

A large fire is burning in a metal kiln, which is a simple structure used for producing biochar. The kiln is filled with logs and is situated in a forest. The fire is bright orange and yellow, and a large plume of smoke is rising from the kiln. In the background, several people wearing hard hats and safety gear are visible, standing in the forest. The forest floor is covered with dry leaves and twigs, and the trees are tall and thin.

FOREST RESTORATION USING SIMPLE KILNS FOR BIOCHAR PRODUCTION AND APPLICATION

BIOCHAR 2018, WILMINGTON, DELAWARE, AUGUST 21, 2018

UTAH BIOMASS RESOURCES GROUP



UtahState University
COOPERATIVE EXTENSION

Amaron Energy



UBRG

Founded
2010

Partners



Reduce
hazardous
fuels

Improve
firefighter
safety

Create a
product

Develop the
bioeconomy



Pile burning:
business as
usual

Air quality
issues

Damage to
soil

Season
extremely
limited

Location
limited



Benefits:

Balancing
mechanism

Fuels
reduction

Water
retention

Durable

Direct carbon
sequestration



2010: UBRG
started with
mobile
gasification



2014: UBRG
introduced
mobile
pyrolysis

Amaron
Energy

Rotary kiln

Cost:
\$500,000+



2017:

Simple kilns

Oregon kilns

Flame-cap
kilns

Kelpie-kilns

Cost: \$600 ish



Metal box

5 feet x 5 feet

2 feet high

Handles

Stackable

Transportable



Culinary
features



Contracted
with Kelpie
Wilson for first
workshop

Purchased
four kilns

USU Extension
Grant

Diverse
audience



Partners:

Utah Division
of Forestry,
Fire, and State
Lands

USU Extension

US Forest
Service
Landscape
Scale
Restoration
Grant



Load kiln

Up to 8 inch
diameter
material

Dry material
most
productive

Make a rick

All can
participate



Top light kiln

Small fuels on top

Windscreens optional



Tending/
stirring



Keep adding material until kiln is $\frac{3}{4}$ full of coals

Can consume 5 times its volume



Fuels cut-to-length

Presorted

All of these
piles will fit into
one kiln



Flames get tall

Beware of
overhead
fuels



Flames still
visible:
cooking



Almost done

Nearly ready
to quench



Quenching

100 gallons



Stirring and
wetting



Finished
product



Tipping



Spread out
coals in non-
flammable
area for
cooling

Brittle: can
reduce piece
size by
crushing



Biochar on
the forest floor

Restoration
value

Cold trailing

Deer
consume char



Biochar
spreading
devices



Proximity to
heavy fuels



Urban applications

DIY kilns

Proximity to
home, garden





Application
in SMZ's



Next steps:
Big box
burning



Applications:

Industrial
application

Lime spreader



High carbon
compost



Application
Rates

10 tons/acre

WSARE Grant:
biochar for
tomato and
melon
production



Biochar from
Russian-olive
for butterfly
habitat



Water
Initiative
Grant:
biochar under
irrigation
pivots for
water
retention



Use of biochar
by sheep:
Impacts on
nutrition and
diet selection



Economic
model:

Reduce fuels

Absorb
nutrients

Increase
productivity

Sequester
carbon



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