



## NJF Seminar 418

**New insights into sustainable  
cultivation methods in agriculture**

**Piikkiö, Finland, 17-19 September 2008**

## The effect of reduced tillage on mycotoxin contents of oat and barley grain

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The practice of direct drilling without tillage has increased in cereal production in Finland during the recent years. The need to minimize labour, as well as economic and environmental aspects has raised interest in this cultivation practice. However, in Finland the effect of cultivation practices on *Fusarium* infection and mycotoxins contents of cereal grain have not been studied before.

A study of cultivation practices, autumn ploughing and direct drilling as well as disease control versus no control was carried out in a field trial at Jokioinen in 2004-2006. The aim of this study was to find out, whether direct drilling is a risk for grain quality and safety. Other objectives were to determine whether oat and barley cultivars exhibited differences in the development of *Fusarium* infection and mycotoxin contents. Both cultivation practices were applied for four cultivars of malting barley and food oats. *Fusarium* infection of developing kernels was investigated from ear emergence until harvest by sampling every two weeks in the field. Mycotoxins were analysed from dried grain. In 2005-2006, analyses from grain were made also two weeks before harvest.

The detected mycotoxin contents were mainly low in the grain produced under tillage and direct drilling. The deoxynivalenol-producing species *F. culmorum* and *F. graminearum* were quite common in the grain, but the DON contents remained well below the EU limits. The highest DON contents remained below 1000µg/kg. There were differences between the cultivars: barley cultivar 'Barke' and oat cultivar 'Roope' seemed to be most susceptible to DON-producers and they also had the highest toxin contents. *F. langsethiae* infections resulted in T-2/HT-2 formation on oat cultivars. The highest contents were detected on cv Belinda which also had the highest infection levels until harvest. Barley cultivars also had T-2/HT-2 in the grain, but the contents were lower. As a whole, direct drilling decreased *F. culmorum* and *F. poae* infections in grain but it also increased infections of *F. avenaceum* and *F. langsethiae*.

Direct drilling did not increase the DON contents of oats and barley compared with autumn ploughing. Disease control at flag leaf stage did not have any effect either on *Fusarium* infection or mycotoxin contents. However, direct drilling is a risk in oat production. It increases both infection of *F. langsethiae* and T-2/HT-2 toxins produced by the species. The risk is highest in oat monoculture, but oats as a pre-crop to barley can increase the toxin risk also on certain barley cultivars.

These results, although from a short period of time, indicate that direct drilling may have effects on mycotoxins contents of cereal grain. To avoid these effects proper crop rotation should be practiced. More information is still needed of the *Fusarium* infections and mycotoxins in different cereal cultivars under reduced tillage.