

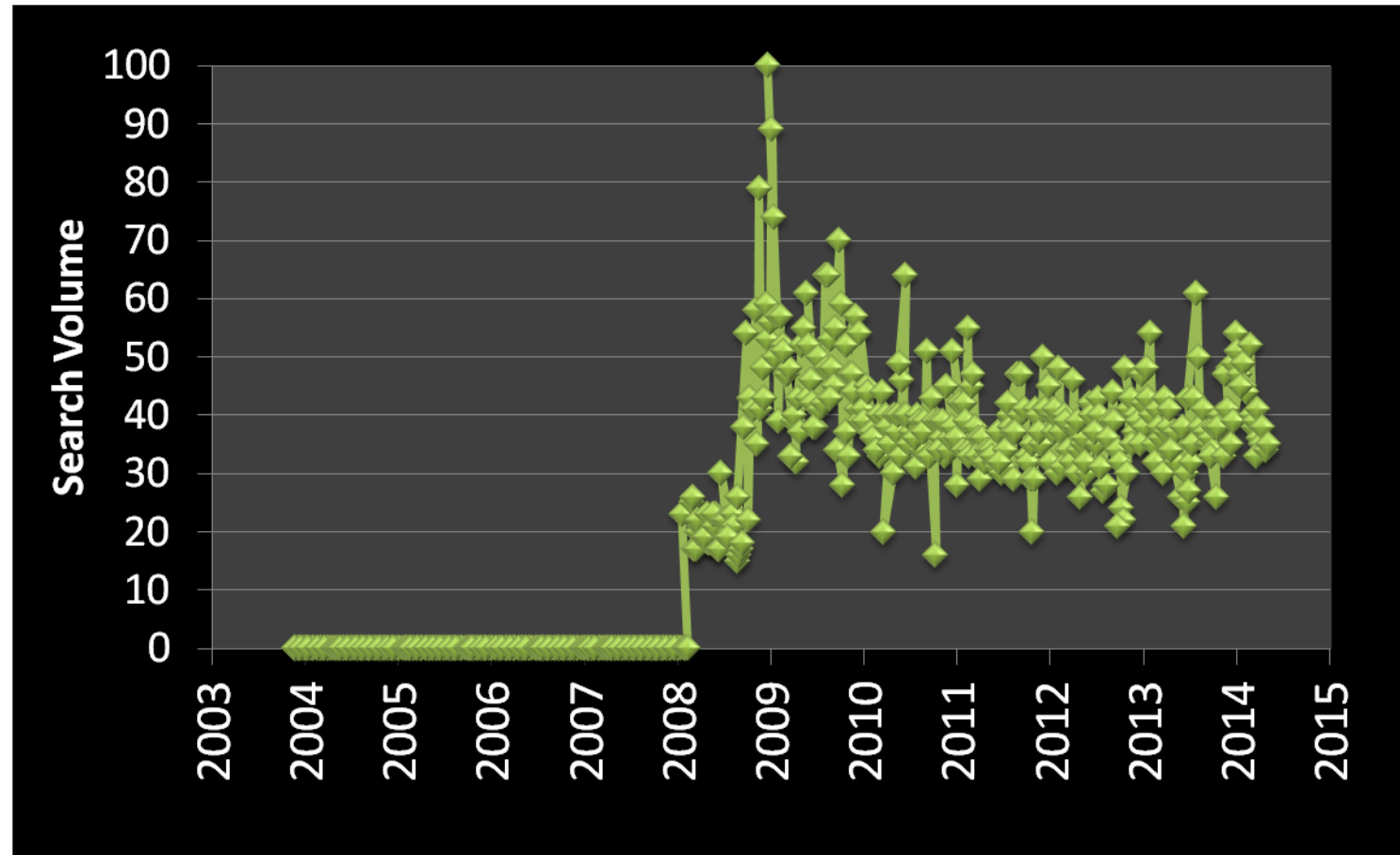


Future Direction of Biochar: *Uncertain or Certain Future?*



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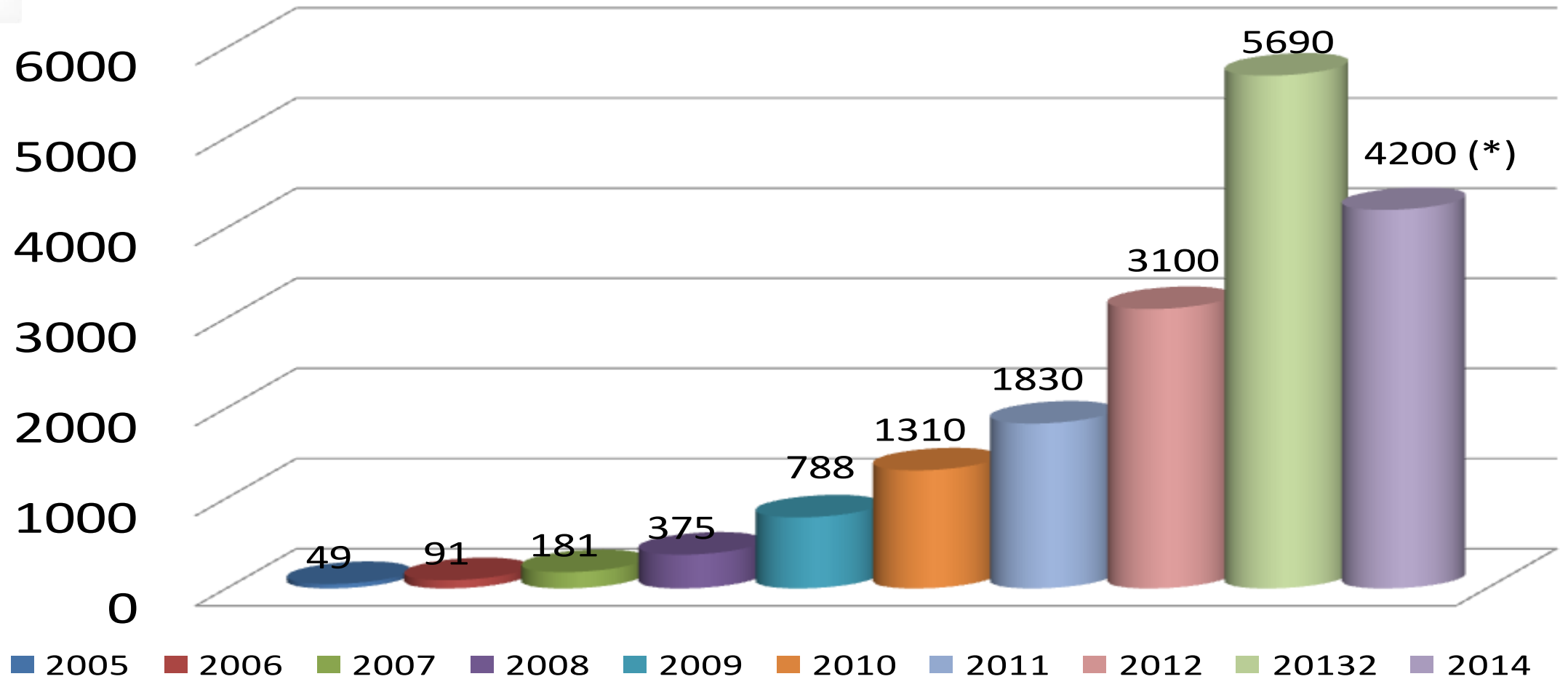
Google™ Trends – “Biochar”



“Biochar” Manuscripts: 2005-2014

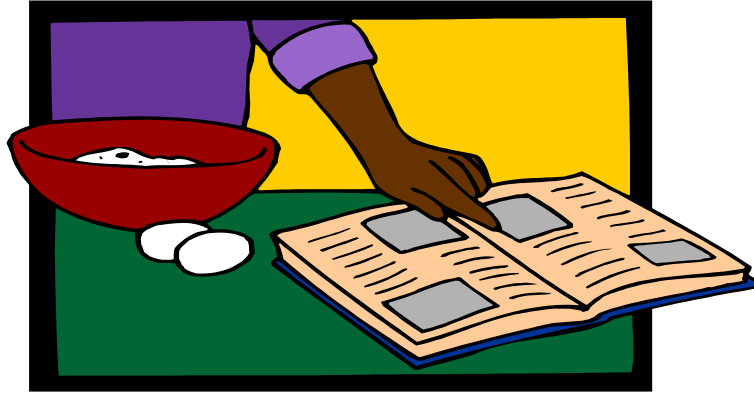


Data from Google™ Scholar



- Increasing number of scientific outputs
 - 2014 estimated (1/1/14-6/30/14 x 2)

