UAV Based Nitrogen Management of Maize in China

Yang Zhang [1], Zichong Wang[2], Klaus Spohrer[3], Xiongkui He[4], Joachim Müller[5]

[1] *University of Hohenheim, Agrartechnik in den Tropen and Subtropen, Germany*
[2] *University of Hohenheim, Agrartechnik in den Tropen and Subtropen, Germany*
[3] *University of Hohenheim, Inst. of Agricultural Engineering, Tropics and Subtropics Group, Germany*
[4] *China Agricultural University, College of Science, China*
[5] *University of Hohenheim, Institute of Agricultural Engineering, Tropics and Subtropics Group (440e), Germany*

Abstract

Nitrogen is the main fertiliser of maize in China. However, misuse of nitrogen fertiliser is widespread. To ensure optimal fertilisation and high crop yields as well as to reduce environmental pollution, precise fertiliser application of nitrogen should be implemented. UAV based spectral remote sensing of plant nitrogen status is fast and non-destructive and thus a good method to monitor possible stress in maize with respect to nitrogen fertilisation. After getting the spectral information of the plant canopy, it is important to decide whether the plants are stressed or not. However, most researchers focus on the accurate nitrogen detection of the plants by analysing different vegetation indices (VIs). Since the recommended amount of nitrogen fertiliser for plants is not unique but within a certain range, there are large individual differences in crop growth. There is still not enough research about optimal fertilisation in practice.

In this research, we adopted a different point of view: We do not focus on absolute nitrogen content in leaves but on spatial spectral differences in the field, which are caused by spatially different nitrogen supply. Based on this, areas of nitrogen demand c be identified. In addition to this, focus is also on the vegetative growth stage, which is sensitive to fertiliser deficiency and important for biomass production and yield. Therefore, different nitrogen fertilisation treatments for maize will be conducted. Spectral images will be captured during the plants' vegetative growth stages and compared with nitrogen content in leaves as well as LAI and plant height. The results are expected to provide basic spectral differences between different plant nitrogen status. Based on this it will be tried to give recommendations for additional spatiotemporal nitrogen fertilisation.

Keywords: Maize, nitrogen fertilisation, spectral remote sensing, uAV

Contact Address: Yang Zhang , University of Hohenheim, Agrartechnik in den Tropen and Subtropen, Stuttgart, Germany, e-mail: yang.zhang@uni-hohenheim.de