

Fertilization & Irrigation for Young 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?

- **Nitrogen is nitrogen**

Some leach more rapidly

Can affect soil pH and micronutrient availability

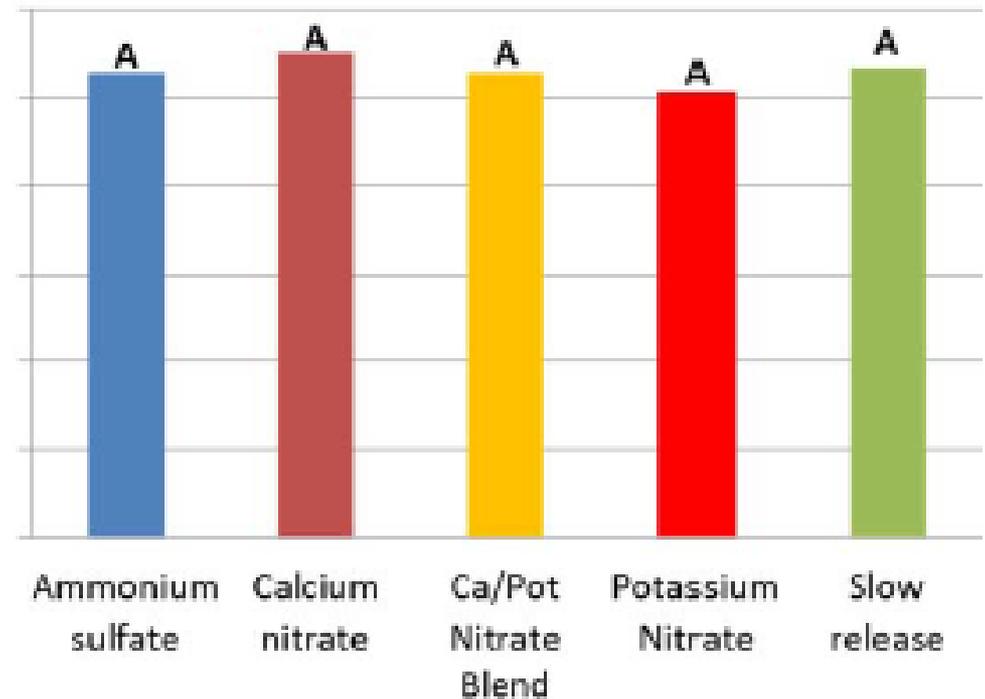
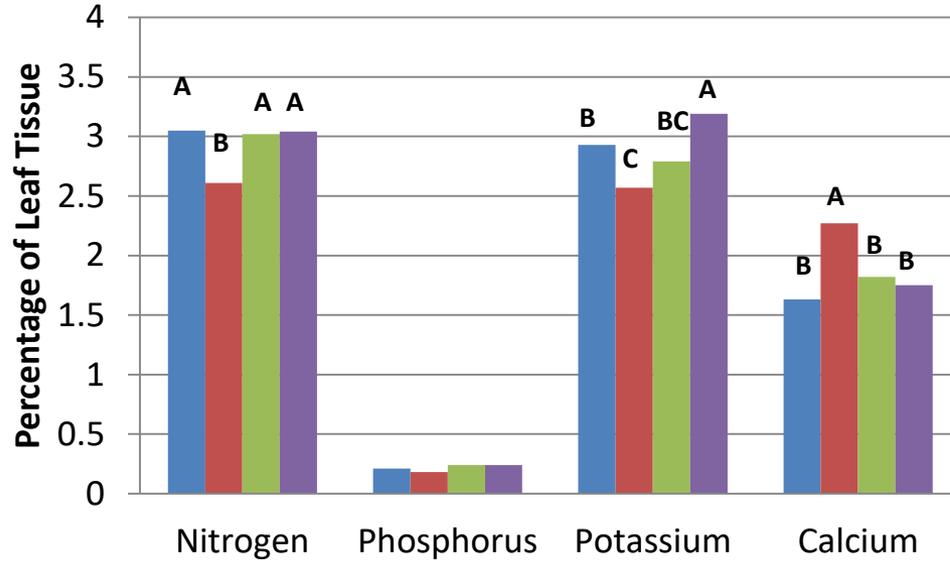


