FLORIDA LAND STEWARD

A Quarterly Newsletter for Florida Landowners and Resource Professionals **SPRING/SUMMER 2024 – VOLUME 13, NO. 2**

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Biochar as an Additive in Forest Systems

By Valentina Vaney, graduate student, and Dr. Jason Vogel, Associate Professor, UF/IFAS School of Forest, Fisheries, and Geomatics Sciences

A key constituent of healthy soil is organic matter, or materials derived from plants and animals. A part of most soil organic matter is the char created by natural fires. Biochar, in contrast, is charred organic matter intentionally created by humans. Ancient societies added biochar to poor soils throughout the world (Wiedner and Glaser 2015), with a well-known example found in the South American Amazon basin. Here organic matter-rich 'Terra preta', Portuguese for 'black soil', helped native societies convert inherently poor soils to ones capable of supporting increased plant growth (Wiedner and Glaser 2015).

Modern farmers and agronomists have investigated biochar and found that, with the right soil conditions, it can improve crop growth (Liu et al. 2013). For forests, the effect of biochar is less well-understood because there are fewer studies. Nonetheless, opportunities exist for forest landowners who would like to try biochar as a soil additive. This article clarifies what biochar is, suggests what soil characteristics make it a viable option, and identifies additional resources for information and potential financial assistance for the production or application of biochar.

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Biochar could be a potential use for wood debris generated from tropical storms. Photo by Dave Conser.

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What is biochar?

Biochar can be created by burning an organic source, such as animal manure, sewage sludge, crop byproducts, tree trimmings, and wood. The general approach for creating biochar is combusting material with minimal oxygen, a process that creates chemical and structural features in the biochar that sustain 'healthy' soil (soil that benefits life processes). These benefits often include improved soil moisture retention and exchange of nutrients, or an increase in soil pH.

Although biochar is not a 'standalone' fertilizer, most plant nutrients (e.g., phosphorus) remain in the material after combustion and may be available to plants. However, nitrogen will be lost to the atmosphere at an increasing rate with warmer burn temperatures and will typically be below plant requirements. Biochar can also absorb nutrients from the soil, creating short-term deficiencies. Thus, biochar typically needs to be supplemented with either compost materials, manures, or inorganic fertilizers before application to crops. Less information is available for tree species, but likely the same supplementation needs to occur (Joseph et al. 2021).

Should I apply biochar to my forest?

The short answer to this question is that 'it depends'. Similar to forest fertilization, a landowner needs to understand the soils of their forests and the characteristics of the biochar that they might apply. Soil scientists have found that the greatest improvements in plant growth typically occurs when biochar is applied to highly degraded, acidic (pH<7.0), and sandy soils (Liu et al. 2013). Compacted, acidic, clayey soils can also benefit from biochar if it is incorporated (i.e., disked) into the soil enough to increase soil porosity, allowing air and moisture to penetrate to root systems. The ability of biochar to act as a liming agent in acidic soils (i.e., increase pH) and to retain water and nutrients, likely creates positive conditions for plant growth.

A soil analysis can help determine whether your soil would likely be responsive, although we will discuss tools developed by the United States Department of Agriculture (USDA) and other groups that can give general guidance on potential plant growth response. In evaluating a biochar to potentially improve soil conditions, landowners can ask a supplier for nutrient analysis and about the liming potential of the biochar. This information, paired with a soil description, can help determine whether a plant growth response is likely. If a landowner is unfamiliar with interpreting these reports, then assistance from an extension agent, or private consultant, should be sought. However, recognize that there is much less information about the response of southeastern forests to biochar than that for agricultural crops.

Make your own biochar

One option a forest landowner might chose is to produce their own biochar from the debris generated on their property. There are a range of commercially available devices that reduce oxygen supply during burning, and do-it-yourself techniques that can be explored online. Regardless of whether a landowner produces the biochar themselves, it should still be tested for its liming and nutritional potential before land application. As a part of the USDA Natural Resources Conservation Service's (NRCS) Conservation Stewardship Program (CSP), landowners can apply for financial and technical assistance to convert into biochar any woody debris that poses a fire hazard, or woody debris created while trying to reduce fire danger. See this CSP page for information on this practice: **https://www.nrcs.usda.gov/programs-initiatives/csp-conservation-stewardship-program/biochar-production-from-woody-residue**

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Biochar produced from forest residues. Photo by Andrew Zimmerman.

How much biochar should be added to a forest?

