Biochar on the Farm
Initiative to Give Grower Guidance

by Tara Maxwell

You have most likely heard of biochar, but you probably have a lot of questions about how to successfully use this soil amendment on your fields. Biochar advocate David Yarrow is working to provide answers to sustainable farmers and gardeners across the country through a research and education project already under way in Kansas.

The Growing with Biochar initiative will assist growers to use, properly prepare and test charcoal (biochar) in soils on at least 28 test plots 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 hardcore scientific 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 cedar biochar at Four Oaks Farm in Topeka last winter with "an old beat up 55-gallon drum and some stovepipe to make a burner." Yarrow said he did about 25 burns and traded a load of wood chips with permaculturist Steve Moring for finished charcoal. Moring charged the biochar with 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 and he was working with some folks near Topeka and he was producing biochar," Moring said. "I was interested in trying to see what effect it might have so I put in about 20 gallons, basically a big tub full,
of real fine charcoal that he had made onto one of my beds, and I had basically a control bed that I didn't have it put in, and I grew vegetables. The vegetables grown with biochar seemed to do much better so I was impressed."

Moring's Vajra Farm is one of the sites participating in the Growing with Biochar project which includes a diverse mix of farm and garden plots spread throughout Douglas, Jefferson and Leavenworth Counties. All of the sites are growing organically although 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 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 is going to have to develop specific and different methods of how they use the 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 specific research issue and design a field test setup and protocol to explore the issue, and each farm has a minimum requirement of four test beds. One bed will serve as a control with fertilizer, the second will get regular fertilizer plus compost, another will receive fertilizer plus biochar and the fourth will get fertilizer, biochar, sea minerals and compost. Growers will have the test plots set up to provide a visual demonstration that allows for photo documentation, field days and training sessions.

“We have several farmers on board and one with fruit trees. I’ve been making the biochar for him,” Moring said. “When he plants the trees he will put some biochar right in the planting holes and out about three to six feet around the tree in the top four to five inches of soil.”

Yarrow has been teaching the participants how to make their own char. In February he made cedar tree biochar. "Juniperus virginiana is a pernicious pest in prairies and pastures, so we'll test it as char feedstock and soil amendment. Its rich resins and oils make an attractive biofuel feedstock and perhaps microbial stimulant.”

He says 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 about how to start doing 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 USDA did their study of this they put 20 tons of raw charcoal on to farmland and to me that's really stupid, because we know from what we've learned in the Amazon that it will take two years for that charcoal to become fully effective in the soil. We know there are specific steps you can take this raw charcoal through and prepare it so that when you put it in soil, instead of putting 10 or 20 tons per acre, you can put a few hundred pounds per acre and get a 50 percent growth increase on your plants. We're not just dumping charcoal in soil, we are demonstrating a method to prepare it for optimum use in soil.”

Adding raw or unprepared biochar to some soils can inhibit crop growth in the first year potentially leaving growers who do not understand and follow proper practices to prepare biochar disappointed with 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 soil amendment spotlight is an absence in the marketplace. Because there is no biochar industry making large amounts of char, farmers haven't been able to purchase it commercially to use it on their farms, but that may be changing.

“In the last 12 months, there have been maybe a dozen or so companies that have announced they have equipment to produce char, and they are looking for farmers to buy it and start using it,” Yarrow said.

Yarrow has been in touch with solid waste officials in Kansas City about acres of woodchips sitting unused that may eventually be part of a pilot project to...
produce char as well as biofuels. He envisions possibly teaming up with a composting, landscaping, arborist or recycling facility in the Lawrence area and eventually expanding to Kansas City. “We’re hoping next year that we will have a lot more farmers that will want more charcoal on their land so this pilot program should be able to crank out a larger quantity of char than we can do right now and get it spread on more farmland for the 2014 growing season.”

A NEW SPIN

Always looking to innovate, Yarrow said he recently designed a new chimney for a burner to create and utilize a vortex. “We have a little attachment 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 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 the gases so we get more rapid and intense combustion of the gas.”

The next step, said Yarrow, is to create a secondary combustion chamber to contain the gas and “start using it to do useful things like heat water, cook a pizza, or melt metal. Whatever we can design, we’re going to start planning to use this burner as a useful heat source.”

COOL FOOD

According to the International Biochar Initiative, biochar creates a soil carbon pool that is carbon-negative. It is this carbon-negative aspect of biochar that Yarrow wants to put front and center. In fact, he wants to put a “cool food” label directly onto food produced using carbon-smart farming methods to alert consumers.

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

“It’s going to be a foot in the water test of this concept,” Yarrow said. “If it proves to be successful, we will proceed to the next step, which is to expand our land in production next year and to develop a full-scale labeling and initial kind of certification or licensing, to give growers permission to use this cool food label. We will have a lot to do to develop this label and the technical specification to define what cool food is and to create some publication, education and marketing tools to make consumers aware of what this new food label and product is.”

Editor’s Note: Look for an article by David Y arrow on preparing biochar for your fields in an upcoming issue of Acres U.S.A.

Resources:
For more on David Yarrow
www.dyarrow.org/biochar
Vajra Farm
www.vajrafarm.com
International Biochar Initiative
www.biochar-international.org