



NIBIO

NORSK INSTITUTT FOR
BIOØKONOMI

Biochar: A solution for climate change and food security

Adam O'Toole 07.03.2023 Permaculture Noosa Club night



Solving climate change requires....



Reducing emissions



Increasing carbon sinks

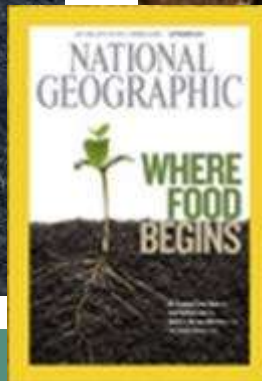
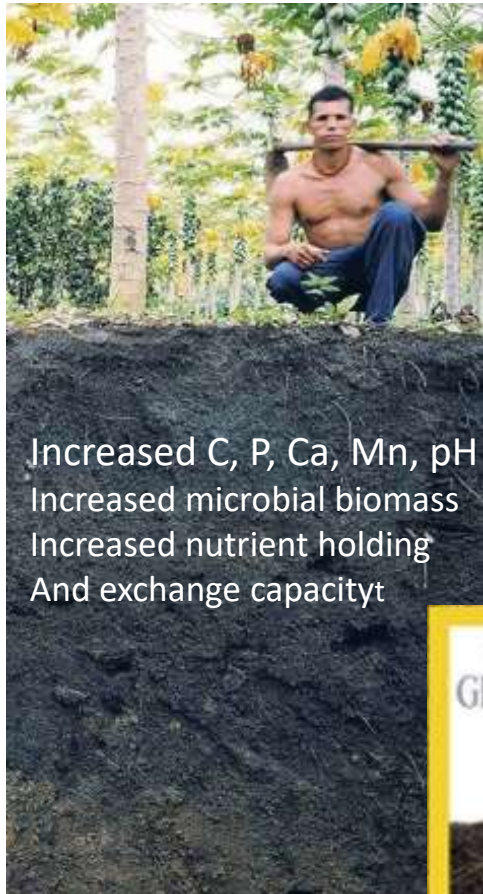


Restoring the fertility and productivity of soils and landscapes is a proven method for improving food security and mitigating climate change



Some soils seem to hold more carbon than others....

The mystery of the Terra preta soils of the Amazon



Soil, Biochar, ash, compost, food waste, bones ceramic, manure
+ soil biology + time

Terra Preta Australis

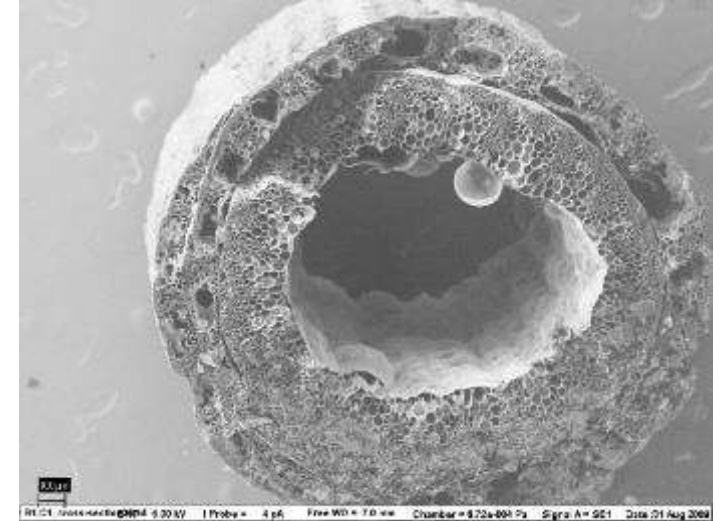
– Biochar in ancient aboriginal oven mounds



