

Biochar Basics and Applications for Agriculture

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ANCA biochar webinar

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Cornell CALS
College of Agriculture and Life Sciences



Factsheets available online!



BEYOND APPLICATION: LEARNING MORE ABOUT BIOCHAR



How biochar impacts soil health

These are general ways biochar impacts soil. Results vary depending upon the soil type, biochar type, plant nutrient requirements and other environmental factors.

Increases:

- Soil moisture
- Plant available water
- Water use efficiency
- Microbial activity
- Hydraulic conductivity
- pH

INICIATIVA DEL BIOCHAR EN EE.UU BIOCHAR-US.ORG

GUÍA DEL BIOCHAR PARA USOS AGRÍCOLAS

Ideas prácticas para aplicar el biochar en cultivos anuales y perennes



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FAQ Document Available

- Designed to answer common questions about biochar, biochar application, and biochar soil interactions.

https://www.pnwbiochar.org/tools/tools_336/



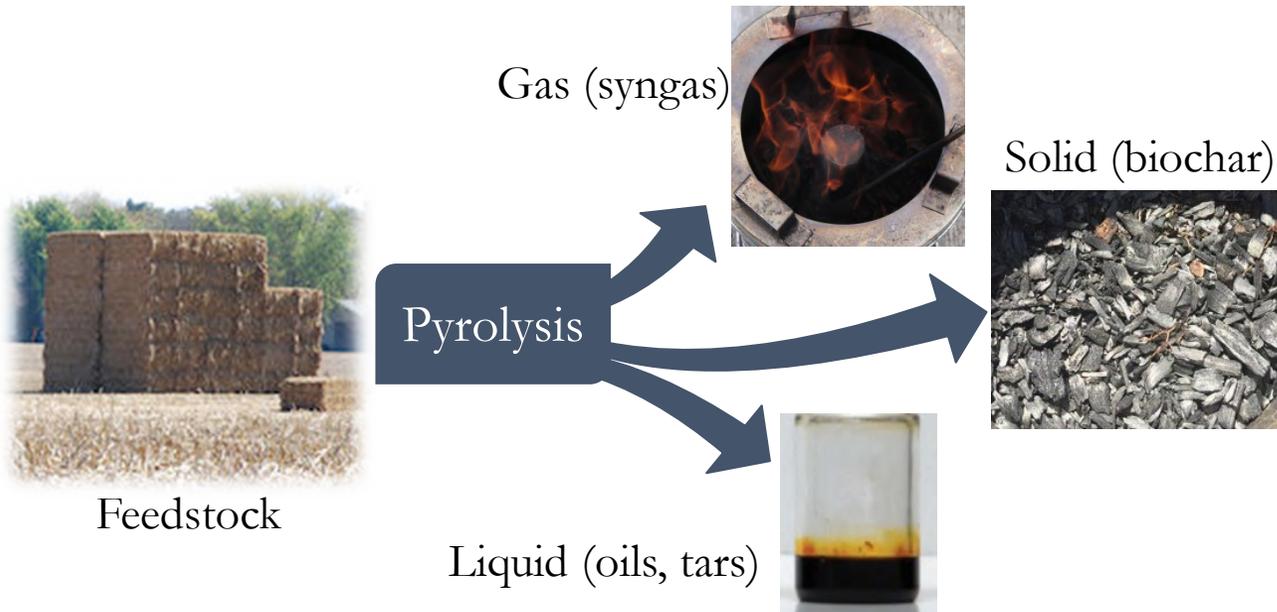
Frequently Asked Questions About Biochar Applied to Soil

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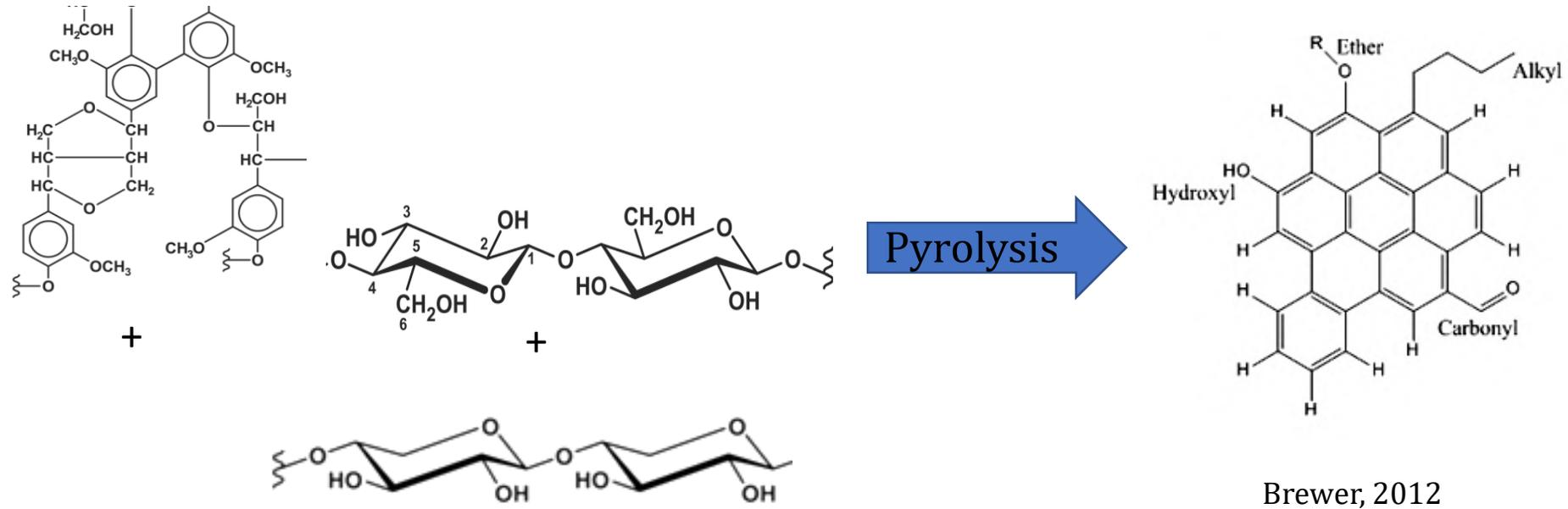
Biochar: a C-rich material made through pyrolysis

- Conversion of organic waste to a high value product
- *Pyrolysis* - the thermochemical decomposition of biomass at high temperatures in a no/very low oxygen environment



- Charcoal like material produced from organic waste materials
- ~50-90% carbon (C-rich material!)
- Highly porous – like a sponge!
- Long-lasting soil amendment

Pyrolysis makes the structure more complex!



As pyrolysis temperature increases:

- Biochar yield decreases
- Fixed carbon content, surface area, and ash content increase

Numerous benefits of biochar for agriculture and beyond

- Long lasting agronomic, environmental, and social benefits
 - Crop – growth/yields
 - Soil – fertility/health
 - Water – quality/WUE
 - Nutrients – retention/NUE
 - Microbial activity
 - Bioremediation
 - Waste management
 - Human health
 - Climate mitigation & adaptation



Biochar has long been used to improve soils

500-8000 years ago
Central Amazon

Anthropogenic
dark earths
(Glaser, 2007)



Terra Preta do Indio
(Oxisol + biochar)

Oxisol
(tropical soil)

Similar soils found in
Liberia, Germany,
Australia, US
Midwest.

Likely resulting from
repeated applications
of small amounts of
charred organic
waste materials

