



Forestry and Game
Management
Research Institute

Forest soil condition, nutrition supply and health state of young Norway spruce stands in the Eagle Mts. during 2002–2018 period

Radek Novotný

Věra Fadrhonsová

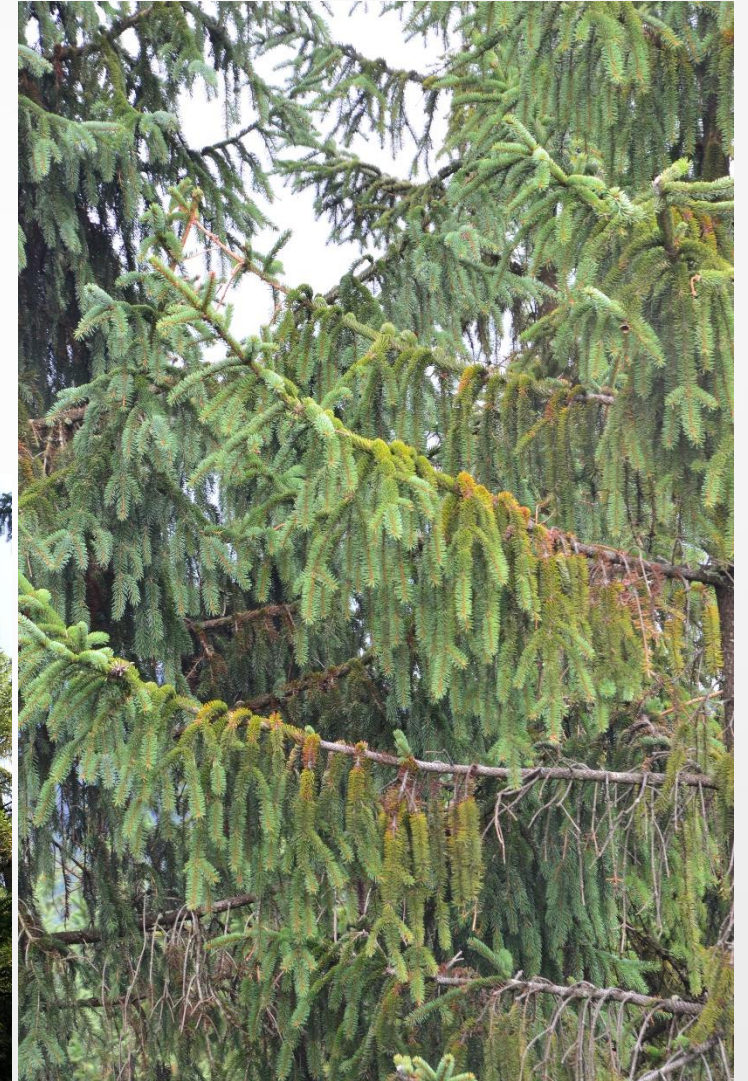
Vít Šrámek

3rd Bilateral Workshop of Forest Research Institutions
from the Czech Republic and Saxony

Orlické hory, 21. – 22. 9. 2022

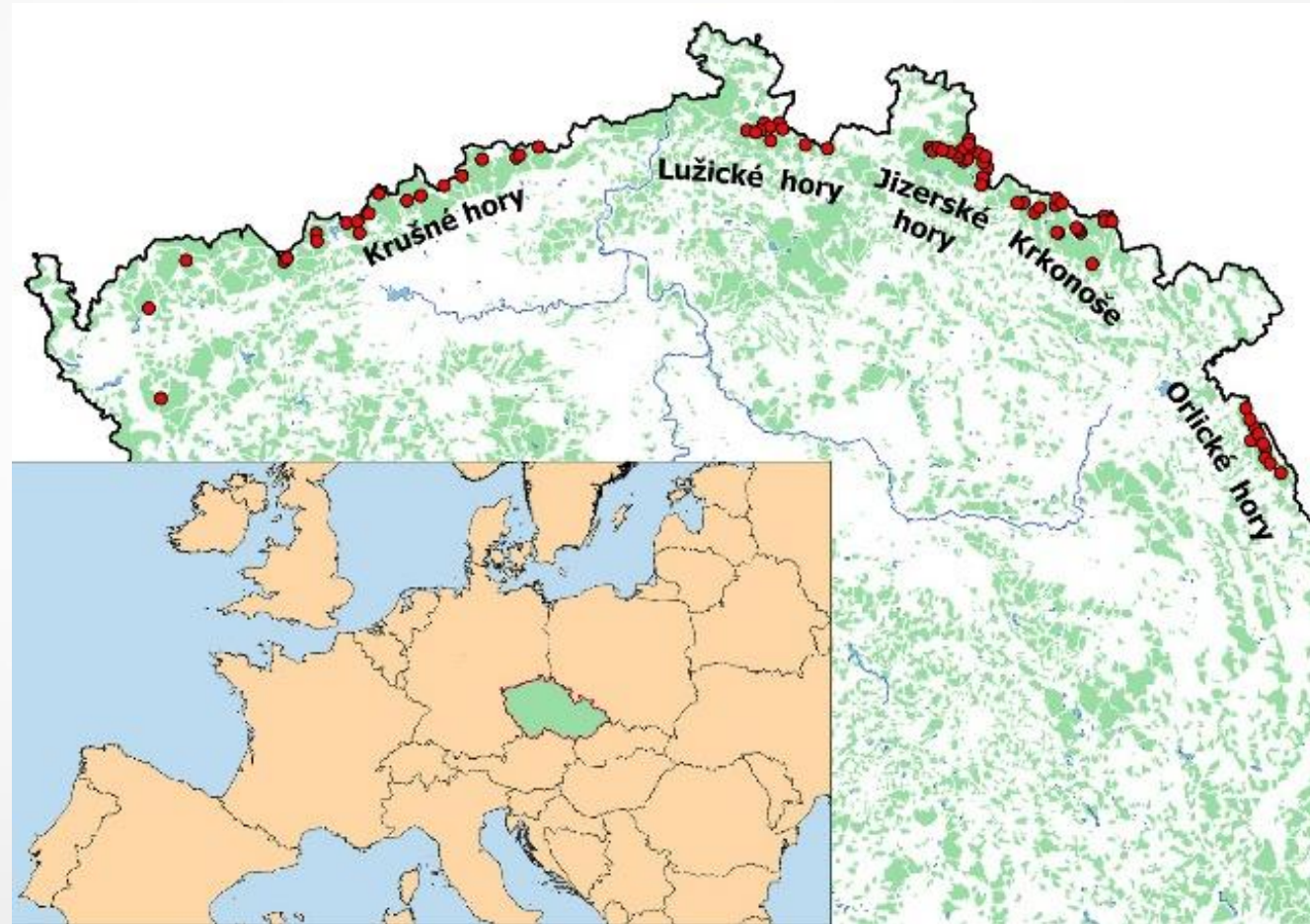
Outlook

- Sample plots + Methodology of sampling
- Results
 - Defoliation
 - Deposition load
 - Soil chemistry available nutrients
 - Soil chemistry total nutrients content
 - Needle chemistry – nutrients content
 - Needle chemistry – N to nutrients ratio
- Summary



