Beneficial effects of biochar on Hawaiian acid soil

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Outline

- Introduction
- Acid Soil and its Constraint for plant growth
- Biochar and its liming potential : pH & exch. Al
- Other beneficial effects of Biochar
- Biochar and Plant Growth
- Biochar & Al content in plant tissue
- Summary

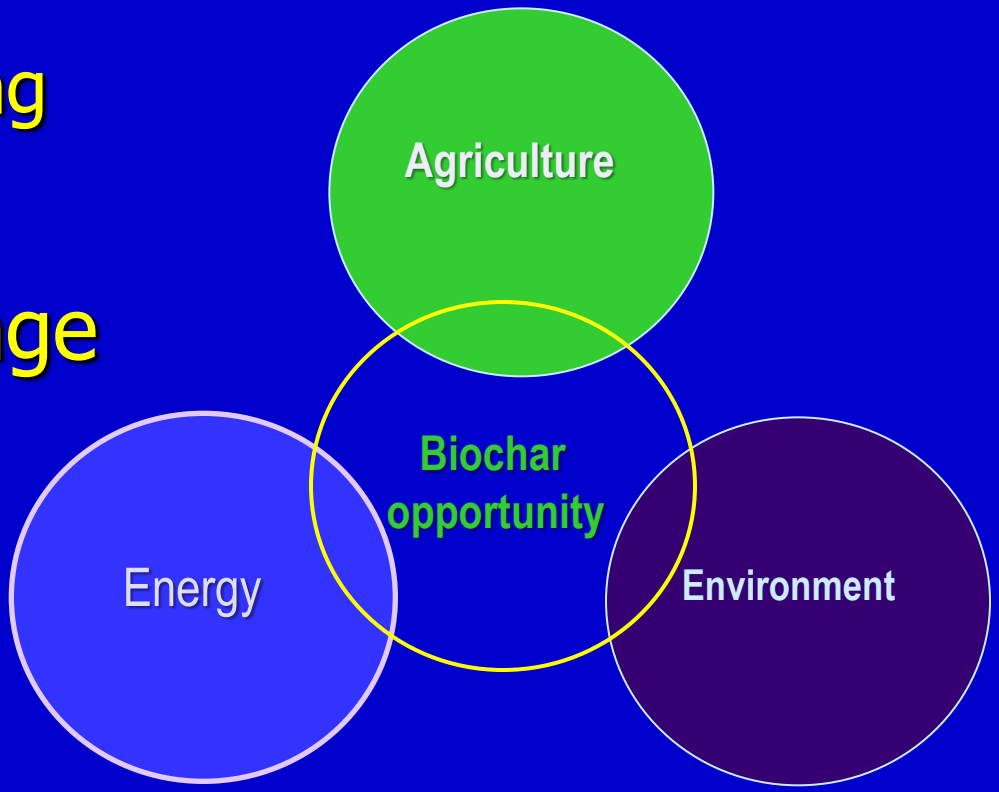
Main Idea

- Biochar could substitute for lime to alleviate soil acidity
- Biochar also improve soil quality, plant growth and production, & environment quality
- Thus, it could be a good soil amendment in organic farming & sustainable agriculture

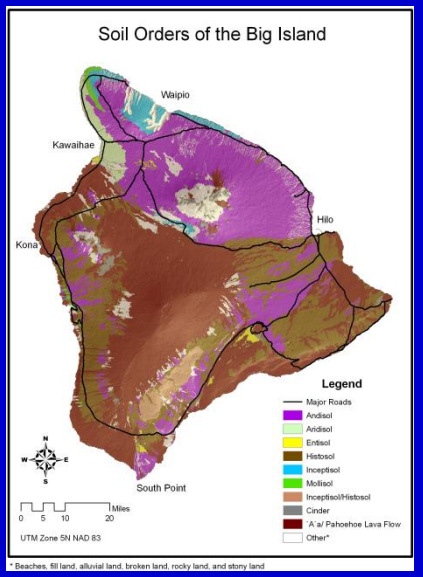
Introduction

Global issues & New trends:

* Organic farming
* Biofuel
* Climate change



Acid Soils & their constraints



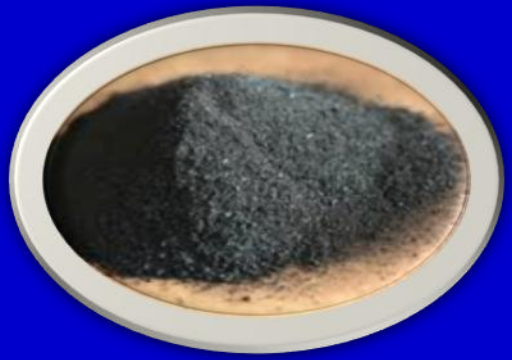
- Acid soils: - low pH
  - Al & Mn toxicity
  - Ca and other nutrients elements deficiencies
  - Plant growth restricted
- Conventional approach: liming

What is Biochar?

- *Biochar is a fine-grained, porous charcoal substance formed via controlled, thermal conversion of biomass in the partial or complete absence of oxygen*

(Reed, 2011)

Biochar



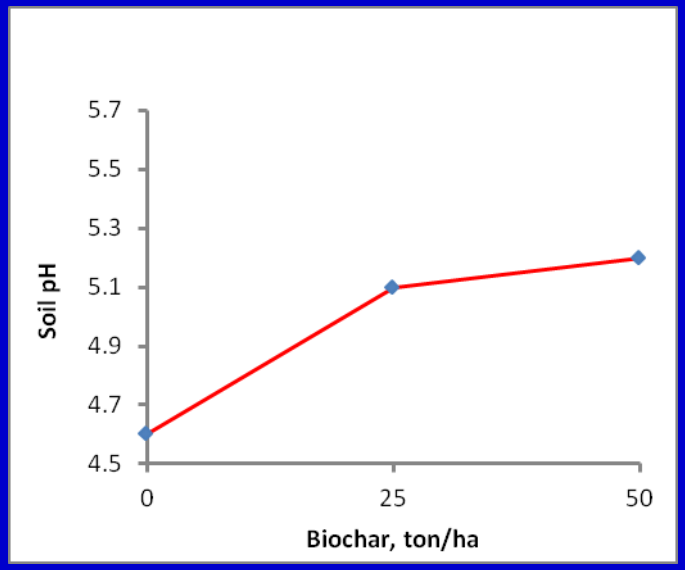
Efficiency of Biochar Production

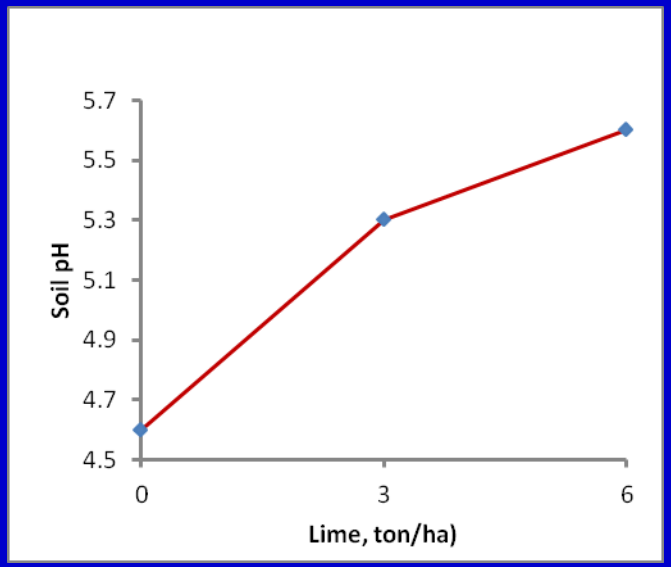
- Open fired methods (traditional)
  efficiency 20-30% biochar
- Semi controlled
  efficiency 30-40%
- Controlled pyrolysis
  efficiency : 40-75% biochar