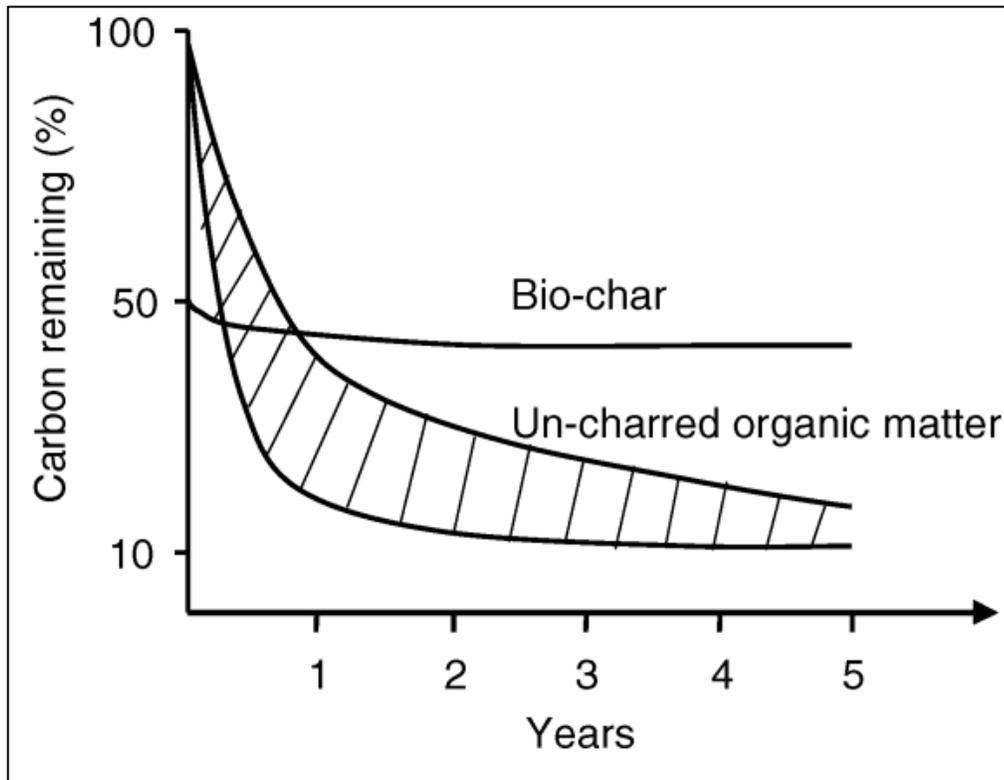
Biochar: another tool for farmers

- A powerful tool for regenerative agriculture, but not a silver bullet!
- Another tool in the soil health toolbox for farmers
- Regenerative agriculture relies on the integration of numerous practices, not a single management practice
- Utilize the 4Rs (Right – source, rate, place, time)

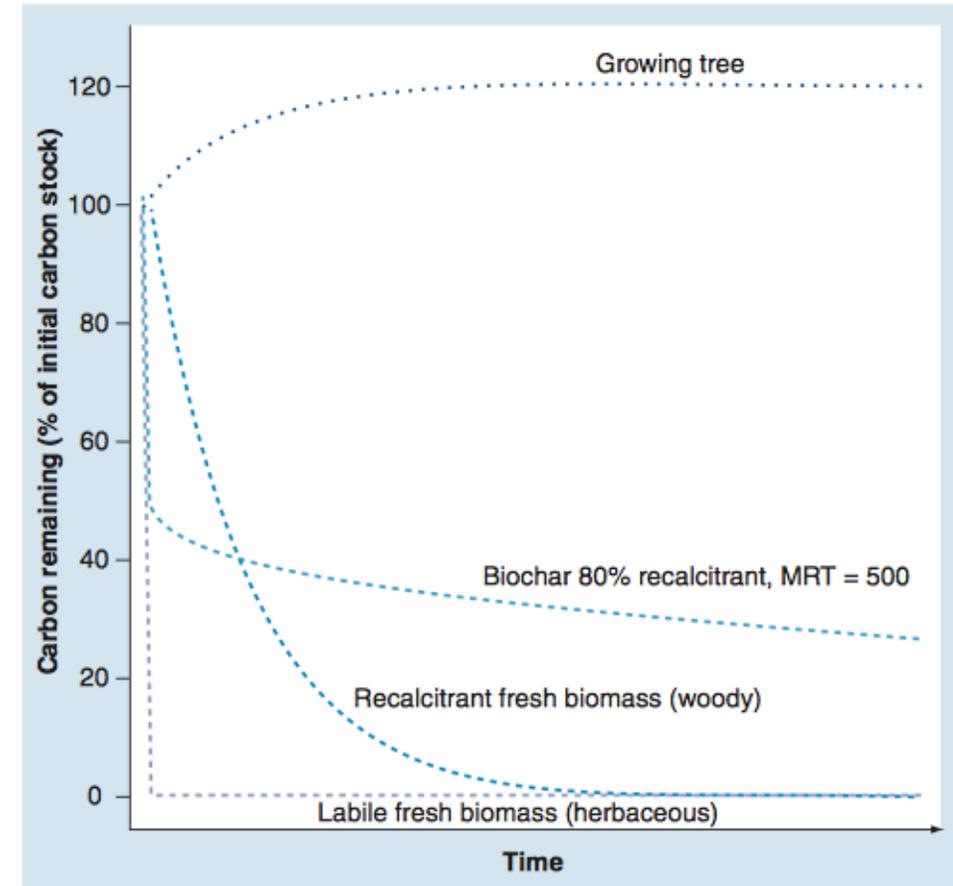


Biochar is stable in soil

Degrades on centennial time scales

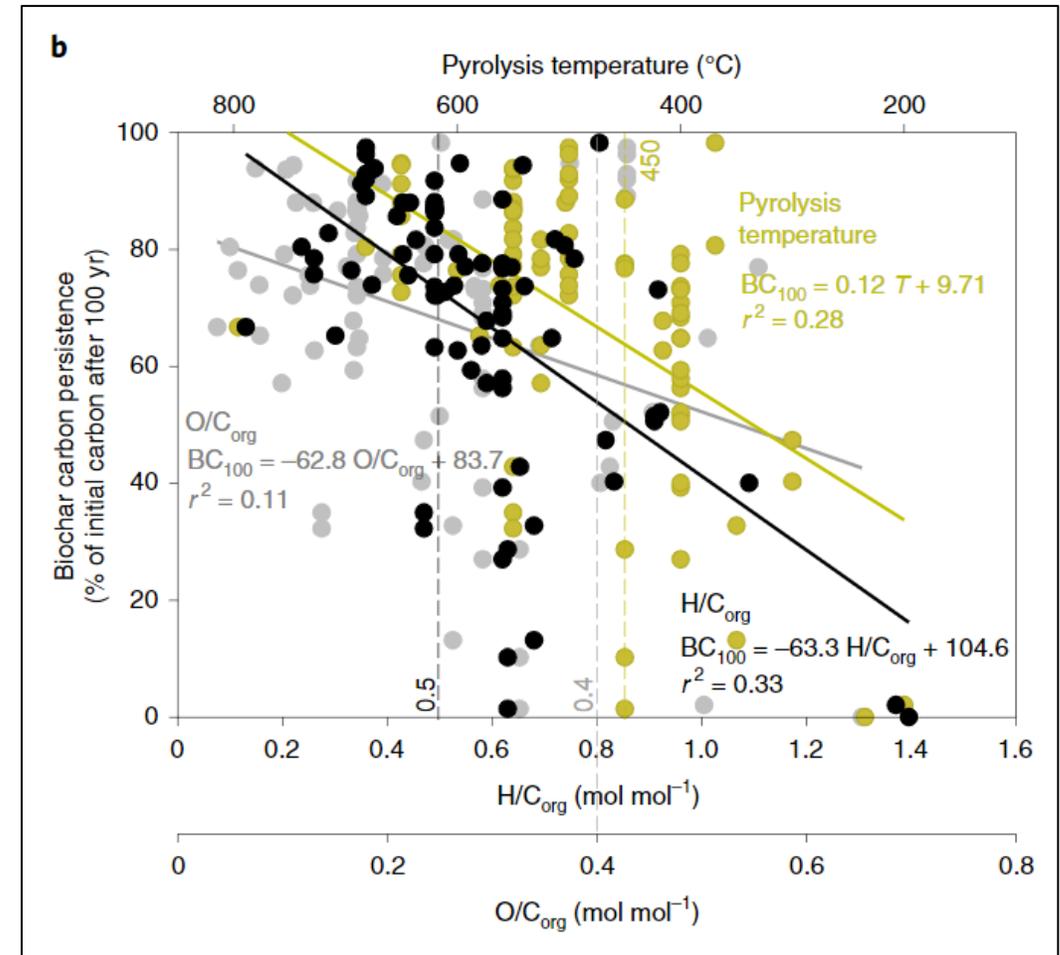
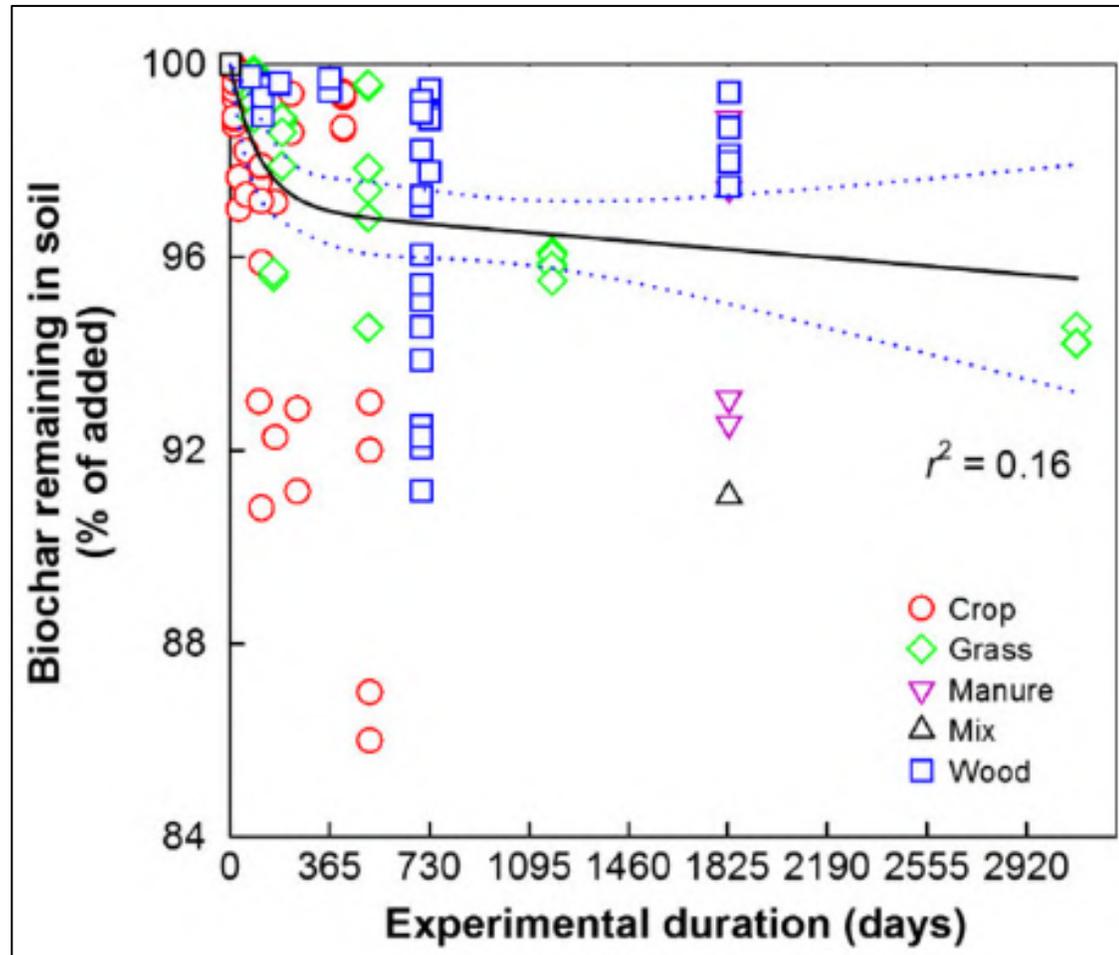


