Strawberry Establishment Period: More drip, less sprinkler

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Lack of water but plenty of soil pathogens

Macrophomina phaseolina

Fusarium oxysporum

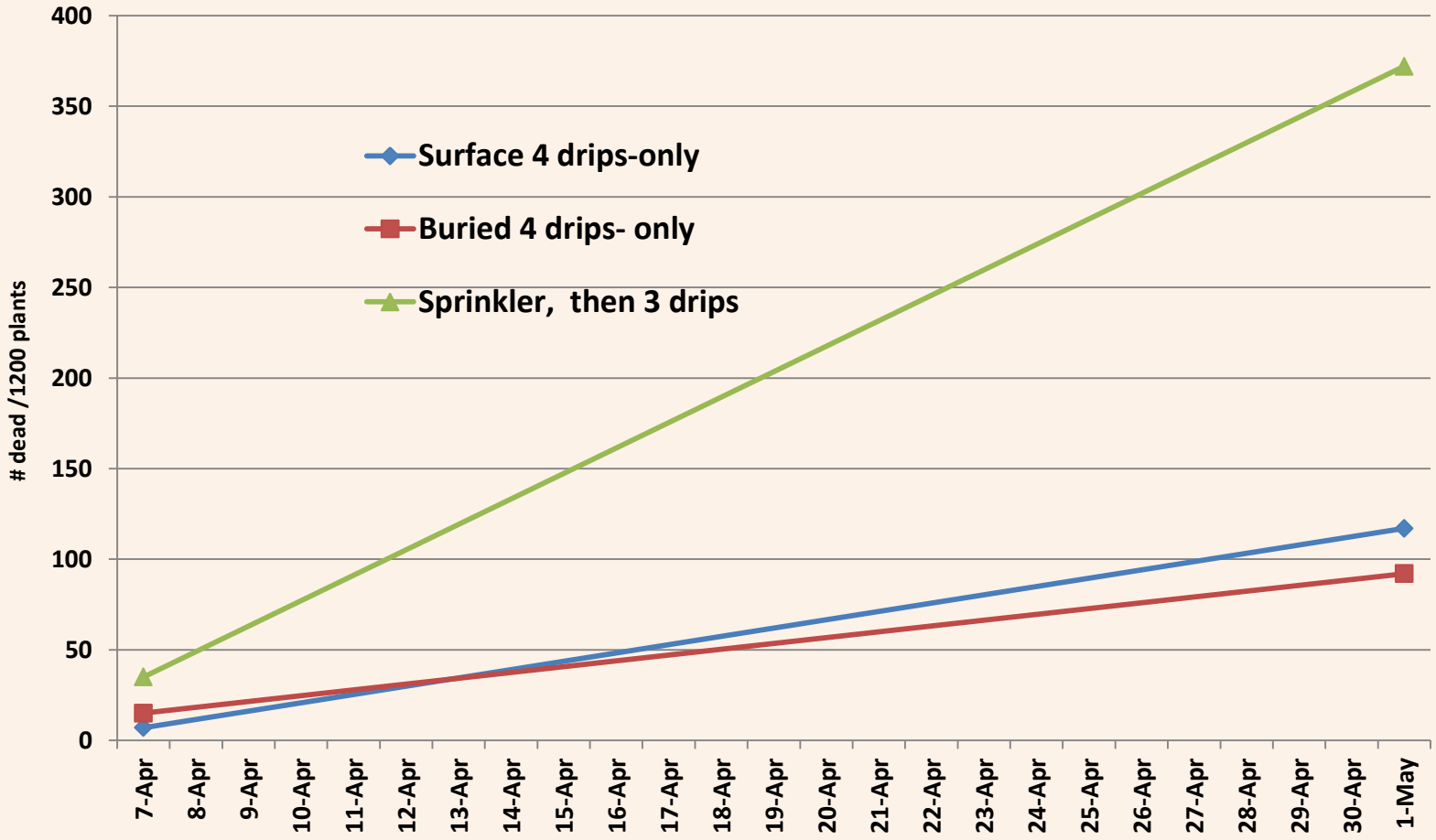
http://www.youtube.com/watch?v=K2TNXAGK_TM

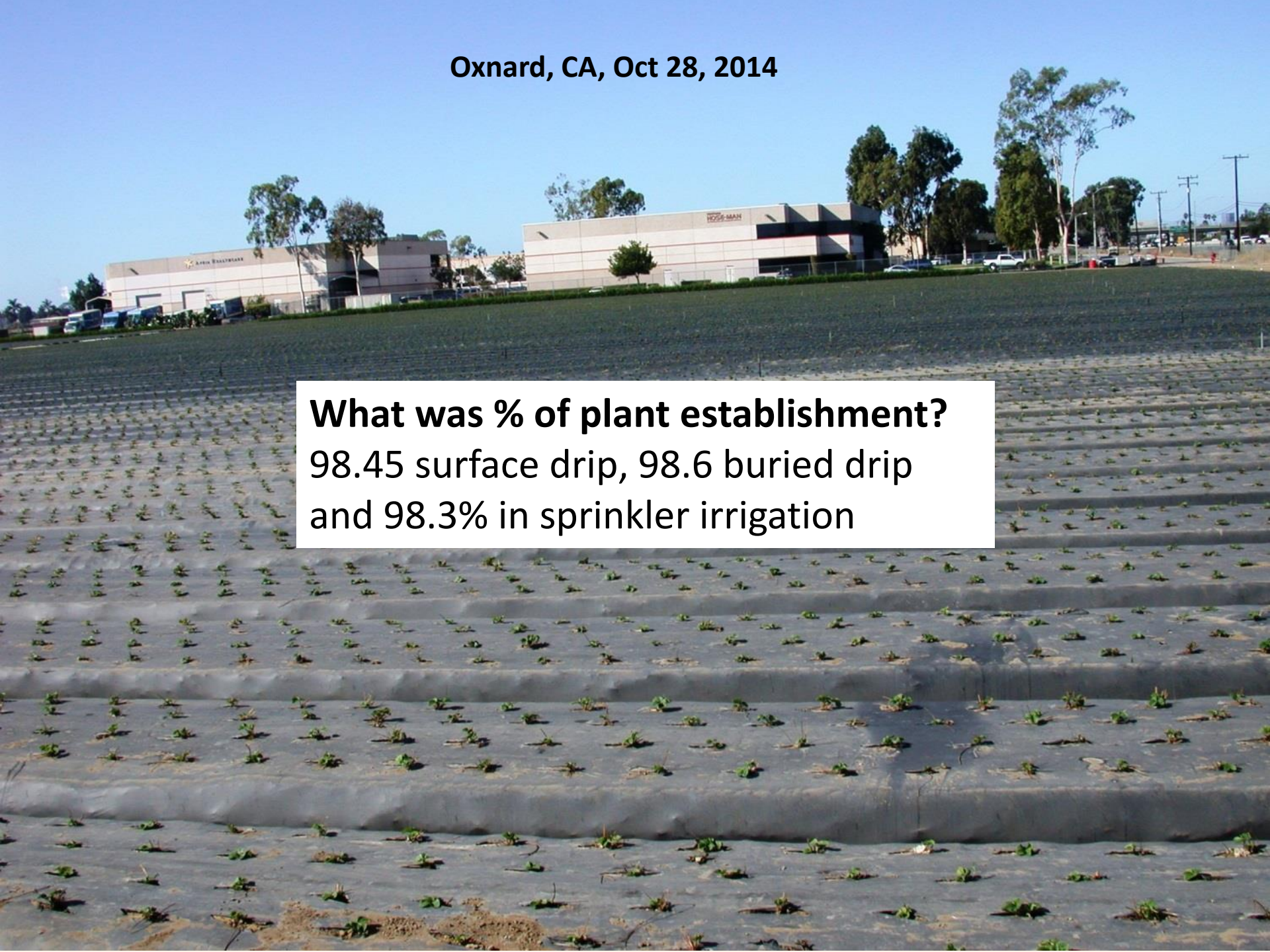
- Placing 4 tapes: depths and locations
- sprinkler irrigation – wet furrows hold plastic during Santa Ana winds
- View plants established on 4 drip lines vs sprinkler irrigated , followed by 3 drips.

