

Soil amendments to improve soil health in agriculture and horticulture

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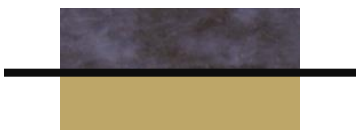
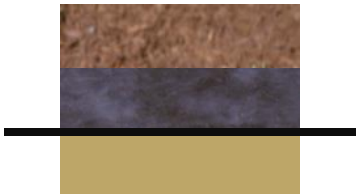
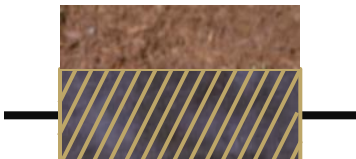
1. Compost and mulch in landscape plantings

- Assess effects of compost and bark applications on soil quality and plant response in a woody landscape bed.
- Compare effects of compost incorporated vs. compost applied as a mulch

Funding: WSU



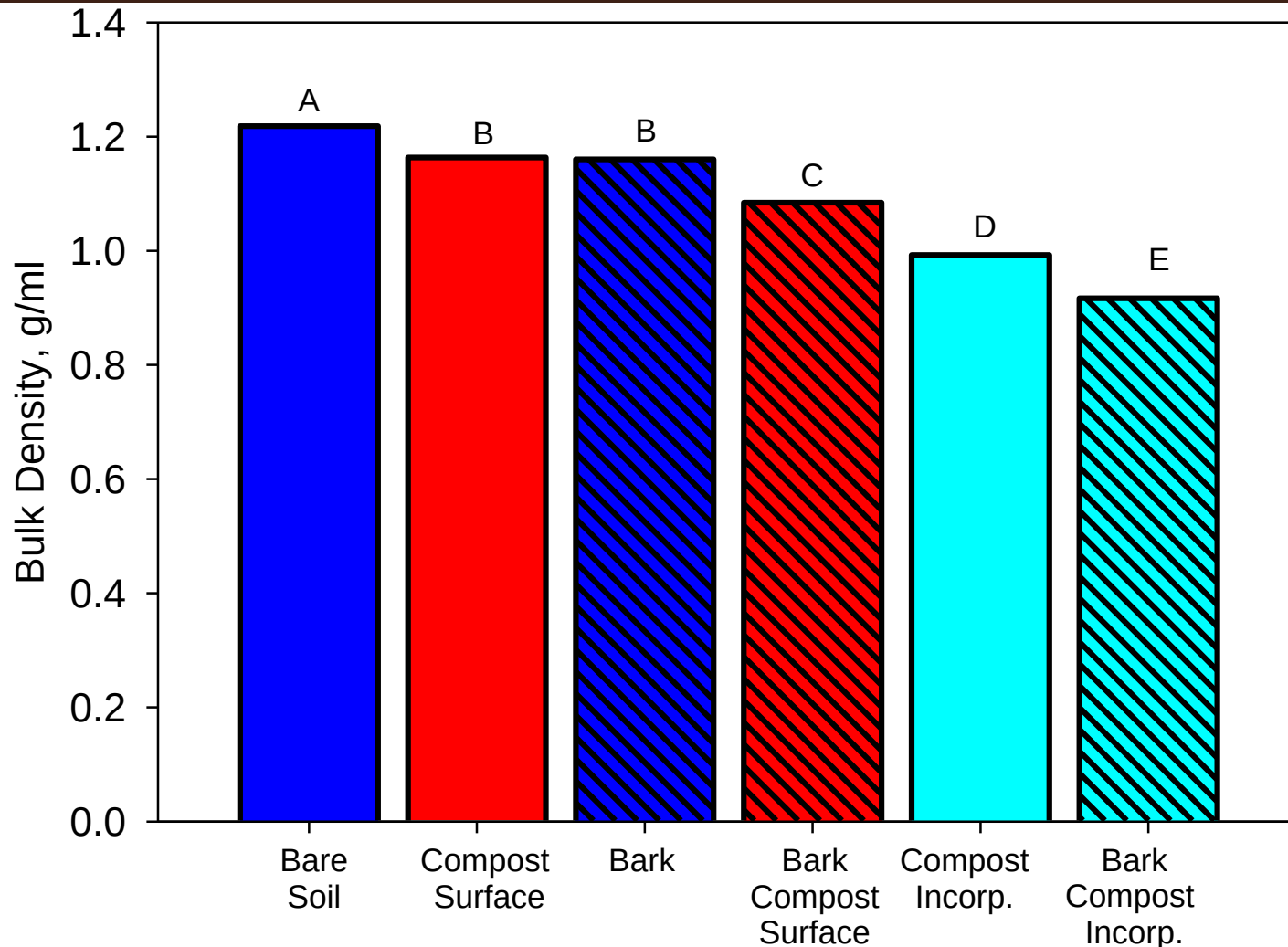
Treatments

- No compost, no bark