Lehmann et al., 2006. *Mitigation and Adaptation*.



Whitman et al. 2010. *Carbon Management*

But stability varies, feedstock and production condition dependent



Biochar production can occur at many scales: low-tech → industrial

Integrated Bioenergy-Biochar System



Photo: Iowa State University

Mobile Units



Photo: US Forest Service

Small kiln



Photo: The Biochar Revolution

Container Reactors



Photo: Bernardo Del Campo

*Small kiln +
cooking stove*



Photo: Debbie Aller

On-farm



Photo: Suzanne Hunt

Biochar is diverse

- Biochar

conditions



Photo Robert Brown - Iowa State University

Photo courtesy UC Davis Biochar Database

Biochar's different forms and uses

Biochars are not created equal, but this can be to our advantage in agriculture!



Be sure your Biochar(s) are certified or supplier proof of lab analysis that meets IBI Biochar Standards Version 2.1 ([Link](#))



Raw Biochar



Pelletized Biochar



Granular Biochar



Blended Biochar

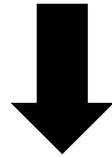


Liquid Biochar

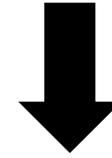
Biochar in the Northeast



Woody waste



Biosolids



Biochar Lab Report

| International BioChar Initiative (IBI) Laboratory Tests for Certification Program | | | | | | | | |
|---|--|--------------------------------|--|---------------------|---------------------------|-----------------------------------|-----------------|--------|
| | | Dry Basis Unless Stated: Range | | Units | Method | | | |
| Moisture (time of analysis) | | 78.8 | | % wet wt. | ASTM D1762-84 (105c) | | | |
| Bulk Density | | 9.8 | | lb/cu ft | | | | |
| Organic Carbon | | 90.7 | | % of total dry mass | Dry Combust-ASTM D 4373 | | | |
| Hydrogen/Carbon (H:C) | | 0.20 0.7 Max | | Molar Ratio | H dry combustion/C(above) | | | |
| Total Ash | | 3.9 | | % of total dry mass | ASTM D-1762-84 | | | |
| Total Nitrogen | | 0.61 | | % of total dry mass | Dry Combustion | | | |
| pH value | | 9.20 | | units | 4.11USCC:dil. Rajkovich | | | |
| Electrical Conductivity (EC20 w/w) | | 0.255 | | dS/m | 4.10USCC:dil. Rajkovich | | | |
| Liming (neut. Value as-CaCO3) | | 8.3 | | %CaCO3 | AOAC 955.01 | | | |
| Carbonates (as-CaCO3) | | 1.5 | | %CaCO3 | ASTM D 4373 | | | |
| Butane Act. | | 7.9 | | g/100g dry | ASTM D 5742-95 | | | |
| Surface Area Correlation | | 386 | | m2/g dry | G | | | |
| All units mg/kg dry unless stated: | | Range of | | Reporting | | Particle Size Distribution | | |
| | | Results | Max. Levels | Limit (ppm) | Method | Results | Units | Method |
| Arsenic (As) | | ND | 13 to 100 | 0.45 | J | < 0.5mm | 13.3 percent | F |
| Cadmium (Cd) | | ND | 1.4 to 39 | 0.18 | J | 0.5-1mm | 3.6 percent | F |
| Chromium (Cr) | | 81.0 | 93 to 1200 | 0.45 | J | 1-2mm | 5.8 percent | F |
| Cobalt (Co) | | 1.1 | 34 to 100 | 0.45 | J | 2-4mm | 13.5 percent | F |
| Copper (Cu) | | 7.8 | 143 to 6000 | 0.45 | J | 4-8mm | 27.2 percent | F |
| Lead (Pb) | | 0.71 | 121 to 300 | 0.18 | J | 8-16mm | 36.6 percent | F |
| Molybdenum (Mo) | | 0.58 | 5 to 75 | 0.45 | J | 16-25mm | 0.0 percent | F |
| Mercury (Hg) | | ND | 1 to 17 | 0.001 | EPA 7471 | 25-50mm | 0.0 percent | F |
| Nickel (Ni) | | 32.3 | 47 to 420 | 0.45 | J | >50mm | 0.0 percent | F |
| Selenium (Se) | | ND | 2 to 200 | 0.89 | J | Basic Soil Enhancement Properties | | |
| Zinc (Zn) | | 11.1 | 416 to 7400 | 0.89 | J | Total (K) | 2512 mg/kg | E |
| Boron (B) | | 33.8 | Declaration | 4.5 | TMECC | Total (P) | 400 mg/kg | E |
| Chlorine (Cl) | | 3713 | Declaration | 20.0 | TMECC | Ammonia (NH4-N) | 44.8 mg/kg | A |
| Sodium (Na) | | ND | Declaration | 445 | E | Nitrate (NO3-N) | 15.3 mg/kg | A |
| Iron (Fe) | | 3766 | Declaration | 22.3 | E | Organic (Org-N) | 6082 mg/kg | Calc. |
| Manganese (Mn) | | 422 | Declaration | 0.45 | J | Volatile Matter | 12.5 percent dw | D |
| * "ND" stands for "not detected" which means the result is below the reporting limit. | | | | | | | | |
| Method A Rayment & Higginson | | | G Butane Activity Surface Area Correlation Based on McLaughlin, Shields, Jagiello, & Thiele's 2012 paper: Analytical Options for Biochar Adsorption and Surface Area | | | | | |
| D ASTM D1762-84 | | | J EPA3050B/EPA 6020 | | | | | |
| E EPA3050B/EPA 6010 | | | F ASTM D 2862 Granular | | | | | |

Interpreting a Biochar Lab Report

Factsheet available

US BIOCHAR INITIATIVE
INTERPRETING BIOCHAR
LAB REPORTS

biochar-us.org

Learn about

- Biochar properties
- Interpreting a test report
- Tests recommended for different applications
- How to collect samples

Biochar's physical and chemical properties control its effectiveness in different applications. Properties are determined by:

- feedstock
- production conditions
- pre- or post- processing

Biochars differ greatly in their properties so laboratory analytical data provides a way to predict biochar's effectiveness.