Drip Fumigation

- Camarillo (200 lbs /A InLine): native *Fusarium oxysporum* in soil: no symptoms in plants observed in Radiance
- Watsonville (300 lbs /A Piclor 60): buried inoculum – no survivorship in 2 or 4 lines per bed at 2 depths for both *M. phaseolina* and *F. oxysporum*
- Oxnard: did not fumigate with 4 lines (2) but irrigated with 4 or 3 in season

Oxnard: irrigation affecting plant mortality due to *F. oxysporum*




Oxnard, CA, Oct 28, 2014
What was % of plant establishment?
98.45 surface drip, 98.6 buried drip and 98.3% in sprinkler irrigation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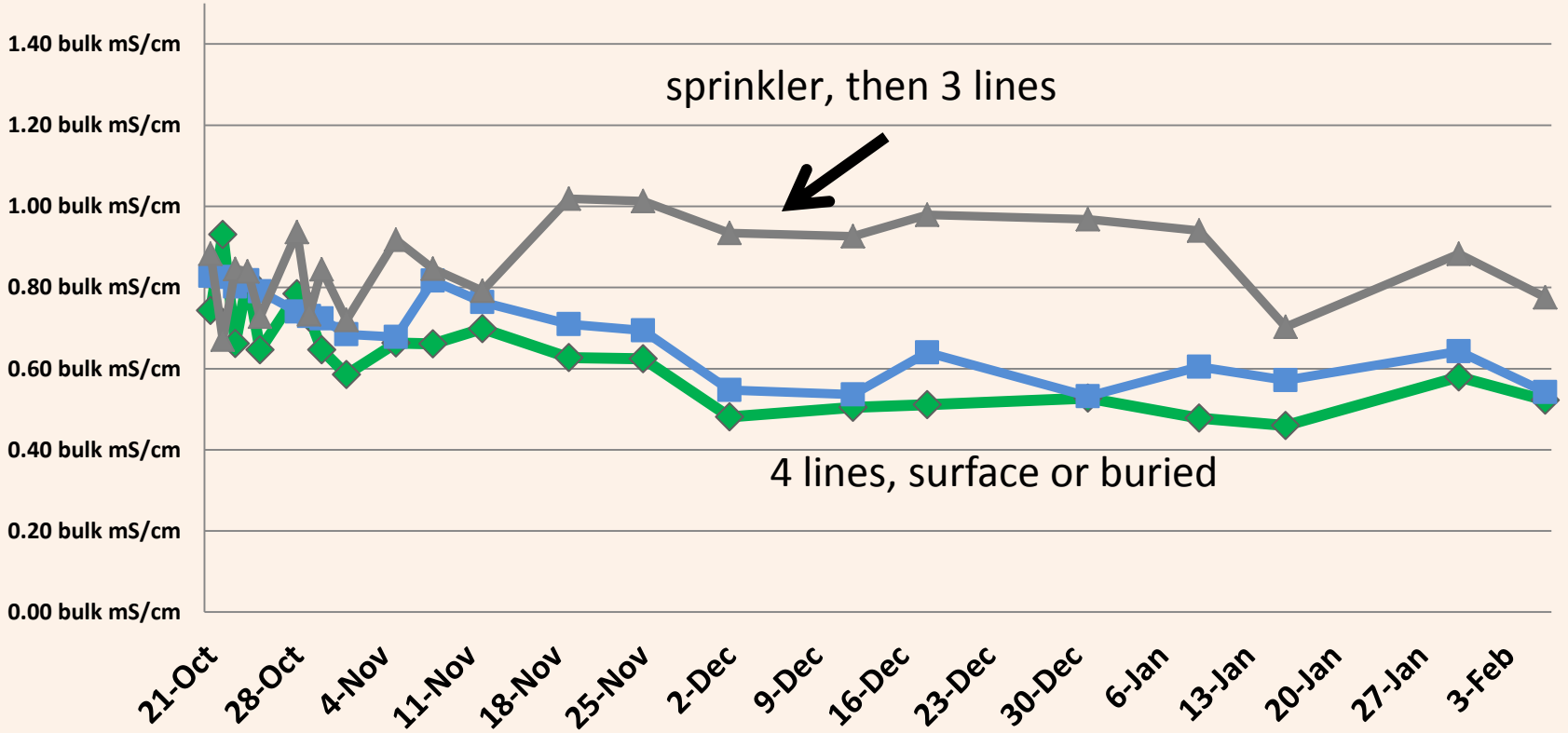
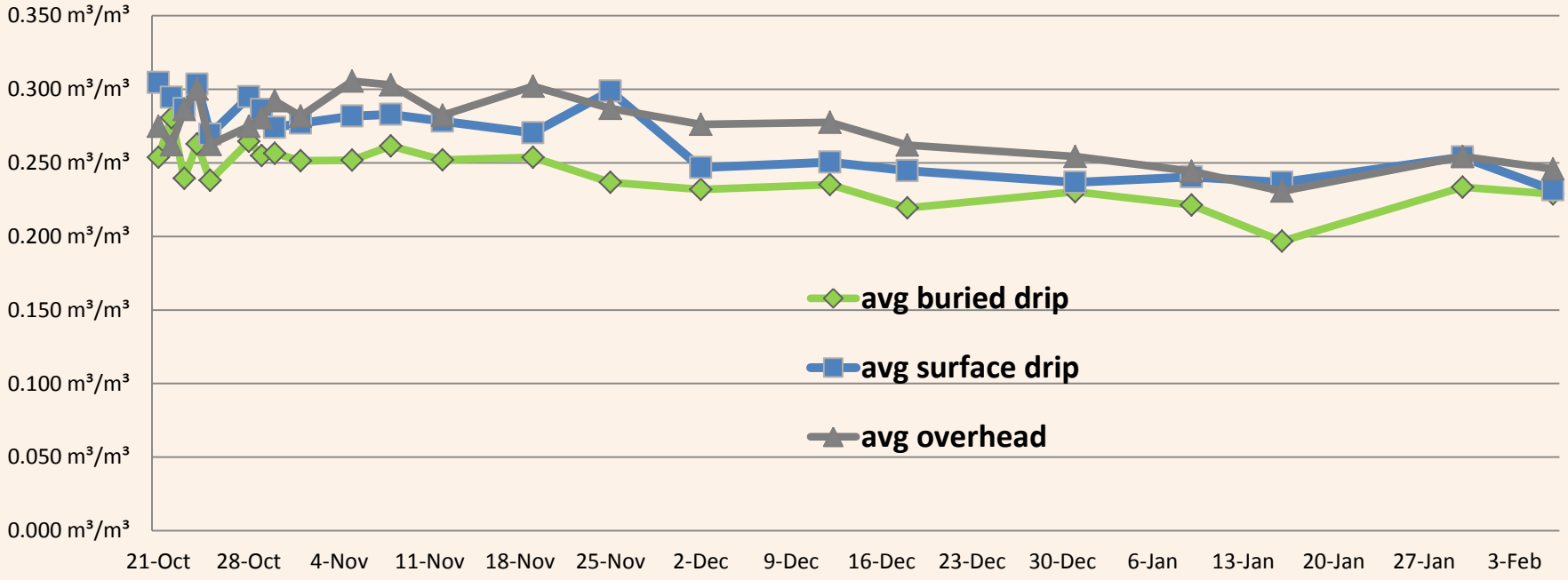
4 – drip vs sprinkler

