



# USING BIOCHAR FOR SOIL ORGANIC MATTER (SOM): FOREST 2 FARM

JIM ARCHULETA-R6 WOOD INNOVATION  
COORDINATOR

# CARBON IN FEEDSTOCK = AMOUNT OF CHARCOAL/BIOCHAR PRODUCED

FEEDSTOCK MATERIAL	C:N RATIO
COFFEE GROUNDS	25:1
FRESH WEEDS	20:1
CORN STALKS	60:1
STRAW OR HAY	90:1
WOODY CHIPS & TWIGS (FOREST BIOMASS)	700:1 (HIGHEST CARBON RESULT)

# FIRST SOME FOREST MANAGEMENT ISSUES

- SCALE R6 (OR & WA):
  - IN NWFP THERE ARE ABOUT 24.5 MILLION ACRES UNDER MANAGEMENT 16%
    - CONGRESSIONAL RESERVES AREAS (PASSIVE MGT)
    - LATE SERIAL RESERVE (PASSIVE/ACTIVE MGT)
    - ADAPTIVE MANAGEMENT AREAS (LIMITED ACTIVE MGT)
    - ADMINISTRATIVE WITHDRAW AREAS (ACTIVE MGT)
    - RIPARIAN RESERVES (PASSIVE/ACTIVE MGT)
    - MATRIX (3.9 MILLION) ACTIVE MGT/LEAST RESTRICTIVE)
- BUDGET NATION WIDE:
  - 2017, HALF OF THE FOREST SERVICE BUDGET IS SPENT ON WILDFIRE SUPPRESSION

# FIRST SOME FARM MANAGEMENT ISSUES

- SCALE COLUMBIA BASIN:
  - THERE ARE ABOUT 4 MILLION DRY-LAND ACRES BEING FARMED
    - LOSS OF 50% SOM ON SOME FARMS
      - IF 1% SOM IS EQUIVALENT TO 25,000G/AC WATER SOIL WATER CAPACITY
      - SOME FARMS HAVE LOST 1 MILLION G/AC
    - LOSS OF SOM CAN REDUCE WATER INFILTRATION UNDER CLIMATE CHANGE
      - MUCH OF THE BASIN TO SEE LESS SNOW AND MORE RAIN
- BENEFIT TO FARMING:
  - MACHADO
    - 5T/AC APPLICATION INCREASED WHAT YIELD ~30%
    - PH BENEFIT TO SOIL
    - POTENTIAL FOR DRY-LAND FARMING BENEFIT WITH NEW SOIL/WATER CAPACITY

# TWO PROBLEMS ONE SOLUTION

PROBLEM 1) FOREST LANDSCAPES: FUEL LOAD ISSUE RELATED TO WILDFIRE RISK

THE FOREST CAN OFFER A READY FEEDSTOCK SOURCE OF CHARCOAL

PROBLEM 2) FARMS LANDSCAPES: LOSING SOM AND IT'S CAPACITY FOR WATER AND NUTRIENT HOLDING

CHARCOAL WHEN APPLIED TO SOIL CAN MITIGATE SOM LOSSES - BIOCHAR

SOLUTION: TAKE THE BIOMASS ALREADY BEING BURNED IN FOREST MANAGEMENT PILES AND CREATE CHARCOAL TO BENEFIT FARMING

TBD, FIND SUSTAINABLE BIOMASS DEDICATED HARVEST SCENARIOS FOR FUELS REDUCTION

# LANDSCAPE PERSPECTIVE OF MANAGEMENT

- UNTIL LANDSCAPE MANAGEMENT WAS CONSIDERED
  - THE FOREST2FARM CONCEPT DID NOT COME INTO FOCUS.
- WHO CAN BE A HIGH OUTPUT BIOCHAR PRODUCER
  - MILL OPERATORS – MILL RESIDUES (STATIONARY)
  - LOGGERS – TIMBER SALE BRUSH DISPOSAL (MOBILE?)
  - FOREST FUEL MANAGERS (FIREFIGHTERS)
- THE LISTED GROUPS REDUCES VEGETATION MANAGEMENT GAPS ACROSS THE LANDSCAPE
  - BUT DOES NOT SOLVE CONTIGUOUS FUELS MANAGEMENT ACROSS THE LANDSCAPE

# MOBILE BIOCHAR MANUFACTURING

- CLOSING THE GAP BETWEEN TIMBER SALE LANDINGS AND STATIONARY MANUFACTURING CONTIGUOUS FUELS REDUCTION
- PATENT SUBMISSION
  - MOBILE CHARCOAL/BIOCHAR PRODUCTION AND PELLETIZER SYSTEM AND METHOD
  - US 2018/0010043 A1
- 2018 COOPERATIVE AGREEMENT TO MODIFY EXISTING EQUIPMENT
  - AIR BURNERS INC.
- OTHER EQUIPMENT
  - ROI
  - OREGON KILNS...