- No compost, 3" bark surface
- 3" compost surface, no bark
- 3" compost surface, 3" bark surface
- 3" compost incorporated, no bark
- 3" compost incorporated, 3" bark surface

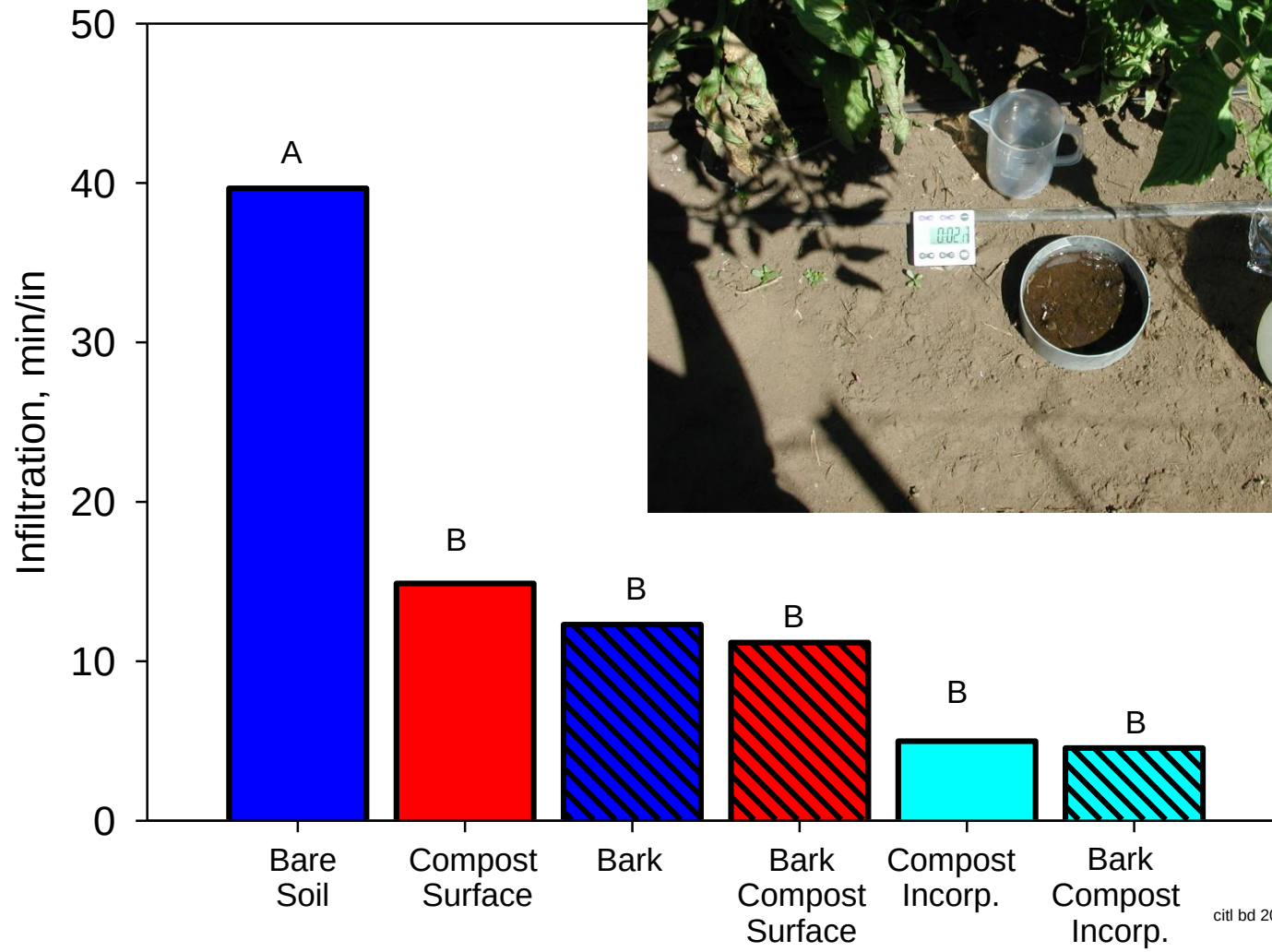
Planted 264 trees and shrubs (11 per plot): June 2001