Biochars are variable in their physical and chemical properties. These properties are generally

Barley straw
Seed waste, 750°C
Seed waste, 500°C
Seed waste, 350°C
Juniper (kiln)
Douglas-Fir
Poultry litter (pallets)
Juniper (moble)

Biochar feedstocks

PARTICLE SIZE

ASH CONTENT



Availability and Cost

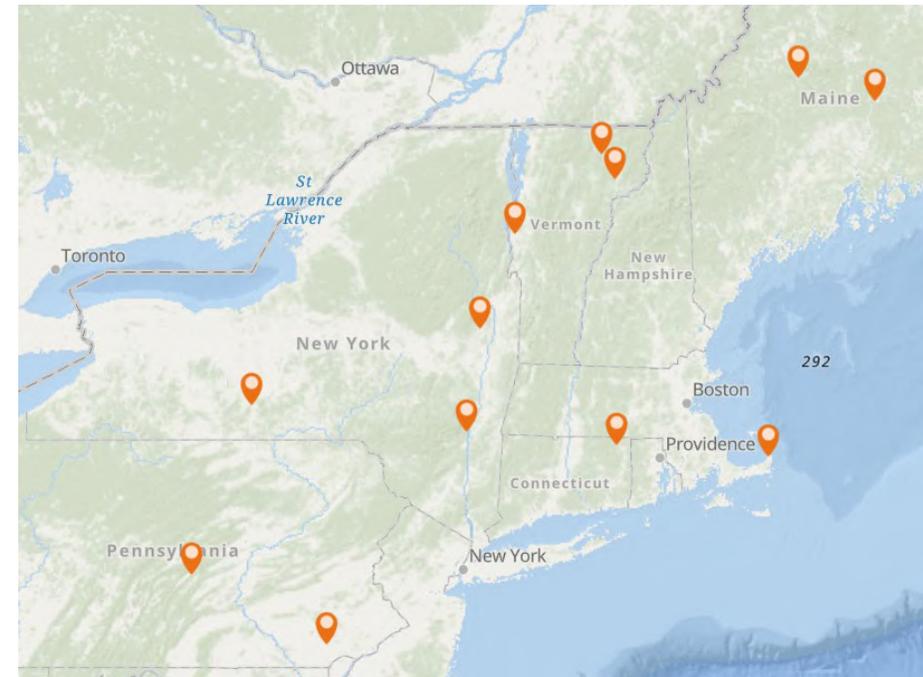
- Widely available at farm scale
- Cost remains high but continues to decrease as markets continue to grow
 - \$0 - \$2,000/ton
 - National average ~\$500/ton
- Majority of the cost is transportation – source local if possible
- Many large producers offset biochar costs with C credits and only charge freight



Photo: Oregon Biochar Solutions

Northeast Suppliers

- Various suppliers across the northeast
- I maintain a list
- Different scales of production and feedstocks
 - Larger scale suppliers (1,000-100,000 tons of biomass per year processed)
 - Blended horticulture products or smaller scale suppliers (100-1,000 tons of biomass per year processed)
- American Farmland Trust map
 - <https://farmlandinfo.org/tools/u-s-biochar-suppliers-map/>



Biochar certifications and standards exist, recently created in the US



- Biochar Certification Program administered by the IBI since 2013 (voluntary)
- Allows biochar manufacturers to verify that the biochar they produce meets minimum standards (physiochemical properties and safety tests) to confirm it is safe for use as a soil amendment
- Considers biochar diversity, to provide certainty to consumers & markets (quality assurance)
- First standards for the US biochar industry released in fall 2025
 - ANSI/ASABE/USBI S668: Methods for Measurement and Testing of Biochar
 - Two more standards in process

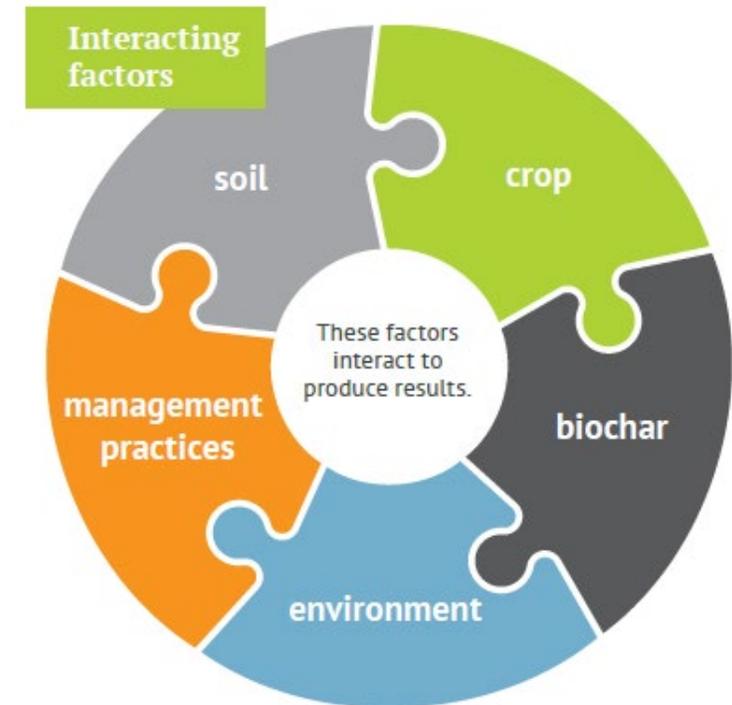
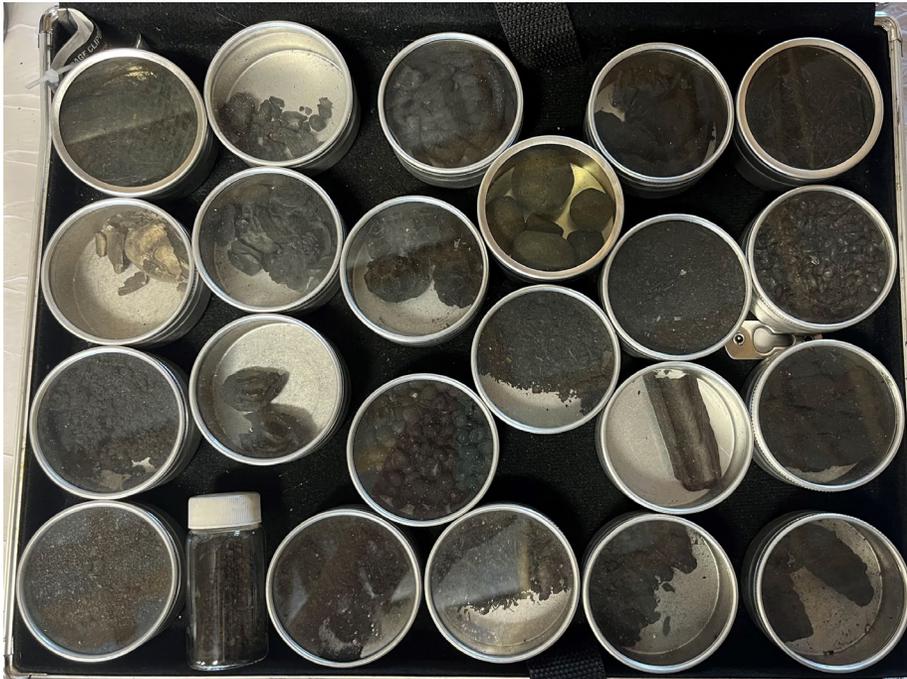