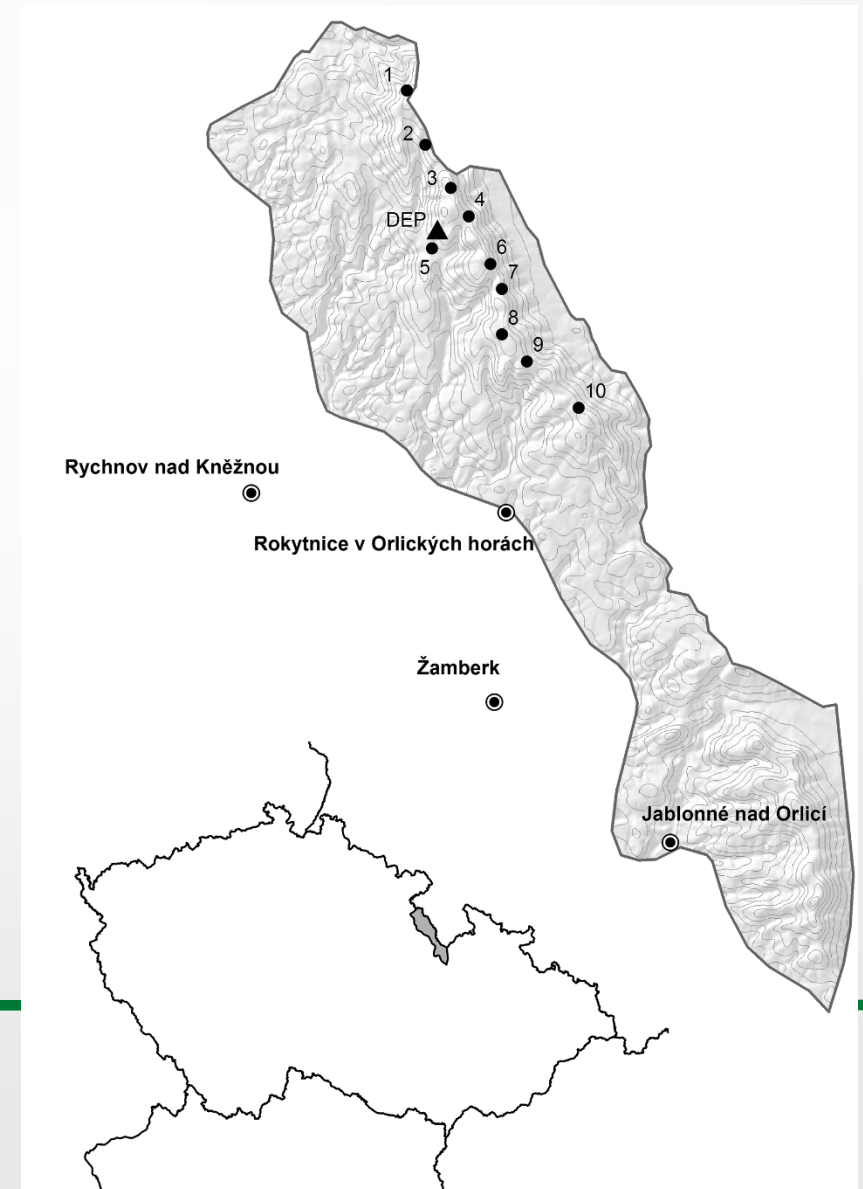
Sample plots + Methodology of sampling

- **Young Norway spruce stands** in heavy polluted areas („border mountains“)
- Since 1994 Erzgebirge, Isergebirge, Riesengebirge
- Since 2004 Lausitzergebirge, **Adlergebirge**
- There are together 76 Norway spruce plots in five mountains, today age of trees is between 25-50 years
- Needles are sampled every year during autumn, samples are taken from 3. – 7. whorl, two youngest needle classes are analysed
- Since 2019 have been started four-year period for soil and nutrition survey

