



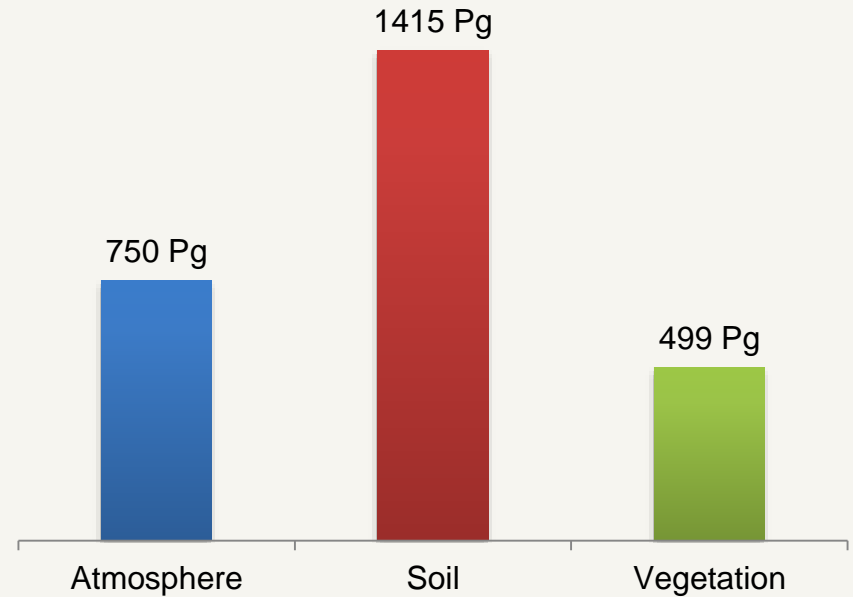
Building soil carbon for environmental & human wellbeing

Stephen Wood

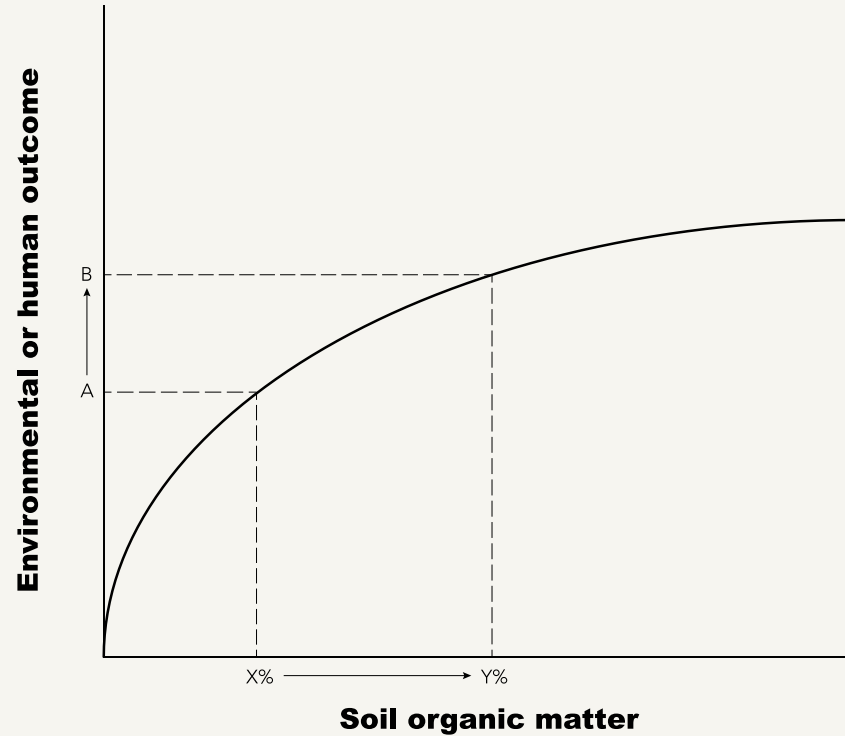
*Yale School of Forestry &
Environmental Studies*