<https://biochar-international.org/certification-program/>

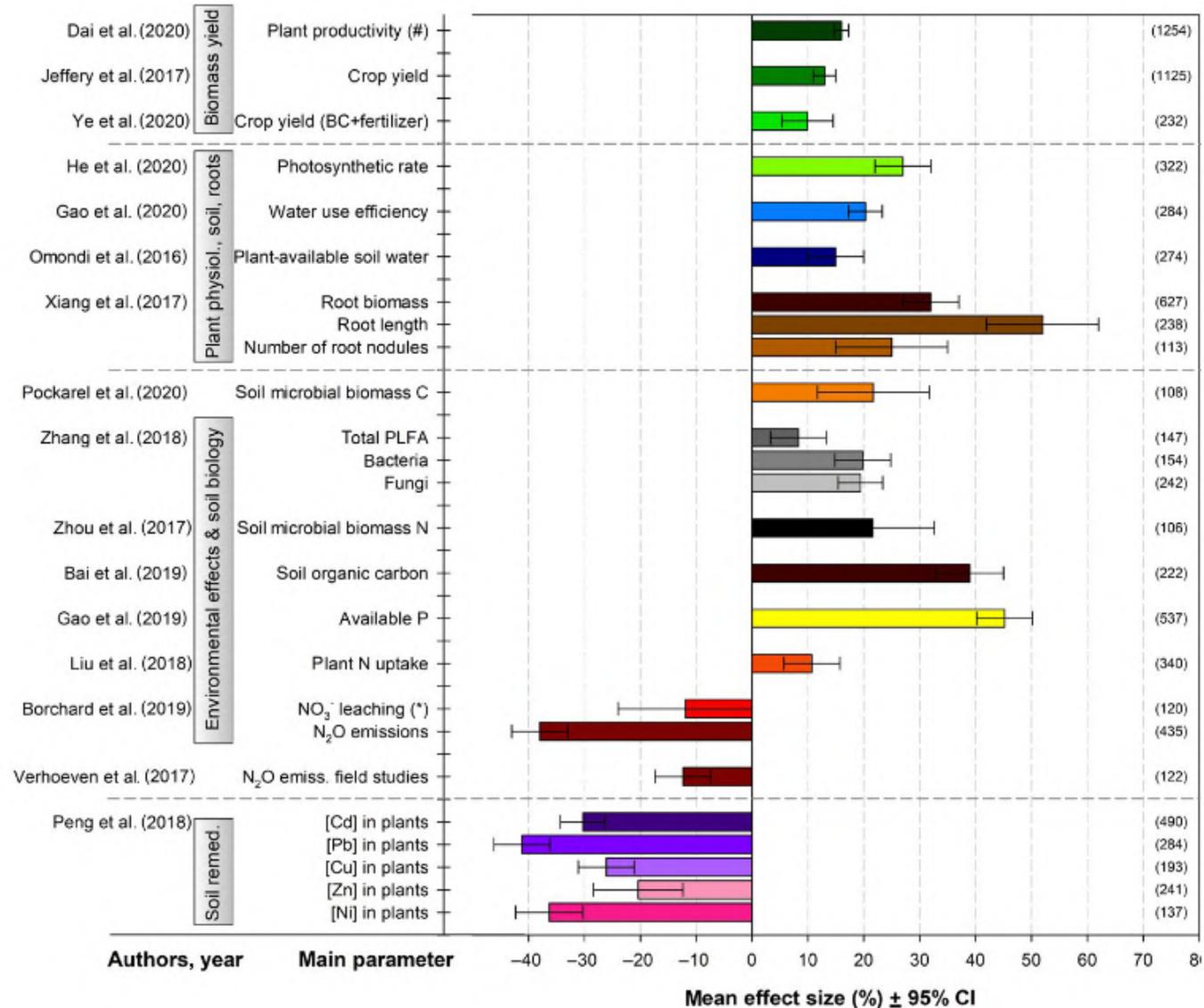
https://www.biochar-international.org/wp-content/uploads/2018/04/IBI_Biochar_Standards_V2.1_Final.pdf

Biochar diversity leads to different impacts

- Impacts are **soil** x **crop** x **biochar** x **environment** x **management** dependent
 - Properties and impacts change over time (fresh vs. ‘aged’) (Joseph et al., 2021)
 - Can produce designer biochars for specific end uses (Novak et al., 2009)



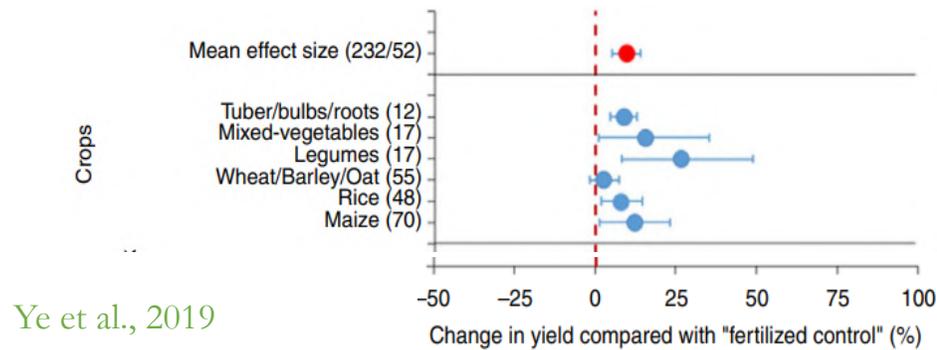
Across thousands of studies biochar positively impacts numerous agronomic parameters



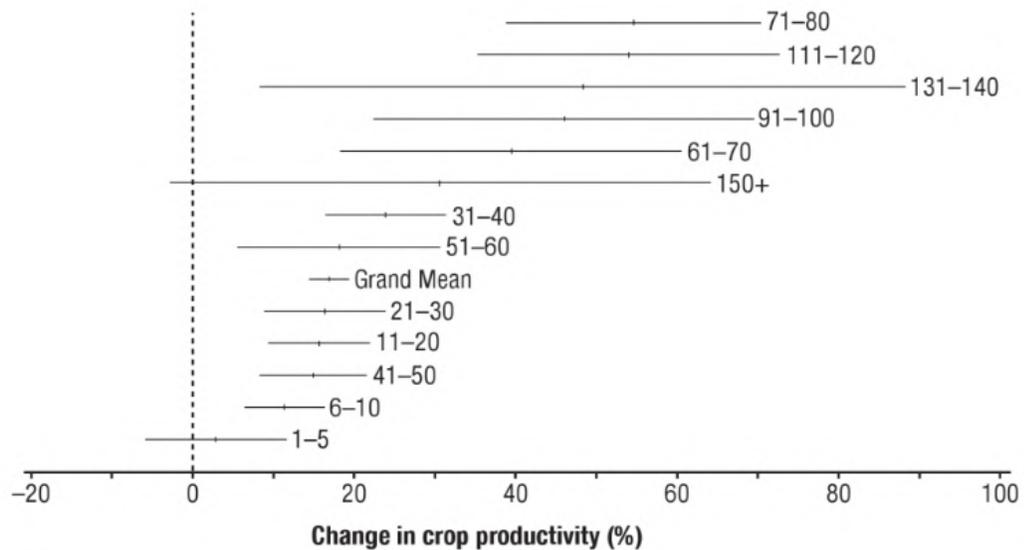
Systematic review of 26 meta-analyses published between 2016-2020

Schmidt et al., 2021
<https://doi.org/10.1111/gcbb.12889>

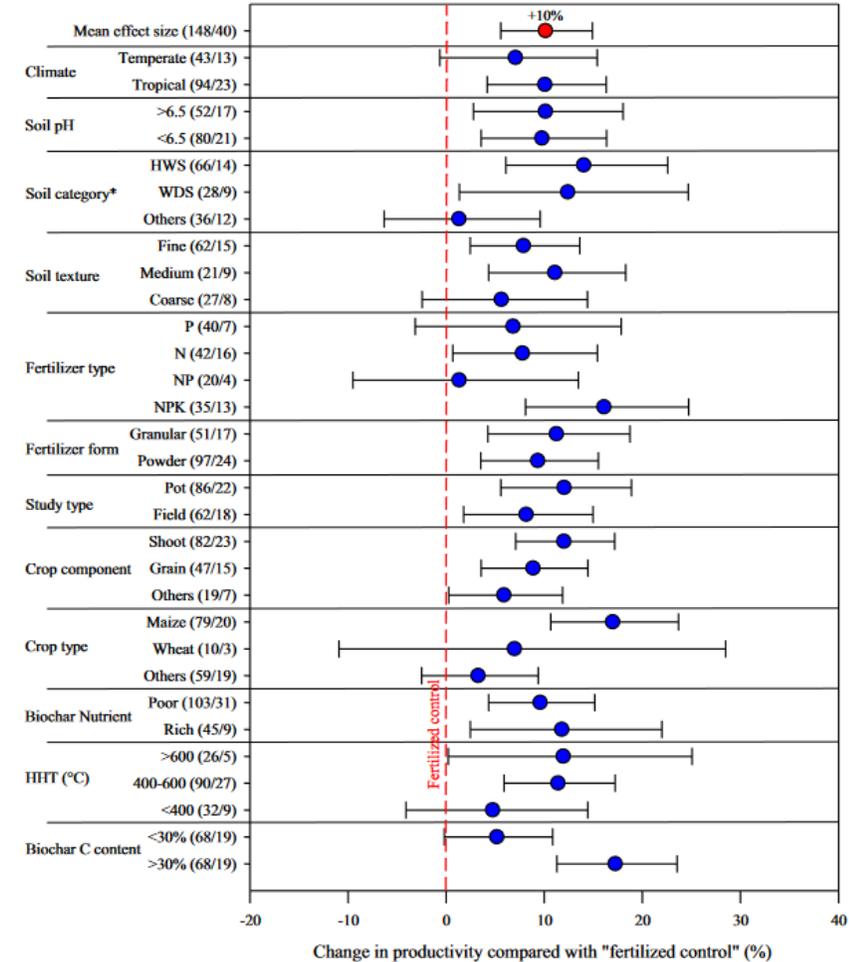
Global crop yields increase with biochar application: 11-28% above average