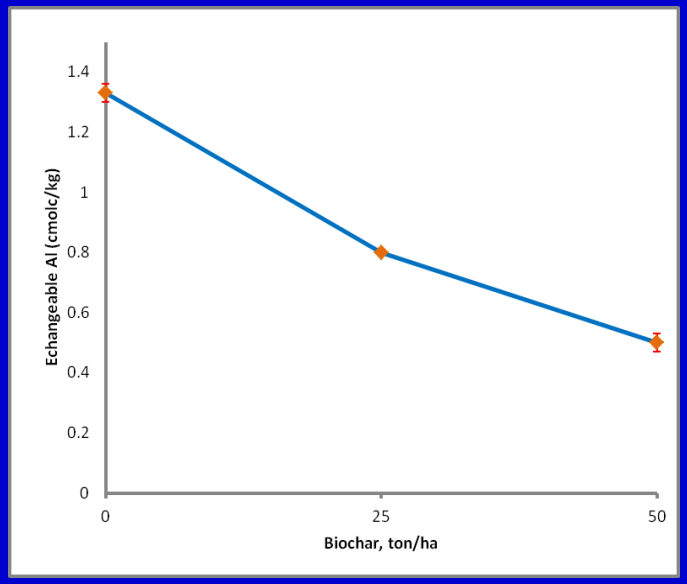
Important Characteristics of Biochar

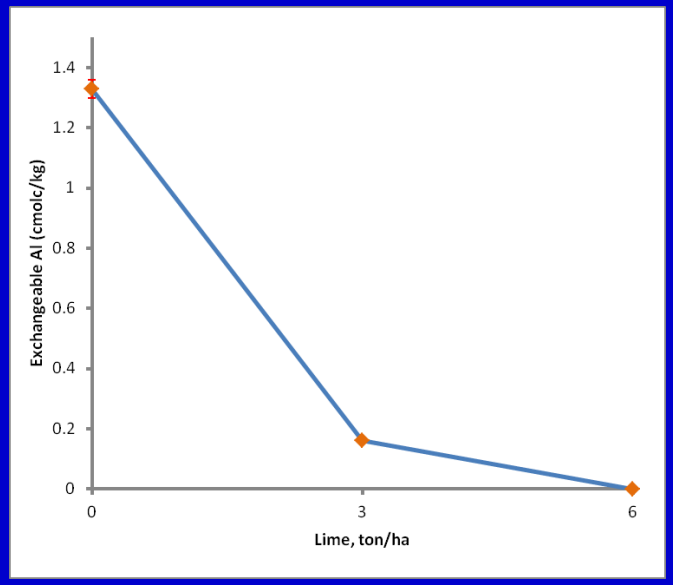
* ash & volatile matter content
* Large surface areas & functionality groups
* high pH
* contain nutrients
* resistant to decay
* porous
* high water retention
* high absorption capacity

