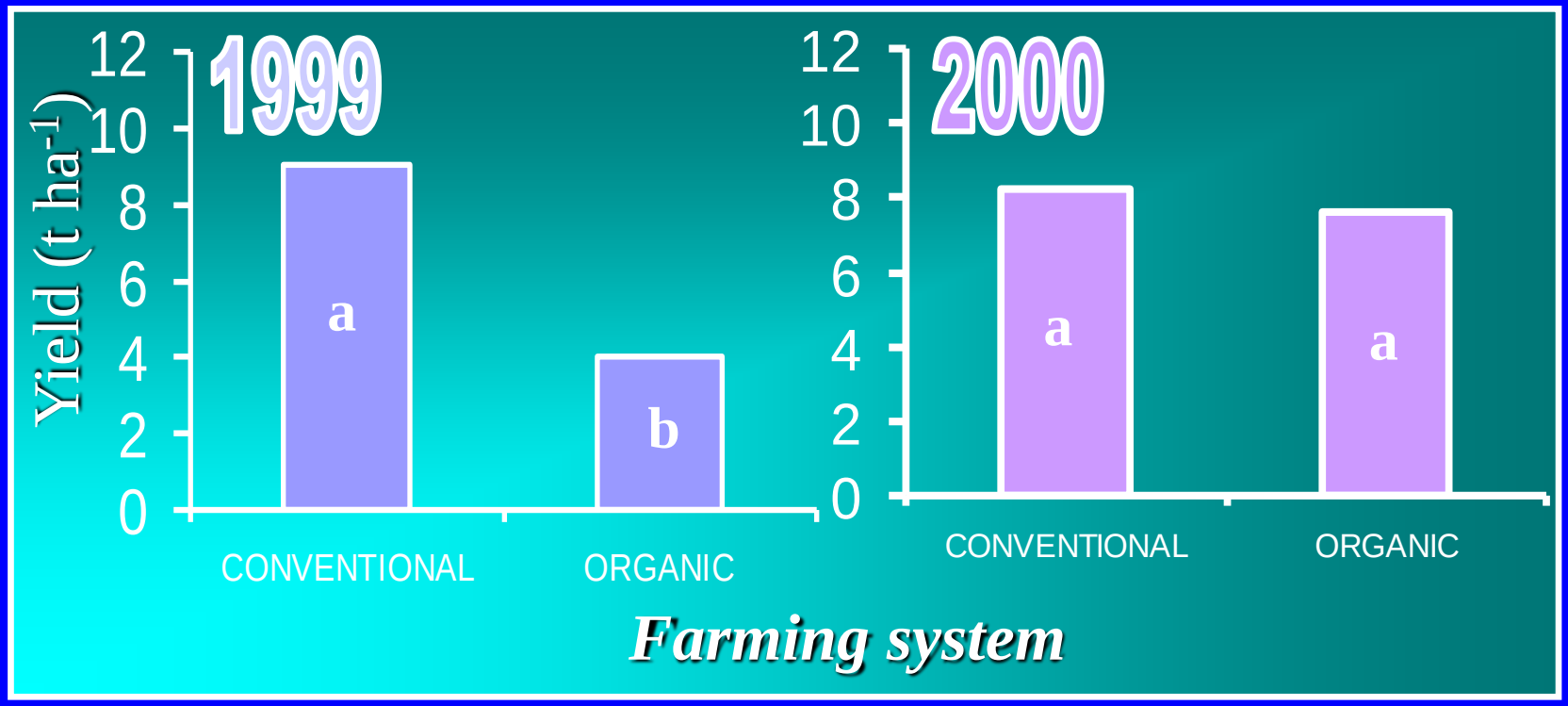
Soil Health

"the continued capacity of the soil to function as a vital living ecosystem that sustains plants, animals and humans"

