Use of Kocide 3000 and a Tower Sprayer in a Fire Blight Management Program

Chuck Ingels
UC Cooperative Extension, Sacramento County

Cooperators:
Jim Adaskaveg, UC Riverside
Franz Niederholzer, UCCE Sutter/Yuba Counties
Thom Wiseman, Lyman Group, Inc.
Ria DeBiase, field assistant

Funding: Calif. Pear Advisory Board

Background

- Streptomycin resistance widespread in Calif.
- Most copper formulations cause russetting
- Kocide 3000 has reduced MCE (30%), “more bio-active copper”
- Dithane, Manzate Pro Stick reduce blight, reduces russetting (?)
- Many growers now use Kocide 3000 (0.5 lb./A) + Manzate Pro Stick (3 lbs./A) season-long
- Copper resistance potential

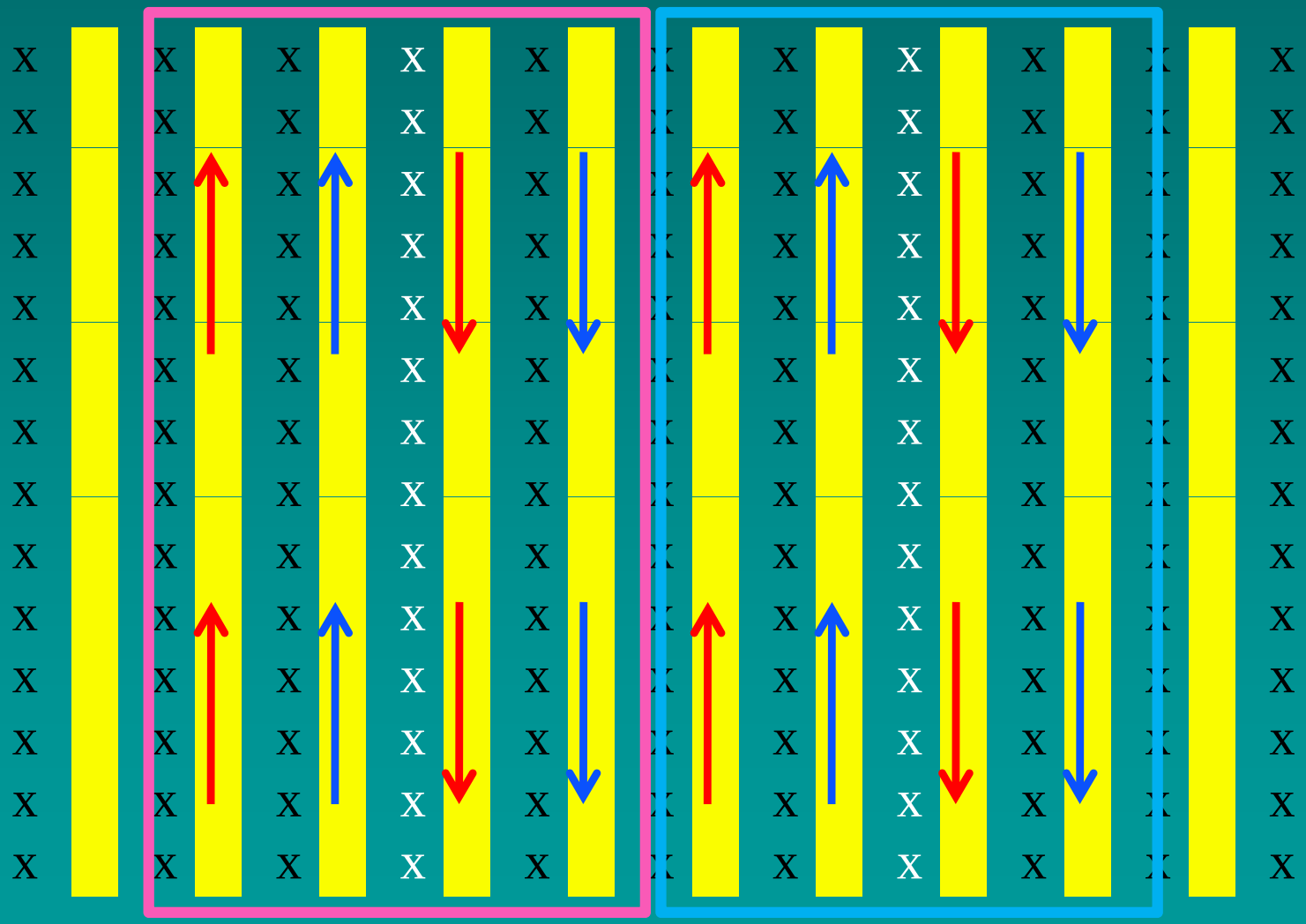
Trial Protocol

- RCB, 4 reps, alt. row spraying
- Treatments:

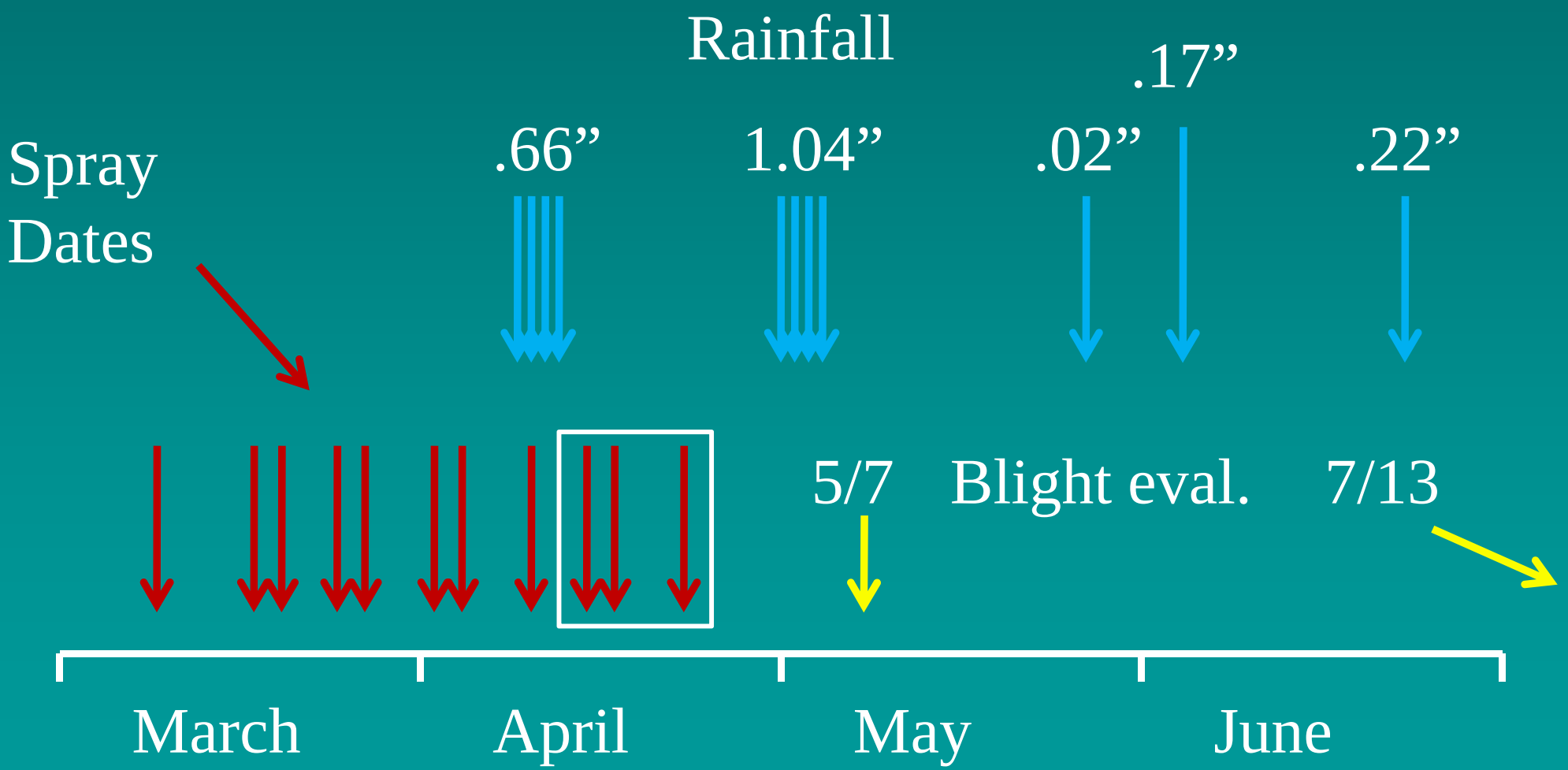
1. Mycoshield (1.0 lb./acre), season-long
2. Kocide 3000 (0.5 lb./acre) + Manzate Pro Stick (3 lbs./acre), season-long
3. Kocide 3000 + Manzate Pro Stick up to April 8, Mycoshield April 14 through April 21
4. (15 untreated trees – nearby point rows)

Layout of Two Plots

Alt. Row Spraying, Data from Center Row



Season Timeline



Mean No. of Blight Strikes / Tree

Treatment	May 7	July 13
Mycoshield	0.11 a	1.52 b
Kocide + MPS	0.27 a	0.62 c
Kocide + MPS, then Myco	0.21 a	1.73 a

P = 0.05, Tukey's HSD (May 7 sig. diff. at P = 0.06)

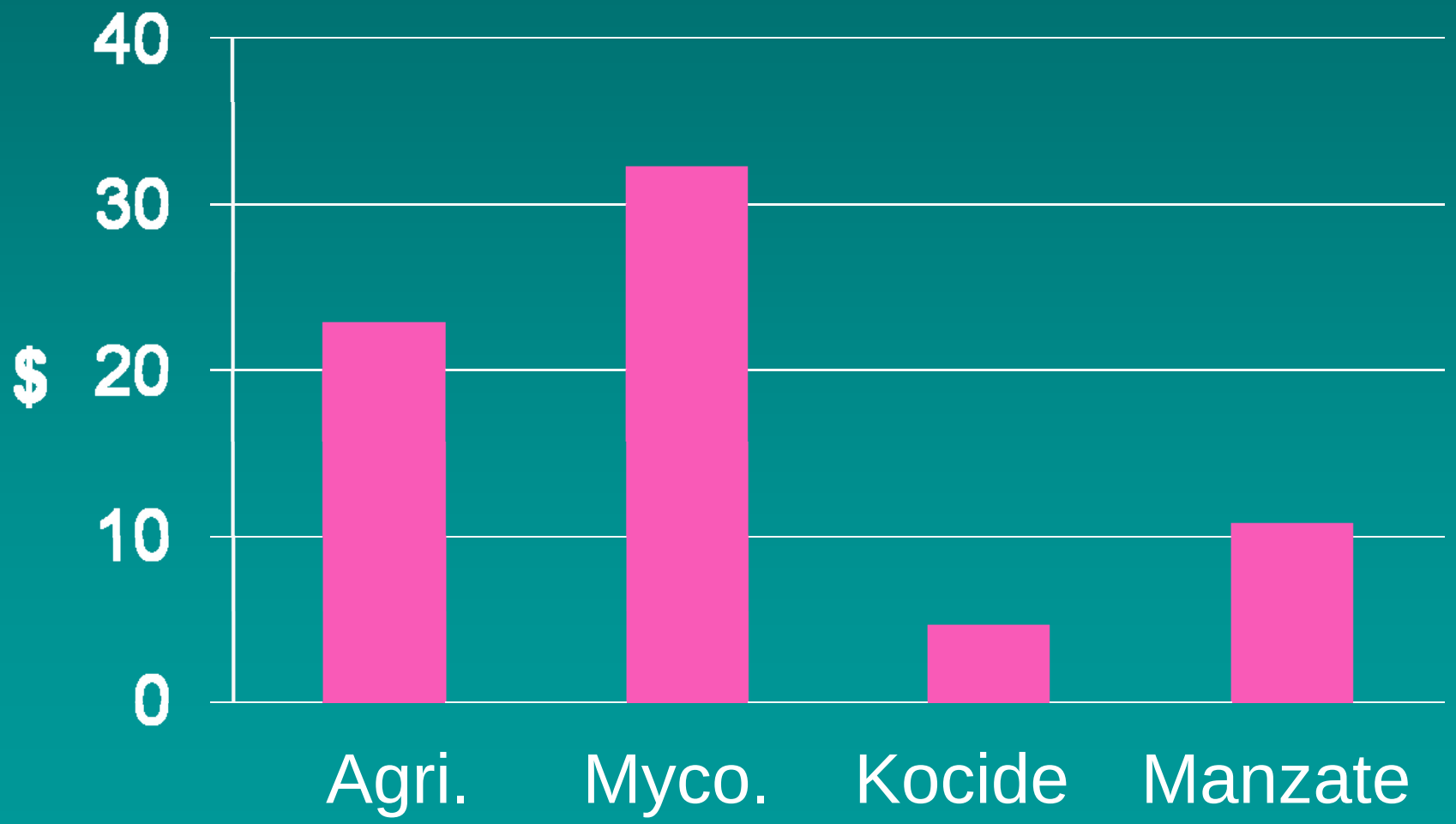
Percent Russetting

Treatment	May 7
Mycoshield	1.06 a
Kocide + MPS	1.09 a
Kocide + MPS, then Myco	0.69 a

