

# Orchard Mulching and Cover Crop Trials

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*Supported by funding from the Wash. Tree  
Fruit Research Commission*

# **Orchard Mulching and Cover Crop Trials: Multiple Goals**

**Weed control – non-herbicide; suitable for organic production**

**Moisture conservation**

**Fertility management, soil quality**

**Pest management ? (e.g. habitat for beneficials)**

# **Factors Influencing Weed Control**

**Age of orchard**

**Rootstock ?**

**Area, timing of weed control**

**Weed species – potential spread, harboring  
pests**

**Cost versus benefit**

# Weed Control Options

**Mechanical – tillage, mowing**

**Thermal – flame, hot water**

**Mulch**

**Competition – cover crops**

**Soil conditions – fertility, structure**

**Biocontrol – insects, pathogens**

**Herbicides**

*All but herbicides are options for organic growers.*



## **Mulch Trials Underway**

**Ag Canada – Summerland, BC; Yakima, WA**

**Washington State University / Wenatchee  
Valley College (WVC), Wenatchee, WA**

**Tonasket Elementary School orchard,  
Tonasket, WA**





**Initial trials with compost showed no consistent benefit. However, when applied as a mulch (right), compost seemed more effective.**





**Heavy weed pressure in check plots at Summerland, BC.**





**This spray-on paper mulch machine is a new innovation for orchard weed control, developed by Dr. Gene Hogue at Summerland, BC.**





**Spray-on paper mulch applied to tree row at Summerland, BC. Good weed control.**





**Shredded paper**

**Wood  
chips**

**Alfalfa hay**

**Mulch trial at Tonasket, WA.**



A photograph of an orchard floor covered in a thick layer of light-colored wood chip mulch. Several red apples are scattered across the mulch. In the background, the lower trunks and branches of apple trees are visible, with more red apples hanging from the branches. The scene is brightly lit, suggesting a sunny day.

**Wood chip mulch,  
Wenatchee, WA.**





**Shredded paper mulch,  
Wenatchee, WA**



A photograph of an apple orchard. The trees are heavily laden with ripe, red apples. The ground is covered with a layer of brown, chopped alfalfa hay mulch. In the foreground, there is a dense patch of tall, green weeds with yellow seed heads. The image is framed by a blue border.

**Chopped alfalfa hay mulch,  
Wenatchee, WA**



**Delayed senescence with alfalfa  
mulch (10/99)**



**Control**

**Alfalfa**





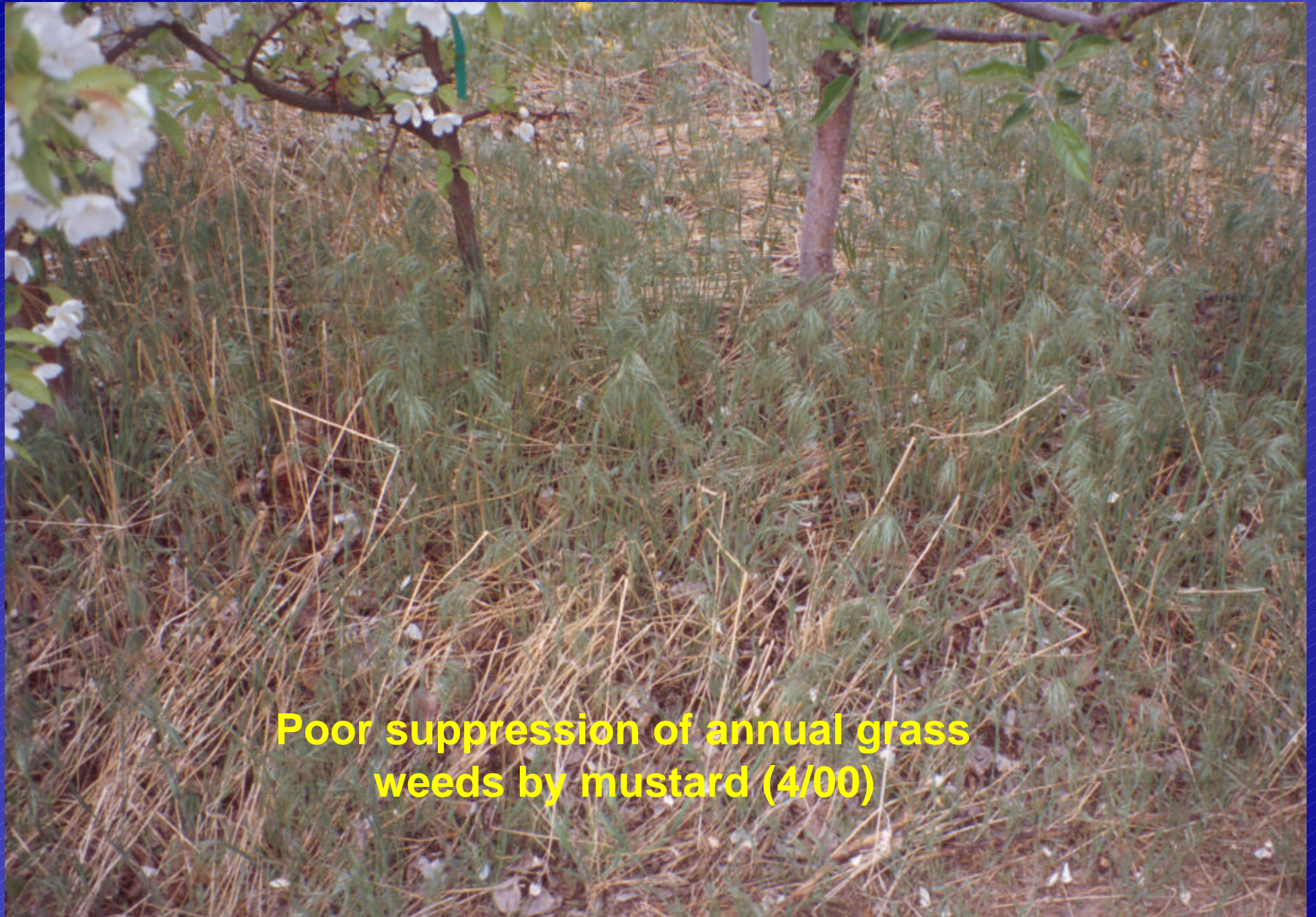
**Fall-planted dwarf white clover (in tree row  
as a living mulch)**