WRSARE Lettuce Plots

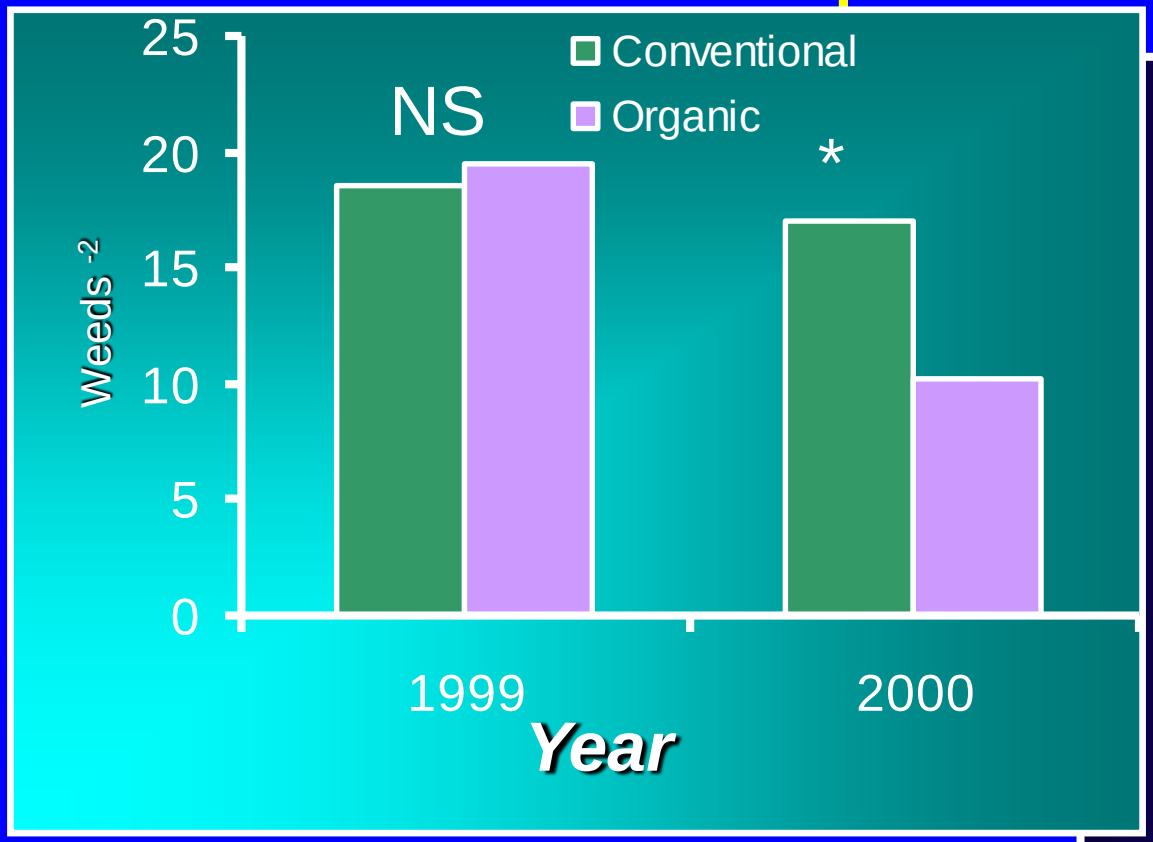
Marketable Yield



- ***Lettuce yield was lower in the organic system in 1999***
- ***Yields were similar in all systems in 2000***

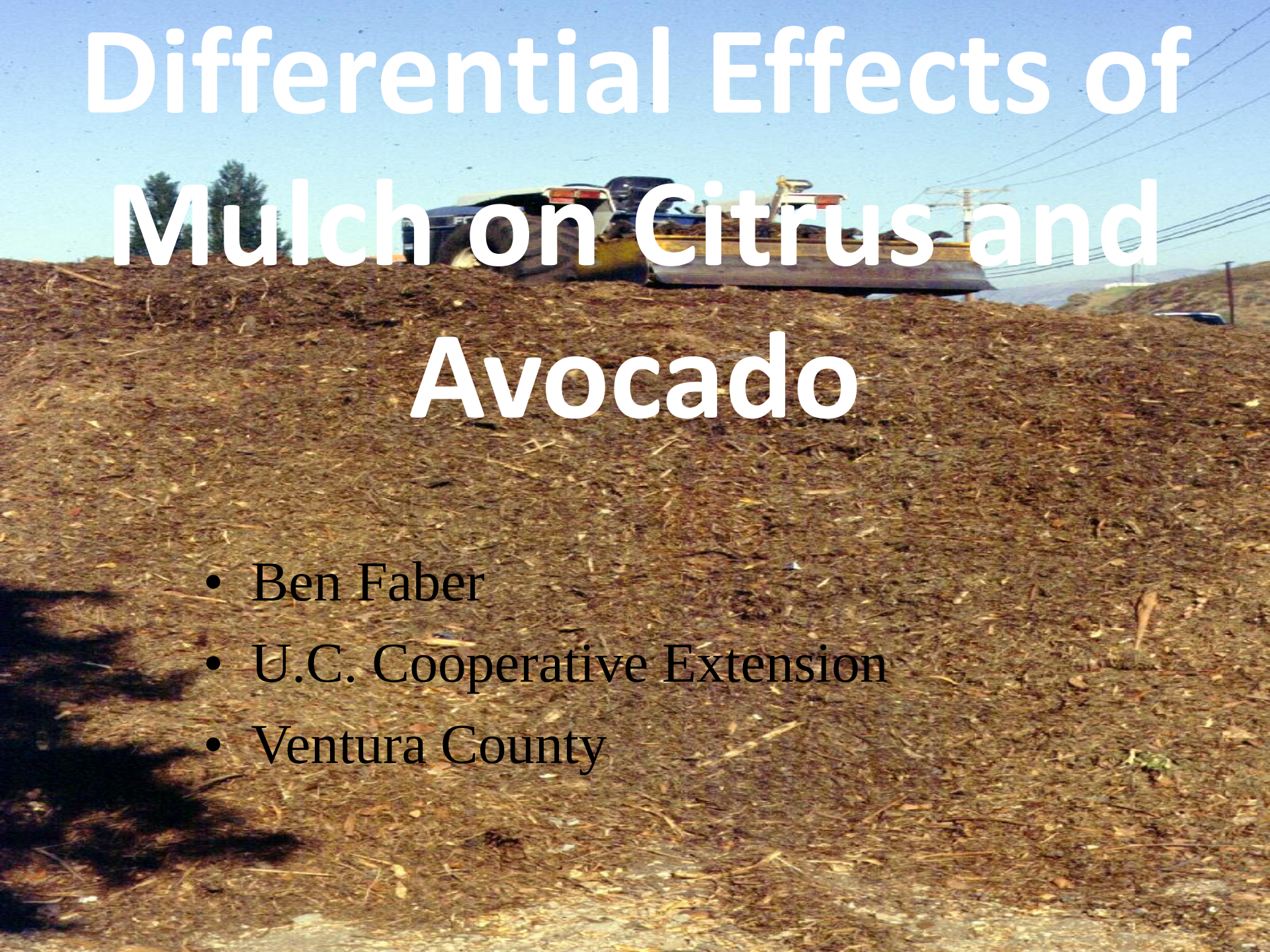
Results....

