Agricultural Geo-Engineering; Past, Present & Future

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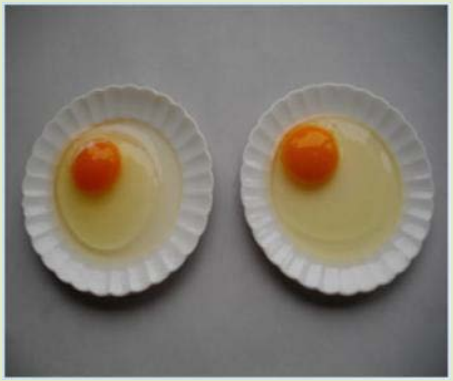
Thanks to Bob Wells; "These are Turnips On Biochar.....Any Questions??"

Craig Sam's Char-colate Cacao Trees Bearing fruit in Three years versus Five

Iwamoto Biochar for Aquaculture and Poultry



Iwamoto Biochar for Aquaculture and Poultry

Black Carbon DK.
Dr. Christoph Steiner

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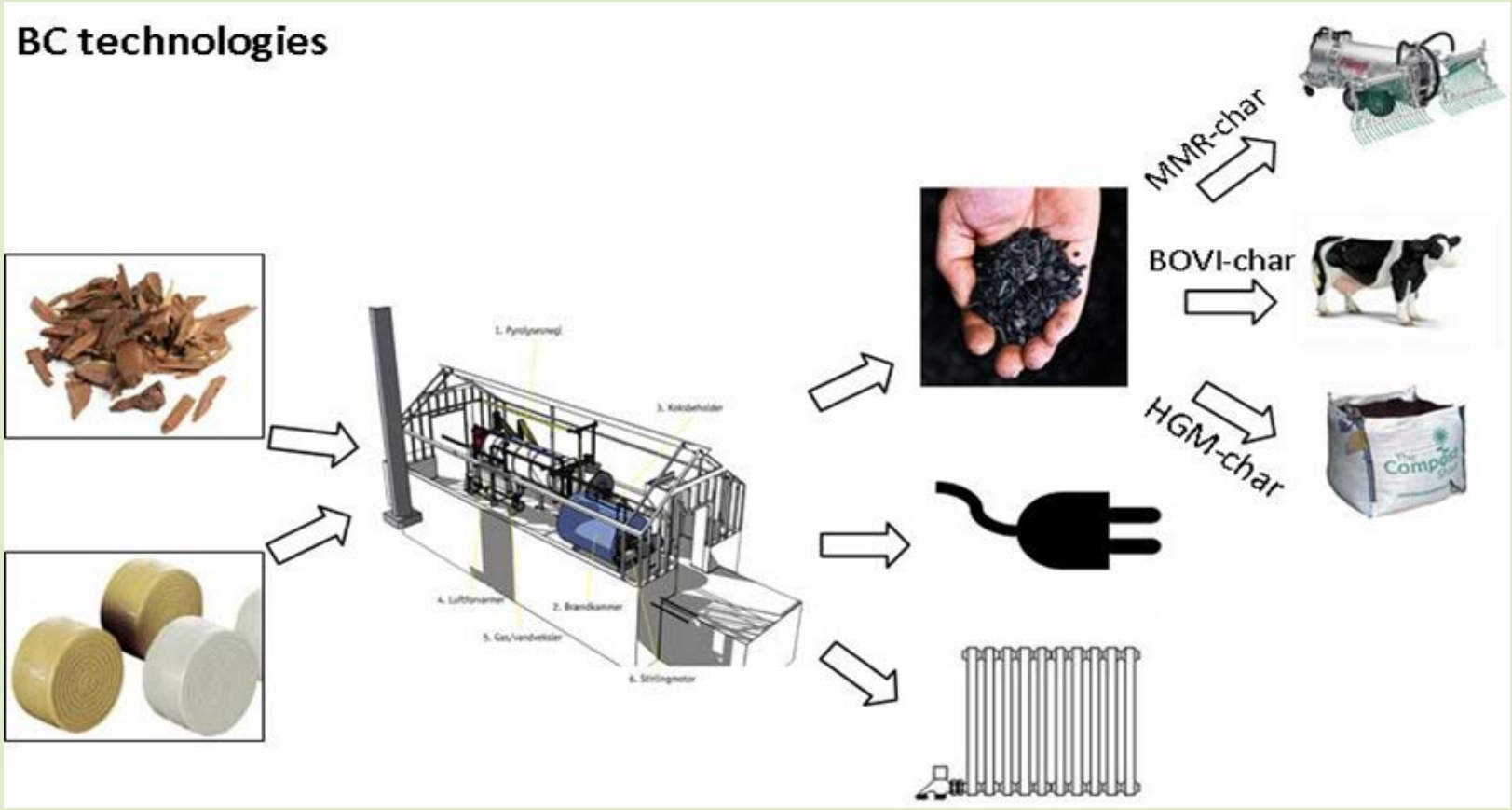
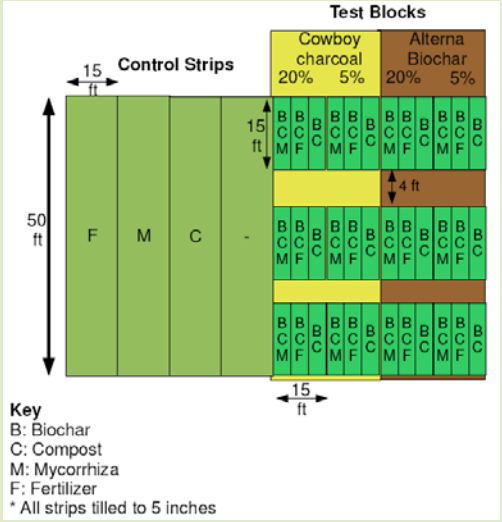
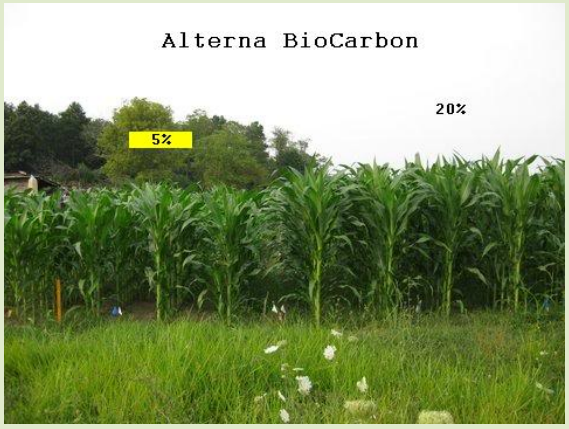
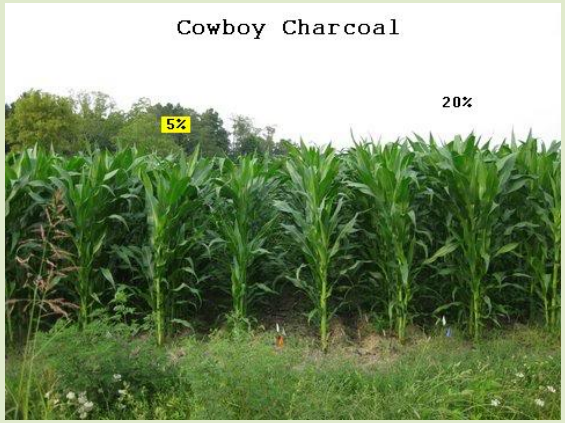
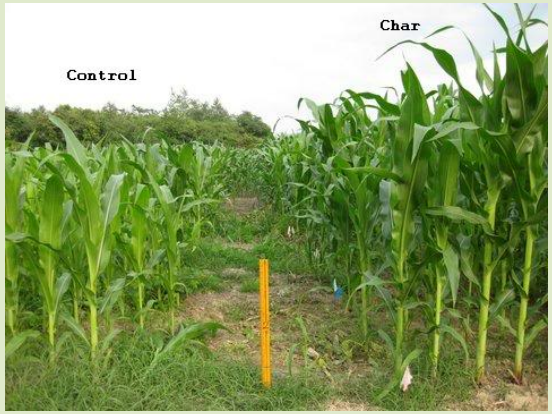