P = 0.05, Tukey's HSD

Cost Comparison

Amount per Full Application



Standard vs. Tower Sprayer

Tower vs. Standard Sprayer

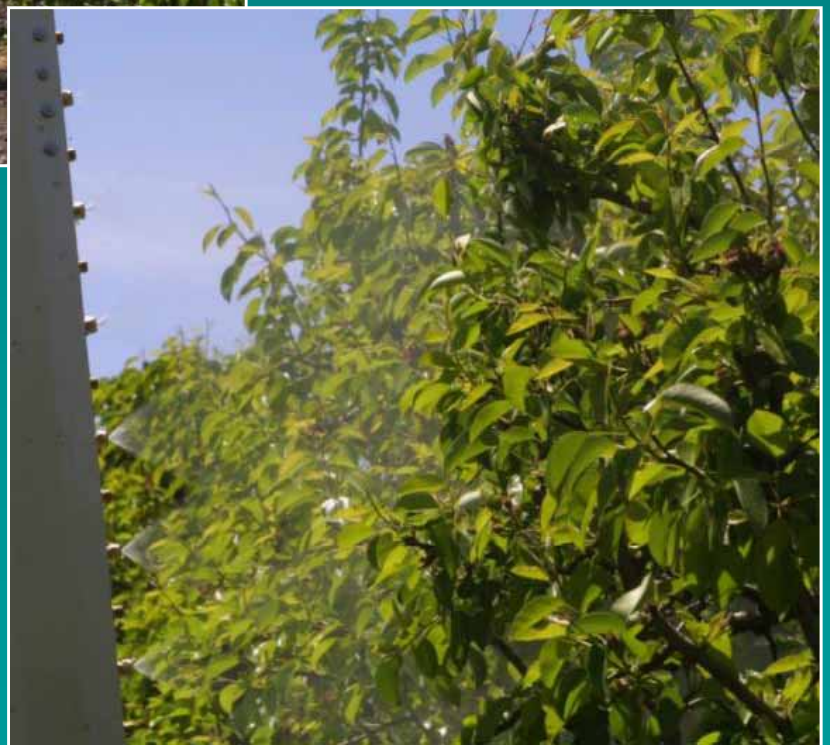
- Standard sprayers: Unequal distribution of pesticide in tree canopy – more in lower portion of tree
- Tower best for high-density orchards
- Most Calif. orchards – branches in the way
- Increased efficiency, reduced drift, improved coverage, reduced gallonage and a.i.

Two Tower Sprayers

LectroBlast Electrostatic Sprayer

Blueline Accutech Sprayer

Turbo-Mist Tower Sprayer (Slimline Mfg., Canada)



Orchard and Sprayers Used

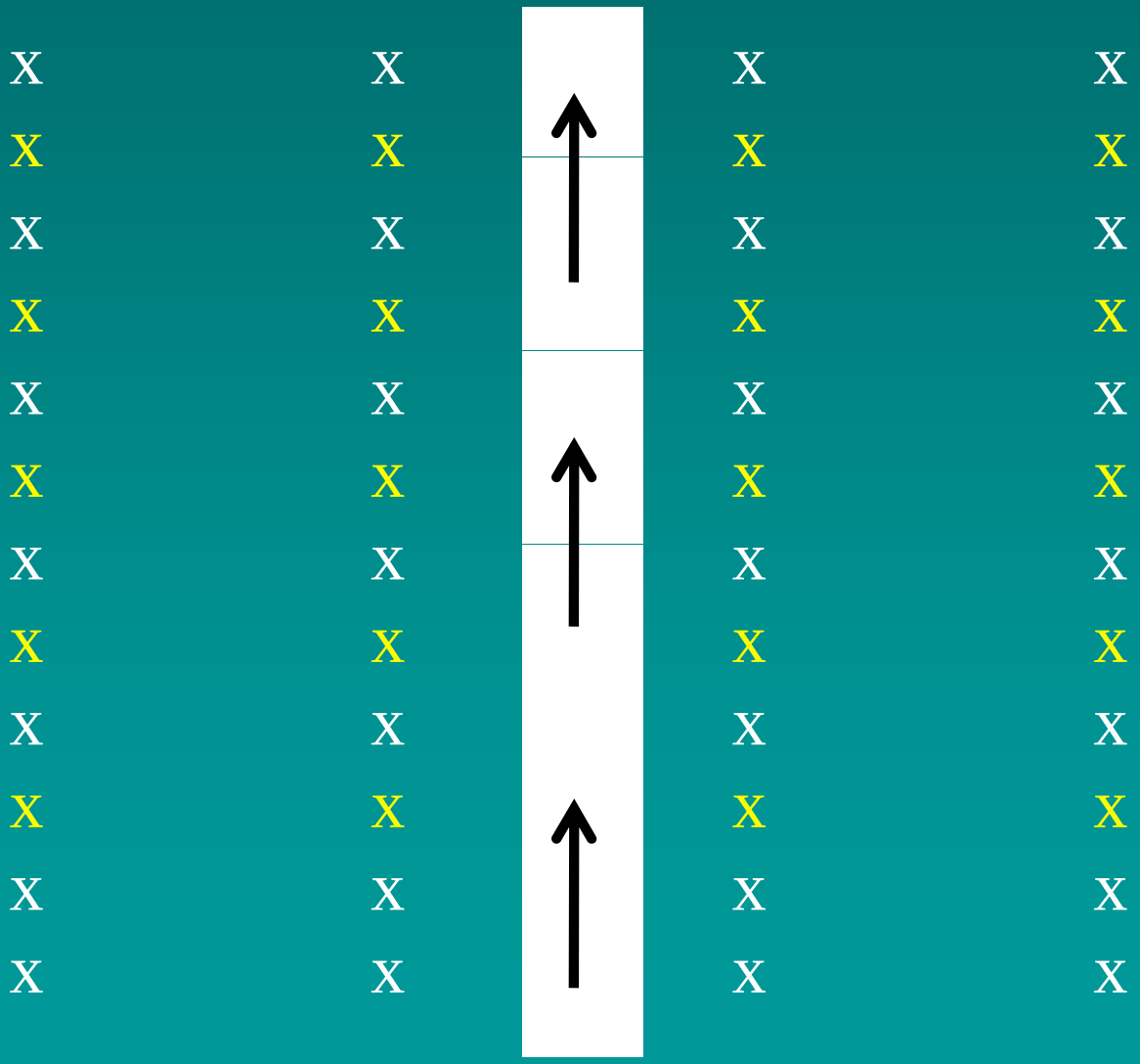
- Orchard 16’ x 10’, canopy 10’ to 11’ wide
- Tractor: FMC 352, Sprayers: PTO driven
- Turbo-Mist tower sprayer – Slimline Mfg., (150 psi)
- Axial fan sprayer –
  - Air-O-Fan (175 psi)

