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Short communication

Fungal contamination and mycotoxin natural occurrence in oats for race horses feeding in Argentina

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ABSTRACT

A mycological survey was carried out for the first time, on oat samples with hull collected in the Argentinean province of Entre Ríos in 2006. Twenty-three oat samples were evaluated. Aflatoxins, zearalenone, deoxynivalenol and fumonisins were also analysed. Species of the genus *Alternaria* were the most prevalent component of the oats mycoflora. Species belonging to *Aspergillus*, *Fusarium*, *Arthrinium*, *Acremonium* and *Curvularia* genera were also recorded. The predominant species of these isolated genera were *Alternaria alternata* (0.59 of specific relative density) and *Aspergillus flavus* (0.34). Aflatoxins, zearalenone and deoxynivalenol were not detected in all samples and only fumonisin B_1 was detected in two samples from Entre Ríos Province at low concentration levels (108.0 and 105.0 μg/kg).

Based on the observed prevalence of *Alternaria alternata*, the potential presence of toxins such as tenuazonic acid, alternariol and alternariol monomethyl ether may pose a contamination risk for oats produced in Entre Ríos Province. On the other hand, according to the incidence of *Aspergillus flavus* in the samples coming from

Abbreviations: *RD*, relative density; Fr, isolation frequency; AF, aflatoxins; AFB_1, aflatoxin B_1; AFB_2, aflatoxin B_2; AFG_1, aflatoxin G_1; AFG_2, aflatoxin G_1; ZEN, zearalenone; DON, deoxynivalenol; FB_1, fumonisin B_1; FB_2, fumonisin B_2; FB_3, fumonisin B_3; OPA, O-pthaldialdehyde.

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Buenos Aires, under inappropriate storage conditions aflatoxins and cyclopiazonic acid might be produced. The fumonisins concentration found in the Argentinean oats did not represent a threat to animal health for high consumers of oats.
The present study has provided, for the first time, information on the internal mycoflora of oats and natural occurrence of fumonisins in Argentina.

1. Introduction

Oats an important cereal for human and animal nutrition is used as horse feed and as fodder for animal grazing (Suttie and Reynolds, 2004).

Molds are the predominant spoilage flora of cereal grains, and their presence can result in the production of mycotoxins. In oats-producing countries, especially in Northern and Eastern Europe there is information regarding the mycoflora of oats and the occurrence of NIV, T-2, HT-2 and especially of DON and ZEN (Lõiveke et al., 2003; Hietaniemi et al., 2004; Kosiak et al., 2004; Mankevičienė et al., 2007; Schollenberger et al., 2006; Buckley et al., 2007; Krysińska-Traczyk et al., 2007; Scudamore et al., 2007).

In Argentina no information has been reported on potentially toxigenic fungi or the natural occurrence of mycotoxins. In Entre Ríos the main destination of oats is for race horses feeding and for fodder rolls to feed cattle and small amounts are used as seed for the next crop season.

The aims of this study were to identify the fungi associated with oats destined to race horses feeding in Entre Ríos Province, Argentina; focusing on the fungal species of mycotoxicological interest and to analyse the natural occurrence of AF, ZEN, DON, and FB.

2. Materials and methods

2.1. Oat grain samples

Race horses breeding is an important activity in two Departments of the Entre Ríos Province. Samples of oat grains (*Avena byzantina* C. Koch: "yellow oats") were collected during 2006 (17 samples) from Urdinarraín (lat 32° 40′ 60″ South; long 58° 52′ 60″ West), Gualeguaychú (lat 33° 00′ 37″ S; long 58° 30′ 51″ W) and Larroque (lat 33° 01′ 60″ S; long 59° 01′ 00″ W) in the Gualeguaychú Department and from Basavilbaso (lat 32° 22′ 45″ S; long 58° 52′ 40″ W) in the Concepción del Uruguay Department. At harvest time, incremental samples of oats with hulls were taken in the storage plants from the trucks coming from different crop fields. Aggregate samples were reduced with the quarter to 10 kg. The oats production in 2006 in Entre Ríos was 12,600 ton, 396 ton being produced in Gualeguaychú and Concepción del Uruguay Departments, this implied that each sample represented 23.3 ton.

In Entre Ríos race horses feeding is supplemented with oats grain coming from Buenos Aires Province. For this reason samples of *Avena sativa* L. (white oats) with hulls coming from Tres Lomas (lat 36° 28′ 00″ S; long 61° 53′ 00″ W), were collected from the six commercial stores for animal feeding in Gualeguaychú Department. Bags of 40 kg were sampled according to the EC 401/2006 and one aggregate sample was collected in each store.

Mycological analysis was immediately performed on oat samples of 300 g and for mycotoxin analysis the remnant of the laboratory samples were grounded in a laboratory mill (Romer Labs Inc., USA). Only one analysis of mycotoxins and fungal contamination was performed on each laboratory sample.

2.2. Isolation of fungi

Oat kernels were surface-disinfected in a commercial 5% (v/v) aqueous solution of sodium hypochlorite for 1 min, rinsed twice, and dried in a laminar flow cabinet. This disinfection is to determine the endogenous mycoflora colonizing during cereal development. Then 100 oat kernels per sample were