# Using Biochar as a Soil Amendment for Sustainable Agriculture

In 2010, ISTC scientists Drs. Wei Zheng, BK Sharma, and Kishore Rajagopalan tested biochar as a soil amendment in a typical corn field in Illinois as part of a larger goal of promoting sustainable agricultural practices. The biochar was made from three feedstocks:

- agricultural residues such as corn cobs and corn stover;
- yard wastes including walnut shells and wood chips; and
- by-products from bioenergy such as defatted dried distiller grains (DDGs).

After harvest, the soil organic matter, soil pH (p H), available phosphorus P1 and P2, and CEC (cation exchange capacity) generally increased in the field plots treated with biochar. The increase in soil organic matter and CEC (cation exchange capacity) showed that fairly large amounts of carbon and exchangeable cations were introduced by biochar application. The high level of available phosphorus P1 and P2 after biochar application indicated that the use of biochar as a soil amendment led to a high retention of nutrients in the soil. By contrast, the contents of nitrate-N in these biochar-amended plots were significantly reduced even when undergoing nitrogen fertilizer application. This further confirms that biochar can sorb nitrogen fertilizers and inhibit their nitrification and thus the concentrations of nitrate in the fields with biochar addition were largely decreased.

In addition, soil analysis after harvest revealed that soil organic matter, soil pH (p H), available phosphorus P1 and P2, and CEC (cation exchange capacity) were generally higher in plots with the application of biochar and fertilizer than for fields with the application of fertilizer alone. And in fact, biochar mixed with 50% of the recommended amount of fertilizer showed a higher yield of corn (measured in bushels per acre) than the control (no biochar) at the 100% recommended fertilizer application. Therefore, biochar as a soil amendment can improve soil quality by increasing soil organic matter, pH (p H), and CEC (cation exchange capacity), and holding nutrients in soils.

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**Meet the Scientists**

- **Wei Zheng**
- **B.K. Sharma**
- **Kishore Rajagopalan**

### Videos

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### Presentations

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One Hazelwood Drive, MC-676
Champaign, IL 61820
p: 217-333-8940
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