

Fertilizing Young Almond Orchards



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Fertilizing Young Almond Orchards

Fertilizing Considerations:

- What type of fertilizer to apply?
- How much should be applied?
- How much should be applied in a single application?
- What are the other concerns for young orchards?



Fertilizing Young Almond Orchards – What Type?

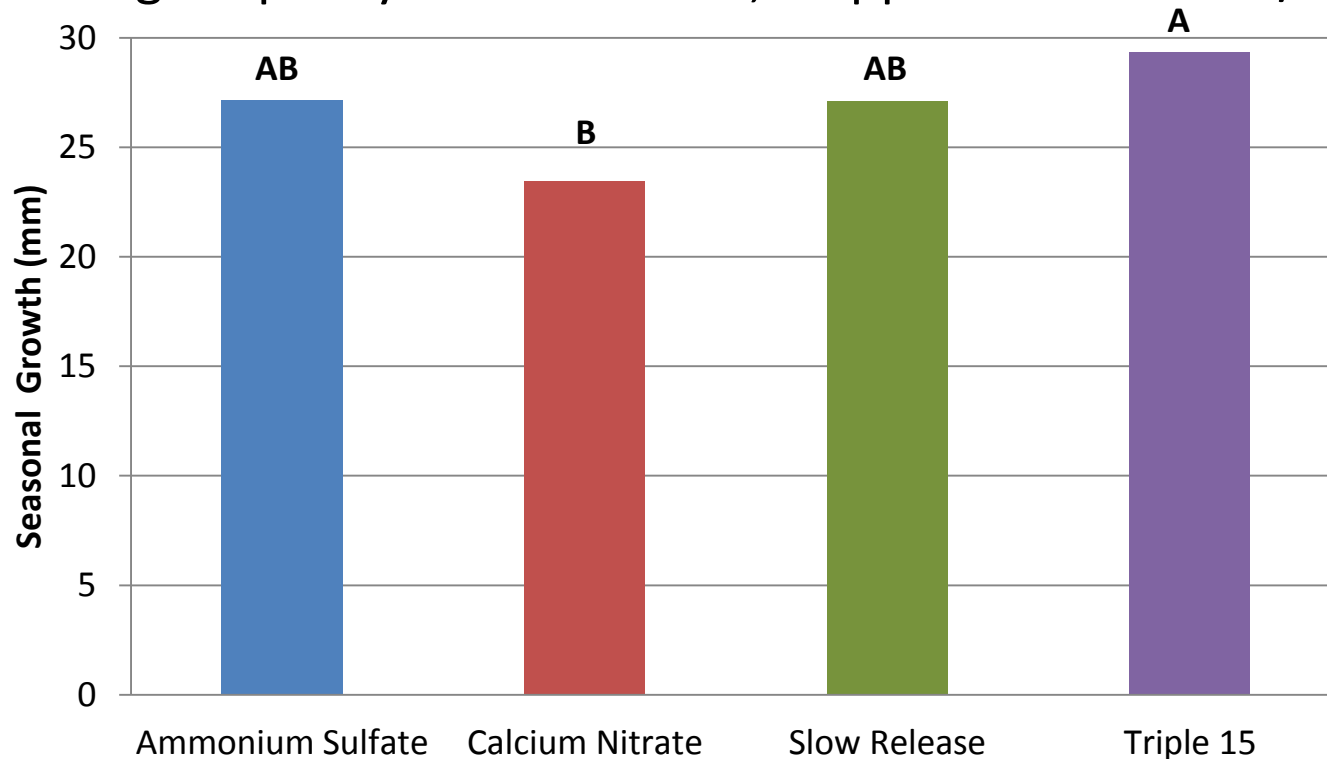
Fertilizer Source Trials

- Two locations within Merced Co.
- Nitrogen was sourced as ammonium, nitrate, or blends
- Applied as granular multiple times through the year at the same rate (4 ozs/tree)
- Measured growth, tissue analysis



