TITLE: EFFECT OF DIFFERENT CARBON SOURCES IN THE INDUCTION OF POLIGALACTURONASE BY THE MESOPHILO FUNGUS VI2R3M

AUTHORS: PAGNONCELI, J.; RASBOLD, L.M.; ROCHA, G.B.; SILVA, J.L.C.; SIMÃO, R.C.G.; KADOWAKI, M.K; MALLER, A.

INSTITUTION: UNIVERSIDADE ESTADUAL DO OESTE DO PARANÁ, CASCAVEL, PR (RUA UNIVERSITÁRIA, 2069, CEP 85819-110, CASCAVEL – PR, BRAZIL)

ABSTRACT:

Pectin is a complex polysaccharide distributed mainly in the middle lamella and primary cell wall of higher plants. According to their mechanism of degradation, pectinases can be classified into deesterifying or depolymerizing enzymes. Polygalacturonase (PG) is referred to as the main depolymerizing enzyme, being much produced from fungi and has high enzymatic activity. Many enzyme preparations that degrade pectin used in the food industry are of fungal origin. The main components of cellulose, hemicellulose, lignin, starch, pectin and proteins are the substrates for liquid fermentation, usually residues or byproducts of agroindustry, which characterize them as extremely heterogeneous materials that act as both carbon and energy source and support for microbial growth. The fungus VI2R3M was previously collected in the Atlantic Forest and stored in the Laboratory of Biochemistry of Microorganisms of Unioeste / Cascavel - PR. The fungus was inoculated into 7 different media supplemented with 1% carbon source. Sixteen carbon sources were tested and incubated at 30 °C for 72 hours at 100 rpm, followed by vacuum filtration on Whatman filter paper nº 1 to obtain the crude enzyme extract. The enzymatic activity was determined by the method of Miller (1959). As a result of this optimization, Khanna medium (NH_4O_3, KH_2PO_4, $MgSO_4.7H_2O$, KCl, $ZnSO_4.H_2O$, $MnSO_4.H_2O$, $Fe(SO_4)_3.6H_2O$, $CuSO_4.5H_2O$ and yeast extract) presented higher enzymatic activity (3.7 U/mL). The enzymatic activity presented high variation in response to the carbon source used in the culture medium for the growth of the microorganism. Polygalacturonase production was significantly higher using passion fruit fiber (13 U/mL) as a source, followed by apple peel (11 U/mL). On the other hand, the fungus did not demonstrate production using rice straw and glucose. The high enzymatic production in cultures supplemented with fibers or peels can be explained since under restrictive conditions of sugar concentration, the metabolism is directed to the pectin molecule breakdown, so that it can be consumed, leading to high pectinolytic activities. With the availability of appropriate technologies, the passion fruit peel can be converted into commercial products, such as passion fruit fiber. Passion fruit fiber is a good source of polygalacturonase of the fungus VI2R3M, being a promising and low cost alternative for the industrial production of this enzyme.

Keywords: agroindustrial residues, pectinolytic enzyme, passion fruit fiber

Development Agency: Fundação Araucária, CAPES, CNPq, Unioeste.