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BUSH
BIOMASS UTILISATION BY SUSTAINABLE HARVEST

TRIALS ON APPLICATION OF BIOCHAR AS SOIL AMENDMENT UNDER IRRIGATION

Ibo Zimmermann, Helmi Auala, Mirjam Namangudu & Abraham Shihepo (NUST)

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Water used to quench biochar in Kon-Tiki kiln

Water was used to quench biochar produced in a Kon-Tiki kiln at CCF

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Quench water drained from Kon-Tiki kiln

The resulting quench water was drained off the following day and kept for use by Abraham Shihepo in his trial at CCF

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Quench water applied in tomato trial

Every week he diluted some quench water 10x and applied it as foliar spray onto tomato plants grown in six of the 12 beds of 2m² each in the CCF garden

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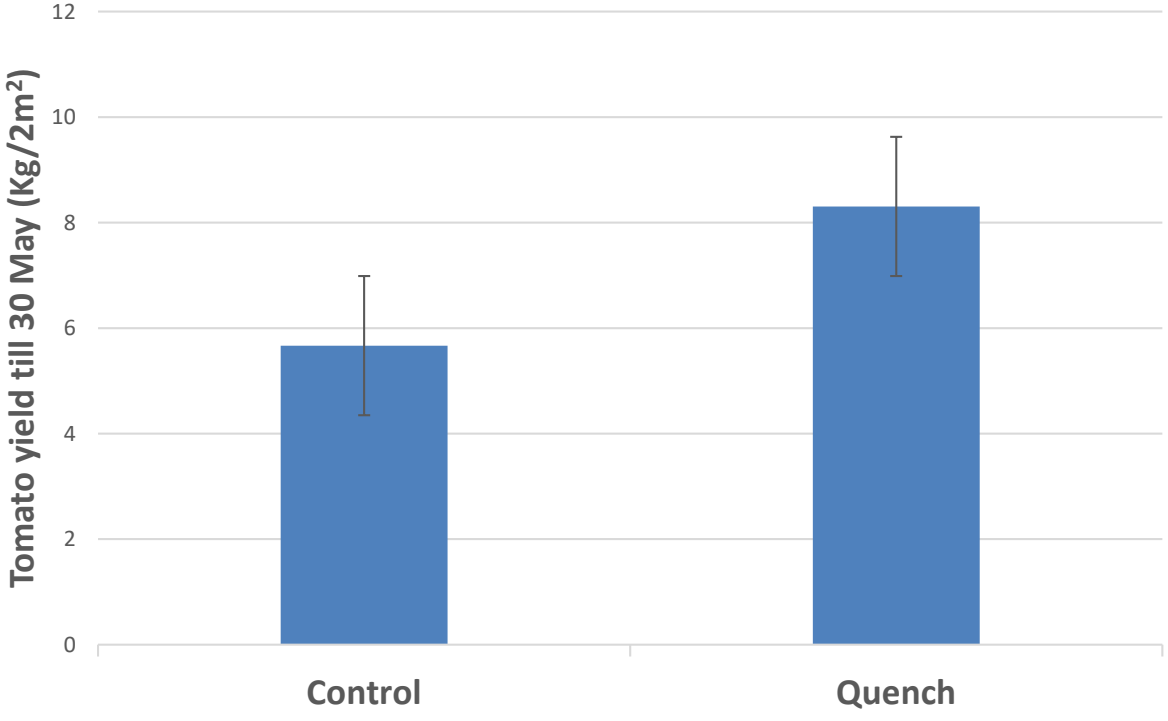
Results from Abraham's trial



P<0.05 by t-test

Error bars represent 95% confidence intervals

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Biochar

… before all the tomato plants were attacked by red spider mite and blossom end rot

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Types of biochar tested in radish bioassay by Mirjam