This question is still under investigation. Although the response across tree species is typically positive, the largest response has been found for hardwood species (Thomas and Gale 2015). Variation in response occurs for species and biochar application rates, which have ranged from 2-12 tons ac^{-1} (Thomas and Gale 2015). This leaves some questions about how southern pines might respond to this soil additive applied at different rates. As of 2024, the only field trial of loblolly pine (*Pinus taeda* L.) response to biochar was done in a relatively high pH (7.4) and fertile soil (Krapfl et al. 2016), characteristics that lower the probability of biochar response. This study found positive benefits of biochar on soil water availability but neither a positive or negative effect on pine growth and nitrogen availability. It remains to be seen whether an ideal soil for biochar application (e.g., infertile and/or acidic) will support a positive response in southern pines.

As an organic material, biochar can float and be easily moved by flowing water. To avoid having applied biochar wash away, incorporation into the soil is necessary. Application followed by disking, or having beds turned over onto the biochar, can help insure that the material stays in place. If the biochar particles are sized for it, a standard fertilizer spreader can be used for application. In most cases, using this type of machinery is best done after harvest and before planting. One thing to consider before application is that slightly dampening biochar can reduce the airborne particulates, and a face mask should be used during handling and spreading (Major 2010). A long-sleeved shirt and gloves are also recommended if one is to have repeated skin contact with the material.

Tools and programs to help determine if biochar is an option for you

The NRCS has initiated a landowner assistance program to promote biochar application under the Environmental Quality Incentives Program (EQIP). In this program, producers are reimbursed when their conservation practices meet NRCS standards and specifications (Thomas et al 2015). Regional Conservation Program administrators of EQIP would use the Soil Carbon Amendment Conservation Practice Standard (Rule 336) to evaluate whether a planned biochar application fits program requirements. Eligible land for applying biochar can be held by private landowners, Indian tribes and water management entities. For more details on how to apply, eligibility requirements, and any other additional information, one should consult their local NRCS office. Find your local service center at **http://offices.sc.egov.usda.gov/locator/app**.

In tandem with these initiatives, USDA, university, and private groups have collaborated on user-friendly web-based tools that are designed to help landowners make decisions regarding biochar. The first stop for a landowner should be the USDA's Web Soil Survey (WSS) (**https://websoilsurvey.nrcs.usda.gov/**). It provides geographically explicit soils information for more than 95% of the counties in the continental United States. Using this tool, a landowner can look at the soils on their own property to determine if plants and soil health would likely be responsive to biochar. A full review of the WSS is beyond the scope of this article but for those generally familiar with it, all biochar-relevant information can be found under the "Soil data explorer", "Suitabilities and Limitations", "Soil Health" menu sequence (Figure 1). These ratings are part of the assessment process for the NRCS as they determine if the soils on your property are suited for biochar application.

Another useful resource is the Pacific Northwest Biochar Atlas (PNBA). PNBA, a consortium of private and government interests that have built a website (**https://www.pnwbiochar.org/**) dedicated to providing information on biochar case studies, production methods, and how to interpret biochar analyses. Despite being centered in the Pacific Northwest, it contains information useful to other regions. A similar web based resource is hosted by the United States Biochar Initiative: **https://biochar-us.org/**.

If a landowner decides to produce their own biochar, then another potential funding source could be carbon markets. In these markets, entities pay another party for carbon dioxide (CO_2; or other greenhouse gas) removal from the atmosphere. For the forestry community, this type of payment has typically occurred for growing forests (Lee et al. 2018).

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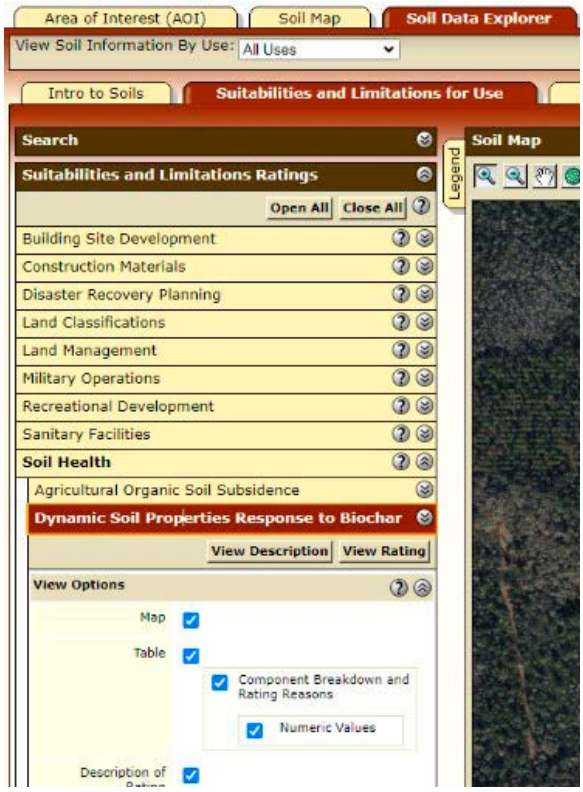

