

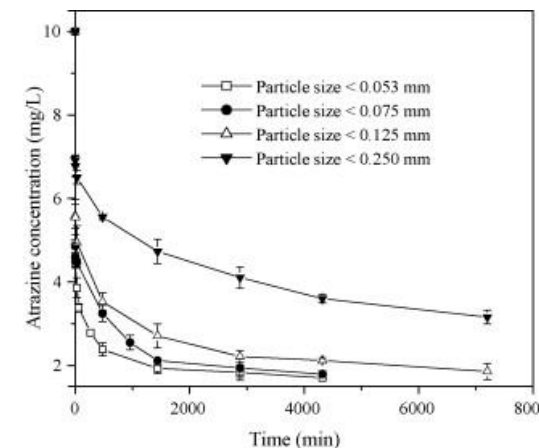
## Biochar Sorption of Pesticides

Wei Zheng – senior research scientist at ISTC – and Kishore Rajagopalan – associate director for applied research at ISTC – evaluated the ability of an unmodified biochar to sorb two triazine pesticides, atrazine and simazine. They also explored the potential environmental value of biochar for mitigating pesticide pollution in agricultural production and removing contaminants from wastewater.

A greenwaste biochar was produced by heating waste biomass (mix of maple, elm, and oak woodchips and bark) under the oxygen-limited condition at 450°C. The effects of several experimental parameters – including biochar particle size, contact time, solid/solution ratio, and solution pH (pH) – on the sorption of atrazine and simazine were investigated.

The biochar with small particle size needed less time to reach sorption equilibrium. The sorption affinity of the biochar for the two pesticides increased with decreasing solid/solution ratio. The sorbed amounts of atrazine and simazine increased from 451 to 1158 mg/kg (milligram per kilogram) and 243 to 1066 mg/kg (milligram per kilogram), respectively, when the solid/solution ratio decreased from 1:50 to 1:1000 (g/mL (gram per milliliter)). Thus, less biochar is needed to sorb more pesticides. The sorption of the biochar for both pesticides was favored by low pH (pH). When atrazine and simazine were in the same solution, a competitive sorption occurred between these two pesticides on the biochar, reflecting a decrease in sorption capacity from 435 to 286 mg/kg (milligram per kilogram) for atrazine and from 514 to 212 mg/kg (milligram per kilogram) for simazine. This means that when atrazine and simazine are both used on a field site, more biochar is needed for higher sorption rates than if only one pesticide was used in a single location.

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Sorption of atrazine on different particle sizes of biochar.

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- Wei Zheng
- Kishore Rajagopalan

#### Publications

- Sorption properties of greenwaste biochar for two triazine pesticides



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