Production	Scale	Feedstock	Sourced from
TLUD	Tiny	CoW woodchips	CoW Parks Division in Pioneerspark
TLUD	Tiny	90% chips + 10% bones	CoW Parks + Butchery
Drum	Small	Mixed species ash & sand	Makarra Bush Products
Drum	Small	Mixed species fines	Makarra Bush Products
Drum	Small	*Terminalia sericea*	Omaheke farmer via NBIG
Kon-Tiki	Small	*Acacia mellifera*	Cheetah Conservation Fund (CCF)
Kon-Tiki	Small	*Dichrostachys cinerea*	Cheetah Conservation Fund (CCF)
Retort	Small	*Acacia mellifera*	Red Nossob via NBIG
Retort	Medium	*Acacia mellifera*	Cheetah Conservation Fund (CCF)
Retort	Medium	*Dichrostachys cinerea*	Cheetah Conservation Fund (CCF)
Retort	Large	Mixed species	Alfa Charcoal

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Free City of Windhoek woodchips

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TLUD stove

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Vortices at syngas inlets to TLUD stove

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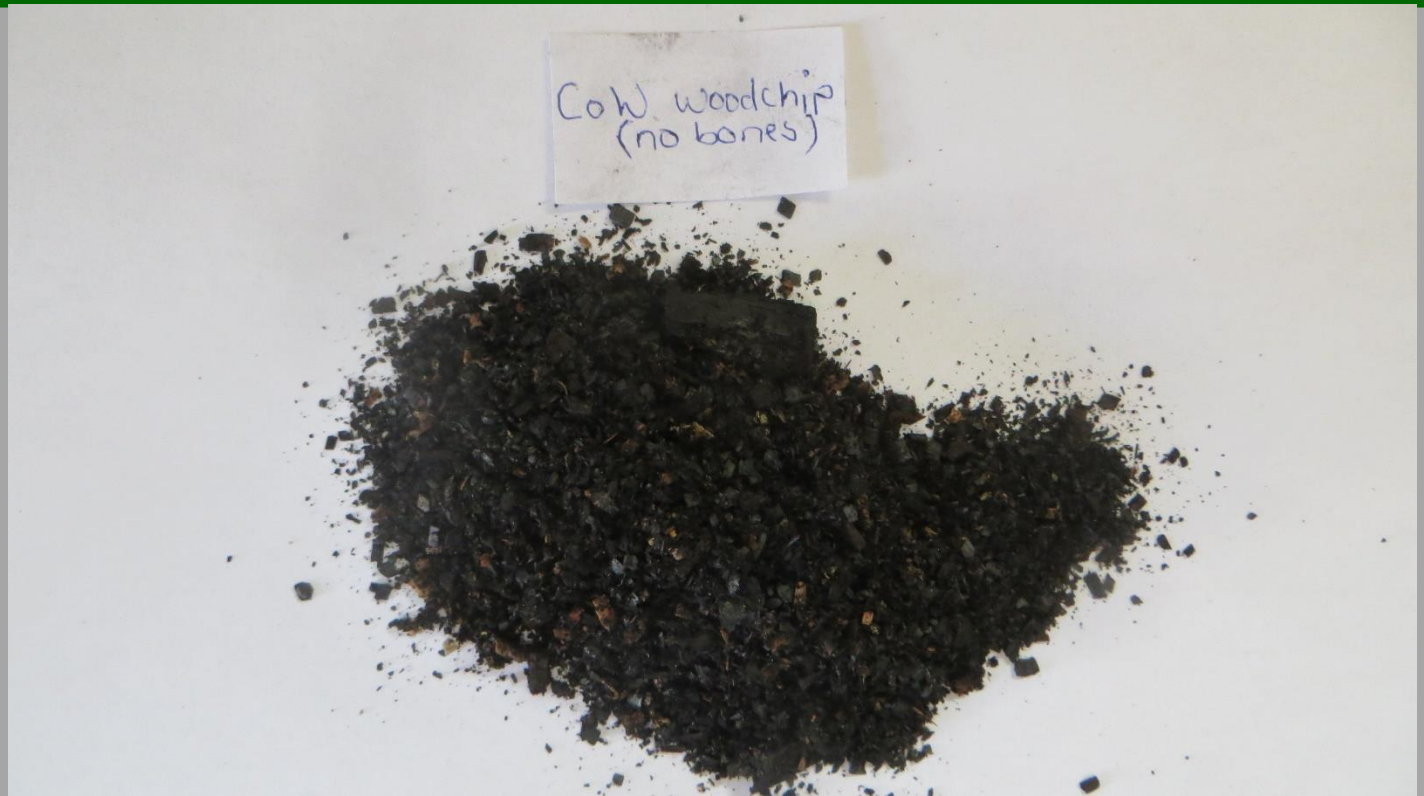
Crushed char from City of Windhoek wood chips



