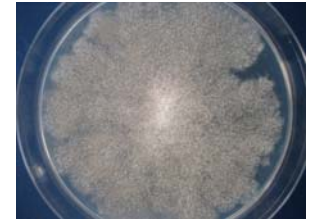


Fusarium langsethiae Infection and Mycotoxin Contents of Oats

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Introduction

Fusarium langsethiae was first detected in Finland in 2001. The species produces T2 and HT-2 toxins in cereal grain and its prevalence seems to be connected to the increase of analysed toxin contents of Finnish oats after the year 2000. The infection and survival of *F. langsethiae* are not well known and there is little knowledge of differences between oat cultivars. Reduced tillage and direct drilling are increasing in cereal cultivation. There has, however, not been much knowledge of *Fusarium* infection of oats in no-till conditions. When the effect of cultivation methods on *Fusarium* infection and mycotoxins contents of oats were studied, the infection time and prevalence of *F. langsethiae* on oat were among the main results.



Materials and methods

In a survey of *Fusarium* species and mycotoxins in Finnish cereals, samples of harvested, dried oat grain were collected from different regions in Finland during 2005-2006. The amount of investigated oat samples was 155 of altogether 19 cultivars.

In the field trial in 2004-2006 comparing cultivation practices four oat cultivars, 'Roope', 'Freja', 'Veli' and 'Belinda' were sown either in autumn ploughed field or direct drilled without any tillage. The trial plots had normal herbicide treatments and they were also sprayed against lodging with trinexapac-ethyl. Harvested grain was dried and cleaned. *Fusarium* infection was investigated of developing kernels from panicle emergence until harvested grain. Samples were taken every two weeks and *Fusarium* fungi were isolated by incubating the kernels and grain on agar medium added with PCNB.



Trichothecene mycotoxins were analysed from grain with GC-MC.

Results

In the survey of *Fusarium* species in cereal grain *F. langsethiae* was detected most often in oat grain samples. It was present in all the cereal producing regions, but its prevalence varied depending on the weather conditions. There were some differences between cultivars but on the other hand the cultivars were grown in different regions, which may affect the results. *F. langsethiae* was more prevalent in 2006 than 2005.

In the field trial in 2004-2006 *F. langsethiae* was the earliest *Fusarium* species detected on oat panicles. The species was first isolated at panicle emergence and it was the most common *Fusarium* species on oats during the early development of kernels. Its prevalence decreased towards grain ripening, and contamination detected in grain was usually low. In the dry conditions of 2006, however, *F. langsethiae* was fairly abundant in harvested, dried grain. More infection was seen in late cultivars than in early ones. Cv 'Belinda' exhibited the highest contamination during early development in 2004 and through the whole grain development in 2006.

F. langsethiae was present both on oats grown in traditionally tilled and direct drilled areas. The prevalence of the species varied: in 2004 it occurred slightly more commonly in tilled than in direct drilled areas, but in the dry conditions of 2006 direct drilling seemed to produce more infected kernels and grain than tillage. In 2006, the T2+HT-2 (950 μ g/kg), contents were higher in direct drilled than in tilled plots.

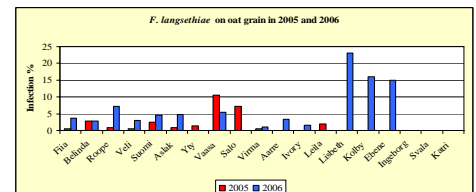


Figure 1. *F. langsethiae* infection on different oat cultivars in the material collected from different locations in Finland 2005-2006.

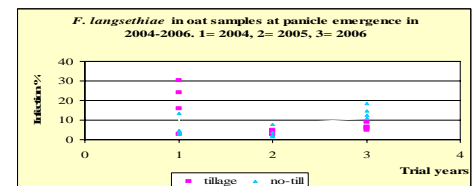
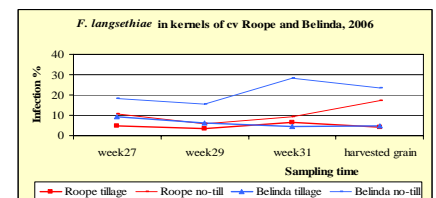
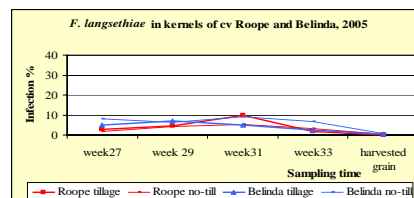
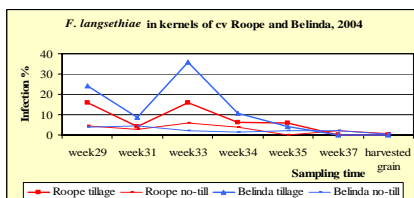


Figure 2. *F. langsethiae* infection at panicle emergence on four oat cultivars under traditional tillage and direct drilling.



Figures 3. Development of *F. langsethiae* infection during kernel development of cv Roope and Belinda under traditional tillage and direct drilling in 2004-2006.

Conclusions

F. langsethiae seems to be the most important producer of T2 and HT-2 toxins on oats in Finland. In the survey of *Fusarium* species and mycotoxins, higher T2+HT-2 contents were detected than in the field trial, although in most of the samples the contents were well below 500 μ g/kg, the maximum contents proposed by the European Union. Direct drilling may favour *F. langsethiae* and thus increase mycotoxins contents of oats. The highest toxin contents can be detected in small grain and cleaning the grain can reduce mycotoxin contents to an acceptable level.