EC in root zone, bulk soil

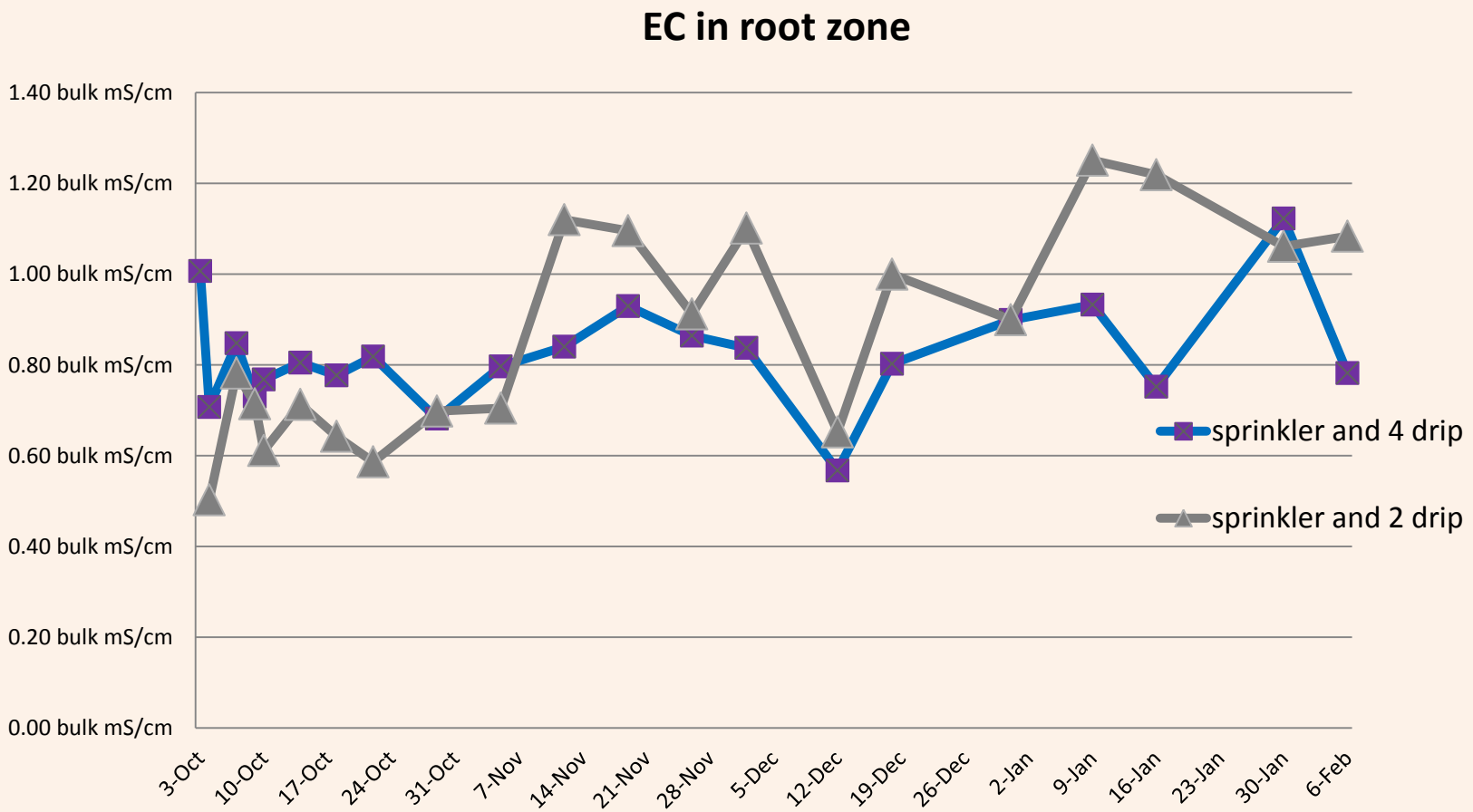


4 – drip vs sprinkler

Volumetric moisture in root zone



4 or 2 drip lines with overhead irrigation: EC bulk soil at a **different ranch**