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Crushed char from CoW wood chips with 10% bones

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Bone char before crushing

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Common drum kiln

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Sorting by charcoal size at Makarra

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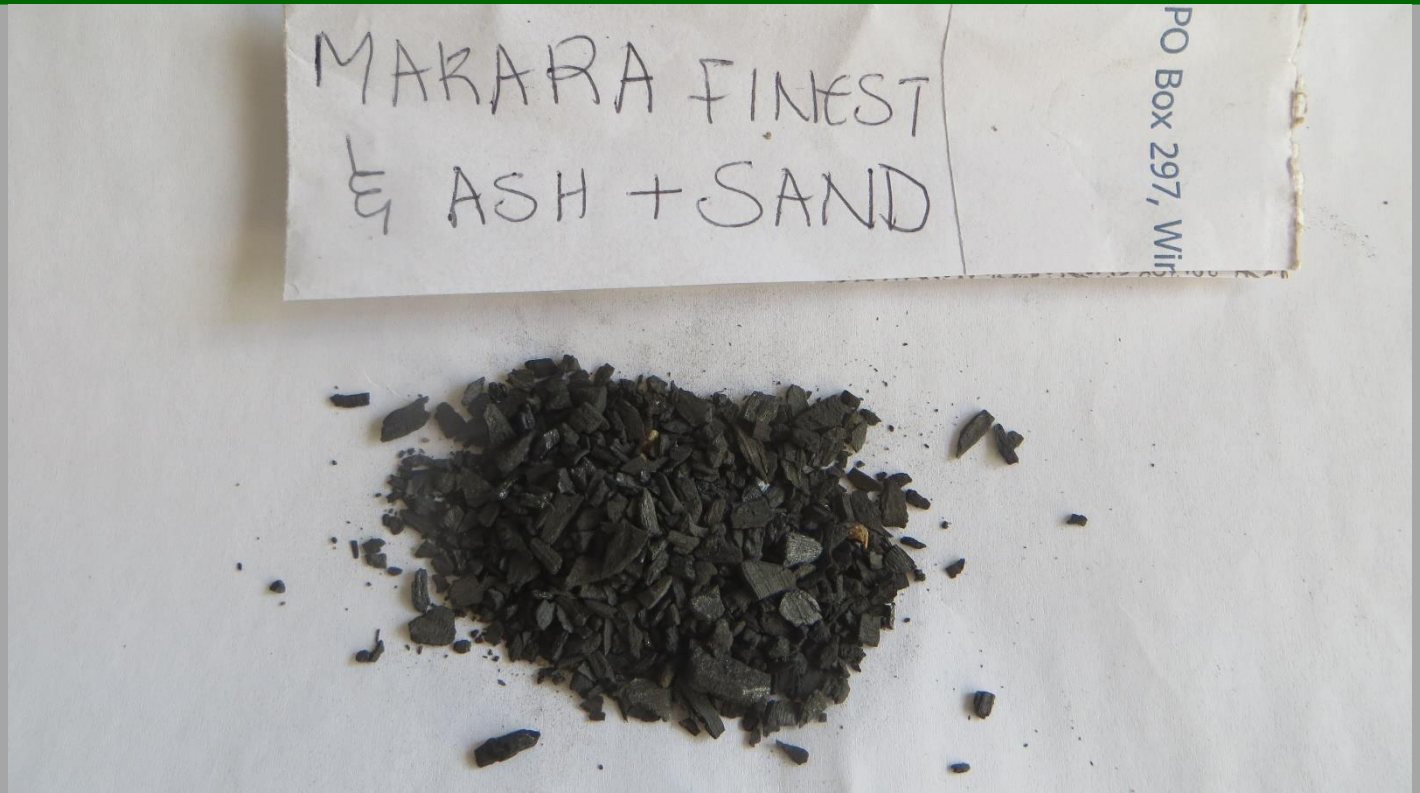
Ash and sand portion from Makarra



