

Differential Effects of Mulch on Citrus and Avocado

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Past Studies of Mulch

McNees, 1916

Craig, 1916

Lefferts, 1919

Kelly, 1922

Vaile, 1924

Hodgson, 1925

Parker & Jones, 1951

Effect of Mulches on Yield of Navel Orange McNees, 1916

Alfalfa	550
Bean straw	463
Manure	358
Sweet clover	314
Burr clover	302
Barley straw	280
Pine shavings	224

- **Disease suppression**
- **Water savings**
- **Nutrients**
- **Weed suppression**
- **Arthropod effects**
- **Snail effects**

Multiple Effects from Mulches

Mulch
is
not
compost

But can be ????????

TERMS ASSOCIATED WITH GREEN WASTE MANAGEMENT

GREEN WASTE = YARD WASTE = GREEN RESOURCE

**COMPOST = biological decomposition of organic matter
under controlled conditions**

**AMENDMENT = any material mixed with soil to alter its
chemical or physical properties**

MULCH = any material applied to the surface of the soil





**With yard waste 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

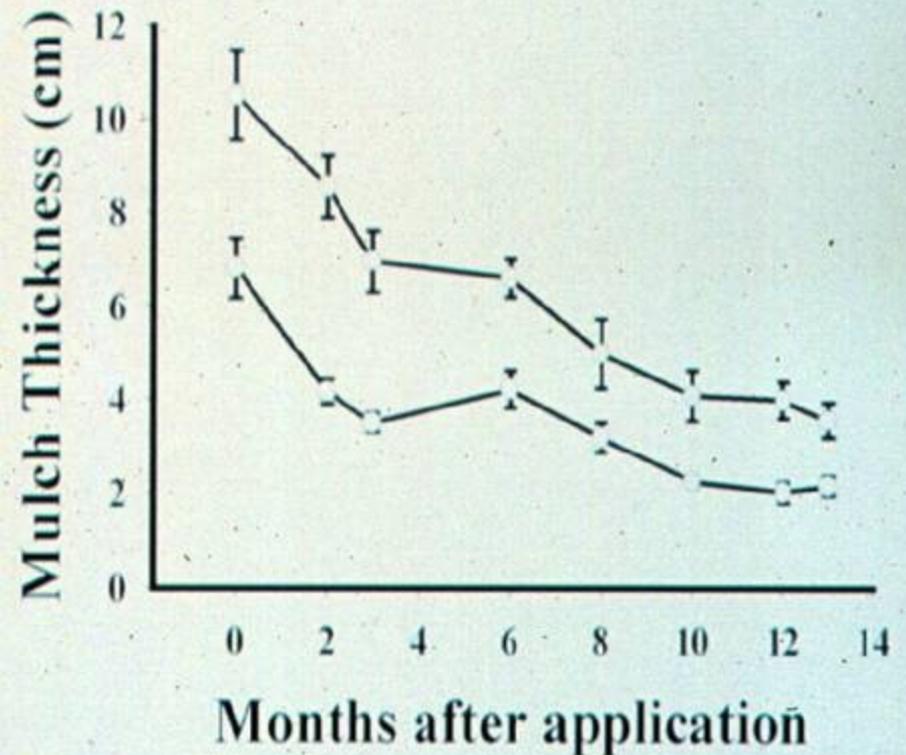
Effect of mulch on selected soil and avocado leaf nutritional levels after 4 years of mulching.

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.