**Fall-planted Oriental mustard  
(foreground)**





**Poor suppression of annual grass  
weeds by mustard (4/00)**





**Winter rye; good weed suppression the following season**



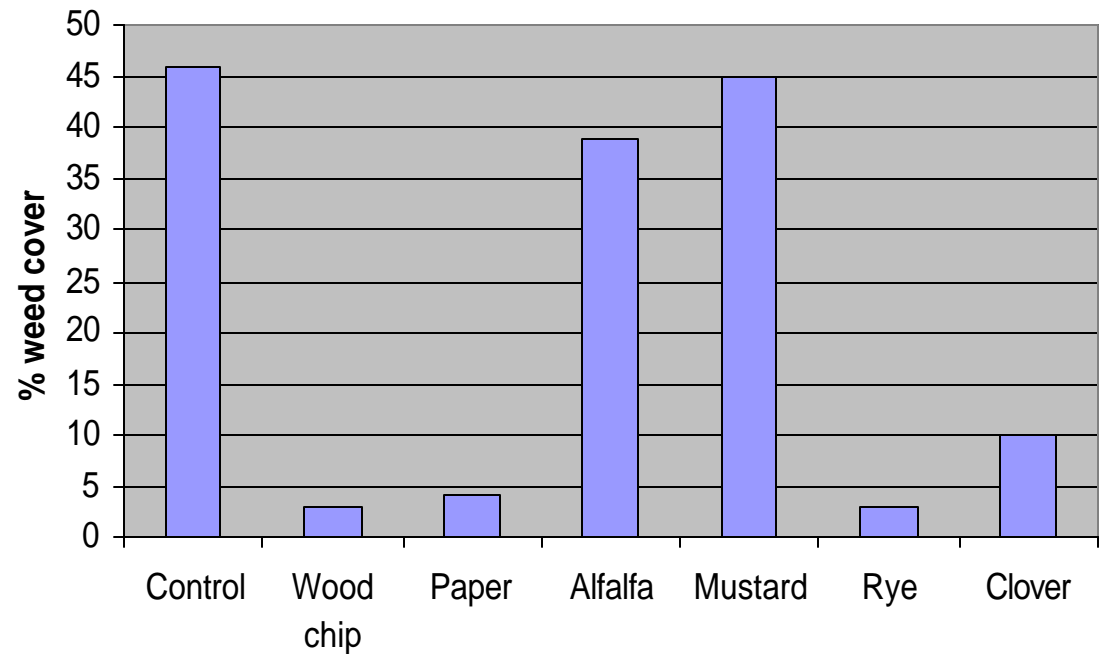
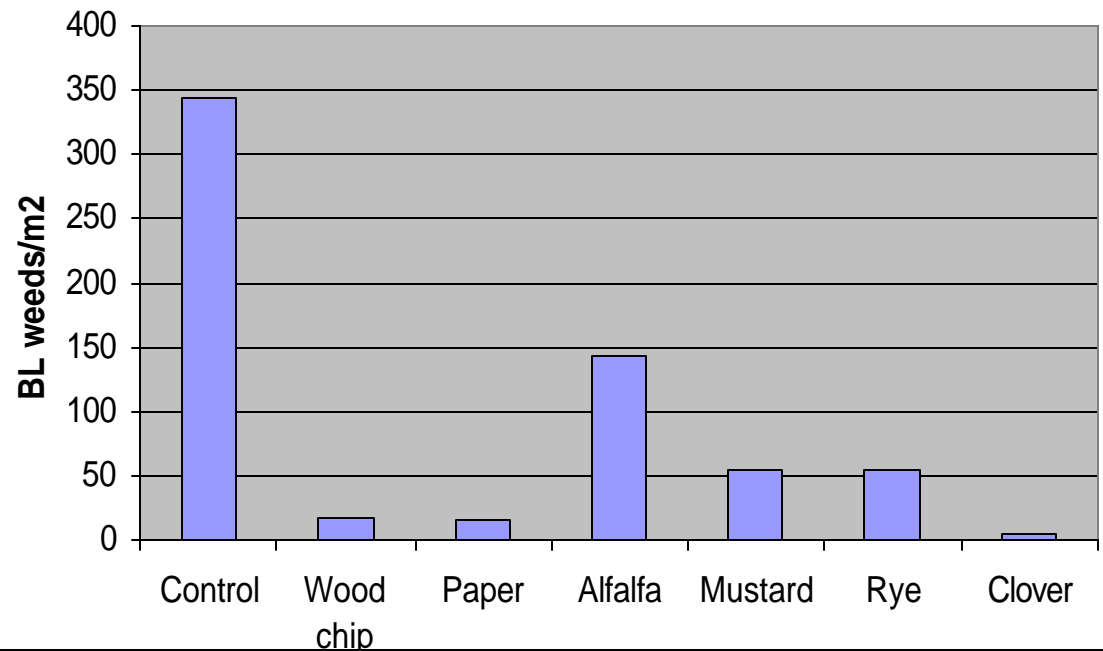
A photograph showing a dense field of dead, golden-brown rye grass. The grass stalks are long and thin, creating a complex, tangled texture. Some green leaves are visible at the top and bottom edges, indicating the grass is still partially attached to the ground. The overall scene is a close-up of the dry vegetation.

