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High throughput screening of fungal enzymes of industrial interest

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Biological Resource Centres (BRCs) and culture collections are essential components of the infrastructures for scientific research and industry and their establishment and maintenance depend on the implementation of reliable preservation techniques and appropriate quality assurance to allow them to become effective and efficient. Fungal strains identification and characterisation are important tasks within the context of BRC. Using a polyphasic approach for identification, allows the increment of associated information for every fungal strain. With this in mind and to harness the experimental based knowledge for scientific research on filamentous fungi, specifically the *Nigri* section of *Aspergillus*, the enzymatic activity of this fungal section was assessed by screening the activity of a set of enzymes, using several methods, in which one is based upon miniaturized cell cultures and automated expression screening in microwell plates (Alberto *et al.* 2009).

Aspergillus fungi use mainly polysaccharides as a carbon source, which they need to degrade before using as substrates. Some of these polysaccharides can be split in three major groups: cellulose, hemicellulose (xylan, galactomannan and xyloglucan) and pectin (Coutinho *et al.* 2009). For the degradation of the referred plant polysaccharides, fungi produce a broad range of hydrolytic enzymes with different and complementary catalytic activities that can be screened for each fungal strain. Some of these enzymes have a large industrial potential and studying enzymatic profiles, exploring the biopotential of fungal strains support research on their application.

The chosen medium for the growth of the targeted strains was adequate to determine, evaluate and screen the enzymatic profiles for the four targeted enzymes: carboxymethyl cellulase (CMCase), xylanase (Xylan), pectinase (Pectin) and mannanase (Manan) (Table 1).

The enzymes analysed in this screening assay were present in most of the *Aspergillus* strains tested except for feruloyl esterase type A that did not present a significant presence in the culture medium. The results obtained allow to better differentiate between the different fungi and to complement the information about each fungal

enzymatic profile of interest for the MUM - Micoteca da Universidade do Minho – culture collection and also usable for research on the different preservation protocols as a mean of analysing the post-preservation characteristics of the fungi.

Table 1 – Maximum activity detected during the 7 days assay for the *Aspergillus* strains studied.

Strain	Max activity (nkat/mL)			
	CMC	Xylan	Pectin	Manan
Aspergillus aculeatus MUM 03.11	1.38	2.89	10.09	0.35
Aspergillus brasiliensis MUM 06.179	0.27	16.90	32.00	0.39
Aspergillus brasiliensis MUM 06.180	0.15	11.53	20.00	0.46
Aspergillus brasiliensis MUM 06.181	0.41	4.97	11.41	0.84
Aspergillus carbonarius MUM 01.08	0.00	2.96	13.75	0.24
Aspergillus ellipticus MUM 03.12	0.20	3.43	11.77	0.76
Aspergillus ibericus MUM 03.49	0.22	2.82	14.09	0.35
Aspergillus ibericus MUM 04.68	0.58	3.02	23.30	0.32
Aspergillus ibericus MUM 04.86	0.00	2.19	18.20	3.85
Aspergillus japonicus MUM 03.02	0.00	7.06	20.43	0.62
Aspergillus japonicus MUM 98.03	0.15	2.87	11.19	0.06
Aspergillus lacticoffeatus MUM 06.154	0.11	3.00	9.51	0.38
Aspergillus niger MUM 03.01	0.28	1.23	23.00	0.00
Aspergillus niger MUM 05.11	0.41	4.07	20.20	1.71
Aspergillus niger MUM 05.13	0.45	5.58	15.79	1.82
Aspergillus phoenicis MUM 03.05	0.35	2.36	30.00	0.83
Aspergillus phoenicis MUM 03.10	0.39	4.24	11.28	0.98
Aspergillus sclerotioniger MUM 06.151	0.12	5.93	13.43	1.11
Aspergillus tubingensis MUM 06.152	0.54	9.37	41.00	1.15
Aspergillus uvarum MUM 08.01	0.13	4.07	9.91	0.28
Aspergillus vadensis MUM 06.153	0.73	2.00	14.86	0.16

References

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