

# Soil fertility management with orchard pre-plant mulching amendments



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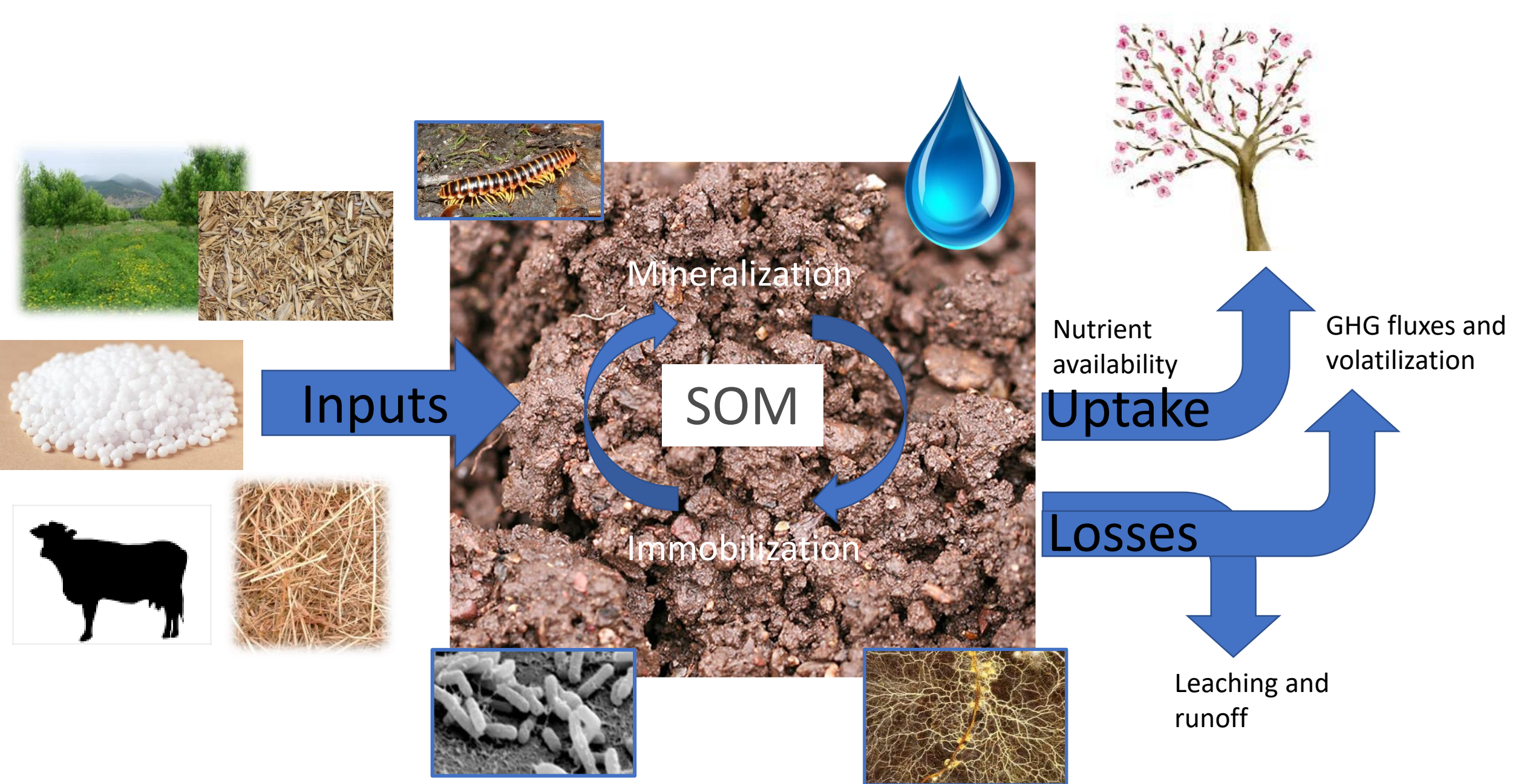
**University of California**  
Agriculture and Natural Resources



# Soil Amendments

- Materials added to soil to improve physical and biological properties that influence water retention, permeability, water infiltration, drainage, aeration and structure.
- The goal is to provide a better environment for tree roots.