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

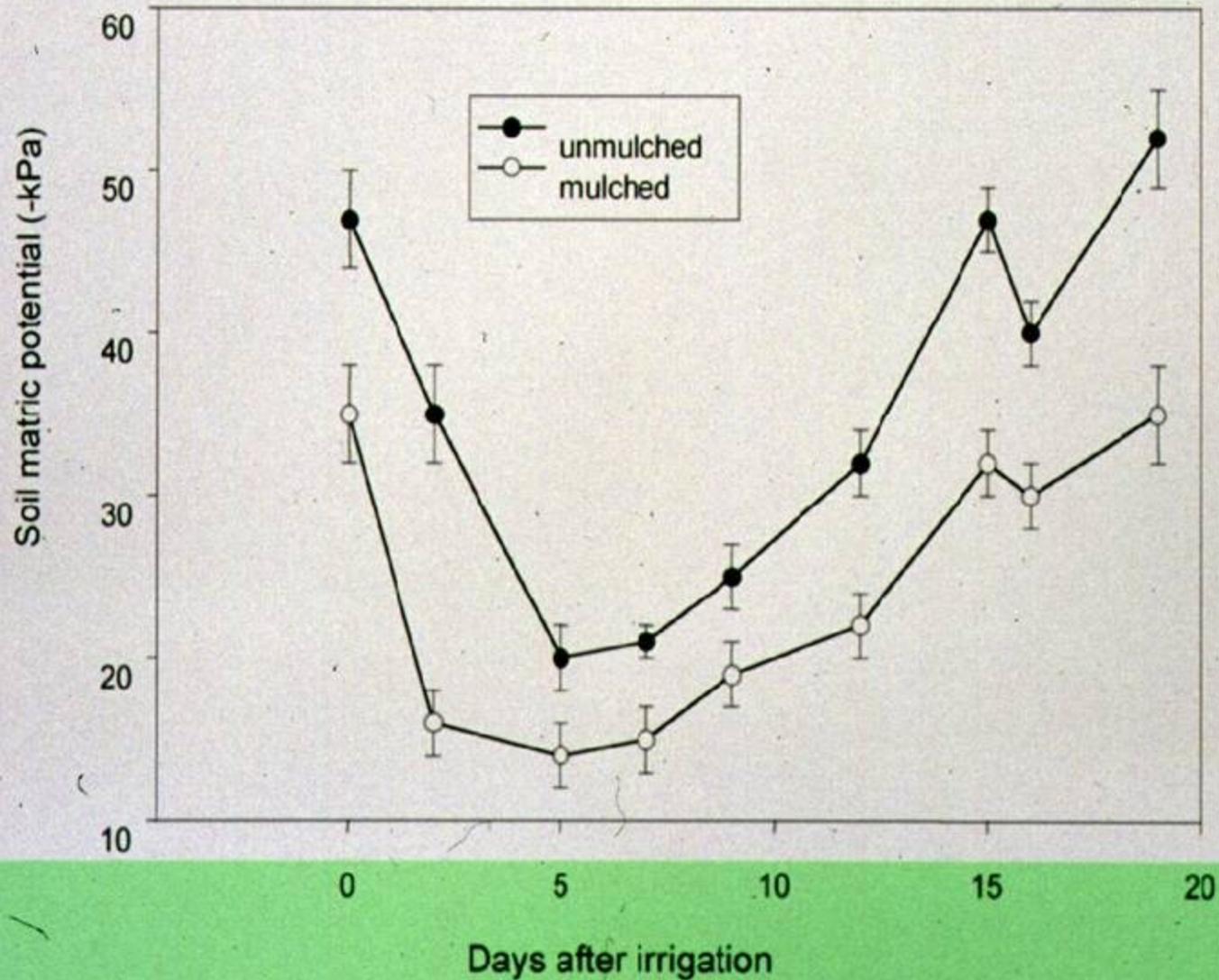






3 16 '94

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.





