

Soil Foodweb Insights

February 2011



This Month

This month SFI is covering a new development in the sustainable world. We interviewed John Miedema, director for biomass energy with a timber company in the Pacific Northwest, about biochar. This is a promising new carbon material that will have far reaching uses including agricultural sustainability. Updates have been made to the workshop schedule on www.soilfoodweb.com that have made it easier than ever to figure out which workshop is the right one for you! We also have another great deal from Earthfort so be sure to check that out.

Improving sustainability through developments in biochar

By Michael Rost

Carbon, or more specifically carbon dioxide, building up in earth's atmosphere is considered by many scientists to be one of the planet's most difficult and pressing problems. Biochar may become a significant part of the solution.

Biochar, the solid carbon rich byproduct produced when biomass (organic matter) is converted to energy in a low oxygen environment (pyrolysis) has potential for beneficial use in agriculture and environmental remediation. Biochar carbon compounds are very stable in soil as compared to carbon compounds present in fresh organic matter. Carbon from unprocessed plant material would enter back into the atmosphere in a matter of decades. Biochar, on the other hand, wouldn't cycle back into the atmosphere for 1,000 years. Biochar has potential economic and environmental benefits because it contributes to long-term carbon sequestration, assists in building soil fertility and in remediation of contaminated soils and watersheds.

The biochar concept has challenged scientists to figure out the best approach to turning waste organic material into stable carbon. This exciting new development has attracted the attention of researchers like John Miedema.

Miedema is collaborating on biochar re-



Miedema experiments with different biochars daily at his facility (by Michael Rost)

search with Oregon State University and USDA-ARS and is funded by a Western Oregon timber company. He was an early adopter of the global warming concept, and is concerned with mitigating the amount of excess CO₂ being deposited in the Earth's atmosphere. He's also concerned about devising new methods to feed the population of the world.

"We burn fossil fuels to produce our nitrogen fertilizers," Miedema said. "As the supply is reduced the price of production and transportation of those fertilizers will go up. The implications of high prices and food riots is significant. This is a problem we have to figure out sooner than later."

He hopes to address numerous problems facing the population of the world and the pollution we create. One example is the waste created by

Edited by Michael Rost
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concentrated feedlots that are common in the United States.

"We're not going to see the '50 cows on 50 acres' farms like the one my grandfather had," he said. "In that kind of situation the animals would supply the soil with nutrients at a stable rate. Now we're seeing '5000 cows on 5 acres' in contained feedlots and the problems inherent in those operations. There's a lot of that waste going into our water supply."

Miedema wants to capture the nutrients from animal waste products and cycle them back into the farm field with biochar. Biochar has the added benefit of potentially filtering the pollutants out of water sources.

"I want to try to turn that waste into a potential value rather than a waste stream that we have to deal with." He added, "I see biochar as a material that, depending on how you process it, can hold onto various nutrients. We are developing a scenario where you can grab nutrients from waste and move them into soil."

He has already successfully experimented with using biochar to filter heavy metals out of water. One documented result demonstrates the ability of biochar to reduce the amount of zinc from 750 mg/liter of water to 40 mg/liter. (EPA discharge level is 117mg/liter).

In addition, biochar could also be used to enhance soil nutrient retention.

"There are soils around the world that are very old and highly weathered. Many of the nutrients have been leached out and the clay that is left over doesn't have much cation exchange capacity (ability to hold nutrients). Biochar can be utilized as a replacement for nutrient storage," Miedema said.

Through oxidation, biochar material gains a negative charge that attracts many critical plant nutrient minerals like potassium (K⁺), calcium (Ca²⁺) and magnesium (Mg²⁺). This is critical for areas in the world with poor nutrient retention in their soils. Biochar also holds onto nitrogen in soils and reduces denitrification.

"Adding biochar to soil has been demonstrated to reduce denitrification by 50-80%. The implication for agriculture is incredible," Miedema said.

Throughout all this, Miedema tries to be re-

alistic about biochar and his expectations. He recognizes that for biochar to be viable, there needs to be consumer and investor interest.

"Nobody is going to pay me to sequester carbon." He continued, "There's no value in carbon. It's upon me to prove the tangible value of the product I'm making. We've got a wide range of possible benefits but we still need to develop the research and the process."