Inputs

Mineralization

SOM

Immobilization

Nutrient availability

Uptake

GHG fluxes and volatilization

Losses

Leaching and runoff

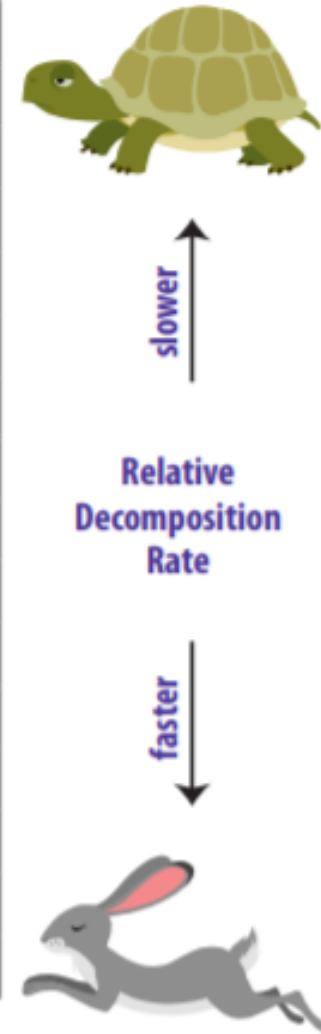
# Soil Amendments

Before amending consider:

- How long the amendment will last in the soil (C to N ratio)
- How C to N balance affects nutrient availability
- How amendments affect structure in different soil textures
- Salt content and pH of the soil and the amendment

**Table 1.** Carbon to nitrogen ratios of crop residues and other organic materials

Material	C:N Ratio
rye straw	82:1
wheat straw	80:1
oat straw	70:1
corn stover	57:1
rye cover crop (anthesis)	37:1
pea straw	29:1
rye cover crop (vegetative)	26:1
mature alfalfa hay	25:1
<b>Ideal Microbial Diet</b>	<b>24:1</b>
rotted barnyard manure	20:1
legume hay	17:1
beef manure	17:1
young alfalfa hay	13:1
hairy vetch cover crop	11:1
soil microbes (average)	8:1



