

Nitrate in rocket lettuce, spinach and other lettuces

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Nitrates are nitrogen compounds which occur naturally in soil but are also applied to fields as fertilisers. Plants need nitrate to build protein. Furthermore, nitrate may be used as an additive in food like certain meat, cheese and fish products.

Nitrate itself is not very toxic. However (endogenous) nitrite can be formed from nitrate in the body. This, in turn, may lead to the formation of n-nitroso compounds (including nitrosamines). Many of them have proved to be carcinogenic in animal experiments. This is the reason why nitrate intake should also be restricted.

Consumers can take up nitrate from various foods. They include vegetables which are the main source followed by drinking water, cereals and fruit as well as certain meat, cheese and fish products. The World Health Organisation (WHO) has established an acceptable daily intake (ADI) of 0 up to 3.65 milligrams (mg) per kilogram (kg) body weight which can be ingested over a lifetime without any risk to health. This means it is acceptable for an adult man (70 kg) to ingest up to 256 mg nitrate, an adult woman (58 kg) up to 212 mg and a child (25 kg) up to 93 mg over their lifetimes.

Various types of vegetables like lettuce, spinach, white cabbage, kale, beetroot and radishes may have high natural levels of nitrate depending on the season and cultivation area. Rocket lettuce is another source and it seems to accumulate particularly high levels of nitrate. This is confirmed by the latest studies of the monitoring authorities of the Federal States and the data from food monitoring for the period 2000-2008. The mean values measured in various national and international studies for nitrate contents in rocket lettuce vary between 4,700 and 4,800 mg/kg. Four years ago very high nitrate levels of over 5,000 mg per kg were determined in almost half of the rocket lettuce samples examined. Hence we can assume that there has been a slight drop in nitrate levels. The nitrate levels in spinach have also fallen. This drop is attributable amongst other things to the efforts undertaken by farmers to reduce the nitrate contents in their products.

The Federal Institute for Risk Assessment (BfR) has assessed the health risk of rocket lettuce with a high nitrate content. The Institute notes that consumption of larger amounts of lettuces of this kind can occasionally lead to a major exceeding of the acceptable daily intake established by the World Health Organisation (WHO). As, however, no long-term exceeding of the acceptable daily intake is to be expected, there does not seem to be any health risk for consumers. The EU is currently planning to raise the maximum nitrate levels for spinach and lettuce. A maximum nitrate level is to be established for rocket lettuce for the first time.

BfR rejects the raising of the maximum level for spinach and lettuce as this runs contrary to efforts to reduce the nitrate contamination of food. The efforts undertaken in recent years by farmers to reduce nitrate contamination would be undermined if the maximum levels were to be raised.

In the case of rocket lettuce BfR welcomes the introduction of a maximum level. However, it should be lower than the value currently under discussion by the EU (5,000 or 6,000 mg/kg). This is because consumption of more than 26 g rocket lettuce per day with an average nitrate content of 4,252 mg/kg, in addition to the average consumption of all food groups of importance in conjunction with nitrate, would lead to an exceeding of the acceptable daily intake. In order to reduce nitrate contamination, BfR advises consumers to eat vegetables

when they are in season. They have a lower nitrate content as they can mature under optimum growth conditions and less fertiliser is needed.

The full version of the BfR Opinion in German is available on
http://www.bfr.bund.de/cm/208/nitrat_in_rucola_spinat_und_salat.pdf