Figure 2. Nitrogen source did not impact tree growth. Fig: D

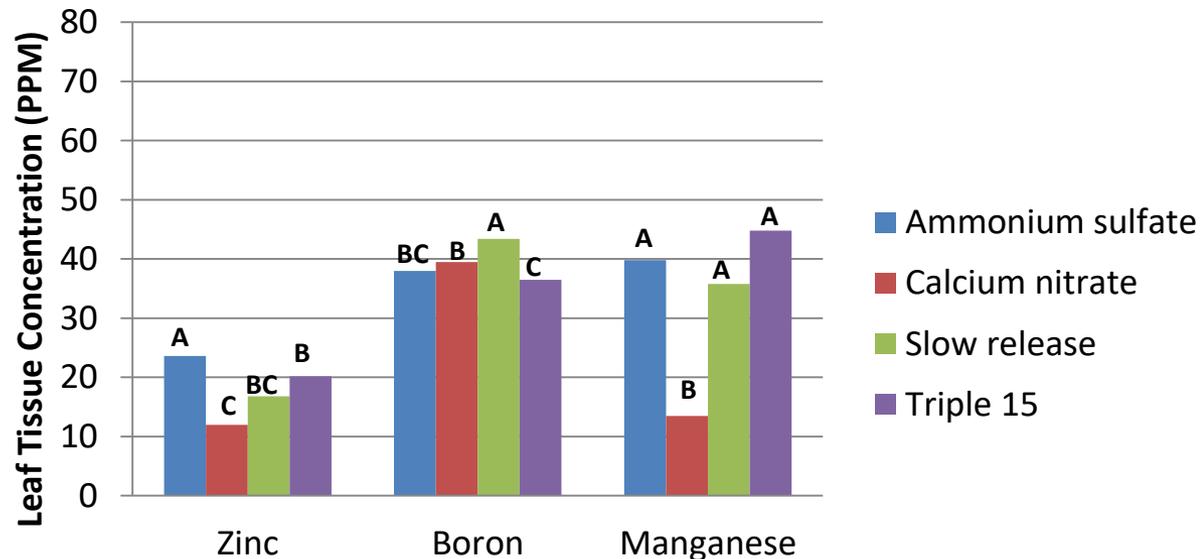
First Year Fertilizer Studies: Merced County



