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N USE EFFICIENCY OF CURRENT SUGAR BEET CULTIVARS IN NORTHWESTERN EUROPE

**Efficiencie d'utilisation de l'azote sur trois variétés actuelles de betteraves
sucrières en Europe du nord-ouest / Nutzungseffizienz von Stickstoff aktueller
Zuckerrübensorten in Nordwesteuropa**

ABSTRACT

For cereals and rape, potential differences in nitrogen use efficiency (NUE) between cultivars have been studied in the recent past. For sugar beet, however, cultivar effects on NUE have been rarely investigated. Thus, we set up a series of trials to test the hypothesis that NUE differs between current sugar beet cultivars differing in taproot saccharose and amino nitrogen content. The data were also applied to elucidate potential cultivar differences in the optimum N fertilizer dose, which might be related to the absolute sugar yield level.

Field trials were conducted in 2010 and 2011 near Sofiehøj (Lolland, DK; Cambisol), Lelystad (Flevo-land polder, NL; Fluvisol) and Göttingen (Southern Lower Saxony, GER; Luvisol). The four cultivars included varied from very low to high sugar content, the N fertilizer supply was 0-200 kg N ha⁻¹. At October/November harvest, dry matter yield of tops (leaves+beet crown) and clean beet (taproot) was established. Quality parameters of the taproot and the N content of the top and taproot dry matter (dm) were analyzed (2 varieties only). Saccharose (SY), taproot dm yield, and NUE were higher for genotypes with high compared to low sugar content (fodder beet, dm type). The N uptake of the total plant (NUpTP) required for maximum SY varied between 200 and 300 kg N ha⁻¹, with values > 250 kg N ha⁻¹ occurring in environments with high soil N mineralization. Sugar beet tended to have a higher NUpTP at maximum SY compared to fodder beet. There was no correlation between yield level and NUpTP at maximum SY. The optimum N fertilizer dose was in the range of 130-190 kg N ha⁻¹ due to environmental effects, while varietal effects were much smaller. However, the data gave some evidence that sugar beet genotypes might differ in the optimum N fertilizer dose.

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