2009 Virginia Field Trials
20% yield Increase









2010 Soy Yields;

Control Plots;..... 24.8 Bushels/acre

Compost Control Plots; 30.1 Bushels/acre

Biochar Plots;..... 40.8 Bushels/acre

Rizosphere Incorporated

Soil food Web Carbon Sequestration Facility.

Cut away View of a 24 / 7, Automated, solar energy integrated, recalcitrant carbon production unit.

Green Job Creation; Employment of Five million trillion trillion Wee-Beasties Carbon Storage Capacity; 150 Billions Tons of Carbon

Equal to; 550 Billion Ton CO_2

(some Northern Facilities offer winter vacations)

Biochar Cascading Values
Feed Ration for integrated nutrient management & Animal Health & Odor
from Hans-Peter Schmidt

1.

Charging biochar with malolactic bacteria and add

1 % BC to silage

2.

1 % BC for feeding

Carbon-Feed

3.

5 - 10 % BC in litter

4.

1- 1,5 % BC

in liquid manure

5.

Composting the carbon manure + the separated solids of the liquid manure

10 – 20% BC

6.

Soil amendment

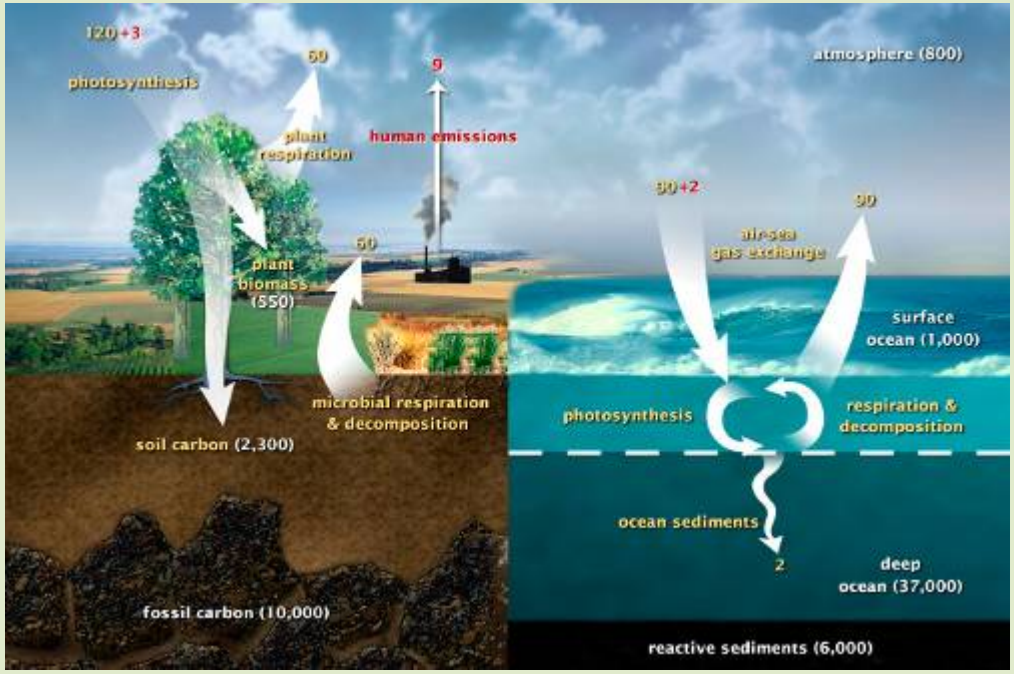
Fixation of nutrients

Increase of SOM

7.

Carbon sequestration

CO2-certificates?



Control Biochar

Control Biochar

Control Biochar

Calabash Gourd Single Plant Over the Roof

Wee-Beastie Real estate, The Rosiest Scenario;

Total Biomass Harvest in the US; 1.6 Billion Tons
If All was processed by CoolPlanet Biofuels the Yield would be;
120 Billion Gallons of tank ready fuel , (The US uses 150 Billion gallons per year)
0.3 Billion Tons of Biochar, with a Surface Area of 600 Square Meters per Gram
One Ton has a surfac area of 148,000 Acres! 148,000 Acres is equal to 230 square miles!!
300 Million Tons of Biochar equals 69 Billion Square Miles, or 348 times the Entire Surface of the Earth !!!

Biochar Gourds of Damocles, a Grown "Green Roof"

Edible Calabash Gourd is an extremely vigorous climbing vine,
growing 1.5 feet per day, I'm planting 6 more next year to cover the entire roof. they average 300 feet of vine (counting tendrils)
My Record Gourd last year was 5.5 feet long and 6 inches in diameter. This stature has been consistent, 20% larger since adopting Biochar.

Agricultural Geo-Engineering; Past, Present & Future

Across scientific disciplines carbons are finding new utility to solve our most vexing problems

In Physics:
Pyrolitic Carbon comes in many forms, this thermally converted carbon is the center of nano material research, C-Nano Tubes, C-60 Buckminsterfullerenes and Graphenes,. The physics of these structures, the tiniest pieces of Carbon, are finding utility in so many processes, Superconductive properties, Solar & Thermo-electric generators. even the sieving of fresh water from sea water.

In Climate Science;
Atmospheric Carbon particles, smoke & soot, that form Carbonaceous aerosols, nucleating 80% of clouds, there for, 80% of our rain, the discovery this year that Carbon aerosols form around a potassium seed, or catalyst, the origins of this atmospheric potassium is fungal life itself. In strong support of the Gaia Hypothesis, life literally calling to the rain. An unaccounted Ecologic Service provided by healthy Soils.
Across disciplines from electronics, agronomy, microbiology and ecology, Spectrographic measurement tools in soil research have reassessed the proportion of Pyrolitic-Carbon that makes up all Soil Organic Carbon, at up to 50%. **[1]**

Several other findings concerning soil microbiology and Soil Carbon are extremely supportive to Carbon Farming initiatives. **[2]**

The first ever assessment of the deep soil carbon sink has increased Soil Sink Bank assets by 225 Tons per hectar in it's 15 foot deep vaults, The "branch offices"; 13.4 billion hectares of biologically productive land brings total Assets to; **3 Trillion Tons of Carbon.** Now, we must cast a proxy vote, as ecological shareholders, on how much interest we should pay the farmers for additional deposits. **[3].**

In Astrophysics & Paleoclimatology;
Geologist using the most intense form of pyrolitic carbons, Nano-diamonds & Rock Carbon Spherules, formed by the 22,000 degrees of cosmic impact. have shown strewnfield evidence, deposition of 10 Million Tonnes of Impact Spherules Across Four Continents 12,800 Years Ago as a smoking gun for the The Younger Dryas Mega-Fauna Mass Extinction. This inverse climate challenge to mankind, 1000 years of Global Cooling, is in debate as the seed of the agricultural revolution it self, and in north America increased use of Fire land management to foster the Bison.