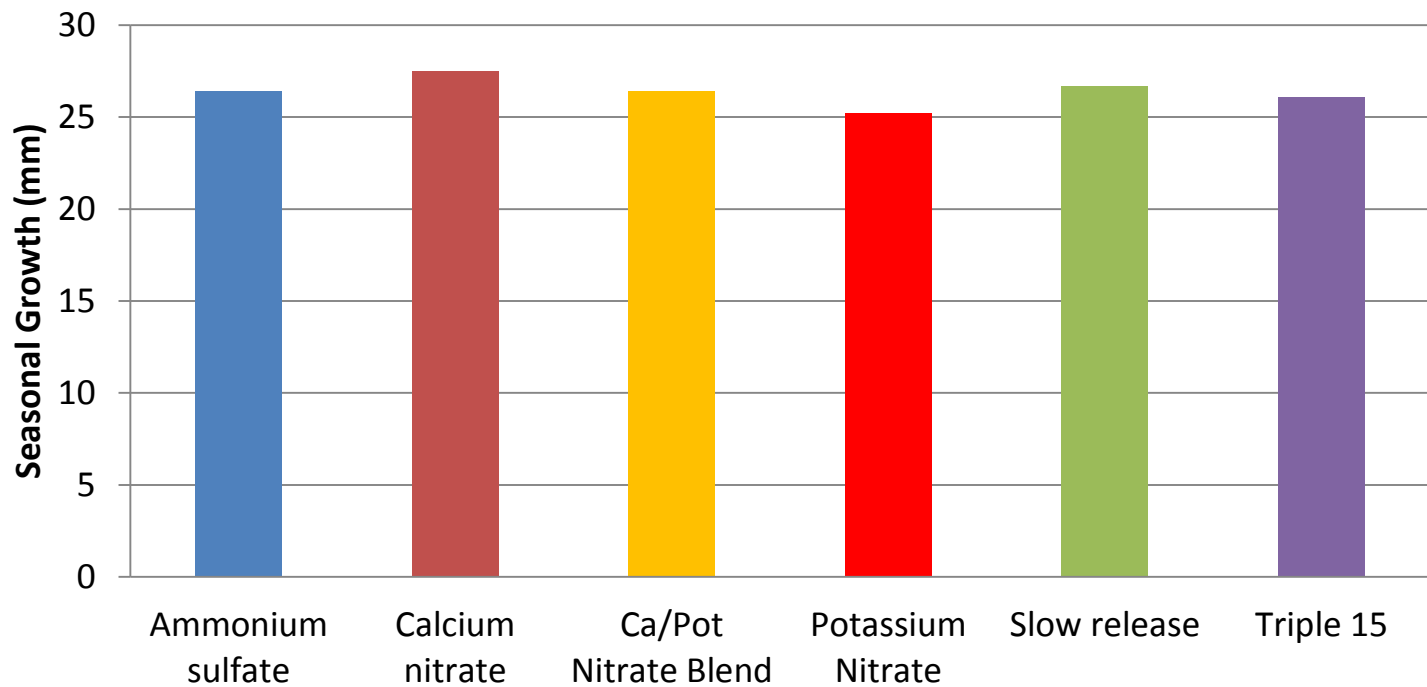
First Year Fertilizer Studies: Merced County

Loamy sand soil, irrigated with solid set sprinklers, neutral soils, low cation exchange capacity – 4 ozs total N, 6 applications of 1 oz/tree