Figure 1. The menu sequence (brick brown) for examining the potential plant growth response to biochar. "View rating" would provide the final information for the soils in an area.

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However, there has been increasing interest in biochar applied to soil because the carbon (C) in it can remain soil-bound for centuries (Joseph et al. 2021), keeping the CO_2 from returning to the atmosphere. Entering carbon markets is often a challenge for landowners (Pan et al. 2022), and for biochar production, there are additional considerations to account for related to the source of feedstock. Nonetheless it is a potential financial opportunity that the forestry community should be aware of.

Conclusions

With growing interest among public and private entities in having biochar applied to poor soils, the forestry community could potentially benefit and play an important role in the market. At this early stage of community understanding on this topic, forests landowners and managers will need to be resourceful in finding assistance that will make its application worthwhile to them.

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Hurricane Idalia Silviculture Recovery Program Open for Enrollment

Hurricane Idalia hit Florida on August 30, 2023 bringing hurricane and tropical storm conditions to the majority of Florida counties. The storm caused major devastation to many coastal communities and it was large enough to cause significant impacts to some of Florida's most productive agricultural landscapes. Timberlands were hit hard with over 289,000 acres damaged and a total economic loss in excess of $64,000,000.

The Hurricane Idalia Silviculture Recovery Program is designed to ensure the long-term viability of Florida's forest lands and restore the ecological and economic value of timberland damaged by Hurricane Idalia. The program offers landowners cost-share funding specifically for site preparation and tree replanting on classified agricultural lands. It is administered by the Florida Department of Agriculture and Consumer Services' Florida Forest Service and funded by the state of Florida.

To be eligible for the program, **practice sites must have been forested on August 30, 2023, and experienced significant timber damage that impacted the future viability of the stand as a direct result of Hurricane Idalia**. Qualified applicants are limited to timber landowners in **Charlotte, Citrus, Columbia, Dixie, Gilchrist, Hamilton, Hernando, Jefferson, Lafayette, Levy, Madison, Manatee, Pasco, Pinellas, Sarasota, Suwannee and Taylor counties**, whose timber experienced significant damage from Hurricane Idalia.

The program is currently open for applications at the online portal or by mail. Please visit **https://IdaliaTimberRecovery.fdacs.gov** to apply. Applications will be accepted until **June 30, 2024.**

Hurricane Idalia damaged over 289,000 acres of timberland in Florida resulting in over $64,000,000 in economic loss. Photo by Zach Butler, Florida Forest Service.

Check out the new ProForest "PodForest" Podcast

Immerse yourself in the world of forestry through extension as ProForest coordinator Dr. Tyler Carney hosts guests to talk about all things forestry. Listeners can join each episode to listen to a new guest and learn about different forestry topics. Curated for private forest landowners but interesting to all, this podcast was created as an Extension product of the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS). Learn more about the PodForest podcast and access episodes here: **https://tinyurl.com/72b6jrcx**

New Forest Management and Stewardship related Publications on AskIFAS

These UF/IFAS Extension publications were recently published or updated on AskIFAS:

- Benefits of Prescribed Fire, **https://edis.ifas.ufl.edu/FR468**
- Hurricane and Tropical Storm Impacts on Prescribed Fire and Wildfire Management Practices, **https://edis.ifas.ufl.edu/FR452**
- Pond Pine (*Pinus serotina* Michx.), **https://edis.ifas.ufl.edu/FR473**
- Prescribed Fire as a Tool for Controlling Tick Populations in the Southeastern United States, **https://edis.ifas.ufl.edu/FR469**
- Prescribed Fire Size, Patchiness, and Pyrodiversity in the Southeastern United States, **https://edis.ifas.ufl.edu/FR470**
- What if Prescribed Fire is not an Option? An Overview of Alternative Vegetation and Fuel Management Treatments, **https://edis.ifas.ufl.edu/FR474**

Bulk Registration Option for the Online Forest Landowner Academy

Do you have a group of employees, clients, or other group that you'd like to enroll in the online Forest Landowner Academy? We now have a bulk registration option where you can purchase multiple "seats" in the course and assign those to people who want to take the course.