Biochar Liming Potential

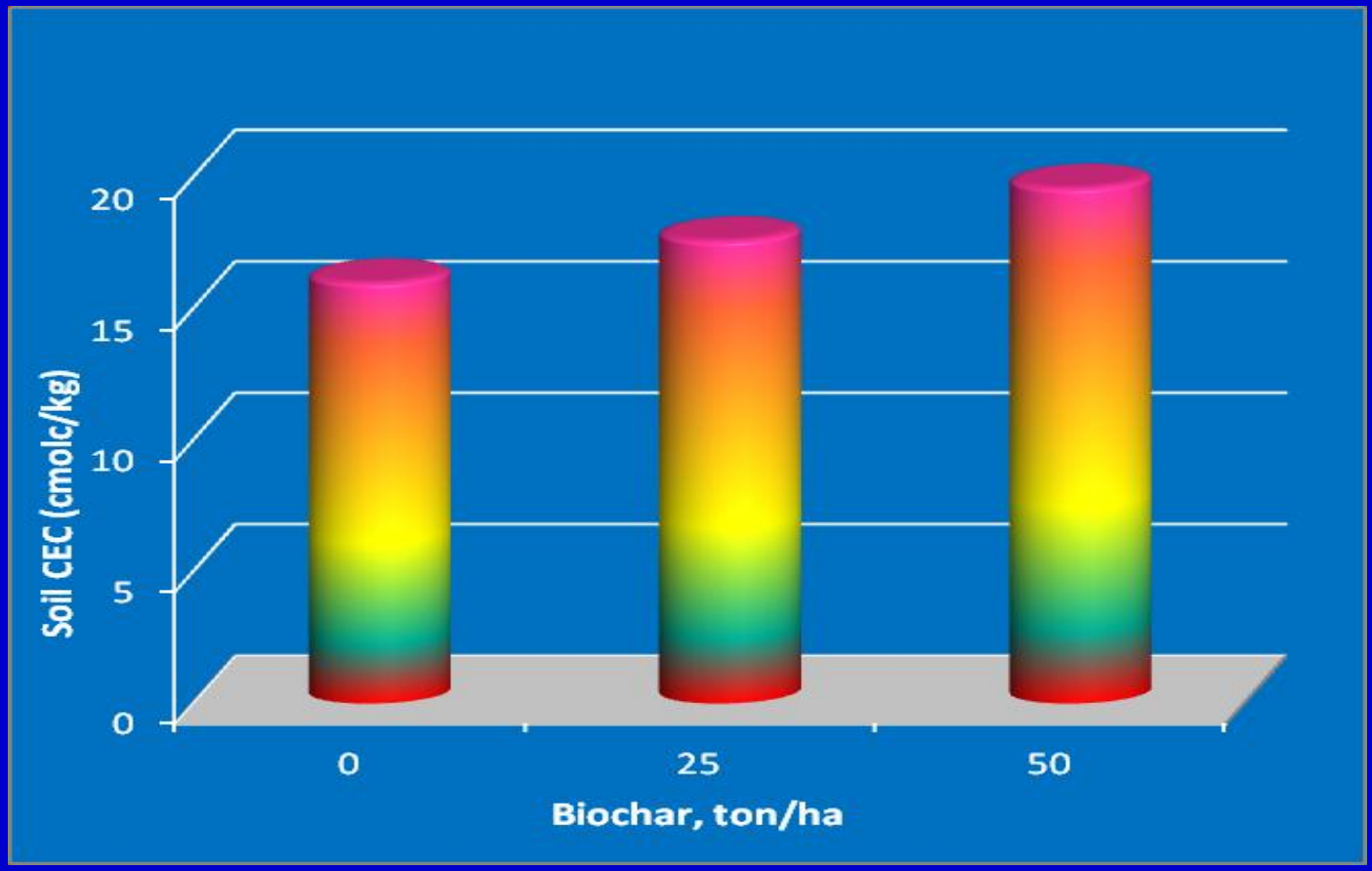




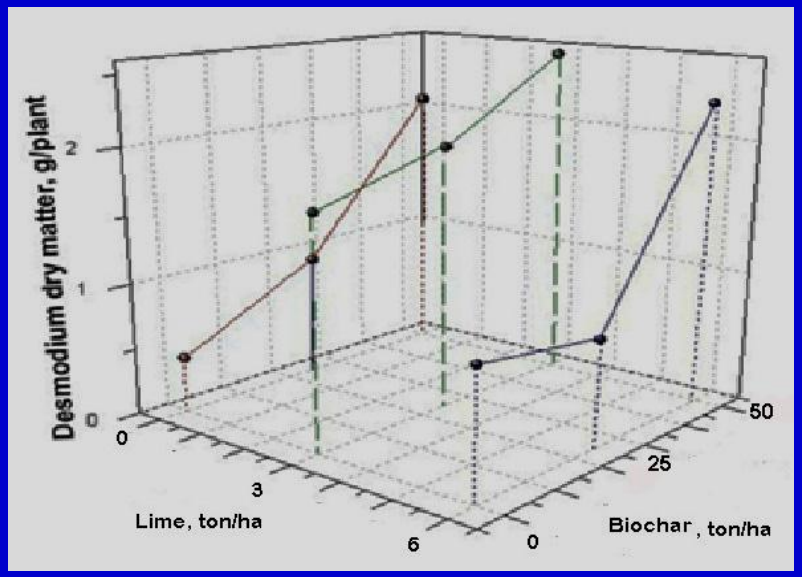




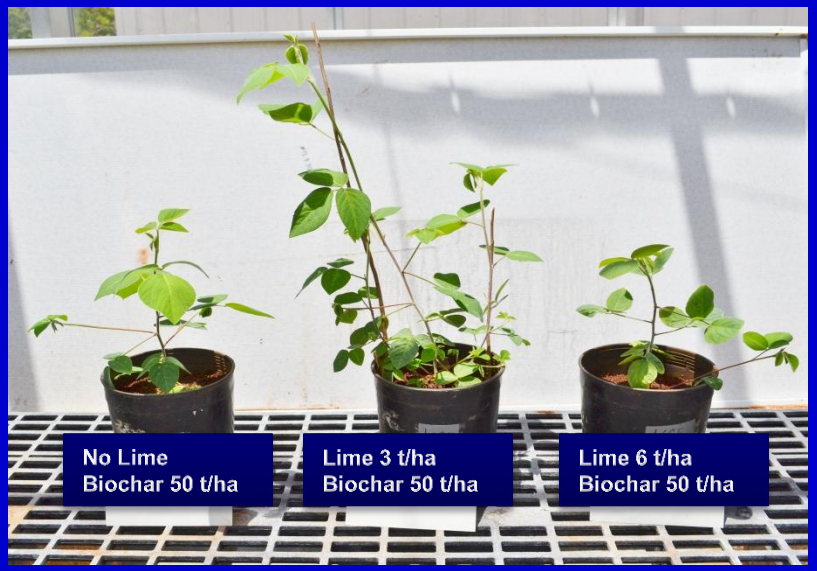
Biochar & Soil CEC



Effect of Biochar on Plant Growth

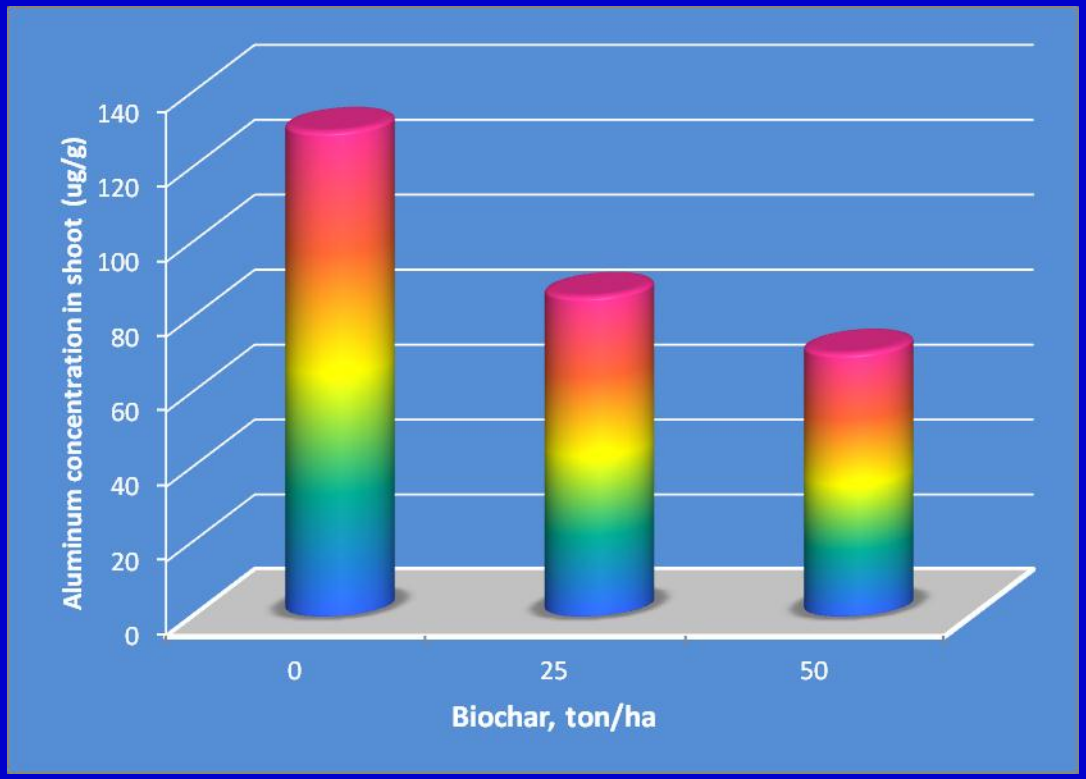


Effect of Biochar on Plant Growth.. continue



Biochar & Al concentration in Plant Tissue

- Al concentration in plant tissue decreased with biochar application



Summary

- Biochar increased pH and reduced Al toxicity. Biochar can substitute for lime
- Biochar increased soil CEC, thus retaining nutrients longer
- We propose applications of biochar 20-40 ton/ha along with 2-3 ton/ha of lime to optimize crop production in Hawaiian acid soils

Mahalo Nui Loa
Terima kasih