Major nutrients affected by fertilizer content

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

Micro nutrients affected by fertilizers – possibly due to changes in soil pH



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

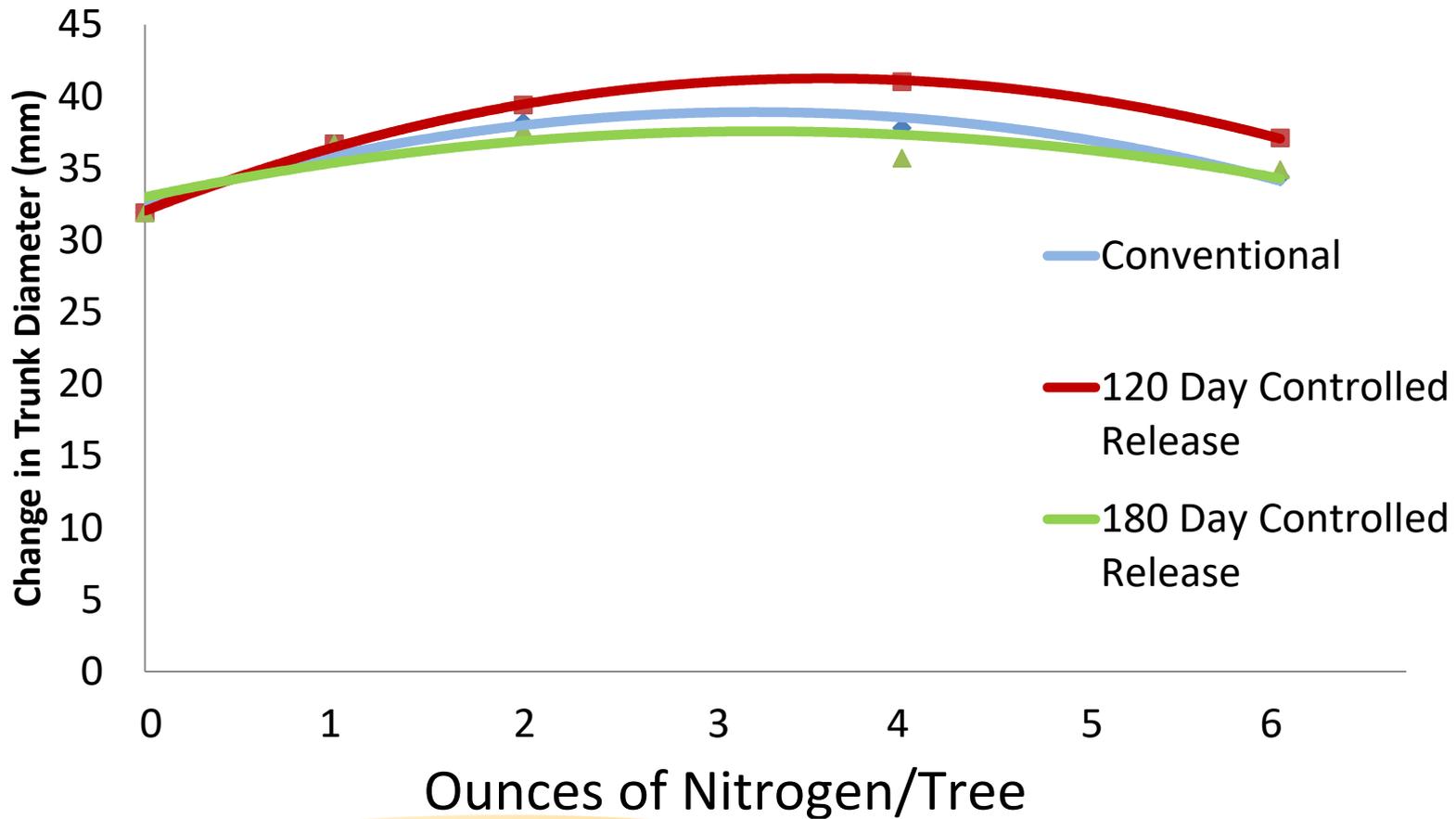
Fertilizing Young Almond Orchards: What Rate?

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 single application

1 year old: one oz of N per fertilization

2 year old: two oz of N per fertilization

WHY?

Fertilizing Young Almond Orchards: How much?

Lanky Growth



Nitrogen Burn



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) = 
6 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?

When to start:

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





Fertility Recommendations for young trees following orchard recycling:

Do not wait for 6-12 inches of growth, fertilize early in spring soon after planting

N fertility management 1st year orchard after whole orchard recycling

Application dates	lbs N / acre fertilizer	Fertigation oz N / tree	estimated lbs N / acre from irrigation*	Fertigation plus irrigation oz N / tree
Apr 19	12.48	1.7	1.28	1.9
May 15 (CAN-17)	5.79	0.8	1.65	1.0
Jun 1	12.48	1.7	1.16	1.9
Jun 25	12.48	1.7	2.57	2.1
Jul 22	12.48	1.7	4.78	2.4
Aug 20	12.48	1.7	2.45	2.1
Aug 21 - Nov 21	-	-	6.73	0.9
Total	68.2	9.3	20.6	12.3