Biochar Differences



Similar to baking...
The same recipe –
might not taste the same
cook to cook

Biochar Differences

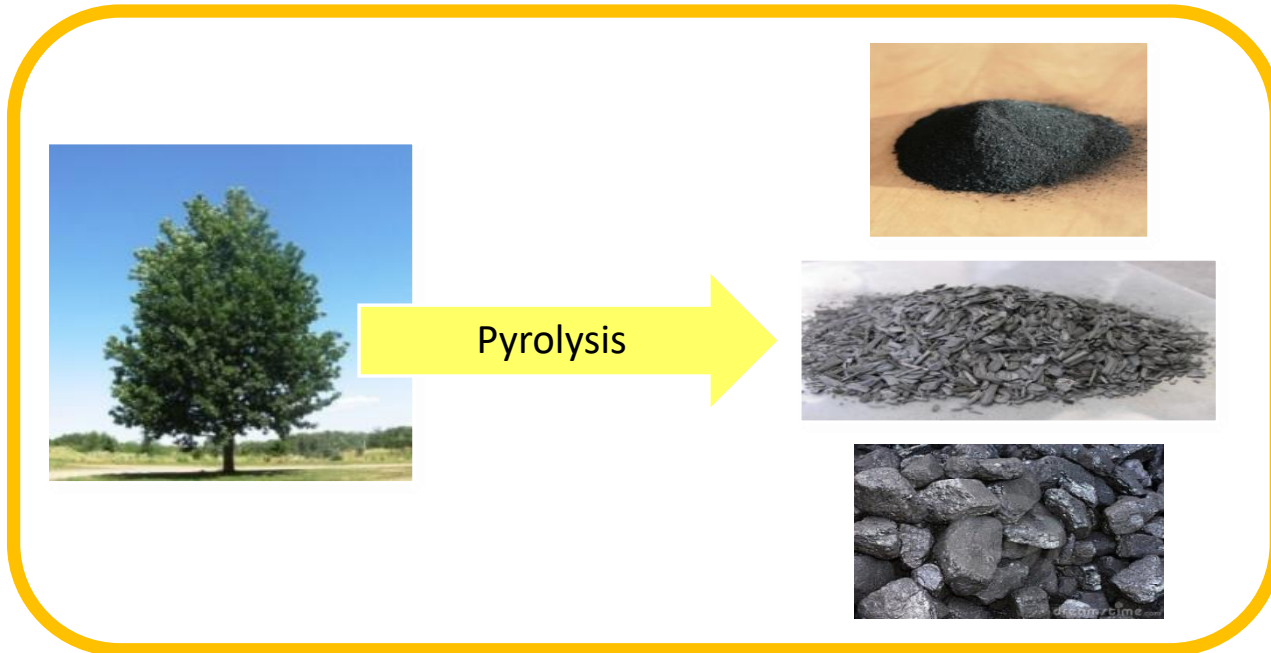


Similar to baking...
The same recipe –
might not taste the same
cook to cook



Even though same conditions –
Pyrolysis can result in different biochar
chemistries

“Not all biochars are equal”



Biochar Industry –

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Major Hurdle –

- Economics



Historic Problems...

Economic of applying charcoal on large scale.



- ***“On stiff clay soils it will produce an increase of vegetation, but not sufficient to pay the expense of the manure (charcoal).”***

Maryland State Agricultural Society (1822) p. 410

- ***“Cost in many situations is probably too great to admit its profitable use as an ordinary manure.”***

The Cultivator (1849):“Improvement of the Soil” p. 342

- ***“Peat charcoal alone does not appear to be of value as a manure commensurate with its cost, and it will be necessary to reduce the cost of the manufacture of this article very considerably, before any extensive applications of it..”***

What has changed?