Field Trials (Somis, California)

3 rootstocks: Duke 7, Toro Canyon, Thomas

Mulched +/-

Gypsum +/-

Aliette +/-

started spring 1994





Mulch Transect Studies

Surface of mulch

Mid mulch

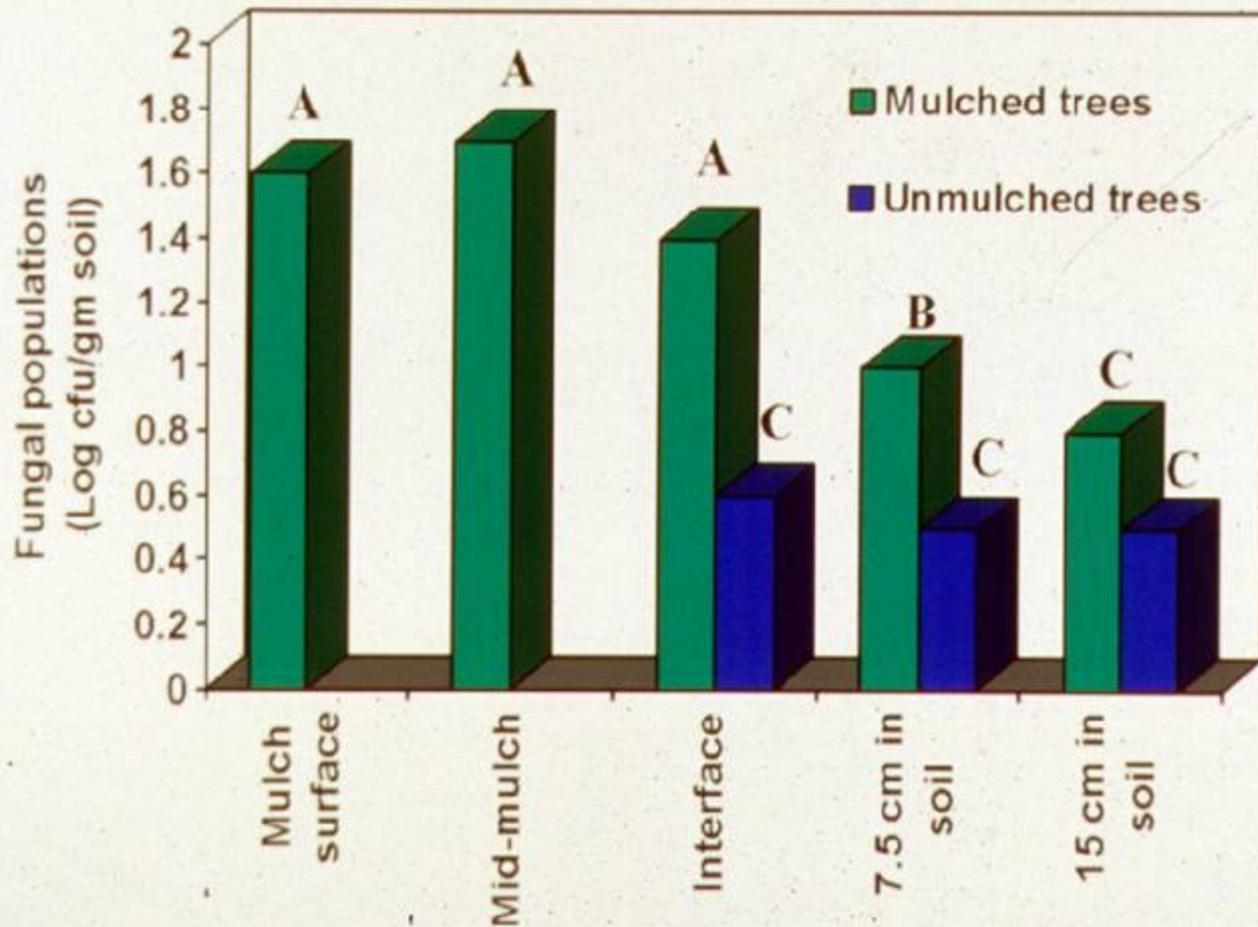