SOIL IS A CRITICAL CARBON STOCK

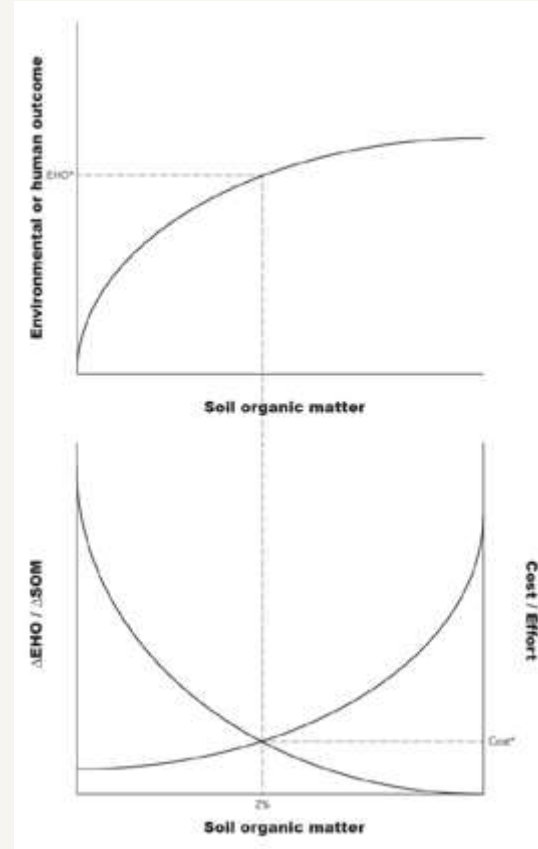
Soil keeps carbon out of the atmosphere and contributes to agricultural productivity



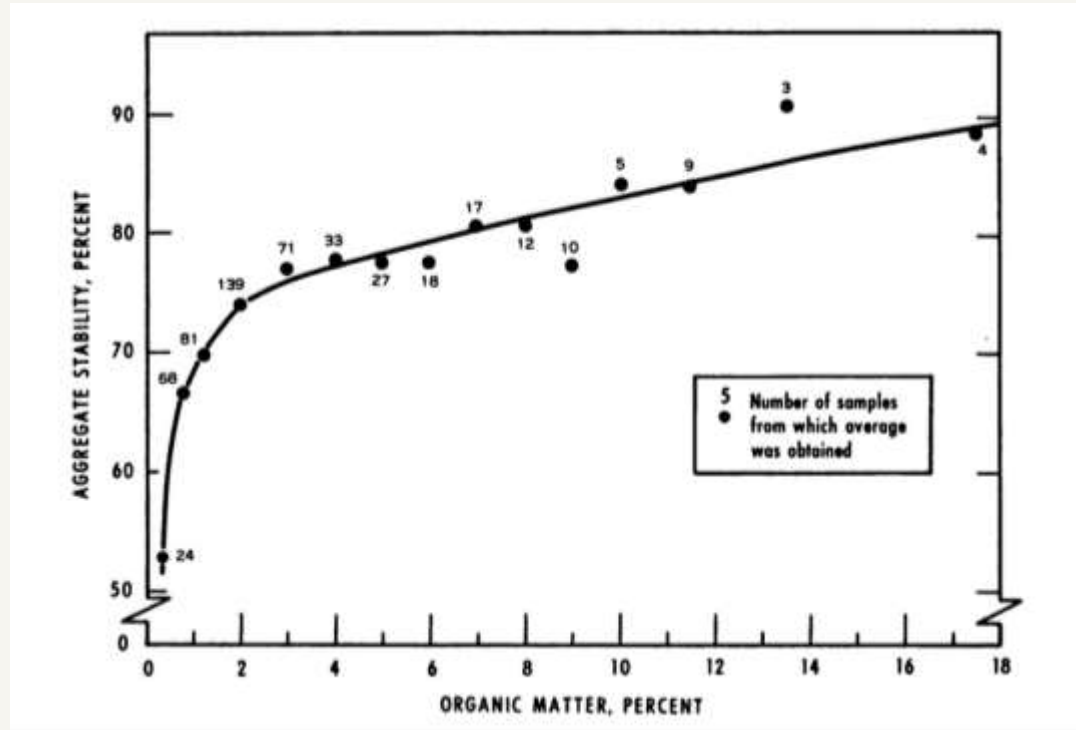
HOW MUCH SOIL ORGANIC MATTER IS NEEDED FOR SUSTAINABLE AGRICULTURE?



