Cover crops reduce erosion, runoff

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This is an overview of the experimental site of Bonlez (May 2004). Credit: Eric Laloy

Cover crops may be more effective at reducing soil erosion and runoff after maize harvest than rough tillage, according to scientists from the Université Catholique de Louvain, in collaboration with the Independent Center for the Promotion of Forage (CIPF).

The three-year study, supervised by Charles Bielders and conducted by Eric Laloy, measured erosion and runoff losses from silt loam and sandy loam soils in continuous silage maize cropping. The research revealed that cover crops reduced erosion by more than 94% compared to bare soil during the intercropping period. Cover crops and reduced tillage appeared equally effective in reducing runoff and soil loss between cropping cycles, despite the fact that the cover crop development was very poor.

The results were reported in the May/June 2010 edition of the *Journal of Environmental Quality*, a publication of the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America.

Since planting a cover crop is often more expensive than rough tillage, the preferred practice would seem to be rough tillage. However, burying sufficient cover crop biomass into the soil in the previous year reduced erosion rates 40 to 90% lower in the next year than maize grown on plots left bare during winter. This residual effect gives cover crops an advantage in erosion and runoff control compared to rough tillage.

According to Bielders, "For the residual effect to be observed, we estimate that at least 1.5 t ha-1 of cover crop biomass must be buried into the soil." Smaller amounts of biomass were insufficient to demonstrate an effect. Two types of cover crop, rye and ryegrass, were studied, but there were no differences between the two.

"The more cover crop biomass is buried, the stronger the erosion reduction during the maize season," says Laloy. "However, farmers should be cautious not to bury too much biomass as this has a negative impact on maize yields."

Soil erosion on loess soils has long been recognized as a major environmental issue, because it affects long term agricultural productivity and may show strong off-site impacts. Sowing winter cover crops is frequently advocated as a means to reduce erosion during the intercropping period in between two main crops. In principle, cover crops can also help reduce erosion during the main crop by improving the soil's physical quality.

This study demonstrated the importance of the residual effect of cover crops in continuous maize cropping systems. Maize that is harvested late

and cover crops sown in autumn may suffer from poor development as a result of cold weather, yet they can still provide benefits to soil quality in the next year.

Further research will be needed to clarify the exact conditions of occurrence of this residual cover effect and the mechanisms involved. This study was funded by the Walloon Region of Belgium.

More information: View the abstract at jeq.scijournals.org/cgi/content/abstract/39/3/1001

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