Weed Populations



- ***Weed populations were similar in 1999***
- ***Less weed in the organic plots in 2000***

Differential Effects of Mulch on Citrus and Avocado



- Ben Faber
- U.C. Cooperative Extension
- Ventura County

Mulch = covering spread on the ground to prevent evaporation, enrich soil, prevent erosion, etc
Can be straw, paper, rocks, plastic!!!!

Compost is usually too expensive to be used


• Disease suppression
• Water savings
• Nutrients
• Weed suppression
• Arthropod effects
• Snail effects
Multiple Effects from Mulches


With yardwaste mulch
Organic Matter – OM –
is being added with
its attendant impacts on
Soil texture
physics
chemistry
microbiology

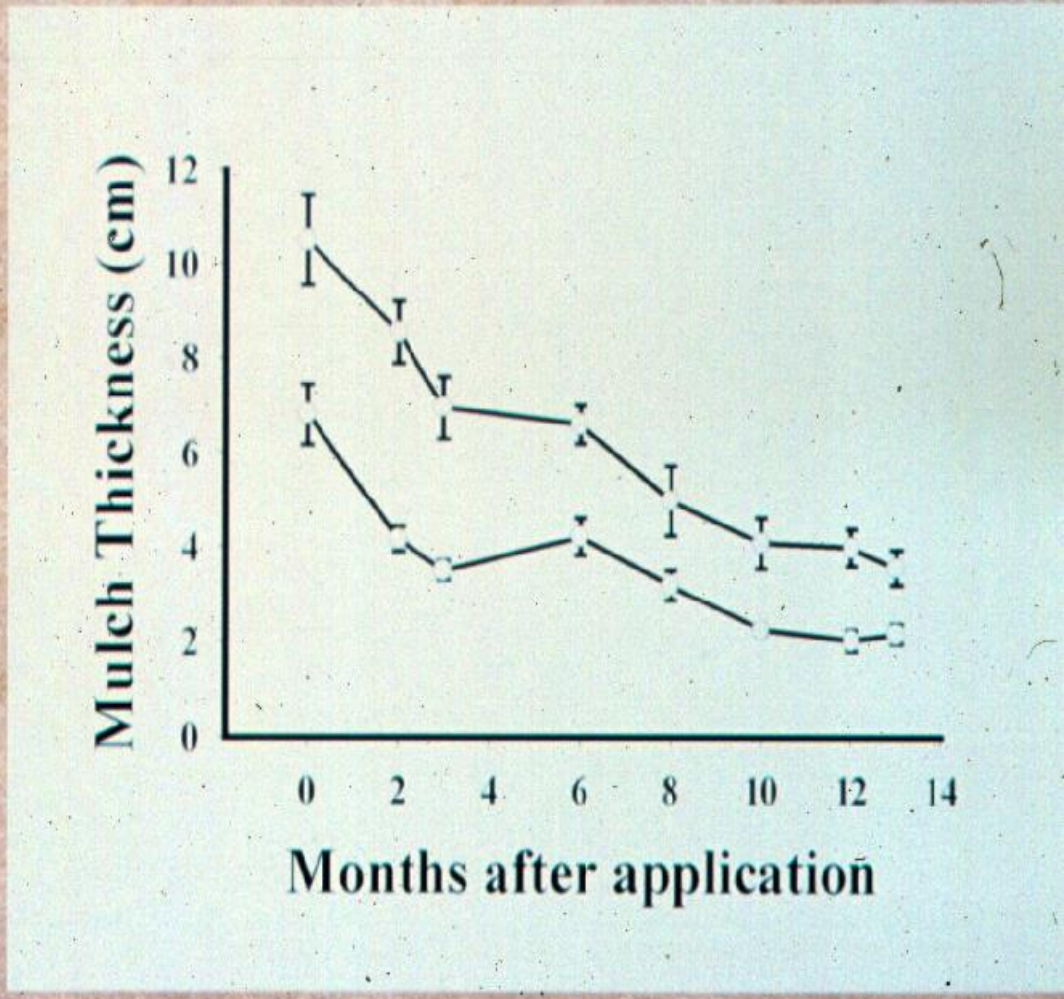
Sometimes the effects are dramatic, and immediate