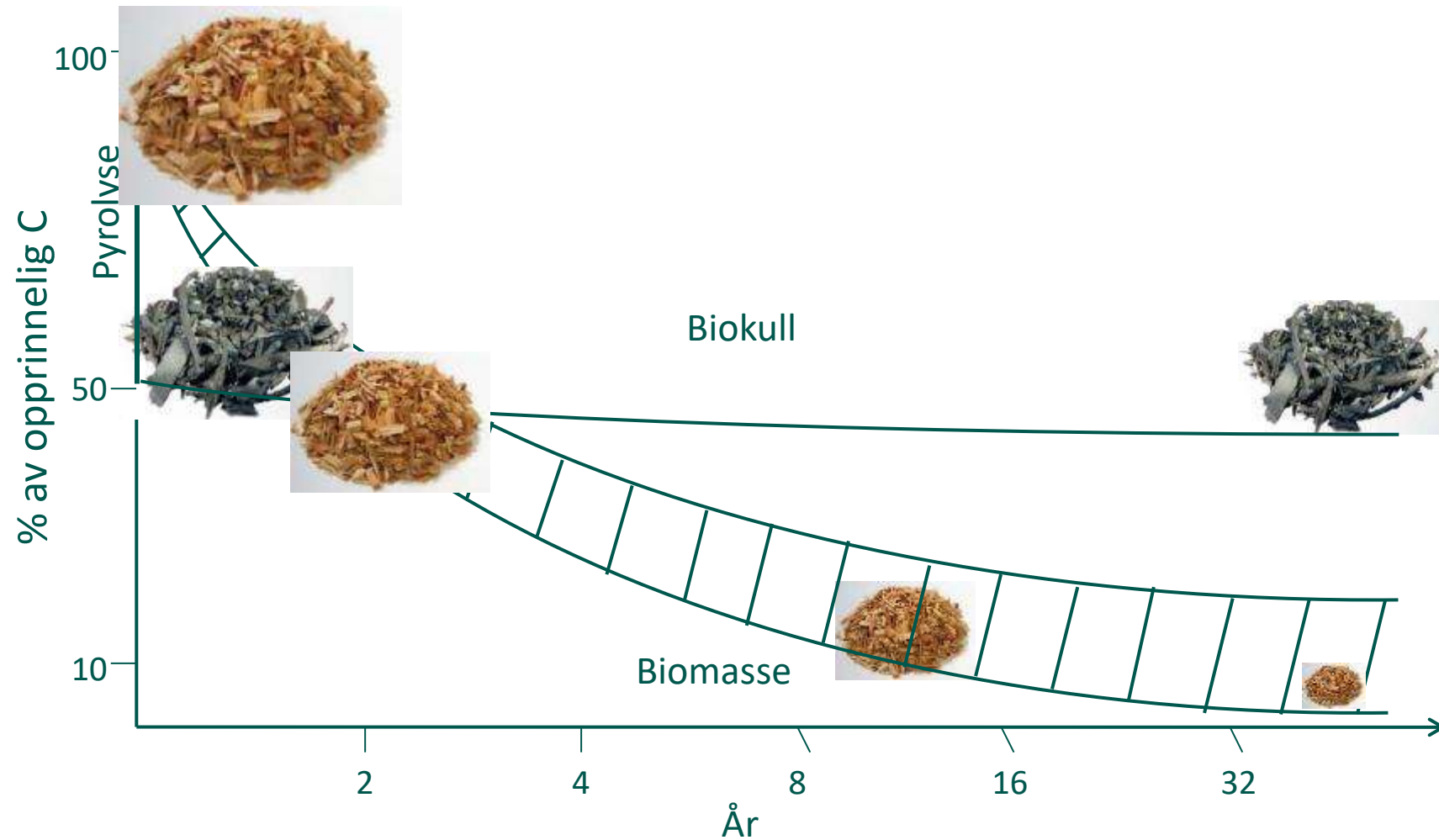
Biochar carbon
dated to 650-1600 years old

What is biochar?