Forest landowners, and others in need of forest management information, are encouraged to enroll in this **self-paced, online**, 7-module course to connect with forest management experts at the University of Florida and receive quality core educational content on forestry and multiple-use stewardship concepts.

Single and bulk enrollment options are both available at the Forest Landowner Academy enrollment page: **https://ifas-sfrc-for.catalog.instructure.com/courses/for-fla**

For more information about the online Forest Landowner Academy, contact: Chris Demers at **cdemers@ufl.edu**, (352) 846-2375 or Dr. Michael Andreu, **mandreu@ufl.edu**

Don't miss out on news and events!

A LOT happens between quarterly issues of this newsletter!

Sign up for the regular Florida Land Steward email updates so you don't miss out on assistance and educational opportunities. Send an email to **cdemers@ufl.edu** to be added to the listserv. Email updates are sent once a week or every other week and include the latest calendar of workshops, tours, webinars, and other events; a link to the current issue of this quarterly newsletter; updates on cost-share and other assistance programs, opportunities, and resources; and other stewardship related news and information.

All the latest news and events are online at the new UF/IFAS Florida Land Steward Program web site: **https://programs.ifas.ufl.edu/florida-land-steward/**.

TIMBER PRICE UPDATE

The timber price information below is useful for observing trends over time, but does not reflect current conditions at a particular location. Landowners considering a timber sale are advised to solicit the services of a consulting forester to obtain current local market conditions.

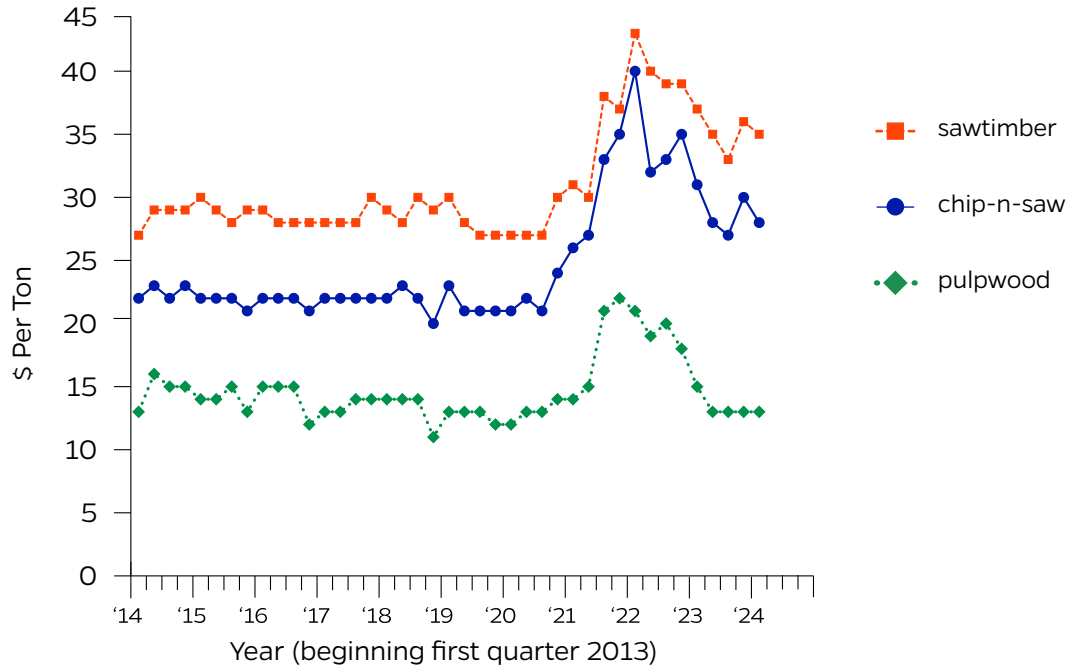
Average stumpage prices for the three major products in Florida, as reported in the **1st Quarter 2024** Timber Mart-South report were:

Florida Stumpage Prices
Pine pulpwood: $13/ton, same as 4th Qtr. 2023
Pine C-N-S: $28/ton, ↓
Pine sawtimber: $35/ton, ↓

Trend Report

Average stumpage prices for most major timber products decreased somewhat in the first quarter of 2024 in Florida, which was generally the opposite from the trend seen across much of the region. The Florida downward stumpage price trends were likely attributable in part to drier conditions rendering increased supply. As this bulletin reaches you we'll be getting into the 2024 hurricane season. Hurricanes Michael and Idalia demonstrated in recent years that major storms can have significant impacts to inland agriculture and forestry operations. Now is the time to prepare. Take the precautions recommended in our publication, "prepare your forest property for hurricane season", at **https://edis.ifas.ufl.edu/FR436**.

