New plant production systems with autonomous agricultural machinery

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Over the last centuries, production systems in arable farming have been adopted constantly to changing demands, like the world´s increasing population, advancements in genetics or breeding and also to steadily improving technological possibilities. This development is driven by the aim to produce food and feed in the most efficient way and to optimize the relation between input and yield.

Processes have been optimized and as a consequence machinery has become more productive which also increased their weight and size in general. Furthermore, improved technologies like assistance and automation systems contributed their part in increasing the productivity. Simultaneously, structural change in agriculture is a main driver for the demand of larger machinery. Nevertheless, modern conditions raise the question of whether today's ways of cultivation are still the ones to be followed in the long term view. The potential of autonomous machinery to change farming processes is shown by highly diverse ideas, approaches and solutions from industry and academia.

The aim of this project is to re-think the ways in which plants are cultivated nowadays and consequently build scenarios on how plant production could be using the chances of autonomous machinery in future.

In order to achieve this aim, today's plant production systems are analysed under consideration of agronomic, economic and technological factors aiming to identify favourable paths for the introduction of autonomous machinery into newly created cultivation systems. Based on the evaluation results, scenarios of production systems will be developed for two kinds of machinery. In a first scenario, the future machines will be about the same size as today's but completely autonomous. The second scenario is about small machines known as autonomous field robots. In a third scenario the combination of both is evaluated.

The final result of the project will not be a single precise scenario on how to include autonomous machines into new plant production systems. Instead, the aim of project is to point up the most favorable path for the utilization of autonomous agricultural machinery by showing the connection between plant production, technology and farm economics. Further needs for research and development for an economic and sustainable new plant production system will be identified.