Nitrogen in the hop field soil in a year with lack of precipitation

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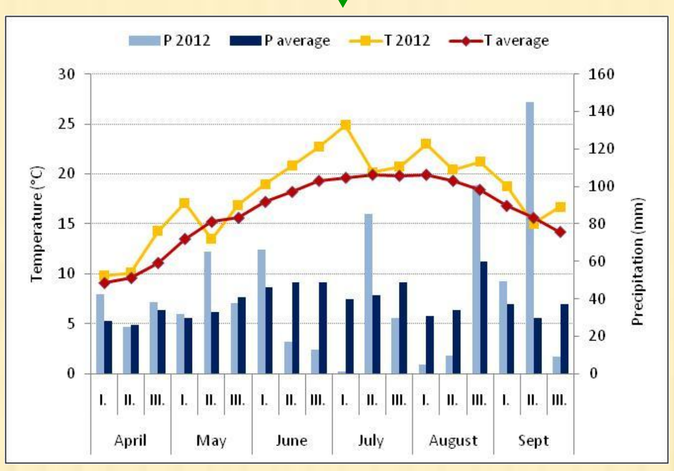
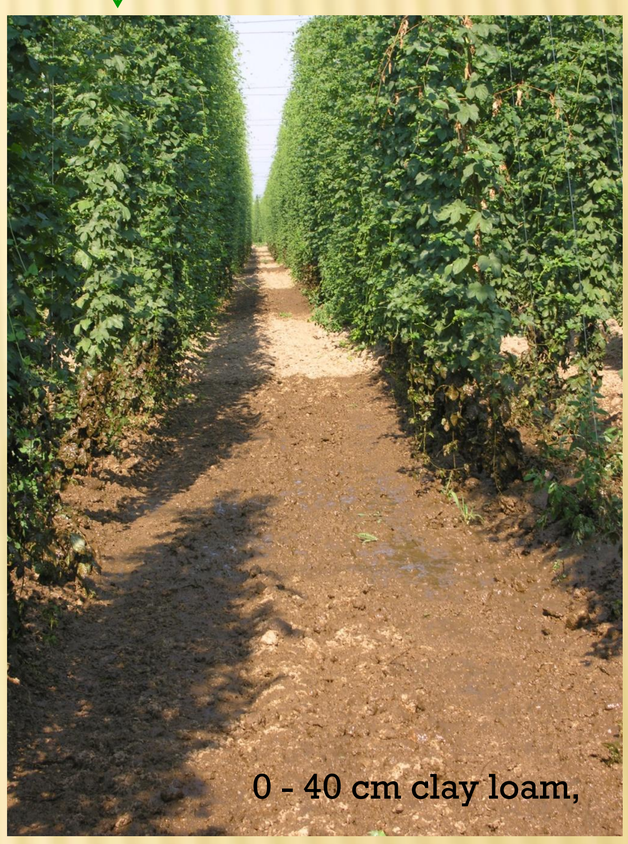
In year 2012 with lack of precipitation which continued from autumn 2011 soil Nmin (NH_4^+- N and NO_3^--N; 0-60) was monitored seven times in the field experiment with hop cultivar Aurora.

In the spring there was no significant difference in Nmin in soil (0-60 cm) among treatments; the quantity was between 78 and 92 kg/ha on 28th April 2012 and 165 to 187 kg/ha Nmin before the second hop side-dress.