Soil Analyses 0-6 “ Nov 19

	4 drip surface	4 drip buried	Sprinkler, then 3 drip
chloride	0.64 meq/L	0.79 meq/L	2.74 meq/L
sodium	5.89 meq/L	7.09 meq/L	9.97 meq/L
EC sat paste	3.66 dS/m	4.21 dS/m	3.99 dS/m
sulfate	39.2 meq/L	36.3 meq/L	45.2 meq/L

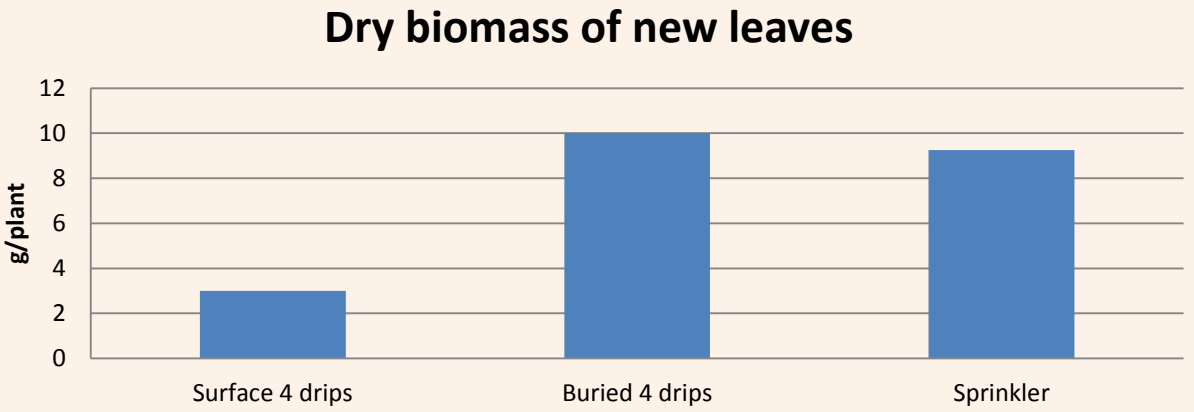
No differences in Ca, Mg, K or B, slightly heavier soil in sprinkler block

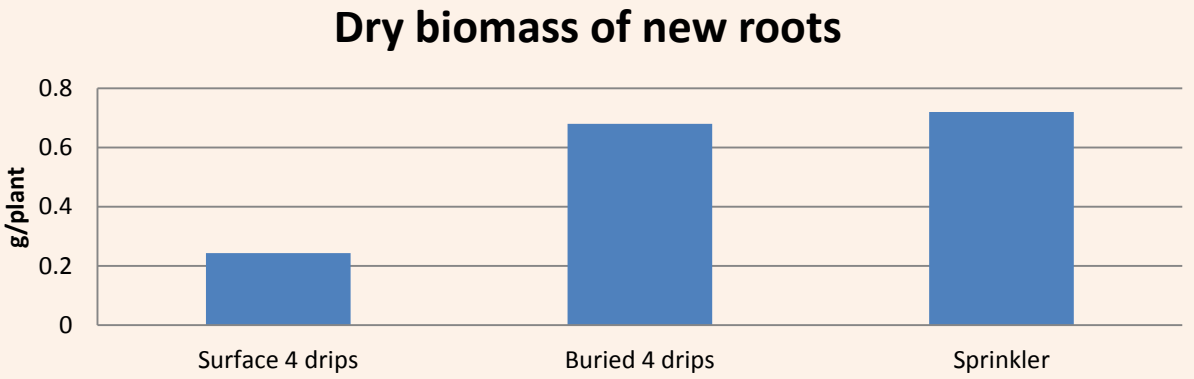
Plant Tissue Analyses, Feb 18

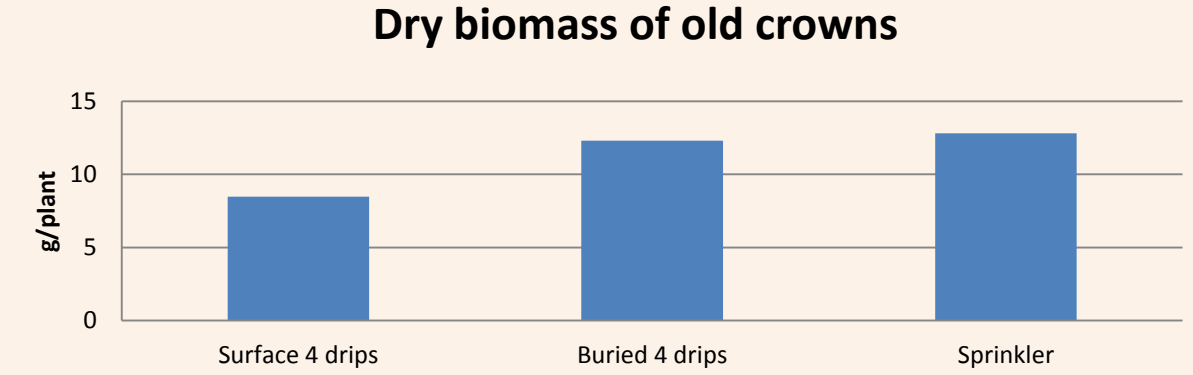
	4 drip surface	4 drip buried	Sprinkler, then 3 drip
Nitrate -N	931 ppm	668 ppm	905 ppm
Phosphate -P	2030 ppm	2040 ppm	2450 ppm
Zinc	21.9 ppm	24.1ppm	27.7 ppm
Manganese	76 ppm	109 ppm	174 ppm