**Dead rye in mid-summer; few weeds**



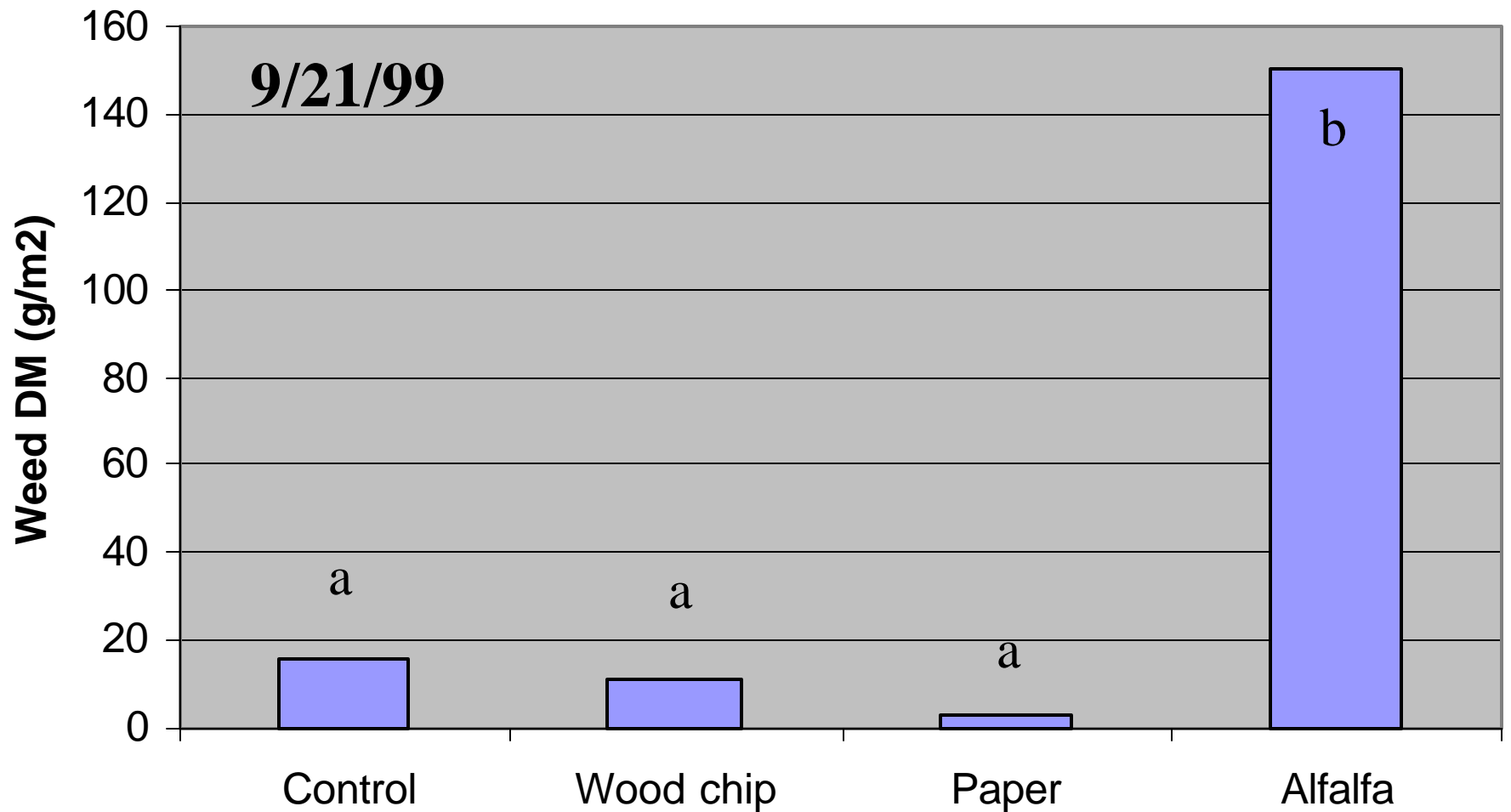
# WVC Mulch Trial

## Weed Control by Mulches – 6/1/00



# WVC Mulch Trial

## Weed Biomass 9/99



# Orchard Mulching Trials – Summerland, BC

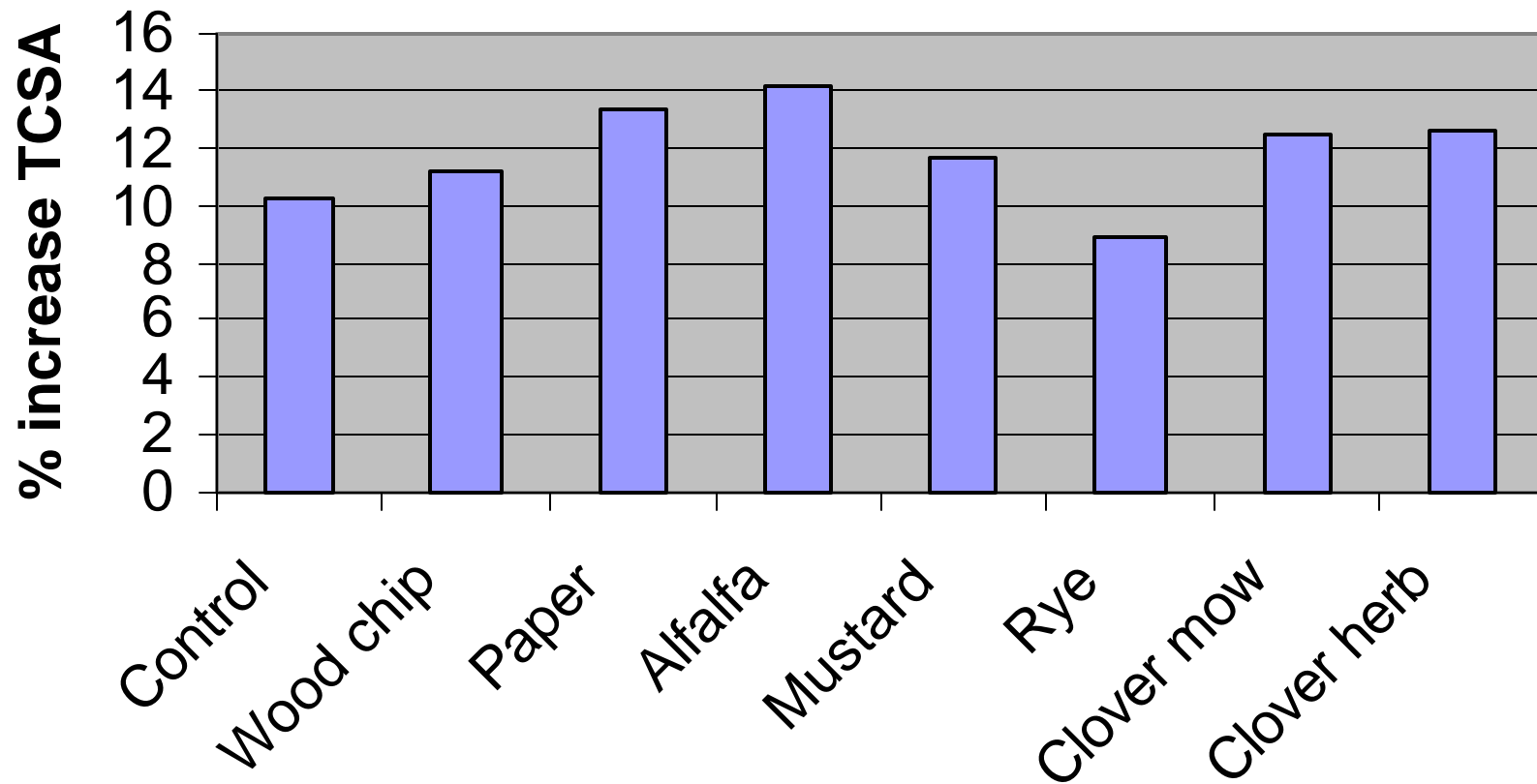
*5<sup>th</sup> Leaf Spartan / M.9*

	<u>TCSA</u> (mm <sup>2</sup> )	<u>Roots</u> (g/0.018m <sup>3</sup> )	<u>Yield</u> (kg/tree)
1. Check (glyphosate)	1011 b	11.3 c	10.3 c
2. Biosolids (Vancouver)	1052 b	16.9 bc	11.2 bc
3. Paper mulch	1565 a	28.7 abc	13.0 ab
4. 2 + 3	1490 a	41.8 a	13.9 a
5. Composted biosolids + 3	1406 a	38.7 a	14.9 a
6. Alfalfa hay	1203 b	35.2 ab	14.0 a
7. Geotextile	1125 b	19.1 bc	12.7 abc

