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No-Tillage & Mulch Cover

by Rolf Derpsch

SCIENCE

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Photo by Jana Lindley

Rolf Derpsch has studied and consulted on no-till systems for 35 years, frequently traveling to far-flung places on his consultancies. Derpsch is one of the world's foremost authorities on no-tillage cropping.

Although no-tillage is at present practiced on roughly 100 million hectares (2.5 million acres) around the globe, the basic principles of the no-till system are not fully understood by many farmers worldwide. Some no-till farmers still view crop residues as a waste product, or something that is causing trouble at seeding, and only a few farmers have understood the importance of soil cover in the no-till system. The low levels of soil cover in many places, because the straw and stalks have been eaten by animals, baled and hauled away, or burned, demonstrates that crop residues are not viewed as a valuable product that enhances soil fertility and increases yields. In other cases, significant opportunities to grow more cover are neglected while the fields are maintained

in a sterile fallow condition with multiple herbicide applications.

Low levels of soil cover lead to higher evaporation and lower water-use efficiency. A no-tillage adoption with low amounts of crop residues, limited crop diversity, and high amounts of soil disturbance will plateau and does not attain the full potential of the no-tillage system. Under these practices and/or the use of occasional tillage, it is difficult to move the system a step further. To be able to move a no-tillage system to the next level it is necessary to implement quality no-till, which includes: full stubble retention and maximizing soil cover; use of low-disturbance seeding equipment; development of more diverse crop rotations including cover crops; and instead of using rotational tillage, practice a permanent no-till system. This will result in higher carbon content of the soil and consequently in higher yields of crops. The development of higher carbon levels in the soil will be an indicator of the quality of the system.

Importance of Soil Cover

It is always necessary to be reminded of the importance of soil cover in a no-tillage (zero-tillage) system. *Many of the benefits and advantages of the no-tillage system come directly from the permanent cover of the soil, rather than from not tilling the soil.* In other words it is not so much the absence of tillage, but the presence of crop residues on the soil surface that results in a better performance of no-tillage in comparison to tilled systems. (*Editors' Note: Both mulch cover and continually undisturbed soil are necessary.*) Failure to pay attention to soil cover has resulted in poor performance of the system (lower yields, increased runoff and erosion, low biological activity, etc.). There is plenty of scientific evidence that no-tillage without soil cover results in poor crop yields.¹



Photo by Unknown, via Rolf Derpsch.

Favorable no-till results as well as long-term soil productivity depend on maintaining an adequate mulch covering the soil.

¹ J.E. Ashburner, 1984, Dryland tillage practices and studies in Algeria, in Proceedings: FAO Panel of Experts on Agricultural Mechanisation, 6th Session (Adana, Turkey, October 1984); P. Wall, 1999, Experiences with crop residue cover and direct seeding in the Bolivian highlands, *Mountain Res. & Development*, 19 (4): 313-317; K. Sayre, B. Govaerts, A. Martinez, M. Mezzalama & M. Martinez, 2006, Comparison of alternative conservation agriculture technologies for rainfed production in the highlands of Central Mexico, in Proceedings of the 17th ISTRO Conference (Kiel, Germany, 28 Aug. – 3 Sept. 2006).