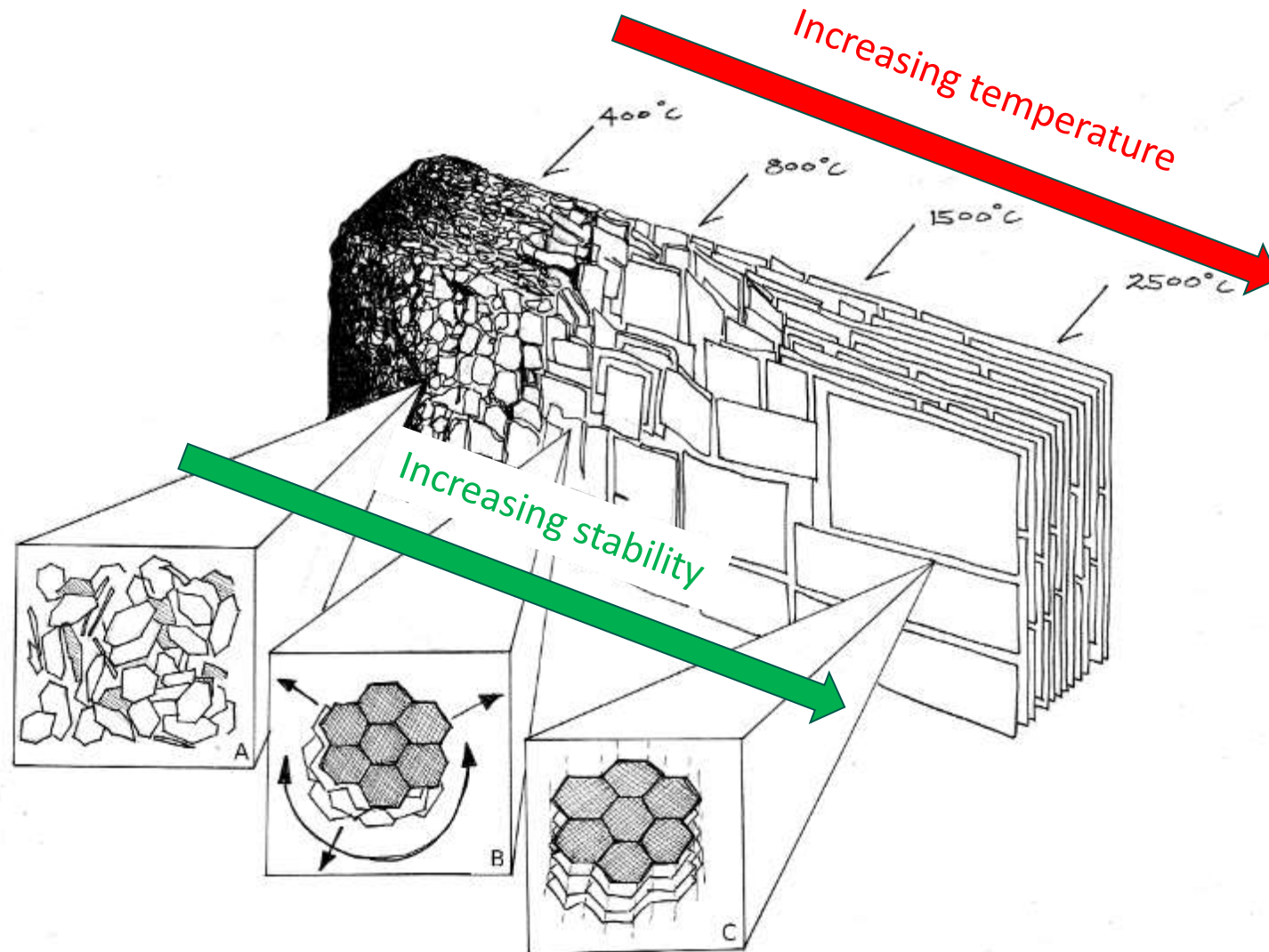
- High pH
- High carbon content
- Large surface area
- High Porosity
- Moderate nutrient retention capacity
- Comes in a variety of size fractions which can be used for different purposes
- Different biomass materials will produce biochars with different properties



Biomass degrades quickly, biochar degrades slowly



How biochar carbon becomes more resistant to microbial decay



Downie et al, 2008

Global technical potential for climate mitigation with use of biochar



«12 % of global emissions could potentially be offset by production and use of biochar»
(Woolf et al. 2010, *Nature*)

Uses for biochar....



Feed additive



Additive to worm composting



Compost improver



Garden soil component

Also...

Hydroponics media

Aquaponics media

Battery material

Water filter

CO2 capture material

Microbial inoculant carrier

Benefits for the gardener

- One time investment – does not disappear like compost and gets better with age
- Can help to increase the water holding capacity of sandy soils
- Can help to improve the water infiltration in clay soils (once you get it in there)
- Can help to increase the pH of your soil if you have acidic soils
- Will also capture more carbon in your soil over time if you have clay soil
- Can buffer the acidity of food waste worm composting – worms seem to love it
- Can save you money on purchasing potting soil if you make it yourself