(Hogue et al., 2000)

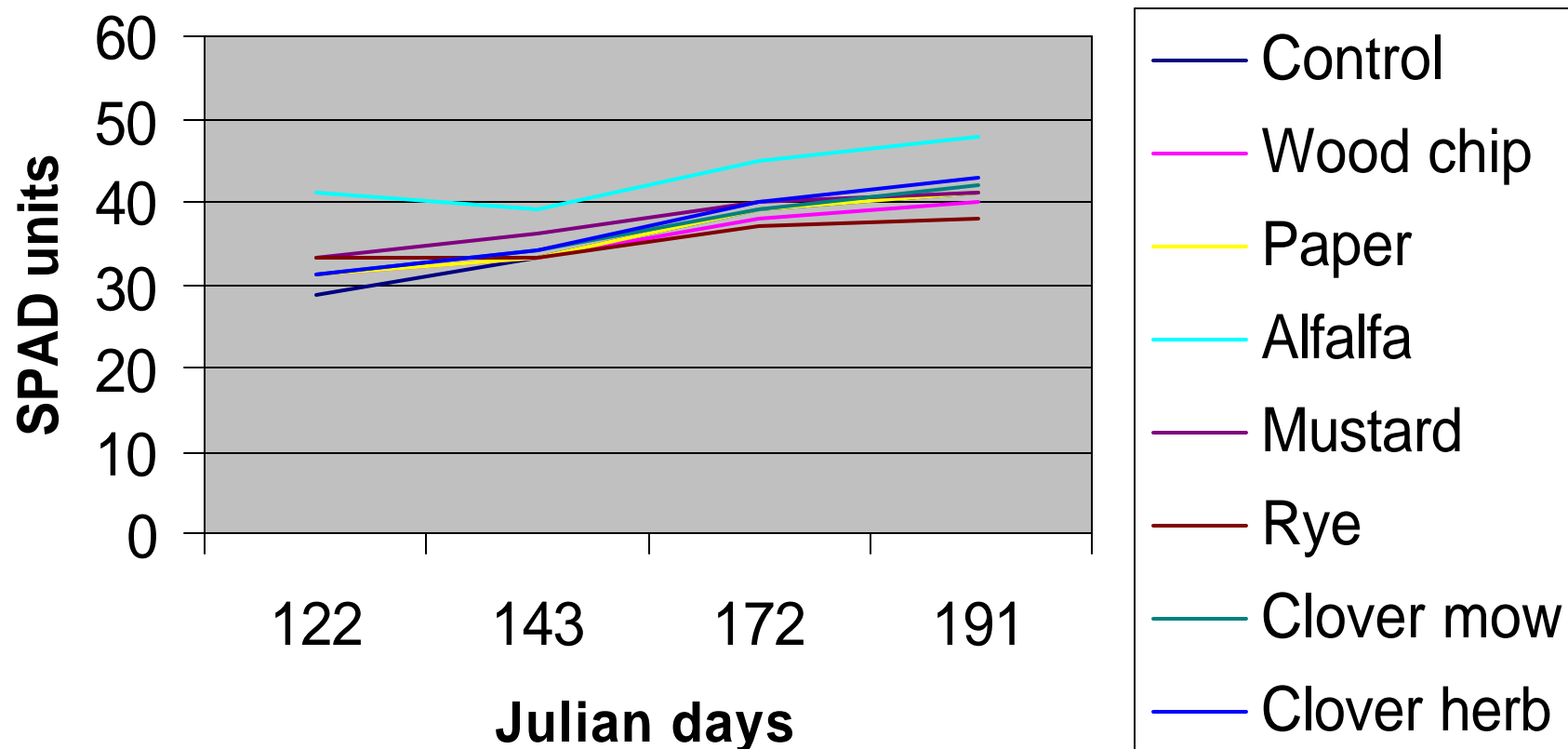
# WVC Mulch Trial

## Trunk Growth - 2000



# WVC Mulch Trial

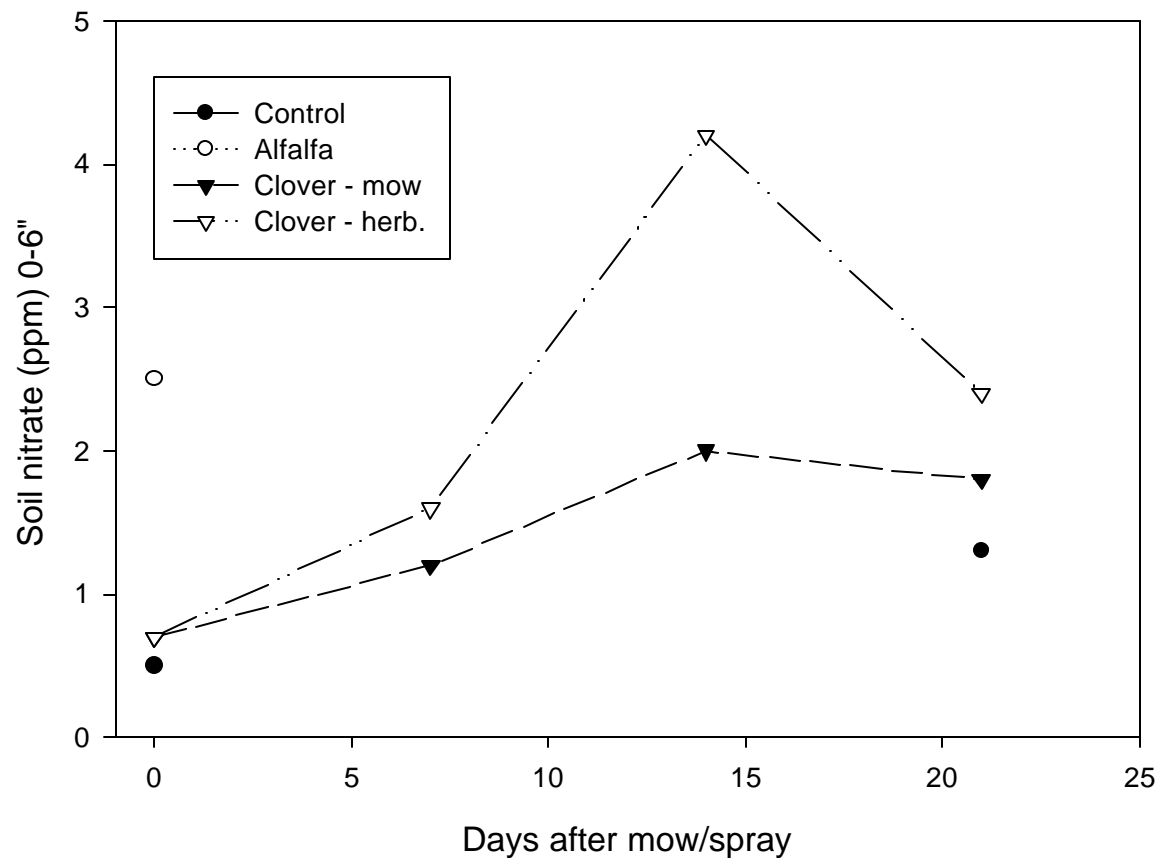
