



On-farm research in Western Siberia: Potential of adapted management practices for sustainable intensification of crop production systems

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Western Siberia is of global significance in terms of agricultural production, carbon sequestration and biodiversity preservation. Abandonment of arable land and changes in the use of permanent grasslands were triggered by the dissolution of the Soviet Union in and the following collapse of the state farm system. The peatlands, forests and steppe soils of Western Siberia are one of the most important carbon sinks worldwide. These carbon stocks are, if deteriorated, an important source of radiative forcing even in comparison to anthropogenic emissions. This situation is aggravated by recent and future developments in agricultural land use in the southern part of Western Siberia, in particular in Tyumen province. The increase of drought risk caused by climate change will led to more challenges in these water-limited agricultural production systems.

The German-Russian interdisciplinary research project “SASCHA” aims to provide sustainable land management practices to cope with these far-reaching changes for Tyumen province. In particular, on farm scale agricultural strategies are being developed for increased efficiencies in crop production systems. Therefore a 3-factorial field trial with different tillage and seeding operations was installed with spring wheat on 10 ha under practical conditions in 2013. Within all combinations of tillage (no-till/conventional), seed rate (usual/reduced) and seed depth (usual/shallower) various soil parameters as well as plant development and yield components were intensively monitored during the growing seasons.

Results after 2-years show significant impacts of the tillage operation on soil moisture and soil temperature. Also a higher trend in nitrogen mineralization could be observed without tillage. Plant development in terms of phenological growth stages took place simultaneously in all variants. Under no-till regime we measured slightly higher grain yields and significant advantages in protein yields.

In conjunction with progressing climate change there seems to be high potential for enhanced production efficiency by no-till systems for the study region in Western Siberia. This way of sustainable intensification of agricultural production will also preserve carbon stocks and biodiversity as there is no need for expanding cropland area into currently natural ecosystems.