No differences in Ca, Mg, K, or Fe, - slightly heavier soil in sprinkler block

Plant dry biomass, Dec 12







Nov 26, 2014 canopy size

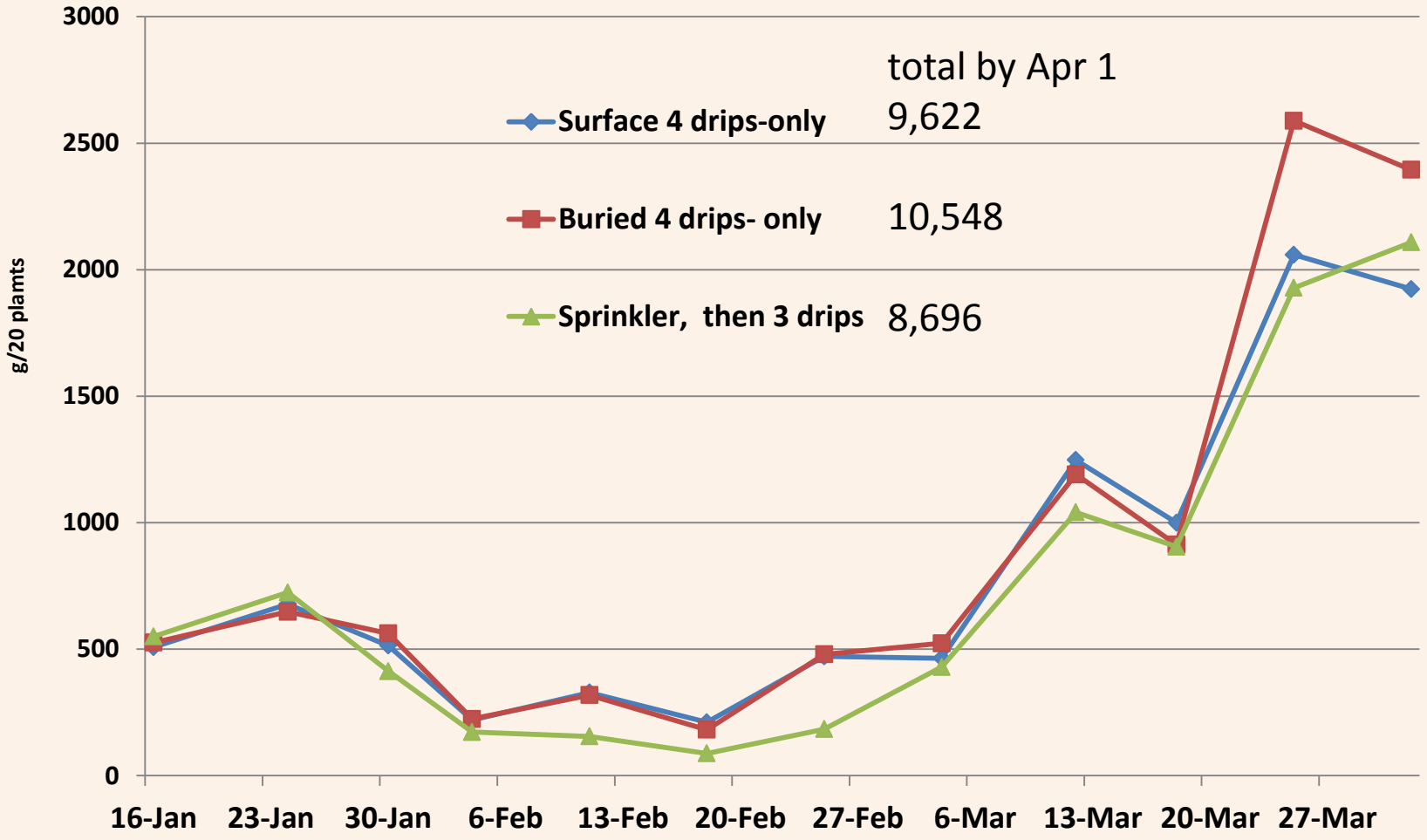
Surface 4 lines (22% smaller)