Ye et al., 2019

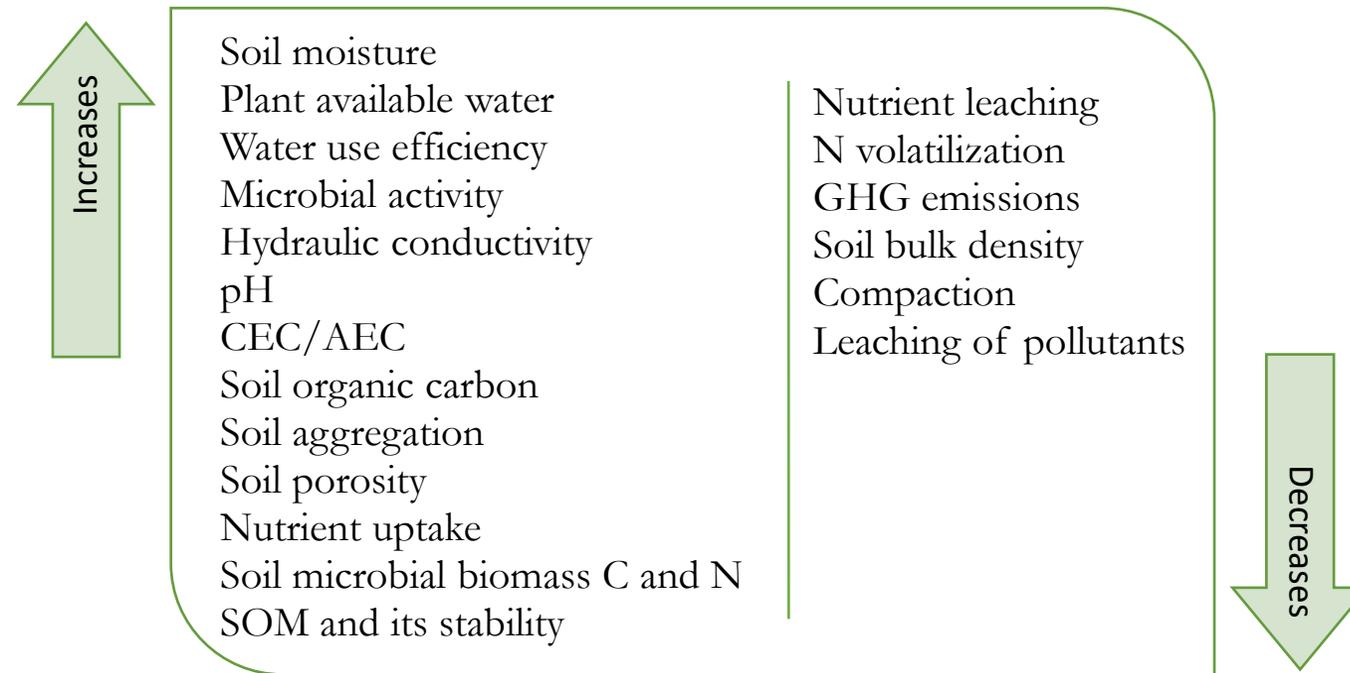


Jeffery et al., 2011



Melo et al., 2022

Biochar improves soil health and can be part of the soil health management toolbox



- Contributes to negative priming over the long-term (Wang et al., 2016; Blanco-canqui et al., 2019; Joseph et al., 2021)
- 33% of the global soils have been degraded, but soil degradation can be reversed by increasing SOC stocks, and the most effective way to accumulate SOC is to increase C inputs (FAO, 2019; Lal et al., 2018; Fujisaki et al., 2018)

What is your resource concern?

biochar is not one size fits all

Nutrient use efficiency

Organic Matter

Water retention

Soil pH

Microbial Activity

Structure

Compaction

Infiltration

Aeration

Erosion

Disease

Fertility

C sequestration

Utilize the 4Rs

4R Principles of Nutrient Stewardship



RIGHT SOURCE

Matches fertilizer type to crop needs.



RIGHT RATE

Matches amount of fertilizer to crop needs.



RIGHT TIME

Makes nutrients available when crops need them.



RIGHT PLACE

Keeps nutrients where crops can use them.

Right Source



Right Rate



Right Time



Right Place



Photo: Doug Beck

Right Source: local, available, sustainable



Photo: David Laird

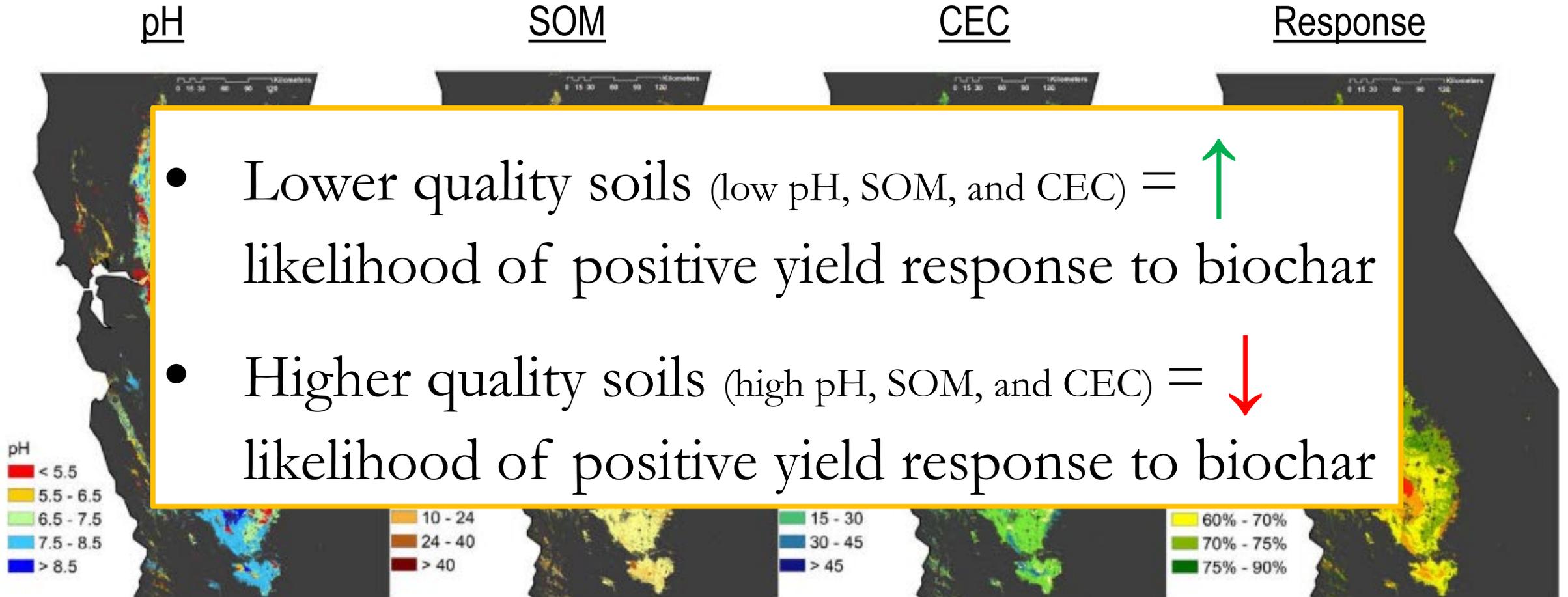


Photo: Isabel Lima



Right Place: where do I apply biochar?

Example: Central Valley, California



Right Place: where do I apply biochar?

Example: Central Valley, California

pH

SOM

CEC

Response

Impact is less pronounced in **clayey soils**, but studies have shown:

- Increased macro- and mesopore volume, total porosity, available water capacity, and soil aggregation (Sun and Lu, 2019)
- Decreased soil bulk density (Obia et al., 2018)

pH



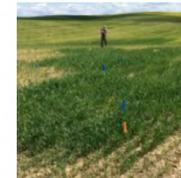
Decision support tools are available!