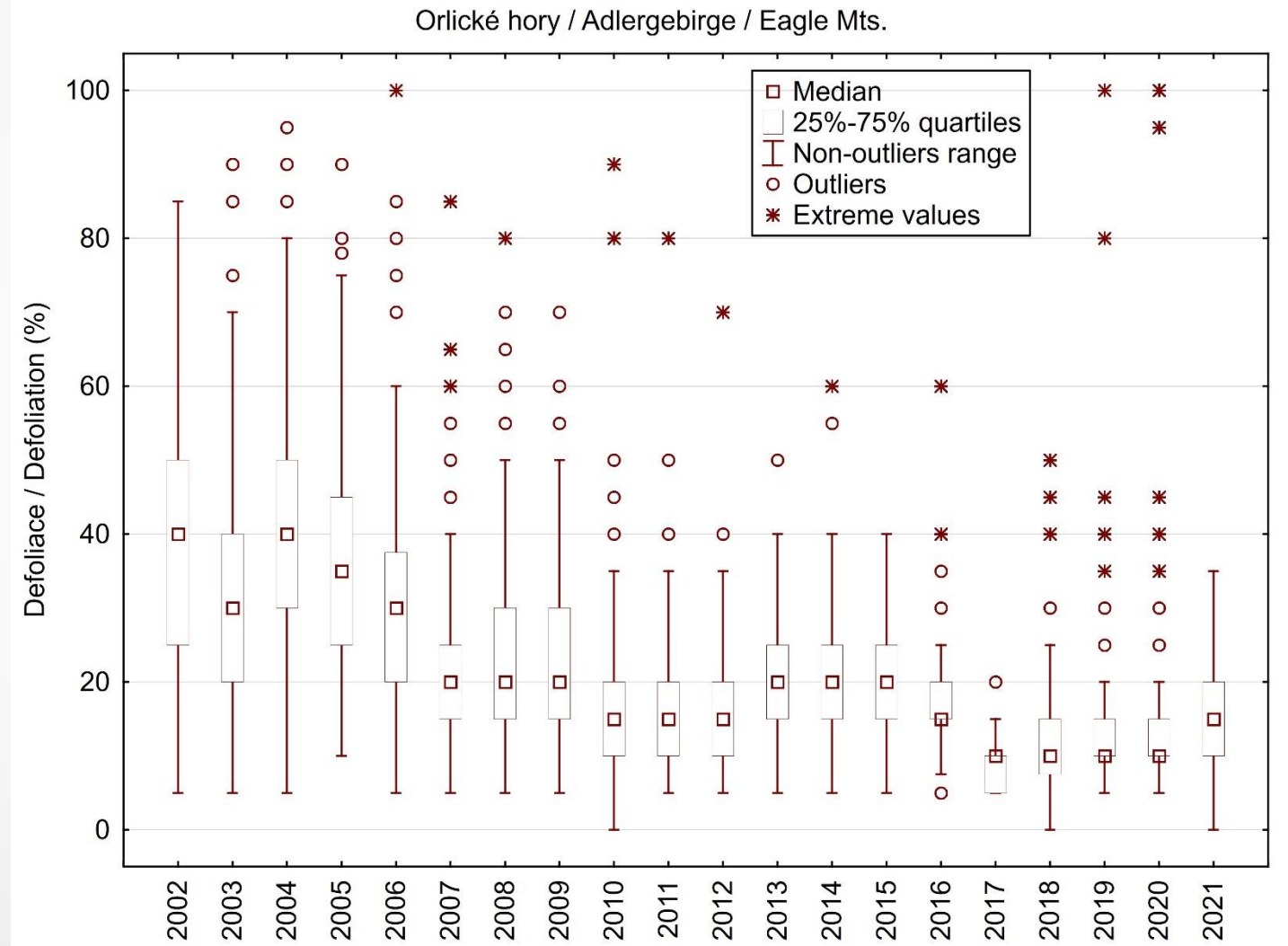
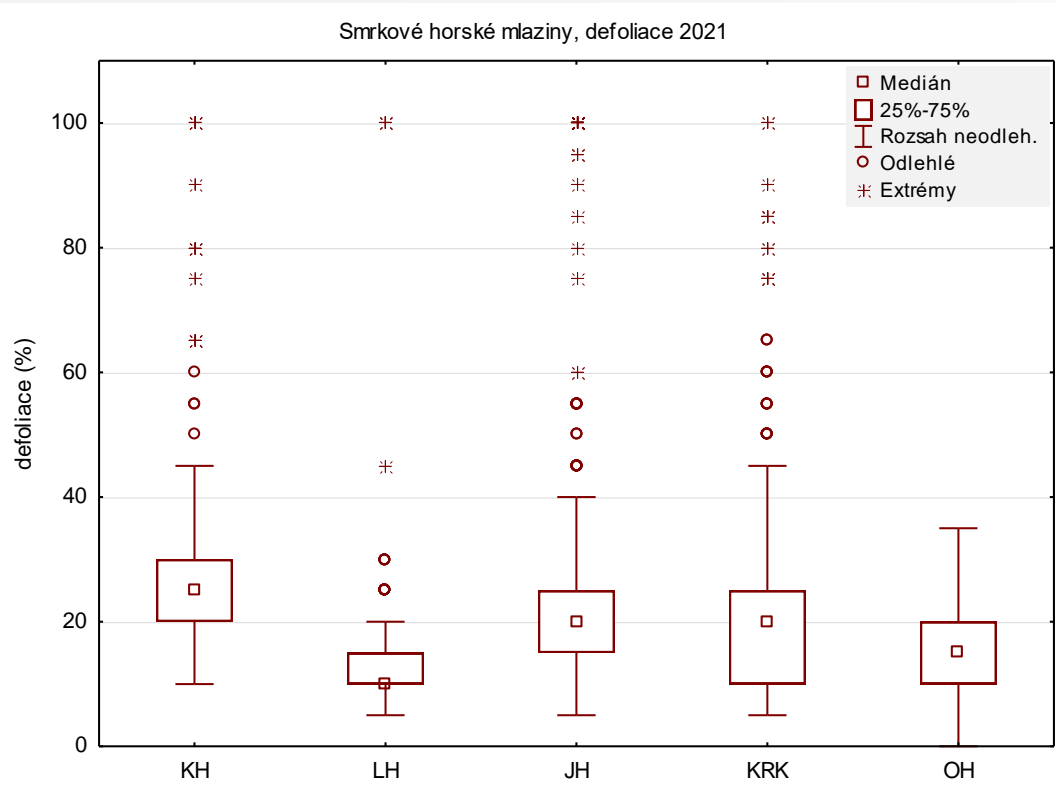


