United States Department of Agriculture

CONSERVATION ENHANCEMENT ACTIVITY

E384A

CONSERVATION STEWARDSHIP PROGRAM

Biochar production from woody residue

Conservation Practice 384: Woody Residue Treatment

APPLICABLE LAND USE: Forest, Associated Ag Land

RESOURCE CONCERN: Plants; Soil

ENHANCEMENT LIFE SPAN: 10 years

Enhancement Description

Uses woody debris remaining after fuel reduction harvests or wildfires to create biochar. Biochar stores carbon and is a useful soil amendment that improves Soil Organic Matter (SOM) and water-holding capacity.

Criteria

- States will apply general criteria from the NRCS National Conservation Practice Standard Woody Residue Treatment (Code 384) as listed below, and additional criteria as required by the NRCS State Office.
- The enhancement will be applied to sites where woody debris presents a fire risk or interferes with land management objectives or planned activities (e.g., impedes regeneration, limits access, interferes with livestock movement, etc.).
- Woody debris that does not have a commercial use is suitable for biochar creation.
- Where this enhancement can be coordinated with a fuel reduction treatment, woody debris should be separated by size classes if possible.
- Biochar will be created on site in kilns designed for the purpose.
- Kiln operators shall be properly trained in procedures for creating biochar and shall adhere to state safety precautions. A plan for quenching biochar will be in place prior

to lighting kilns, and the capability for quenching will be maintained during firing and while the char is cooling.

- Biochar may be spread in the forest to enrich soils or used elsewhere on the operation.
  - Biochar may be spread in forests using equipment such as a bucket loader on a tractor, or a manure spreader. It is best to spread biochar just before the start of a moist season. Incorporate biochar into the forest floor or mix with an organic material (e.g., manure, compost, etc.) before spreading, where possible.
  - If applying biochar to agricultural fields, apply in appropriate amounts based on soil analyses of the fields, and an analysis of typical biochar produced within the geographic area and forest type.
  - Biochar may be used in manure treatment (e.g., to reduce odors in barns, as an amendment in manure composting, etc.).
- Care shall be taken to minimize impacts on residual plant communities during biochar creation.
- Timing of biochar creation shall coincide with periods of low fire risk.
- Any residual woody material left on the site after treatment will not present an unacceptable fire, safety, environmental, or pest hazard. Such remaining material will not interfere with the intended purpose or other planned management activities.
- The use of woody material to create biochar shall not be detrimental to the site. Soil and water resources will be protected during the activity. Adequate woody material will be left to maintain wildlife habitat. Activities will be consistent with established regulations and guidelines for Woody Biomass Retention and Harvesting, if available.
- Activities will be consistent with established regulations and guidelines for PM10 and PM2.5 emissions, ozone precursors (NOx and VOCs), as well as smoke and fugitive dust, and state and local permit requirements.
- Secure all necessary approvals and permits prior to conducting biochar creation. Burning permits may be required.
- Access by vehicles or people will be controlled during biochar creation for safety.

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Documentation and Implementation Requirements:

Participant will:

- ☐ Prior to implementation, identify a suitable location for producing biochar, away from flammable vegetation, livestock, structures, and any desirable vegetation.
- ☐ Prior to implementation, arrange to have equipment on-site that is specially designed for biochar production meeting state or NRCS requirements, if any.
- ☐ Prior to implementation, complete a biochar site safety plan. Arrange to have enough water on-site to quench the biochar. Ensure that persons managing the biochar operation are properly trained. Have biochar site safety plan documentation available for NRCS review.
- ☐ Prior to implementation, acquire all necessary approvals and permits (i.e. local, state, or federal, as applicable).
- ☐ Prior to implementation, develop a plan for using the biochar. If the biochar is intended to be used on agricultural fields, consult a technical specialist about chemical properties of the biochar. Amend the biochar with additives as needed to ensure proper soil chemistry.
- ☐ During implementation, restrict access to the biochar production site so that only trained operators are present.
- ☐ During implementation, and prior to ignition of biochar fuels, acquire a current fire weather forecast and ensure all weather conditions are appropriate. If conditions are not suitable, postpone burning. Only produce biochar when fire danger is low.
- ☐ During implementation, maintain all safety procedures during biochar production and until biochar is fully quenched and cooled.
- ☐ After implementation, use the biochar on the operation as planned.

NRCS will:

- ☐ Prior to implementation, verify the enhancement is planned for the appropriate land use, and woody residue is not suitable for other uses.
- ☐ Prior to implementation, verify the safety plan and training meets the enhancement criteria and state or NRCS requirements.
- ☐ As needed, prior to implementation, NRCS will provide technical assistance in:
  - o Selecting suitable locations for biochar production.

- Advising on tests for biochar chemistry, and on biochar amendments for field application.
- Preparing specifications for applying this enhancement for each site using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan, or other acceptable documentation.

☐ Prior to implementation, as needed, provide explanation and technical assistance to the following conservation practice standard as related to implementing this enhancement.

- NRCS Conservation Practice Standard Woody Residue Treatment (Code 384)

☐ During implementation, evaluate any planned changes to verify they meet the enhancement criteria.

☐ After implementation, verify the biochar is being used as planned.

NRCS Documentation Review:

I have reviewed all required participant documentation and have determined the participant has implemented the enhancement and met all criteria and requirements.

Participant Name _____ Contract Number _____

Total Amount Applied _____ Fiscal Year Completed _____

_____ _____

NRCS Technical Adequacy Signature Date

OREGON SUPPLEMENT TO CONSERVATION

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Additional Recommendations and Guidance

Biochar is a modern technology that returns carbon to the soil in the form of long-lasting charcoal. It's made by baking biomass (such as tree wood, plants, manure, and other organic materials) without the oxygen that could cause it to burn completely to ash. Consider current size classes of material to be disposed and converted to biochar. Ensure the kiln design is adequate to dispose of the majority of the material on site.

- How to make Biochar in a burn pile
- Using a Flame Cap Kiln
- Kiln Construction Drawings, Oregon Kiln and Ring of Fire Kiln
- How to Use Biochar in Barns
- How to Use Biochar in Compost
- Plant Bioassays to Evaluate Biochar Compost
- Wilson Biochar Website
- CIG Final Report and Practice guidelines