Protocol

- Sprayed water in two tests (May 5, May 18)
- Sprayed down single row, spraying E & W
- Std. sprayer 100 gpa, tower sprayer 80 gpa
- Wind: May 5 – 0-5 mph, May 18 – 0-7 mph
- 2” x 3” water-sensitive cards at 5’ & 10’
- Std. sprayer dry new cards in identical location tower sprayer

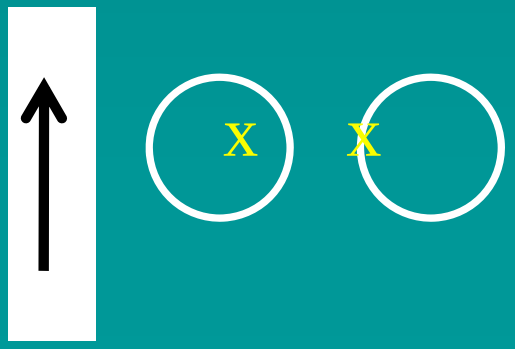
Spray Card Setup

May 5



- Cards on clips at 5’ & 10’ on PVC poles
- Adjacent rows: beyond row ctr.
- 2 rows over:

  at canopy edge



Spray Card Coverage (%)

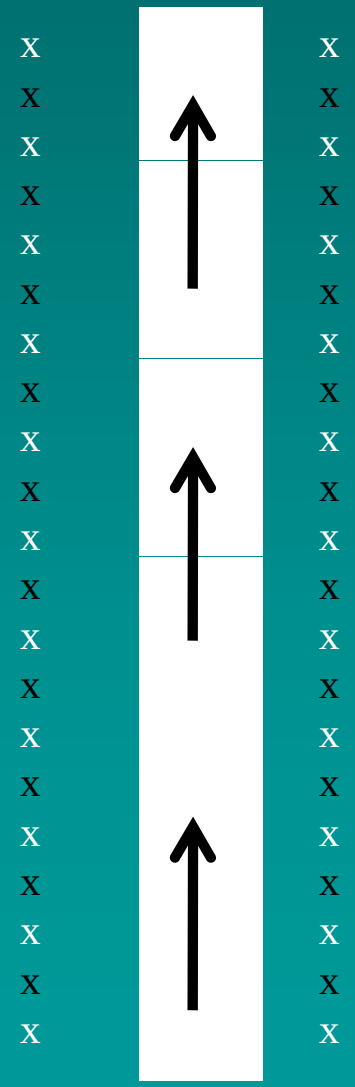
May 5

Ht.	Type	Downw. Row 2	Downw. Row 1	Upw. Row 1	Upw. Row 2
10 ft.	Std.	9.6 a	9.7 a	0.6 a	0.0 b
	Tower	7.5 a	12.8 a	4.2 a	9.4 a
5 ft.	Std.	1.2 a	28.1 b	2.7 a	0.1 b
	Tower	17.4 a	57.7 a	14.8 a	6.7 a

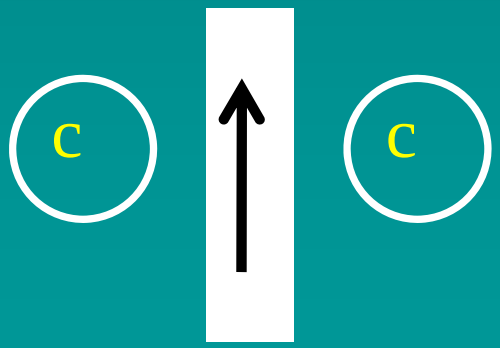
P = 0.05, Tukey's HSD

Spray Card Setup

May 18



- Cards on clips at 5’ & 10’ on PVC poles
- Adjacent rows: in row centers



Spray Card Coverage (%)

May18

Ht.	Type	East Row	West Row
10 ft.	Std.	11.9 a	14.0 a
	Tower	21.2 a	8.3 a
5 ft.	Std.	67.3 a	32.3 b
	Tower	72.2 a	65.1 a

P = 0.05, Tukey's HSD

Finding Cost-Effective Weed and Nutrient Management Practices in Organic Pear Orchards

Chuck Ingels, UCCE Sacramento County
Tom Lanini, UCD Plant Sciences Dept.
Karen Klonsky, UCD Ag. & Resource Economics
Ken Shackel, UCD Plant Sciences Dept.

Grower Cooperator: Chris Frieders

Past Survey Results

Surveys of organic growers in WA & CA: Weed control, soil fertility are two of the top production challenges in organic tree fruit production

Experimental Methods

Trial Started Oct. 16, 2008

- Uniform Bosc block, 18’ x 10’ (242), planted 2001
- RCB design, 7 treatments, 5 reps
- Plot size: 6 trees/rep (sample middle 4 trees)
- All 7 treatments down each row

Treatments

Applications Oct. 16-22, 2008

1. In-row mowing, no N fert.
2. In-row mowing, chicken (2 T/A [120 lbs. N])
3. In-row mowing, chicken (4 T/A [240 lbs. N])
4. In-row mowing, feather (0.5 T/A [120 lbs. N])
5. Landscape fabric + chicken (4 T/A)
6. Wood chips + chicken (4 T/A)
7. Herbicide strip + chicken (4 T/A)

In-Row Mower and Occasional Damage

Herbicide

Vinegar

- 20% acetic acid (30% vinegar + water [2:1]) + org. surfactant (NuFilm P), 0.5% v/v

GreenMatch (Marrone Bio Innovations, Davis)

- Lemongrass extract, 10% solution

- Spray volume 75 gal./treated acre
- Application dates:
  - Oct. 22 (V), Nov. 5 (V), Nov. 19 (V), Feb. 10 (GM), and June 23 (V)

Herbicide

10/22/08

11/5/08

Vinegar

Applied 10/22, 11/5

11/5/08

11/25/08

Wood Chips

- 5 ft. strip, 6 in. deep
- 226 yds./acre (nearly 1 yd./tree)

Wood Chips

Landscape Fabric

- 3 ft. wide per side, overlapped ~8 in. (~5 ft.)
- Pins placed every 2-3 ft.
- Lasts 8-10 yrs.(?)

