

WINTERWHEAT - INCREASED EROSION DURING WINTER PERIOD IN NORWAY

Lillian Øygarden , Heidi Grønsten, Rut Skjevdal .

Bioforsk-Norwegian Institute for Agricultural and Environmental Research. Soil and Environment Division. Email: Lillian.oygarden@bioforsk.no,

In Norway the area used for winter wheat production is increasing, in some areas up to 50 % of the cereal area. Most erosion during Nordic climatic conditions occur during late autumn and especially during snowmelt period. Farmers get subsidies for leaving their soil in stubble during autumn and winter period and the subsidies are graded after erosion risk of the areas. Many farmers are interested in growing winter wheat to get a plant cover as soil protection during winter period. Winter wheat gives higher yield and is therefore economic beneficial for farmers.

In a project (2002 - 2007) the purpose was to study effects of different soil tillage methods for winter wheat on soil erosion. Direct drilling, autumn harrowing, autumn ploughing and spring tillage was compared. Two sites in south eastern Norway were chosen for plot studies. In each site 4 plots (8 m * 22 m) with 2 replicates were established. A monitoring station by the end of each plot collected surface runoff and was instrumented for water sampling. Sampling was event based, after each rainfall event or daily during snowmelt. The Hellerud site had clay soil influenced by land levelling. This soil has a higher erosion risk than the other site Øsaker also representing marine sediments (silty clay loam) but lesser influenced by land levelling.

Weather conditions varied between years resulting in very different runoff and erosion conditions. The two first years of the study there were very few runoff events during the autumn period and consequently the soil losses were small. In the third year however, intensive rainfall (105 mm) occurred shortly after tillage and sowing. Concentrations of suspended solids in runoff from plots varied from 5 mg/l with direct drilling, 1110 mg/l with autumn harrowing and 5820 mg/l with autumn ploughing for the Øsaker site. The same event for the Hellerud site gave concentrations in runoff from 235 mg/ l for direct drilling, 824 mg/l for autumn harrowing and 1900 mg /l for autumn ploughing to winter wheat. Light autumn harrowing reduced soil loss with 66% (silt loam) and 79% (clay) compared to traditionally ploughed winter cereals. Direct drilling or no-till reduced soil loss with 88%. Erosion was even higher from autumn tilled winterwheat than for autumn tilled spring cereals. Scenarios for climate change indicates more rainfall during autumn period and this can lead to higher risk of soil erosion in winter wheat areas. Based on research results the regulations and environmental subsidies have been changes. E.g in the County of Østfold: Farmers who choose winter wheat will only receive economic support if they locate winter wheat to areas with low erosion risk and in addition have control with surface runoff and establish buffer strips along streams.

References: Grønsten, H.A. Øygarden, L., Skjevdal, R. 200. Effects of traditional soil tillage, autumn harrowing and direct drilling of winter wheat on runoff, erosion and nutrient losses. Bioforsk report Vol. 2 Nr. 60/2007. 71 pp.