

Biochar Production and Field Application

“A” Multiple-win success story for farmers in Uganda.



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“Agriculture is the solution for Climate change mitigation”

Presentation outline

1. Background (Uganda, Uganda's Agriculture and Biochar)
2. Biochar production and field application
3. Biochar benefits
4. Farmer success stories
5. Conclusion

Background > UGANDA



- Geographical location: East Africa, astride the Equator, land locked.
- Geographical neighbors: Kenya, Tanzania, S. Sudan, DR Congo, Rwanda
- Administrative system: Decentralized with central government retaining role of policy making, supervision and admin. Units - 121 districts
- Area: 241.038 km² (93.072 sq miles)
- Life expectancy: 62 years – UN; Population: 43,777,469, 222 P/Km². Annual Popn. Growth is 2.88.

Background > Genesis of Uganda's agriculture

Conventional farming



Conservational farming



Background > Biochar Technology in Uganda

- **What is Biochar?**

-carbonaceous solid material produced when biomass is heated in a zero or low-oxygen environment

- Biochar widely recognized as an efficient material for carbon sequestration and soil fertility



Biochar Technology in Uganda...

- In Uganda Biochar was initially used for making smoke less briquettes for charcoal stoves.
- Biochar was produced mostly from crop residues especially maize and rice straw.
- Crop residues (CR) should be retained in the soil to increase organic matter and soil nutrients.
- In Uganda CR have been discouraged for biochar production;

Biochar Technology in Uganda...

- The use of Invasive weeds especially Lantana camara and Tithonia affecting many farmlands and wood byproducts e.g wood shavings have been encouraged and are now major source materials for biochar production.
- In Uganda and many countries across the world, farmers have successfully used biochar as a soil amendment material to increase crop resilience.
- The interest in the application of biochar as a method for mitigating the global warming effects is steadily increasing (Jindo *et al*, 2014).

Biochar production process

Prolysis-Biochar Kiln



Gasification –Biochar stoves



Biochar Source and product

Maize Stover



Maize Biochar

-Although

discouraged



Biochar Source and product...

Rice husks



Rice Biochar



Biochar Source and product...

Wood shavings



wood shavings biochar



Invasive weeds for Biochar production

Lantana camara



Tithonia



Biochar field application tips

- Biochar can be made from different sources (municipal waste, crop residues , forest litter among others)
- A 50kg bag costs about \$ 15
- A farmer may apply once in three seasons
- Method of application depends on the crop (Direct/Spot application or broad casting)

Biochar field application tips...

- Basically, 4 bags used for 1 acre of land
- Quantity per plant depends on the type of crop
- Can be applied in almost all range of soil types but more beneficial for high acidity soils



Biochar benefits

- **Reduction of climate change effects**
 - Holds 50% of biomass's carbon & when applied to soil, sequesters that carbon for centuries
 - Biochar also enhances plant growth which absorbs more CO₂ from the atmosphere.
- Power generation during pyrolysis
- Biofuels- for energy production
- Solid Waste Conversion
- From Waste to Value

Biochar benefits...

- **Biochar Enhances Soil, crop & Water Quality**

- ✓ increased Nutrient and Water

- Retention

- ✓ Less Fertilizer Needed

- ✓ Improved soil properties

- ✓ Remediate soil with heavy metal and organic pollutants

- ✓ Increases crop resistance to disease

- ✓ Improves crop yield (NARO)



Farmer success stories in Uganda



success stories...

1. *Mr. Andrew Ebongo of Mbale-Vegetables*

Before biochar application

- Harvest 4 leaves of spinach/plant/week
- Revenue increased from \$9/week/bag
- Irrigation from three times a week
- No biochar as a business
- Exposure

After biochar application

- Harvest 6 leaves/plant/week.
- \$11/= /week/bag.
- Twice a week
- Biochar as business
- Contracted NUCAFE

Andrew's Observations on farm...

Before biochar application

- Fewer soil organisms
- Less soil moisture
- Hard pan
- Worm soils
- Slow germination

After biochar application

- More soil organisms e.g earthworms
- More soil moisture
- Reduced hard pan
- Cooler soils
- Faster germination

Success stories...

2. Mr. Kayigwa Moses-Maize farmer in Namutumba

Biochar application at planting



After biochar application



Success stories...

2. Mr. Kayigwa's benefits from Biochar

- Increased maize yield (from 15bags - 21bags/ acre)
- Reduced use of artificial fertilizers on his farm
- Less pesticides used
- Increased quantity of maize Stover for mulching his banana plantation

Conclusion

“Use Biochar for resilient farming systems and climate change mitigation”



Thank you!

For God and my Country