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Kon-Tiki kiln

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Acacia mellifera char from Kon-Tiki kiln

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Crushed *Acacia mellifera* char from Kon-Tiki kiln

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Dichrostachys cinerea char from Kon-Tiki kiln

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Small and Large retorts

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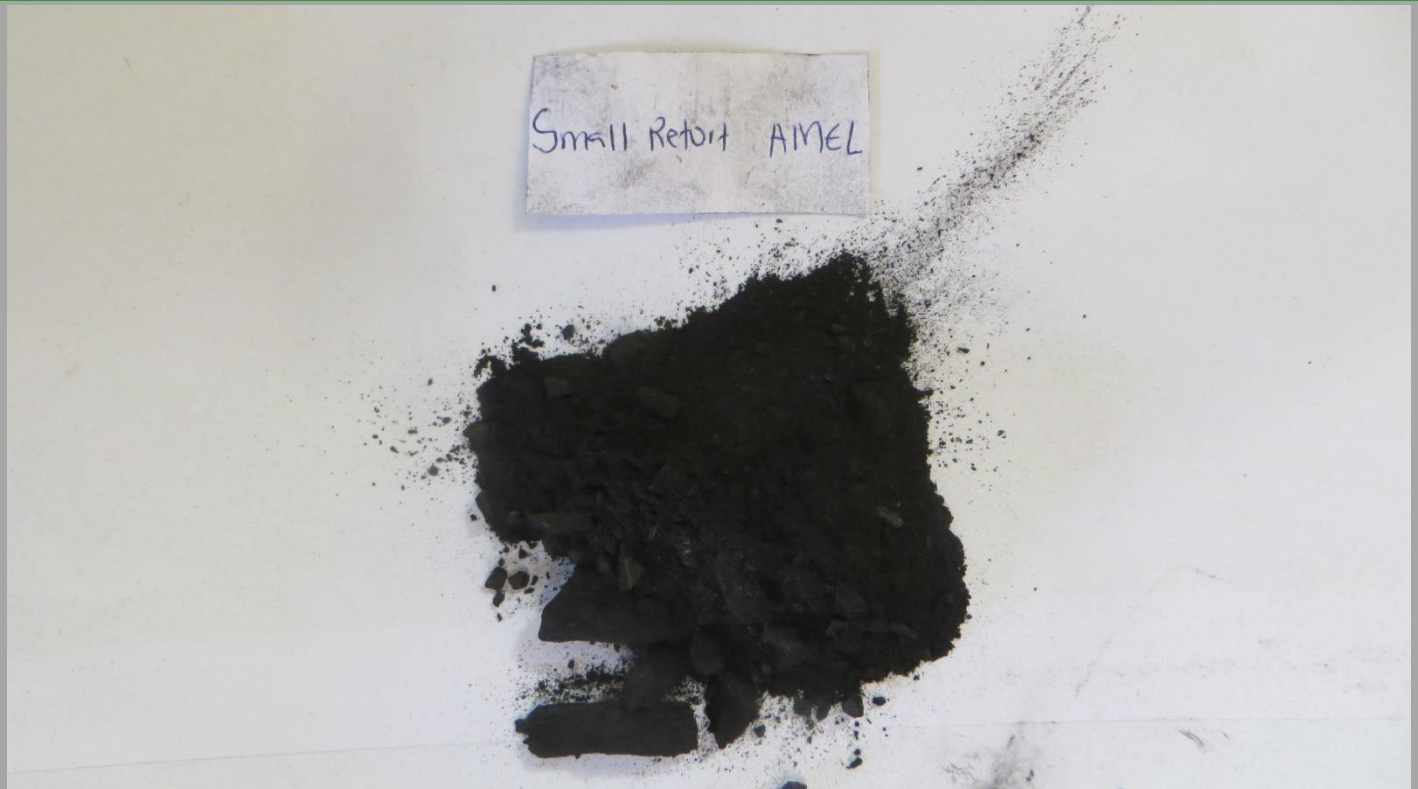
Crushed *Acacia mellifera* char from small retort