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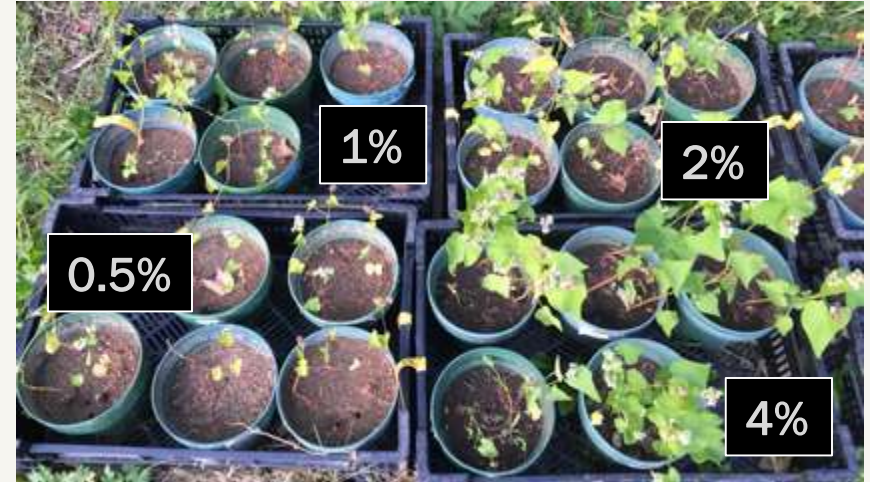
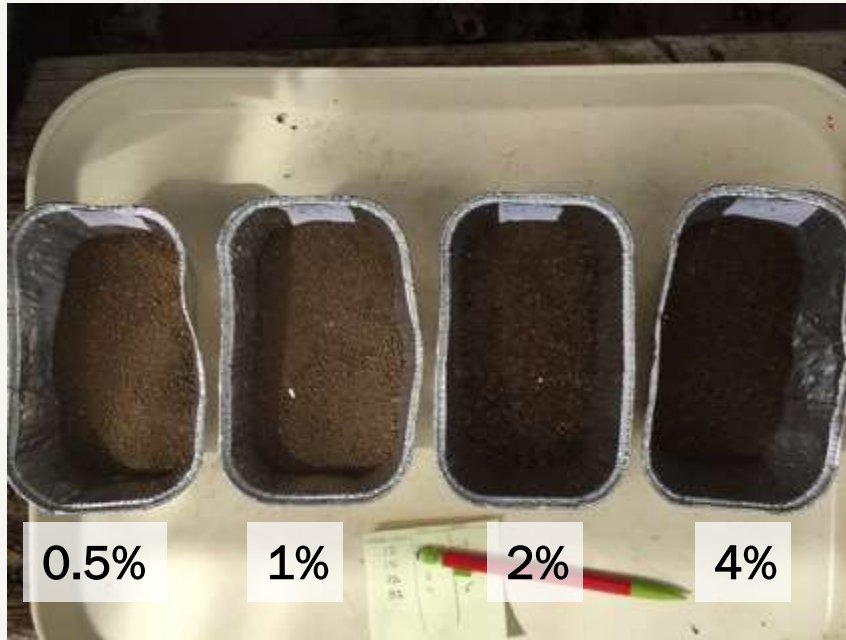