Landscape Fabric

Organic Fertilization

Chicken Manure

- Usually with wood shavings, rice hulls
- 3.2% N, 1.7% P, 2.7% K
- N: 120 lbs./A ÷ 0.03 = 2 T/A
- Smell, NH_4 volatilization are major issues

Chicken Manure

Organic Fertilization

Feather Meal

- Often-used N source (avg. 12% N)
- Pelleted; slow release through season
- 11% N, 2% P, 0.5%K
- N: 120 lbs./A ÷ 0.12 = 0.5 T/A
- Little smell, little NH_3 volatilization

Feather Meal
(Pelleted)

Feather Meal
(Pelleted)

Before irrig.

After 12 hrs.
sprinkler irrig.

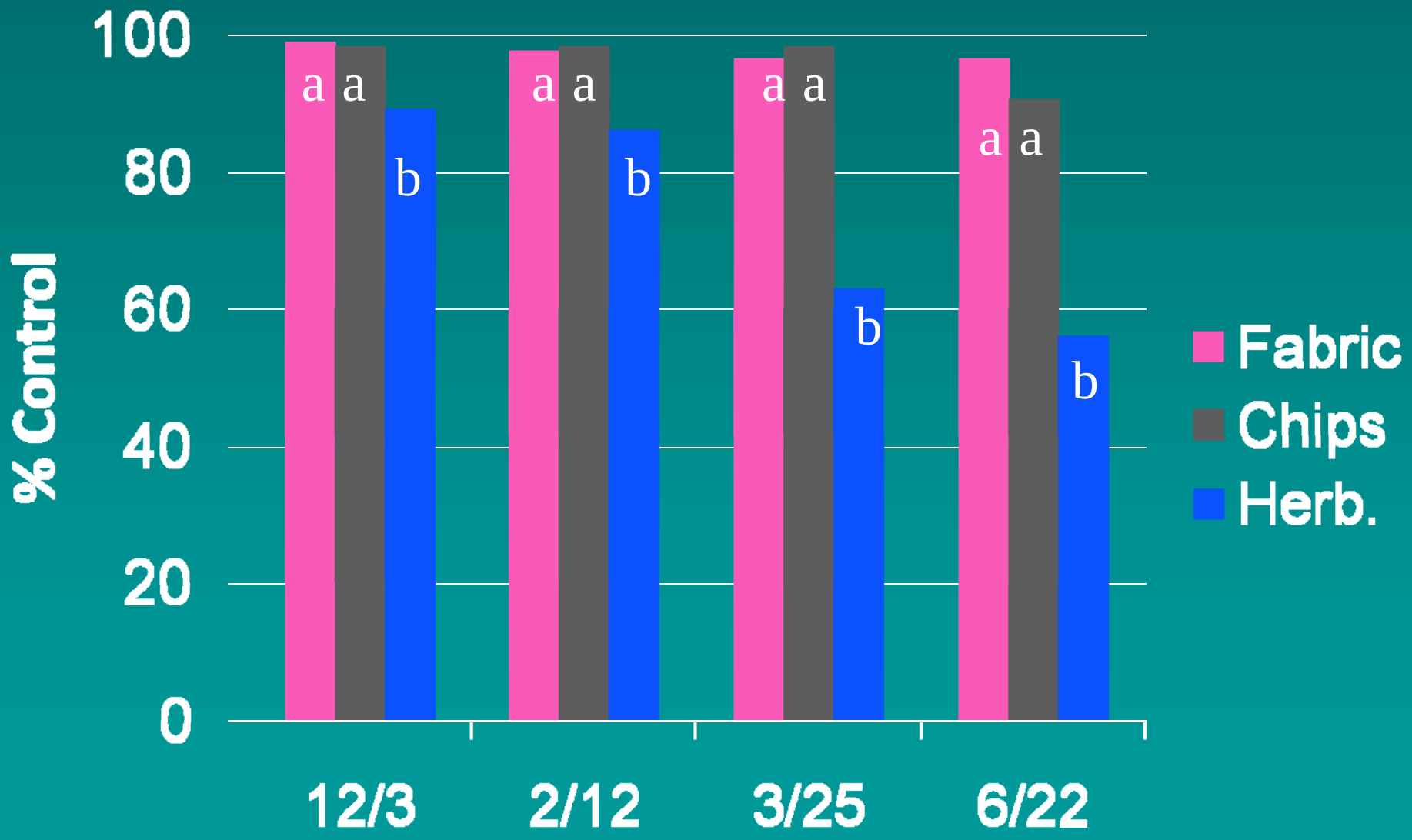
Results – Year 1

No Significant Differences for These

- Yield (29-30 T/A)
- Fruit diameters
- Trunk cross-sectional area (growth)
- Leaf P, K, Ca, Mg content
- Most soil nutrients (0-12”, 12-24”)