Sample plots + Methodology of sampling

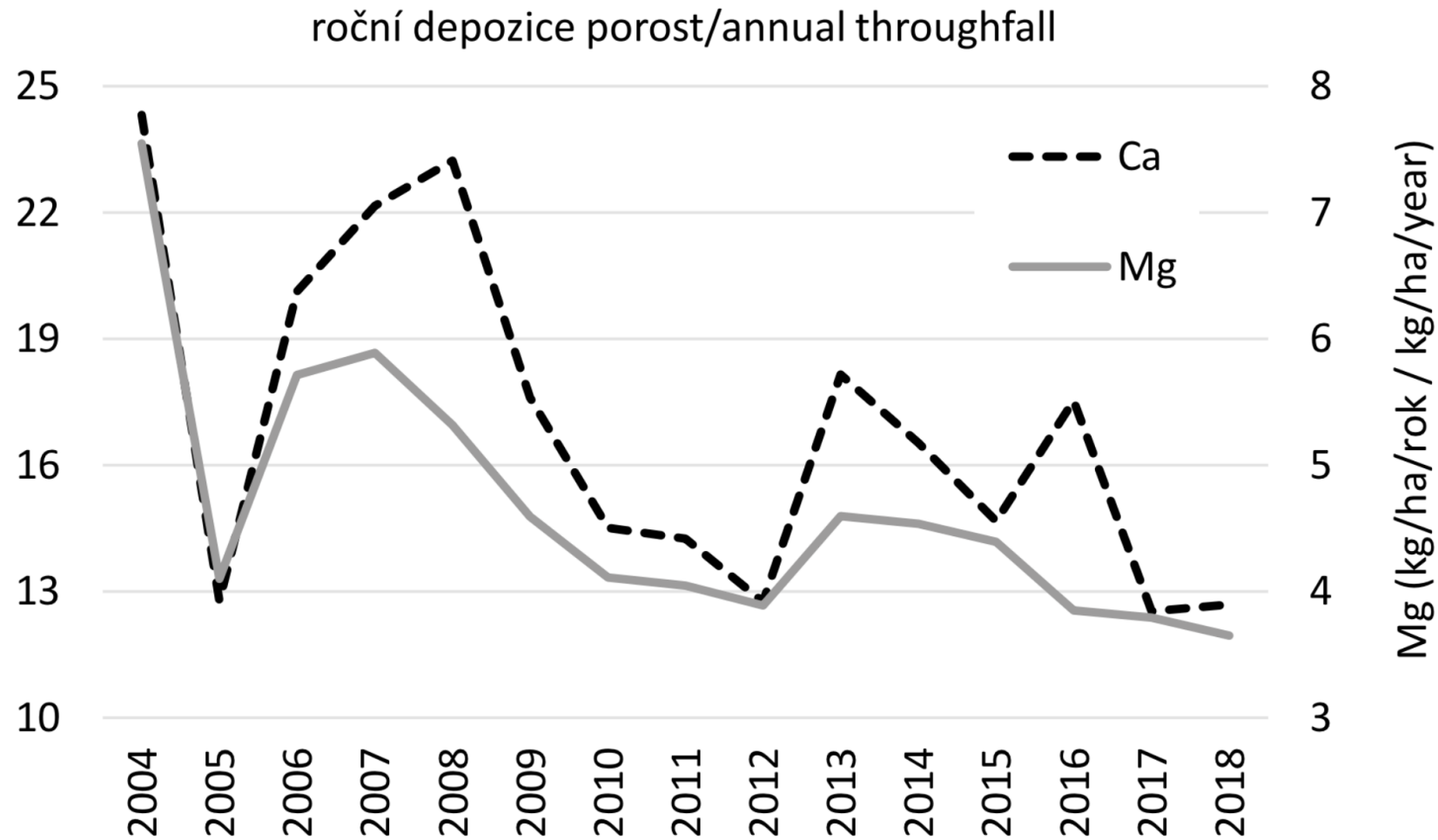
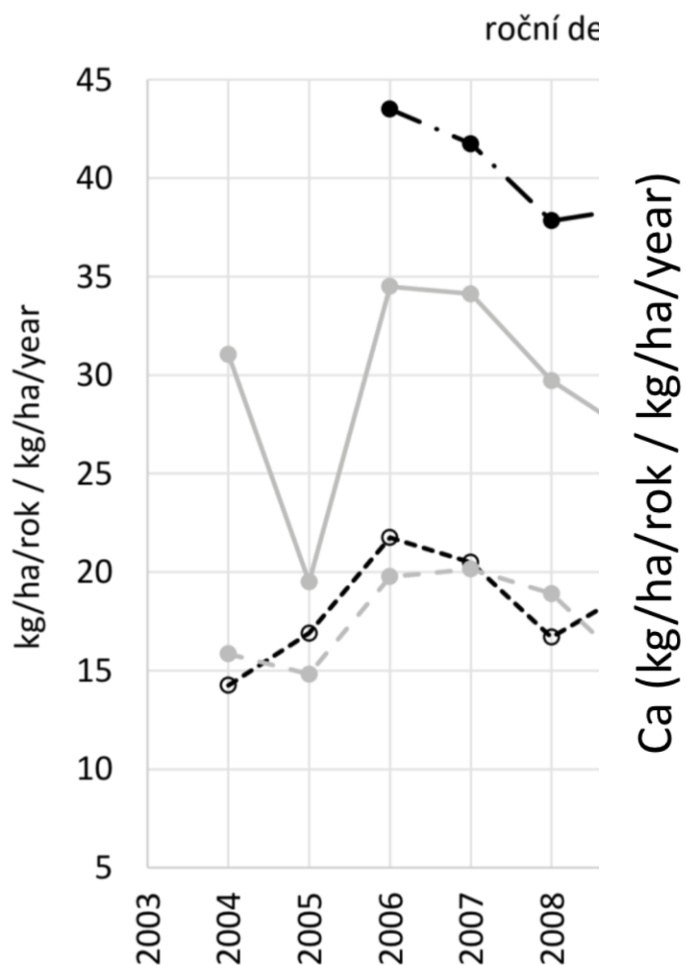
- **Adlergebirge** – monitoring of young NS stands as a reaction to the massive appearance of the fungi *Ascocalyx abietina*
- Ten plots on the ridge of mountains which were affected by *Ascocalyx abietina*
- Altitude 940 – 1040 m a. s. l.
- Age in 2018: 20-36 years
- Needles are sampled every year during autumn, samples are taken from 3. – 7. whorl, two youngest needle classes are analysed
- Needles are taken by telescopic scissors, today we must climb to the top of trees, but without climbing irons



