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ANALYSIS OF AIR QUALITY IN RIDING HALLS WITH SPECIAL EMPHASIS ON FUNGAL CONTAMINATION

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Introduction

The exposure to dust, fungi and their mycotoxins represents a predisposing factor for respiratory diseases in horses. Studies on air quality in riding halls are lacking, although horse and rider consume large amounts of air during training. To determine the potential health risk for horses and riders in riding halls, the air quality including measurements of dust particles and fungi was investigated in this study.

Material and Methods

- monthly sampling of four riding arenas in Saxony-Anhalt over one year
- four sampling points at 1.5 and 2.5 m height
- sampling before & after a standardized riding program with one horse
- measurements of respirable dust particles (0.3-5µm, 6 channels using a particle counter)
- mycological analyses of air samples
- statistical analysis using SAS 9.2

Particle counter HHPC-6,Argo-Hytos, Germany

MAS-100 Eco Air Sampler, Merck KGaA, Germany

Results

In this study (09/12-06/13), 528 air samples were analysed for fungal spores, and respirable dust particles were measured in parallel (Fig. 1). Univariate analyses for fungal colony forming units (cfu) and weights of dust particles demonstrate a significant influence of the fixed effects arena and month, and in the case of dust particles time of sampling, while height and arena sampling point did not show any effect.

Mycological analyses of the air samples identified a broad spectrum of fungi containing *Alternaria/Cladosporium* species (spp.), *Penicillium* spp. and *Aspergillus* spp. most frequently (Fig. 2A). The mean number of different fungal species per sample was three (range 0-7, median 3,11) and varied significantly between the riding halls (Fig. 2B) and months.

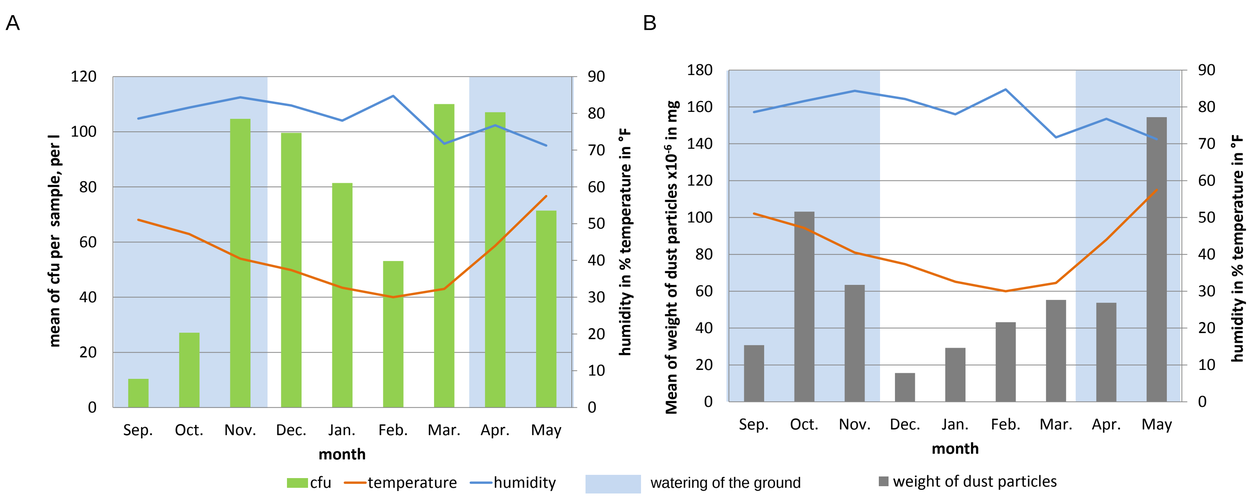

Fig.1: Fungal spores (means of cfu) (A) and weight of dust particles (B) (dependent on the distribution of the particle fractions) in the course of nine months.

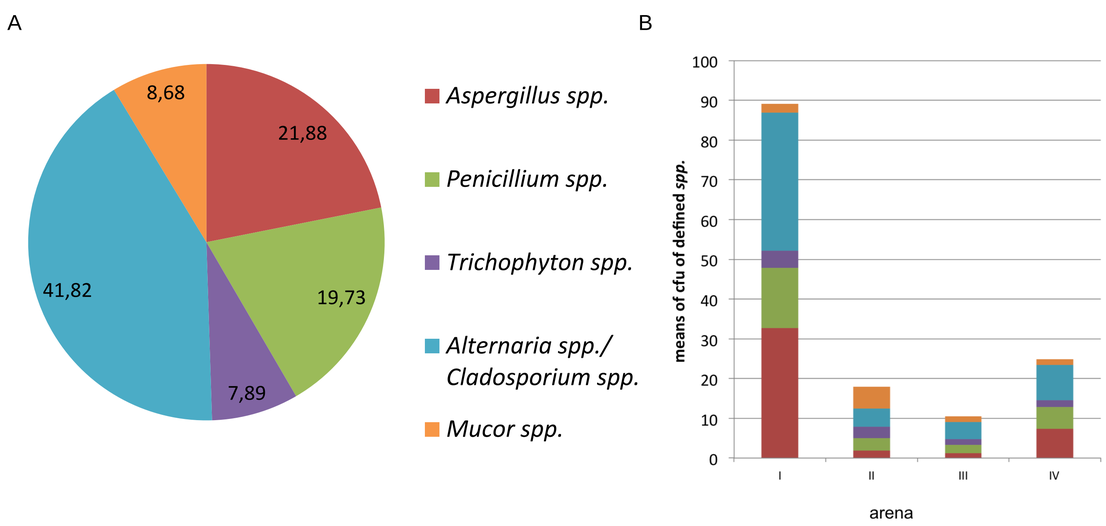

Fig.2: Fungal spectrum (cfu of defined spp. in %, range 0-400 cfu per sample) in total (A) and in relation to the arena I-IV (B).

While air samples in the arenas contained on average 6-30 cfu and 15-40 * 10^{-6}mg dust particles, air samples of arena I, which is directly connected to the stable, showed ten times more fungal spores and dust particles.

The timing of sampling (before or after the riding program) showed a significant effect on the number of cfu in three of four arenas (Fig.3). With one exception, the number of fungi increased during the riding program similar to the observations made for dust particles.

Take home message

- air quality in riding arena is influenced by: arena, month and time of sampling (before or after riding)
- fungal spores with pathogenic, especially allergenic potential, mainly *Alternaria/Cladosporium* spp., *Penicillium* spp. and *Aspergillus* spp., were identified.
- a direct connection via arena and stable is presumably a risk factor for air contamination with fungal spores and dust particles

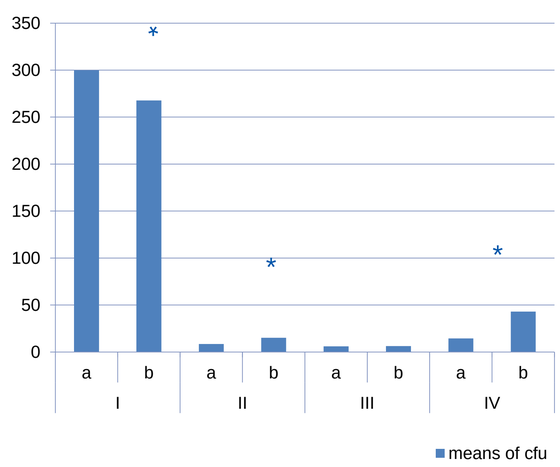

Fig.3: Fungal spores (means of cfu) in relation to the time of measurement.
a: before, and b: after the riding program.
Asterisks indicate significant differences.

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