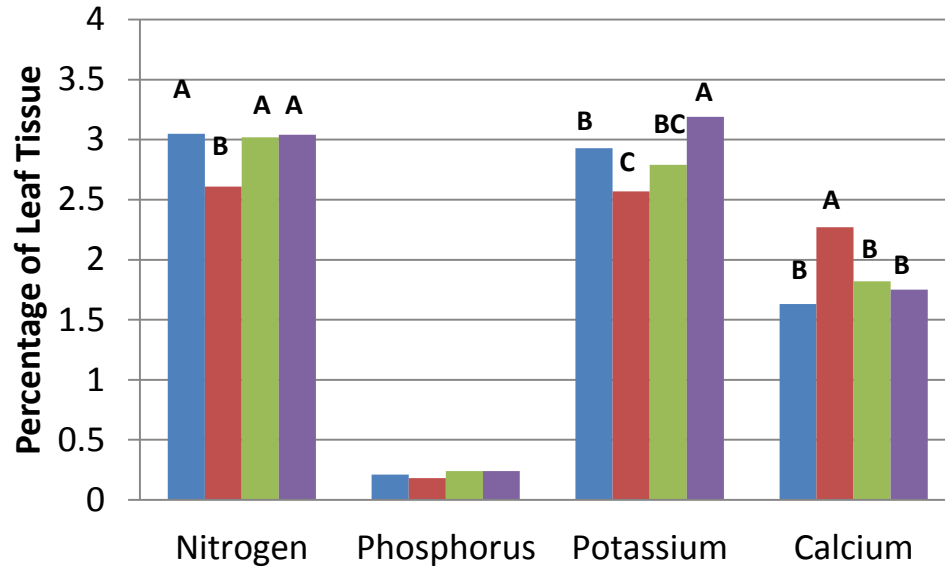


First Year Fertilizer Studies: Merced County

Sandy loam soil, irrigated with micro-sprinklers, acidic soils, medium cation exchange capacity – 4 ozs total N, 6 applications of 1 oz/tree



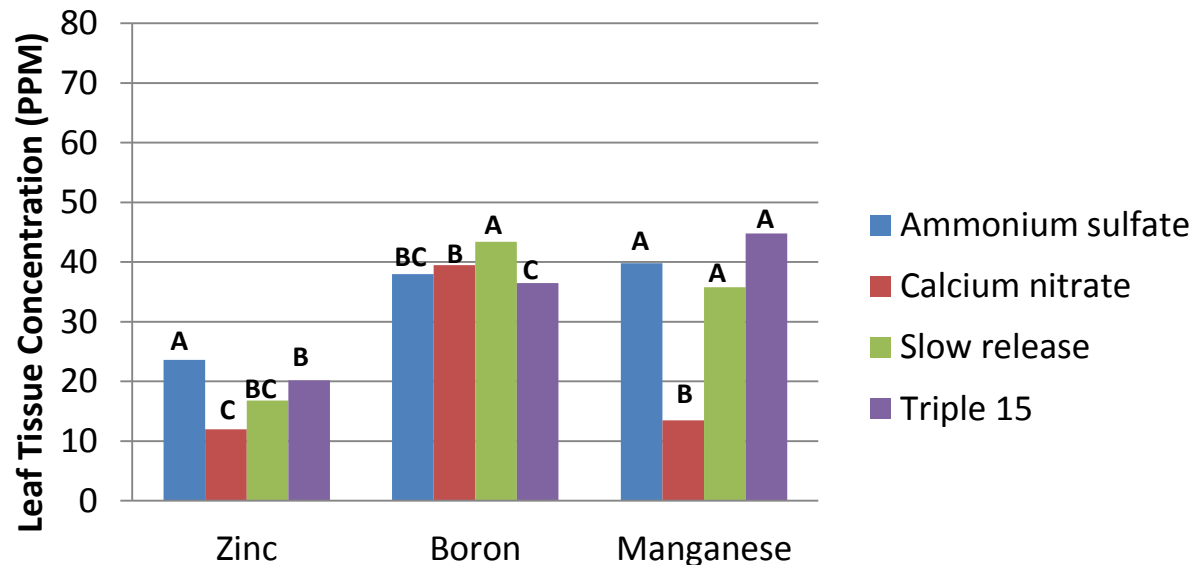
First Year Fertilizer Studies: Merced County



Major nutrients affected by fertilizer content

Treatments not connected by same letter indicate statistical difference at $p > 0.05$

Micro nutrients affected by fertilizers – suspect changes in soil pH



- Ammonium sulfate
- Calcium nitrate
- Slow release
- Triple 15

Fertilizing Young Almond Orchards: What type?