# Whole Orchard Recycling a waste management alternative to burning and co-generation plants



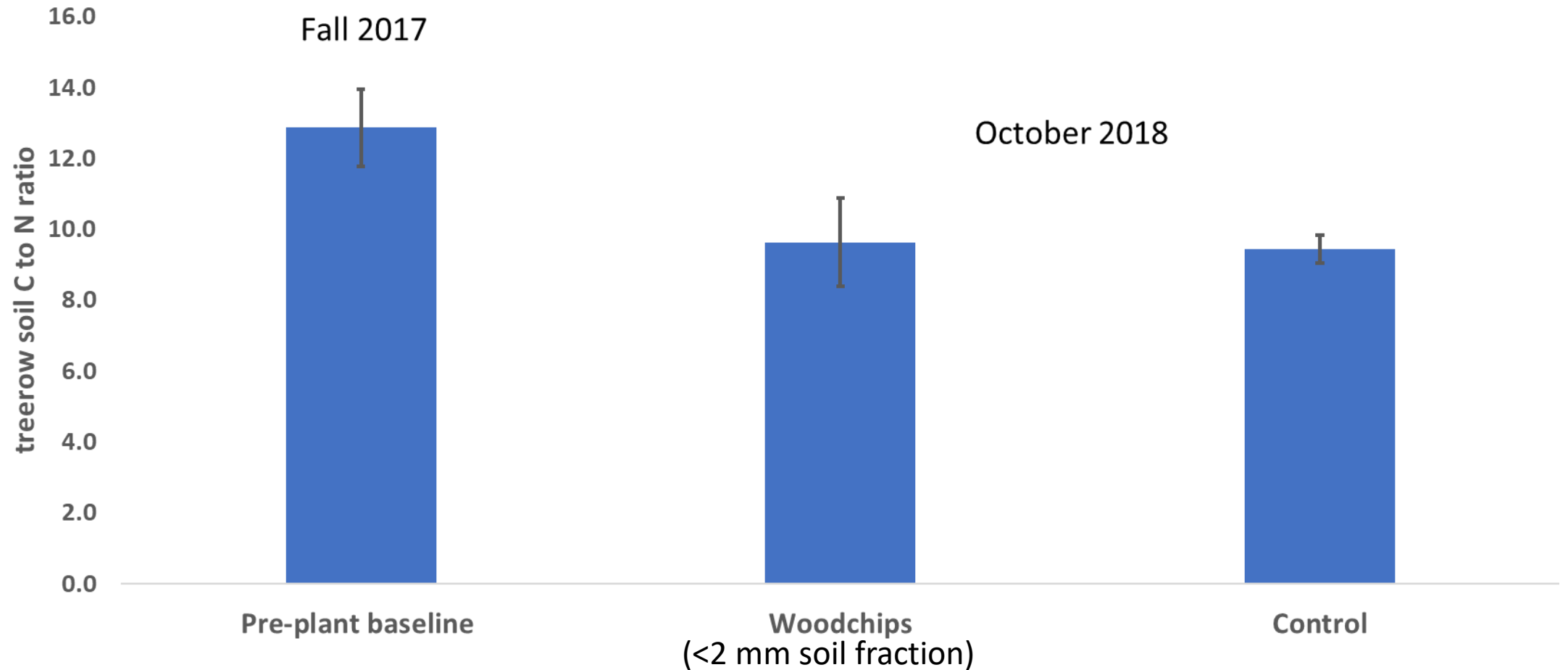


# Replant Orchard: Recycled Woodchip amendment C to N ratio

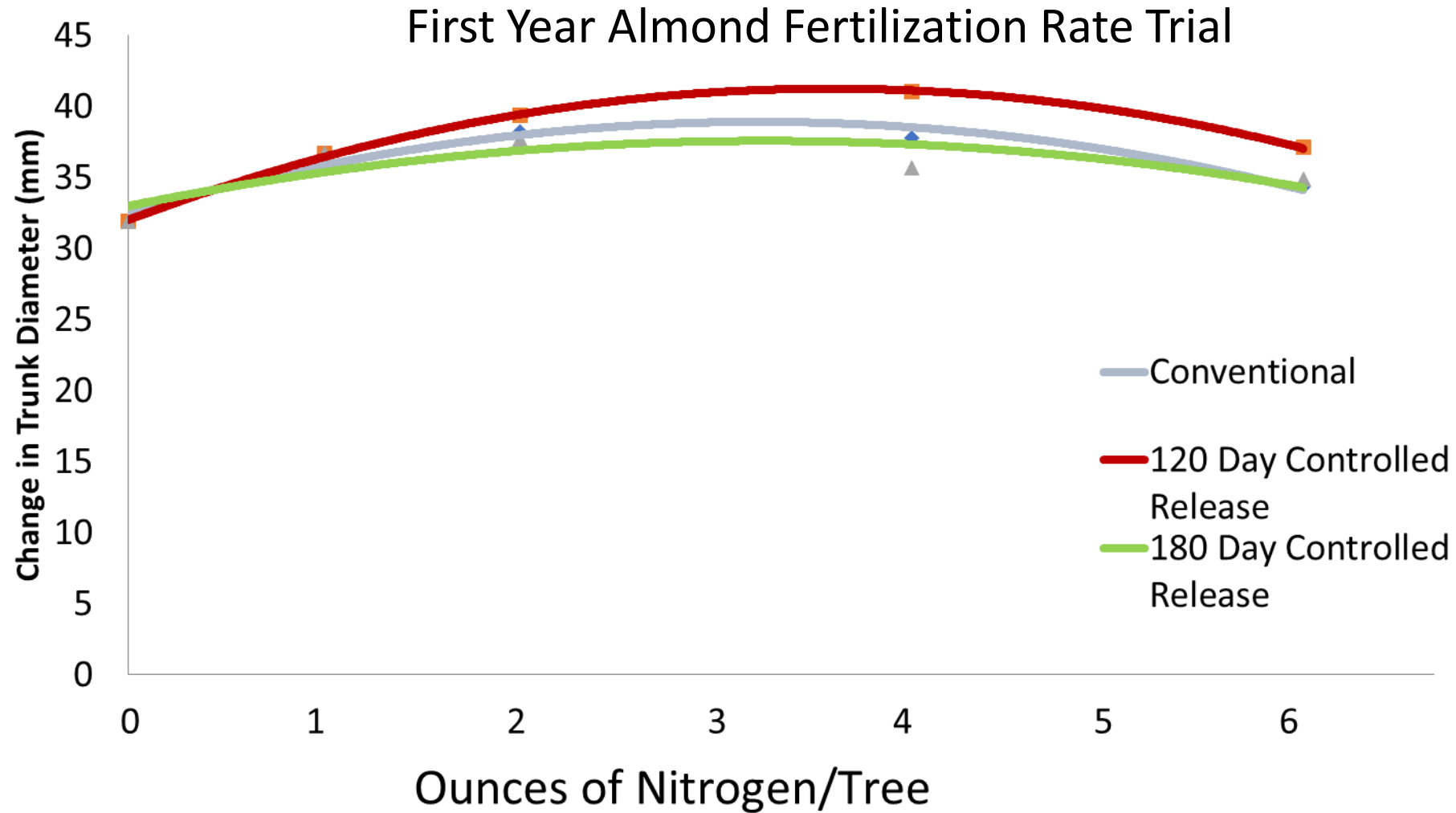
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- Carbon 50%: at 45 tons per acre: 45,000 lbs C per acre.
- Nitrogen 0.31 % at 45 tons per acre: 279 lbs N per acre
- 160:1 C:N woodchip amendment ratio
- Amending with 8 tons per acre dairy manure (18:1) will lower C:N to estimated 136:1
- Applying 100 lb N UAN32 to the treerow (~8,712 sq ft per acre) will reduce the C:N of woodchip amendment to 58:1

