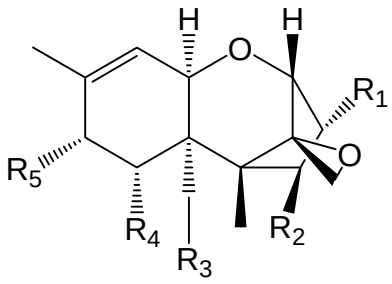
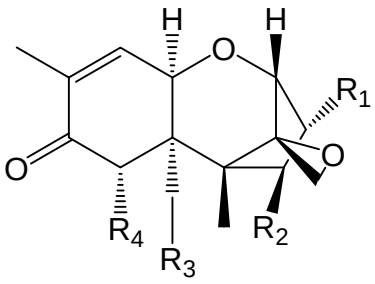
# Trichothecene mycotoxins

Type A




Type B




| | | $R_1$ | $R_2$ | $R_3$ | $R_4$ | $R_5$ | Formula | MW | CAS |
|---|---|---|---|---|---|---|---|---|---|
| Type A | HT-2 toxin | OH | OAc | OAc | H | $OCOCH_2CH(CH_3)_2$ | $C_{24}H_{34}O_9$ | 466.5 | 21259-20-1 |
| | T-2 toxin | OH | OAc | OAc | H | $OCOCH_2CH(CH_3)_2$ | $C_{24}H_{34}O_9$ | 466.5 | 21259-20-1 |
| Type B | Deoxynivalenol | OH | H | OH | OH | — | $C_{15}H_{20}O_6$ | 296.3 | 51481-10-8 |
| | 3-Acetyldeoxynivalenol | OAc | H | OH | OH | — | $C_{17}H_{22}O_7$ | 338.4 | 50722-38-8 |
| | 15-acetyldeoxynivalenol | OH | H | OAc | OH | — | $C_{17}H_{22}O_7$ | 338.4 | 88337-96-6 |
| | Nivalenol | OH | OH | OH | OH | — | $C_{15}H_{20}O_7$ | 312.3 | 23282-20-4 |
| | Fusarenon-X | OH | OAc | OH | OH | — | $C_{17}H_{22}O_8$ | 354.4 | 23255-69-8 |

**[Summary of trichothecene mycotoxins]**

Trichothecenes are sesquiterpene compounds that consist of the trichothecene core with epoxy rings at C-12 and -13 positions. They are classified into four types based on the carbonyl group at the 8-position, macrolide rings at 4- and 5-positions, and the number of epoxy rings. Among these, types A (such as T-2 toxin and HT-2 toxin) and B (such as deoxynivalenol (DON) and nivalenol (NIV)) are well known.

Trichothecenes are produced by fungi of genera *Fusarium*, *Trichothecium*, *Myrochecium*, *Stachybotrys*, etc. These producers are soil fungi which live in the soil, and they parasitize on plants, showing pathogenicity in plants such as cereal Fusarium head blight, producing harmful compounds including trichothecenes. In particular, Fusarium head blight emerges widely in bad weather of low temperature and raininess in the growing and harvesting seasons of cereals.

Natural contamination by trichothecene mycotoxins occurs frequently in grains cultivated in wide areas of middle- to high-altitudes, and there have been large numbers of reported contamination by DON, NIV, T-2 toxin, HT-2 toxin.

Trichothecenes have strong cytotoxicity, as well as proinflammatory and emetogenic properties, and harmful to hematopoietic organs and to immune function. The intensity of toxicity is in the order of T-2 toxin, HT-2 toxin >nivalenol >diacetoxynivalenol

>deoxynivalenol.

**<<Standards and specifications in the Act on Safety Assurance and Quality Improvement of Feeds>> [Deoxynivalenol in feed (Notification No. 2267, 14 Seichiku, Feed Division, Livestock Industry Department, Agricultural Production Bureau, Ministry of Agriculture, Forestry and Fisheries, Japan, dated July 5, 2002) ]**

The maximum value of deoxynivalenol acceptable to be contained in feed given to livestock, etc. (except cattle of 3 months old or older): 1.0 ppm

The maximum value of deoxynivalenol acceptable to be contained in feed given to cattle of 3 months old or older: 4.0 ppm

Feeds containing deoxynivalenol over the acceptable value shall be handled as the feed containing harmful substances in Article 23, (formerly Article 2-6), Paragraph 1 in the Act on Safety Assurance and Quality Improvement of Feeds, and their manufacturing, importing or marketing shall be inhibited according to the provisions in the article; or the user of the feed may be inhibited the use of the feed according to the provisions in the said article, and may be ordered disposal etc. according to the provisions in Article 24 (formerly Article 2-7) (“Inhibition on marketing etc. of feeds containing deoxynivalenol according to the provisions in Article 2-6 in the Act on Safety Assurance and Quality Improvement of Feeds” (Notification No. 8021, 14 Seichiku, Feed Division, Livestock Industry Department, Agricultural Production Bureau, Ministry of Agriculture, Forestry and Fisheries, Japan dated March 17, 2003)).