But more commonly it takes time

Mulch Thickness deteriorates over time

- Decay in the first few months is due to settling. Stable decay rates occur in later months.

- For maximum weed prevention 6 month reapplication intervals are best



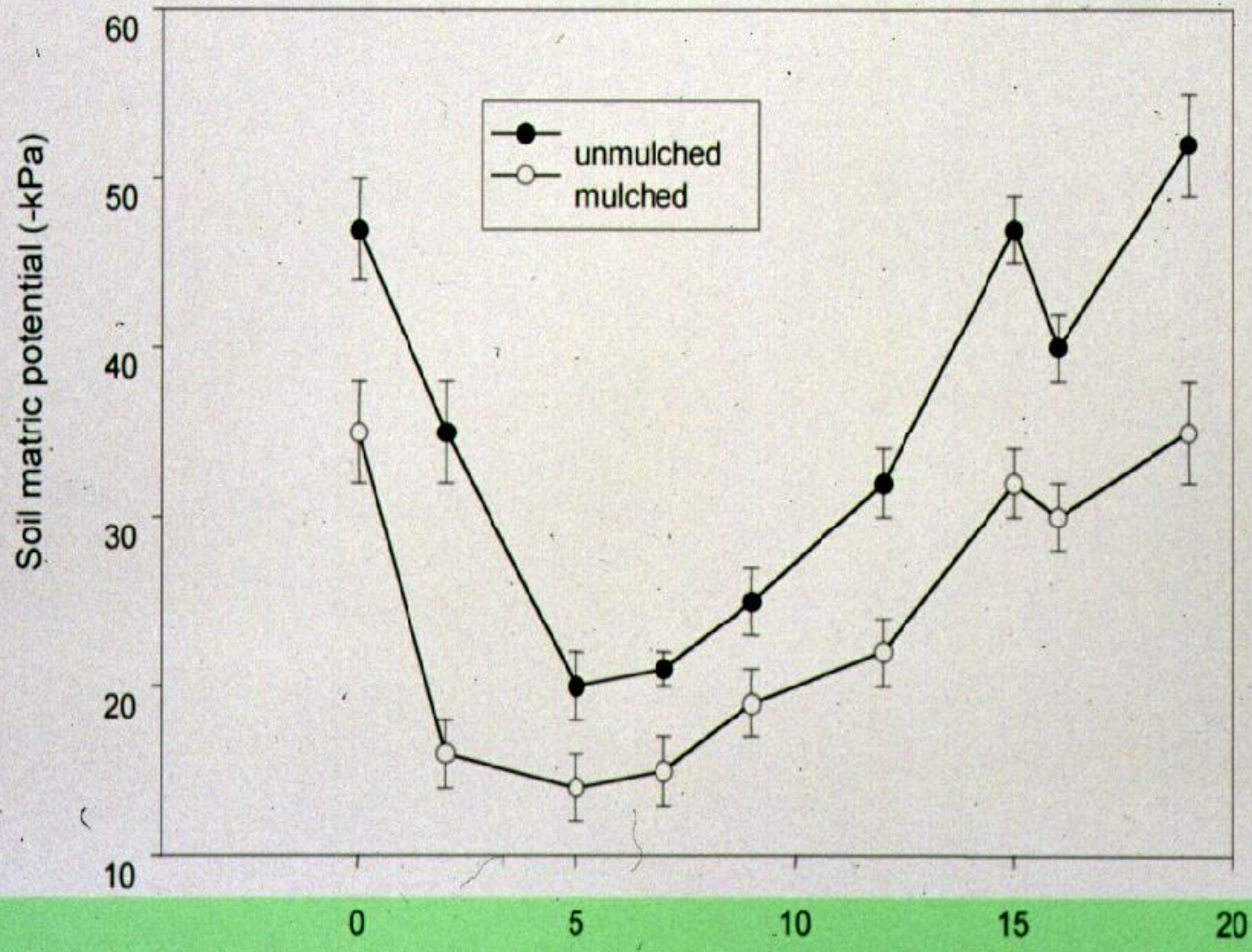
Effect of mulch on selected soil and avocado leaf nutritional levels after 4 years of mulching.