## Leaf Greenness - 2000



# WVC Mulch Trial

## Managing clover for N release

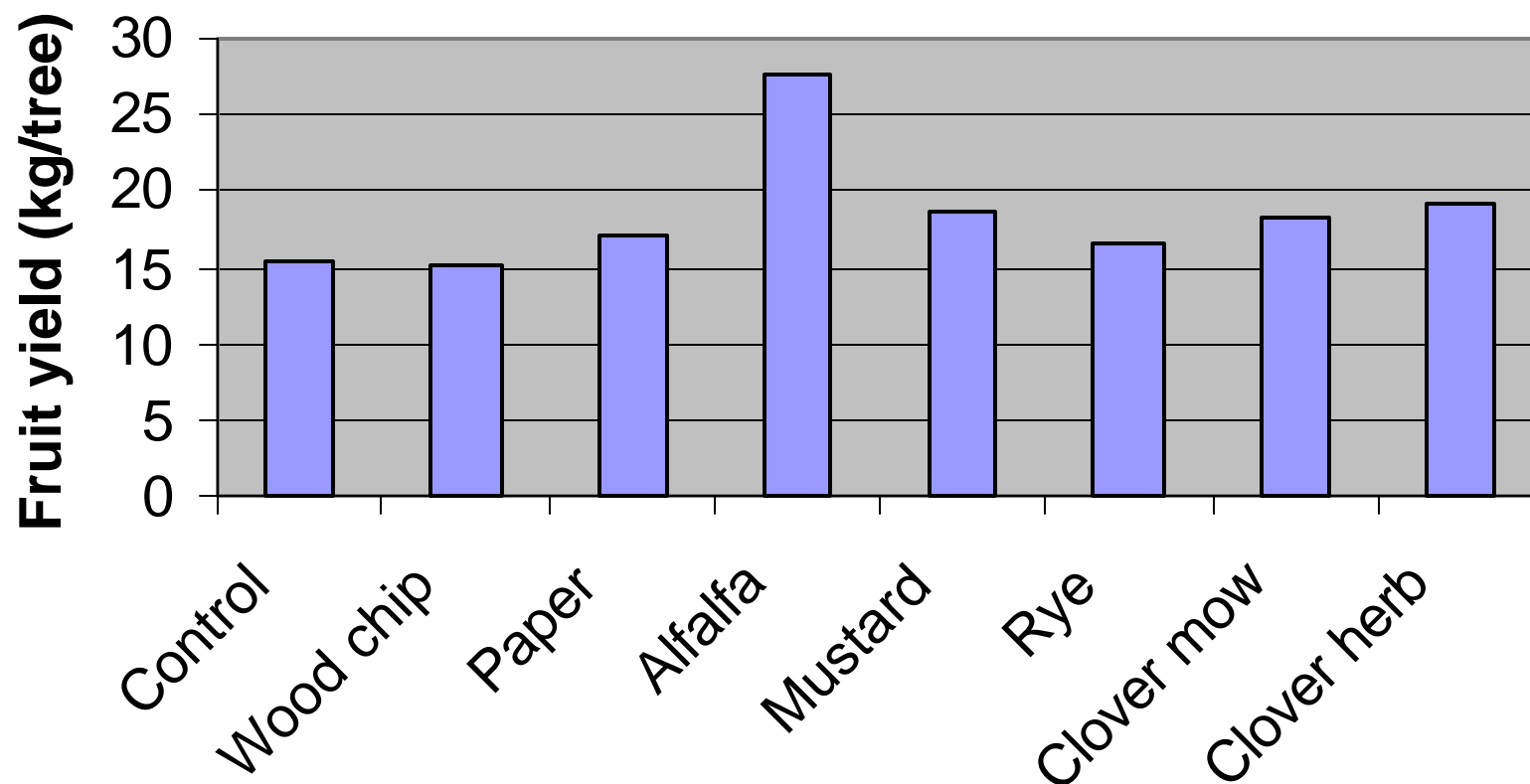
Effect of clover mow or spray on soil nitrate (0-6")