Average Pine Stumpage Prices for Florida ($/Ton)
1st Qtr 2014 through 1st Qtr 2024



Timber Mart-South is compiled and produced at the Center for Forest Business, Warnell School of Forest Resources, University of Georgia, under contract with the Frank W. Norris Foundation, a non-profit corporation serving the forest products industry. See **http://www.tmart-south.com/** for information on subscriptions.

CONGRATULATIONS
CERTIFIED LANDOWNERS

More information about certification in these programs is available at:

https://www.fdacs.gov/Forest-Wildfire/For-Landowners/Programs-for-Landowners/Forest-Stewardship-Program

https://www.treefarmsystem.org/florida

https://myfwc.com/lap

These landowners have achieved certification in the Tree Farm, Forest Stewardship, and/or Wildlife Habitat Recognition Programs and demonstrate excellent stewardship of their land resources.

David Owsley, Escambia County

Helen Roth with Nathan Bunting (FWC), Gadsden County

Lisa and Daniel Barlett, Escambia County

Amber and James Nims with children Scout and Barrett, Escambia County

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Upcoming Events

Date	Event, Location, Contact
May 29	**Madison County Landowner Cooperative Group Meeting**. 10 a.m.-12 p.m. ET, UF/IFAS Extension Madison County, 184 NW College Loop, Madison, FL 32340. Join us to hear how fellow landowner, Larry Perrin, offers outdoor learning experiences to youth through the Youth Hunt Program (and how you can too!). Also learn from FWC Deer Biologist, Becky Peters, about how chronic wasting disease can pose risk to Florida's deer. *Please RSVP to Megan Ellis, **Megan.Ellis@MyFWC.com**.*
May 31	**Panhandle Cattlemen's College Pasture Class.** 8 a.m.-3 p.m. CT at UF/IFAS North Florida Research and Education Center at Marianna. This Pasture Class will be a one-day, hands-on class that will allow participants to practice everything that is taught in a field setting. Bring your boots and fencing gloves. *For more information contact Kalyn Waters, UF/IFAS Extension Holmes County Agent at (850) 547-1108 or **kalyn.waters@ufl.edu**.*
June 6	**Florida Women Landowners Association: Virtual Open House/Programs Available to Landowners 101.** 7-8 p.m. EDT. We'll cover educational and financial assistance programs available to private landowners, and a recap of FWLA's recent events and upcoming events. *A registration link will be posted soon online and in email updates. Please send questions or request to **FWLA.contact@gmail.com**.*
June 11	**Landowners Assistance Expo**. 8:30 a.m.-2 p.m. ET, UF/IFAS Extension Highlands County, 4509 George Boulevard, Sebring, FL 33875. Provided by Central Florida Regional Planning Council. Featuring Technical Assistance, Cost-share Opportunities, Conservation Easements, Financial Management Implications, Land Management Plans, and more. *See **https://www.eventbrite.com/e/landowners-assistance-expo-2024-tickets-878399094337** for details and registration.*
June 12	**USDA Natural Resources Conservation Service (NRCS) State Technical Meeting.** 9 a.m.-12 p.m. ET. Participation in the meeting is open to the public in-person or remote participation. In-person attendance is limited to up to 30 members of the committee and NRCS employees at the NRCS state office in Gainesville, FL. All other stakeholders may attend the meeting virtually. *See **https://content.govdelivery.com/accounts/USDAFARMERS/bulletins/39bb37f#link_4** for details.*
Aug. 27-29	**2024 Florida Forestry Association Annual Meeting**. Mark your calendar. Venue to be announced, Amelia Island, FL. *Details will be posted on the Florida Forestry Association website at **https://www.flforestry.org/**.*

More events, webinars, webinar recordings, news, and information can be found at programs.ifas.ufl.edu/florida-land-steward

The Florida Land Steward Newsletter is joint project of the UF/IFAS Extension, Florida Forest Service, Florida Fish & Wildlife Conservation Commission, U.S. Fish & Wildlife Service, USDA Natural Resources Conservation Service and Florida Tree Farm Program:

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