Spot Farming – a new approach for a small-scale and sustainable plant production

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The climate change poses a challenge to agriculture: Changes in the annual temperature- and rainfall distribution, heat waves, and heavy precipitation events already have noticeable impacts. Furthermore, a constantly growing world population asks for a save food supply with a simultaneous social demand for a climate-friendly and sustainable agriculture, as well as the conservation of biodiversity. These challenges demand for an adoption of agricultural systems to accommodate for these changes.

One solution to deal with these challenges could be the Spot Farming approach, which is intensely investigated in the project „futurelab agriculture." In Spot Farming, the often heterogeneous field will be divided into several homogeneous fields ("spots"), based on their characteristics, e.g. soil properties, topography or risk of erosion. In these spots different crop rotations will be cultivated, adjusted to the location's characteristics. Alternative cropping systems will be applied, integrating variations in row distances and sowing pattern to optimally fulfil the plants' specific requirements. Additionally, ecological structural elements like flowering fields will be integrated on poorer spots to improve and conserve biological diversity. Because the generated spots will be small-scale, a management with modern, large-size agricultural technology will not be possible anymore. The integration of small autonomous field robots will provide new possibilities for a small-scale and site-adjusted management.

For some exemplary areas, located in different regions throughout Lower Saxony, Spot Farming management is in planning. Based on geodata, the spots are categorized into homogeneous zones. Different scenarios on varying data basis are being evaluated. The goal is to quantify the demands based on the input data in terms of abundance, resolution, and scaling: Which data is essential and which data can serve as additional information under preservation of practicability?

Furthermore, a theoretical Spot Farming cultivation is planned for the exemplary areas based on literature research, integrating alternative cropping systems, in which different crop rotations will be cultivated in the spots, adapted to the local soil properties and the incident radiation, depending on the area exposure. For erosion protection, permanent crops with soil cover will be grown in areas at risk. Moreover, ecological structural elements will be added to increase the biological diversity.

The Spot Farming approach will be a future tool to deal with the challenges of the climate change and a concept for more sustainable, resource-friendly, and small-scale agriculture.