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Mixed char from large retort

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Two additional factors of fertilsation and inoculation

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Biochar prepared growing media before randomisation

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Randomised block design for radish bioassay

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Harvest

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Numbering of harvested radishes

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Determining mass of harvested radish plant

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Measuring root diameter of harvested radish

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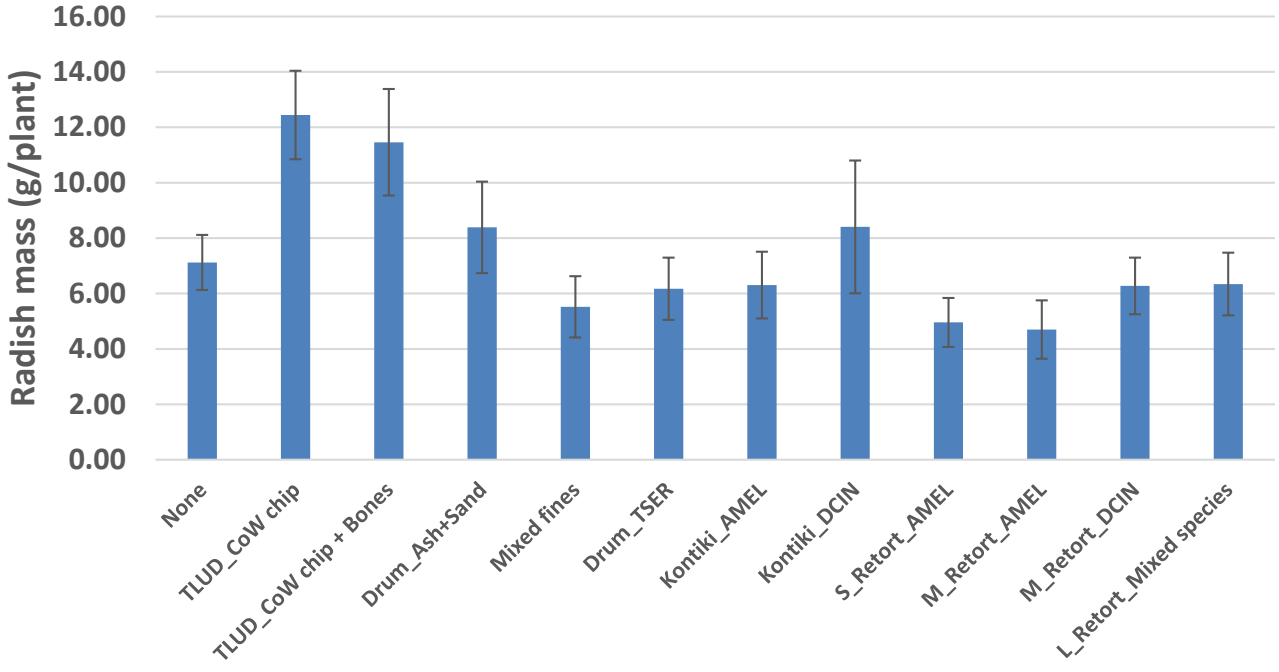
Initial results while analyses still underway



