

Chemical analysis of Amino acids in needles of conifer trees

The higher concentration of amino acids in needles of conifer trees is a marker to environmental air pollution in the surrounding of these forests. Over a couple of years the county office to forestry affairs located in Eberswalde measured the amino acid total amount in needles of conifer trees and records an annual report on the situation of forest trees in the Berlin-Brandenburg district of Germany.

Since 2010 they used as measurement equipment the ARACUS analyzer. The device handling is convenient and linked to a high repeatability of the results. Up to 120 samples can be managed during an auto sampler run by individual programming setup. Overall ARACUS has a modular configuration of each part in its device, low cost in service and entertainment. Extra ordinary fact is the closed link between the personal users and manufacturer developers.

The scenario of the approach

Since the years from 1970 more and more damaged plants were detected as a result of the arising NO_x (nitric oxides) pollutions by industry and traffic vice versa by agricultures in an excess of nitrogen fertilizer. Beginning at an imperfect amount of nitrogen in early times the situation collapsed into more as enough spreading of nitrogen. Nowadays nitrogen has built a stress factor.

In direct contact to air-leaves-pathway especially gaseous emission of ammonia (90% according to animals production in agriculture) could lead to irresistible damages. At the entrance point the ammonia will connect to carbohydrates immediately and used to synthesize amino acids. Therefore the amino acid syntheses contribute to decontaminating of an excess on nitrogen in the cells. As a result the soluble amino acids storage will be refilled permanently. The amount of free soluble amino acids in needles of conifer trees rise up nearby the pollution generator evidence by 130 per cent. At these conditions the single value of the free amino acid arginine (as a sample linked to small carbon-nitrogen-ratio) reached up to 40 per cent of the total amount.

Due to an increase in nitrogen the bioavailability of carbohydrates in all compartments of the whole tree organism is quenched. In consequence a smaller sustainable growth, a lower robustness and resistance to hardiness in winter times and a higher sensibility to biogenic pests will be registered.

The origin details (in German) you can find:

http://www.mil.brandenburg.de/media_fast/4055/Waldzustandsbericht_2008.pdf

http://www.stadtentwicklung.berlin.de/forsten/waldzustandsbericht2001/de/download/wse_6_3.pdf