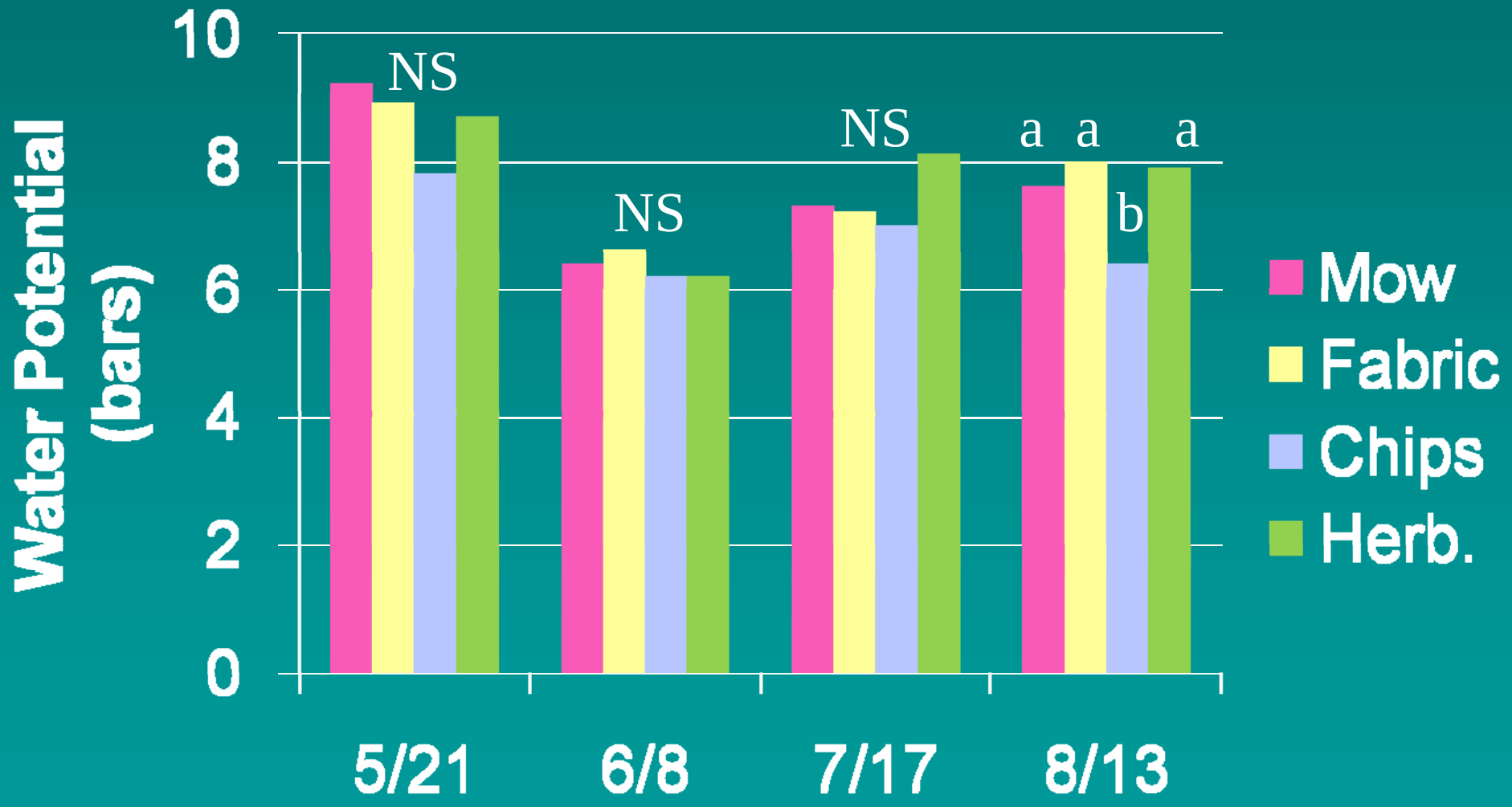
% Control of Weeds

5 Herb. Sprays (Oct. 2008 – June 2009)

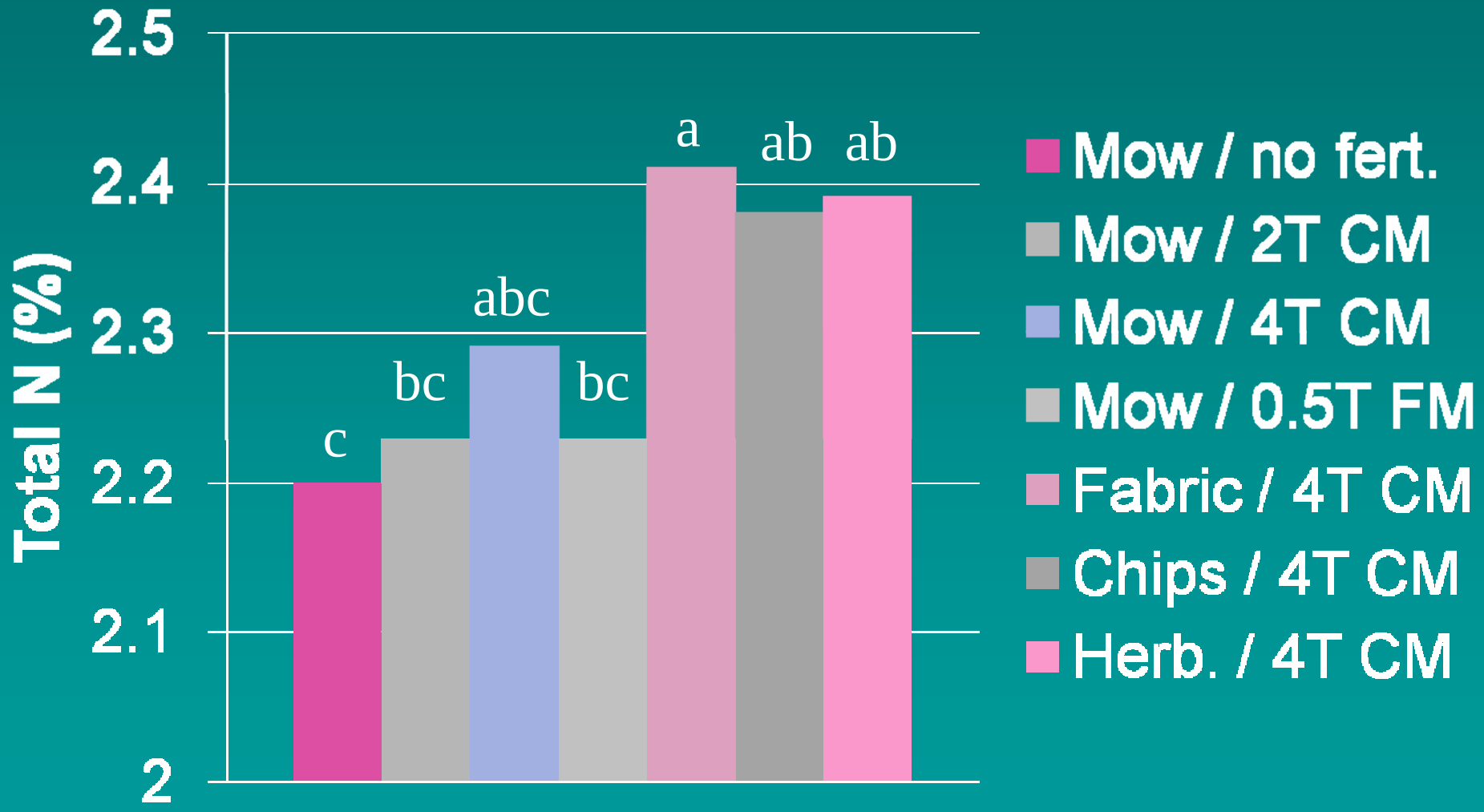


Stem Water Potential

(Tree Water Stress)