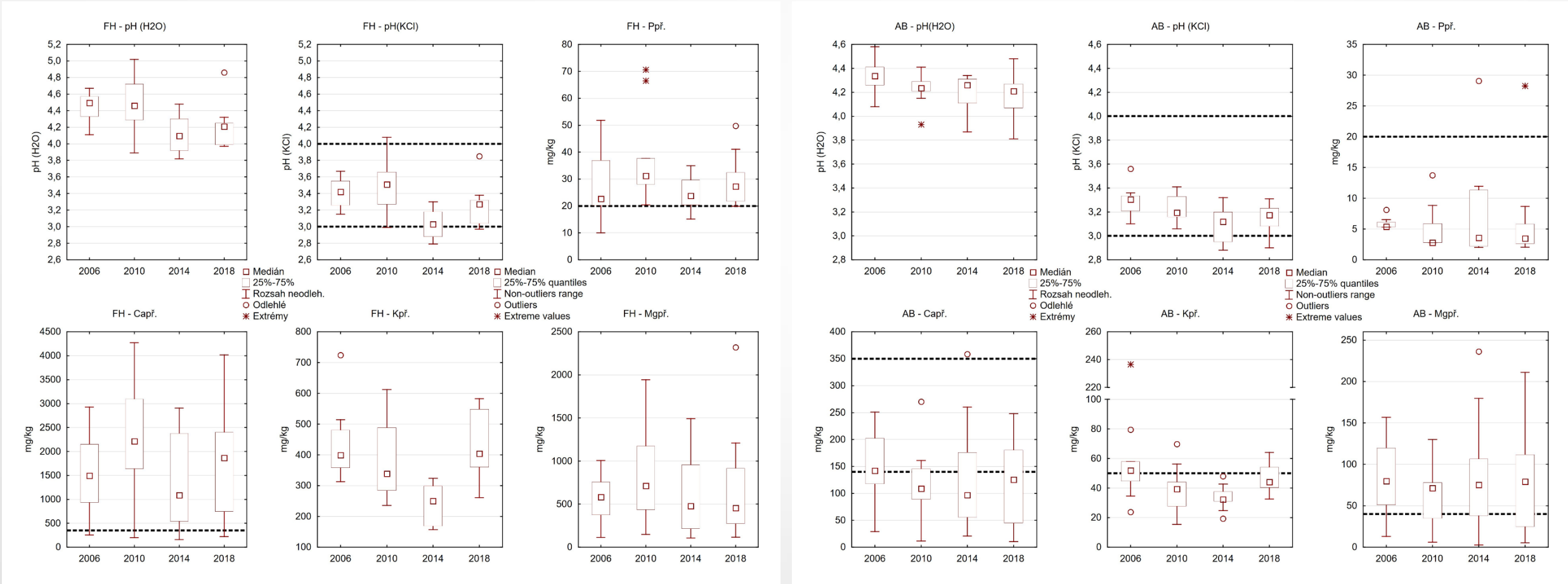
Results: defoliation



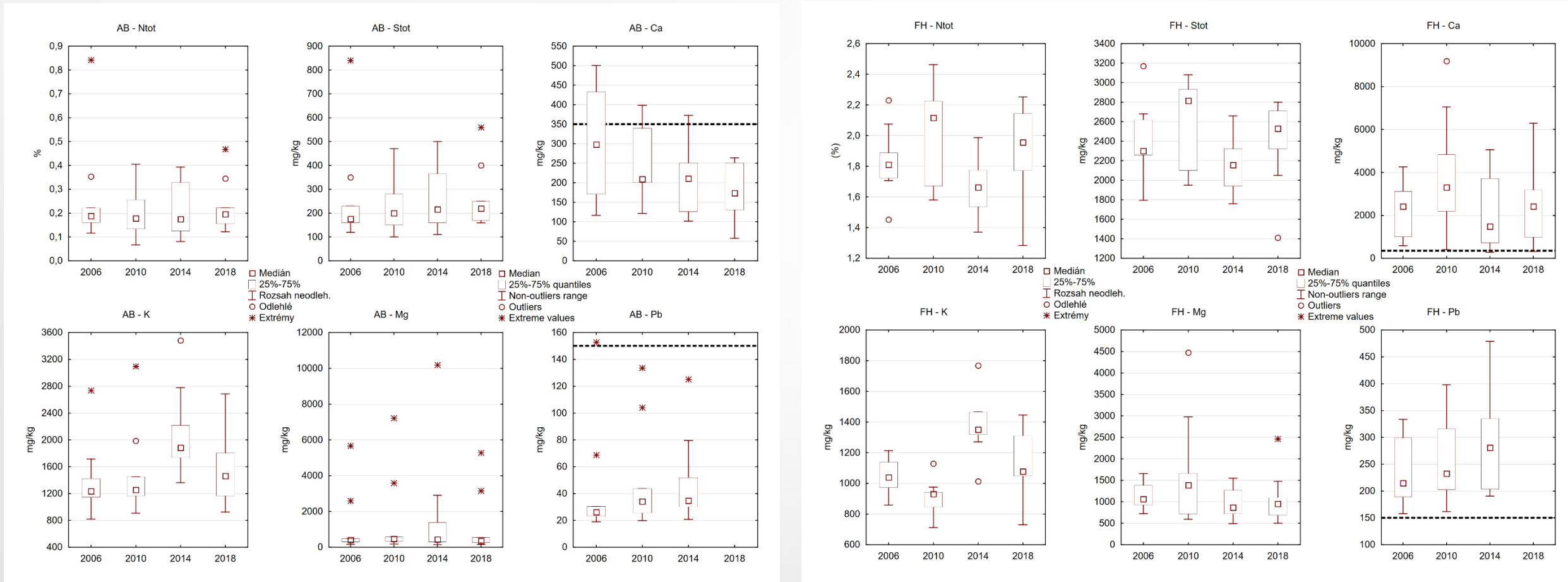
Results: deposition load



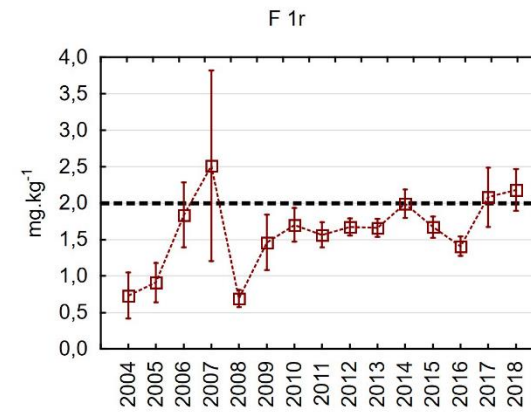
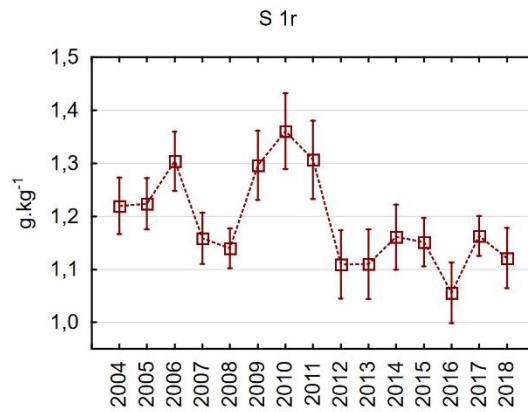
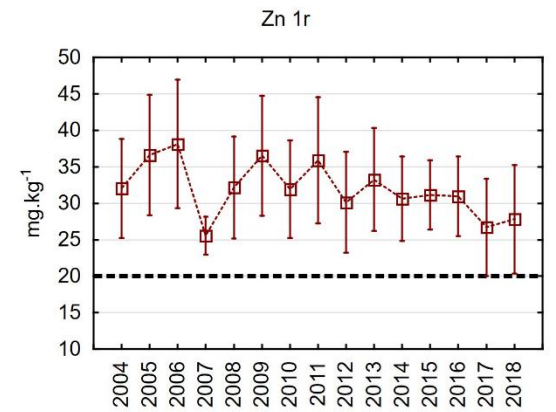