Interface

0-7.5 cm

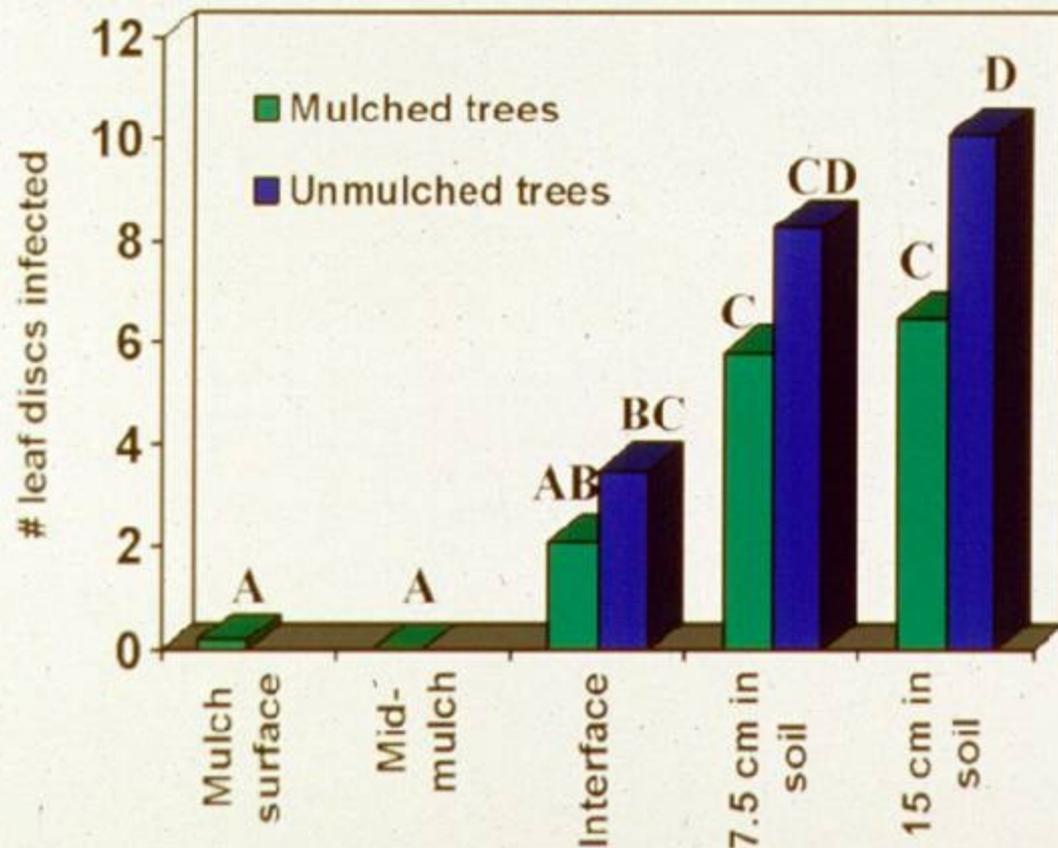
7.5-15cm



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.

Treatment	Duke 7		UC2011		Thomas	
	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.

