Variable Rate Technologies – Costs and Benefits of Increasing Information Accuracy

Karin Späti[1], Robert Huber[1], Robert Finger[1]

[1]Agricultural Economics and Policy Group, ETH Zurich

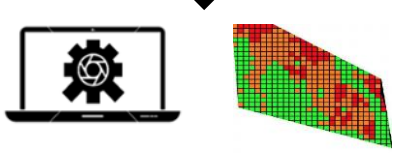
Tailoring nitrogen application to crop needs using variable rate technologies (VRTs) is expected to increase the efficiency of nitrogen fertilization and reduce nitrogen losses from agriculture. We develop a modelling framework to assess, under which conditions VRTs may be adopted in small-scale agricultural settings and what the benefits and costs of different approaches towards VRT are. Our work is especially related to Sustainable Development Goal 2, which aims to promote sustainable agriculture and goal 12, which which focuses on ensuring sustainable production patterns.

Introduction

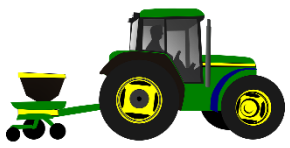
The site-specific application of nitrogen involves the following steps:

Data collection

Processing of the collected data



Site-specific nitrogen application

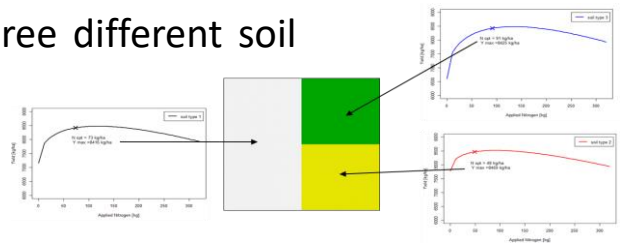


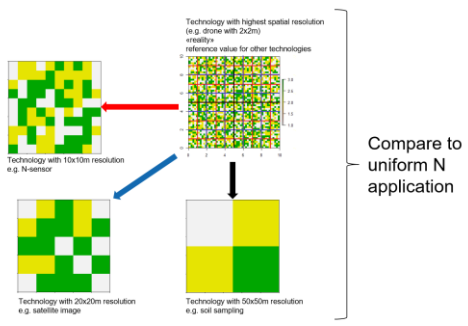
Recent technological developments increase the range of cost-efficient technologies to be used for crop sensing (e.g. drones and satellites)

→ Is it worth to use more accurate technologies?

Method

- Assuming three different soil types:





- Yields are calculated for every parcel individually

Results and Discussion

The first results show only small differences in yield, applied amount of nitrogen and profits.

But it is also important to consider the other positive effects of site specific N application like:

- Higher grain quality
- Reduction in nitrous oxide emissions and nitrogen leaching
- Social impacts like the reduction in workload and administrative burden