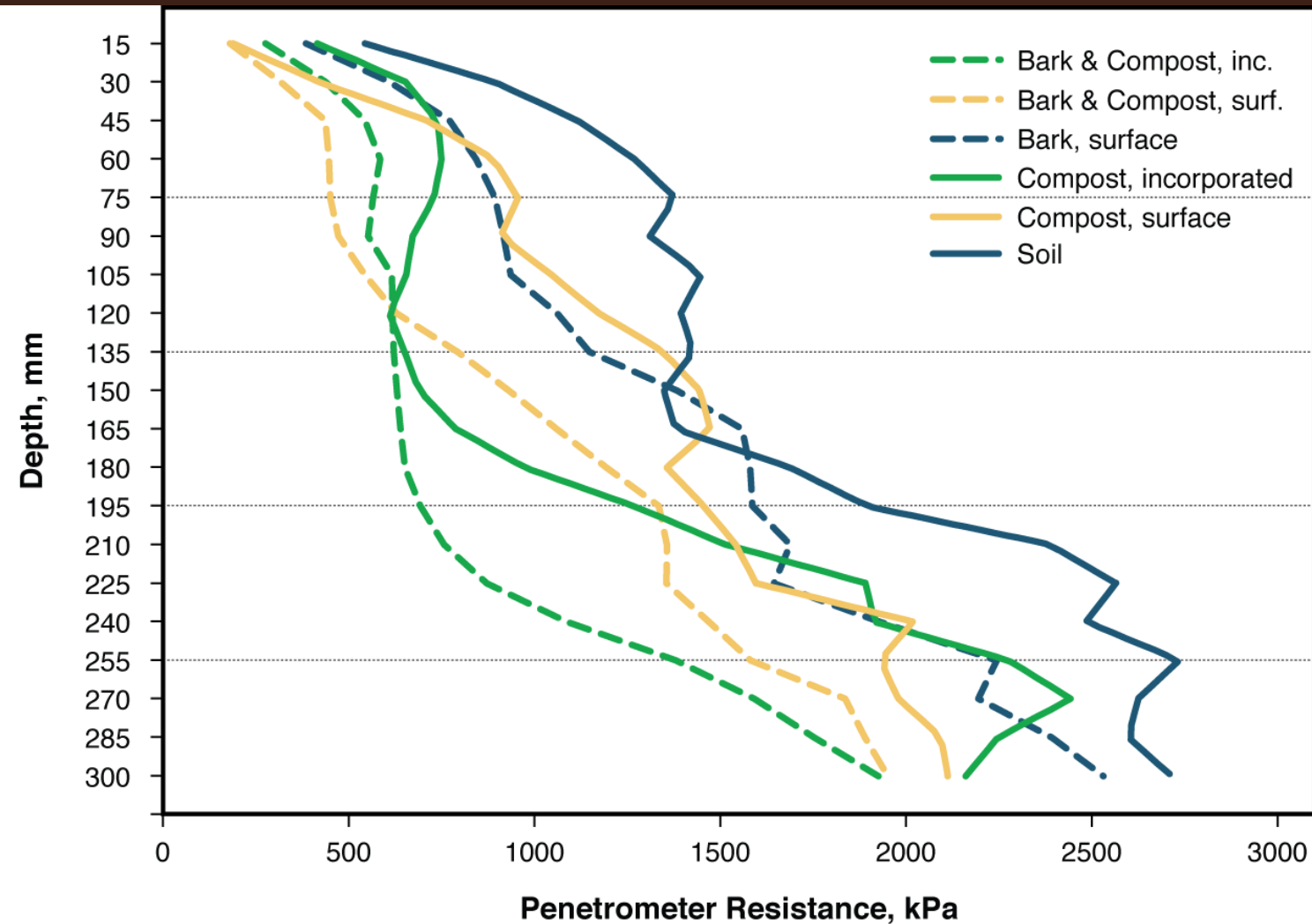
Compost and mulch treatments reduced soil bulk density, 2004