Treatment	N	P	K	Ca	Mg	Zn	Mn	pH
Soil	(%)	(ppm)	(ppm)	(meq/L)	(meq/L)	(ppm)	(ppm)	
mulch	1.59 A *	17.6 A	284.6 A	26.7 A	9.9 A	7.3 A	30.7 A	7.19 B
control	1.22 B	12.2 B	218.3 B	26.8 A	8.1 B	6.7 B	23.7 B	7.26 A
Leaf	(%)	(%)	(%)	(%)	(%)	(ppm)	(ppm)	
mulch	2.54 A	0.49 A	1.15 A	1.43 A	0.38 A	20.0 A	35.5 A	
control	2.80 A	0.47 A	1.12 A	1.45 A	0.38 A	19.3 B	36.7 A	

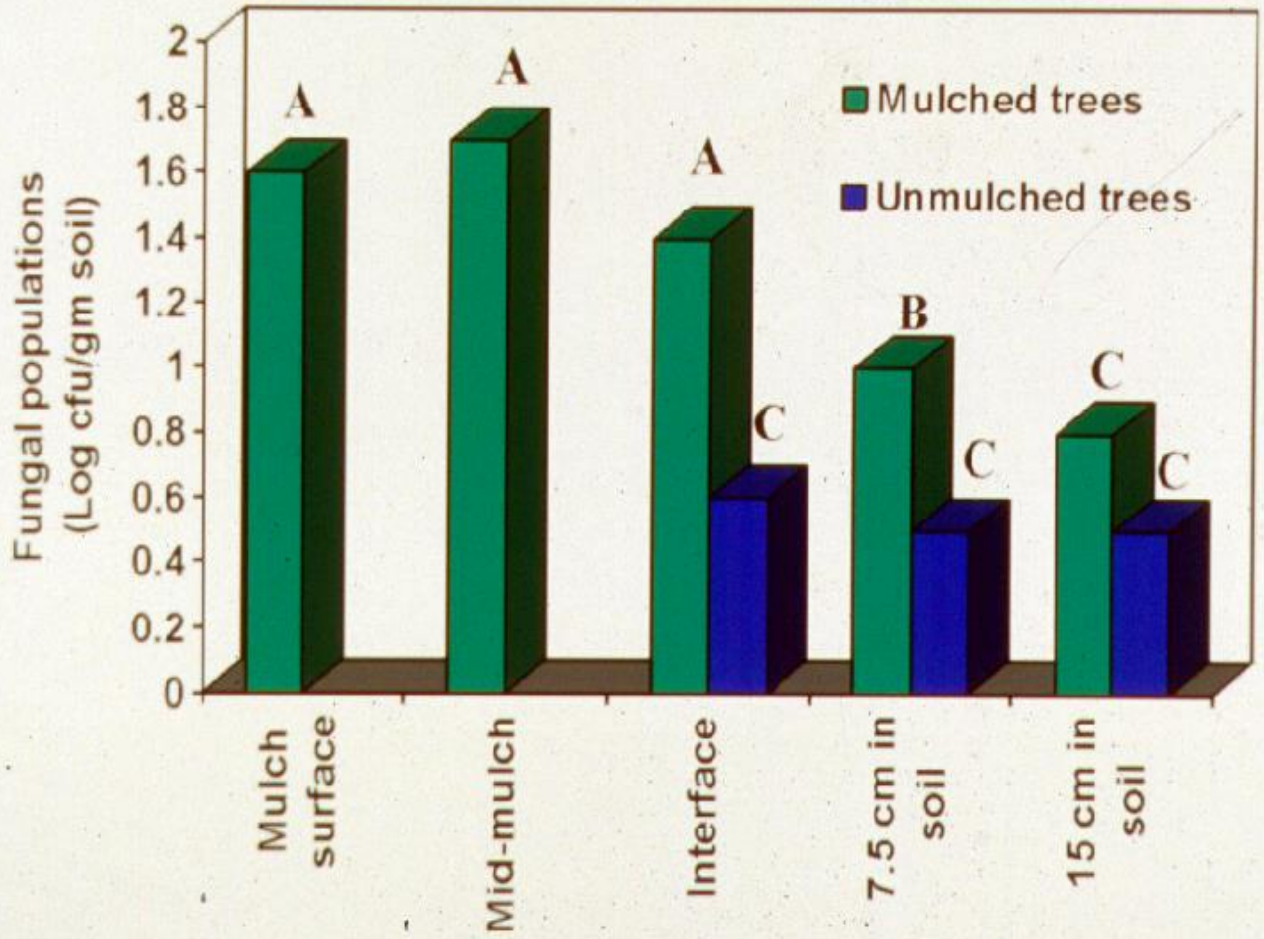
* Mean values followed by identical letters are not statistically different according to ANOVA at P=0.05.


