Mitigation of water erosion in no tillage systems in the Mediterranean zone of central Chile

by Ingrid Martínez

Mitigation measures are needed to reduce and avoid serious soil erosion and gullying

Conservation tillage techniques

In the Mediterranean climate region of central Chile, with 690 mm of annual rainfall (80% concentrated in winter and autumn), water erosion and inappropriate agricultural management are the major cause of soil degradation and desertification. As a result, about 46% of the land is affected to some level by erosion. 78% of these soils are moderately and highly eroded. In this scenery, the use of conservation tillage techniques is extremely necessary to mitigate water erosion in these highly vulnerable areas.

No tillage with contour ploughing in runoff plots of 1000m²

An oat-wheat rotation under different conservation systems: no tillage (Nt),Nt+contour ploughing, Nt+barrier hedge, and Nt+subsoiling were compared to conventional tillage.

Runoff storage tank

Retaining crop residues on the surface maintains soil water content

During four years of experimental study (2007-2010), the results showed that crop residues maintained on the soil surface on the conservation tillage system, maintain a higher soil water content in the profile (0-100 cm) than conventional tillage. However, the high values of soil compaction (>2000 kPa) reduced yield because the roots are not able to penetrate the soil and use that increased availability of water. The higher productivity of wheat was observed in no tillage + subsoiling and lowest when this technique was not performed. Therefore, a change in soil structure is necessary to obtain high yields in these compacted soils.

The runoff coefficient during the rainfall period was more than 50% in conventional tillage, while in conservation tillage it was between 20-30% in the first month after sowing, and less than 7% the following months. Reduced runoff is important since soil erosion will also be reduced.

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