Nitrogen is nitrogen

- certain fertilizers leach more rapidly
- affect soil pH, changes micronutrient availability

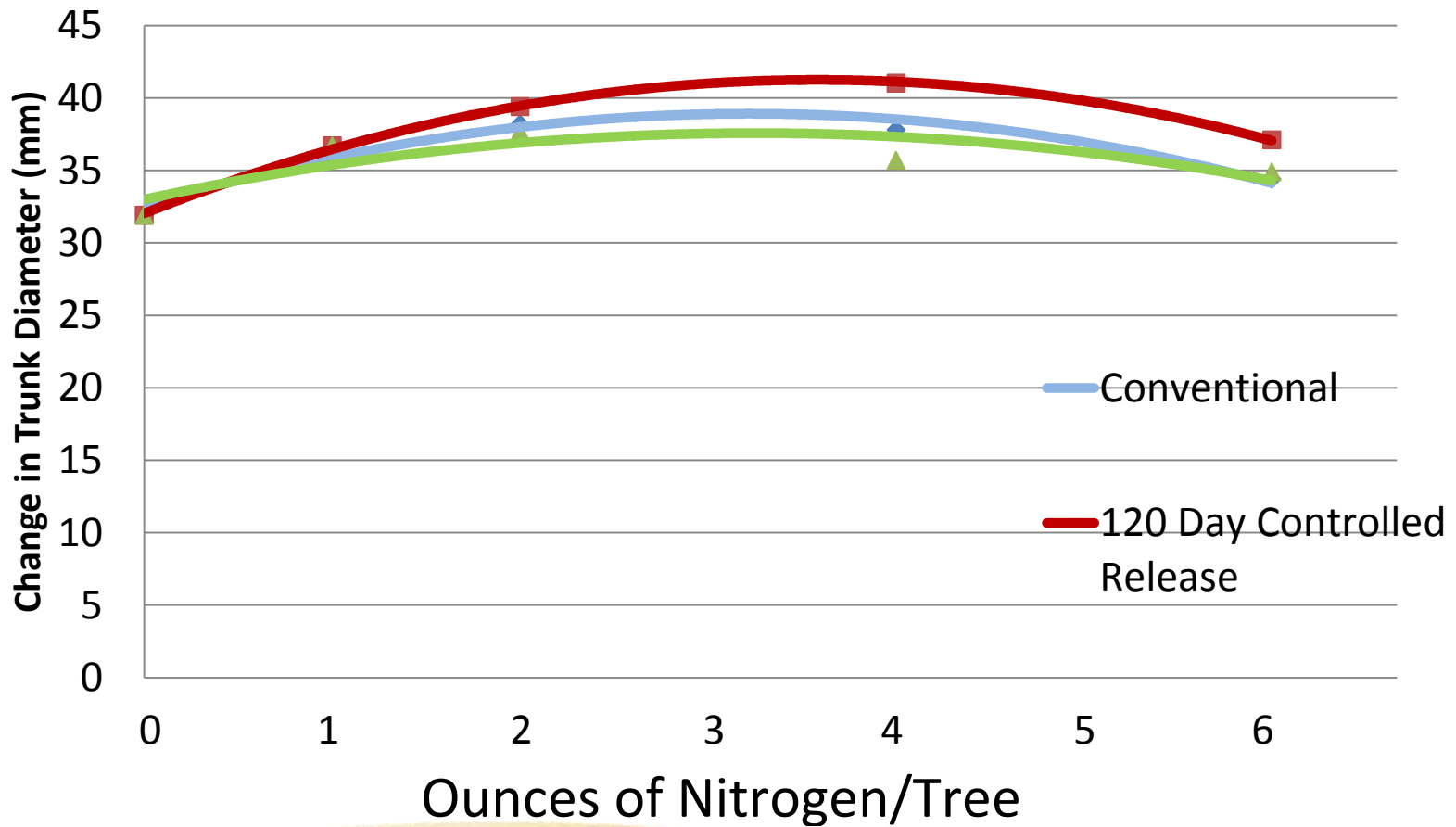
Fertilizing Young Almond Orchards: What Rate?

Fertilizer Rate Trials

- Sand soil
- Nitrogen was sourced using blended triple 15 granular, controlled release
- Applied at variable rates with 0, 1, 2, 4, 6 ozs of N/tree with split applications
- Tree growth and tissue (tissue not shown)



Merced Trials – First Year Almond Fertilization Rate



Fertilizing Young Almond Orchards: What rate?

