingdoms have been evaluated for cellulose degrading activity and sugar and protein synthesis. 45 species have expressed good abilities for that, and Trichoderma harzianum was the most active among them. Various plant raw materials (filter paper, residues of camel thorn, cotton leaves, corn stumps, wheat straw, rice straw and rise husks) have been evaluated as media for cultivation of T. harzianum, and the most appropriate one recognized was camel thorn residues. Dynamics of both cellulose degradation and saccharification of the substrata by the fungus has been determined; optimum temperature and reaction of media for growth of T.harzianum and maximum production of sugars have been identified.

Key words: soil, micromycetes, enzymes, cellulose, cellulolytic activity, mineralization, proteins, biosynthesis, hydrolysis, hydrolyzate, sugars, growing microorganisms

Introduction: Increasing crop's yields is dependent on improving of metabolism in plants, and the latter, in its turn, is significantly conditioned by the mineralizing of plant residues in the soil (Mukhammadiyev B., Baybayev B.,2014).

Metabolic processes in microorganisms, biosynthesis of biologically active substances and cellulase in particular are influenced by growing conditions and content of nutritional media (Mukhammadiev,2016).

Purpose of our investigations was to identify species composition of soil micromycetes that are active producers of cellulose-degrading enzymes and proteins. We have studied some features of cellulase biosynthesis by *Trichoderma harzianum* Rifai and its saccharifying ability.

Materials and methods: Common mycological methods of isolation of micromycetes have been used in our investigations. *Trichoderma harzianum* has been grown in 250 ml Erlenmeyer flasks containing 50 ml of Mandel's nutrition broth with pH 5.5, on shakers, using a method of the submerged cultivation, during 72 to 96 hours, at 30^{o}C. Saccharifying ability of fungi has been determined on the base of production of reducing sugars under influence of enzymes of the culture fluid in hydrolyzates of plant residues after Somogyi.

Results and discussion: From these 45 species of the genera *Aspergillus, Chaetomium* (anamorph stage *Botryotrichum*), *Fusarium, Penicillium* and *Trichoderma* have had a notable ability to degrade cellulose.

Activity of enzymes has been on the same level between pH 5.0 and pH 7.0.Decreasing pH till 4.5 has affected negatively on growth and activity of the producer-fungus, and its growth has stopped at pH 4.0.

Then, replacing of the source of cellulose with easy for assimilation product as glucose has led to the suppression of biosynthesis. This apparently can evidence that process of biosynthesis of cellulase by *Trichoderma harzianum* has an inducible character.

Further investigations have been carried out for evaluation of saccharifying ability of *Trichoderma harzianum* on different waste materials containing cellulose. Firstly, substrata have been cut using knife-mill into pieces with length 0.2 to 0.5 mm.

Results have shown that the highest concentrations of sugars have been registered after enzymatic hydrolysis of the camel thorn residues and corn stumps. Evidently, this can be explained by the availability of these products for cellulases and xylanases of *Trichoderma harzianum*.Degrees of conversion of these products have been 30% to 50%.This parameter has been much lesser for rice husks (10%), apparently because of solid association of these crystalline polymers with hemicellulose and/or lignin. Hydrolysis of cellulose-containing substrata has been the most intensive during the first hours of the trial. Then,decreasing amount of the enzyme has led to slowing of the cellulolytic action of the culture fluid and,respectively,to decrease of producing sugars.

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