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Natural turfgrass and carbon sequestration: What's the real story?

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LM Direct!

Research results can sometimes create more questions than answers. For example, The British Coffee Association reports that research shows coffee has a protective effect in the liver; a 71% lower risk of developing liver cirrhosis was found in subjects drinking three or more cups of coffee each day.

Not so fast: Health researcher Bee Wilder reports that preliminary findings from a small study suggest that drinking moderate amounts of coffee may put healthy individuals at risk for decreased insulin sensitivity, or an inability to process blood sugar efficiently, which is a precursor to diabetes.

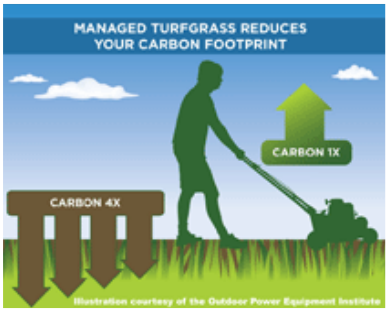
Hold on a second: A study by researchers at the Harvard School of Public Health and Brigham and Women's Hospital found that participants who regularly drank coffee significantly reduced the risk or onset of type 2 diabetes, compared to non-coffee drinking participants. The findings appeared in the Jan. 6, 2004 issue of the *Annals of Internal Medicine*.

Which research study is correct, or are they all correct to some degree? It's all a bit confusing, isn't it?

So, what does all this have to do with the benefits of turfgrass and its ability to store carbon?

Well…let's consider two recent research studies regarding carbon storage and carbon emissions as they relate to turfgrass. A turfgrass study conducted by Dr. Ranajit Sahu, an independent environmental and energy expert and university instructor, titled *"Technical Assessment of the Carbon Sequestration Potential of Managed Turfgrass in the United States,"* shows that responsibly managed lawns sequester, or store, significant amounts of carbon. In fact, the research study reports that healthy turfgrass can capture up to *four times* more carbon from the air than is produced by the engine of today's lawnmowers. The findings are based on several peer-reviewed, scientific studies and models where carbon sequestration had been measured in managed and unmanaged turfgrass.

But hold on: Another recent research study (reported in *Athletic Turf News* 1/10/10) suggests that the carbon-storing benefits of lawns are counteracted by fuel consumption. According to Amy Townsend-Small, Earth system science post-doctoral researcher at University of California, Irvine and the lead author of the study, which has been accepted for publication in *Geophysical Research Letters* , a journal of the American Geophysical Union (AGU), reports a different conclusion.



Focusing on four parks and lawns in Southern California, the Townsend-Small study found that greenhouse gas emissions from fertilizer production, mowing, leaf blowing and other lawn management practices were four times greater than the amount of carbon stored by grass in parks and lawns.

The Townsend-Small study concludes that emissions include nitrous oxide released from soil after fertilization. Nitrous oxide is 300 times more powerful than carbon dioxide, the Earth's most problematic climate warmer.

The UCI study was supported by the Kearney Foundation of Soil Science and the U.S. Department of Agriculture.

In response to the Townsend-Small research finding, Sahu offered the following comment:

"The benefits of urban lawns and green spaces are multi-faceted and well documented. While we look forward to reviewing Dr. Townsend-Small's study in detail, our careful analysis of the overall carbon storage benefits in urban lawns using sustainable cultural practices indicates that the carbon storage benefits of well-maintained lawns ***exceeds*** *the carbon emissions associated with maintaining such lawns, including fuel usage. Fuel usage and emissions from lawn maintenance equipment is significantly smaller currently than in the past due to regulatory requirements. Use of sustainable practices such as using grass clippings as the nitrogen sources for lawns as opposed to external fertilizer use alone is also a practice that is being encouraged to minimize greenhouse gas emissions."*

So what are the facts when it comes to carbon sequestration in turfgrass and the amount of carbon resulting from the care and maintenance of turfgrass? Suddenly it's not so simple, is it? We're going to sit back, have a cup of coffee, and try to be objective in deciphering the facts… as soon as we understand what the facts are!

UPDATE: How do you get spilled coffee back in the cup?

What do you do when a peer reviewed research study is found to be incorrect and contains misinformation, but the misinformation has already been circulated and generated worldwide attention? The Amy Townsend-Small study referenced above generated plenty of press coverage. The American Geophysical Union (AGU) carried the story, as did a press release from the University of California (Irvine). The story was picked up by *USA Today, National Geographic's Green Guide, Science Daily, China Meteorological Administration (CMA), First Science, Discovery News, Yahoo News India,* and the list goes on. Just about every science publication, newspaper, Green Industry blog site and media outlet jumped on the bandwagon with assorted headlines that read:

- "Urban Green Space May Aid Global Warming"
- "Green Spaces (Lawns) Are Not So Green"
- "Urban Lawns Contribute to Climate Change"
- "The Grass Isn't Always Greener"

There's only one problem: *The authors acknowledge the study contains errors and miscalculations.*

The following excerpt is from a correspondence received from Dr. Thomas Rufty, Bayer Distinguished Professor, Environmental Plant Biology, North Carolina State University. He points out several discrepancies in the research report:

"Regarding 'Carbon sequestration and greenhouse gas emissions in urban turf' by Townsend-Small and Czimczik, we suspected an error in calculations because their numbers were so different from the models we are developing. I challenged the graduate students to find out why. Two of our Ph.D. students took apart all of the assumptions and calculations in the paper. Twelve hours later, they came into my office with the rather bold proclamation 'They made some mistakes.' I asked for a complete analysis of the situation …and they handed it to me on the spot. The students were right! We emailed the authors and they responded that there was a mistake in their spreadsheet that no one had caught during the writing or peer review. The authors said 'someone' had informed them of the mistake and a correction was sent to the journal. Their corrected calculations showed that CO2 generation was 122 g m-2 yr-1 rather than > 1238 g m-2 yr-1 in the paper.

"This is important, because it makes the situation with 'ornamental lawns' carbon neutral to positive, depending on some of their other assumptions about fertilization. The students also are arguing that the authors made another mistake that will result in decreasing the estimated CO2 further – they did not take into account C speciation during combustion. Depending on the kind of mowers used, this will lower levels by another 15 to 50%.

"The Townsend-Small and Czimczik paper is being viewed as an important publication for the carbon sequestration debate. I'm hoping the efforts of our students will help correct this misperception."

Dr. Ranajit Sahu, whose earlier study concluded turfgrass carbon sequestration was considerable and quite the opposite of the Townsend-Small study, is currently completing a summary critique that also questions the validity of the calculations in the peer-reviewed research report. Now that it's apparent that misinformation has received broad distribution worldwide, the question is, how do you get the same media coverage for the corrected version of the research report? The challenge is much like getting the genie back in the lamp... or trying to get spilled coffee back in the cup.