- Study suggest somewhere between 3-4 ozs of Nitrogen per tree
 - Supported earlier work of John Edstrom
 - Supports Patrick Brown's work of 20-30 lbs/acre of vegetative growth requirement

Rate/Tree	18'x22' (110)	16'x22' (123)	14'x22' (141)
3 oz	20 lbs N	23 lbs N	27 lbs N
4 oz	28 lbs N	31 lbs N	35 lbs N

Fertilizing Young Almond Orchards: How much?

For 2nd leaf or older:

- Nitrogen needs look to be around 25-30 pounds for growth
- Needs to be added to crop requirements if yielding under 2000 lbs/acre



Fertilizing Young Almond Orchards: How much?

BE CONSERVATIVE: Many little feeds are better than one “slug.”

No More than one oz of N per tree’s age for any application

1 year old: one oz of N per fertilization

2 year old: two ozs of N per fertilization

WHY?

Fertilizing Young Almond Orchards: How much?

Lanky Growth



Nitrogen Burn



Fertilizing Young Almond Orchards: Other Considerations?

Fertilizing Young Almond Orchards: Other Considerations?

Nitrate-nitrogen ($\text{NO}^3\text{-N}$) in the soil:

$\text{NO}^3\text{-N}$ concentration (ppm) * 2 * soil sample thickness (in.)

N (lbs/acre) = $\frac{\text{NO}^3\text{-N concentration (ppm)} * 2 * \text{soil sample thickness (in.)}}{6 \text{ inches}}$

Depth	5 PPM	10PPM	15 PPM	20 PPM
0-6"	10	20	30	40
0-12"	20	40	60	80

Fertilizing Young Almond Orchards: Other Considerations?

Nitrate-nitrogen (NO³-N) in the water:

$$\text{N (lbs/acre inch)} = \text{NO}^3\text{-N concentration (ppm)} * 0.23$$

Acre inches applied	3 PPM	5 PPM	10 PPM	15 PPM
1	0.7	1.15	2.3	3.45
6	4.1	6.9	13.8	20.7
12	8.3	13.8	27.6	41.4
24	16.6	27.6	55.6	82.8

Fertilizing Young Almond Orchards: Other Considerations?

- **Urea** – produced through Haber-Bosch process, must be converted to nitrate, can volatilize, water soluble, stable (~46% N)
- **Ammonium (NH_4^+)** – Can be used by plants in anaerobic conditions, positively charged in neutral, acidic soils
 - Ammonium Sulfate
- **Nitrate (NO_3^-)** – Plant available form of nitrogen, negatively charged, easily leached
 - Calcium Nitrate
 - Potassium Nitrate
- **N-pHURIC**– Source of acid for acidification of soils (high pH) and nitrogen
- Blends:
 - Urea Ammonium Nitrate (UN-32) – liquid blend
 - Calcium Ammonium Nitrate (CAN-17) – liquid blend

Fertilizing Young Almond Orchards: Other Considerations?

When to start:

- Wait until at least 6-12 inches of new growth
- Hold off irrigation until soil begins to dry down



Fertilizing Young Almond Orchards: Other Considerations?

Iron Deficiency



Zinc Deficiency



Fertilizing Young Almond Orchards: Other Considerations?

We tend to focus on nitrogen...

But really should be focusing on water.

Almonds, one seasons growth:
Dry treatment (SWP about -15 bars)