2% SOIL ORGANIC CARBON IS CITED AS A CRITICAL THRESHOLD FOR SUSTAINABLE AGRICULTURE

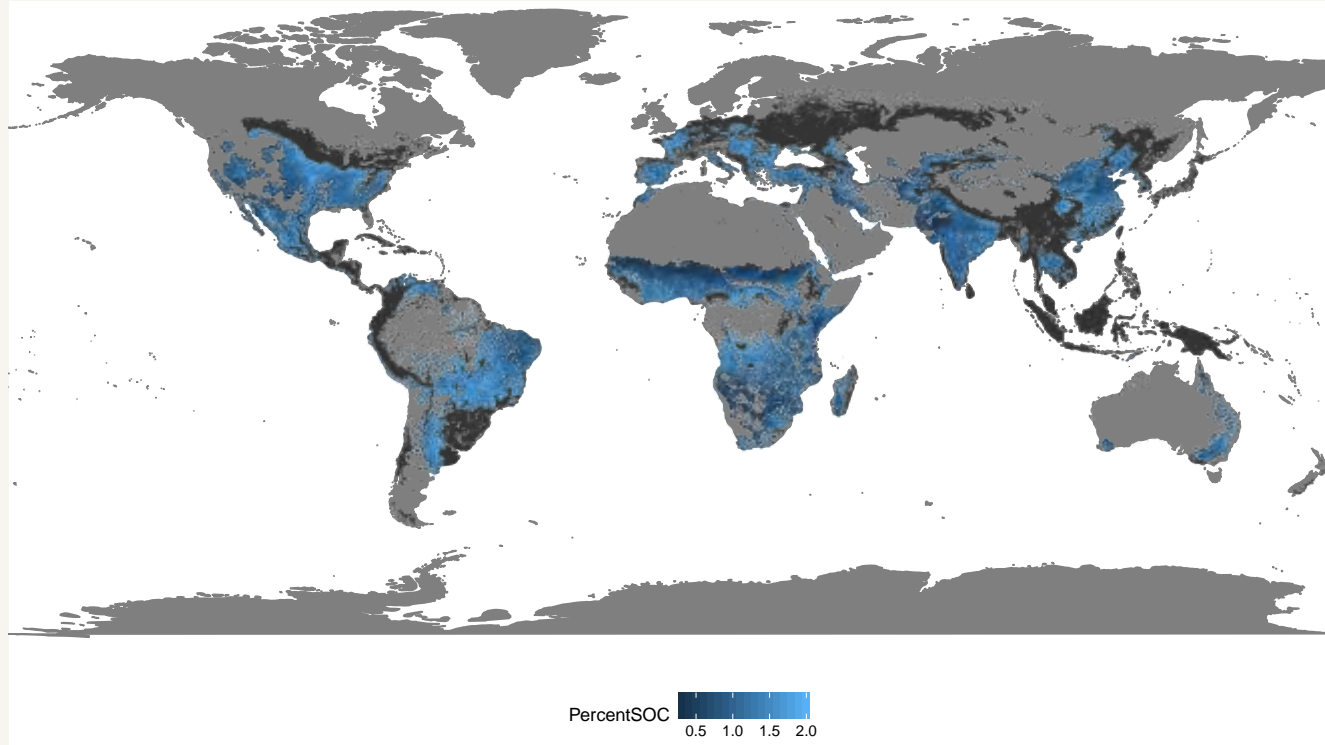


Kemper and Koch (USDA ARS 1966)

