

TABLE 10.1. Examples of soil structural changes reported in different no-till studies where crop residues were left on the soil surface

Location	No-till duration (years)	Soil texture	Observations (contrasts between no-till and conventional till)
Tennessee [37]	4	Silt loam	More surface organic matter, less plow layer compaction with no-till than with disking
North Carolina [40]	3	Sandy loam	Bulk density increases over time while permeability decreases in trafficked interrows (only investigated no-till)
Kentucky [35]	10–25	Silt loam	More organic matter and moisture, lower surface bulk density with no-till
Maryland [42]	3	Silt loam	More stable aggregates and more glomalin ¹ with no-till
Mississippi [32]	4–8	Silt loam	Aggregates were more stable, but less surface crust prone with no-till
Canada [1]	5–15	Sandy loam, silt loam	More small pores and faster infiltration with no-till
Brazil [23]	—	Clay	More stable aggregates with more total organic carbon with no-till
Australia [24]	8	Clay	More large pores and faster infiltration, less crusting with no-till

¹ Glomalin is a glycoprotein (carbohydrate plus protein) compound that contributes to soil particle aggregation and improved soil structure.

TABLE 10.2. Soil pH stratification patterns reported in different studies

Location	Soil texture	Tillage type ¹	Tillage duration, years	pH stratification pattern
Georgia [14]	Sandy loam	CT, RT, NT	5	pH lower in subsoil with NT, similar at surface for all
Kentucky [2]	Silt loam	CT, NT	10	Limed: pH higher near surface with NT Not limed: pH lower near surface with NT
Maryland [22]	Silt loam	NT	2–3	If high nitrogen fertilizer rate (250 pounds of N per acre): pH lower near surface than in subsoil
Montana [19]	Silt loam, clay loam	CT, RT, NT	2–4	pH lower near surface with NT and RT
Kentucky [18]	Silt loam	CT, NT	20	pH higher near surface with NT
North Carolina [11]	Statewide, several soils	CT, NT	Less than 6 and more than 6 of NT	pH higher near surface with CT or NT less than six years, than with NT more than six years
Australia [6]	clay loam	CT, NT	8–12	pH higher near surface with NT
Brazil [3]	Clay	CT, NT	5	pH higher near surface with NT

¹Tillage options are abbreviated: CT is conventional tillage (intensity varies by region); NT is no-till; and RT is one of several forms of reduced tillage.

TABLE 10.3. Estimates of ammonia volatilization losses for different soil, weather and fertilizer scenarios as percentages of total nitrogen fertilizer applied

Soil pH	Rainfall	Fertilizer ¹	Placement		
			Broadcast	Surface band	Inject or incorporate
			Percent of total N lost via volatilization ²		
Lower than 7	Humid ³	Urea	0–5	0–5	0
		UAN	0–5	0–5	0
		AS or NH ₃	0	0	0
	Subhumid ⁴	Urea	5–30	2–20	0–2
		UAN	2–15	2–10	0–2
		AS or NH ₃	0–2	0–2	0–2
	Dry ⁵	Urea	5–40	2–30	0–2
		UAN	2–20	2–15	0–2
		AS or NH ₃	0–2	0–2	0–2
7 or higher	Humid	Urea or UAN	0–20	0–15	0–10
		AS	0–40	—	0–10
		NH ₃	—	—	0–2
	Subhumid	Urea or UAN	2–30	2–20	0–10
		AS	2–50	—	0–20
		NH ₃	—	—	0–3
	Dry	Urea or UAN	2–40	2–30	0–10
		AS	5–60	—	0–30
		NH ₃	—	—	0–5

Source: Modified from [25]

¹ Fertilizer abbreviations: UAN is any of the solutions composed of urea plus ammonium nitrate (28, 30 or 32 percent N); AS is ammonium sulfate; NH₃ is anhydrous ammonia.

² For low-CEC soils (less than 10 meq per 100g) or if residue cover is more than 50 percent, use the upper end of the range. For high-CEC soils (more than 25 meq per 100g), use the lower end of the range.

³ Rainfall of 0.5 inches or more within two days of fertilizer application.

⁴ Rainfall of 0–0.25 inches of rain within seven days of fertilizer application.

⁵ Little or no rain likely within seven days of fertilizer application.

TABLE 10.4. Estimates of denitrification losses for various soils

Soil organic matter content	Soil drainage classification ¹				
	Excess	Well	Moderate	SWPD	Poor
	Percent of inorganic N denitrified				
	Conventional tillage				
Less than 2	2–4	3–9	4–14	6–20	10–30
2–5	3–9	4–16	6–20	10–25	15–45
More than 5	4–12	6–20	10–25	15–35	25–55
	No-till				
Less than 2	3–9	4–14	6–20	10–30	10–30+
2–5	4–16	6–20	10–25	15–45	15–45+
More than 5	6–20	10–25	15–35	25–55	25–55+

Source: Modified from [25]

¹Soil drainage classifications: excess is excessively well drained; well is well drained; moderate is moderately well drained; SWPD is somewhat poorly drained; poor is poorly drained.