# Soil C to N one year after woodchips application and fertigation (68 lbs N /ac) commercial site

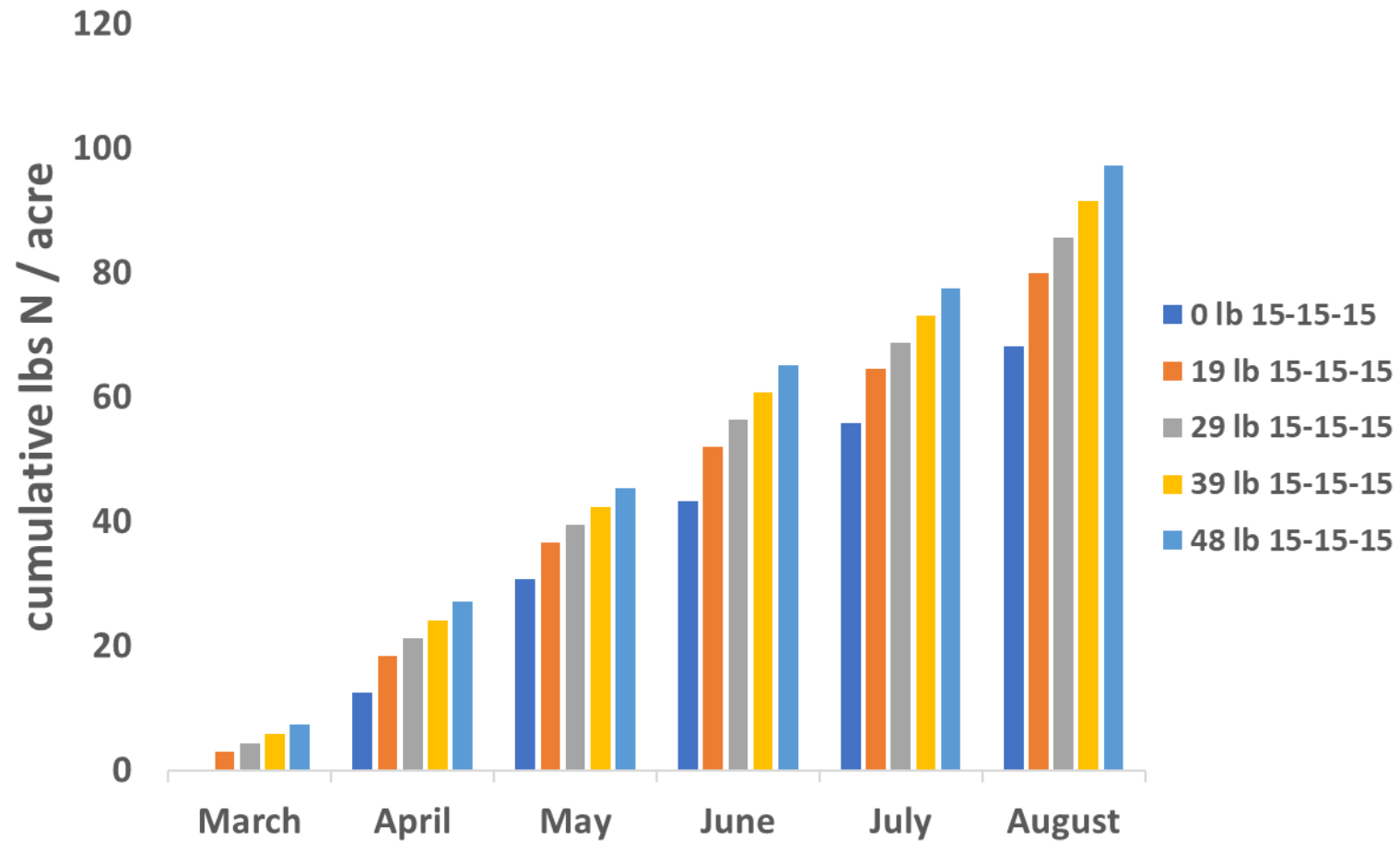


# Current recommendations for newly planted almond trees



First leaf almond orchard trial:

15-15-15 + 4 gallons (12.5 lb N/ac) UAN 32 monthly April to August





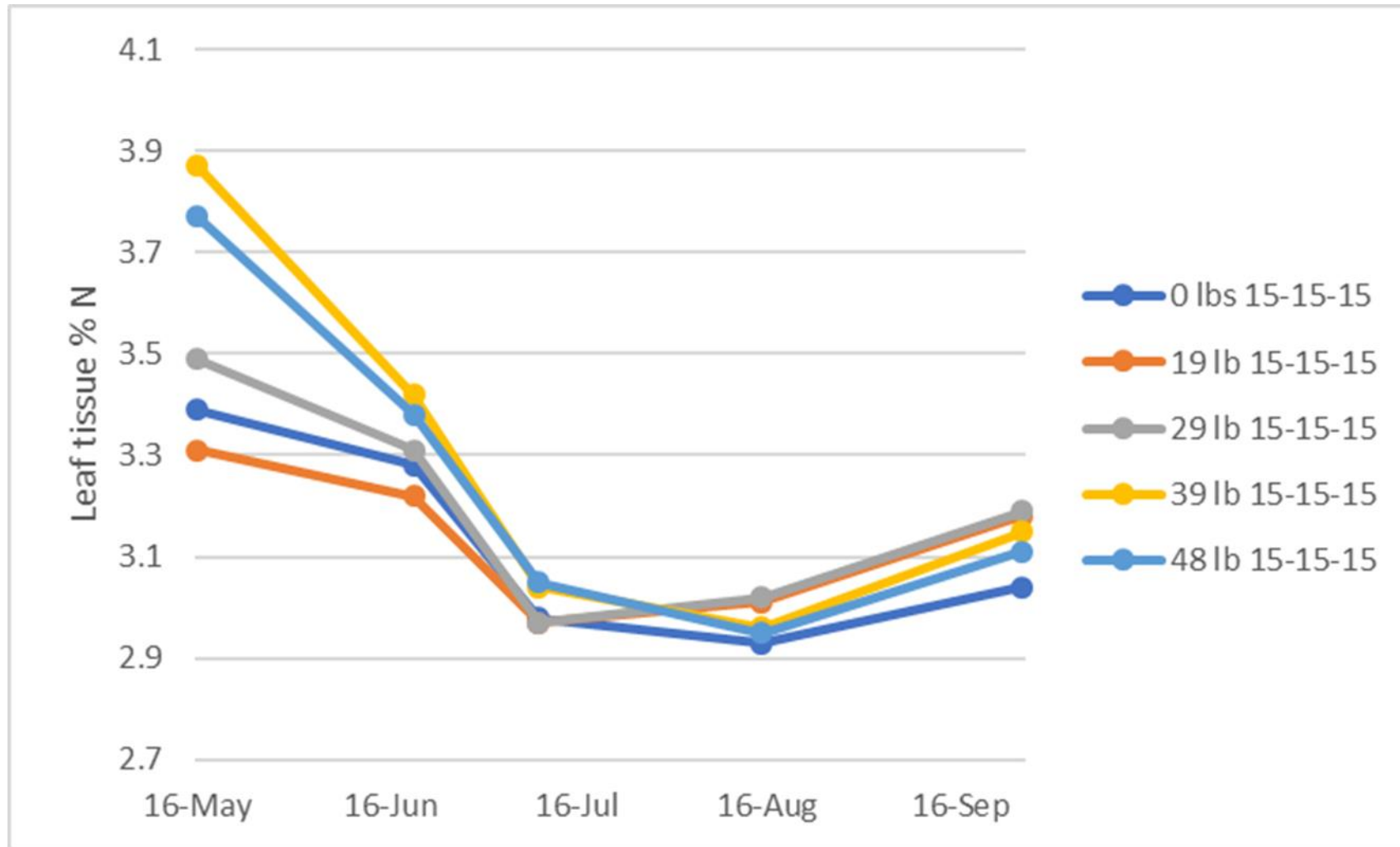
Control



0.8 oz of N applied in March

April 18<sup>th</sup>

# 15-15-15 rates and leaf tissue %N



No clear rate effect, timing may be more critical

# Conclusions:

- Soil amendments have a range of quality differences that will influence how long they will take to degrade, the impact on soil structure, and nutrient availability
- High C containing amendments may need supplemental N and lower the C:N ratio
- Wood chip amendments can delay tree growth in newly planted orchards
- Preliminary trials suggest early spring 39 and 48 lb N / ac with 15-15-15 improved nutrition early on
- No difference in nutrition between 15-15-15 rates after June
- Tree growth data yet to be collected for 2018