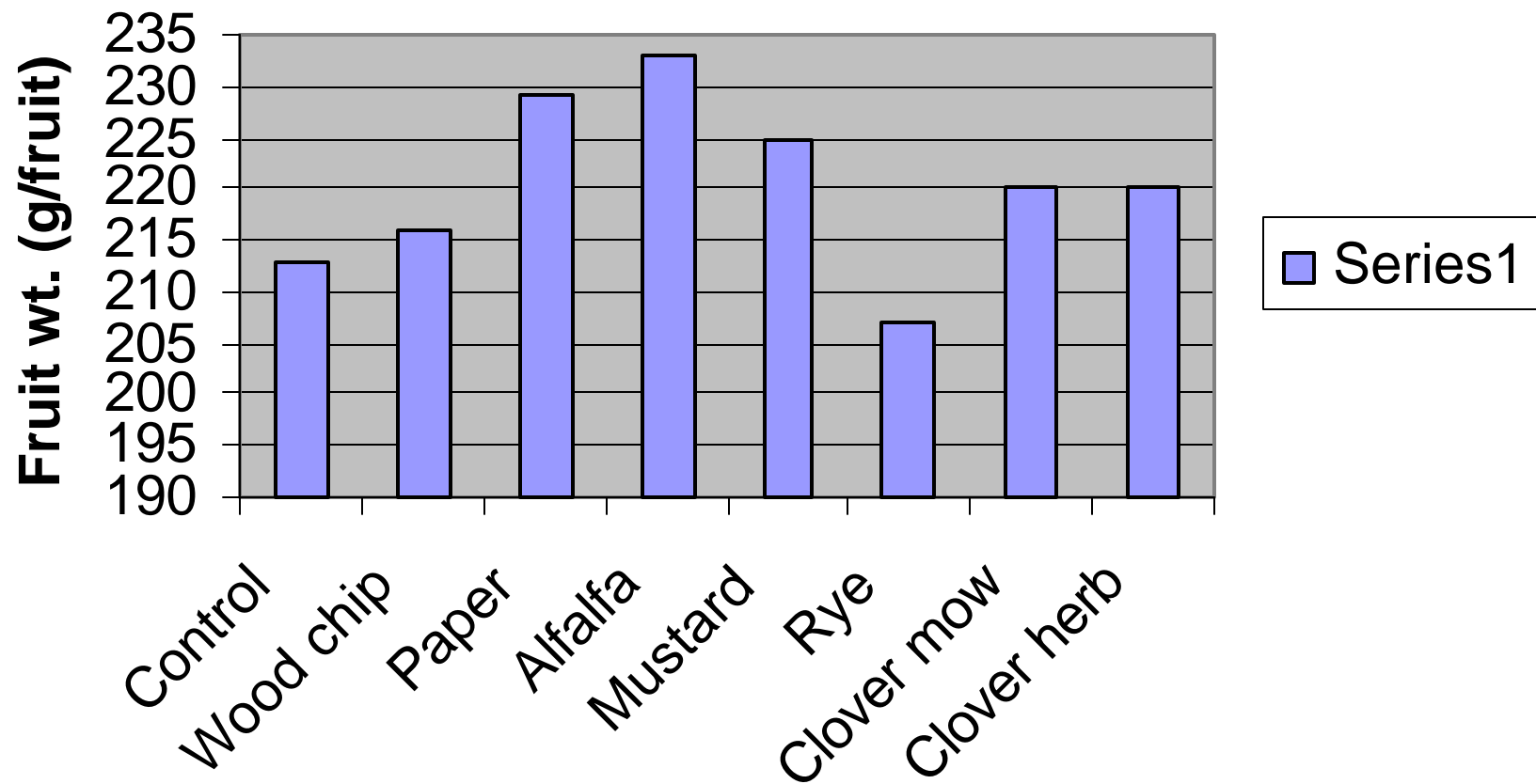
# WVC Mulch Trial

## Fruit Yield - 2000



# WVC Mulch Trial

## Fruit Weight - 2000

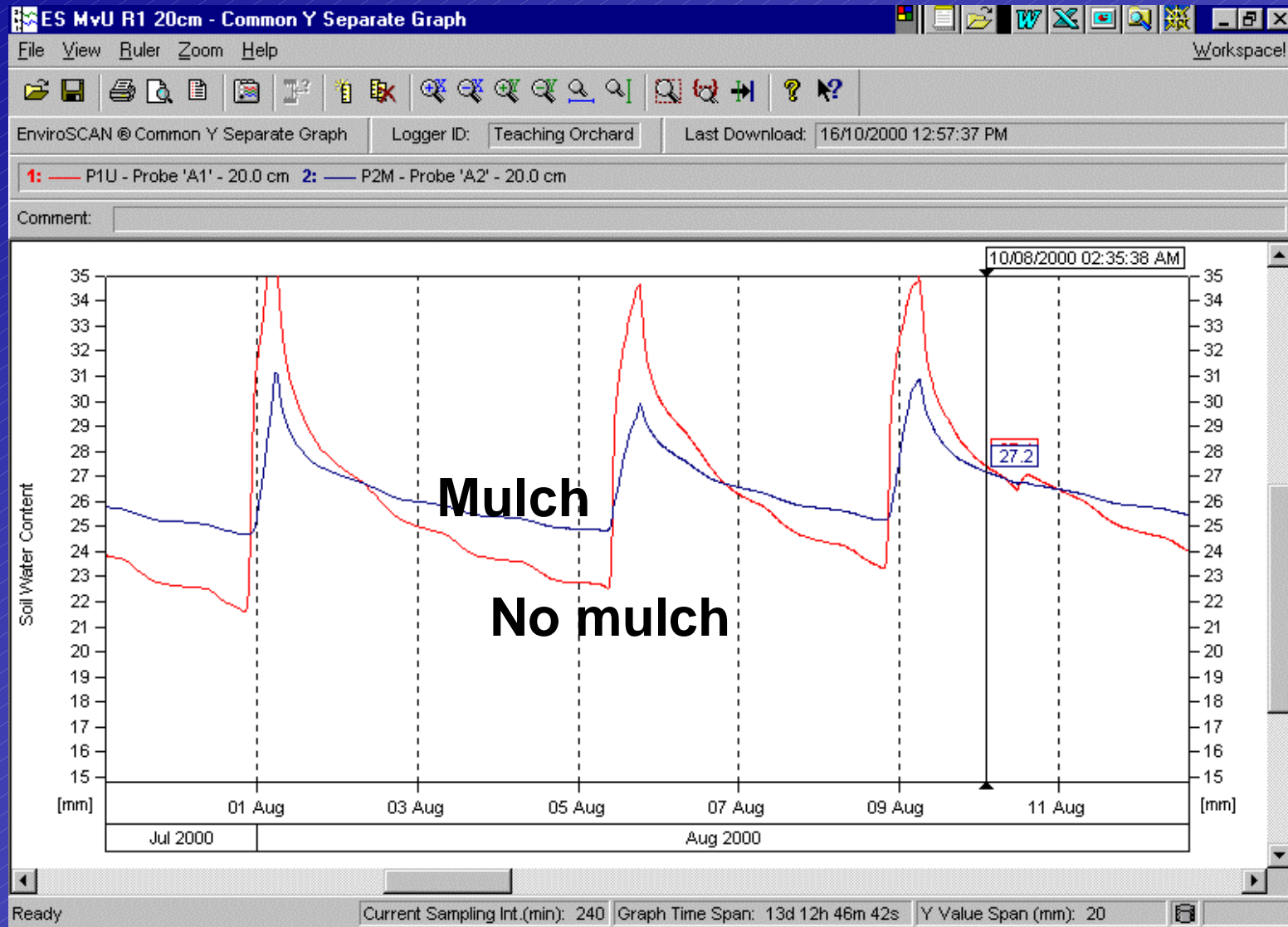


# Enviroscan Mulch Trial



An automated system that continuously measures soil moisture content.