CROPS GROWN ON SOILS WITH LESS THAN 2% SOIL CARBON ARE LESS PRODUCTIVE



77% OF MAIZE CULTIVATION IS ON SOILS WITH <2% SOIL ORGANIC CARBON



TYPES OF SOIL CARBON

Different forms of soil carbon impact different ecosystem services

STABLE SOIL CARBON

Locked onto minerals
for years; increases
water holding capacity



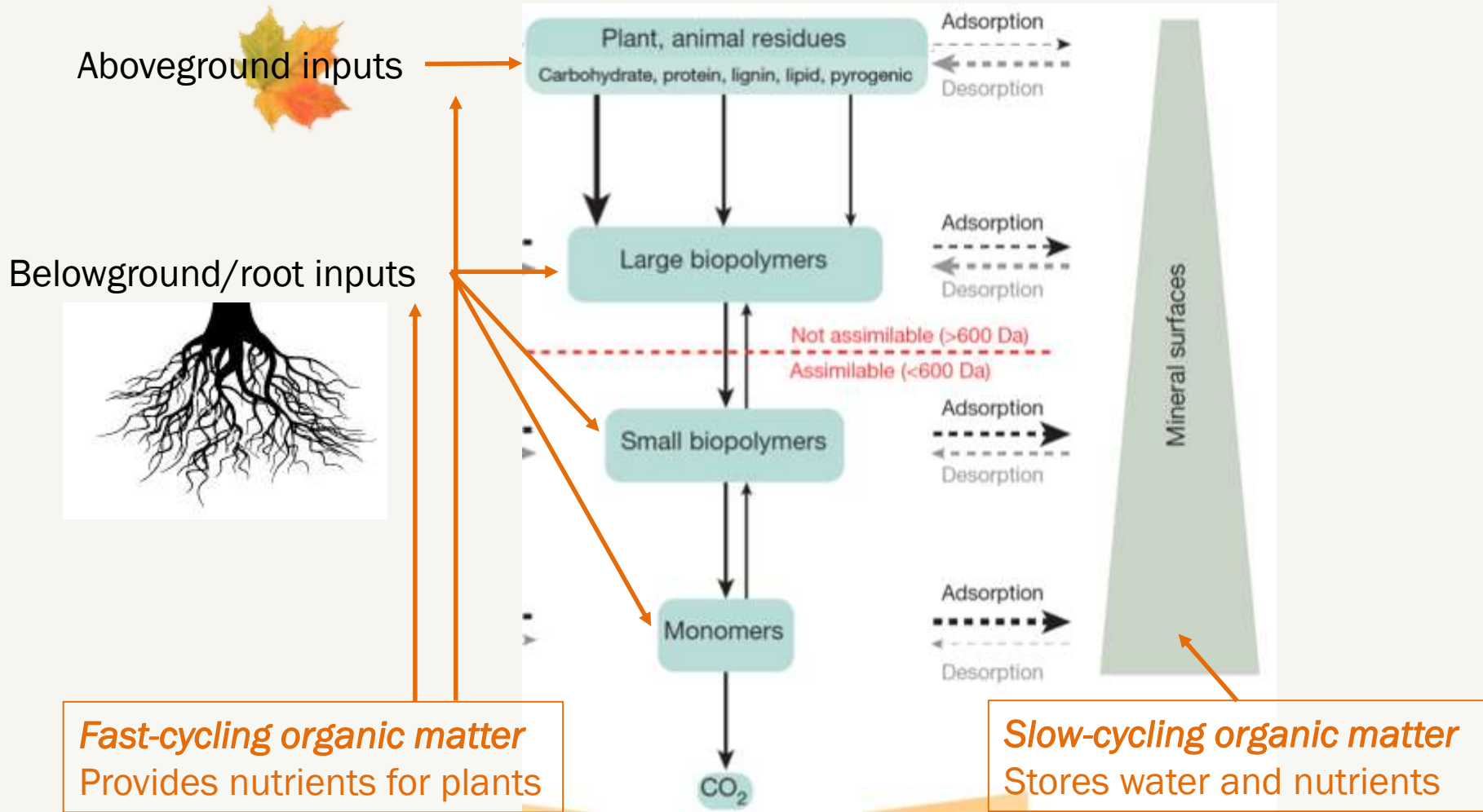
ACTIVE SOIL CARBON

Readily usable by
microbes. Sometimes
correlated with crop
productivity



DECOMPOSITION

FORMATION



SOIL ORGANIC MATTER SCIENCE

Key knowledge gaps

SEQUESTRATION

How can land management increase *stable* soil carbon?

CROP YIELD

How does organic matter impact yield and water availability?

IS TNC HAVING AN IMPACT?

How much and what types of soil carbon are being built by TNC?

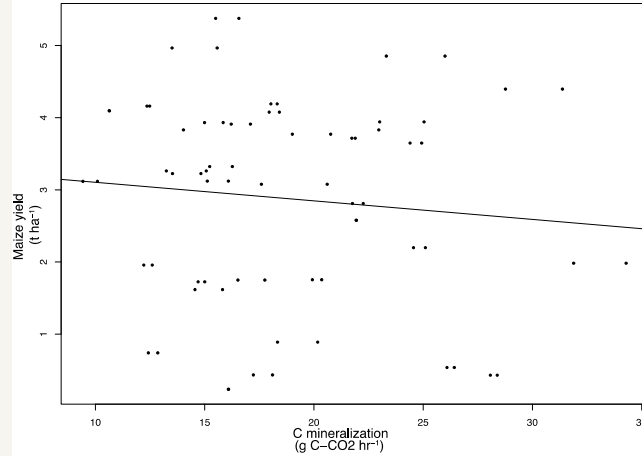
SAMPLING TNC SOIL

15 sites globally

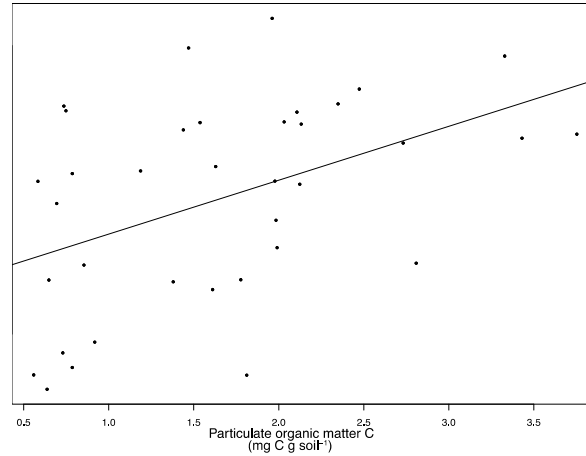


DOES SOIL ORGANIC MATTER IMPACT YIELD?