1849

Farmers \approx 69% of labor force

Avg. farm size 160 acres

1 farmer supports 2 people

\$ 0.75 per bushel for corn



What has changed?

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*\$1.00 in 1914 had the same
buying power as \$22.57 in 2012
[\$16.92 /bu]*

Today

Farmers <2% of labor force

Avg farm size 461 acres

1 farmer supports >200 people

\$3.71 per bushel for corn [8/8/14]



Is biochar better than current practices?

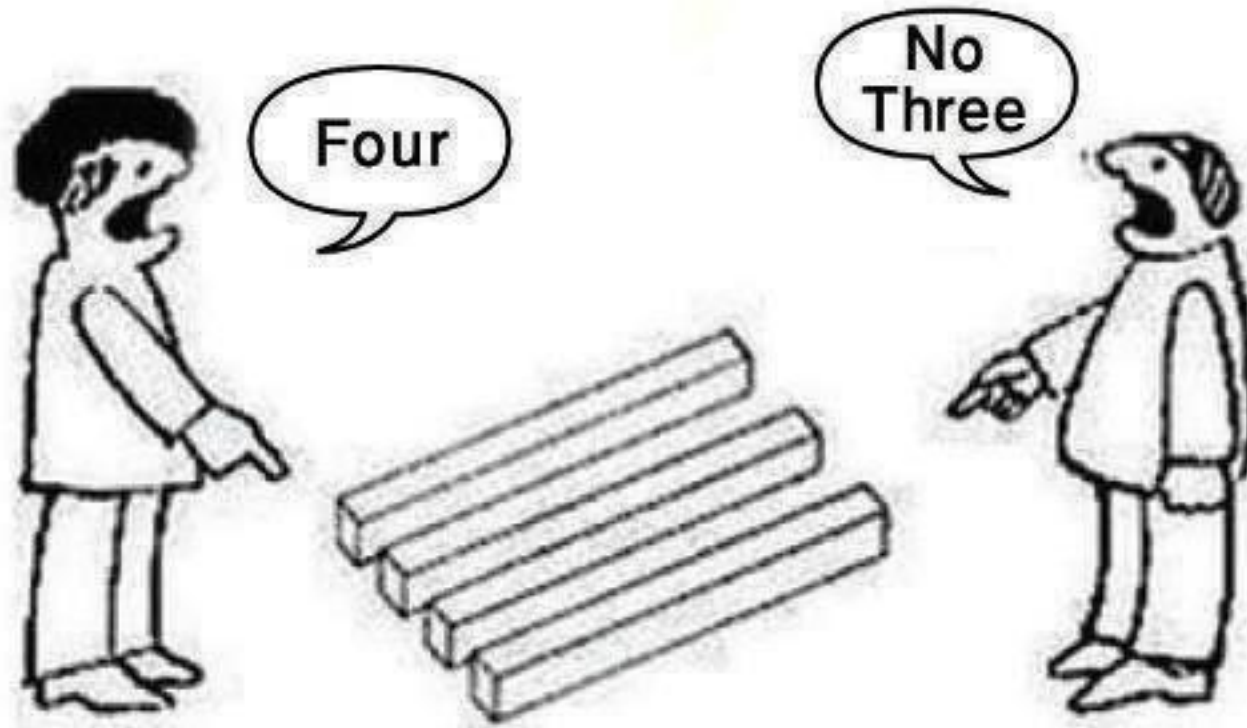
- Soil Fertilization:
 - Fertilizers, compost, etc. → predictable more direct & significant alteration of soil properties
- Nutrient Capture
 - Ion exchange resins, etc.
- Soil Remediation Uses
 - Sorbing vs bioremediation
- Activated Carbon Substitute
 - Unreliable vs reliable performance
 - Lower efficiency – higher disposal problem ?
- Biochar is “lost” bio-energy
 - Reduction of energy efficiency to make biochar
 - Direct and indirect costs (lost of energy revenue)



Cheaper ≠ Better ?

Or maybe depends on your perspective....