# WVC – Enviroscan Results

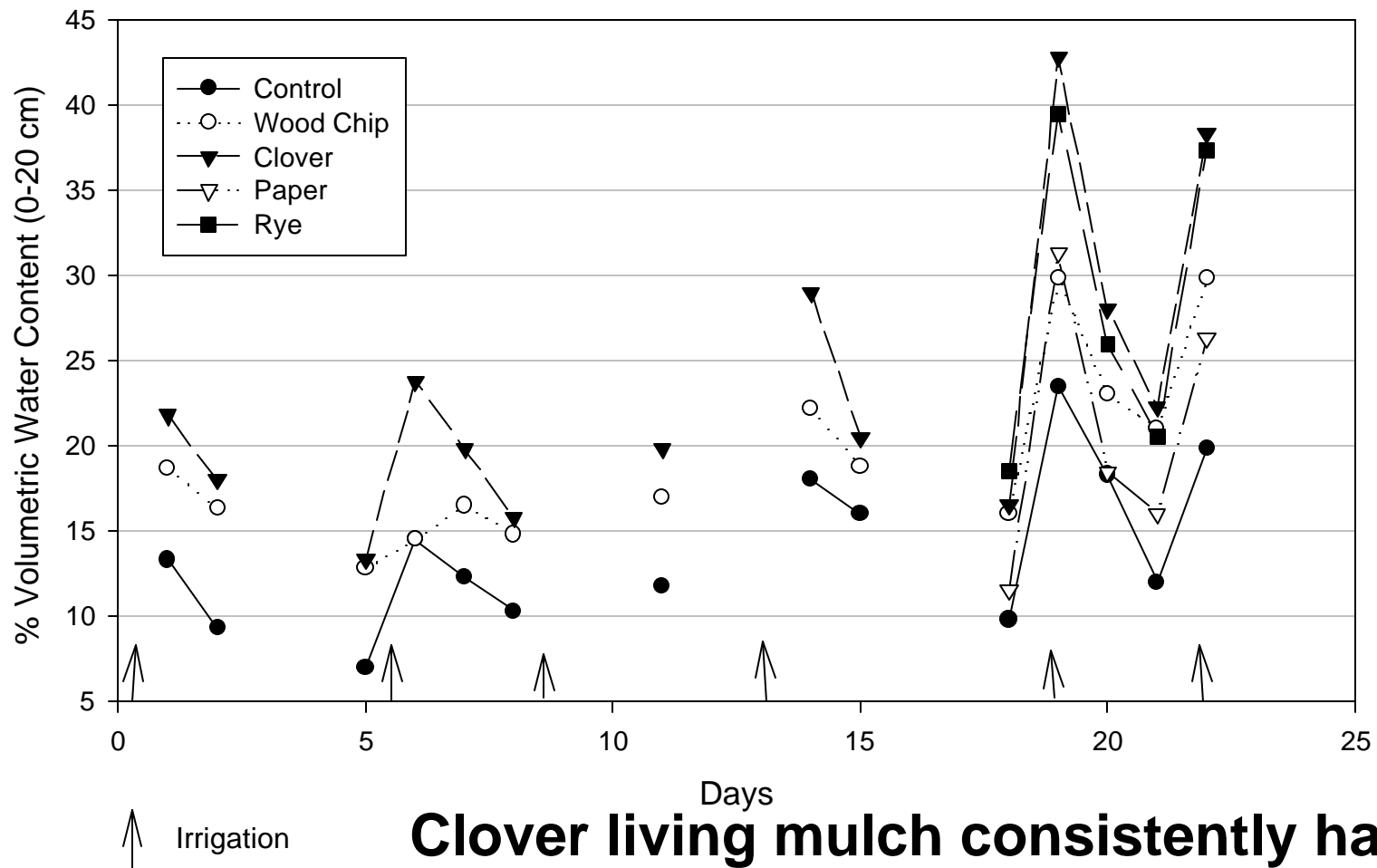


**Wood chip mulch led to 20-25% less moisture depletion between irrigations.**



# Effect of Mulch on Soil Moisture - Hydrosense meter

Red Delicious/M26 -- Pogue sandy loam  
WVC Auvil Orchard, E. Wenatchee, WA Summer 2000

