

TRENDS IN TREE NUTRITION WITHIN THE ICP FORESTS LEVEL II PLOTS IN THE CZECH REPUBLIC



Forestry and
Game Management
Research Institute

Radek Novotný – Bohumír Lomský – Vít Šrámek
Czech Republic, www.vulhm.cz



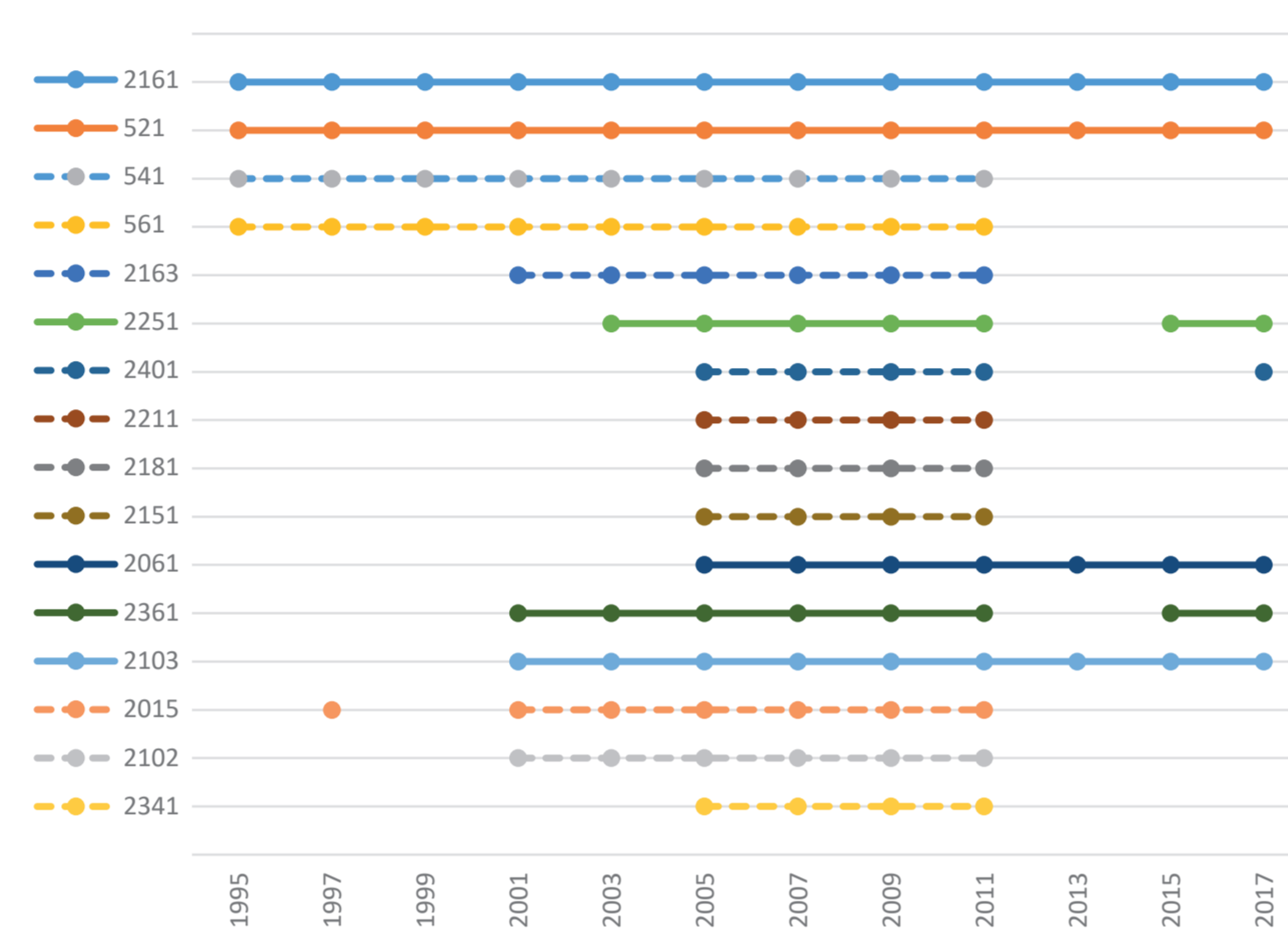
Methods

Leaf analyses are carried out within the long-term investigation in the intensive monitoring plots of ICP Forests network. Taking of the samples of assimilation organs within the level II plots, their preparation and analysis were done in harmony with the Manual ICP Forests Forests (Rautio et al. 2016). Sampling is done in two year interval. In each plot leaf samples are taken by non-destructive way, in the upper third of the crown of five sample trees. Chemical analyses of assimilation organs are done for each tree separately, for conifers separately for the first and second needle-year-class. Following parameters are stated: weight of 100 leaves/1000 needles, amounts of N, S, C, P, Ca, K, Mg, Zn, Mn, Fe, Cu, Pb, Cd, B. Analyses of the samples were done in the FGMRI laboratory. To state the amounts of the basic nutrients and sulphur in assimilation organs of the main tree species, the threshold values as proposed by the EP Leaf Analyses were used, characterizing the level of insufficient and over limit nutrition – see the table 1.

