LIGNOCELLULOLYTIC ACTIVITY OF *Fomes* sp. EUM1 ON AGROINDUSTRIALBY-PRODUCTS

Arce O[1,2], Megías R.D[3]., Hernández F[3], Madrid Josefa[3], Mendoza G[4], Loera O[2].
[1]University of the State of Hidalgo, ICAP, [2]UAM-Iztapalapa. Dept. Biotechnology. [3]University of Murcia, Faculty of Veterinary, Spain. [4]UAM-X. Dept. Animal & Agricultural Production, Mexico.
oarce@uaeh.edu.mx

Key word: enzymes lignocellulolytic, thermotolerant , Fomes sp. EUM1

Introduction. Intensive agriculture generates lignocellulosic wastes. White rot fungi have the ability to bioconvert these materials for biotechnological applications [1]. The fungus *Fomes* sp. EUM1 is a thermotolerant strain [2] able to grow at temperatures up to 45°C. This strain produces lignocellulolytic enzymes when grown on corn stover and wheat bran [3].
This study evaluated the simultaneous enzymatic activity (cellulases, xylanases and laccases) produced by *Fomes* sp. EUM1 on different wastes.

Methods. *Fomes* sp. EUM1 was grown in: alfalfa stem (**AS**), wheat straw (**WS**), barley straw (**BS**), corn stover (**CS**), grape residue (**GR**), dry olive residue (**DOR**), wet olive residue (**WOR**), sunflower meal (**SM**). The substrates were added (200 g L^{-1}) to distilled water and stirred for 1 h, then added bacteriological agar (15 g L^{-1}) was added before autoclaving (121 ° C 15 min). Incubation was kept at 35 °C for 7 d.

The crude extract was obtained by measuring enzymatic activity of cellulases and xylanases [3]. Laccase activity was measured by the oxidation of ABTS (0.1 M). The International Unit (IU) was defined as the enzyme amount which produces 1µmol of substrate oxidized per min [4]. Enzymatic activities from different substrates were subjected to ANOVA.

Results. In tables 1 and 2 show the natural pH at which the fungus grew on every substrate. Production of xylanases on barley straw was 58% higher (27 $IUmL^{-1}$) against corn stover. However, the production than laccases (1 $IUmL^{-1}$) and cellulases (18.2 $IUmL^{-1}$) was high for **CS** respect to other substrate.

The xylanase activity in the **SM** showed an increase of 75% compared to **DOR,** and 100% compared to with **WOR**. On **GR** hydrolytic enzymes were not detected, but the highest laccase (10.6 U mL^{-1}) was produced.

Table 1. Enzymatic activity by *Fomes* sp. EUM1 grown (7 d) on different agricultural by-products.

By-products	pH	Enzymatic activity (IU mL^{-1})		
		Cellulases	Xylanases	Laccases
CS	7.2	18.2±2[a]	17.5±1.6[b]	0.9±0.2[a]
WS	5.4	9.6±2.4[b]	12.5±2.0[c]	1.0±0.3[a]
BS	6.3	3.3±0.4[c]	26.6±3.3[a]	0.4±0.06[b]
AS	5.9	9.2±1.7[b]	10.1±1[c,d]	0.4±0.09[b]

a-d Means in the same column with different letters show significant differences (P<0.05)

Table 2. Enzymatic activity by *Fomes* sp. EUM1 grown (7 d) on different agroindustrial by-products.

By-products	pH	Enzymatic activity (IU mL^{-1})		
		Cellulases	Xylanases	Laccases
DOR	6.6	9.6±3	15.5±2.9[b]	1.1±0.05[b]
WOR	5.5	ND	7.7±2.0[c]	1.3±0.2[b]
SM	6.4	7.1±1.2	26.6±2.0[a]	0.5±0.04[b]
GR	5.3	ND	ND	10.62±1.4[a]

a-c Means in the same column with different letters show significant differences (P<0.05)

Conclusions. The fungus *Fomes* sp. EUM1 induced the enzymes production depending on the substrate. The different products are maintained as alternative for the production of enzymes. Was could keep them as potential substrates in enzyme production and bioremediation of pollutants.

Acknowledgements. OAC thank the National Council of Science and Technology for the scholarship during the PhD and the stay at the University of Murcia, Spain.

References

1. Graminha, E., et al. (2008). *J Anim Sci.*, 144: 1-22.
2. Ordaz A., et al. (2012). *J Basic Microb*. 52: 167-174.
3. Arce-Cervantes, O., et al. (2013). *J Agr Sci Tech*. 15: 229-240.
4. Miller, G.L. (1959). Anal Chem. 31:426-428.
5. Bourbonnais, R et al. (1997). *Appl Environ Microb*. 63:4627-4632.