A Brief History of Agricultural Time;
Our farming for over 10,000 years has been responsible for 2/3rds of our excess greenhouse gases. This soil carbon, converted to carbon dioxide and methane began a slow stable warming that now accelerates with burning of fossil fuel. The unintended consequence has been the flowering of our civilization. Our science has now realized the consequences and developed a more encompassing wisdom. **[4]**

Agronomics & Renewable Energy;
Biologically structured Carbons from Biomass; Charcoal, Plant-Coal, the elemental Carbon of the basic plant cell structure, is the pyrolitic Carbon which has held my interest for the past seven years. A renown New Zealand climate scientist, the late, Dr. Peter Read coined the term **"Biochar"** for charcoal used in the soil and calculated the soil carbon building

potentials to draw-down CO2e. This term embraced has made Google filtering to follow the exponential rates of publications in the last few years a simple task.

Animal feed supplements, as practiced by the European and Japanese, allow this Black Revolution for agriculture to be fermented by our livestock. In the EU, 90% of the Biochar produced is passed through livestock before composting and field application. On Swiss Farms they have eliminated manure odor and closed the nutrient loop by retaining Nitrogen in Char/Compost. Dr. Ron Leng have shown cattle fed char reduced enteric methane emissions 40%, enhancing feed conversion 25%!, this has to be one the greatest advances in bovine nutrition in the last few decades. **[5]**

Long Term Biochar Field Trials;
If you enter "biochar field trials" into the search engine Google Scholar, it will bring up thousands of peer-reviewed studies, For the last two years growing exponentially, like biologic systems. The heavy metal remediation studies show great promise for in situ binding of toxins from the food chain. Coal plants utilizing pyrolytic co-combustion then have a byproduct for mine scarred land reclamation and remediation of Arsenic, Selenium, Uranium, Mercury, etc., into both air & ash piles.

Early Field trials tended to use raw Biochar, unamended or formulated with compost and other nutrient charging, with treatment plots receiving various rates of Biochar application from 0.5 - 10 tons per acre. The several Meta-Analytical surveys, incorporating these early trials may incorporate a negative bias in their results, Future surveys incorporating trials more attuned to the soil microbiology will favor increasingly positive outcomes. **[6]**

Everything is About Soil Carbon;
The "Founding father" of Terra Preta soil study is Dr. Wim Sombroek, Before Sombroek died in 2003, he called together a team of internationally renowned soil scientists and gave them the challenge of creating a new Terra Preta capable of solving some of the world’s most pressing problems. He called this new Terra Preta, "Terra Preta Nova", created using modern thermal conversion technologies; Pyrolysis, Gasification and Hydrothermal Carbonization

To meet this challenge laid out before us the real work lies in ferreting out the mechanisms, the soil physical property changes, how to improve soils' sustainably at a scale that will make a difference.

A Carbon Farming Initiative, like the Aussies have, and Canadaians are contemplating, feeds into a carbon labeling for all products, as Walmart is developing. A carbon label puts externalized cost right there for the public to understand, parsing out all that has gotten the product to their hands.

The Accounting of soil carbon as the base measurement of sustainability and aligning incentives to get a farmer paid for his good works, is where all carbon markets should grow from. The farmer will always have the lowest cost system for sequestration of carbon and it is about time that the carbon markets recognize that as it's their very foundations. A foundation far more secure than any other market. All political persuasions agree, Building soil carbon is good.

The Coalition on Agricultural Greenhouse Gases;
This coalition of agricultural stakeholders' urgings for continued investment in the existing

USDA projects and funding additional projects, can lead us to the Royal Road of building soil carbon. As goes California's Air Resources Board ,so will go, eventually, the rest of the States.
Agricultural offset protocols are essential for California's mandatory cap-and-trade program, for developing infrastructure and encouragement of Ag producers' participation in carbon markets. So Soup to nuts, all Ag producers not only get paid for what they produce, they get the full value of how they produce it. The USDA projects have enabled adoption in California and in the Voluntary carbon markets.

Oz and Canada know that all good things come from building soil carbon; greenhouse gas emissions, nutrient efficiency, and the plethora of ecological services. The farmer has many tools to create efficiency, burning less fossil carbon, emitting less Bio–methane, tight N & P management etc...etc. Good economics, sustainable economics requires that all the cards be on the table, quantifying the values and deficits of Agricultural production is the first step for this recognition and instituting incentive programs. **[7]**

Interlude with Dr. Hansen:
Aiming high to bring a household name to our keynote podium, I got shot down, the consolation prizes were however quite substantial.
Michael Pollan declined, promising Biochar will feature in his next book. Dr. Jim Hansen, not answering his invitation, asked about data for his new paper; "The Scientific Case for Avoiding Dangerous Climate Change". Gathering addenda from char researchers and extrapolating the impact of Pyro-Catalytic fuel technology, given the new estimates for sustainable biomass yields, provided expanded potentials for his 100 Gigaton afforestation solution.

