Orchard Mulching and Cover Crop Trials

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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
Alfalfa hay
Wood
chips
Mulch trial at Tonasket, WA.


Wood chip mulch,
Wenatchee, WA.


Shredded paper mulch,
Wenatchee, WA


Chopped alfalfa hay mulch,
Wenatchee, WA


Delayed senescence with alfalfa mulch (10/99)
Alfalfa
Control

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

Fall-planted Oriental mustard (foreground)

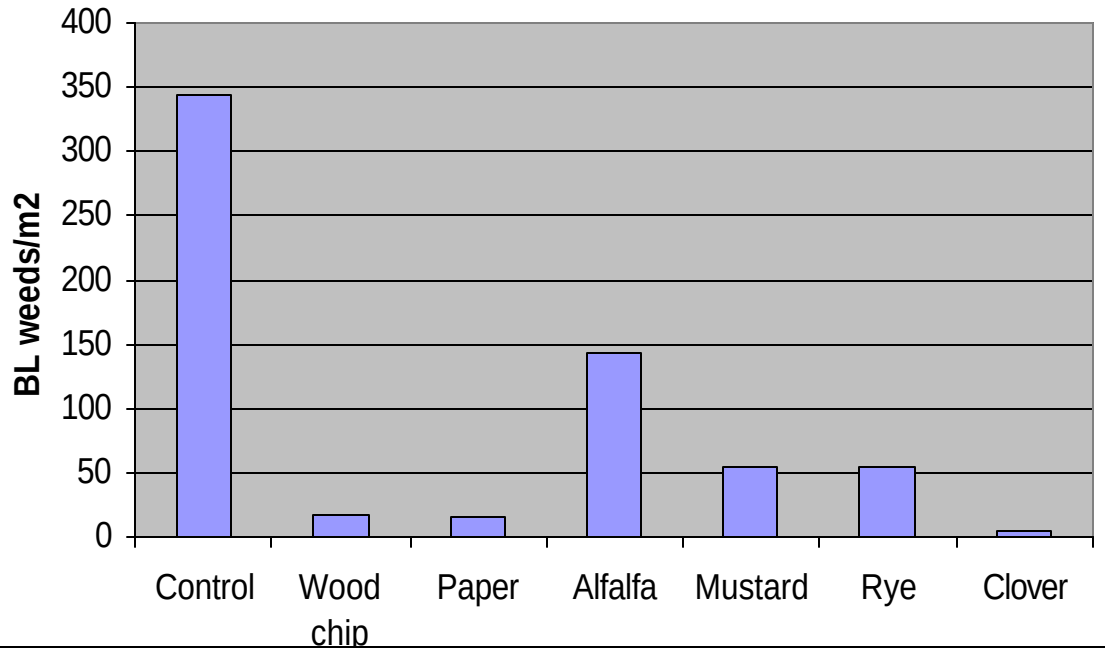
Poor suppression of annual grass weeds by mustard (4/00)