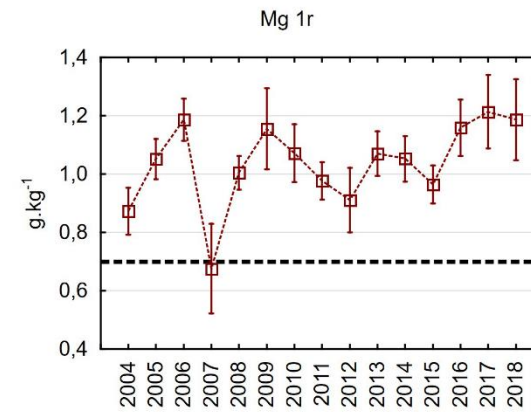
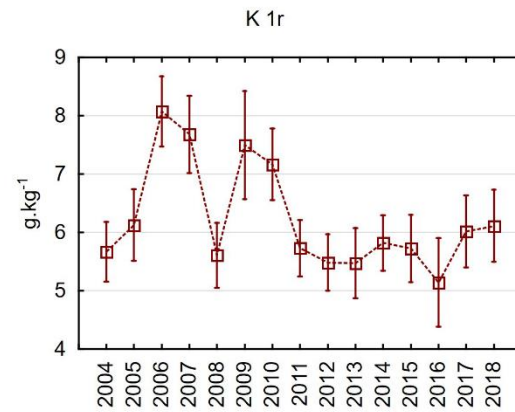
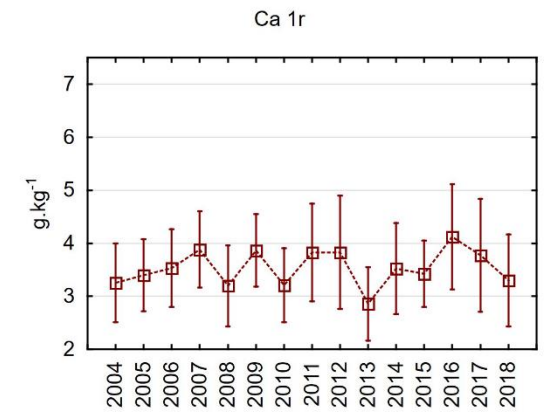
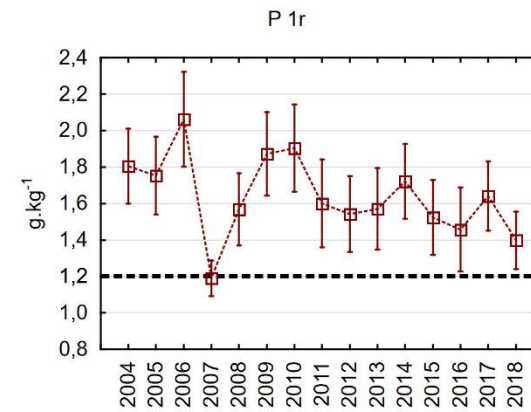
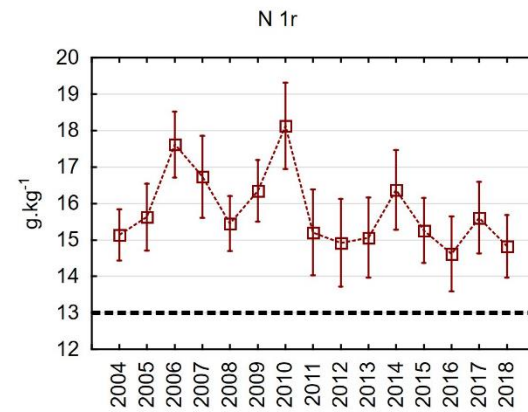
Results: soil chemistry – available nutrients content