Compost and mulch treatments increased water infiltration rate, 2005.



Compost and mulch treatments reduced soil compaction, 2005.



2. Highway 16 Revisited: Disturbed Urban Soils



Funding: Northwest Biosolids, Seattle Public Utilities, in-kind from WADOT

Treatments

- Tagro mulch incorporated
- Tagro mulch surface
- Yard Debris compost incorporated
- Yard Debris compost surface
- Worm compost surface
- No amendment check



Both surface applied and incorporated amendments improved plant growth

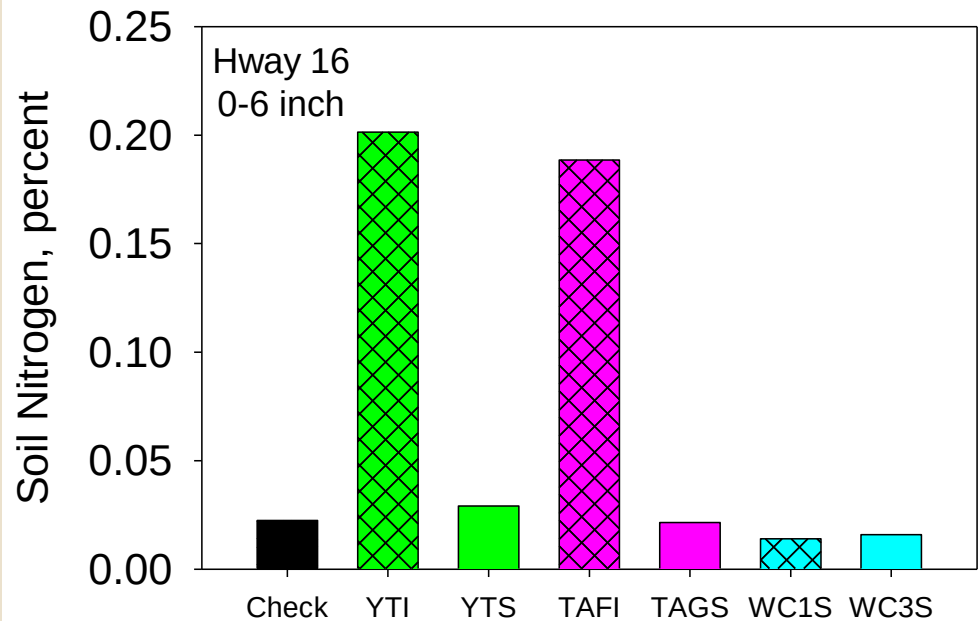
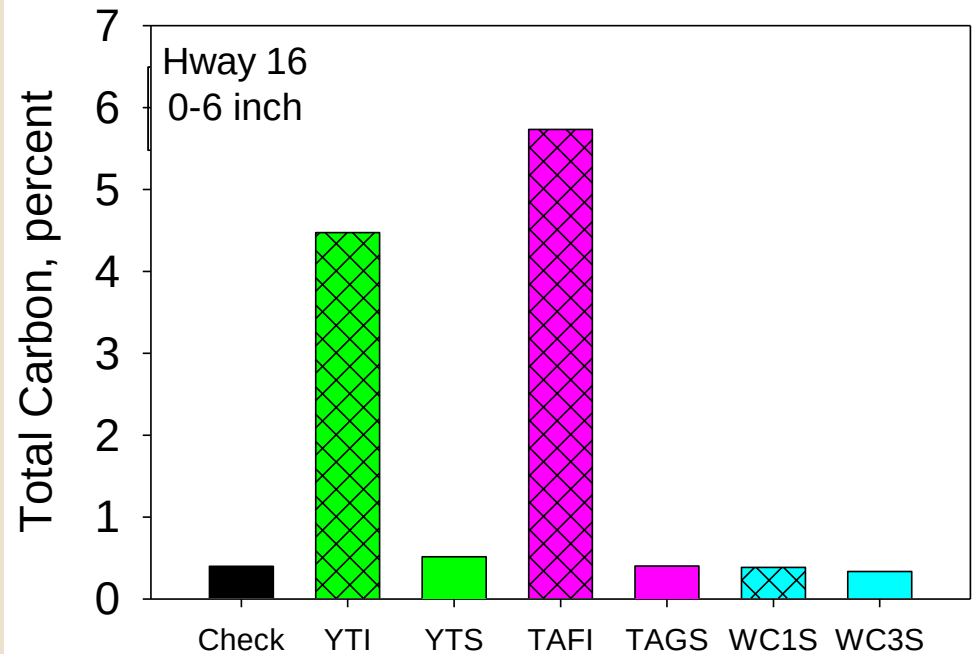


Vermicompost > Tagro > Yard debris compost > control
Photos 18 months after transplanting

Highway 16

One year after application:

Only incorporated treatments show increased C and N in soil



3. Long-term dryland wheat-fallow experiment, 1994-2012

Biosolids applied every
4th year, crop
harvested every 2
years

Inorganic N 60 kg/ha
each crop

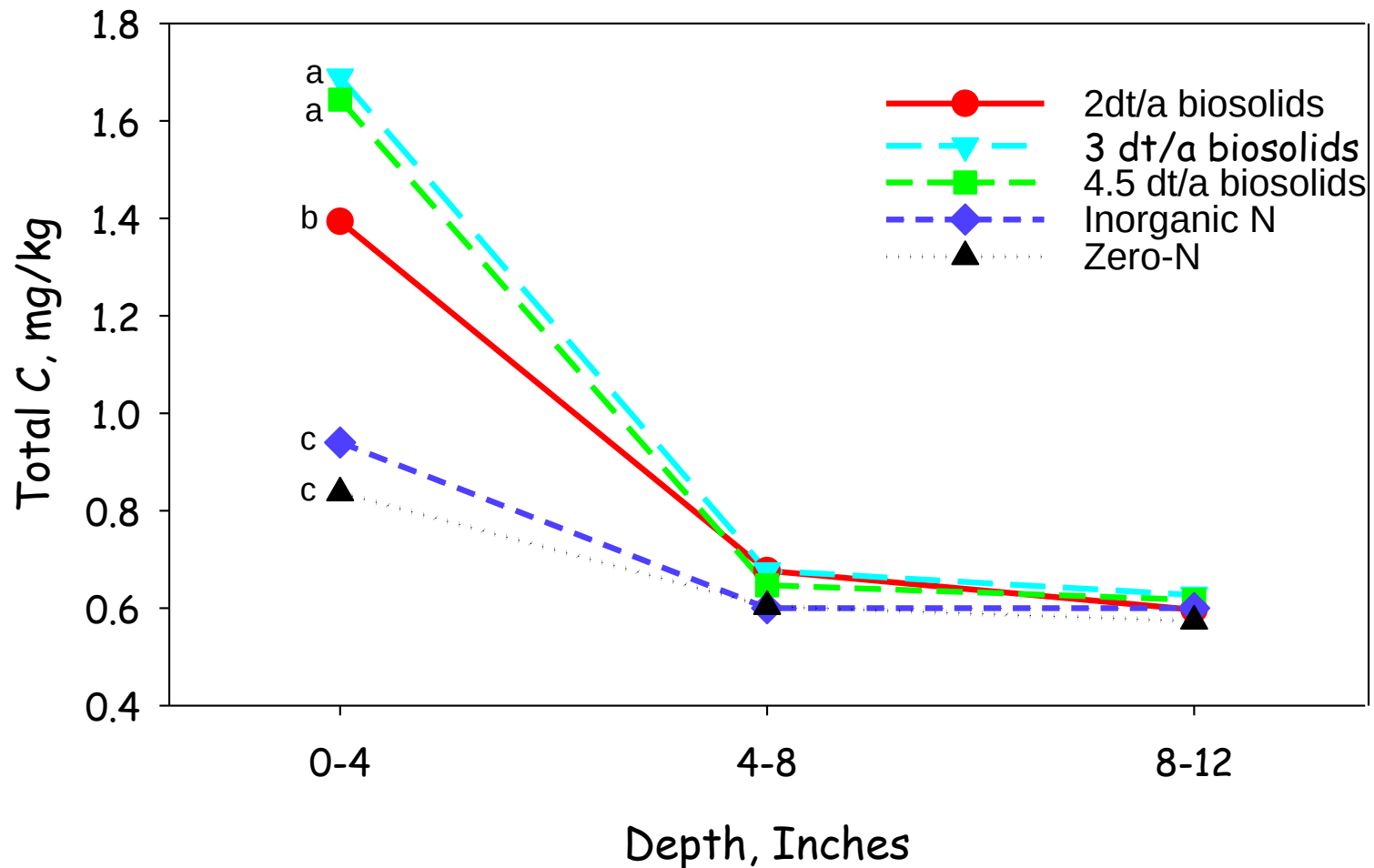
Zero-N control



Total biosolids applied 1994 – 2010: 10 – 20 dry tons/acre

Funding: King County and Northwest Biosolids

All biosolids application rates increased organic matter in the upper 4 inches of soil



C and N accumulation in soil as % of biosolids C and N applied

Wheat: Applied every 4th year since 1994

C increase = **57%** of total C applied

N increase = **33%** of total N applied

Improves soil and sequesters carbon

Long term improvement to soil health

- Biosolids decreased soil bulk density
- Microbial biomass, bacteria, and bacteria:fungi ratio tended to increase with increasing biosolids rate
- Response to organic matter and nutrients