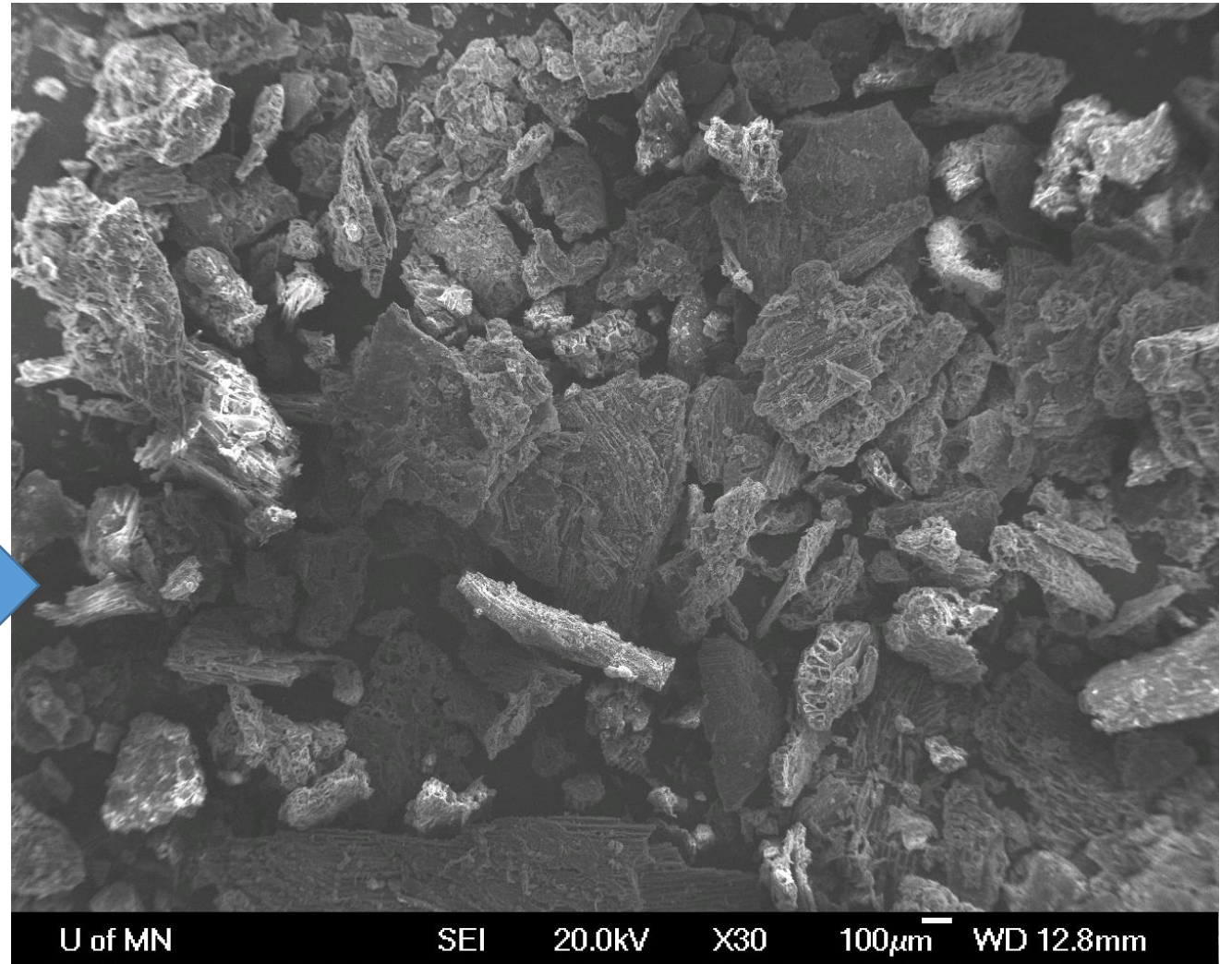
How many boards ?



Or maybe depends on your perspective....



Or maybe depends on your perspective....



- Can you find two equal pieces ?

So... the path forward?

- Finding applications where paying for biochar replaces:
an ineffective current management or improves sustainability

