

# Impact of variety and N application on quality of sugar beet used as biogas substrate

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## Introduction

In comparison to other crops sugar beets gain a high fresh and dry matter yield. There is some evidence that the high amount of easily fermentable substances positively affects the fermentation process. Furthermore, harvesting the whole plant with beet and leaves would increase the yield. This study aimed at analysing the impact of beet quality on biogas yield. It furthermore attempted to clarify whether the biogas yield can be estimated with the content of the crude nutrients.



## Material and Methods

- Field trials in 2009 near Göttingen and near Regensburg
- 4 varieties (different sugar and amino-N content)
- 3 N application rates (0, 150, 300 kg N ha<sup>-1</sup>)
- Feed stuff analysis of beet and leaves
- Fermentation of beet and leaves (21 days, 35 °C)
- Calculation of the theoretical biogas yield after Baserga (1998) with the results of the feed stuff analysis



## Results

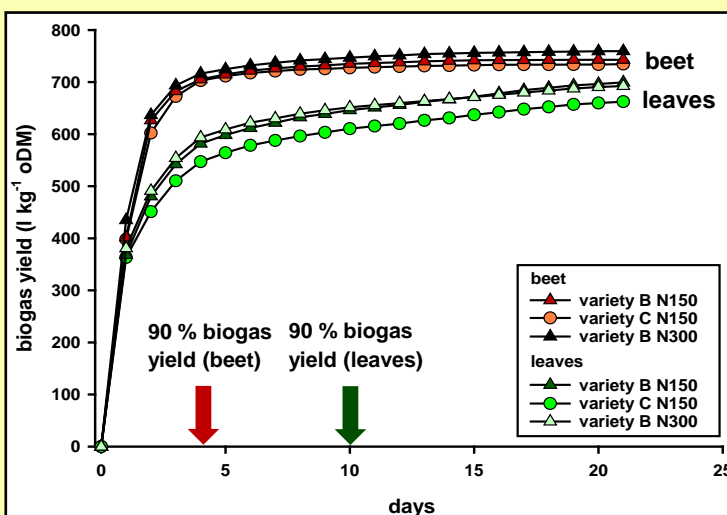
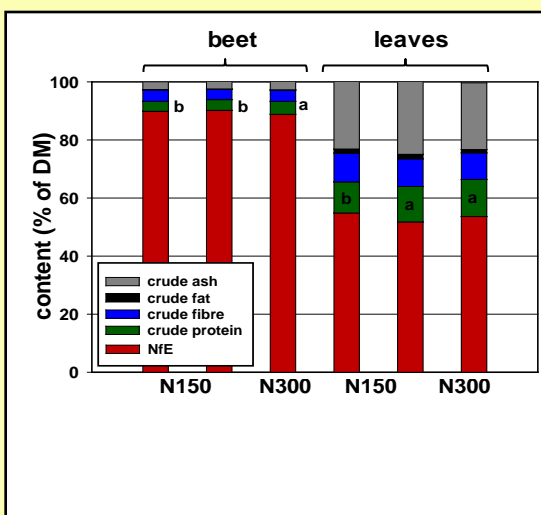


Fig. 1: Content of crude nutrients of beet and leaves of 2 sugar beet varieties and different N application rates. Mean of 2 sites (Göttingen, Regensburg), November 2009. Different letters indicate significant differences at  $p < 0.05$ .

Fig. 2: Cumulated biogas formation of beet and leaves of 2 sugar beet varieties and different N application rates. Mean of 2 sites (Göttingen, Regensburg), November 2009.

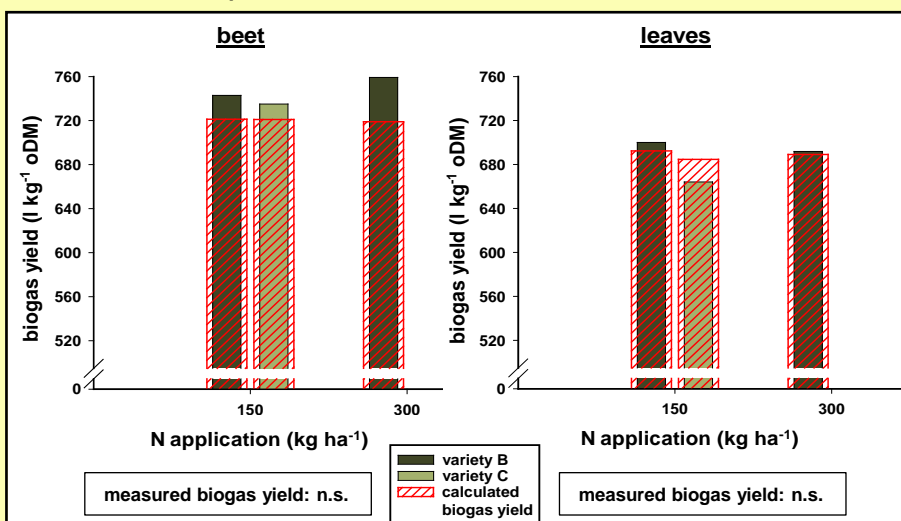


Fig. 3: Specific biogas yield of beet and leaves of 2 sugar beet varieties and different N application rates and calculated yield after Baserga (1998). Mean of 2 sites (Göttingen, Regensburg), November 2009.

## Conclusions

- Large differences in the composition of beet and leaves (esp. NfE, crude ash), but only few differences between varieties and N application rates
- Rapid biogas production within the first days; 90 % within 4 days (beet) and 10 days (leaves)
- Specific biogas yield of beets: 740 l kg<sup>-1</sup> organic DM, biogas yield of leaves: 665 - 700 l kg<sup>-1</sup> organic DM
- No significant effect of variety and N application rate on the specific biogas yield
- Biogas yield can be estimated with 95 % accuracy from the content of crude nutrients