3 15 94

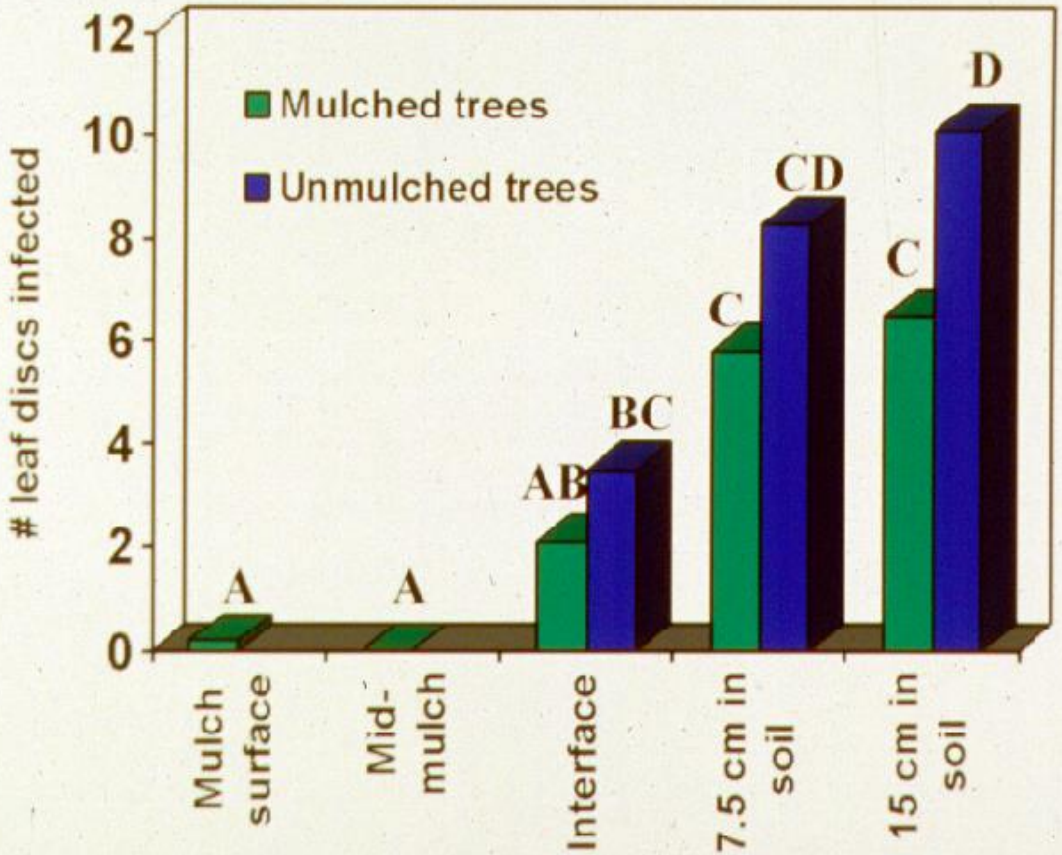
Figure 1. Soil moisture tension under mulched and unmulched trees after an irrigation at Vanoni site. Standard error bars for each sampling date are for the means of sixteen trees for each treatment.



Effect of mulches on fungal populations



The effect of mulches on the inoculum potential of *Phytophthora cinnamomi*



Effect of mulches on canopy volume (cubic meters) and tree health on avocado trees with 3 different rootstocks after 4 years of mulching.

