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PATHOGENICITY CHARACTERISTICS OF FILAMENTOUS FUNGI STRAINS ISOLATED FROM PROCESSED OAT

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SHORT COMMUNICATION

ABSTRACT

Nineteen strains of filamentous fungi isolated from processed oat were tested for pathogenicity factors, based on three parameters: growth at 37ºC, production of phospholipase and urease. *Aspergillus niveus*, *Oidiodendron gryseum* and *Sporothrix cyanescens* were positive for the three parameters. The other species were positive only for one or two of them.

Key words: Filamentous fungi, processed oat, pathogenicity.

Fungi, like heterotrophic organisms, inhabit the most varied substrates, acting as saprophytes, parasites and symbionts. Saprophytes, provided the appropriate conditions, may become pathogenic, and are called opportunist fungi. Immunodepressed patients are susceptible to infections caused by such fungi, which may be located in the human body or come from the air or foods (6).

The purpose of this work was to characterize strains of filamentous fungi, isolated from processed oat (8) and preserved under mineral oil. These strains belong to the Collection of Fungi Cultures - Mycotheca-URM, Department of Mycology, Center of Biological Sciences (CCB), Federal University of Pernambuco (UFPE). This Collection is registered at the Comnonwealth Mycological Institute (CMI) under the abbreviature URM (University of Recife Mycology).

Seventeen strains of Hyphomycetes and two of Zygomycetes (Table 1) were used in this study. Strains were transfered to medium containing 40g/L glucose, 3g/L meat extract, 5g/L sodium chloride, 10g/L meat peptone and kept at room temperature (28ºC±1ºC) for five days. The strains were then transferred to test tubes containing specific media: Czapek Agar (7) for *Aspergillus, Paecilomyces* and *Penicillium* and Potato Dextrose Agar (7) for *Acremonium, Cladosporium, Nigrospora, Oidiodendron, Rhinocladiella, Rhizopus, Sporothrix, Syncephalastrum* and *Tritirachium*. The tubes were left at room temperature (28ºC ± 1ºC) for 48h.

After growth, a taxonomic review was carried out based on macroscopic (colony aspect, diameter and color pattern) and microscopic (microstructures) caracteristics (2, 3, 5, 10, 12).

Three pathogenic parameters were tested: growth

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at 37ºC and production of phospholipase and urease. For the growth at 37ºC, the strains were incubated on specific media for seven days and germination was monitored on a daily basis. For phospholipase activity, aliquots of five-day-growth cultures were transferred to the center of Petri dishes containing Medium I or Medium II, according to Price et al. (11). The basic medium for both Medium I and II was Sabouraud agar added of NaCl and $CaCl_2$. Medium I is basic medium plus 2% egg lecithin (LO) and Medium II is basic medium plus 2% soy lecithin (LS). After seven days at room temperature, the diameters of transparent halos were measured. For urease activity, strains were streaked on Christensen Agar medium (urea agar) (7) in test tubes and left at room temperature. Urease reaction was observed up to three days. A red-fucsin coloring pattern of the medium indicated a positive result.

Table 2 shows that seven out of the nineteen strains, incubated at 37ºC, resulted excellent growth. Phospholipase activity was positive mainly when Sabouraud Agar medium containing soy lecithin was used. The positive species presented a variable halo diameter. On the medium with egg lecithin, only two species, *Oidiodendron gryseum* and *Paecilomyces lilacinus*, presented halos, which were small, indicating a poorly positive result. Seventeen species were positive for urease activity. Among the positive species, *A. fusidioides*, *A. griseoviride*, *O. gryseum*, *R. microsporus* and *S. cyanescens* were not referred until now to be opportunist fungi that cause mycosis(1).