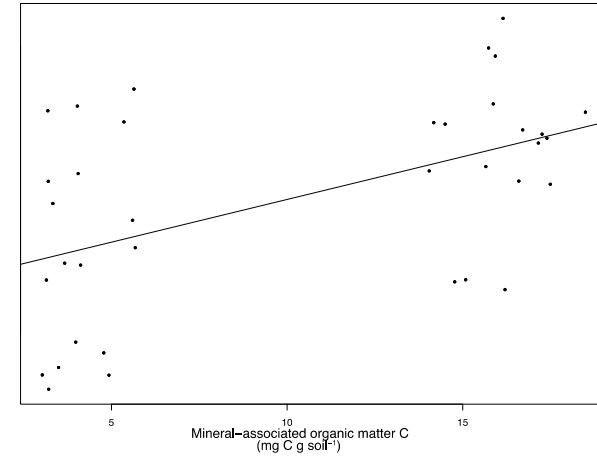
Active cycling organic matter



Partially decomposed plant material

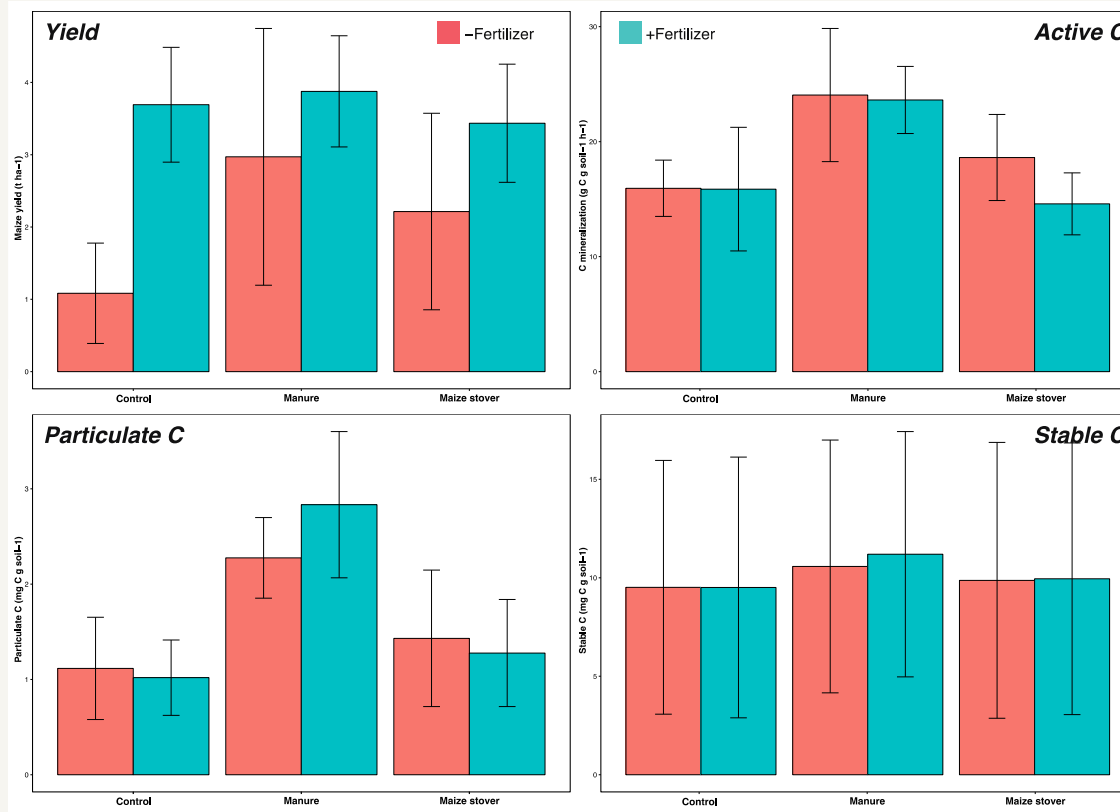


Stable organic matter

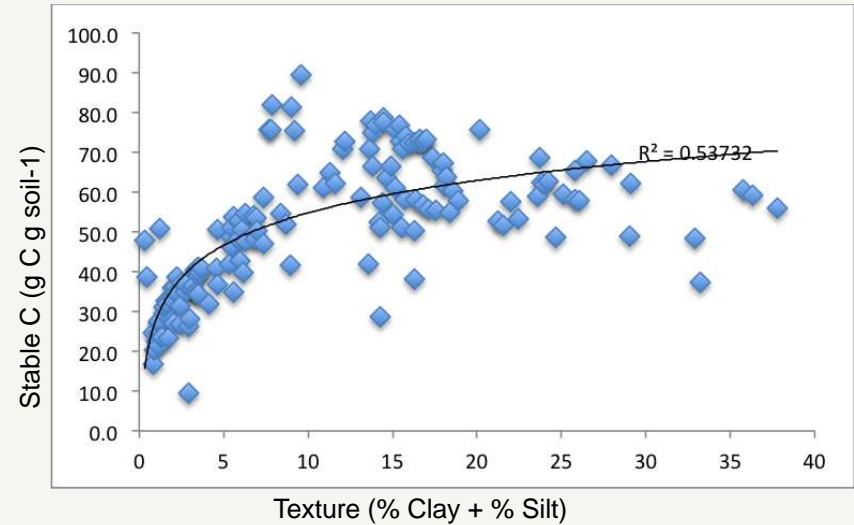
