CARBON IMPACT OF CONSERVATION PRACTICES:
REDUCED TILLAGE

Reduced tillage involves decreased frequency or intensity of tillage compared to conventional methods. Overall, tillage decreases soil health and makes the land more susceptible to erosion, nutrient loss, and drought. There are many options for reducing tillage that result in greater carbon sequestration and healthier soil.[1,2]

Benefits of extended reducing tillage[3,4,5,6]

Improves soil structure

Allows soil to better sequester carbon

Reduces wind and water erosion

Helps soil retain and store water

Preserves healthy soil organisms

Decreases weed pressure

Prevents soil crusting

Improves nutrient management

Helps soil retain organic matter

Creates healthier soil

IMPACTS OF TILLAGE

Tilling a field requires heavy equipment to make several passes to break up the topsoil. This process creates a compact lower layer of soil that is harder for roots and water to penetrate, and a loose top layer that is susceptible to both wind and water erosion. Turning the soil also brings weed seeds to the surface, increasing, rather than decreasing, weed growth. Tilling also removes protective vegetation, leading to the crusting of topsoil. This crusting reduces the amount of oxygen in the soil, makes water absorption more difficult, negatively impacts seed germination, further increases erosion, and makes soil more susceptible to drought during dry seasons.[7,8,9]

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THE IMPORTANCE OF CARBON SEQUESTRATION

Tilling releases carbon that is naturally stored in the soil, making it more difficult for it to be retained in the future. In addition, by reducing soil disturbances, the soil is better able to sequester additional carbon.[10]

CREATING HEALTHIER SOIL

Reducing disturbances allows soil to better retain its organic matter, nutrients, oxygen, and carbon, leading to healthier soil. It is better able to absorb and retain water and maintain its structure. This reduces erosion and prevents crusting of topsoil.[11,12,13]

METHODS FOR REDUCING TILLAGE

Options to reduce tillage include:

- **Strip-till:** Popular in grain and vegetable systems, strip-till involves shallow tilling of narrow strips, providing areas for seeds to be planted. The remaining areas in the field are left undisturbed.[14]
- **Mulch-till:** This method includes precisely timed tilling of the entire field and leaving 30% of plant residues. These residues are coarsely tilled into the top of the soil to increase soil organic matter.[15]
- **Ridge-till:** Popular with row crops, this involves creating mounds and furrows. Crops are then planted on the mounds. The furrows are managed through tilling during the growing season. Plant residues are left and tilled back into the soil the following season.[16]
- **Vertical tillage:** This method requires specific machinery that cuts vertically into the field, interspersing crop residues into the top portion of the soil. Proper vertical tillage leaves 60% to 80% of crop residues on the soil. This method aims to reduce soil disturbance compared to conventional tilling and incorporate crop residues into the soil to help facilitate their breakdown.[17]

CONSERVATION FACT

Switching from conventional tillage to strip-tillage can sequester up to 0.13 metric tons of carbon dioxide per acre per year, and up to 0.22 metric tons of carbon dioxide equivalent per acre per year.[18,19]

HOW TO REDUCE TILLAGE

The Natural Resources Conservation Service (NRCS) supports tillage reduction through programs such as the Conservation Stewardship Program (CSP) and the Environmental Quality Incentives Program (EQIP). These programs provide producers with both technical and financial assistance to start new tillage reduction plans. Visit a local USDA Service Center to find out more. Find local offices at offices.sc.egov.usda.gov/locator/app.

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