Grower applied more than double the recommended rate for 1st leaf trees



0 oz N applied in March



0.8 oz of N applied in March

Fertilizer sub-trial April 18th 2018

N fertility management 2nd year orchard after whole orchard recycling

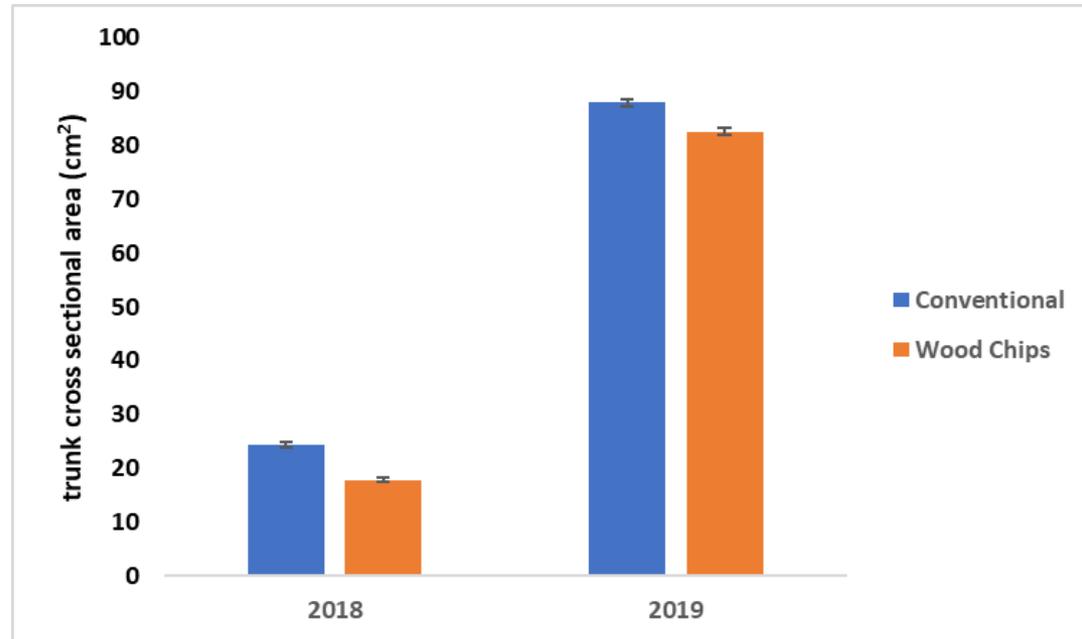
Application date	lbs N / acre fertilizer	cumulative lbs N / acre from irrigation*	Fertigation plus irrigation oz / tree
March 18	9.65	0	1.34
April 22	9.65	2.0	1.61
June 24	9.65	5.27	2.06
July 15	0	10.9	5.5
Total	28.95	10.9	5.5

Grower applied half the recommended rate for 2nd leaf trees

Tree growth after whole orchard recycling compared to conventionally planted trees in first 2 years



2nd year NP on Bright's hybrid 5



Fertilizing Young Almond Orchards: Other Considerations?

We tend to focus on nitrogen...

But really should be focusing on water.

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



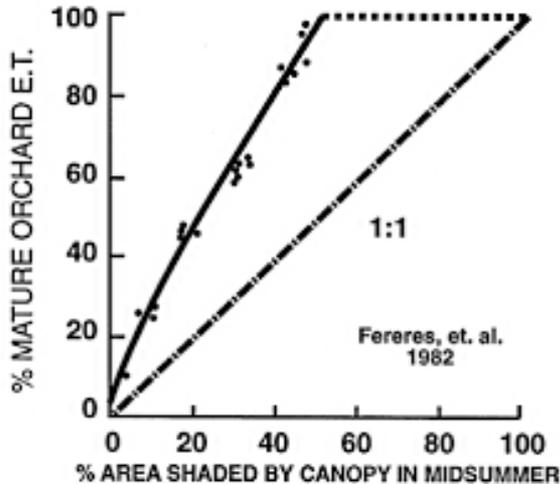
General Estimates of Almond ET (inches)

Table 2. Young Almond Orchard ETc

Almonds						
Month	1st Leaf		2nd Leaf		3rd Leaf	
	inches/month	inches/day	inches/month	inches/day	inches/month	inches/day
February	0.31	0.01	0.56	0.02	0.77	0.03
March	0.77	0.02	1.41	0.05	1.92	0.06
April	1.39	0.05	2.55	0.09	3.48	0.12
May	2.14	0.07	3.93	0.13	5.36	0.17
June	2.51	0.08	4.6	0.15	6.27	0.21
July	2.69	0.09	4.93	0.16	6.72	0.22
August	2.4	0.08	4.39	0.14	5.99	0.19
September	1.76	0.06	3.23	0.11	4.41	0.15
October	1.05	0.03	1.92	0.06	2.62	0.08
Total	15.69		28.76		39.22	

Approximately, 1212 m³ per acre-foot (Ac-Ft) of water.