Buried 4 lines

=

Sprinkler

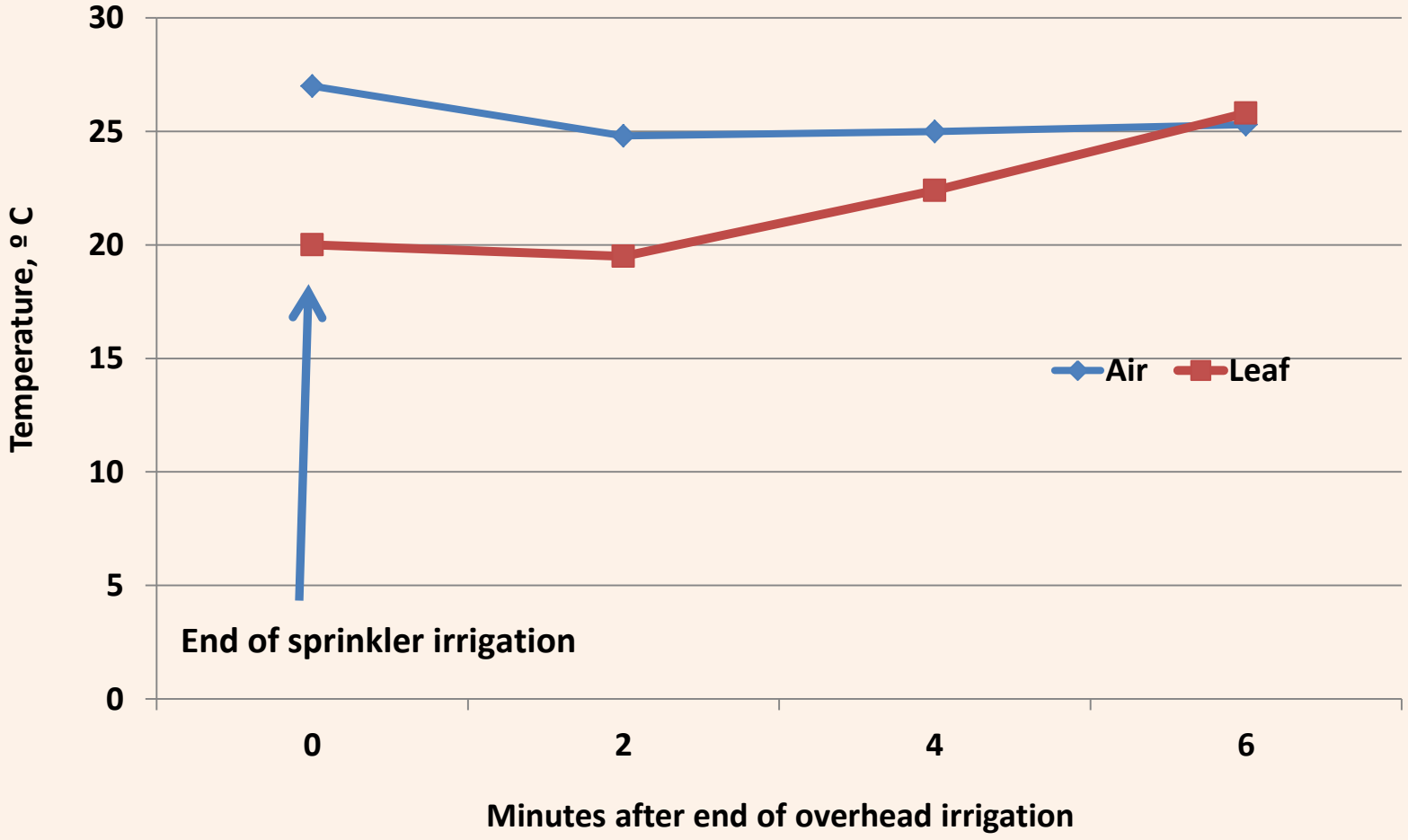
Marketable fruit yield- Oxnard

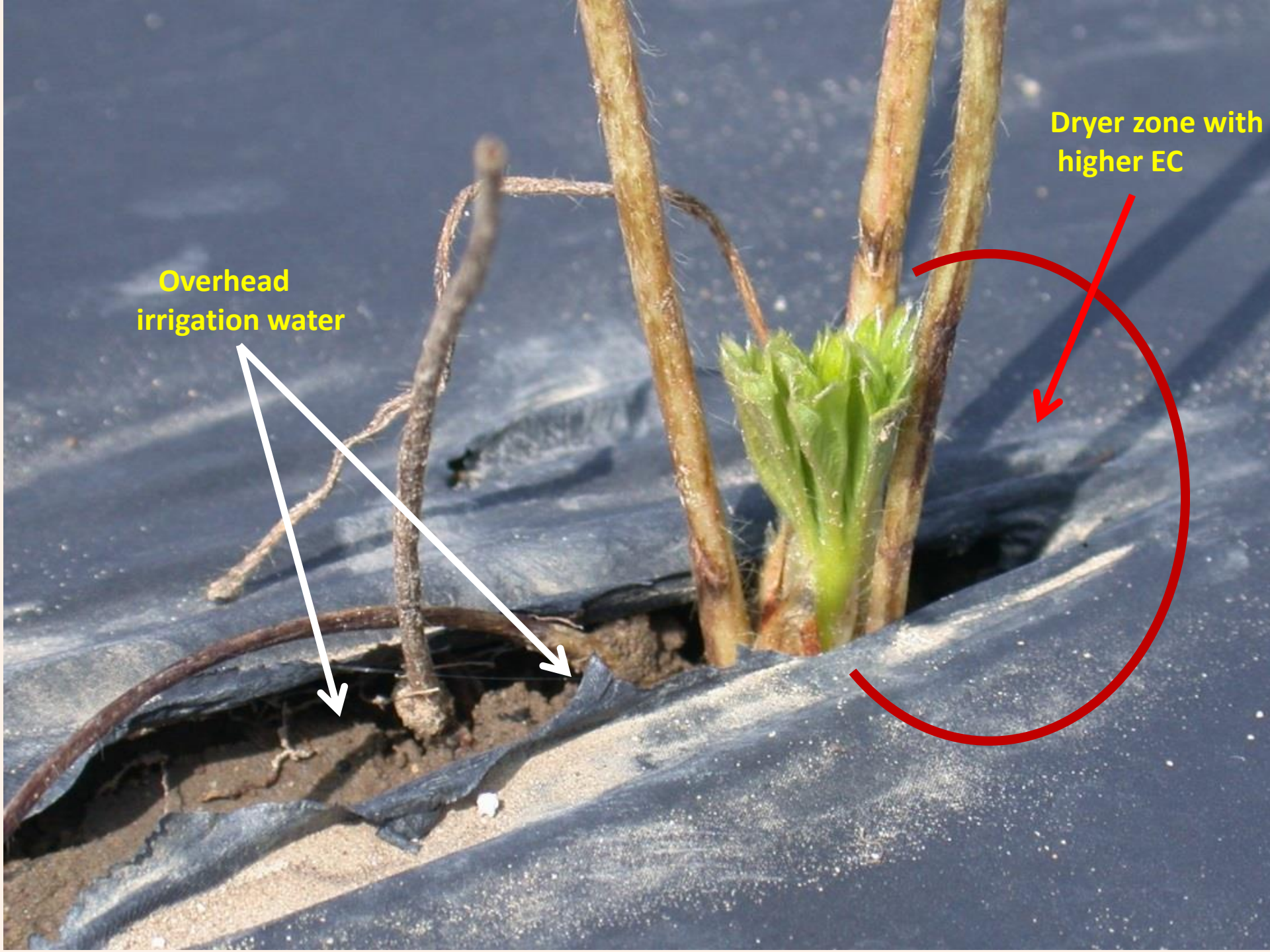


Water use/acre by Nov 12 (before removal of sprinklers):

- **4-DRIP block:** 11, 200 gal (by drip) + 4, 060 gal (2 sprinkler runs during Santa Ana conditions, 1st week of Nov) = **15,260 gal**
- **SPRINKLER block: 47, 250 gal** (collected by cans)

Plant temperature during Santa Ana winds




Dryer zone with higher EC
Overhead irrigation water

Santa Maria:

2 or 4 drip lines with reduced or regular sprinkler irrigation

Plant size or biomass: **Similar, except smaller plants in 4 lines+regular sprinkler**

Bulk soil EC and moisture in root zone: Similar

		0-12" Apr 9th		
	loam	loam	sandy loam-loam	sandy loam
	4 lines reduced	**4 lines regular**	**2 lines regular**	**2 lines reduced**
EC sat paste dS/m	4.16	3.83	4.82	3.72
Chloride, meq/L	2.82	3.23	4.12	2.89
Sodium, meq/L	9.1	9	10	8
Sulfate, meq/L	41	35	38	28
Potassium, meq/L	1.6	1.6	1.7	1.9