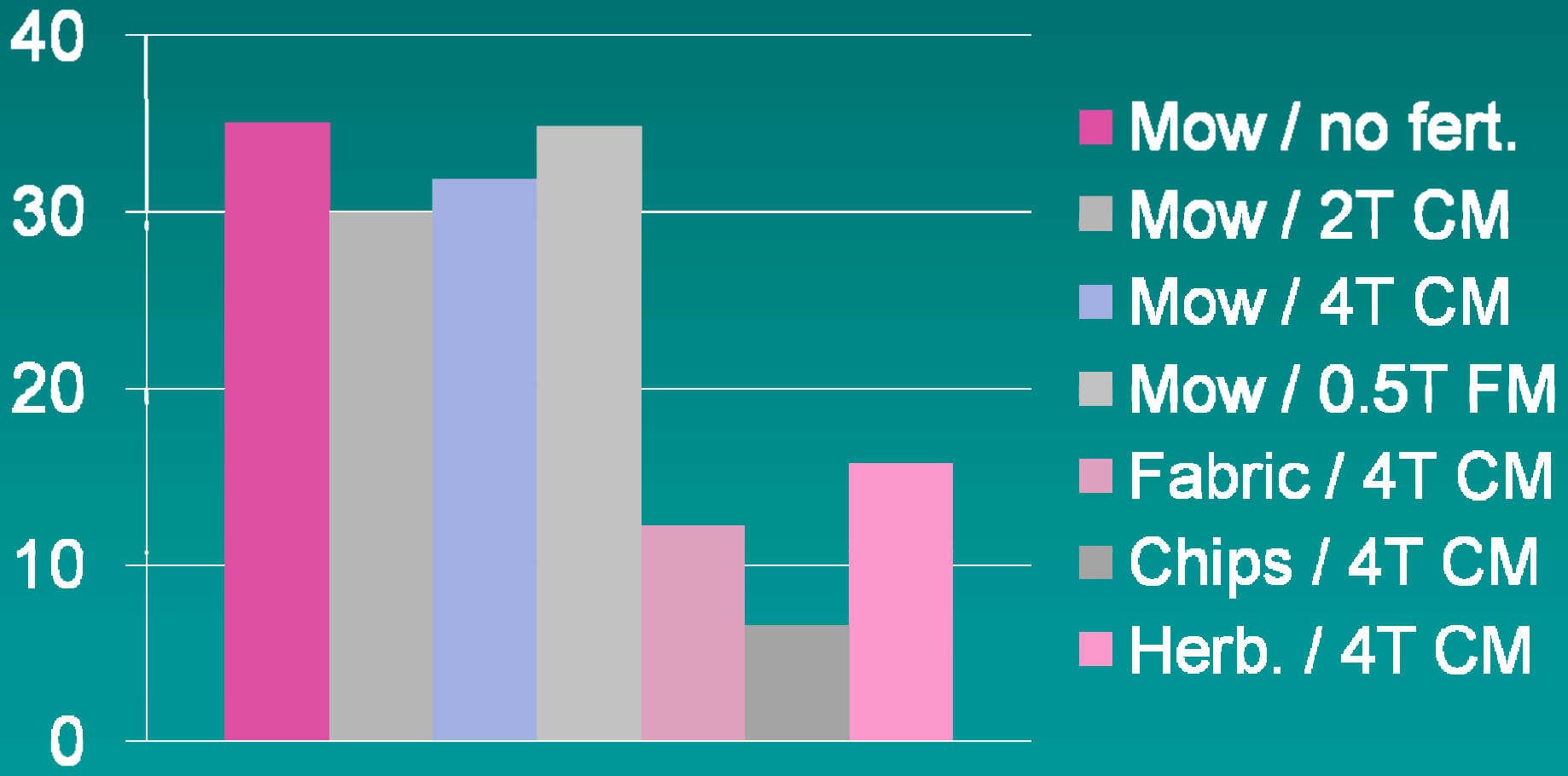


Leaf Nitrogen Content



Vole Holes

No. per 6 Trees (1 Side Only)

