Conservation Tillage and Stratification of Soil Properties:

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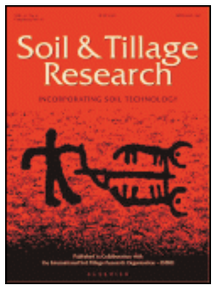

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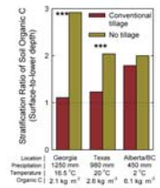
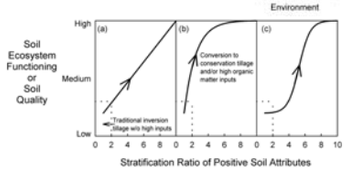
Soil organic matter stratification ratio as an indicator of soil quality, *A.J. Franzluebbers*

Stratification of soil properties is a natural consequence of conservation tillage management. This paper describes a protocol for quantifying stratification and how it can be related to soil quality. Further research is needed to quantitatively relate ratios to important soil functions in different environments.





Conservation tillage and depth stratification of porosity and soil organic matter, *B.D. Kay, A.J. VandenBygaart*

This paper is a review of porosity and soil organic matter under conservation tillage systems in temperate agroecosystems.

Soil under no tillage (NT) generally has higher bulk density within the plow layer than under conventional tillage (CT). In the top few cm, bulk density under NT may be lower due to soil organic matter (SOM) accumulation.
Loss of porosity when converting from CT to NT is associated with changes in pore size distribution. Volume of macropores declines, but volume of micropores may increase.
The effects of tillage appear to be most consistent after 15 years have elapsed.
Interrelationships between rates of change in SOM (and its fractions) and porosity (and pore size fractions) during conversion to NT are poorly documented, but information is needed to predict long-term impacts in different soils.

Stratification of soil aggregation and organic matter under conservation tillage systems in Africa, *R. Mrabet*

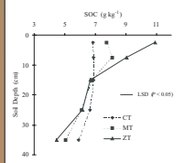
This paper is a review of the effects of conservation tillage and its potential for further development in Africa.

Conservation tillage can create an aggregated, fertile surface layer that protects soil from erosion and sustains agriculture in Africa.
Some indigenous tillage systems in Africa are compatible with objectives of conservation.
A shift to conservation tillage in Africa could significantly reduce the severe level of degradation that occurs, because of existing soil and environmental constraints.

Tillage	Stratification Ratio of Aggregation
Conventional disk	1.1
No tillage without residues	1.2
No tillage with 50% residue cover	1.2
No tillage with 100% residue cover	1.4

Long-term effects of tillage systems and rotations on soil structural stability and organic carbon stratification in semiarid central Spain, *J.L. Hernanz, R. Lopez, L. Navarrete, V. Sanchez-Giron*

Similar yields of wheat, vetch, and barley among conventional, minimum, and zero tillage systems from 1984 to 2000, as well as improvements in surface soil organic matter and aggregation under zero tillage suggests that zero tillage is a more sustainable system for the semiarid Mediterranean region of Spain.



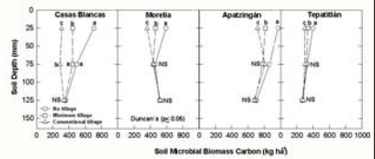
0-5-cm soil depth

Tillage	Water-stable aggregates (%)
Conventional	3
Minimum	4
Zero	11

Tillage effects on microbial biomass and nutrient distribution in soils under rain-fed corn production in central-western Mexico, *J.R. Salinas-Garcia, J. de J. Velazquez-Garcia, M. Gallardo-Valdez, P. Diaz-Mederos, F. Caballero-Hernandez, L.M. Tapia-Vargas, E. Rosales-Robles*

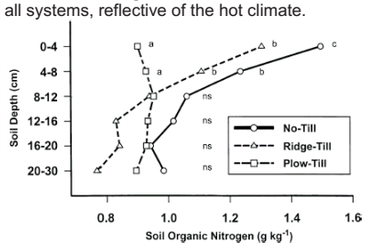
Four mid-term, rain-fed tillage experiments were established in 1992 at four sites:

Site	Soil	Temperature	Precipitation
Casas Blancas	Andisol	15 C	1100 mm
Morelia	Vertisol	17 C	698 mm
Apatzingan	Vertisol	27 C	650 mm
Tepatitlan	Alfisol	18 C	830 mm



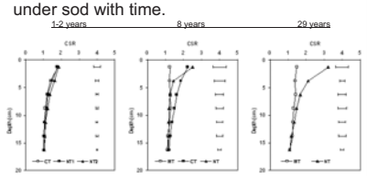
Conservation tillage induced changes in organic carbon, total nitrogen and available phosphorus in a semi-arid alkaline subtropical soil, *L.M. Zibilske, J.M. Bradford, J.R. Smart*

On an alkaline, semiarid, subtropical soil in southern Texas USA, soil organic C and N under no tillage were greater in surface soil than under plow tillage. Against the background of improved soil organic C and N, P solubilization was greater in the top 8 cm of soil under conservation tillage. Oxidizable C was low in all systems, reflective of the hot climate.



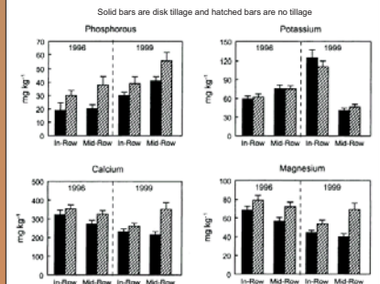
Duration of tillage management affects carbon and phosphorus stratification in phosphatic Paleudalfs, *M. Diaz-Zorita, J.H. Grove*

Stratification of soil organic C and P was greater under no tillage (NT) and chisel tillage (CT) than under moldboard tillage (MT).
Increasing the duration under NT caused the thickness of C-enriched soil to increase.
The rapid early changes in stratification of soil organic C under NT suggests that relatively thin soil layers should be characterized under conservation tillage.
Stratification of soil organic C under NT approached a maximum value similar to that under sod with time.



Tillage effect on nutrient stratification in narrow- and wide-row cropping systems, *P.J. Bauer, J.R. Frederick, W.J. Busscher*

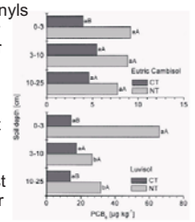
Combining narrow-row widths with no tillage, NT, and intensive subsoiling resulted in higher yield potential for both corn and soybean.
Row spacing did not have much influence on nutrient stratification at 3 (1996) or 6 (1999) yr.



Depth distribution and bioavailability of pollutants in long-term differently tilled soils, *R.-A. Duering, T. Hoss, S. Gaeth*

The effect of long-term tillage (9-17 yrs) was evaluated in two soils in Germany.

The soil surface under no tillage (NT) was enriched in pollutants, but concentrations declined with soil depth.
Zinc was significantly enriched in the 0-3-cm depth under NT, attributable to higher sorption capacity from organic matter enrichment.
Polychlorinated biphenyls (PCBs) were greater under NT than under conventional tillage (CT) at the soil surface.
Organic C enrichment of surface soil may buffer contaminants against leaching and transfer into crops.



Water infiltration and soil structure related to organic matter and its stratification with depth, *A.J. Franzluebbers*

In a controlled experiment of two soils under long-term conventional tillage (CT) and no tillage (NT), sieving disturbance led to rapid deterioration of soil structural properties.
Greater total soil organic C content (sieved NT vs sieved CT) reduced bulk density by 12% and improved water infiltration by 27%.
Greater stratification of soil organic C (intact NT vs intact CT) reduced bulk density by 10% and improved water infiltration nearly 3-fold.
Stratification ratio of soil organic C could be a simple diagnostic tool to identify land management strategies that restore critical soil functions, such as water infiltration.