Biochar and compost = win-win



0%

20%

40%

60%

30.03.2023
80%

Root hairs can grow into biochar looking for water and nutrient





Straw



Wood chips

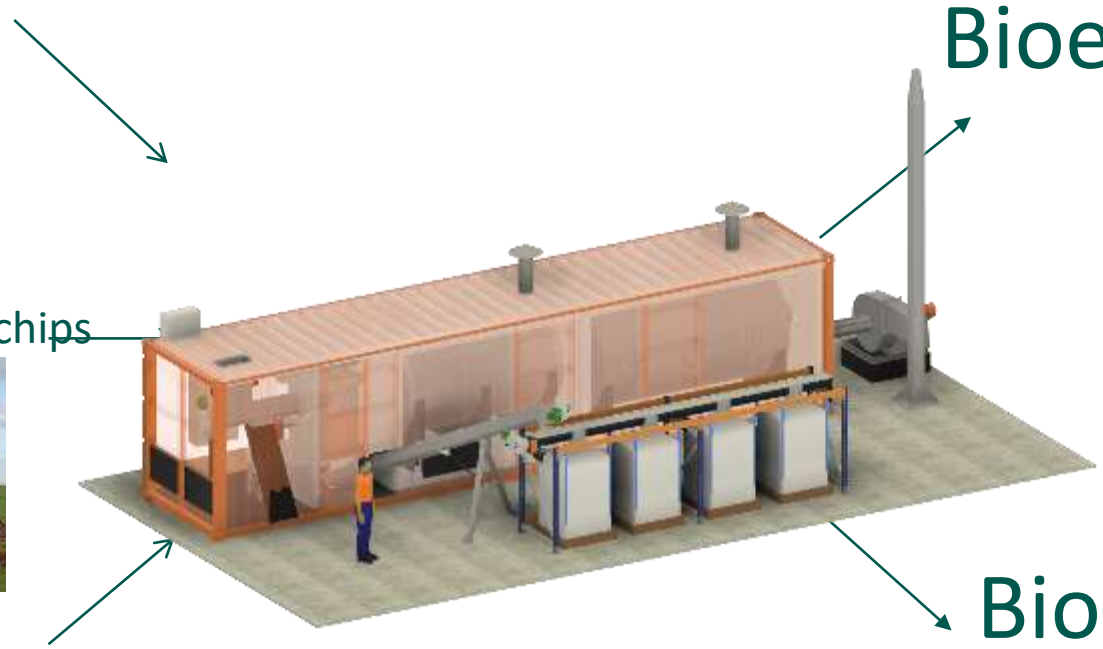


Horse /chicken manure / Sludges



Nut shells

Pyrolysis or Gasification



Heat
Electricity

Bioenergy



Wood vinegar
Pyrolysis oil
Biofuels

Biochar



How to make biochar on a small scale



You can also make it in a 44 gallon drum



Search



Whitlox Charcoal Maker - Easy barrel method for biochar, forge or grill fuel

- <https://www.youtube.com/watch?v=bNOiVCpRWXw&t=3s>

Tips for making biochar and tradeoffs with DIY

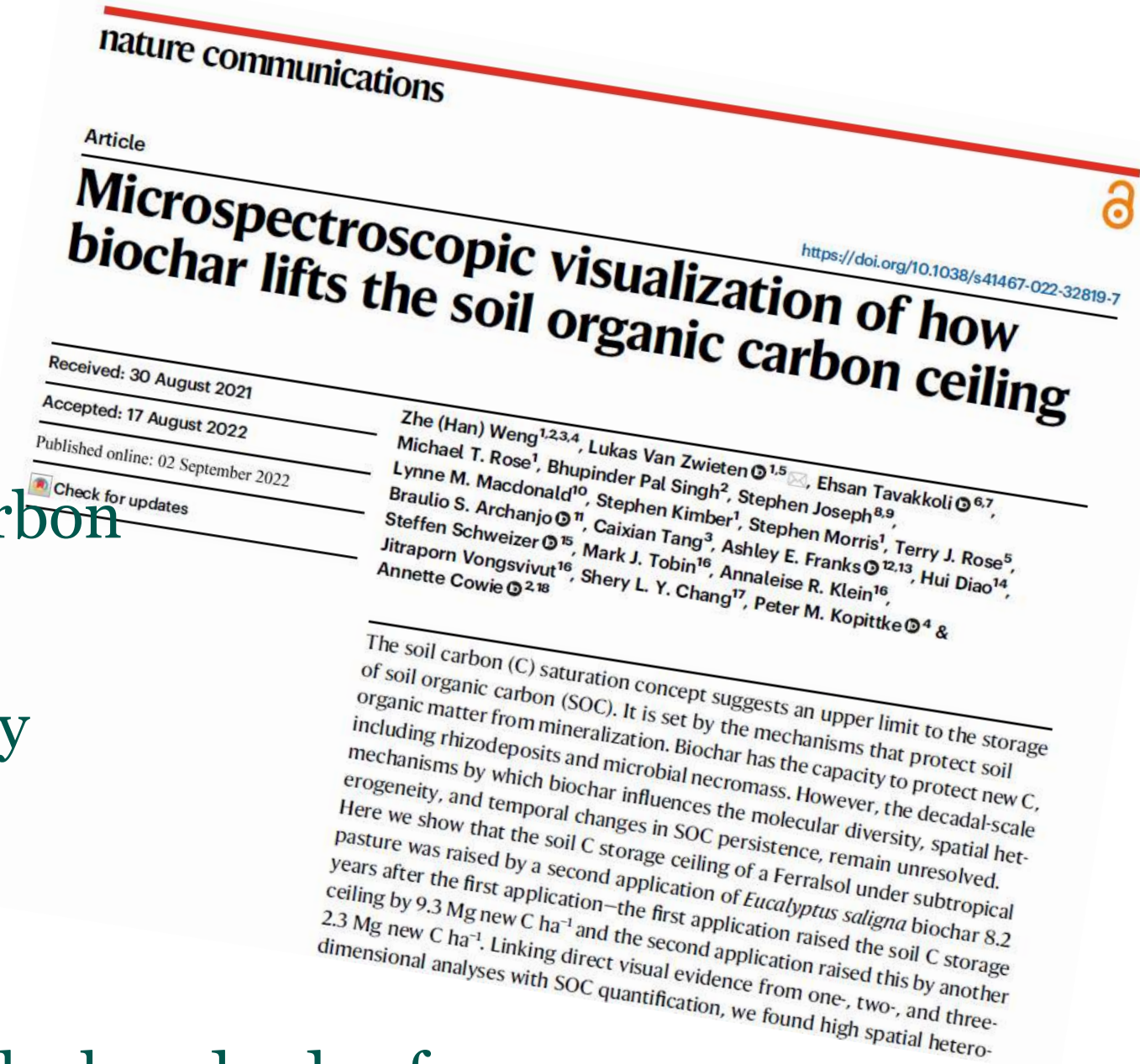
- Make sure your material is dry, under 20% moisture content
- Use thin material, thick logs will take too long and the small stuff will turn to ash
- Soak your finished biochar in a nutrient laden solution or add it to compost before you add it to your soils
- Don't cut up 44 gallon drums with an angle grinder if it has the lid on and there are flammable vapours inside, it can potentially blow up and you can die
- If you don't burn off all the smoke which occurs during carbonization it can release small amounts of methane and literature estimates suggest you will lose up to half of the carbon storage effect by releasing unburnt methane