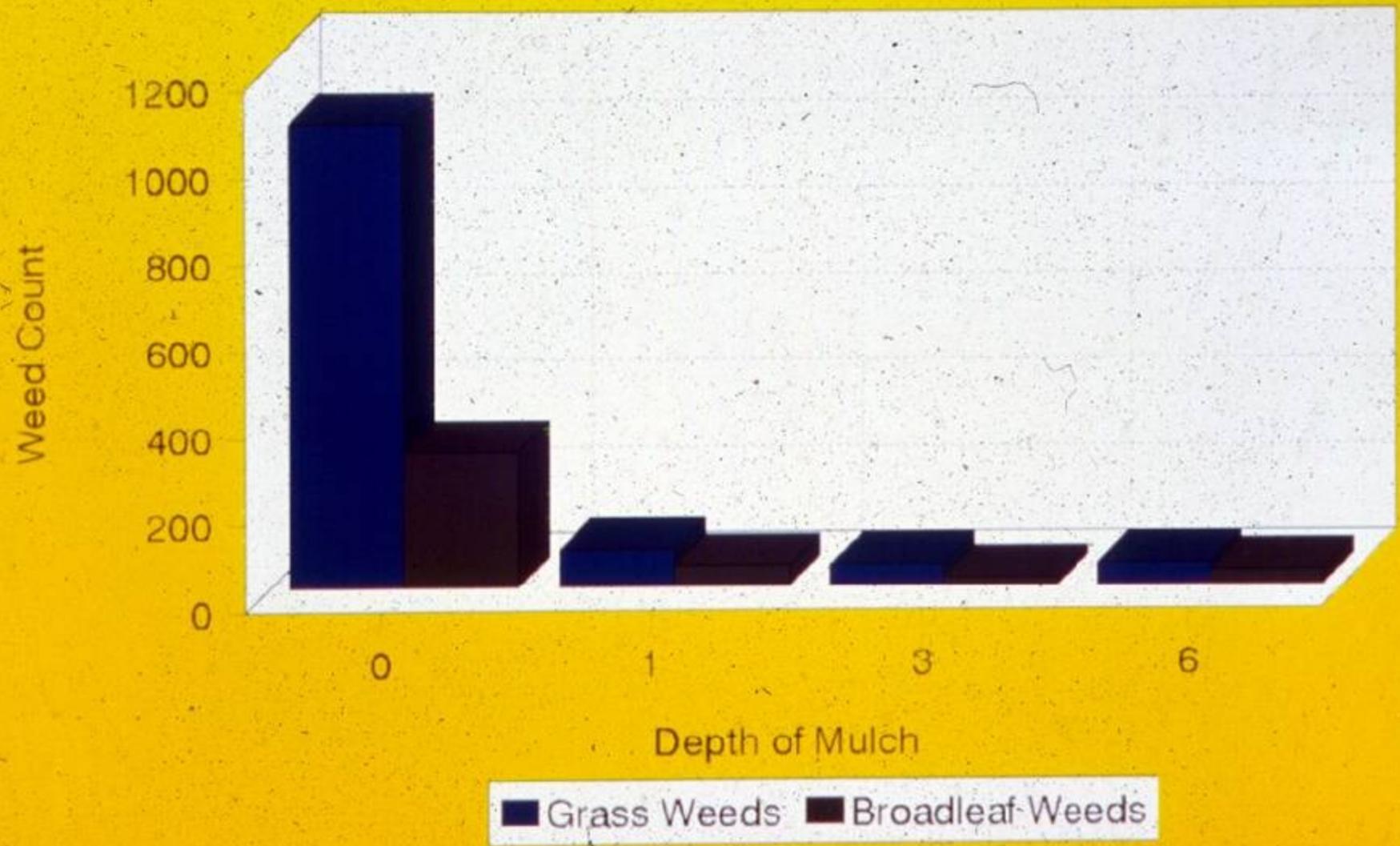
Effect of mulch on root length in citrus (2 sites) and avocado (2 sites) trials.

Treatment	Lemon	Orange	Avocado 1	Avocado 2
	Root length (cm/100 cc soil) *			
Control	7.1 A	14.6 A	13.3 B	5.1 B
Mulch	6.1 A	8.7 A	19.0 A	14.5 A