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Field trial by Helmi at Humulus farm in Okahandja

A new field
0f 21 x 42m
was cleared
for the trial

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Common drum kilns

One type of charcoal tested as biochar is from the common drum kiln, comprising the “fines” that fell through the finest sieve, which gets sold at a low price

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Kon-Tiki kiln

The other was produced in a Kon-Tiki kiln, designed for improved efficiency at higher temperature that burns with a clean flame, clearing tar and oils from char pores, enhancing microorganisms

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Crushing of Kon-Tiki char

The Kon-Tiki char is crushed between rollers

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Inoculation of biochar

Half of each type of char is inoculated by spraying with beneficial microorganisms in a product called Super Grow

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Field application in subplots

The two char types, inoculated and uninoculated, are each applied at three rates of 2, 10 and 40 tons/ha on subplots of 3x3m replicated seven times and compared with an untreated control

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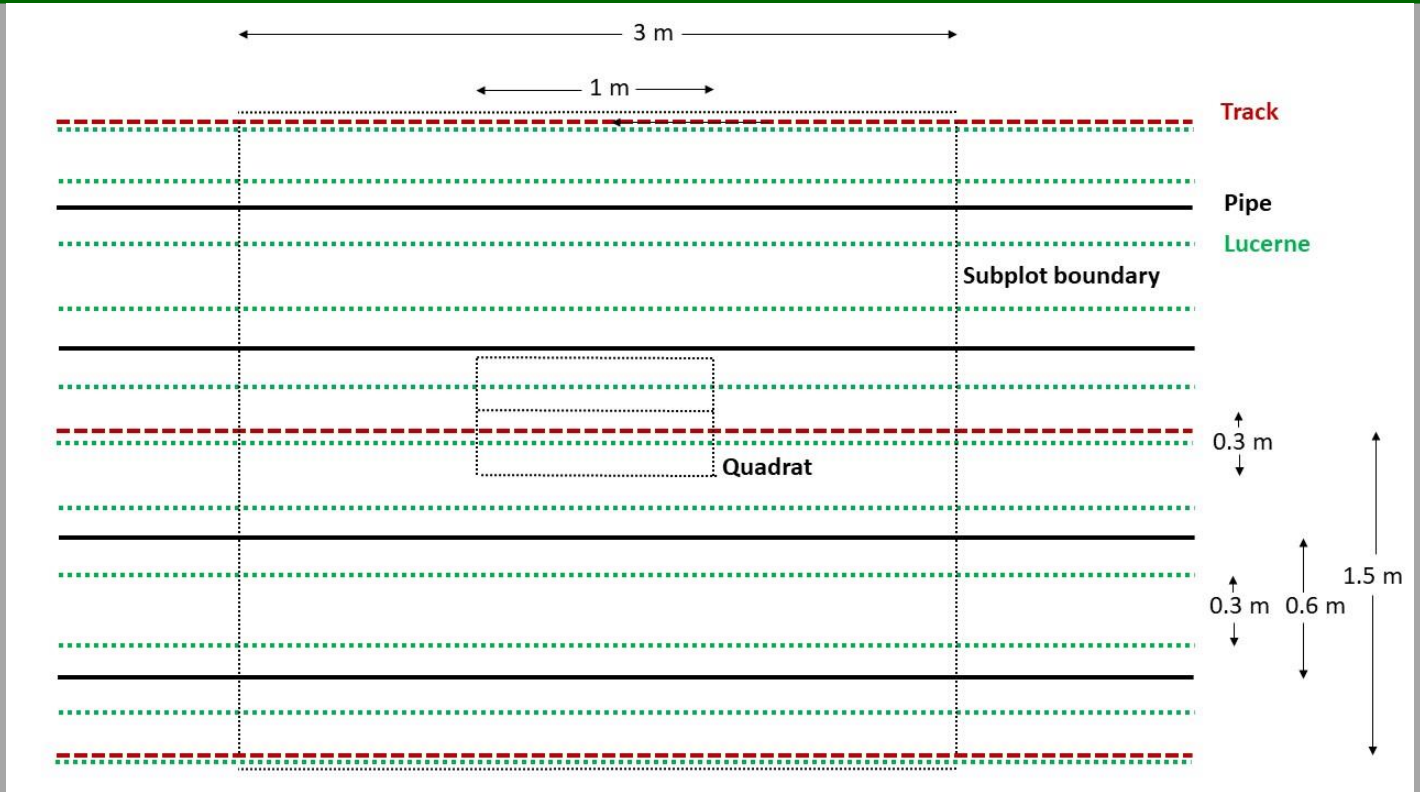
Lucerne growing in all subplots

