Are Golf Courses Holding the Carbon?

JACK DYKINGA (K7087-17)

Turfgrass As A "Sink" for CO_2

Next time you see Tiger Woods drive a golf ball 300-plus yards or Annika Sorenstam drain a 15-foot putt, take a look at what's under their feet. The beautifully manicured tees, fairways, and greens are not only helping the golfers enjoy their round, but are also helping the environment. That's because the turfgrass used for golf courses—and elsewhere—may help rid the atmosphere of carbon dioxide by capturing CO_2 through photosynthesis and sequestering some of it in the soil.

Agricultural Research Service soil scientist Ronald F. Follett and Colorado State University researcher Yaling Qian have studied soil records from 16 Denver-area golf courses. Follett says they found that carbon sequestration in the soil under turfgrass occurred at a "significant rate that is comparable to the carbon sequestration rate reported from U.S. land that has been placed in the Conservation Reserve Program." That voluntary program, run by USDA's Farm Service Agency, pays agricultural landowners to "establish long-term, resource-conserving covers on eligible farmland," which helps trap carbon.

Follett explains that golf course managers generally keep excellent soil records; some of the records used for this research go back 45 years. The scientists found that carbon sequestration lasts for up to 31 years in fairways and 45 years in greens, after which the rates slow or become negligible. While carbon sequestration exists on tees, it was not nearly as much as those on fairways and greens. The researchers are still investigating why this is the case.

A rapid increase in carbon sequestration occurs the first 25 to 30 years after the turfgrass is established. The study found that greens and fairways each store nearly a ton of carbon per acre per year.

Since lots of turfgrass is growing on golf courses, suburban lawns, and public parks, the scientists hypothesize that the turfgrasses help to mitigate CO_2 emissions resulting from the combustion of fossil fuels. That is, CO_2 that may otherwise linger in the atmosphere is instead trapped in the soil. Follett and Qian believe this occurs "because of high productivity and lack of soil disturbance" in turfgrass. Cities and their suburbs too have open spaces within them—like lawns and parks—that are planted with turfgrass. These areas may in fact serve as sinks for CO_2.

This is one of the first studies to measure carbon sequestration in urban environments. Other ARS scientists are studying rangeland (see *Agricultural Research*, October 2002) as well as farmland (see *Agricultural Research*, February 2001) as possible carbon sinks.

The scientists are currently using computer models to figure out the potential rates for carbon sequestration on golf courses. They are also conducting a more detailed evaluation of soil samples in fairways and in irrigated and nonirrigated rough.—By **David Elstein,** ARS.

This research is part of Global Change, an ARS National Program (#204) described on the World Wide Web at www.nps.ars.usda.gov.

Ronald F. Follett is with the USDA-ARS Soil, Plant, and Nutrient Research Laboratory, 301 South Howes St., Fort Collins, CO 80522; phone (970) 490-8220, fax (970) 490-8213, e-mail rfollett @lamar.colostate.edu. ★