Abstract voor keynote:

Agricultural systems need accurate assessments of nutrients in soil, manure and plant material

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Abstract

Efficient agriculture is key to combine targets for food production, environment, greenhouse gas emissions and biodiversity. One of the options to address these targets is circular agriculture, (re-)utilizing biomass and nutrients with highest possible utility. This requires that flows of biomass in the system need to be transparent, but also that farming systems use waste streams effectively with a minimum of nutrient losses to the environment. Reduction of yield gaps, the difference between potential yields under irrigation or rainfed conditions and actual yields on farms, in developing areas is important to minimize effective land use for food production. The lack of nutrients are the main reason for low yield levels in e.g. smallholder farming systems, while sub-optimal agronomic practices including oversupply or the imbalanced amounts of macro- and micronutrients cause low input use efficiencies.

In contrast, the excess input of nutrients in animal-dense farming systems in the European Union resulted in large losses to the environment. This aspect may be addressed in circular systems, with larger proportions of fertilizers from organic sources with suboptimal nutrient composition. However, maintaining high yield levels using precision agriculture and the 4R principles is challenging when inputs have variable composition and nutrient release patterns. This requiring insight in composition and flows of biomass, but also mineralization in the soil and release of nutrients from these organic fertilizers. A circular farming system with relatively small yield gaps requires therefore a combination of accurate soil-, plant- and manure analysis combined with an array of sensing tools to manage biomass flows and spatial and temporal variability in the field. In this keynote, an overview will be given of yield gap analysis and some newly developed concepts of circular agriculture and the need to better quantify and monitor flows of biomass and nutrients in the system.