Results: soil chemistry – total elements content



Results: current year needles

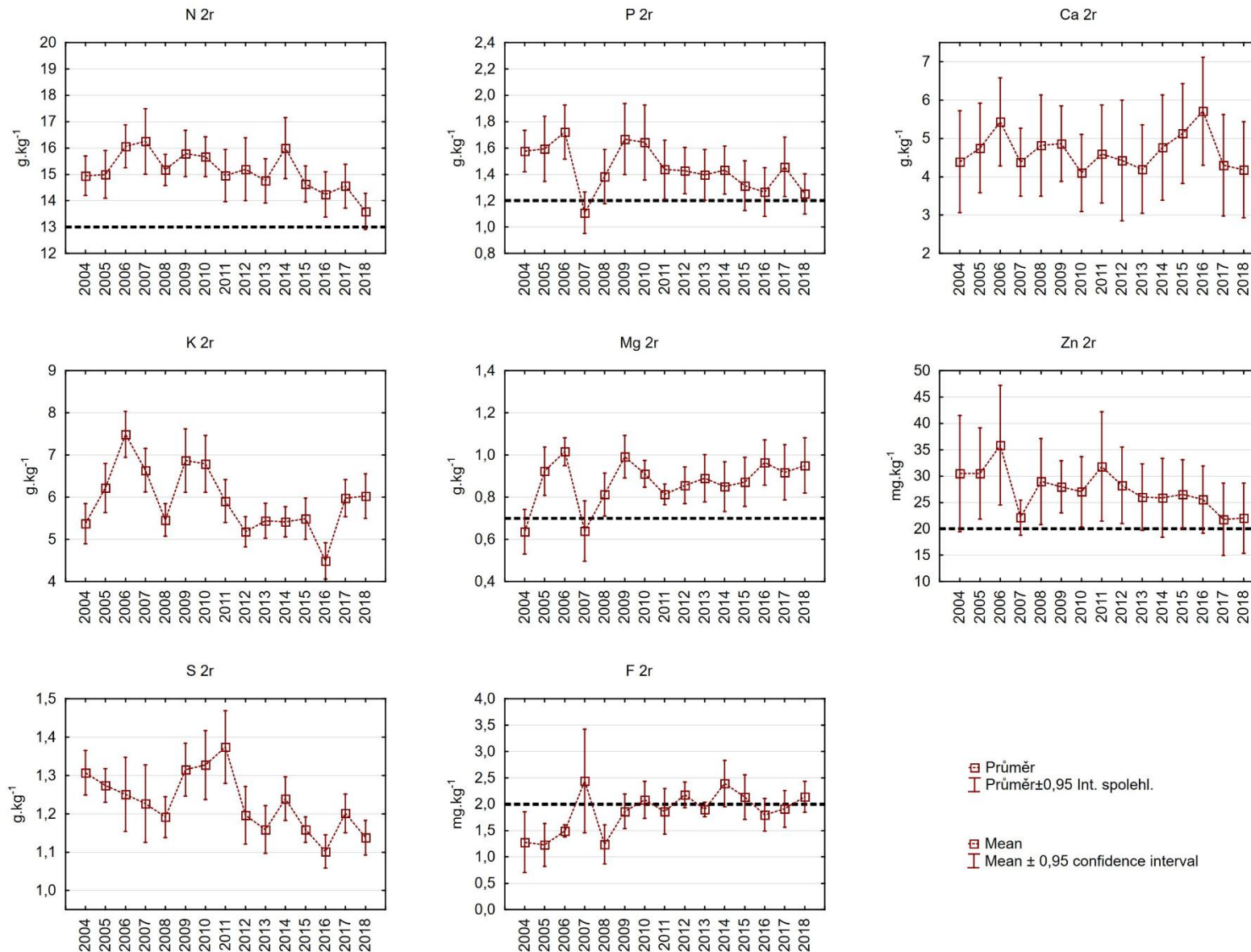


 Průměr
 Průměr±0,95 Int. spoehl.

 Mean
 Mean ± 0,95 confidence interval

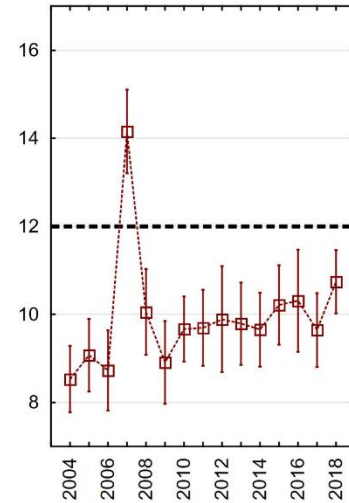


Results: one year old needles

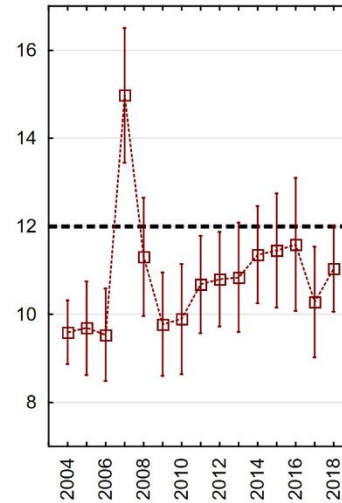


Results: Nitrogen to other nutrients ratio

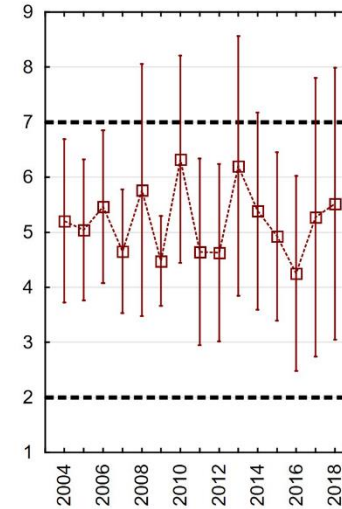
poměr N/P 1r



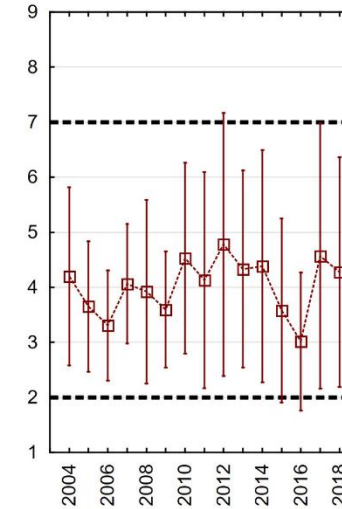
poměr N/P 2r



poměr N/Ca 1r



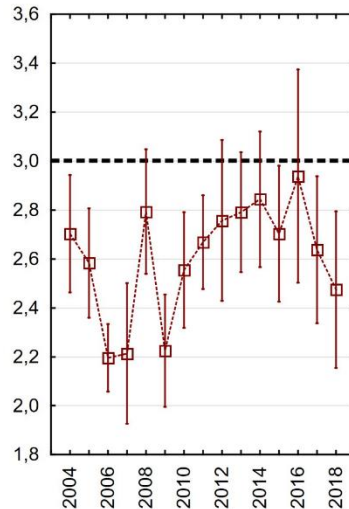
poměr N/Ca 2r



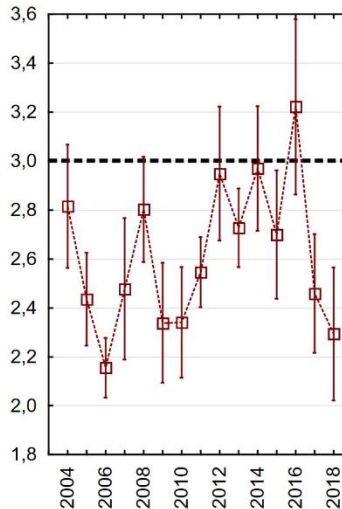
□ Průměr
| Průměr ± 0,95 Int. spolehl.

