

Effect of no-till versus ploughing on soil quality and wheat yield on heavy clay soils

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Introduction The Oldambt is a region in The Netherlands with intensive wheat cropping systems on heavy clay soils. Besides farm size, yield and product quality, costs of production are an important determinant of farmers' income. Decreasing the production costs is therefore desirable.

Objective To investigate the suitability of no tillage for farmers, in terms of effects on soil quality, yield and cost reduction.

Material and methods

- An experiment was set up at seven conventional arable farms in the Oldambt region: a permanent wheat field was split up in two parts.
- No tillage (NT) was compared with conventional tillage (CT).
- Measurements: chemical, physical and biological soil quality properties and wheat yield were determined.

Results and conclusions

- No tillage resulted in positive effects on chemical and biological soil quality in the upper 0-10 cm: SOM, Total-N, Total-C, bacterial biomass and potential mineralizable N were higher and more earthworm burrows were observed.
- Soil structure parameters were positively influenced by ploughing, showing a lower percentage of angular elements in the upper 0-10 cm.
- Crop yield was on average 4,5% higher under ploughing than under no tillage.
- Thanks to lower costs, in the case of continuous wheat, no tillage seems to offer a cost-efficient perspective for the heavy clay soils in the Oldambt.



Table 1. Effects of no tillage versus conventional tillage.

Parameter	Unit	Tillage system		
		NT	CT	P-value
Organic matter	%	5.16	4.66	<0.001
Total N	g N kg dry soil ⁻¹	2.80	2.61	0.010
Total C	g C kg dry soil ⁻¹	29.5	27.3	0.038
Bacterial biomass	µg C g dry soil ⁻¹	21.7	9.9	0.007
Pot. mineralizable N	mg N kg dry soil ⁻¹ wk ⁻¹	48.7	34.3	0.034
Earthworms	n m ⁻²	239	185	0.093
Burrows at 10 cm depth	n m ⁻²	88	25	0.041
Angular soil elements	%	46.8	22.9	<0.001
Crop yield	ton/ha	10.3	10.8	0.008



The visual effect of soil life at work in the topsoil under no tillage.



No tillage resulted in more earthworm burrows. Main species found: *A. Calliginosa*, *A. Chlorotica*, *A. Rosea* and *L. Castaneus*.