In this work, the results of tests for pathogenicity indicated that *R. microsporus* was positive only for the growth at 37ºC; *A. griseoviride* was positive for urease and phospholipase activity; but *A. niveus*, *O. gryseum* and *S. cyanescens* were positive for the three pathogenicity tests (Table 2). The other species, which were positive for one or two of the parameters tested, are regarded as opportunist agents by De Hoog and Guarro (1). However, *A. niveus, C. oxysporum* and *P. lilacinus* are referred to not only as opportunists but also as pathogenic agents as well, causing human otitis (13), keratitis (4) and ocular infections (9), respectively. *A. niveus* turned out to be positive for the three parameters tested and *P. lilacinus* and *C. oxysporum* were positive for urease and phospholipase production, but negative for growth at 37ºC. The latter feature may not be indicative of pathogenicity.

Fungi in processed foods may cause mycosis, for most fungi isolated from processed oat turned out to

Table 1: Genus/species of filamentous fungi isolated from processed oat (Micoteca-URM, UFPE)

Genus/Species	Number of Register at Micoteca-URM
Acremonium fusidioides (Nicot) W. Gams	3563
Acremonium griseoviride (Onions & Barron) W. Gams	3530
Aspergillus janus Rapper & Thom	3555
Aspergillus niveus Blochwitz	3385
Aspergillus sydowi Bain. & Sarf.	3547
Aspergillus terreus Thom	3420
Cladosporium oxysporum Berk. & Curt.	3389
Cladosporium sphaerospermum Pens.	3546
Nigrospora sphaerica (Sacc.) Mason	3529
Oidiodendron gryseum Robac	3564
Paecilomyces lilacinus (Thom) Samson	3566
Penicillium citrinum Thom	3424
Penicillium decumbens Thom	3380
Penicillium expansum Link	3396
Rhinocladiella atrovirens Nannf.	3545
Rhizopus microsporus V, Thiegem	3388
Sporothrix cyanescens (de Hoog) de Vries	3428
Syncephalastrum racemosum Cohn ex. Schrot.	3384
Tritirachium oryzae Vicens (de Hoog)	3561

Table 2: Pathogenicity tests accomplished by strains of filamentous fungi from Mycotheca-URM, isolated from processed oat.

Genus/Species	Growth at 37ºC	Phospholipase production*		Urease production*
		LO**	LS***	
Acremonium fusidioides	-	-	-	++
Acremonium griseoviride	-	-	++	++
Aspergillus janus	-	-	-	++
Aspergillus niveus	+	-	++	++
Aspergillus sydowi	-	-	+	++
Aspergillus terreus	+	-	-	++
Cladosporium oxysporum	-	-	+	++
Cladosporium sphaerospermum	-	-	++	++
Nigrospora sphaerica	-	-	-	++
Oidiodendron gryseum	+	+	+	++
Paecilomyces lilacinus	-	+	+	++
Penicillium citrinum	+	-	-	++
Penicillium decumbens	+	-	-	++
Penicillium expansum	-	-	-	++
Rhinocladiella atrovirens	-	-	+	-
Rhizopus microsporus	+	-	-	-
Sporothrix cyanescens	+	-	+	++
Syncephalastrum racemosum	-	-	-	++
Tritirachium oryzae	-	-	++	++

*: + = halo diameter between 0.2 and 0.6cm
++ = halo diameter between 0.7 and 1.8cm
- = absence of halo
** LO = egg lecithin
*** LS = soy lecithin

be positive for at least one of the pathogenicity tests. Nevertheless, the onset of the disease will depend on the immune system of the individual, since most fungi are regarded as opportunists.

RESUMO

Características de patogenicidade em amostras de fungos filamentosos isolados de aveia processada

Dezenove amostras de fungos filamentosos isoladas de aveia processada foram testadas quanto a fatores de patogenicidade, utilizando-se três parâmetros: crescimento a 37ºC, atividades fosfolipásica e ureásica. *Sporothrix cianescens, Aspergillus niveus* e *Oidiodendron gryseum* apresentaram características de patogenicidade nos três testes realizados. As demais espécies apresentaram características de patogenicidade somente em um ou dois destes parâmetros.

Palavras-chave: Fungos filamentosos, aveia processada, patogenicidade

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