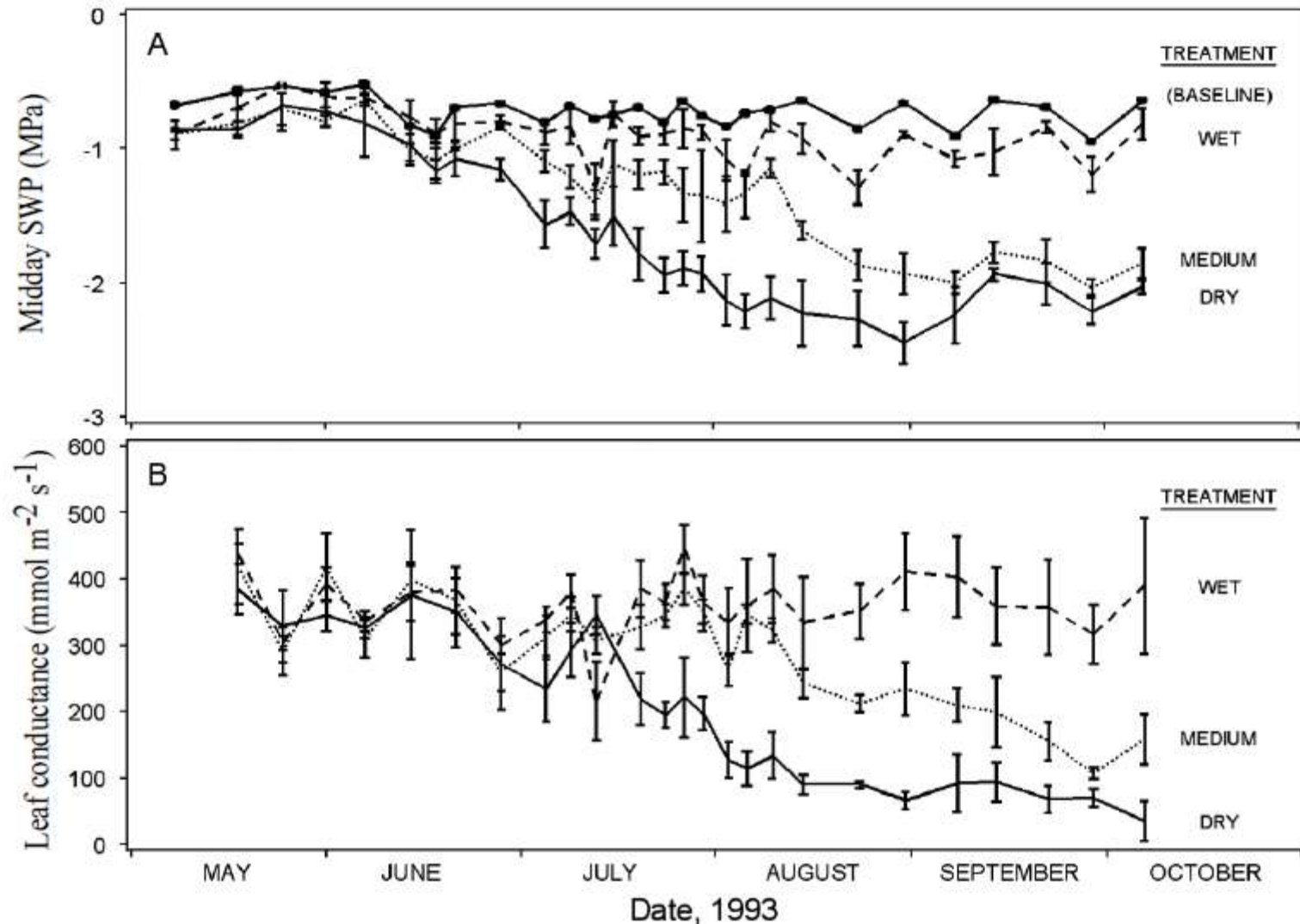
Almonds, one seasons growth:
Medium treatment (SWP about -12 bars)



Almonds, one seasons growth:
Wet treatment (SWP about -8 bars)



Fertilizing Young Almond Orchards: Other Considerations?



Fertilizing Young Almond Orchards: Other Considerations?

- Don't water too much!
 - Roots need oxygen
 - Wet feet leads to root rot, Phytophthora
 - Yellow trees, lack of growth
 - Major problem for young orchards



Fertilizing Young Almond Orchards: Other Considerations?

The effects of poor planting:



Fertilizing Young Almond Orchards: Other Considerations?

- 3-4 ozs of actual N per tree for the first growing season, applied across the whole season
- For older trees: 25-30 lbs/acre + crop requirements (83 lbs/1000 kernel lbs) until 2000 lbs/acre is reached
- Keep an eye on micronutrient deficiencies
- Don't over-irrigate...but don't' under-irrigate