# TILLED FOREST BIOCHAR TREATMENTS

APPLICATION ON SNOW  
WHICH CAPTURED MOISTURE  
ON SANDY SOILS





# NO-TILL FOREST BIOCHAR TREATMENTS



20T/AC APPLICATION IN  
LIGHT RAIN



NEXT DAY BIOCHAR  
TRANSLOCATED BELOW DUFF







- BIOCHAR TEST CORE
- 6" DIA X 12" H



- SOLUTIONS FROM TEST CORES
- BIOCHAR                      CONTROL



# SOLIDS COLLECTED FROM SOLUTIONS

- BIOCHAR SOLIDS AND CONTROL SOLIDS
  - <1% DIFFERENCE (BY WEIGHT)
- ASSUME THAT >99% OF APPLIED BIOCHAR WAS RETAINED WITHIN SOIL CORE
  - UPPER ROOTING ZONE BENEFIT

# BIOCHAR FARM APPLICATIONS

SEED COATING, INCREASED  
ROOT DEVELOPMENT  
DR. MACHADO (OSU)



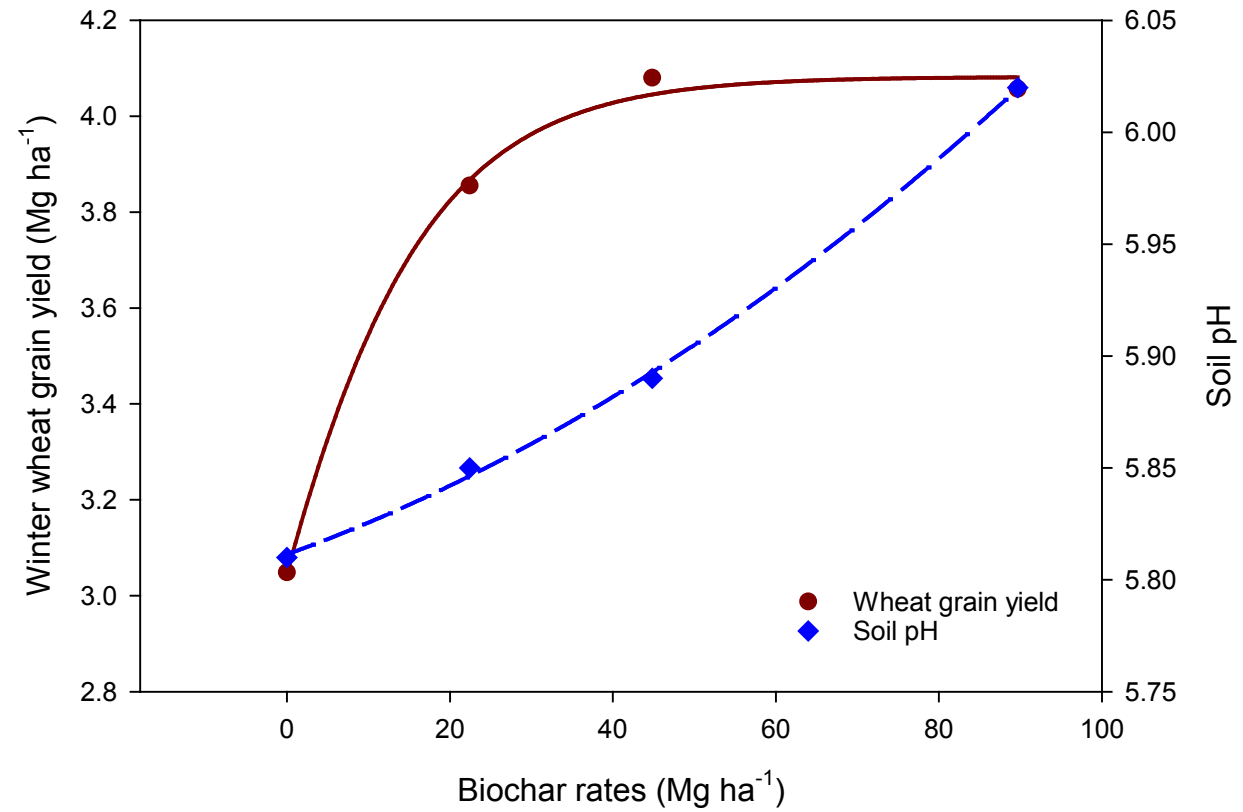


Fig 1. Biochar effects on winter wheat grain yield, 2012-13, Athena, Oregon

Dr. Stephen Machado (OSU-CBARC)



# QUESTIONS

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