cenusa bioenergy

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Master Gardeners' Safety Precautions for Handling, Applying, and Storing Biochar

Biochar is a fairly common label used to identify the by-product from the gasification of carbonaceous materials like wood chips or grasses. It is a solid odorless powder that has a gray/black or black/ tan color depending on the process and original carbonaceous material. This by-product has some characteristics that require safety precautions while storing, handling, and applying.

Handing and Applying Biochar

The personal safety concerns for biochar are potential irritations to your skin, eyes, and respiratory system. The exposure to airborne biochar dust may cause irritation. The body's reaction could be immediate or delayed. To help minimize the potential irritation exposure, Master Gardeners should follow some safety practices of applying biochar and use specified personal protective equipment when needed

Biochar Safe Practices

A safety goal of handling and applying biochar is to minimize the amount of biochar that is suspended in the air. Use caution when transferring biochar from package to soil or package to applicator. Avoid dumping biochar out of the package from a height. Consider postponing applications when the wind creates conditions that can easily suspend biochar. If using an applicator, staying upwind during transfer of biochar into the applicator may reduce personal exposure. These practices prevent the formation of a biochar dust cloud and limit potential exposure biochar.

Personal Protective Equipment

Personal protective equipment recommended for Master Gardeners while handling or applying biochar would be eye protection, gloves, long sleeves, long pants, and respirator depending on the conditions. The level of protection depends upon the amount of biochar dust suspended in the air and quantity of biochar that could be suspended. The minimum eye protection recommended is safety glasses but if the environment is laden with biochar dust then non-

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vented goggles are recommended. In the case of eye exposures, treat biochar dust in eyes as a foreign object and flush with water for 15 minutes, including under the lids to remove any dust particles.

Gloves

Most Master Gardeners already use gloves while working so this is no different. However if conditions are such that the biochar is or becomes wet then typical cloth, canvas, or leather gloves may not be sufficient, so in these wet conditions latex or PVC gloves are recommended. Gloves and long sleeves are a barrier to prevent dust from contacting the skin. Consideration should be given to using disposable outer garments if the work environment is extremely dusty with biochar. It is important to wash all exposed skin with soap and water. Launder all clothing before reuse or discard disposable outer garment after use.

Respirators

Avoid breathing biochar dust. In small applications of biochar and when precautions are taken to avoid suspending biochar then no respirator is required. If conditions are such that you cannot avoid breathing dust, you experience discomfort with any level of biochar dust, or have respiratory problems then the use of an NIOSH-Approved N95 particulate filtering face piece respirator should be used. Use of respirator requires proper fitting and checking with your physician before using.

Hazards to Watch

- Avoid biochar dust contact with skin
- Do not inhale biochar dust
- Avoid biochar dust contact with eyes
- Do not ingest biochar

Precautions to Take

- Keep biochar dust to a minimum
- Wear safety glasses/goggles
- Wear gloves
- Wear long sleeve shirts
- Consider respirator if needed
- Follow rules for safe storage

Biochar Storage

Never store near food and beverages. Biochar should be stored in a cool, dry place away from direct sunlight. It is important to reseal containers immediately after use. Freshly produced Biochar may be prone for auto ignition and spontaneous heating when exposed to air. Consider the volume of biochar being stored and location of your storage site knowing the potential for auto ignition. Large quantities of stacked biochar have more potential of spontaneous flame when exposed to air.

Finely ground biochar powder suspended in the air in a closed container has the potential to become a fuel if an ignition source is present. If leftover biochar is re- packaged,

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avoid using tightly sealed rigid containers such as cans or jars, but consider using a bag so that flexible sides and be rolled up leaving little opportunity for dust to become airborne inside the container during transportation or other handling.

Additional Resources

- **CenUSA Project Resources** - Research-based information on the opportunities and challenges in developing a sustainable system for the thermochemical production of biofuels from perennial grasses grown on land marginal for row crop production is available at www.cenusa.iastate.edu

Contributors to This Article

Authors

- **Charles V. Schwab**. Iowa State University Professor of Ag and Biosystems Engineering and Extension Safety Specialist
- **Mark Hanna**. Iowa State University Professor of Ag and Biosystems Engineering and Extension Agricultural Engineer

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