Web Soil Survey (WSS)

The screenshot displays the Web Soil Survey (WSS) interface. The main map area shows a field with various soil health ratings, including 'Ro', 'ApA', 'ApB', 'ApC', 'ApD', 'ApE', 'ApF', 'ApG', 'ApH', 'ApI', 'ApJ', 'ApK', 'ApL', 'ApM', 'ApN', 'ApO', 'ApP', 'ApQ', 'ApR', 'ApS', 'ApT', 'ApU', 'ApV', 'ApW', 'ApX', 'ApY', 'ApZ', 'ApAA', 'ApAB', 'ApAC', 'ApAD', 'ApAE', 'ApAF', 'ApAG', 'ApAH', 'ApAI', 'ApAJ', 'ApAK', 'ApAL', 'ApAM', 'ApAN', 'ApAO', 'ApAP', 'ApAQ', 'ApAR', 'ApAS', 'ApAT', 'ApAU', 'ApAV', 'ApAW', 'ApAX', 'ApAY', 'ApAZ', 'ApBA', 'ApBB', 'ApBC', 'ApBD', 'ApBE', 'ApBF', 'ApBG', 'ApBH', 'ApBI', 'ApBJ', 'ApBK', 'ApBL', 'ApBM', 'ApBN', 'ApBO', 'ApBP', 'ApBQ', 'ApBR', 'ApBS', 'ApBT', 'ApBU', 'ApBV', 'ApBW', 'ApBX', 'ApBY', 'ApBZ', 'ApCA', 'ApCB', 'ApCC', 'ApCD', 'ApCE', 'ApCF', 'ApCG', 'ApCH', 'ApCI', 'ApCJ', 'ApCK', 'ApCL', 'ApCM', 'ApCN', 'ApCO', 'ApCP', 'ApCQ', 'ApCR', 'ApCS', 'ApCT', 'ApCU', 'ApCV', 'ApCW', 'ApCX', 'ApCY', 'ApCZ', 'ApDA', 'ApDB', 'ApDC', 'ApDD', 'ApDE', 'ApDF', 'ApDG', 'ApDH', 'ApDI', 'ApDJ', 'ApDK', 'ApDL', 'ApDM', 'ApDN', 'ApDO', 'ApDP', 'ApDQ', 'ApDR', 'ApDS', 'ApDT', 'ApDU', 'ApDV', 'ApDW', 'ApDX', 'ApDY', 'ApDZ', 'ApEA', 'ApEB', 'ApEC', 'ApED', 'ApEE', 'ApEF', 'ApEG', 'ApEH', 'ApEI', 'ApEJ', 'ApEK', 'ApEL', 'ApEM', 'ApEN', 'ApEO', 'ApEP', 'ApEQ', 'ApER', 'ApES', 'ApET', 'ApEU', 'ApEV', 'ApEW', 'ApEX', 'ApEY', 'ApEZ', 'ApFA', 'ApFB', 'ApFC', 'ApFD', 'ApFE', 'ApFF', 'ApFG', 'ApFH', 'ApFI', 'ApFJ', 'ApFK', 'ApFL', 'ApFM', 'ApFN', 'ApFO', 'ApFP', 'ApFQ', 'ApFR', 'ApFS', 'ApFT', 'ApFU', 'ApFV', 'ApFW', 'ApFX', 'ApFY', 'ApFZ', 'ApGA', 'ApGB', 'ApGC', 'ApGD', 'ApGE', 'ApGF', 'ApGG', 'ApGH', 'ApGI', 'ApGJ', 'ApGK', 'ApGL', 'ApGM', 'ApGN', 'ApGO', 'ApGP', 'ApGQ', 'ApGR', 'ApGS', 'ApGT', 'ApGU', 'ApGV', 'ApGW', 'ApGX', 'ApGY', 'ApGZ', 'ApHA', 'ApHB', 'ApHC', 'ApHD', 'ApHE', 'ApHF', 'ApHG', 'ApHH', 'ApHI', 'ApHJ', 'ApHK', 'ApHL', 'ApHM', 'ApHN', 'ApHO', 'ApHP', 'ApHQ', 'ApHR', 'ApHS', 'ApHT', 'ApHU', 'ApHV', 'ApHW', 'ApHX', 'ApHY', 'ApHZ', 'ApIA', 'ApIB', 'ApIC', 'ApID', 'ApIE', 'ApIF', 'ApIG', 'ApIH', 'ApII', 'ApIJ', 'ApIK', 'ApIL', 'ApIM', 'ApIN', 'ApIO', 'ApIP', 'ApIQ', 'ApIR', 'ApIS', 'ApIT', 'ApIU', 'ApIV', 'ApIW', 'ApIX', 'ApIY', 'ApIZ', 'ApJA', 'ApJB', 'ApJC', 'ApJD', 'ApJE', 'ApJF', 'ApJG', 'ApJH', 'ApJI', 'ApJJ', 'ApJK', 'ApJL', 'ApJM', 'ApJN', 'ApJO', 'ApJP', 'ApJQ', 'ApJR', 'ApJS', 'ApJT', 'ApJU', 'ApJV', 'ApJW', 'ApJX', 'ApJY', 'ApJZ', 'ApKA', 'ApKB', 'ApKC', 'ApKD', 'ApKE', 'ApKF', 'ApKG', 'ApKH', 'ApKI', 'ApKJ', 'ApKK', 'ApKL', 'ApKM', 'ApKN', 'ApKO', 'ApKP', 'ApKQ', 'ApKR', 'ApKS', 'ApKT', 'ApKU', 'ApKV', 'ApKW', 'ApKX', 'ApKY', 'ApKZ', 'ApLA', 'ApLB', 'ApLC', 'ApLD', 'ApLE', 'ApLF', 'ApLG', 'ApLH', 'ApLI', 'ApLJ', 'ApLK', 'ApLL', 'ApLM', 'ApLN', 'ApLO', 'ApLP', 'ApLQ', 'ApLR', 'ApLS', 'ApLT', 'ApLU', 'ApLV', 'ApLW', 'ApLX', 'ApLY', 'ApLZ', 'ApMA', 'ApMB', 'ApMC', 'ApMD', 'ApME', 'ApMF', 'ApMG', 'ApMH', 'ApMI', 'ApMJ', 'ApMK', 'ApML', 'ApMM', 'ApMN', 'ApMO', 'ApMP', 'ApMQ', 'ApMR', 'ApMS', 'ApMT', 'ApMU', 'ApMV', 'ApMW', 'ApMX', 'ApMY', 'ApMZ', 'ApNA', 'ApNB', 'ApNC', 'ApND', 'ApNE', 'ApNF', 'ApNG', 'ApNH', 'ApNI', 'ApNJ', 'ApNK', 'ApNL', 'ApNM', 'ApNN', 'ApNO', 'ApNP', 'ApNQ', 'ApNR', 'ApNS', 'ApNT', 'ApNU', 'ApNV', 'ApNW', 'ApNX', 'ApNY', 'ApNZ', 'ApOA', 'ApOB', 'ApOC', 'ApOD', 'ApOE', 'ApOF', 'ApOG', 'ApOH', 'ApOI', 'ApOJ', 'ApOK', 'ApOL', 'ApOM', 'ApON', 'ApOO', 'ApOP', 'ApOQ', 'ApOR', 'ApOS', 'ApOT', 'ApOU', 'ApOV', 'ApOW', 'ApOX', 'ApOY', 'ApOZ', 'ApPA', 'ApPB', 'ApPC', 'ApPD', 'ApPE', 'ApPF', 'ApPG', 'ApPH', 'ApPI', 'ApPJ', 'ApPK', 'ApPL', 'ApPM', 'ApPN', 'ApPO', 'ApPP', 'ApPQ', 'ApPR', 'ApPS', 'ApPT', 'ApPU', 'ApPV', 'ApPW', 'ApPX', 'ApPY', 'ApPZ', 'ApQA', 'ApQB', 'ApQC', 'ApQD', 'ApQE', 'ApQF', 'ApQG', 'ApQH', 'ApQI', 'ApQJ', 'ApQK', 'ApQL', 'ApQM', 'ApQN', 'ApQO', 'ApQP', 'ApQQ', 'ApQR', 'ApQS', 'ApQT', 'ApQU', 'ApQV', 'ApQW', 'ApQX', 'ApQY', 'ApQZ', 'ApRA', 'ApRB', 'ApRC', 'ApRD', 'ApRE', 'ApRF', 'ApRG', 'ApRH', 'ApRI', 'ApRJ', 'ApRK', 'ApRL', 'ApRM', 'ApRN', 'ApRO', 'ApRP', 'ApRQ', 'ApRR', 'ApRS', 'ApRT', 'ApRU', 'ApRV', 'ApRW', 'ApRX', 'ApRY', 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The sidebar on the left contains a search bar and a list of 'Suitabilities and Limitations Ratings' such as 'Building Site Development', 'Construction Materials', 'Disaster Recovery Planning', 'Land Classifications', 'Land Management', 'Military Operations', 'Recreational Development', 'Sanitary Facilities', and 'Soil Health'. The 'Soil Health' section is expanded to show 'Agricultural Organic Soil Subsidence' and 'Dynamic Soil Properties Response to Biochar'. The 'Dynamic Soil Properties Response to Biochar' section has 'View Description' and 'View Rating' buttons. Below this, there are 'View Options' for 'Map' and 'Table', and a 'Description of Rating' section.