Lucerne was grown on the overall plot, irrigated by underground drip lines spaced 0.6m apart, to be harvested monthly from quadrats of 1x0.3m placed at two distances from a dripline near the entre of each of the 98 subplots

Subplot layout



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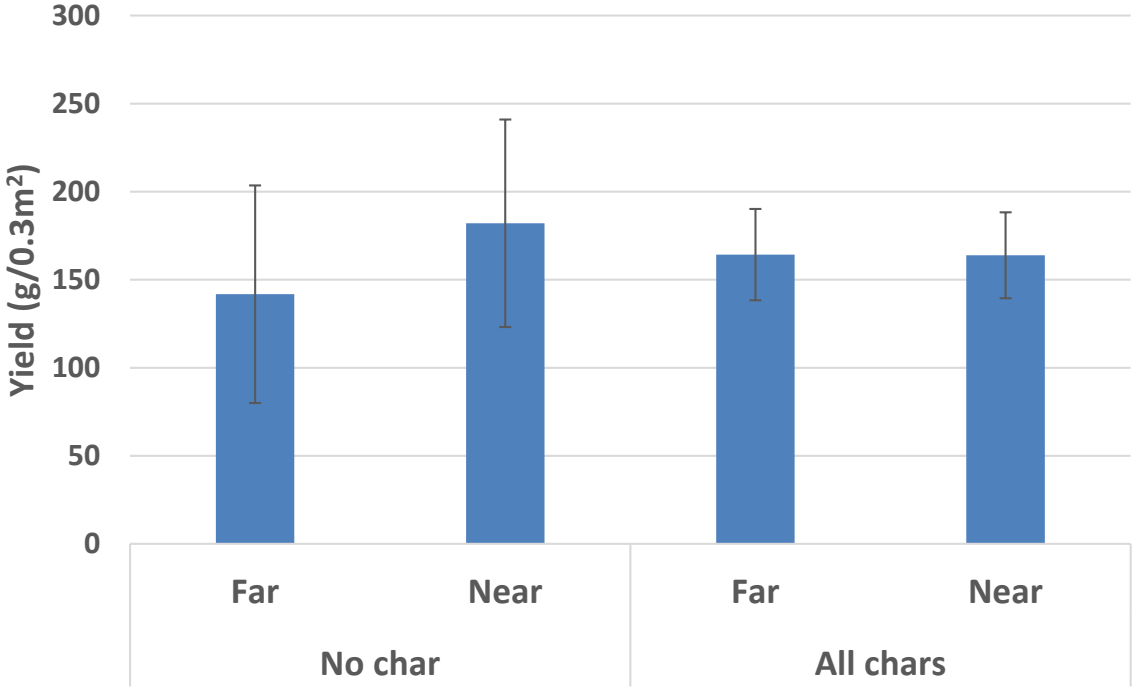
Initial result from November harvest of field trial



No significant differences yet, and samples not yet completely dry, but hint of lateral spread of water with chars

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The way ahead with biochar trials

- Another bioassay
- Monthly harvests of lucerne
- Trials with biochar applications for animals
- such as measuring rates of free-choice intake
- and effects on milk or egg production
- and growth rates