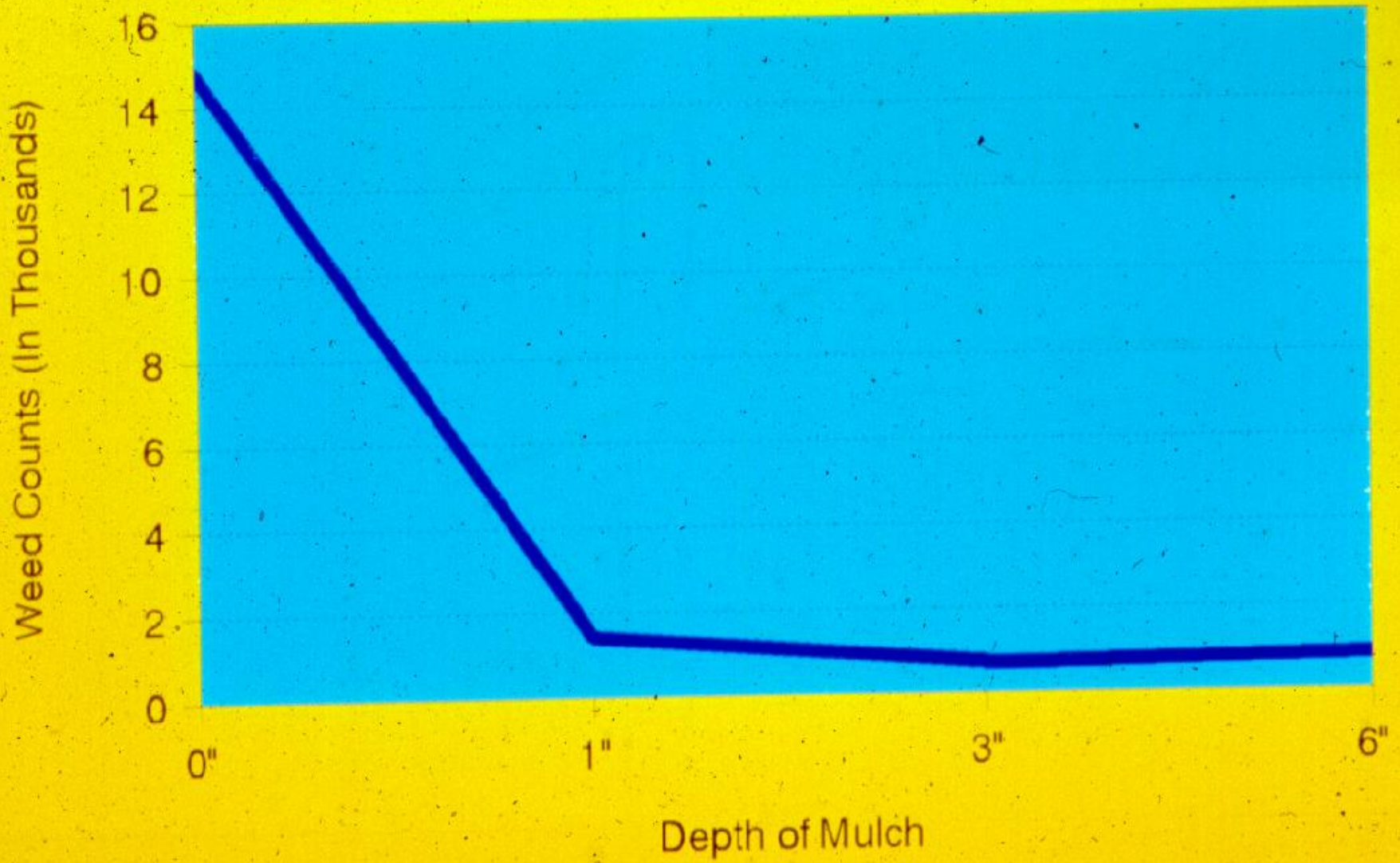
	Duke 7		UC2011		Thomas	
Treatment	Can. Vol.	Rating **	Can. Vol.	Rating	Can. Vol.	Rating
control	1.49 B	1.83 A	2.25 A	1.33 A	3.24 A	0.46 A
mulch	2.81 A	0.43 B	2.86 A	0.52 B	3.79 AB	0.12 A

* Mean values followed by identical letters are not statistically different according to Waller's k-ratio test.