<https://websoilsurvey.sc.egov.usda.gov/app/>

Biochar Atlas



[Soils Data Explorer](#)

Explore soils data from the Natural Resources Conservation Service to



[Biochar Property Explorer](#)

This tool shows the agricultural properties of different biochars made Northwest. Explore the data to see how feedstock and production cor



[Biochar Selection Tool](#)

This tool guides users to assess their soil needs, select the most appropriate amendment rate.



[Cost Benefit Analysis Tool](#)

This tool guides users through a cost-benefit analysis to assess wheth

<http://www.pnwbiochar.org/>

Right Rate: More is not always better

- Application rates differ: S x C x B x E x M
- Field rates: 1-10 t/ac at a single time
 - 1 t/ac (4 cu yd/ac) – lowest effective rate to improve soil organism habitat
 - 3 t/ac (12 cu yd/ac) – for improved SOM levels
- Container rates and tree plantings: 5-25% (v/v)

Photo: Sam Rathke



Inoculating/Charging/Blending

- The temperatures at which biochars are produced creates an inert material (except nutrient rich feedstocks like manure)
- Biochar is a soil amendment not a fertilizer – must still meet the nutrient needs of your crop (although research is happening around biochar-based fertilizers)
- Biochar is the backbone that acts as a home for microbes and to slowly release nutrients
- Need to add microbes and nutrients to initiate surface reactions
- Mixing with compost, manure, microbial solutions, etc. adds biology and labile (bioavailable) nutrients as well as improves the efficiency of these amendments
 - Prevents nutrient immobilization and possible yield drag or loss
 - More economical
- No consensus on the amount of time needed to activate before use: 1-3 weeks has been recommended.

Inoculating/Charging/Blending

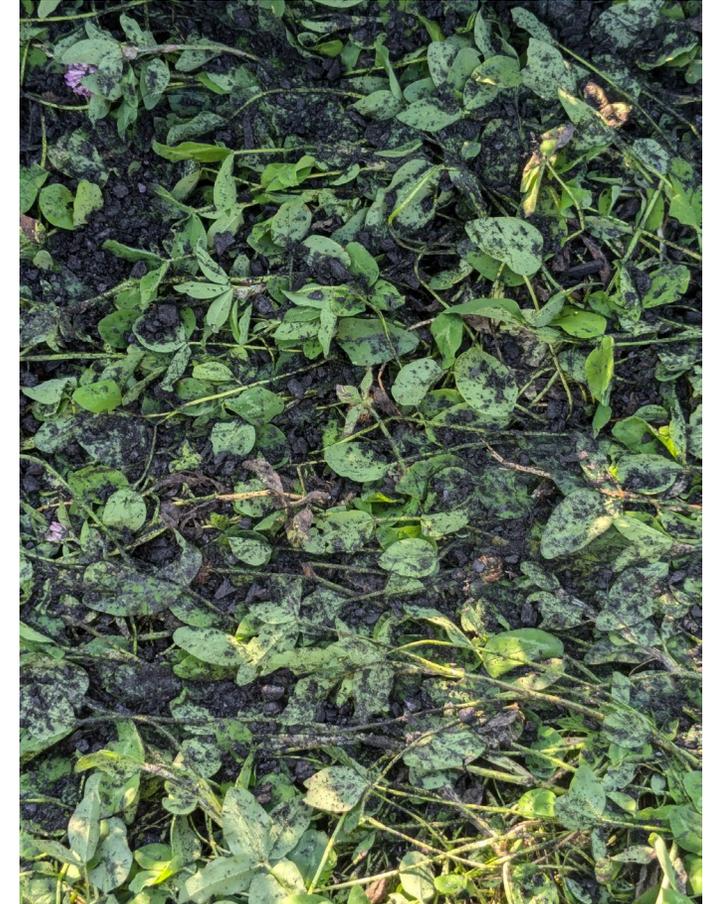
Photo: Suzanne Hunt



Mix with compost



Mix with compost tea



Broadcast applied then tilled in
with legume cover crop

Biochar and Compost



Photo: Aaron Ristow

Right Time: single & repeated applications work

- **Single applications**

- Biochar resists decomposition so does not need to be applied annually
- Ideal for perennial cropping systems where the biochar can be incorporated directly into the root zone (closer to the main roots)

- **Repeated applications**

- More economically feasible
- May align better with current management practices (no-till, equipment, logistics, etc.)



Many ways to apply biochar, and at different scales of production



Broadcast



Precision Applications



Photo: Kristin Trippe



Photo: Kirsten Workman



Photo: Andrew Borner

Hand application



Photo: Ben Roosa



Photo: Roy Smith



Lime spreader



Drop spreader



Manure & spinner spreader



Other application considerations



- Moisten biochar before application to minimize dust and reduce risk of loss
- Do not apply on a windy day
- Incorporate biochar into soil
- Use appropriate PPE
- Pelletized biochar
 - produced by compacting residual biochar into small pellets with or without a binder
 - Easier to transport and apply using existing equipment and makes biochar denser, reducing potential loss
- Prilled biochar
 - Similar product to prilled urea plus biochar
 - Aids in slow release of N and improved fertilizer use efficiency

CPS 336 – Soil Carbon Amendment

- Supports the application of biochar, compost, and other state-approved carbon amendments to increase soil carbon sequestration and improve soil health across various land uses.
- Trying to get more carbon back into the soil
- Financial assistance opportunity for farmers
- Make sure compost meets the USCC Seal of Testing Assurance Program (STA) and/or the Biochar meets the International Biochar Initiative (IBI) Certified biochar seal

<https://www.compostingcouncil.org/page/NRCSCode336ResourceHub>

<https://www.nrcs.usda.gov/resources/guides-and-instructions/soil-carbon-amendment-ac-336-conservation-practice-standard>

 United States Department of Agriculture 336-CPS-1

Natural Resources Conservation Service
CONSERVATION PRACTICE STANDARD
SOIL CARBON AMENDMENT
CODE 336
(ac)

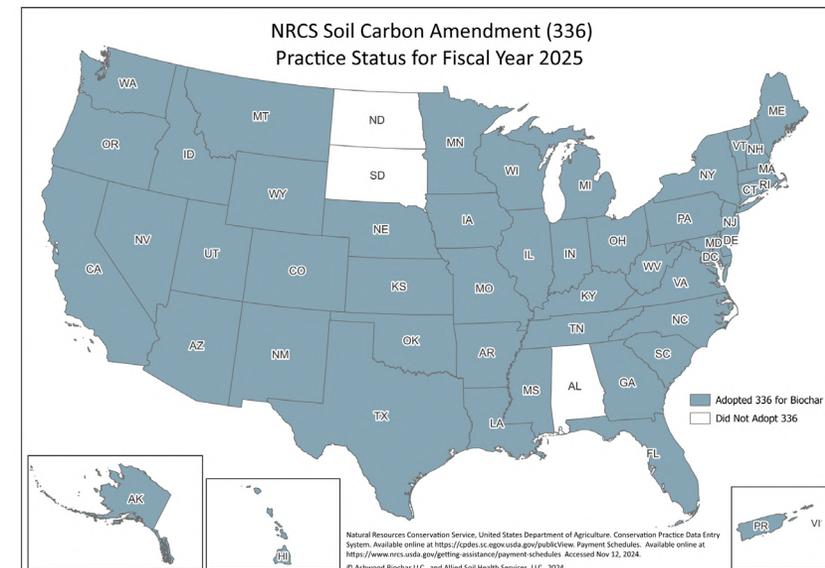
DEFINITION
Application of carbon-based amendments derived from plant materials or treated animal byproducts.

PURPOSE
Use this practice to accomplish one or more of the following purposes:

- Improve or maintain soil organic matter.
- Sequester carbon and enhance soil carbon (C) stocks.
- Improve soil aggregate stability.
- Improve habitat for soil organisms.

CONDITIONS WHERE PRACTICE APPLIES
This practice applies to areas of Crop, Pasture, Range, Forest, Associated Agriculture Lands, Developed Land, and Farmstead where organic carbon amendment applications will improve soil conditions.

CRITERIA



Summary Points

- Biochar is a long-lasting C-rich soil amendment that has potential benefits for improving crop yields and soil health, and sequestering C in soils
- Biochar can provide benefits to both annual and perennial crop production systems
- Biochar applications should be made strategically to degraded or poor performing areas of fields
- Inoculate biochar before application to crops to eliminate nutrient immobilization
- Incorporate biochar into existing management strategies
- Cost of biochar continues to decrease, availability continues to increase
- Decision support tools and financial assistance to qualifying farmers will help encourage greater adoption in the agriculture industry



Thank you! Questions?

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