The CEOs of CoolPlanet Biofuels, guided by Google's Ethos and funding, along with GE, BP and Conoco, are now beyond pilot scale, building the reactors
that convert 1 ton of biomass to 75 gallons of bio–gasoline and 1/3 ton Biochar. The price of production, from field to tank, is $1.50 per gallon. Their time line; Commercial production of 30 Million gallons and 200,000 Tons of Char by 2016 and mass-production of 400 Farm scale reactors over the next 10 years.

If CoolPlanet Biofuels processed the entire projected US biomass harvest in 2030; 1.6 Billion Tons, the yields would be;
120 Billion Gallons of tank ready fuel ,The US uses 150 Billion gallons per year, and 0.3 Billion Tons of Biochar
It would require just 12,000 distributed refineries. each producing 10 Million gallons. Building 1000 plants per year is quite realistic.

If it's good enough for Google… It's good enough for me! **[8]**

If I May be so bold,… As I speak for Biologic Carbon… I speak for the very center of life itself.

We have been burning it for well over one million years, exploiting it out of the soil for 10,000 years, combusting fossil carbon for 150 years. Now, we can grow nano-structured fossil carbons into an unprecedented varieties of material and even human tissues.

The Stone Age did not end for a lack of stones, as well, the Combustion Age will not end for lack of fossil fuels. Nanotechnology and Terra Preta Technology has thrust The Diamond Age upon us, with it, the rectification of the Carbon and Nitrogen Cycles, Restoring Soil Ecology, Inturn rectifing the Hydrologic and ClimateCycle, this train is leaving the station, either get

on board or be left in the combusted soot and CO2 pollution of history!

Since we have filled the air, filling the seas to full, Soil is the only ubiquitous and economic place to put it.

Thank you for your efforts

[1]

(Potassium**) Salt Seeds Clouds in the Amazon Rainforest;**
http://newscenter.lbl.gov/feature-stories/2012/09/10/amazon-aerosols/

Demonstration, Using quantitative ^{13}C nuclear magnetic resonance (NMR) spectroscopy measurements, concluding that both Terra Preta Soils and Midwest dark soils contain **40% to 50% +** of their **organic carbon (SOC**) as **pyrolytic carbon char**, that this pyrolytic carbon can account for all CEC

Abundant and Stable Char Residues in Soils: Implications for Soil Fertility and Carbon Sequestration
J.-D. Mao, J. Lehmann,

http://pubs.acs.org/doi/abs/10.1021/es301107c

[2]

Fertile soil doesn't fall from the sky. The contribution of bacterial remnants to soil fertility has been underestimated until now
http://www.alphagalileo.org/ViewItem.aspx?ItemId=126987&CultureCode=en

Biologists Unlock 'Black Box' to Underground World: How Tiny Microbes Make Life Easier for Humans,
http://www.sciencedaily.com/releases/2013/01/130103092030.htm?goback=.gde_4767237_member_201276911.

Cross-biome metagenomic analyses of soil microbial communities and their functional attributes,
http://www.pnas.org/content/109/52/21390

Re-Building the World's Soil: The Role of Soil Carbon Methodology for U.S. and Global Carbon Offset Projects,
http://www.prweb.com/releases/2012/12/prweb10185341.htm

See; Fischer and Glaser, for a discussion of how compost and biochar are thought to have formed terra preta,
Published last year and their results since then have been very useful implementing integrated systems.
“Synergisms between Compost and Biochar for Sustainable Soil Amelioration"

http://cdn.intechopen.com/pdfs/27163/InTech-Synergisms_between_compost_and_biochar_for_sustainable_soil_amelioration.pdf,

For years the Chem-Ag folks maintained that the increase of biomass production above ground in modern hybrids would maintain soil-C. This Meta-Analysis from the very belly of the Chem-Ag beast, University of IL, the Morrow Plots, America's oldest experimental fields, after 40 to 50 yr of synthetic N fertilization their conclusions read;
"An inexorable conclusion can be drawn: The scientific basis for input-intensive cereal production is seriously flawed. The long-term consequences of continued reliance on current production practices will be a decline in soil productivity that increases the need for synthetic N fertilization, threatens food security, and exacerbates environmental degradation."

The Myth of Nitrogen Fertilization for Soil Carbon Sequestration
https://www.agronomy.org/publications/jeq/abstracts/36/6/1821

This 2008 meta-analysis of Syn-N and soil Carbon content shows our dilemma,;
Synthetic Nitrogen Fertilizers Deplete Soil Nitrogen: A Global Dilemma for Sustainable Cereal Production
https://www.agronomy.org/publications/jeq/articles/38/6/2295

Both the Organic and Agricultural chemical schools of soil science recognize Biochar as a powerful tool to foster biodiversity and nitrogen efficiency in soils. My hope is that Biochar can form the basis for an uncomfortable marriage between commercial agriculture and organic practice. For him, improved synthetic nitrogen deficiency and livestock manure management, For her, increasingly biodiverse soil microbiology, forming ever more recalcitrant forms of humic substances.

