

# Sustainable intensification for future crop production

Til Feike

Julius Kühn Institute, Institute for Strategies and Technology Assessment, Kleinmachnow

E-mail of corresponding author: [til.feike@julius-kuehn.de](mailto:til.feike@julius-kuehn.de)

Current crop production faces multiple challenges. The ever-growing world population along with dietary shifts in large parts of the world are expected to lead to a doubling of world calorie demand by mid-century. At the same time, arable land and freshwater resources for irrigated production are continuously declining. In addition, global climate change leads to an increasing frequency and extent of extreme weather events with negative impact on productivity and yield stability. In European crop production, yield plateaus are recognized for major crops in recent years. Furthermore, farmers find themselves in the dilemma between low producer prices and high societal demands regarding product quality and environmental protection.

In view of the above sustainable intensification of crop production constitutes a promising approach to overcome the described challenges. However, the key question remains how to increase the efficiency of crop production to produce more with less input and reduced environmental impact?

The presentation highlights different research approaches and technological innovations that support sustainable intensification for future crop production.

A key message is that the assessment and understanding of the status quo of farmers' current crop production is crucial to develop viable adaptation options that can successfully be applied in practice in the future.

Accordingly, it is inevitable to evaluate the (historic) impact of climate change on crop production and understand cause-effect relationships to be able to develop promising climate change adaptation strategies.

Finally, potentials and challenges of agriculture 4.0 for sustainable intensification are introduced and discussed. Vast developments in digitalization, sensor technology, remote sensing, robotics, and computer science occurred in recent years. These technological innovations create novel opportunities in cropping systems design. Furthermore, the easy, affordable and fast generation of in-field data of high spatio-temporal resolution generates a great basis for improving the precision of crop management measures. However, to derive meaningful decision support for farmers from such data is still the largest challenge for researchers and commercial actors.