Table 1: list of plots with basic characteristic

plot code	plot name	species	latitude	longitude	elevation
2015	Míšečky	EB	50,735	15,540	940
2161	Želivka	NS	49,675	15,230	440
2061	Benešovice	SP	49,742	12,861	535
2102	Březka	oak	49,902	14,549	435
2103	Všeteč	EB	49,230	14,300	615
2151	Třeboň	SP, NS	49,004	14,816	440
2163	Lásenice	NS, EB, SF, oak	49,028	14,982	595
2181	Provodín	SP	50,639	14,615	270
2211	Jizerka	NS	50,837	15,337	910
2251	Luisino údolí	NS	50,293	16,390	940
2341	Litovel	ash, oak, LT	49,709	17,137	249
2361	Medlovce	EB, oak, SP, EL	49,070	17,279	350
2401	Klepačka	NS, EB	49,454	18,399	650
521	Lazy	NS	50,042	12,625	875
541	Švýčárna	NS	50,103	17,211	1300
561	Nová Brtnice	NS	49,264	15,701	640

EB european beech SP scotch pine LT lime tree
NS norway spruce SF silver fir EL european larch



Picture 1: sampled plots during the time period 1995–2017. Bold - evaluated level 2 plots, dashed - other level 2 plots.

Results

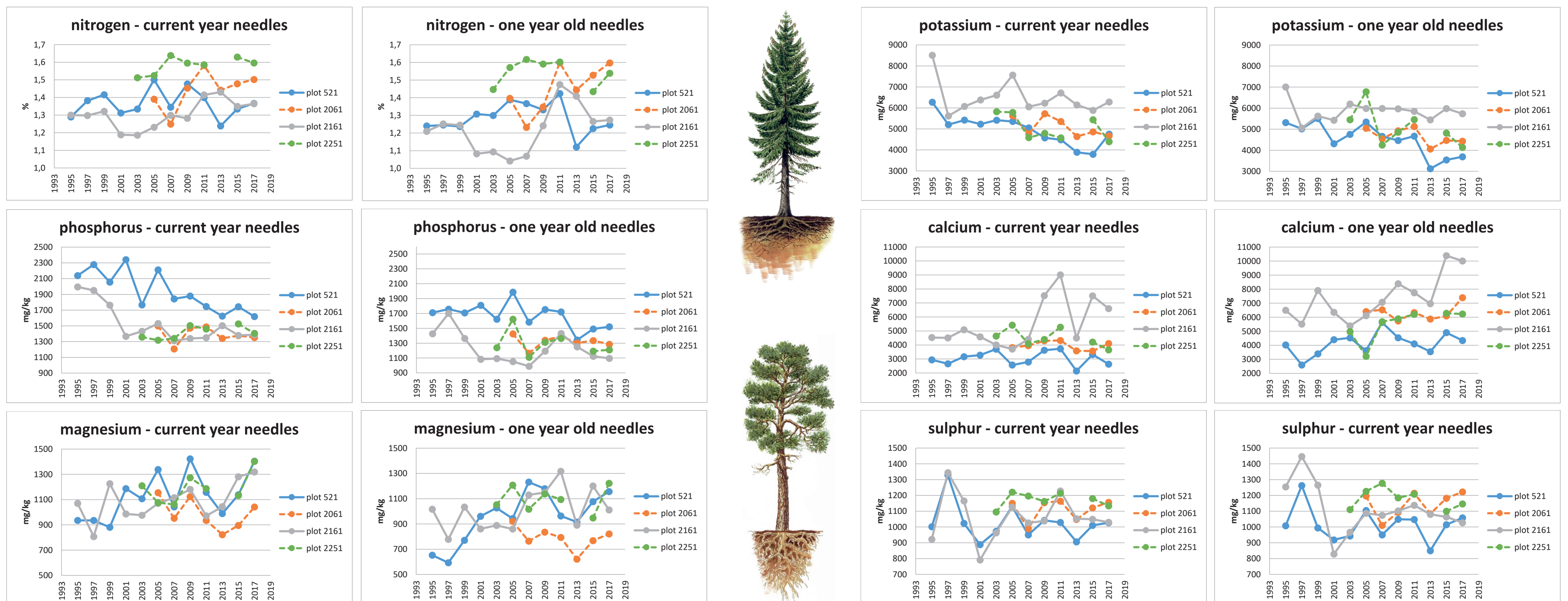
- There is a fluctuation or slight increase of nitrogen concentration and simultaneously slow decrease of phosphorus concentration. This leads into imbalance between these two important nutrients. Ratio between these two elements exceeds often the upper optimum limit 12 points.
- Potassium behaves differently in mountainous areas (> 800 m a. s. l.), where there is a decrease, especially in one year old needles while in lower altitudes is the situation better and concentration of potassium fluctuates or there is slight increase.
- Concentration of magnesium decreased on two sampled broadleaves plots (European beech) as well as on Scots pine plot. The decrease within the beech plots is from 2.3, resp. 1.4 g/kg (2001) to 1.5, resp. 0.9 g/kg (2015). The decrease about 25 % was found on pine plot between years 2005-2015.
- Concentration of sulphur was higher in 90ties, but nowadays there is between 1.0-1.3 g/kg within the coniferous plots and about 1.6 g/kg within the broadleaves plots. It means we can call sulphur as a nutrient instead of load or stress element.
- In general we can conclude, that nutrition level is slightly changing, often we observe imbalance in ratio between nitrogen and other important nutrients, especially between N and P.