- So DIY biochar production has its tradeoffs

Breaking news!

Even after only 10 years in the soil, Australian scientists have shown that biochar can increase the amount of extra organic carbon that can be stored in the soil

They estimated storage capacity increased by extra 10 tonnes carbon per ha in a tropical red soil (Ferralsol) in NSW.

This means that it might not take hundreds of years to create the types of soils found in Aboriginal soil mounds



Want to deepen your knowledge further?

1 day biochar course – 1st April in Woodford

www.theregenerativetrainingcentre.com.au/courses

\$150 including lunch and biochar making demo

A promotional banner for a biochar course. The background is a close-up photograph of dark, irregular biochar particles. A green rectangular box in the center contains the text '1ST APRIL 2023' and '8 A.M. - 2 P.M.' in blue. At the bottom, a dark blue banner contains a logo on the left, the text 'BOOK ONLINE OR SCAN THE CODE' in white, the website URL 'WWW.THEREGENERATIVETRAININGCENTRE.COM.AU/COURSES' in white, and a QR code on the right.

1ST APRIL 2023
8 A.M. - 2 P.M.

 **BOOK ONLINE OR SCAN THE CODE**
WWW.THEREGENERATIVETRAININGCENTRE.COM.AU/COURSES 



NIBIO

NORSK INSTITUTT FOR
BIOØKONOMI

Thanks for your attention

adam.otoole@nibio.no

adam@soilcquest.org.au (new job soon)