M. Fauci

4. Organic Farming Systems Research 2003-12 Tillage and Amendment



Funding: USDA NIFA and SARE

Cover crop system affected tillage frequency



Twice/year



Once/year



Every third year

Amendment affected organic matter addition



Broiler litter – low C

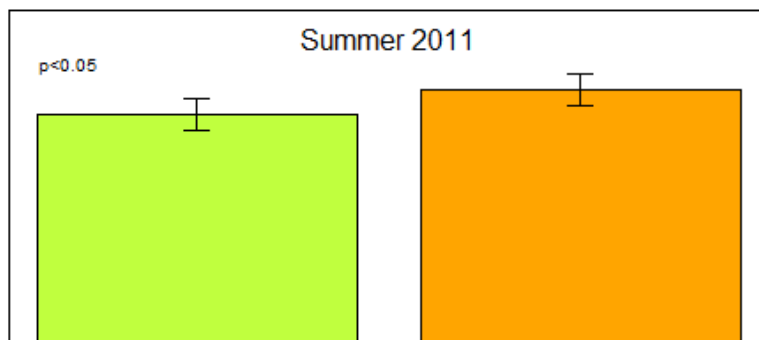
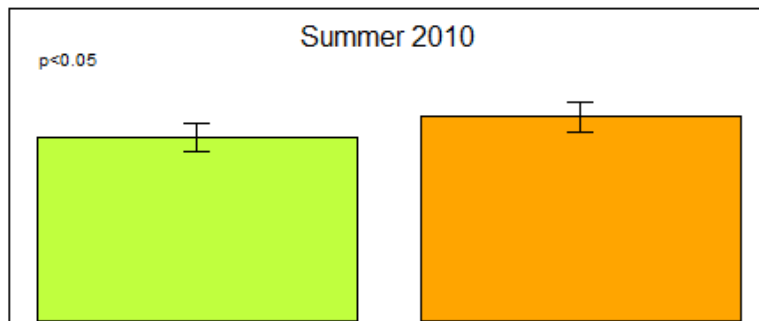
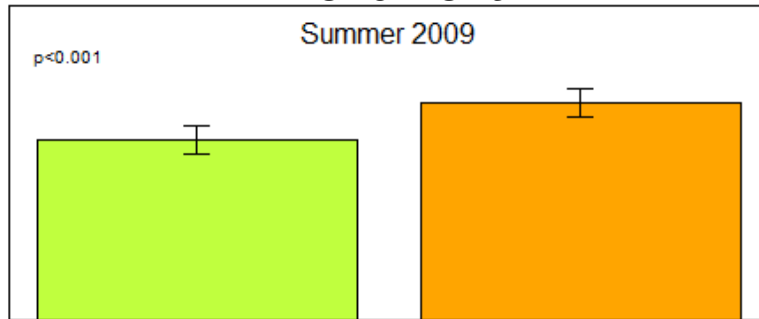


Compost– High C

Organic matter application and time since tillage both affected microbial biomass

Microbial biomass

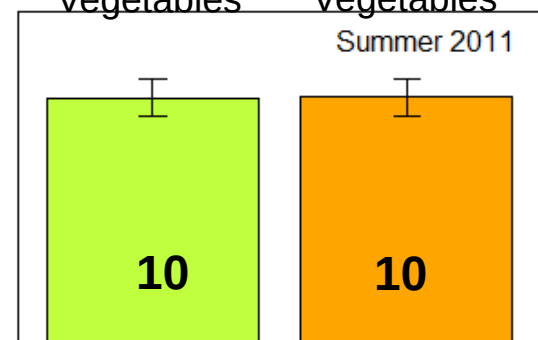
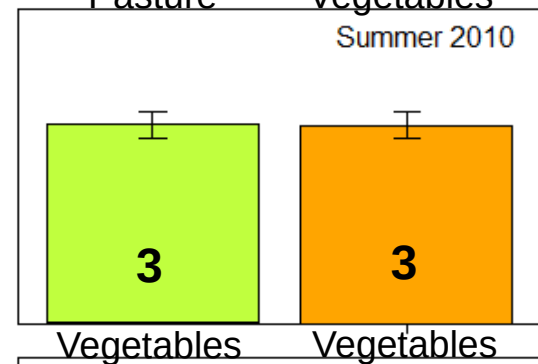
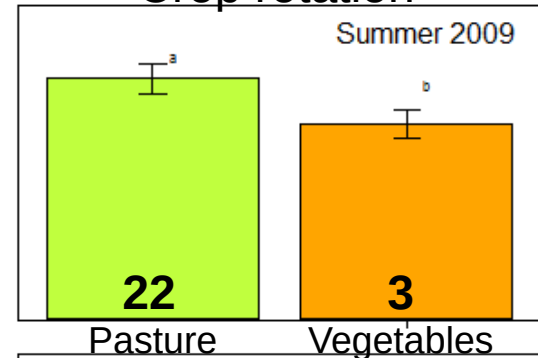
Amendment