Estimating Young orchard ET

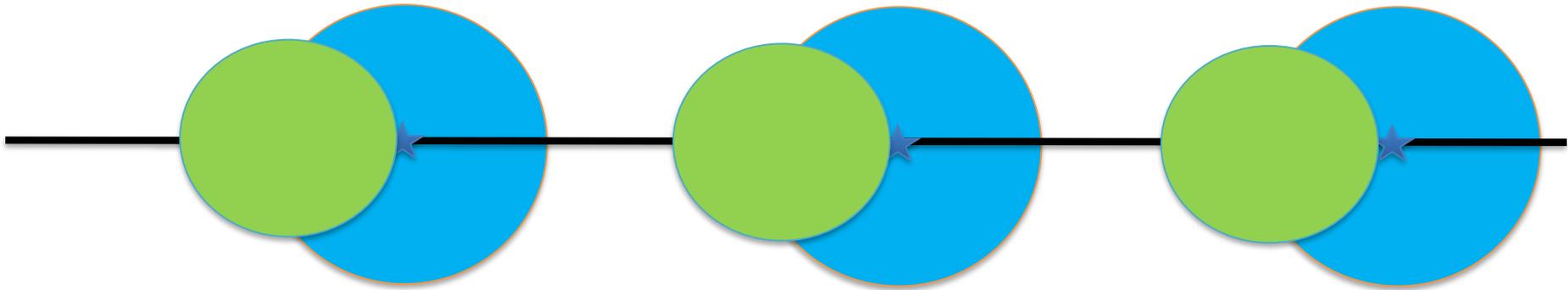


ET_c for young trees is roughly double % canopy cover

Example: 3rd leaf orchard covering 35% of the orchard floor will use 60% of the water that a mature orchard would use.

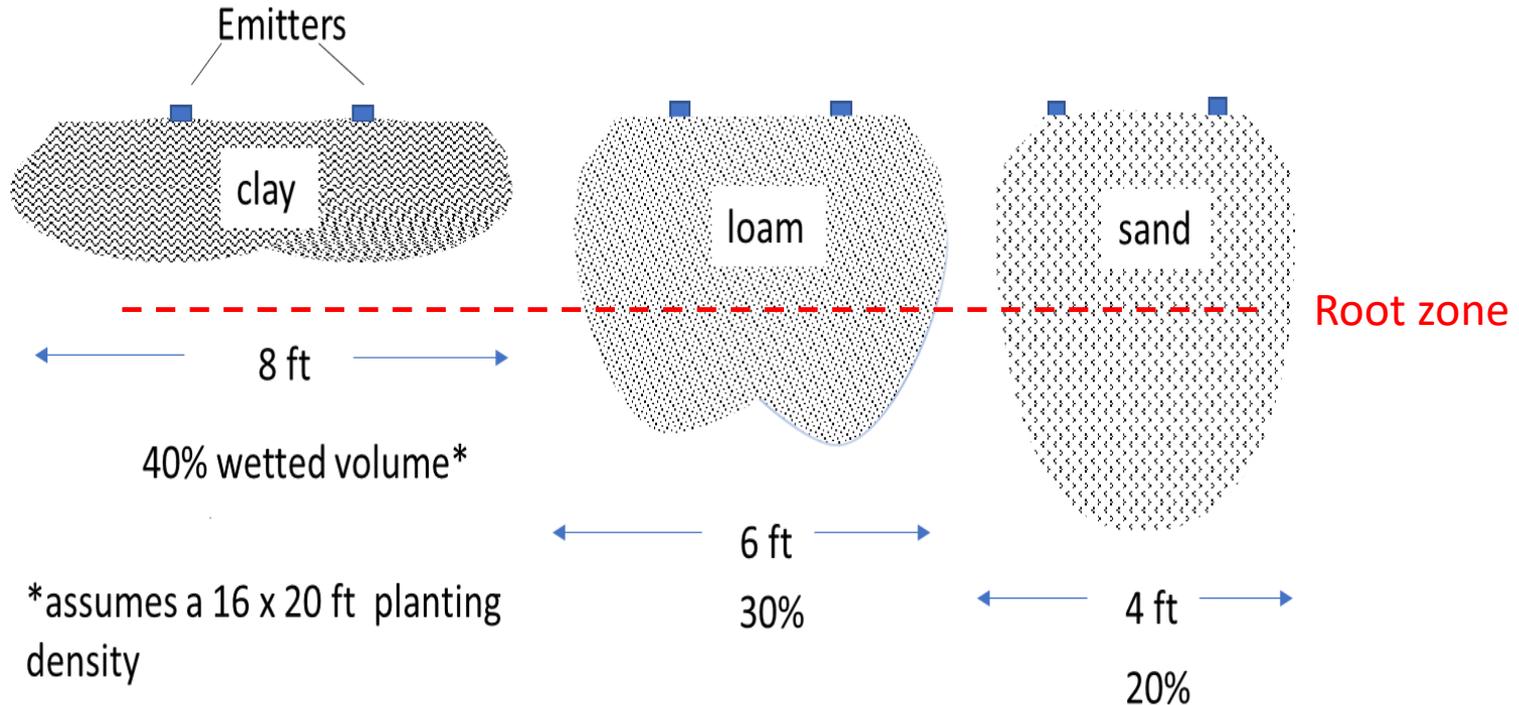
Example: young tree ET_c = (2.1 inches) (60%) ≈ 1.7 inches