Work by Christoph Steiner, then at U of GA, showing **a 52% reduction of NH3 loss** when char is used as a composting accelerator. This will have profound value added consequences for the commercial composting industry by reduction of their GHG emissions and the sale of compost as an organic nitrogen fertilizer.
http://www.ibi2010.org/wp-content/uploads/BiocharPoultrySteiner.pdf

Biochar effects on soil biota – A review
Soil Biology and Biochemistry journal, a review of international work
by Lehmann & Janice Thies; http://www.biochar-international.org/node/2528

[3]

Deep soils store up to five times more carbon than first thought;

The Soil Sink Bank; "on average, the soils that were analyzed had 3.2 kg of soil organic carbon in the top 10 cm of soil per m2 (2.3% of .1 m depth x 1 m2 x the average mass of soil 1,400 kg/m3), 5.5 kg/m2 in the top 50 cm of soil and 13.8 kg/m2 in the top 500 cm (5 meters). That is 32 tons/hectare, 55 t/ha and 138 t/ha of soil organic carbon in the top 10 cm, 50 cm and 500 cm of soil,"

The Hidden Organic Carbon in Deep Mineral Soils;
http://link.springer.com/article/10.1007%2Fs11104-013-1600-9

This Reappraisal of the Soil Sink Bank of 225 Tons/ha in it's 15foot deep vaults, Multiplied by 13.4 billion hectares of just biologically productive land branch offices, brings their total Assets to; **3 Trillion Tons Carbon.** Now we must cast a proxy vote on how much interest we should pay the farmers for additional deposits.

[4]

Cosmic Impact Sparked Devastating Climate Change, Caused Mass Extinctions,
http://scitechdaily.com/cosmic-impact-sparked-devastating-climate-change-caused-mass-extinctions/

.**Paleoclimatic Engineering;**
The Anthropogenic Greenhouse Era Began Thousands of Years Ago
http://www.springerlink.com/content/h328n0425378u736/

The Columbian encounter led to terrestrial biospheric carbon sequestration on the order of 2 to 5 GtC Climate Forcing.
The Columbian Encounter and the Little Ice Age: Abrupt Land Use Change, Fire, and Greenhouse Forcing - Annals of the Association of American Geographers

[5]

The International Biochar Initiative's Directory of Worldwide research institutions and continue to be maintained and updated at IBI's searchable electronic biochar bibliography that contains 1,000 published citations on Biochar. 60 papers published in 2008, 129 in 2009, 140 in 2010, 171 in 2011, and to date 235 in 2012.
2012, A Year in Review for IBI
http://www.biochar-international.org/node/3847

Japan Biochar Assoiation;
http://www.geocities.jp/yasizato/pioneer.htm

eBRN European Biochar Research Network
http://cost.european-biochar.org/en

UK Biochar Research Centre
http://www.geos.ed.ac.uk/sccs/biochar/

The Australian and New Zealand Biochar Researchers Network
http://www.anzbiochar.org/index.html

Dr. Ron Leng, the first in vivo study;
Biochar reduces enteric methane and improves growth and feed conversion in local “Yellow” cattle fed cassava root chips and fresh cassava foliage
http://www.lrrd.org/lrrd24/11/leng24199.htm

The Delinat Institute's Ithaka Journal;
The use of biochar in cattle farming
http://www.ithaka-journal.net/pflanzenkohle-in-der-rinderhaltung?lang=en

"90% of the biochar produced in Europe is used in livestock farming." is a pretty powerful statement.

At Delinat they are developing a "Building Division" to exploit char use as a building material; in bricks, wood siding finishes, CharPlasters for solid state moisture control. If high temperature char is used...hold on to your Hats!.....All cellphone signals are Blocked!

Carbon Terra, http://www.carbon-terra.eu/en/home
are offering a full line of Carbon Feeds; CarbonCattle, CarbonDog & CarbonCat food

SupperStoneClean; In aquaculture a doubling in size of fish, clams & shrimp
http://superstoneclean.com/video-presentations/

[6]

Meta-Analysis & Long Term Biochar Field Trials

Spokas et al, (2012); Biochar: A Synthesis of Its Agronomic Impact beyond Carbon Sequestration
Fifty percent of the reviewed studies reported yield increases after black carbon or biochar additions, with the remainder of the studies reporting alarming decreases to no significant differences.
https://www.agronomy.org/publications/jeq/abstracts/41/4/973

Another meta-analysis of biochar field trial results has been published to date by Jeffery, et al. 2011.
This analysis included both pot and field trials and used all available published literature with quantitative results up to March 2010. Overall, the mean results for each analysis performed within the meta-analysis covered a wide range (from −28% to 39%, but found that when compared to a control, biochar application to soils showed a small but statistically significant benefit to crop productivity, with a grand mean increase of 10%
Jeffery, S., F.G.A. Verheijen M. van der Velde, A.C. Bastos.
"A quantitative review of the effects of biochar application to soils on crop productivity using met-analysis."
Agriculture, Ecosystems and Environment 144 (2011): 175-187

