Introduction

Rapid urban growth constantly changes the conditions for crop production and exerts increasing pressure on farmers to adapt the cropping systems to the altered situation. C01 employs terrestrial and remote sensing to better understand the dynamics of crop production in the process of urbanisation and to gain insight into the effects of growing cities on the structure, management intensity, and crop species diversity of cropping systems.

Research questions

• What is the potential of in situ sensor measurements for crop discrimination and the prediction of biomass and quality of crops grown at the plot scale?
• How much reduction in accuracy occurs during upscaling of plot scale spectral libraries to the field level represented by spaceborne multispectral imagery (SMI) and what potential provides LiDAR?
• How reliable is the assessment of crop management intensity based on SMI using spectral libraries with N fertilizer rate and irrigation level as classifiers?
• How do spatial patterns of crop structural and functional parameter change over time along the investigated transects?

Work plan

Methodology

Fig. 1: Work-flow diagram of the project.

Fig. 2: Measurement periods of proposed sensor types allocated to investigation objects of different spatial relevance.

Fig. 3: Exemplary data generated by the proposed sensor types.

Expected results and contribution to the framework

• Discrimination of crop species and management intensity.
• Calibration of bio-physical and bio-chemical crop parameters.
• Patterns of crop production in the on-farm fields.
• Spatio-temporally explicit data on crop production for the analysis of land use, ecosystem services, and socio-economic components in agricultural transformation processes.

Collaborations

Within FOR2432: A01 to A03, B01, B02, C02, C03.

Indian partner project: Integrating air- and spaceborne spectroscopy and laser scanning to assess structural and functional characteristics of crops and field margin vegetation (R.R. Nidamanuri, S. Nautiyal).