# USE OF TRITICALE AS SUBSTRATE FOR PHYTASE PRODUCTION BY *Aspergillus Niger* IN SOLID STATE FERMENTATION

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**Introduction.** Several functional additives are used in animal feed, highlighting enzymes such as phytases due to several adverse effects of phytates in monogastric animals, like poultry and pigs, whom can't assimilate them. A phytase is an enzyme that catalyzes the hydrolysis of phytic acid - an indigestible, organic form of phosphorus- and releases a usable form of inorganic phosphorus. High endogen phytase activity previously was reported in triticale (a wheat and rye synthetic hybrid) (1). However, it hasn´t been used as substrate in microbial phytase production by solid state fermentation (SSF), although this may be an appropriate option because of its availability throughout the year in North of Mexico.

The goal of this research was to evaluate triticale - an agricultural waste - as substrate for the phytases production by solid state fermentation, comparing results with obtained using canola meal and wheat.

**Methods.** The assay was carried out using triticale, canola meal and wheat as substrates for phytase production by *Aspergillus niger* under SSF conditions at 25°C In the case of wheat and triticale, the spike and stalk mixtures treated on mechanical mill (1:3 w/w) were used. Phytase activity (2), total proteins (3) and reducing sugar concentration (4) were determined each 24 h during 168 h of fermentation.

**Results.** After 96 h of fermentation phytase activity, calculated for 1 g of solid substrate (Ss), in the system with triticale was lower than in the system with canola meal but higher than in the presence of wheat (Fig. 1, left). Wheat was the substrate with lowest yield. Phytase production in triticale reached a good activity level, even higher than those reported for crushed soy and rice flour (as 16 U/g Ss) (5) or thick corn flour, wheat bran and whole wheat flour (as 5.56 U/g Ss) (6). Total protein concentration increased as time function (Fig. 1, right). However, the lower protein concentration was observed in the system with canola meal.

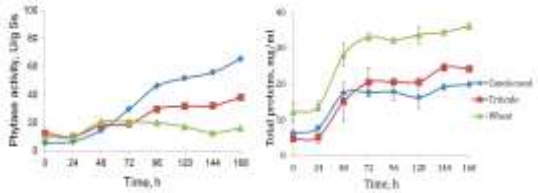


**Fig. 1** Kinetics of phytases (left) and protein (right) production by *Aspergillus niger* in SSF on different solid substrates.

The initial increase in reducing sugars concentration and subsequent its decrease (Fig. 3) in the presence of three studied substrates suggest the manifestation of hydrolytic activity of other enzymes (for example, cellulases, amylases, etc.), which hydrolyze the polysaccharides, as well as fungus metabolic activity to consume the carbon source.

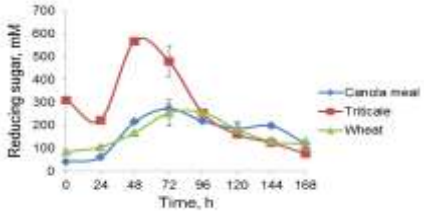


**Fig. 2** Kinetics of reducing sugars in SSF of *Aspergillus niger* on different solid substrates at 25°C.

**Conclusions.** This work demonstrates for first time the possibility of triticale using as solid substrate for phytase production by *Aspergillus niger* in SSF.

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