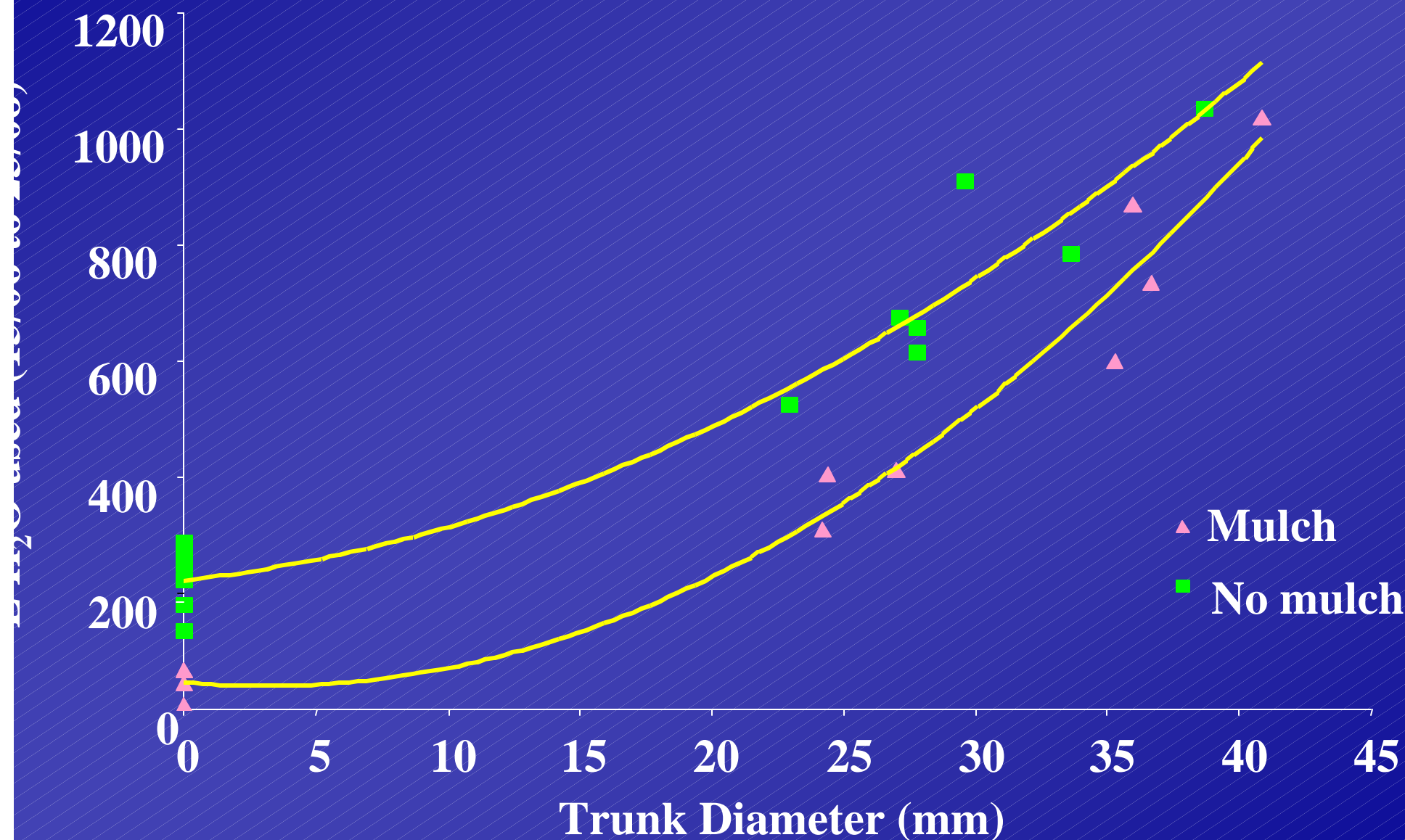


**Clover living mulch consistently had the highest soil moisture.**



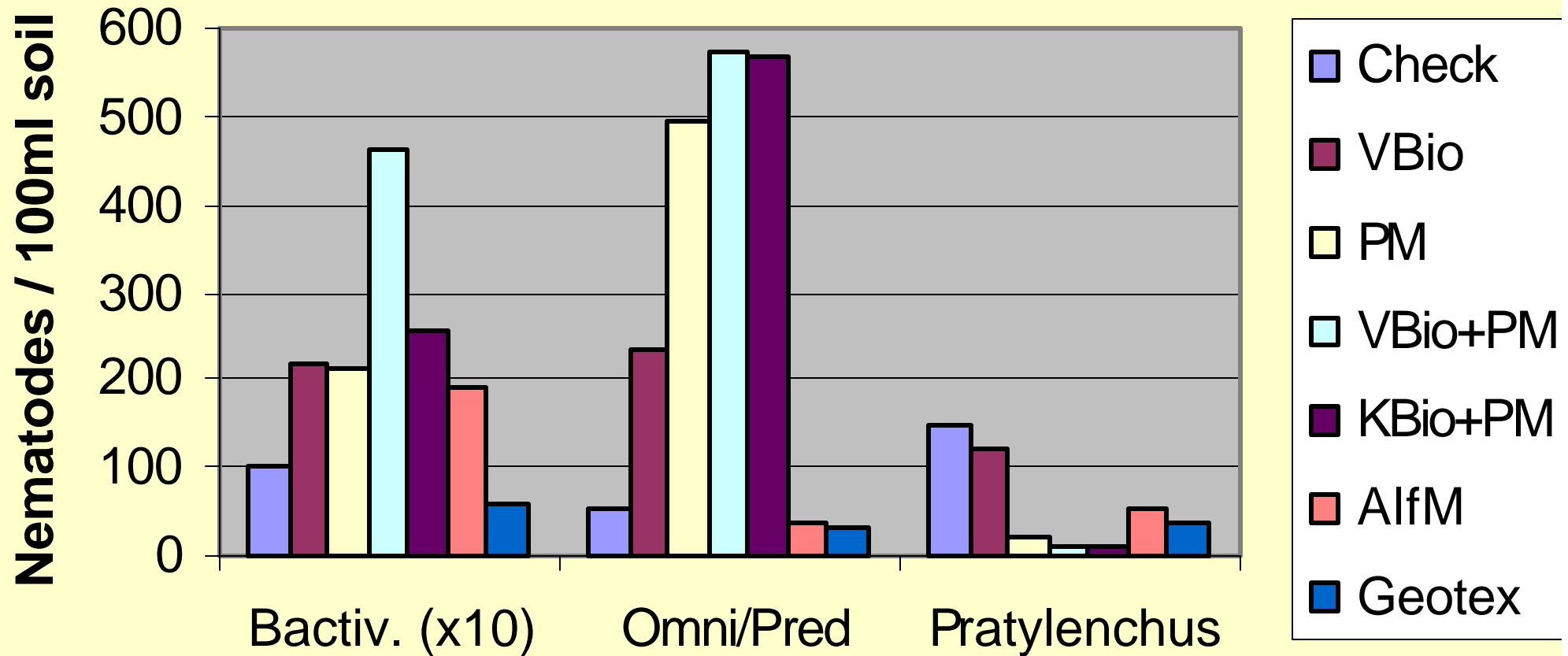
**Single-tree lysimeters were used to monitor mulch effects on soil moisture at Summerland, BC.**

# Summerland, BC - Cumulative Water Use





# Effect of Mulches on Nematodes in Orchard Soil - Summerland, BC



(Hogue et al., 1998)

**Mulching unexpectedly suppressed  
plant-damaging nematodes.**

# WVC Mulch Trials – Current Status

**Wood chip** – most promising; low maintenance

**Paper** – best weed control

**Alfalfa** – poor weed control; excellent N source

**Clover** – good weed control; low maintenance;  
minimal N contribution

Further evaluation of water conservation, soil  
biology, N relations, insect habitat

## **Conclusions - Summerland, BC**

- 1. Shredded paper, alfalfa hay, wood chip and geotextile mulches provided good to excellent weed control.**
- 2. Organic mulch was an effective barrier to soil surface moisture loss.**
- 3. Mulches, except geotextile, generally increased yields.**
- 4. Geotextile affected soil quality adversely.**
- 5. Organic amendments improved soil quality but did not increase yields.**
- 6. Cover crops able to outcompete weeds also reduced crop vigour.**
- 7. Sprayed-on mulch, an effective barrier to weed growth and soil surface water loss, offers ease of application.**

# Parting Thoughts

**Weed control in organic orchards a problem in other countries**

**More research and development focusing on it**

**Zillah, WA study – mow grassy weeds; low soil nitrate, but comparable yields**

**Switzerland – “sandwich” system**

**Need “integrated” control – multiple tactics, may change with orchard age**