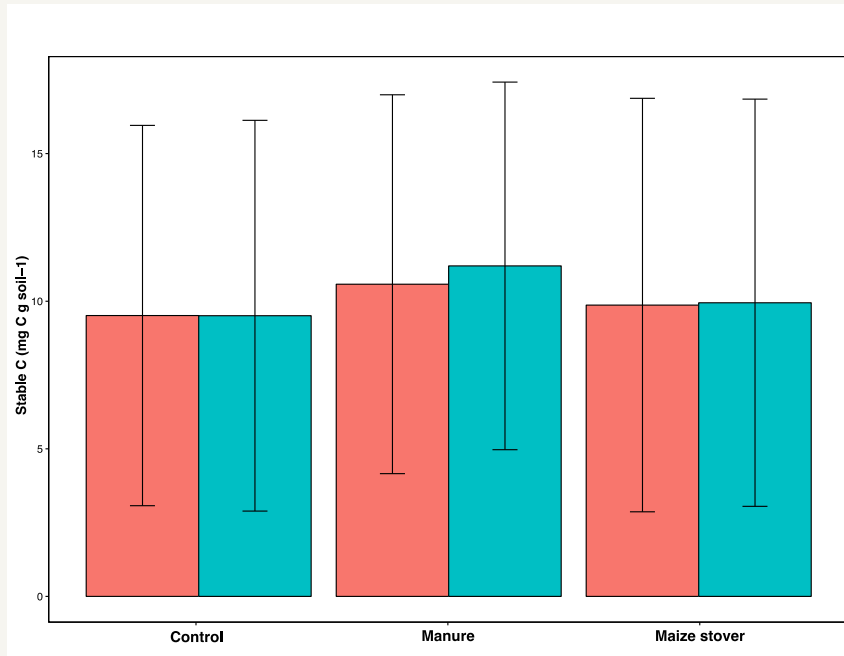


Fast cycling \longrightarrow Slow cycling

DOES SOIL ORGANIC MATTER IMPACT YIELD?

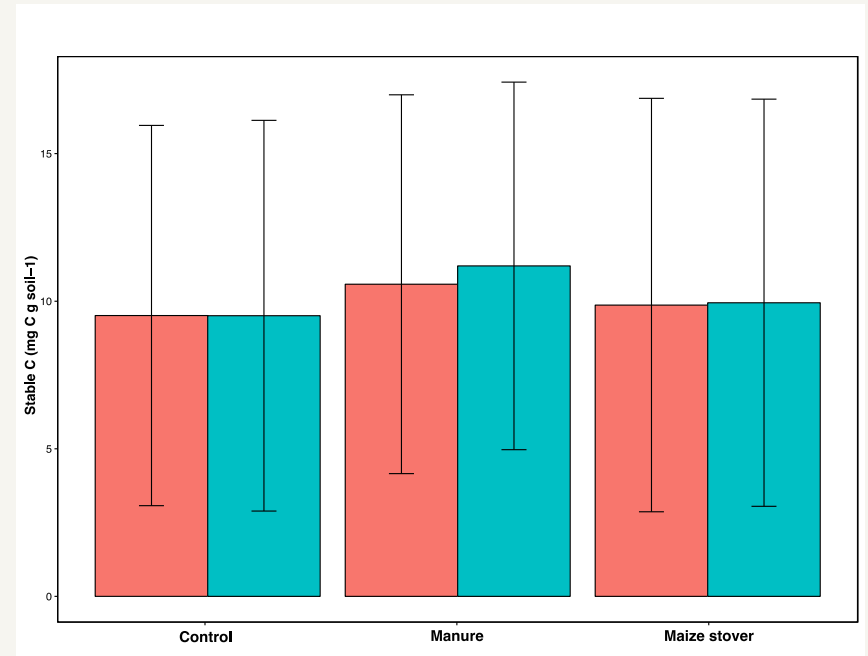
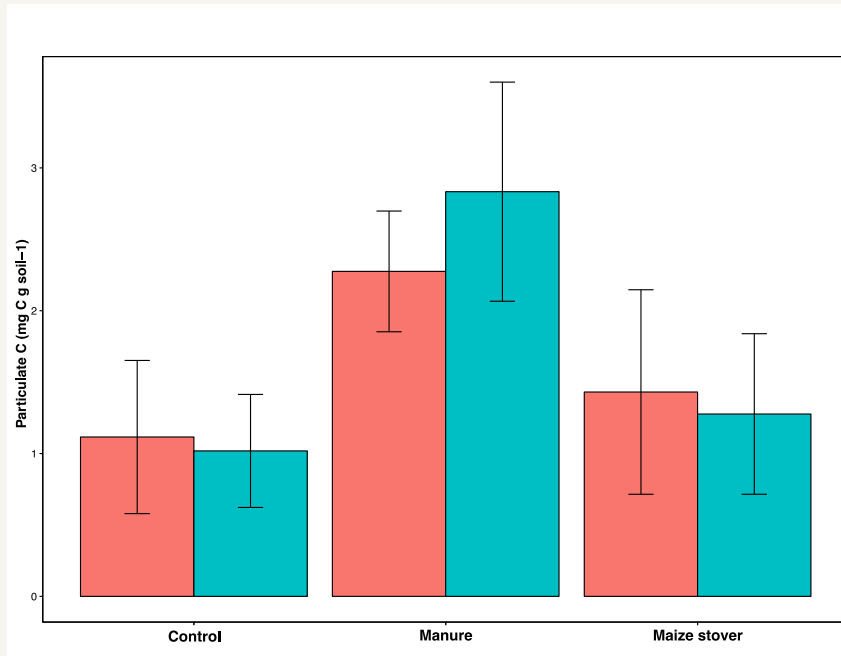