Biederman & Harpole. (2013) performed a meta-analysis of 371 independent studies culled from 114 published manuscripts finding an averaged increase of; above ground productivity, crop yield, soil microbial biomass, rhizobia nodulation, plant K tissue concentration, soil phosphorus , soil potassium , total soil nitrogen , and total soil carbon
Biederman L., W.S. Harpole. (2013).
Biochar and its effects on plant productivity and nutrient cycling: a meta-analysis.
Global Change Biology–Bioenergy, Special Issue: Biochar. 5:202–214.
http://onlinelibrary.wiley.com/doi/10.1111/gcbb.12037/abstract

Long Term Biochar Field Trials
My focus here will be on the longer duration Biochar trials and those showing unique results by manipulating plant growth variables.
Internationally, Japan, Australia and the EU are 10 to 15 years ahead of the US in developing Biochar soil technologies. The US has been catching up fast, particularly with the development of Pyro/Catalytic thermal conversion of biomass directly into transport fuels. Much of the work in Japan can be reviewed at the Japanese Biochar Association website and the other regional research networks. There is much work that is not yet translated The US total number of acres under Biochar protocols is in the hundreds, while the totals probably number in the thousands of hectares across Asia, Australia and Europe.

Project Rainbow Bee Eater
Nine years of broad field Biochar studies in a host of common field crops, utilizing a banding application right in the planting furrow, have shown consistent yield increases, increases in water holding capacity, and are providing an economic model for inclusion in Australia's Carbon farming initiative.
http://www.anzbiochar.org/projects.html#nine

Virginia Tech is in their 7 th year of field trials with the Carbon Char Group's "CharGrow" formulated bagged product. These studies have consistently shown that just 5% Biochar placed in the growing medium of tomato transplants, when planted out to the field have an average 40 to 50% increase in yield, and fruit quality.
http://www.carbonchar.com/plant-performance

The BlueLeaf Inc. Four years of study, using several different Biochar's in different cropping systems with exciting results, given how far north the site is at 45 degrees, and the low application rates. Other parameters showing increases with Biochar included; earthworms, nematode and mycorrhizal root colonization, supporting the hypothesis that biochar may serve as a refuge for soil microbes. Surface soil water infiltration was also greater. These studies are the most thoroughly measured, including Greenhouse gas soil emissions, Leaf temperature and protein content, in soybean and forage crops.
Generally Biochar amendments increased crop productivity 10 to 15%, Given the low metabolic rate in these Canadian soils.
http://biomassmagazine.com/articles/3501/dynamotive-blueleaf-complete-two-year-biochar-trial

My own studies covered only a two-year period, first as a sister study with the Rodale Institute in 2009 and with no additional Biochar amendments, the measured yield from a commercial soybean crop in 2010. Both years the yields increased roughly 20% over the controls in our temperate Virginia clay loam soils. Also of note were increased soil bacteria and rates of fungal infection, Earthworks increased 25%, and SPAD readings (a proxy for tissue nitrogen) increased proportionally to yield increases.
Alterna Biocarbon and Cowboy Charcoal Virginia field trials 2009
field testing for the 09 corn season with JMU and consultation with Dr. Hepperly at Rodale Institute.
http://biochar.bioenergylists.org/node/1408

The NC Farm Center has large scale field application trials encompassing 40 acres on two farms in southeastern North Carolina.
http://www.biochar-international.org/profiles/northcarolinafarmcenter

Imperial College test,
This work in temperate soils gives data from which one can calculate savings on fertilizer use, which is expected to be ongoing with no additional soil amending.
http://www.iop.org/EJ/article/1755-1315/6/37/372052/ees9_6_372052.pdf?request-id=22fb1902-1c23-4db8-8801-2be7e2f3ce1b

Nikolaus Foidl's work with Aspirin & Char is Amazing in Maize, demonstrating plant chemical signaling with resultant epigenetic effects on corns' metabolism, 250% yield gains, 15 cobs per plant. While the "Biochar only" treatment plots showed increases in yield, the large increases reported were in conjunction with a foliar feeding of ascorbic acid, a known growth stimulant. this additional application had little affect on the crops without Biochar. Nikolaus explains this result as a combination plant chemical signaling, first the plants sense

the pyrolytic substances from the Biochar giving them the message that a forest fire occurred, an opportunity to shine in the sun, then when the aspirin is applied at the 4- Leaf growth stage, this caused the corn to reach deep into its own genetic library, to selectively express long dormant genetic capabilities which produced these startling results.
http://terrapreta.bioenergylists.org/content/trials-maize-reactivating-dormant-genes-using-high-doses-salicylic-acid-and-charcoal