Low carbon

High carbon

Crop rotation



Pasture

Wheat

Numbers show
months
since tillage

A soil nematode community

Aporcelaimellus-
predator; 1.9 mm

Cephalobidae-
bacterivore;
0.5 mm

Aphlenchoides-
fungivore; 0.3mm

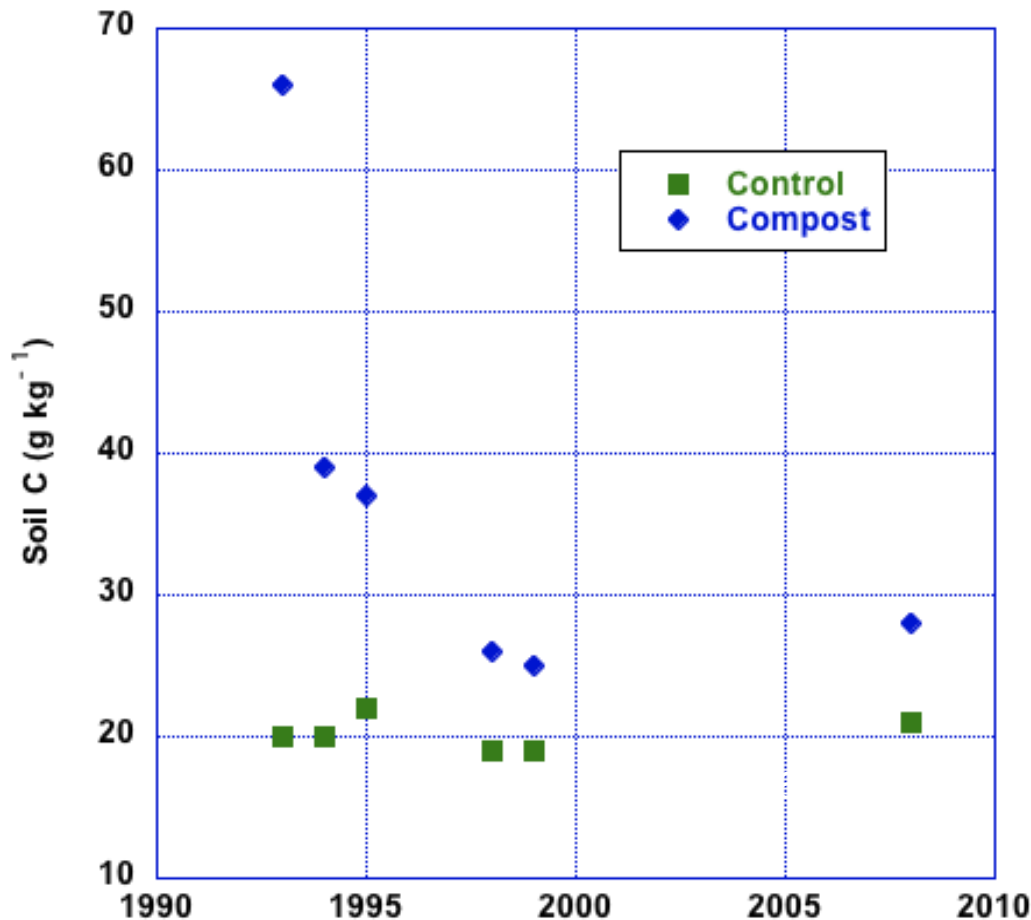
Rhabditidae;
bacterivore

0.1mm



5. Food waste compost application in 1993 still showed increased soil OM in 2008

Tall fescue planted; no tillage since 1993



Funding: Northwest Biosolids