CAN LAND MANAGEMENT INCREASE STABLE SOIL CARBON?



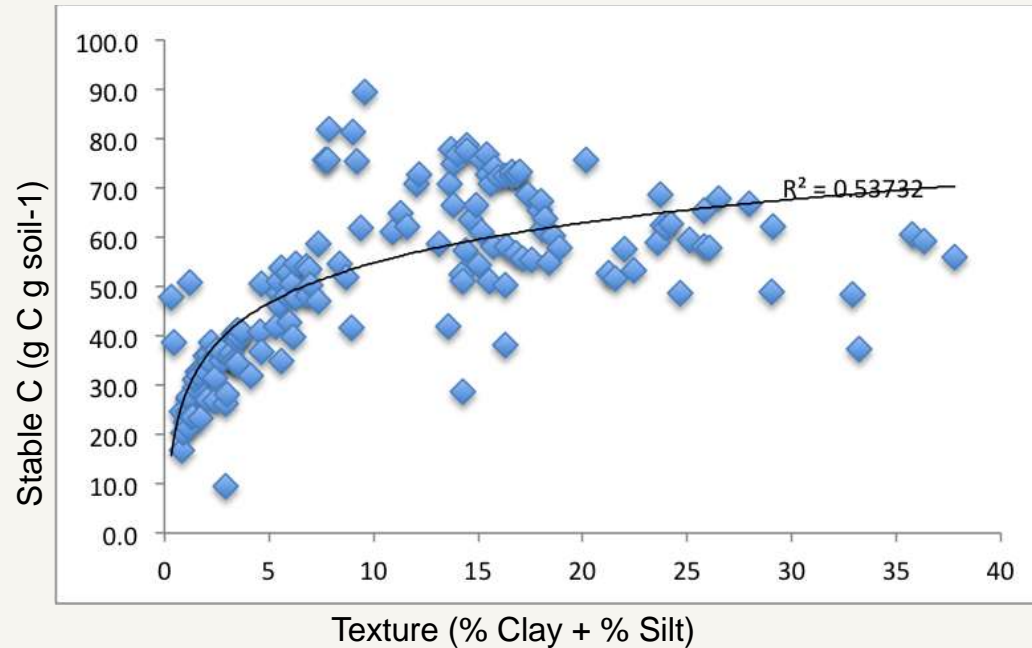
PRIORITY PRACTICES FOR SOIL CARBON

Management impacts different types of carbon at different time scales



PRIORITY AREAS FOR SOIL CARBON

Soil minerals determine carbon sequestration



SOIL SOLUTIONS

Three approaches to managing soil for climate and agriculture

RESTORE STABLE AND ACTIVE CARBON

Use priority practices in
priority areas to build
carbon

PROTECT EXISTING STABLE CARBON

Reducing land
conversion will keep
carbon in the soil

CONSIDER LOCAL BENEFITS

The greatest benefits of
soil carbon may be to
local ecosystems

ACKNOWLEDGEMENTS

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