IAMP—Carbon Amendment with Biochar (within NRCS Code 336)

Description: Biochar is a carbon rich material obtained through partial combustion of biomass, typically cropped residues, manure, or forest slag. Biochar can be applied as a soil amendment to raise soil pH, reduce nitrogen leaching, and increase water holding capacity. It can also be incorporated into soils to improve soil structure and long-term organic matter stability. As described in NRCS Soil Carbon Amendment practices (Code 336), biochar is produced by heating biomass at temperature more than 350 degrees under conditions of controlled and limited oxygen concentrations to prevent combustion. Biochar is typically 70% carbon by weight.

Benefits: Biochar helps to buffer soil pH with associated nutrient availability benefits. Biochar contains some mineral nutrients in addition to carbon. It has a high cation exchange capacity. It can improve soil structure. It can absorb some contaminants of soil. It increases soil moisture retention, potentially minimizing leaching losses, and possibly increasing crop yields. Its highly porous structure also helps microbial communities recolonize soil that has been in production for long periods of time, restoring the soil health benefits facilitated by natural microbial activity.

Soil Health Benefits: As a soil adjuvant biochar directly incorporates carbon in a relatively stable form into soil.

Considerations for Success:

- Biochar applications may not improve crop performance or yield as anticipated.
- Costs associated with the higher application rates may be substantial and well above incentive payments.
- Recommend mixing biochar to a depth of 6 to 12 inches following field application.
- Not all biochar is the same and therefore needs to be tested to understand the characteristics of the biochar.
- It is possible that the biochar results in net nutrient retention and possible nutrient stress. Mixing or conditioning biochar with compost or other nutrients can minimize the risk of nutrient stress, particularly phosphorus stress.

Options: See NRCS Soil Carbon Amendment (Code 336).

IAMP Preferences/Considerations: The IAMP project incentivizes practices that improve soil health and long-term agronomic productivity. One IAMP partner, the Coeur d'Alene Tribe, will be manufacturing biochar on its Tribal lands to document the cost of production. The Coeur d'Alene Tribe will also apply biochar to a demonstration site to test its effectiveness for improving crop production. Other IAMP participants may elect to implement biochar depending on availability and costs. Depending on those costs, IAMP incentives may only offset rather than fully cover the costs of biochar application. IAMP is investigating biochar sources suitable for the project, and producers should consult with an IAMP representative for the status of those sources. Other agronomic benefits of biochar accrue directly to the producer and may support additional practice adoption.

Specific Details:

IAMP has several requirements to document the biochar practice implemented correctly and to document the effectiveness of the practice from the current cropping strategies employed in the field. Each of these requirements is described below.

1) Biochar sampling: A biochar sample will be sent in for analysis prior to application each year, see the IAMP Crop/Soil Sampling Matrix for information on where to send the sample. Specifically the biochar analysis must include the following information.
    a. Use biochar that is produced by heating biomass to a temperature of more than 350°C under conditions of controlled and limited oxidant concentrations to prevent combustion (pyrolysis or gasification).
    b. Biochar analysis must report:
        - Country of origin of biochar and feedstock, and feedstock composition.
        - Production method (e.g. verification of temperature and limited oxygen conditions).
        - Organic carbon, ash, nitrogen, pH, EC, liming equivalent, phosphorus, potassium, and pH of the final material.
        - Use laboratories successfully meeting the requirements and performance standards of the International Biochar Initiative (IBI) Seal or use an alternative NRCS- or State-approved certification program that considers laboratory performance and proficiency to assure accuracy of laboratory analyses.
    c. Do not use biochar produced from:
        - Crop residues that could otherwise be left on the field to provide soil protection and improve soil organism habitat, or
        - Woody residue needed to sustain forest health and wildlife habitat referenced in NRCS CPS Forest Stand Improvement (Code 666).
2) Producer supplied field management information:
    a. Annual operation data including crop yield.

Soil Organic Matter and Biomass Sampling: Soil organic matter changes slowly and therefore sampling the same location once every 5 to 10 years is encouraged. Measuring total biomass production from the intercropping can also be useful to document potential increases in overall biomass to the crop rotation. For an overview of all suggested sampling protocols for each IAMP practice, see IAMP Crop/Soil Sampling Matrix.

Soil Nutrient Sampling: Soil samples may be collected from the enrolled field to provide potentially beneficial marketable information. If a producer elects to do so, sampling would optimally occur both prior to planting and after harvesting, at one-foot intervals to a depth of 2 feet. This sampling assesses the practice's impact on available soil nitrogen and identifies any nutrient deficiencies or benefits resulting from implementation. Refer to the IAMP Soil Sampling Protocol for details.

Verification required prior to payment:

- Inspection by implementing partner. Producers will provide a record of the biochar application rate and timing, source of the biochar, and specific characteristics of the biochar provided by the supplier. Confirm that at least 2 ton/ac (4.5 Tonnes/ha) of biochar was applied.
- Certification that biochar source is approved and meets the practice standard as described above.

Incentive Payments: $205/acre in the year of application, with a minimum required application of 2 tons/acre (4.5 tonnes/ha). The per-acre payment increases by $205/acre for each additional 0.5 ton/acre of biochar applied, as follows:

2.0 tons/ac (4.5 tonnes/ha) — $205/ac
2.5 tons/ac (5.6 tonnes/ha) — $410/ac
3.0 tons/ac (6.7 tonnes/ha) — $615/ac
3.5 tons/ac (7.8 tonnes/ha) — $820/ac
4.0 tons/ac (9.0 tonnes/ha) — $1,025/ac
4.5 tons/ac (10.1 tonnes/ha) — $1,230/ac
≥5.0 tons/ac (≥11.2 tonnes/ha) — $1,435/ac

Stacking or Companion Practices: Biochar amendments are compatible with other incentivized IAMP practices. Cover crops, Conservation crop rotation (>2 crops), Intercropping, No tillage from conventional, Reduced tillage from conventional, Nutrient management, Prescribed grazing, other Soil carbon amendment.

Sources:
NRCS Soil Carbon Amendment (Code 336)

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