How to Establish a Biochar Supply Chain

Meei-ru Jeng
Fellow from Taiwan
Geographic

Location: East Asia
Area: 1/7 of Oregon
Population: 23 million
(6 times > Oregon)
Capital: Taipei City
What is Biochar?

Biochar is a solid material obtained from the carbonization or thermochemical conversion of biomass in an oxygen-limited environment

“High quality charcoal”
Some Examples of Biochar Applications

1. Soil Amendment
   - Agriculture
   - Forestry
   - Horticulture

2. Stormwater/ Wastewater Filtration

3. Composting
Why Biochar?

Biochar is fine-grained, highly porous martial that increases soil retention of nutrients and water.

https://www.dudegrows.com/biochar/
Lessons Learned
Status of the Biochar Industry in the US

- 150 producers
- 30 producers (20%) make 80% of the biochar
- 120 producers make very small amounts of biochar
- 87% of biochar feedstock comes from woody biomass

Domestic biochar production is 35K to 70K tons/yr.

For example:
290 million acres of US Crop Land, 21.6 million tons/yr. fertilizer usage (biochar @ 2% > 400K tons/yr.)
Status of the Biochar Industry in the US

- Price depends on quality and final use
  - $400 to $2K/ton
    - wholesale price: $1/lb
    - retail price: $1.5/lb
- Biochar products come in different formulations, mostly to amend soil
Status of the Biochar Industry in the US

- Biochar products composition and crop specific applications are still in development
- Price is high
- Market is small
- Technology development to scale up production

How much + Yield = ?
Biochar Supply Chain

1. Biomass production
- Logging type
- Moisture content

2. Feedstock logistics
- Collection
- Transportation
- Storage

Source: Science You Can Use Bulletin • September/October 2014 • ISSUE 13
Biochar Supply Chain

3. Conversion
- Treatment
- Co-products

4. Distribution logistics
- Packaging
- Transportation
- Storage

5. End use
- Blending
- Processing
- Application

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Biochar Supply Chain

Costs/Profits
Encourage research collaboration between Industry and Universities

- **Technology**: Increase efficiency of biochar conversion systems (<$)
- **Material**: Standardize biochar “grades”
- **Use**: Conduct longer-term field trials amending soils with biochar in high-value crops
- **Tested use**: Promote biochar uses among farmers through University Extension
Take Home Messages
Biochar Materials in Taiwan

- Forest Coverage Rate: **60%** (5.4 million acres)

- (1992) Natural Forests
  **Logging ban** = no logging

- No logging waste
Biochar Materials in Taiwan

- Taiwan is a Fruit Kingdom
- Fruit tree orchard trimming waste can become biochar feedstock
Biochar Conversion Technology in Taiwan
Biochar Use Research in Taiwan
Biochar Application Promoting Project in Taiwan

- feedstock logistics
- feedstock quality control
- combustion testing
- combustion unit
- economic analysis

Biochar Industry

- value-added application
- innovation application
- biochar production improvement
- end use
- soil carbon sink
- industrial benefits
Take Home Messages

- Include economists in our project team
- Establish a feasible biochar supply chain
- Consider using biochar on high-value crops and estimate its yield improvements
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