

# Biochar Affects Macronutrient Leaching from a Soilless Substrate

Biochar, a byproduct of pyrolysis, is being used as an alternative fertilizer amendment product in the agriculture industry. The use of biochar is justified by its ability to moderate soil acidity, improve soil microbiological properties and increase water retention, thus decreasing leaching of beneficial nutrients. However, very little is known about how these materials react with commonly used greenhouse container substrates. The objective of this research was to determine the effects of one form of biochar on nutrient retention and release in a typical commercial greenhouse container substrate.

A column study was conducted using a mixture of 85:15 sphagnum peatmoss:perlite (v:v) amended with 0, 5, or 10 percent biochar. A known nutrient solution was used to drench each column followed by leaching events with water over sixteen days. Analyses of biochar (Table 1) and leachates were carried out to examine the effect of the biochar on nitrate, phosphate and potassium retention and leaching. Release curves

(Figure 1) show that nitrate had a higher residual release over time with an increase in biochar rate suggesting that biochar might be effective in controlling nitrate levels in container substrates over time.

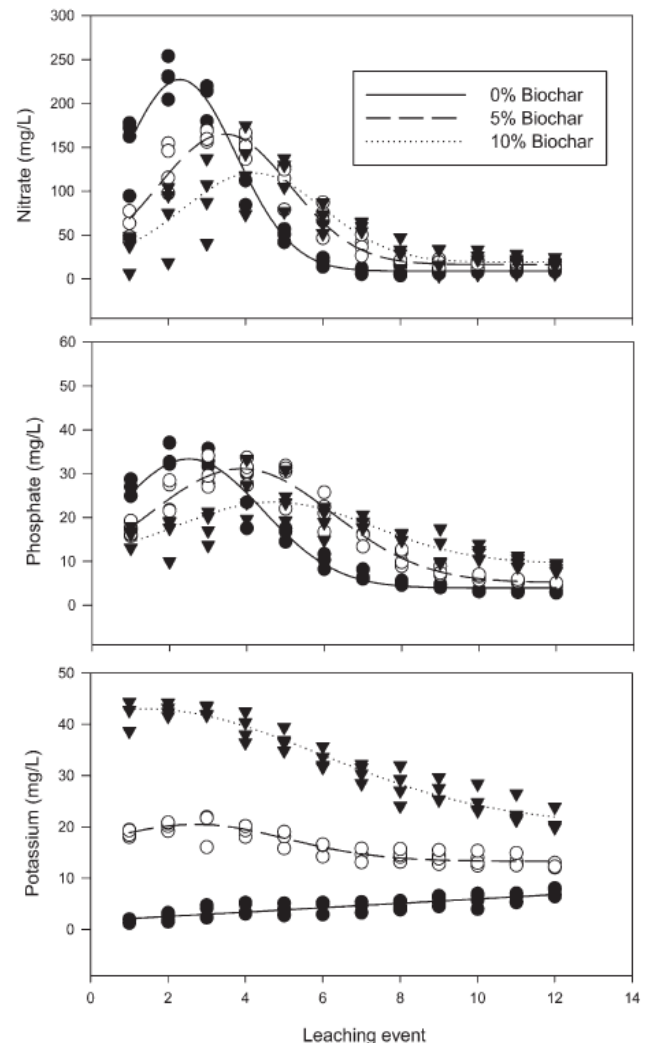
Peak phosphate concentration decreased with increasing biochar amendment rate and final residual phosphate released increased with increasing biochar amendment. This suggests that this type of biochar can act as a modest source of phosphate for ornamental plant production. Similarly to nitrate and phosphate, leached potassium (K) concentration increased with increased biochar amendment demonstrating the capability of this form of biochar in moderating K and other nutrient levels. Future studies will examine different biochar materials effects on greenhouse container production.

Figure 1. Nitrate, phosphate, and potassium leaching from 85:15 sphagnum peatmoss:perlite substrates amended with 0%, 5%, or 10% biochar.

Table 1. Chemical Properties of biochar before substrate amendment.<sup>z</sup>

	Units	Nutrient concn
Carbon	(%)	59.5
Nitrogen		0.2
Phosphorus		0.07
Potassium		0.50
Calcium		1.15
Magnesium		0.27
Sulfur		0.02
Silicon		3.01
Boron	mg·kg <sup>-1</sup>	17.01
Copper		10.87
Iron		1609.9
Manganese		323.3
Molybdenum		4.13
Zinc		9.26

<sup>z</sup>All analyses are expressed on a percent or concentration of oven dried biochar.



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