

# T-2 and HT-2 in grain and grain-based commodities in Europe

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## Introduction

T-2 toxin (T-2) and HT-2 toxin (HT-2) belong to trichothecenes; a large family of chemically related mycotoxins produced mainly by fungus *Fusarium* spp. in cereal grains. T-2 and HT-2 belong to the most toxic trichothecenes (type A group). They have high acute and subacute toxicity as they cause haematotoxic, immunotoxic, cytotoxic, and dermal effects. Carcinogenicity of T-2 and HT-2 in human is not proven.

In the near future the EC will introduce maximum limits on T-2 and HT-2 in food products. To do so, it is necessary to perform high standard risk assessments, using a complete up-to-date overview of the available information and data. The aim of this study is to review the occurrence of T-2 and HT-2 in cereal derived food products and their commodities in Europe, along with factors that affect the toxin contamination<sup>1</sup>.

## Occurrence at field and in commodities

T-2/HT-2 incidence and levels in raw oats from the UK and Scandinavian countries were high in the years 2003- 2007, particularly in the UK, but greatly reduced in 2008 and 2009. The contamination of barley and maize with T-2/HT-2 was generally low, but incidentally - in some years and/or countries - moderately high. Wheat, durum wheat, triticale and rye were not susceptible to T-2/HT-2 contamination.

## Occurrence in food products

Cereal derived food products showed to have high incidence of T-2/HT-2. However, contamination levels were much lower as compared to levels in their commodities. From the foods investigated, oat products showed to have the highest T-2/HT-2 contamination.



## Co-occurrence

- At the field and commodity level, the levels of T-2 and HT-2 seemed to be highly correlated to each other, particularly at high concentrations. The level of HT-2 was found to be 2-7 fold higher than the T-2 level.
- In food products, the correlation between T-2 and HT-2 showed to be weak or even absent.
- In raw cereals, the presence of T-2/HT-2 was not correlated with the presence of deoxynivalenol (DON) and nivalenol (NIV).
- T-2 triol, neosolaniol and T-2 tetraol occurred together with T-2 and HT-2 in raw cereals.

## Agronomical factors

- Region-year. T-2/HT-2 contamination levels varied between regions and years (probably weather effects)
- Sowing time (varieties). In barley, spring sowing resulted in 3-times higher contamination than autumn sowing. In oats, spring sowing resulted in lower contamination than winter sowing.
- Precrop. When cereals were used as precrop, the levels T-2/HT-2 contamination in cereals were higher.
- Fungicides. Little or no effect.
- Organic wheat and oats. Lower contamination as compared to conventional grown cereals.

## Processing factors

- Processing raw cereals greatly reduced T-2 and HT-2 contamination to low levels in food products.
- By-products of processing –used as animal feed - had high T-2 and HT-2 contamination, due to uneven distribution of the toxins over the different fractions.
- In oats with high initial T-2/HT-2 levels, processing resulted in a reduction of 70-95% of the initial contamination.

## Recommendations

- Agronomical factors to reduce T-2 and HT-2 contamination in the field need more investigation as well as the biology of the responsible fungi.
- The use of by-products of cereal processing for animal feed should be re-considered.

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