

Effects of ozone on the allergen content of grass pollen

Kristin Galler

Elevated ozone levels during summer cause oxidative stress to plants. To a certain extent, they are able to cope with this; beyond, the plants suffer damage. The stress related mechanisms induced in plants cause a different metabolism which may lead to changes in the allergenic potential of the pollen.

To examine these changes, ryegrass as a model plant is grown under defined temperature and light conditions. Different ozone levels are applied; e. g. 0 ppb by night and up to 100 ppb by day. When the grass flowers, pollen are collected, extracted and the extracts are characterized by several methods.

- ELISA (Enzyme linked immunosorbent assay) to define the content of group-5 allergen
- SDS-Electrophoreses to compare the protein pattern of the extracts and show new or changed proteins
- Capillary electrophoresis to compare native pollen extracts
- FT-IR Spectroscopy and statistical analysis of the data

No significant changes in group-5 allergen content or protein content could be observed. In the electropherograms an additional peak in two series of ozonized pollen is found. The UV-spectrum of the peak shows one maximum. The substance is not necessarily a protein but may also be a carbohydrate or another plant substance.

The FT-IR-spectra show differences in the region around 1000 cm^{-1} . This perhaps is a sign for changes in carbohydrates of glycosylated proteins or starch. Further research is necessary to define the nature of these changes.

These results indicate that there are varieties in pollen extracts, but a change in allergenic potential of the pollen cannot not be verified. Due to different reaction of plants to ozone in dependence on species or cultivar it cannot be excluded that other grasses show bigger differences. The application of different ozone programs may also influence the results.