Biochar on the Farm
Initiative to Give Grower Guidance
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Growing with Biochar
USDA SARE grant project
KAW Valley Biochar, Lawrence, Kansas

You most likely heard of biochar, but probably have lots of questions how to successfully use this substance in your soils. Biochar advocate David Yarrow is working to provide answers to sustainable farmers and gardeners through a Sustainable Agriculture Research and Education (SARE) project already underway in Kansas.

Growing with Biochar will assist growers to use, properly prepare and test charcoal (biochar) in soils on at least 28 test beds in the Lawrence, Kansas foodshed with the ultimate goal of creating an instruction manual on how to produce and use biochar on the farm.

“Lots of scientists are doing serious research into biochar. That’s not what we’re trying to do,” said Yarrow. “We’re trying to make this method accessible and understandable to growers.”

In addition to various instruction manuals and reports, the project also aims to provide field days, grower training, open houses, and other public events.

Yarrow started making biochar from a brushpile at Four Oaks Farm in Topeka last winter with “an old, beat-up 55-gallon drum and some stovepipe to make a burner.” Yarrow did 25 burns that winter, and traded a load of wood chips with permaculture teacher Steve Moring for finished charcoal. Moring charged the biochar with SEA-90 sea minerals and applied it to one of his garden plots. The positive effects of the biochar on Moring’s plants served as an inspiration for the initiative.

“I met David early last year when he was near Topeka producing biochar,” Moring said. “I was interested to see what effect it has, so I put about 20 gallons of Yarrow’s screened charcoal in one of my beds. I had a control bed I didn’t put it in, and I grew vegetables. Vegetables grown with biochar did so much better, so I was impressed.”

Moring’s Vajra Farm is one of the sites participating in Growing with Biochar, which includes a diverse mix of farm and garden plots spread throughout Douglas, Jefferson and Leavenworth counties. All the sites are growing organically, but not all are certified organic.

“They are local farms that have an interest in using biochar. It’s an assortment of operations. There are vegetable farms, fruit and nut farms, and an herb farm. One farm has a 35-acre wheat field that they will try to do something with,” said Yarrow. “It will be tricky, because each farm—being a different kind of farm—will develop specific and different methods for how they use char.”

Yarrow applied for a Sustainable Agriculture Research and Education (SARE) one-year, farmer-rancher grant to help fund the project, which was approved in March. This spring, soil samples will be taken and biochar will be spread on the test plots.

Each participating farmer must define at least one research issue to design a field test to explore. Each farm has a minimum of three test beds. One bed will serve as a control with fertilizer only. The second will get regular fertilizer plus biochar. The third will receive fertilizer and biochar, plus sea minerals and inoculant. Growers will set up test plots to provide a visual demonstration and photo documentation for field days and training sessions.

“We have assorted farmers, one with fruit trees. I've been making biochar for him,” Moring said. “When he plants the trees, he will put biochar right in planting holes, and out three to six feet around in the top inches of soil.”

Yarrow taught participants to make their own char. In February, he made cedar biochar. “Juniperus virginiana is a pest in prairies and pastures, so we'll test it as char feedstock and soil amendment. Its resins and oils make it an attractive biofuel feedstock, maybe microbial stimulant.”

He has observed “a wildfire of interest spreading about biochar among growers” in the last several years. “In most situations, farmers have heard of it, but don’t have a clue how to start using it on their own farm,” he said. The pivotal point, for Yarrow, is that growers learn how to take raw charcoal and apply it to soil so that a relatively small amount of charcoal provides maximum results.

“I'm trying to demonstrate how to prepare the charcoal for use in soil so you get optimum response, and then we want to document this and start teaching this method to...
farmers,” Yarrow said. “When the USDA did their study, they put 20 tons of raw charcoal on farmland. To me, that’s stupid, because we know from the Amazon it takes two years for charcoal to become fully effective in soil. We know specific steps to take raw charcoal through to prepare it so when you put in soil, instead of putting 10 or 20 tons per acre, you put just a few hundred pounds per acre, and get 50 percent growth increase on plants. We don’t just dump charcoal in soil, we teach methods to prepare it for optimum effects.”

Raw or unprepared biochar added to some soils can inhibit crop growth for the first year. Growers who don’t understand and use proper practices to prepare biochar can be disappointed by initial results.

A September 2012 International Biochar Initiative study revealed that participants ranked “the lack of sustainability monitoring, reporting and verification methodologies” among the greatest potential risks from biochar.

Besides lack of guidance, another barrier keeping biochar out of the mainstream is absence in the market. There is no biochar industry making large amounts of char. Farmers can’t purchase it commercially to use it on their farms. But that may be changing.

“The last 12 months, a dozen new companies announced they have equipment to produce char. They’re looking for farmers to buy biochar and start to use it,” Yarrow said. “Unfortunately, framers know little about biochar, don’t understand how it benefits their soils, crops and profitability.”

Yarrow is in touch with solid waste officials in Kansas City about acres of wood chips that currently sit rotting into CO2, methane and mulch. This biomass resource could be a pilot project to produce biofuels as well as biochar. He envisions teaming up with compost, landscape, arborist, or City of Lawrence recycling facility to expand biochar production in Kansas.

“We hope next year a lot more farmers will want more charcoal on their land, so this pilot program can crank out a lot more char, and get more spread on more farmland in 2014.”

A NEW SPIN

Always looking to innovate, Yarrow recently designed a new chimney adapter to create a venturi and utilize a vortex. “We have a little attachment that takes that takes a 6-inch hole and connects it to an 8-inch stovepipe, and then we put diagonal slots in the fluted, beveled part of the attachment,” he said. “The result of that is that now we have a little vortex inside the chimney. We have the gases, instead of shooting straight up the chimney, spinning in a vortex. It provides for more complete and rapid mixing of the air and gases, so we get more rapid and intense combustion of the gas.”

Next step, said Yarrow, is to create a secondary combustion chamber to contain the gas flare, and “start to do useful things, like heat water, cook rice, bake pizza, or melt metal. Whatever we can design, we plan to use this burner as a useful heat source.”

COOL-FOOD LABEL

The International Biochar Initiative claims biochar creates a soil carbon pool that is carbon-negative. This carbon-negative aspect of biochar is what Yarrow puts front and center. In fact, he wants to put a “cool-food” label on food produced using carbon-smart farming methods to alert consumers.

At the end of the summer Yarrow plans to take stock of the Growing with Biochar project and try to arrange for the crops grown with biochar to be harvested separately, specially labeled and sold locally at the Lawrence food co-op and area farmers’ markets.

“It’s going to be a first test of this “cool-food” label concept,” Yarrow said. “If it’s successful, we go the next step, we expand land in production next year and develop full-scale label and certification to license growers to use a “cool-food” label. A lot must be done to develop a label and technical specification to define “cool-food,” create publication, education and marketing tools to make consumers aware of this new food label and product.”

RESOURCES

SARE grant proposal
www.dyarrow.org/SAREbiochar

Growing with Biochar
www.dyarrow.org/biochar

KAW Valley Biochar
www.dyarrow.org/KAW

Carbon, Minerals & Microbes
www.dyarrow.org/letFreedomRing