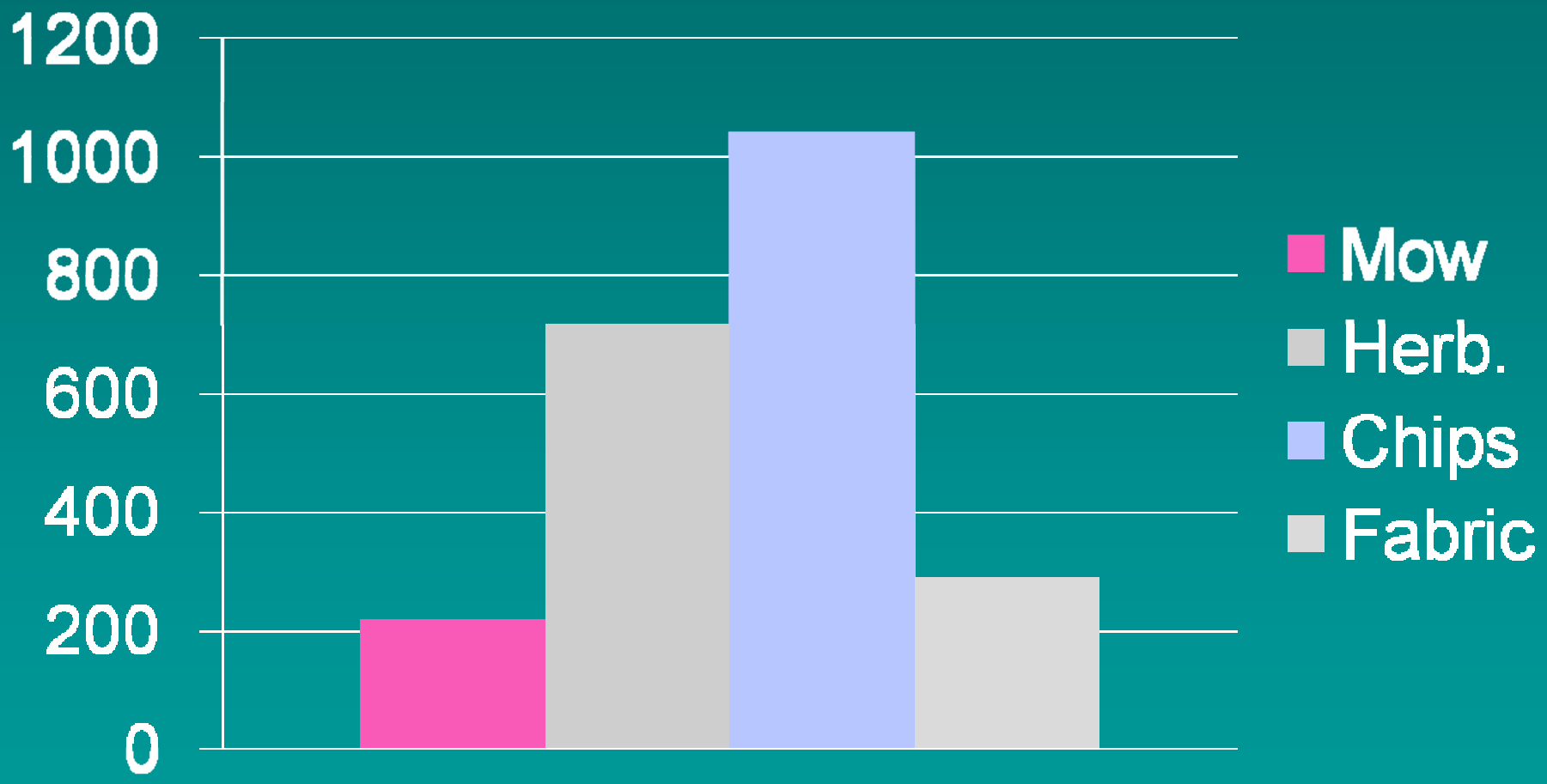


Economics
Assumptions

- In-row mowing 5 times per yr. (2 passes)
- Herbicide (GreenMatch) applied 5 times (vinegar is much cheaper)
- Wood chips – Year 1: 4”, Year 2: 2”
- Fabric longevity: 8 yrs. (amortized)
- Chicken manure – 2 vs. 4 T/A
- Feather meal – 800 lbs./A

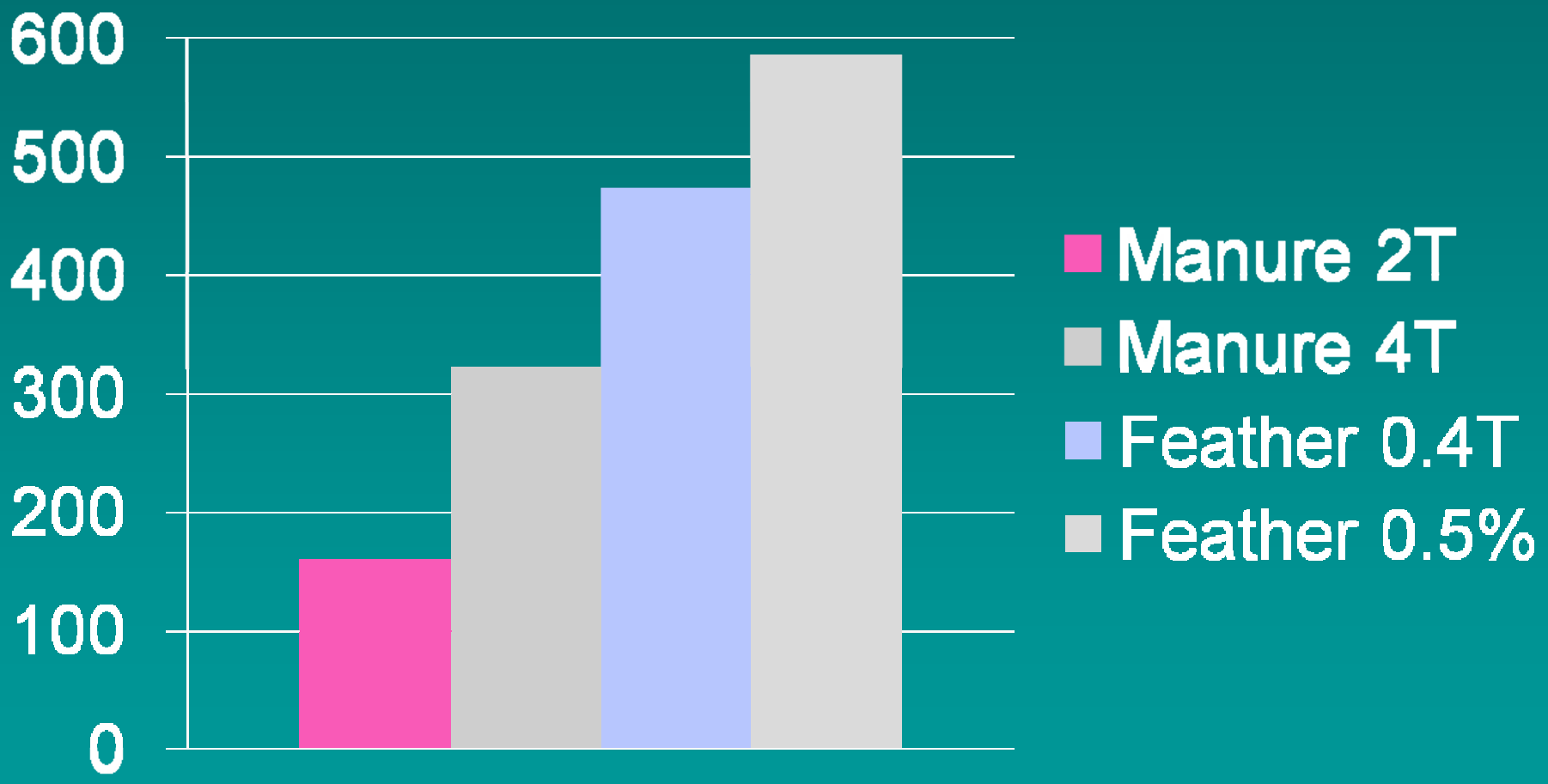
Economics – Weed Control

Total Costs / Acre / Year



Economics – Fertilization

Total Costs / Acre / Year



Conclusions

- Wood chip cost prohibitive; weeds invade
- Fabric mulch may improve fruit size, may not affect tree moisture status, and may be cost-effective (if it lasts)
- Current organic herbicides don’t work well
- Manure is cheapest but availability limited
- Organic production requires price premium
- Project to continue 2 more years (OFRF, W-SARE)