Acknowledgements

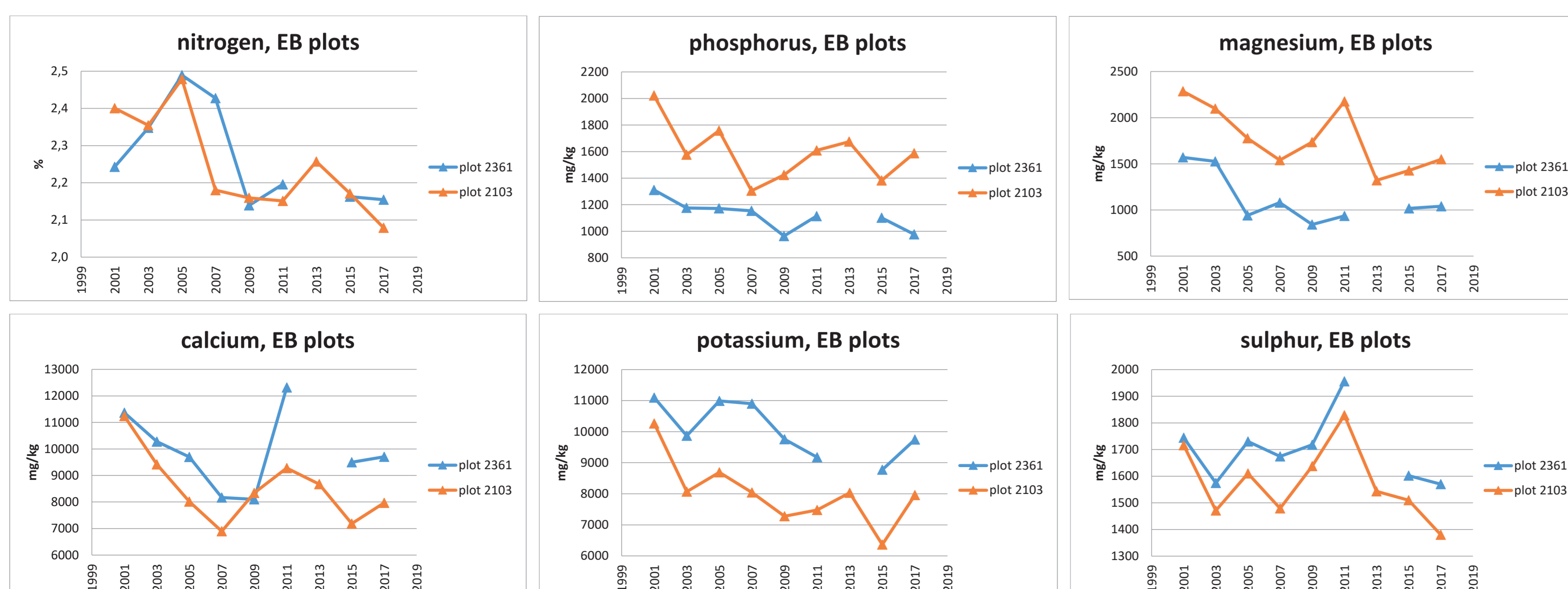
ICP Forests is supported by the Ministry of Agriculture of the Czech Republic. The results were processed within the institutional support Nr. MZE-RO0118.

References

Rautio P, Fürst A, Stefan K, Raitio H, Bartels U, 2016: Part XII: Sampling and Analysis of Needles and Leaves. In: UNECE ICP Forests Programme Co-ordinating Centre (ed.): Manual on methods and criteria for harmonized sampling, assessment, monitoring and analysis of the effects of air pollution on forests. Thünen Institute of Forest Ecosystems, Eberswalde, Germany, 19 p. [http://www.icp-forests.org/Manual.htm]. ISBN: 978-3-86576-162-0.



Picture 2: Nutrient concentration in norway spruce (plots 521, 2161 and 2251) and scotch pine (plot 2061) needles during the period of sampling. For coniferous trees current and one year old needles are sampled.



Picture 3: Nutrient concentration in european beech leaves during the period of sampling.



7th ICP Forests Scientific Conference, 21-23 May 2018
Main Office of Joint Stock Company "Latvia's State Forests" (LVM)
Riga, Latvia