10 April ’14

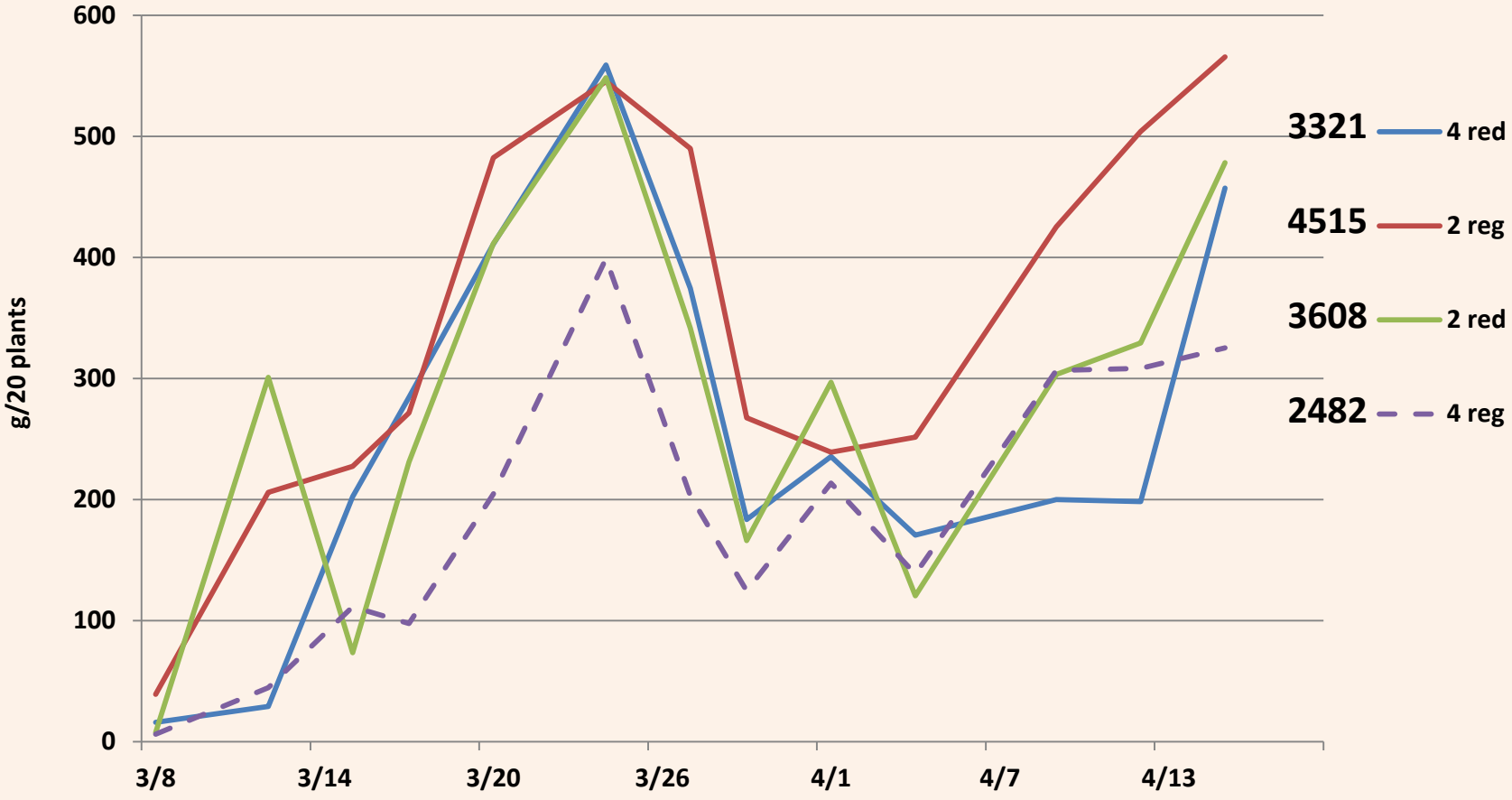
4 lines reduced

4 lines regular

2 lines reduced

2 lines regular

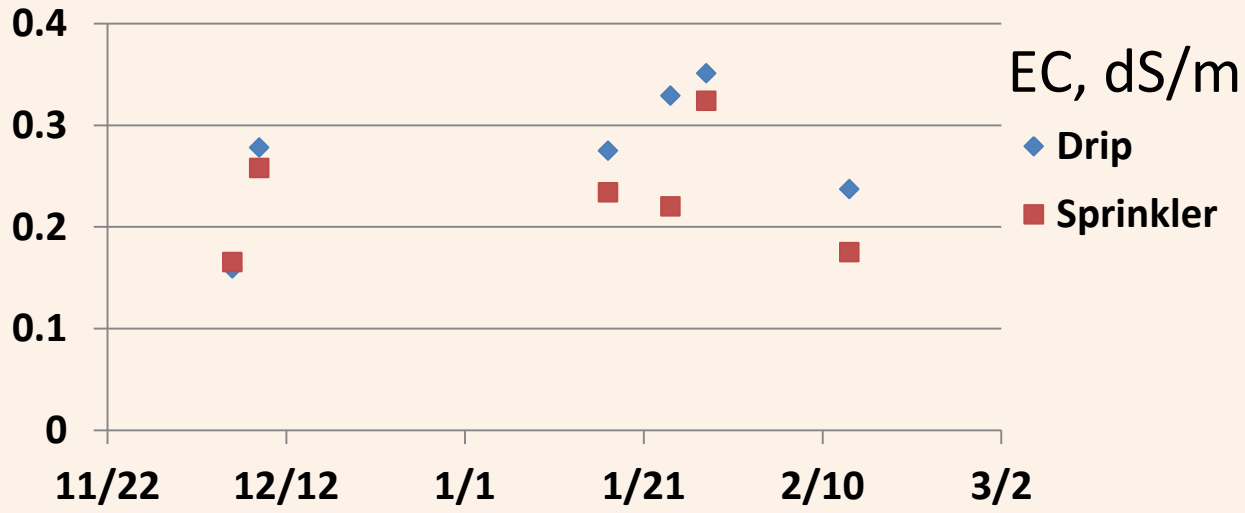
Santa Maria: fruit yields



Watsonville:

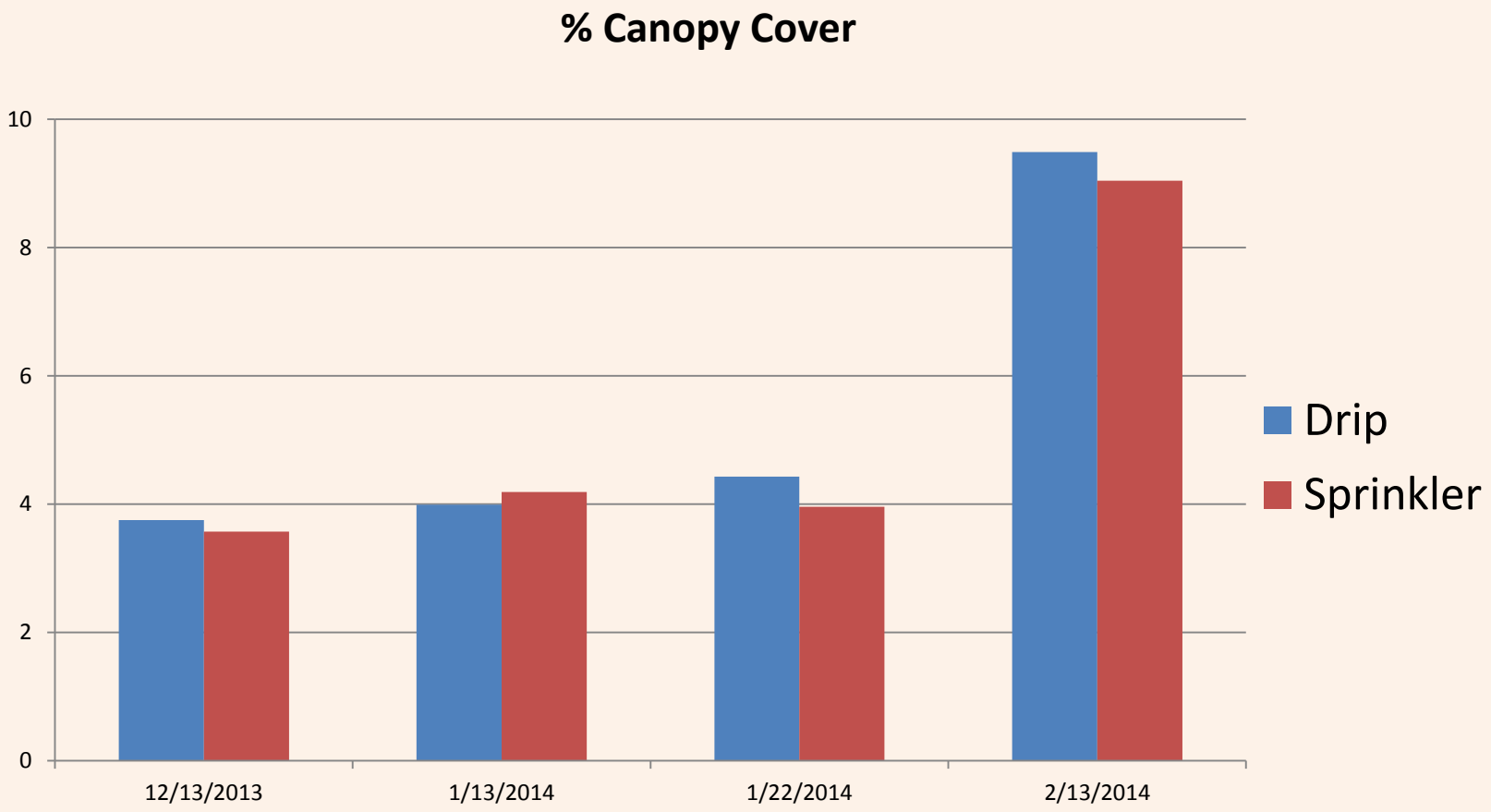
2 drip-only vs sprinkler + drip

- Water savings: 21%
- Plant biomass: similar, but more roots in drip-only
- Electrical conductivity:



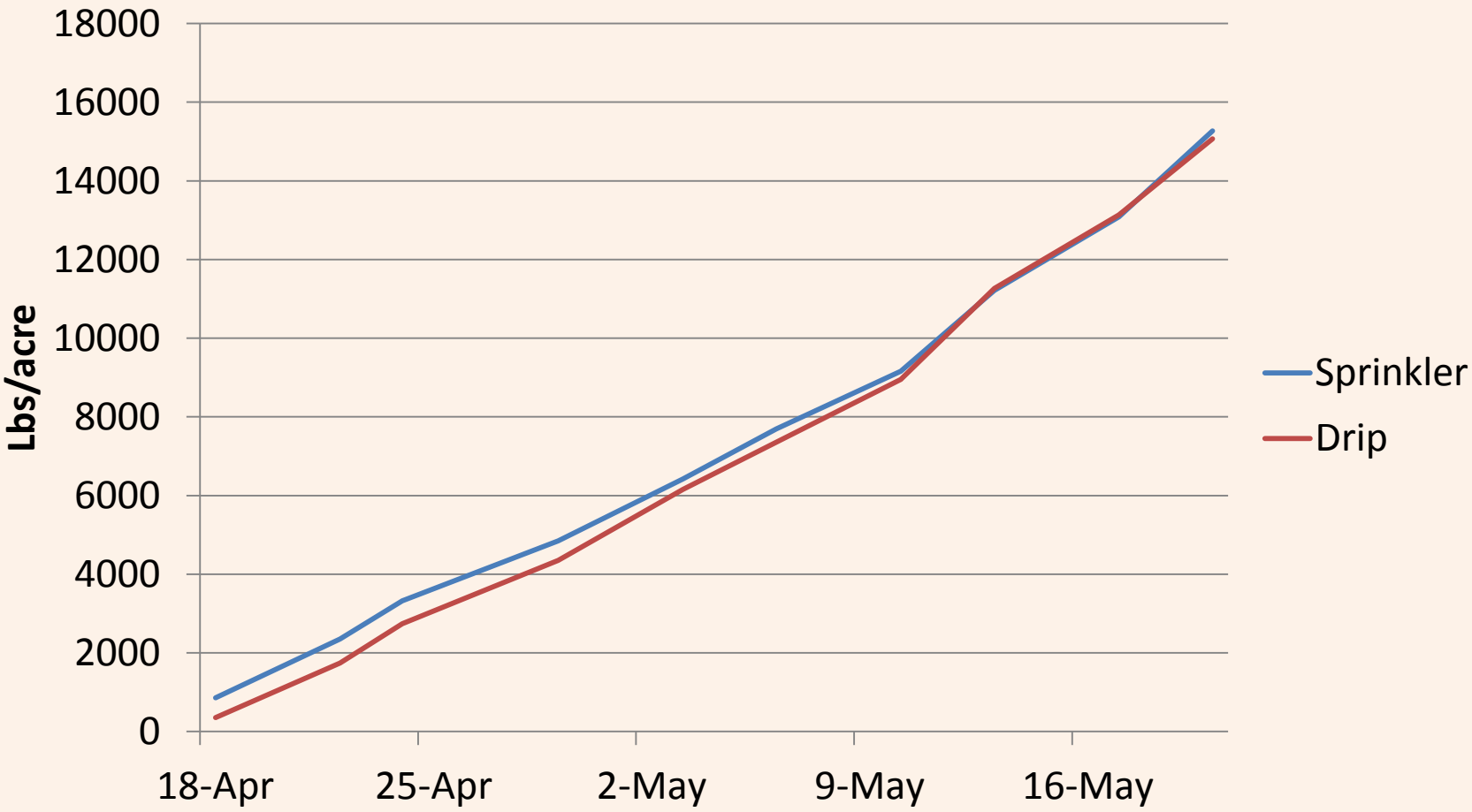
- Soil Moisture: similar

Watsonville:



Watsonville:

cumulative fruit yield



Summary

- Additional drip lines hydrate root zones and leach salts effectively (may leach N)
- Conserve water and prevent runoff with no negative effect on yield
- Sprinklers needed but amount of overhead water can be minimized
- Need to document fumigation improvement with additional drip lines

Acknowledgements:

- Dole (Watsonville), Manzanita Berry Farms (Santa Maria), and Ito Bros. (Oxnard), Solimar Farms (Camarillo)
- California Strawberry Commission