Organic oat seed quality

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Overview
At least 1.8 million hectares of main cereal species are under organic management (including in-conversion areas). As some of the world’s largest cereal producers (such as India, China and the Russian Federation) do not provide land use details, it can be assumed that the area is larger than shown here (Willer and Kilcher, 2009). Comparing this figure with the FAO’s figure for the world’s harvested cereal area of 184 million hectares (FAOSTAT, 2011), 0.5 percent of the total cereal area is under organic management.

Oat is one of the most suitable cereal species for organic farming (Lockertz et al. 1981). As it has low requirements on growing conditions, it is a suitable crop for organic farming in Central Europe (Leistrumaite et al. 2004). It is the second most frequent crop (just after bread wheat) in the Czech organic farming system. The common oat growing area represents 5,000 hectares and its average yield rate represents 2.5 t/ha (Hrabalová, 2011).

The organic seeds used in order to establish organic crop stands must originate from plants being grown in compliance with the organic farming rules for at least one generation. Seed multiplication is an extremely difficult process. The reproduction crop stand and seed must meet the requirements of the seed certification and authorization procedure as conventional plants and seed do, but organic farming does not allow the use of any pesticides or mineral nitrogenous fertilizers, etc. Organic farmers may use certified organic seeds or farm seeds in order to establish the crop stand. They may also apply for an exception (derogation) and use the conventional untreated seed.

Results / Conclusions
The contamination rate is mostly determined by the year and the trial locality conditions. The studied biological characteristics of seeds were mostly good. In that case, the question of quality in various provenances of seed is to be answered in this poster.

Objectives
The paragraphs above indicate a lower productivity of the organically grown cereal crop stands. A deficiency of certified organic seeds and a serious necessity of an application of own farm saved seed are the factors that might provoke it. For this reason, a question of quality in various provenances of seed is to be answered in this poster.

Material and Methods
Varieties and seeds: Three categories of seeds have been found in the Czech Republic: certified organic seeds, conventional untreated seeds and farm seeds. Two varieties of hulled naked oat (Avena sativa L.) (Neklan, Vok) and two varieties of naked oat (Avena sativa var. nudica) (Izak, Sluš) were used in the research.

Field Trials: Randomized, complete block design on organic certified trial parcels at two locations in Prague (Czech University of Life Sciences Prague and Crop Research Institute) and Ceske Budejovice (University of South Bohemia during 2010 and 2012). Analyses of Seeds Before Seeding and After Harvest: The method of isolation of microorganisms inside an artificial nutritious soil was applied in order to evaluate the rate of grain contamination with the microscopic fungi. Laboratory germination and the energy of germination, the laboratory emergence and the thousand grain weight.

Statistical data assessment: Elementary analyses and the Statistics 9.0 (Statsoft, Inc. USA) program provided the statistical data processing. The comparison of varieties and their division into statistically different categories were provided by Tukey HSD test.

Table 2: Evaluation of biological characteristics of seeds of oat (before they were sown in the exact field trials)

Table 3: Evaluation of health seeds of oat stands harvested (evaluation of coenoses on artificial nutrient substrates)

Table 4: Evaluation of biological characteristics of oat seeds after harvest

Results / Conclusions
We studied the quality of hulled and naked oat seeds of various origin for three years – the certified organic seeds, the farm organic seeds and the conventional untreated seeds. Results of our research have shown the farm seeds are not of inferior quality or worse health to the certified organic seeds. Seeds of the above-mentioned cereal varieties were little contaminated with the studied and evaluated microorganisms. The contamination rate is mostly determined by the year and the trial locality conditions. The studied biological characteristics of seeds were mostly good. In that case, the year and the trial locality conditions have had a negligible impact on them.

Working on the assumption of the results of our research, we can say that a well-arranged cropping, a good forgoing crop and a respect of agrotechnological principles lead to production of high quality organic farm seeds. The quality of such organic farm seeds is similar to the quality of certified organic seeds. There might be some problems in the localities where certain pathogens and microorganisms live (e.g. Fusarium spp.), or in certain years when the pathogens and microorganisms emerge.

Keywords: Fusarium spp., health and biological characteristics, seed, organic farming, oat

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