Bartlett Tree Experts and The Morton Arboretum, assisted by the Chicago Bureau of Forestry and Department of Environment studied Biochar applications on About 60 trees on Milwaukee Ave. in Chicago's Wicker Park/Bucktown community. Bartlett's research indicates improvements in soil fertility and water retention, but another unexpected benefit has also started to emerge. Experimental trees in soil with biochar are demonstrating improved resistance to certain insects and disease. Premium Landscape Biochar is a new soil amendment offered by Bartlett Tree**;**
http://www.bartlett.com/tree-expert-news-details.cfm?id=72

[7]

The Coalition on Agricultural Greenhouse Gases (C-AGG) http://www.c-agg.org/

Re-Building the World's Soil: The Role of Soil Carbon Methodology for U.S. and Global Carbon Offset Projects,
http://www.prweb.com/releases/2012/12/prweb10185341.htm

The first methodology approved by the UNFCCC that will allow carbon credits to be generated from the biochar arena. The approved CDM methodology will help to clean up charcoal production in developing countries – and for existing biochar projects that are using traditional technologies, will also help the biochar arena
The Final Frontier for Biochar. Carbon Credits;
http://www.britishbiocharfoundation.org/?p=725
A copy of the methodology can be found;
http://www.britishbiocharfoundation.org/wp-content/uploads/EB67_repan08_ACM0021_NM0341.pdf

[8]

Addenda for Dr. Hansen's; "Scientific Case for Avoiding Dangerous Climate Change",
http://tech.groups.yahoo.com/group/biochar-policy/message/4324

CoolPlanet Biofuel Systems, (CPBS), CO., If it's good enough for Google… It's good enough for me; http://www.youtube.com/watch?v=zkYVlZ9v_0o

If CoolPlanet Biofuels processed the entire projected US biomass harvest in 2030, estimated at 1.6 Billion Tons, the yields would be;
120 Billion Gallons of tank ready fuel ,(The US uses 150 Billion gallons/year), and 0.3 Billion Tons of Biochar
It would require just 12,000 distributed refineries. (each producing 10 Mgal/yr)

According to Dr Hansen's new formula for assessing national CO2 liabilities, The US CO2 reduction fraction is;
26.3 PPM = 207Gt CO2, 207 GtCo2 = 56 GtC,

The avoided Fossil carbon from 120 Billion gallons of Bio-Gasoline = -0.324 GtC/yr + -0.3 Gt Char = **-0.624 GtC/yr**
A significant draw-down & avoidance without even accounting for the out year increases of NPP, lower fertilizer use & avoided CH4 & N2O emissions .

2011 Son of Billion Ton Study
A research team led by Oak Ridge National Laboratory projected that the US would have between 1.1 and 1.6 billion tons of available, sustainable biomass for industrial bioprocessing by 2030. The finding was a highlight of the "2011 U.S. Billion-Ton Update: Biomass Supply for a Bioenergy and Bioproducts Industry". The report is an update of a landmark 2005 study undertaken by the DOE and ORNL in 2005.
http://www1.eere.energy.gov/biomass/pdfs/billion_ton_update.pdf

This tonnage could be doubled with an aggressive program to develop marginal lands of the south west. Colleagues working with Agave on marginal lands in Mexico & US southwest, estimate that such marginal lands have the potential of another 1.5 Gt of biomass production.

Borland A. et al. 2009
Exploiting the potential of plants with crassulacean acid metabolism for bioenergy production on marginal lands
"The substantial biomass increases reported for CAM species under elevated CO_2 on marginal lands indicate that serious consideration should be directed towards exploring the potential of CAM plants as a low-input source of bioenergy and as a means of stimulating sustainable economic growth in developing countries."
http://jxb.oxfordjournals.org/content/60/10/2879.full

Biographical Info;

Erich J. Knight, an ornamental gardener of 33 years, has spent the last seven years advocating for thermal conversion of biomass. He has been directly involved in several projects concerning soil carbon at James Madison University, as well as conference planing & presentations at ISU and CU Boulder and Sonoma State in 2012

Erich is working to integrate the many applications of Biochar for enteric health as a feedstuff in animal husbandry, for mine scarred lands as an in situ bioremediation for a host of toxic agents and pesticides, in addition to carbon negative energy and transportation fuels, Erich has networked and collaborated with a host of organizations across the globe. His goal is total symbiotic integration of nutrients, carbon and energy by the husbandry of whole new orders and kingdoms of life. To recruit the Wee-Beasties from numerous biomes allows nature to do the heavy lifting and solve many dilemmas in our macro world. There is Plenty of Room at the Bottom and Biochar has provided the tools to explore this vast realm.

Erich's networking efforts have lead to collaborative field trials with the Rodale Institute , DuPont & ORNL for brownfield remediation trials, and dissemination of char practices to academic & grass-roots organizations. Additionally he has provided editorial assistance on topical articles and the leading books; "The Biochar Solution" & "The Biochar Revolution".

His policy & research lobbying efforts with the USDA, USGS, DOE, NOAA, NASA and EPA

lead to a briefing of the EPA chiefs of North America at the 2011 Commission for Environmental Cooperation.

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