

INSUSFAR: Quantifying the agronomical and ecological performance of innovative wheat genotypes

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Objectives

Within the scope of INSUSFAR (INnovative approaches to optimize genetic diversity for SUSTainable FARming systems of the future), diverse wheat populations of different origin and degrees of diversity will be tested. In order to better meet demands of a changing climate and low-input strategies, these new genotypes will have to exhibit features that give them an advantage over already established varieties when dealing with adverse site conditions such as insufficient N inputs, water scarcity or soil compactions, as well as in reduced tillage farming systems.

In the INSUSFAR project, it is our goal to quantify the new genotypes' and populations' yield performance and ability to respond to adverse site conditions in comparison with traditional line varieties. This will be achieved by on-farm field experiments with farms representing a range of low to high input systems. In addition, new criteria for the assessment of their ecological sustainability will be established. Based on these results, scenario modeling of their integration into on-farm operations will allow an assessment of their ecological sustainability.

Material and Methods

To this end, on-farm experiments will be conducted on at least 8 German farms with different site conditions and input strategies. On each of the farms a plot with large spatial heterogeneity, a new composite cross population and a reference line variety will be cultivated. Utilizing portable spectroscopy and GPS equipment, non-destructive measurements of yield development and soil sampling will conclude in a site-specific map of the varieties' responsiveness to site heterogeneity. Ecological sustainability will be assessed using REPRO software, mapping the whole production process with all inputs and outputs and utilizing innovative indicators for the system's ecological performance.

Work Progress

As of January 2016, three preliminary experiments employing different experimental designs have been established on TUM experimental sites. After calibration of measurement equipment, spectroscopy measurements will start with the beginning of the plant growth period. Based on these results, one experimental design will be selected and applied to on-farm experiments starting in September 2016.