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

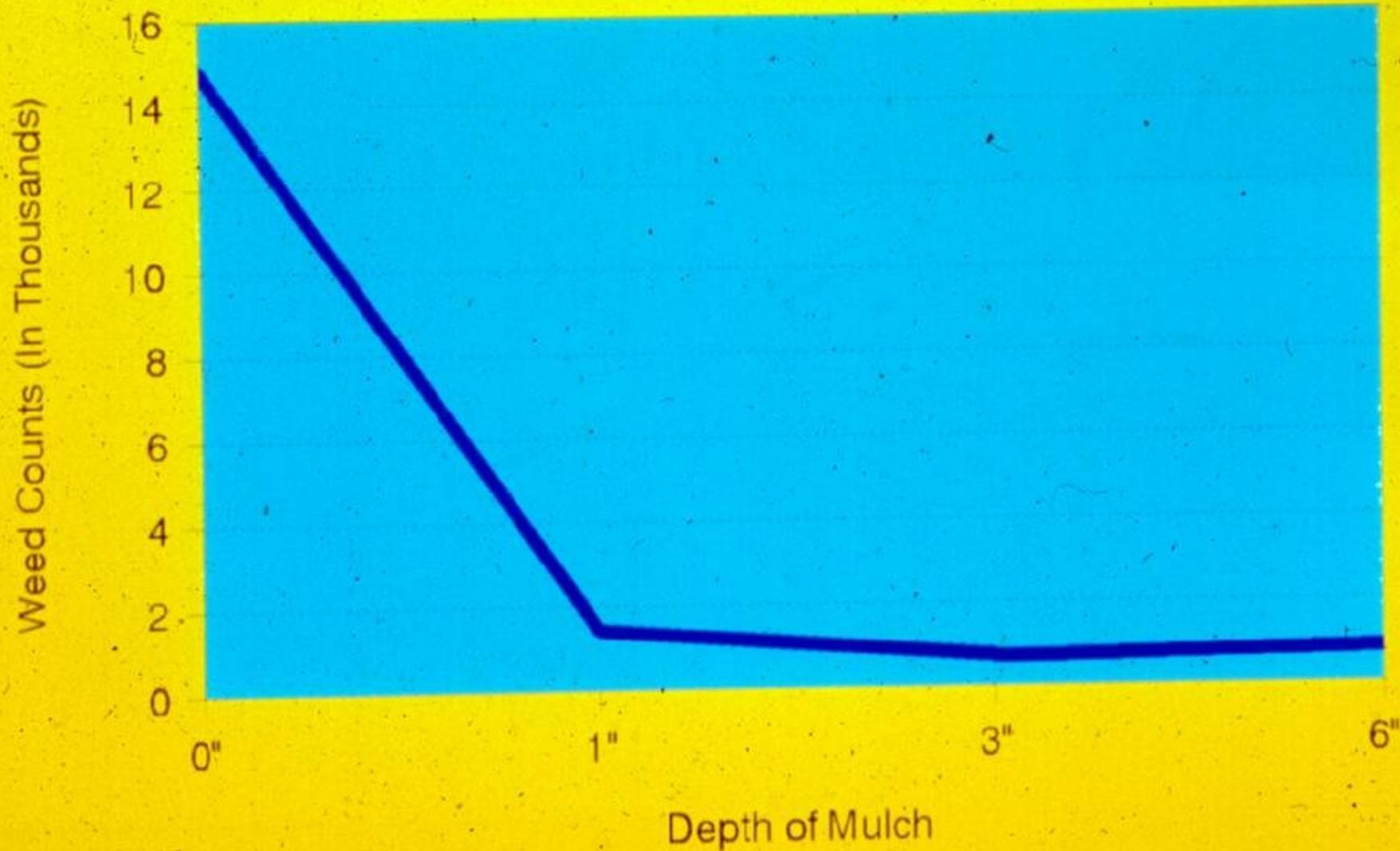
Mean # of Weeds Per Plot

From 4/94 to 4/96

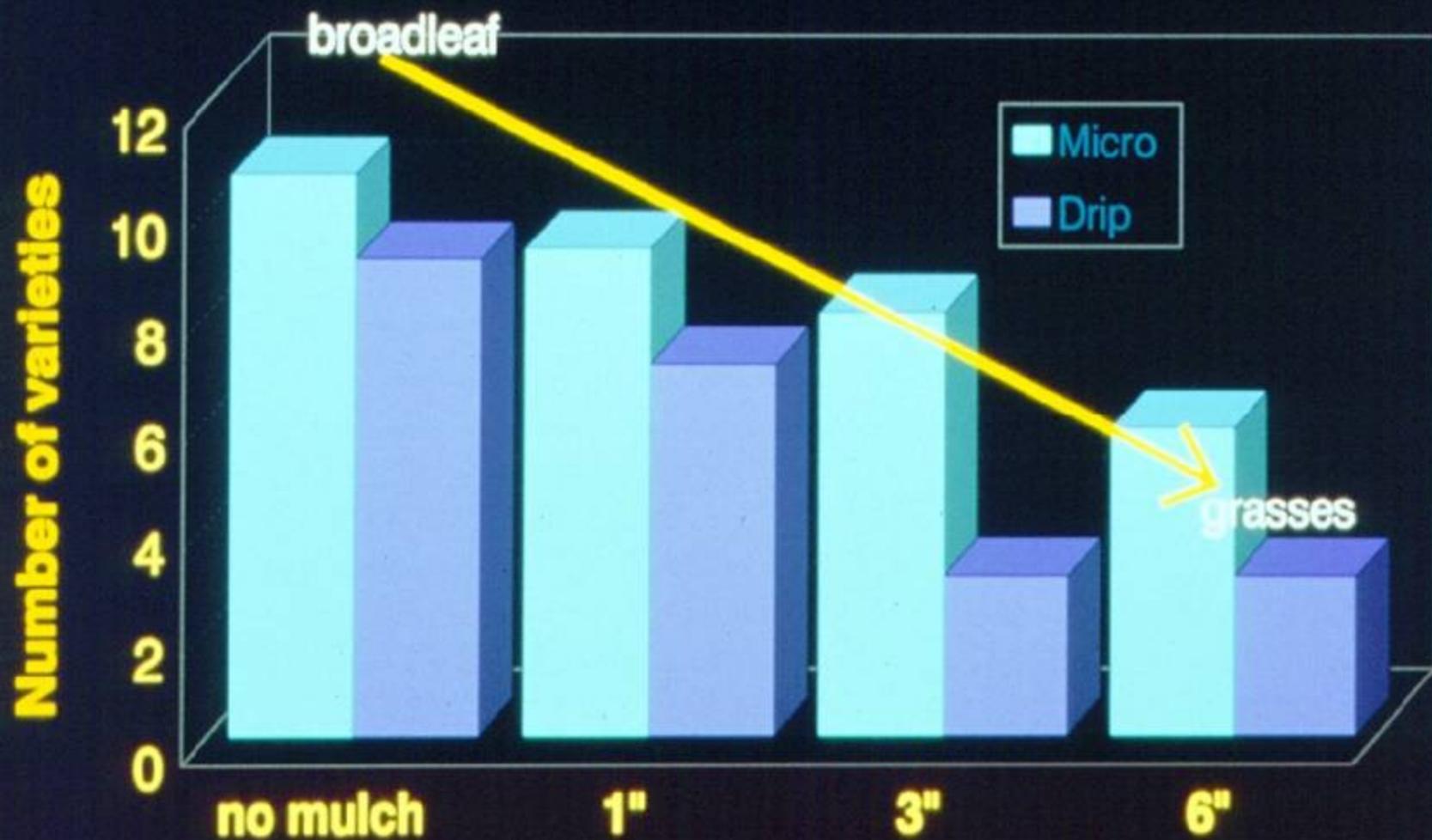


Total Weeds

From 4/94 to 4/96

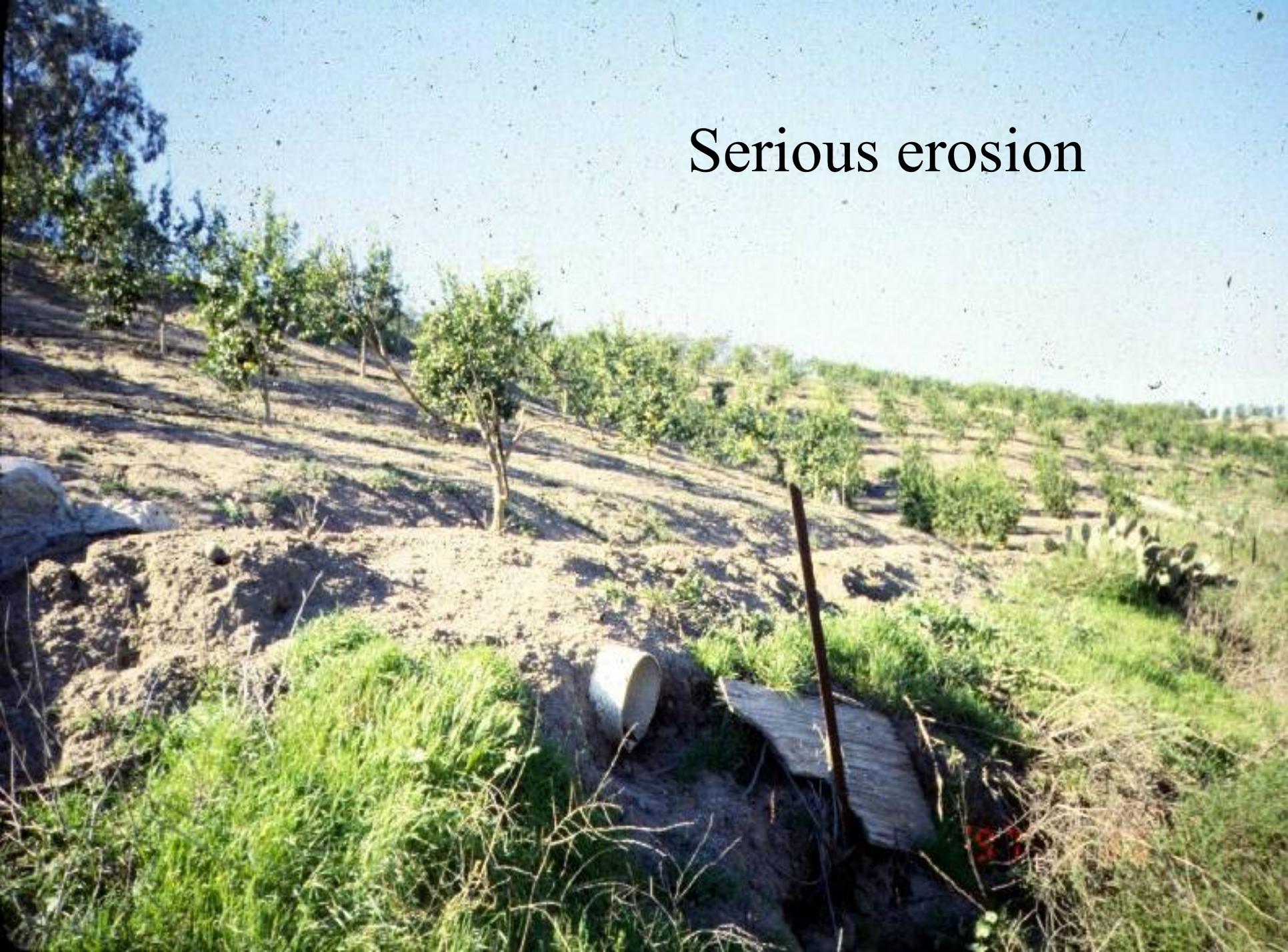


Variety of weeds in mulches



Since woody materials are preferred for
mulches,
palm
pine
eucalyptus
seedlings will commonly grow from
yard waste mulches

Serious erosion





????????? So what are the effects of
mulch relative to a cover crop in
affecting Erosion?????????

Plots were established as one acre blocks:

1. with or without barley

2. with or without fescue/medic mix

3. with or without 6” deep mulch in tree row



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

Early nitrogen deficiency

Excess moisture buildup

Delay in developing hardiness

Increased rodent damage

New weeds and diseases

\$ for application





8'21'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