** 0-5, 5 is dead.

Total Weeds

From 4/94 to 4/96



Since woody materials are preferred for mulches,

palm

pine

eucalyptus

seedlings will commonly grow from yardwaste mulches

Survival of Pests & Pathogens in Yardwaste mulch

Oleg Daugovish
Jim Downer
Ben Faber

Into freshly built

yardwaste piles

armillaria

sclerotinia

phytophthora

olive fruit fly larvae

GWSS egg masses

Citrus nematode

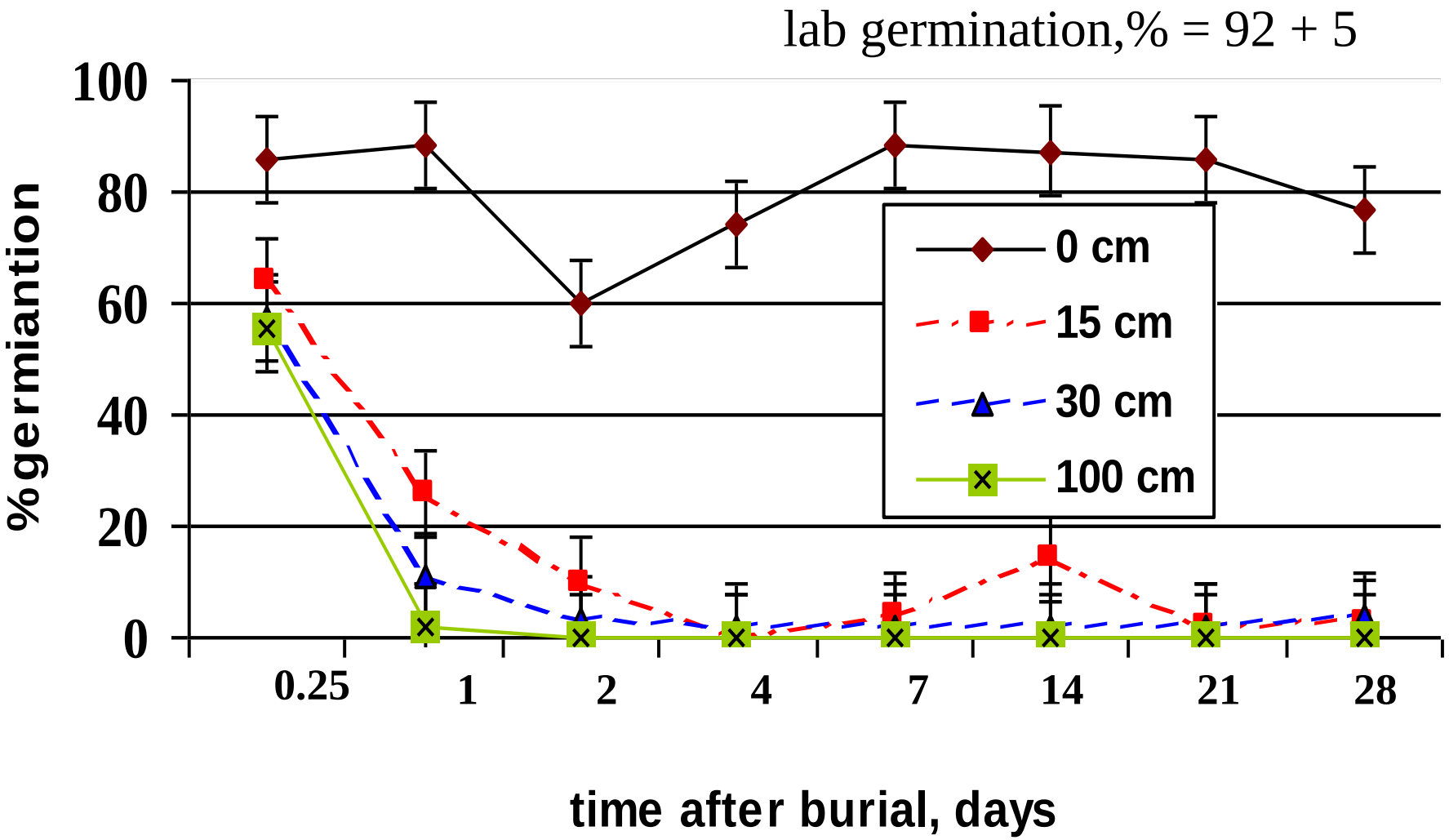
And seeds of

burclover, cheeseweed,

Bermudagrass and nutsedge

Bermuda & nutsedge clones

Burclover (*Medicago polymorpha*) seed germination



Grind versus Chip on Weed Survival

Erosion Control

Sediment (inches) collected from covers and mulch					
Month	Rain	Fescue	Barley	Mulch	Bare
Nov.	2.6	tr	tr	tr	0.7
Dec.	5.3	1	0.1	0.2	3.3
Jan.	3.4	0.1	tr	tr	2.6
Feb.	17	4.9	3.3	tr	15
Mar.	3.9	0.8	tr	tr	2.9
Totals	33	6.8	4.4	0.2	25

Measured problems with mulch

Colder orchard in winter
Early nitrogen deficiency
Excess moisture buildup
Delay in developing hardiness
Increased rodent damage
New weeds and diseases
$$$$$$$$$$$$$$$ for application

The mulch is persistent and insulates the soil, preventing heat transfer at night.

Number of days below 32 F at mulched and unmulched sites							
		Site 1			Site 2		
Dates		Mulch		None	Mulch		None
11/20-12/18		3		3	2		1
12/19-1/13		9		7	3		1
1/14-2/11		7		4	1		1


2'21 E

Rules of Mulching

1. Apply mulch to all of an irrigation block
2. Keep mulch 6 inches away from trunk
3. If receiving freshly chipped mulch, allow to rest in pile for 2 weeks or longer
4. Make stock piles close to where it will be spread
5. Inspect loads for trash and turn it away if it doesn't meet your standards
6. Don't apply when soil is wet

Know the Source of the Mulch

Transport from areas of infestation of:

- Asian Citrus Psyllid
- Invasive Shot Hole Borer
- Laurel Wilt Disease Ambrosia Beetle
- Goldspotted Oak Borer
- ???????????

Can spread those problems to you and all along the road

HSP and SWEEP – Grant Programs