□ Mean
| Mean ± 0,95 confidence interval

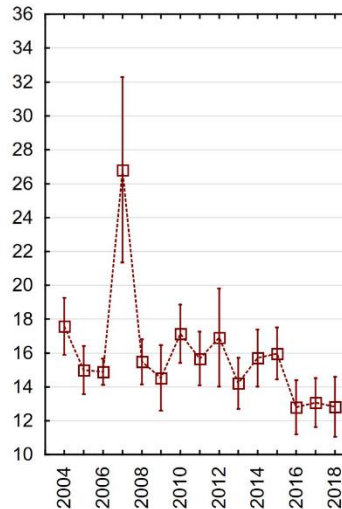
poměr N/K 1r



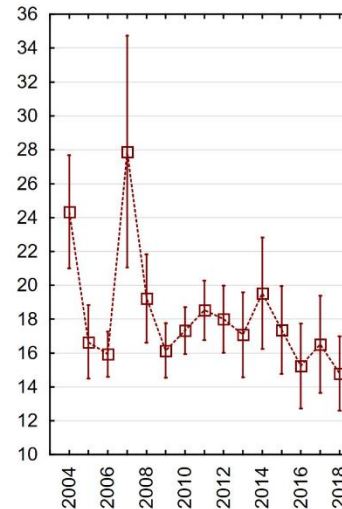
poměr N/K 2r



poměr N/Mg 1r



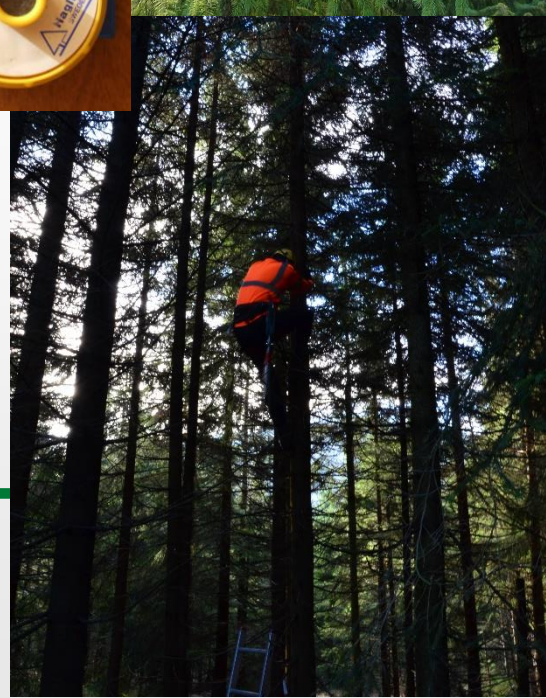
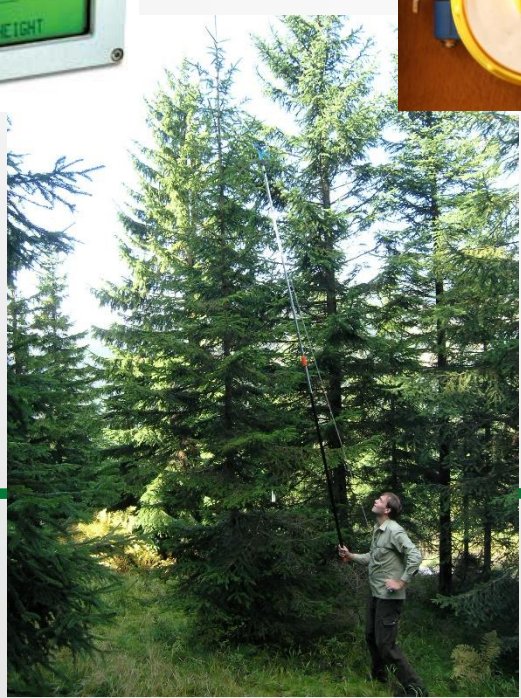
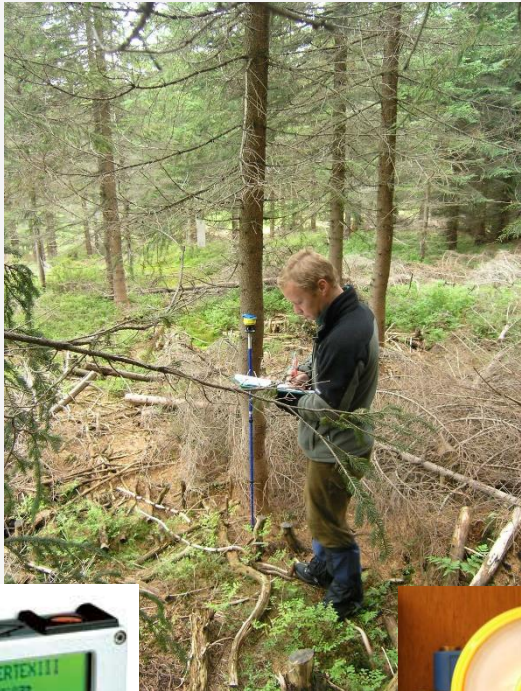
poměr N/Mg 2r



Summary

- Health state, expressed in crown defoliation, has been improving during the last 15 years (from 40 % to less than 20 %).
- High nitrogen deposition is an important factor that influences the vulnerability of forest ecosystem in this region.
- Soil in assessed stands is acidic – exchange pH is usually below 3.5 and values below 3.0 is no exception.
- Availability of phosphorus in soil is being significantly limited.
- The amount of available P, K, Mg, Ca is deficient in the mineral soil.
- Very good supply of nitrogen can affect spruce nutrition and balance between nitrogen and other important elements.
- Phosphorus deficiency has been found on the half of evaluated plots almost every year.





Thank you for your attention!

Source:

www.vulhm.cz

www.icp-forests.net

*Data processing was supported by Ministry of
Agriculture, project No. MZE-RO0118.*



Forestry and Game
Management
Research Institute

Strnady 136
252 02 Jíloviště
www.vulhm.cz