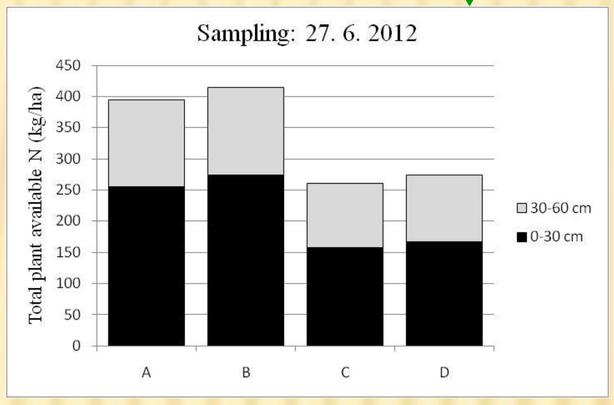


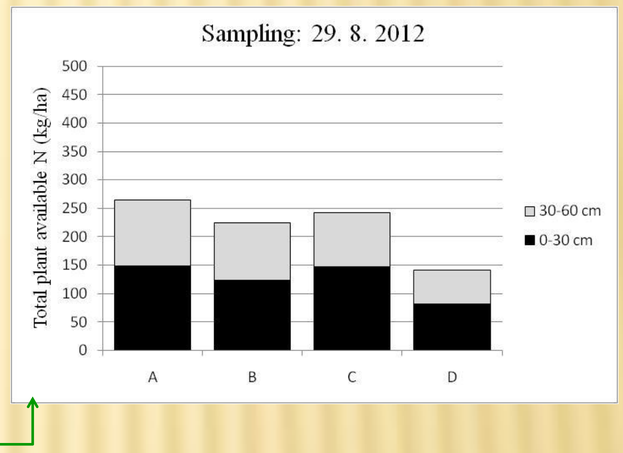
Field experiment was conducted as a block trial in three replications in 2010 and treated the same way in 2011 and 2012, treatments differed in the form of N fertilizer for the second and the third hop side-dresses:

Treatment	1st N side-dressing	2nd N side-dressing	3rd N side-dressing
A	KAN 50 kg/ha N	KAN 70 kg/ha N	KAN 50 kg/ha N
B	KAN 50 kg/ha N	KAN 70 kg/ha N	cattle slurry (26 m^3/ha; 33 kg/ha NH_4^+-N)
C	KAN 50 kg/ha N	cattle slurry (26 m^3/ha; 35 kg/ha NH_4^+-N)	KAN 50 kg/ha N
D	KAN 50 kg/ha N	cattle slurry (26 m^3/ha; 35 kg/ha NH_4^+-N)	cattle slurry (26 m^3/ha; 33 kg/ha NH_4^+-N)


0 - 40 cm clay loam,

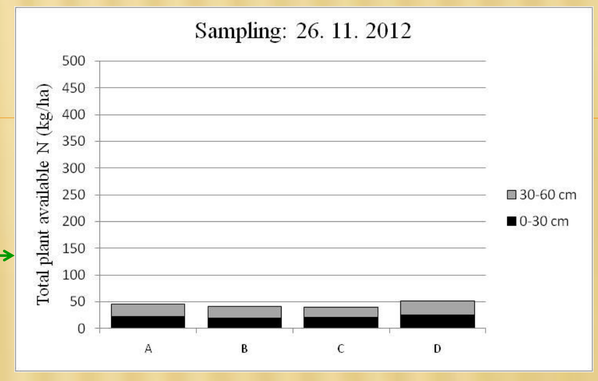
Before the third hop side-dress significantly higher Nmin in soil was at treatments where KAN was used for the second hop side-dress (approximately 400 kg/ha Nmin 0-60 cm) compared to the treatments where cattle slurry was applied (265 kg/ha Nmin). The lack of rainfall probably did not allow KAN to be dissolved and so N was not available to be absorbed by plants; it was only accumulating in soil. On the other hand less N was applied with cattle slurry at the second side-dress compared to KAN (35 kg/ha plant available form applied with cattle slurry) and it was more available to plants because of its water content - so plants were able to absorb some more N compared to the KAN treatment.





High amounts of Nmin in soil were recorded also in mid summer (6th August) and after harvest, the differences among treatments in soil Nmin continued to be present. After harvest there was as much as 264 kg/ha Nmin in the soil (0-60 cm); significantly lower at treatment where cattle slurry was used for the second and the third hop side-dresses (142 kg/ha), and from 224 to 264 kg/ha at the other investigated treatments.

Unfortunately Nmin did not stay in the soil until the next hop season but it was leached away from the upper 60 cm layer of the soil; after very rainy autumn (209 mm in September) we detected on 29th November less than 50 kg/ha Nmin in soil (0-60 cm) at all treatments.



Nmin analyses are urgent in such extreme years to get familiar with the quantity of plant available N already present in soil before deciding about the next hop side-dress - when there is still time to act and avoid such situations, which lead to environmental burdening and reflect also money wasted on fertilizers and bad management.

Acknowledgement
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