Young Almond Orchards: Fertilizer and Water Efficiency Considerations



Application Efficiency of systems for young trees is dependent upon delivery to development root system.

Available water

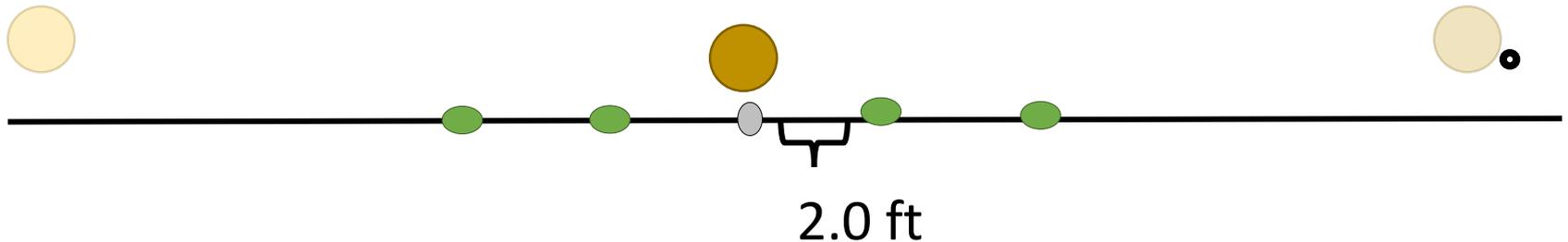


Important to know what percent area is covered by irrigation system because concentrating water means the soil in that area fills more quickly

$$8 \text{ gal/hr} \div 20\% = 40 \text{ gal/hr}$$

Irrigation option for 1st and 2nd year plantings

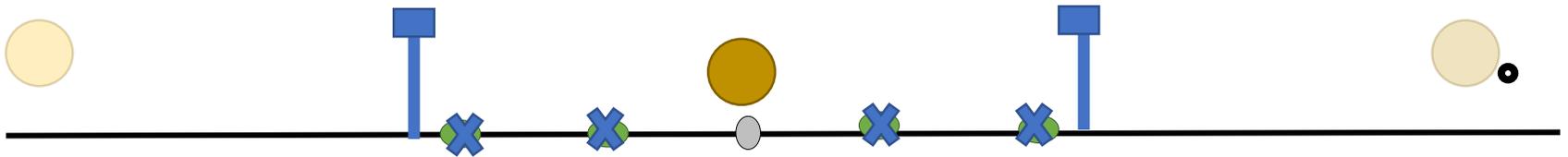
Button drip emitters release water right to the plants root zone.



- Three button emitter per tree (Black line)
 - One 1 gal/hr emitter 6" from center of trunk
 - Two 2 gal/hr emitters 2 ft from center emitter

Irrigation option 3rd year

Plug buttons and install
microsprinklers



Microsprinkler provide a larger wetting pattern than drip
but greater band canker susceptibility in the first few years
of growth

Fertilizing Young Almond Orchards: Other Considerations?

Iron Deficiency



Zinc Deficiency



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
 - 2x when replanted after WOR
- 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

Thank you!

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