Miedema isn't looking to sell carbon sequestering potential, he merely sees it as added information for the consumer market. He wants to market biochar for agriculture and horticulture purposes while informing consumers how much carbon they're sequestering.

"I want to adopt the organic movement as a model. In this model, the consumers have a line of sight back to production. They make their choice based on where the product came from, what was used to grow or process it, and how it affected the environment. I think people will see a similar value in carbon sequestration. When they buy biochar for their home garden, they will also be able to see how much carbon they are taking out of the atmosphere," Miedema said.

Most importantly, Miedema recognizes that the results need to be proven in the lab before they can start to be marketed. He has been experimenting daily with different materials, temperatures and applications for biochar.

He concluded, "There are many people working with biochar out there that aren't pursuing this scientifically enough. We need to work hard to make this a legitimate field of research. There are many unknowns regarding the material. Prior to a couple years ago, the chars that were being used for research didn't have much if any information regarding their sources or process used to make it. It's getting better but we still have a long way to go--the possible advantages found within a well designed biochar system are so great, we would be remiss if we did not rigorously investigate."

For more information on biochar, there are many excellent papers on development and application at <http://www.css.cornell.edu/faculty/lehmann/publications/index.html>. ■

Upcoming workshops

Here are a few quick reminders about upcoming workshops happening in February and March:

Harrington's Soil Foodweb workshop Feb 28 - March 4

There's still a little time to register for this workshop in Bloomfield, CT! Visit http://www.harringtonsorganic.com/events/sfw_workshop.html for more info or call Harrington's Organic Land Care at 860-243-8733.

Discovering the Soil Foodweb & Compost Technologies March 21 - March 25

This is a five day workshop happening in San Rafael, CA. The missing link in today's comprehensive understanding of the soil and plant relationship is Dr. Elaine Ingham's 5 day intensive workshop. When you leave you'll have a full understanding of plant, soil, and microbe needs. To register, or for more info, visit www.sweet-soil.com or call (415) 699-0916.

New workshop calendar at www.soilfoodweb.com

We're glad to announce we've updated our workshop calendar! At www.soilfoodweb.com/calendar.html we have a completely interactive calendar showing all workshop dates for the entire year of 2011 with more added every month! Information is always being updated so make sure you stay informed and check regularly!

The screenshot shows the Soil Foodweb website interface. At the top, there is a navigation menu with links for 'labs', 'resources', 'about us', 'news', and 'contact'. Below the navigation is a calendar for March 2011. The calendar grid shows the following workshop dates:

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
		1 Harrington's Soil Foodweb Workshop	2 Harrington's Soil Foodweb Workshop	3 Harrington's Soil Foodweb Workshop	4 Sustainable Nutrient Programs Harrington's Soil Foodweb Workshop	5
6	7	8	9	10	11 Compost Quality Evaluation	12
13	14	15	16	17	18	19
20	21 Dispersing Soil Foodweb Workshop	22 Dispersing Soil Foodweb Workshop	23 Dispersing Soil Foodweb Workshop	24 Dispersing Soil Foodweb Workshop	25 Compost Tea Production Dispersing Soil Foodweb Workshop	26
27	28	29	30	31		

On the right side of the calendar, there is a section titled 'Informational Audio CD's' with a sub-heading 'CD's'. The text reads: 'Can't attend the lectures? Order the complete set of audio discs with information from Dr. Ingham about the Soil Foodweb, compost, and compost tea [here!](#)'. Below this text is a circular logo for 'SOIL FOODWEB' with 'WELLING LIFE' written around the bottom edge.

Earthfort Plant Production sale, 47% off!

The Earthfort store is offering the Plant Production CD at a great value!



<http://www.earthfort.com/products/literature/cds/plant-production.html>

The information covered in this disc will teach you about the soil food web and develop your understanding of the biological approach to growing and caring for your plants. This valuable information is priced temporarily at \$10.00! Be sure to act quickly while supplies last! ■

That's all for now. Be sure to check out more information about biochar, as there is just too much information and potential to try to fit in one article! We'll have some more great news and information in our next newsletter so keep an eye out for it! ■ ■ ■