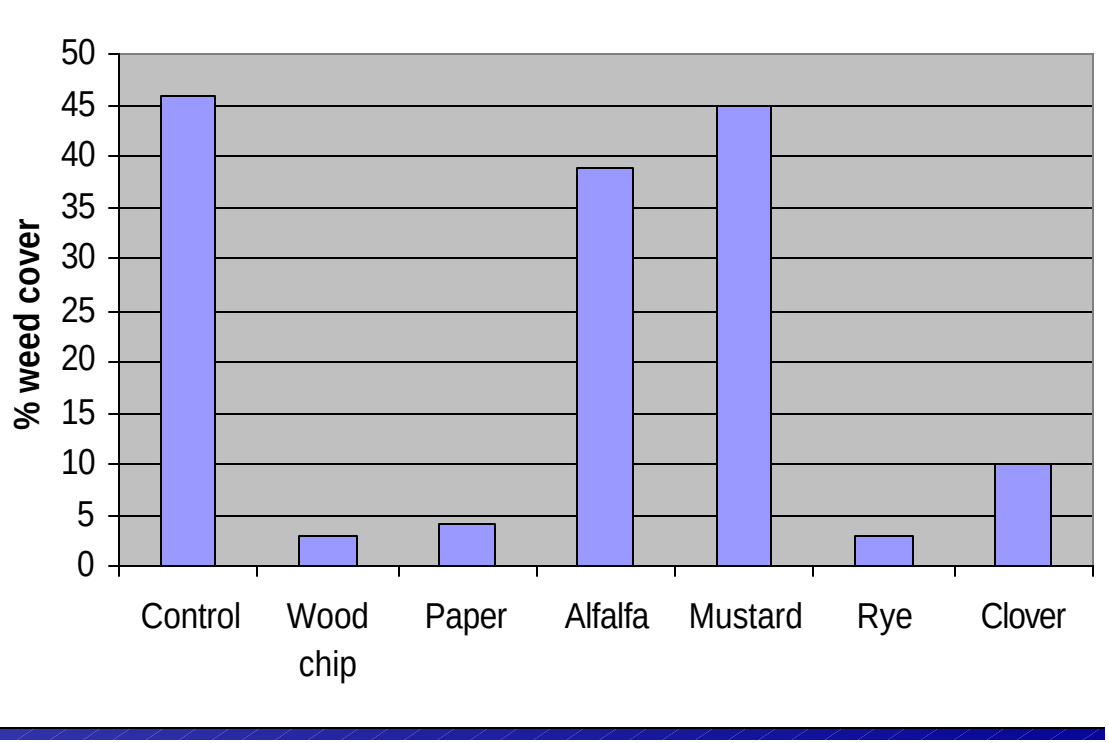

Winter rye; good weed suppression the following season


Dead rye in mid-summer; few weeds

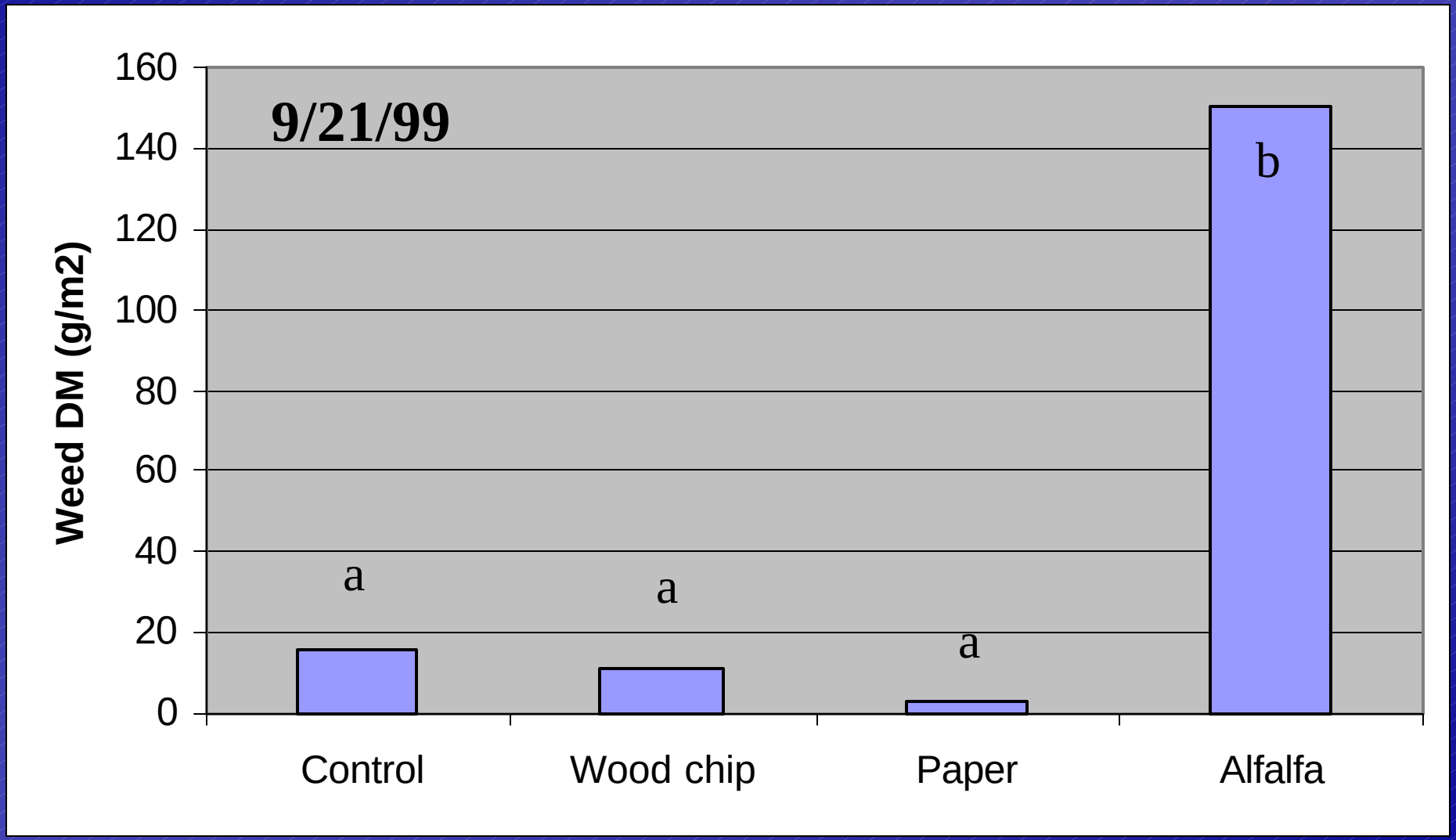
WVC Mulch Trial

Weed Control by Mulches – 6/1/00





WVC Mulch Trial
Weed Biomass 9/99



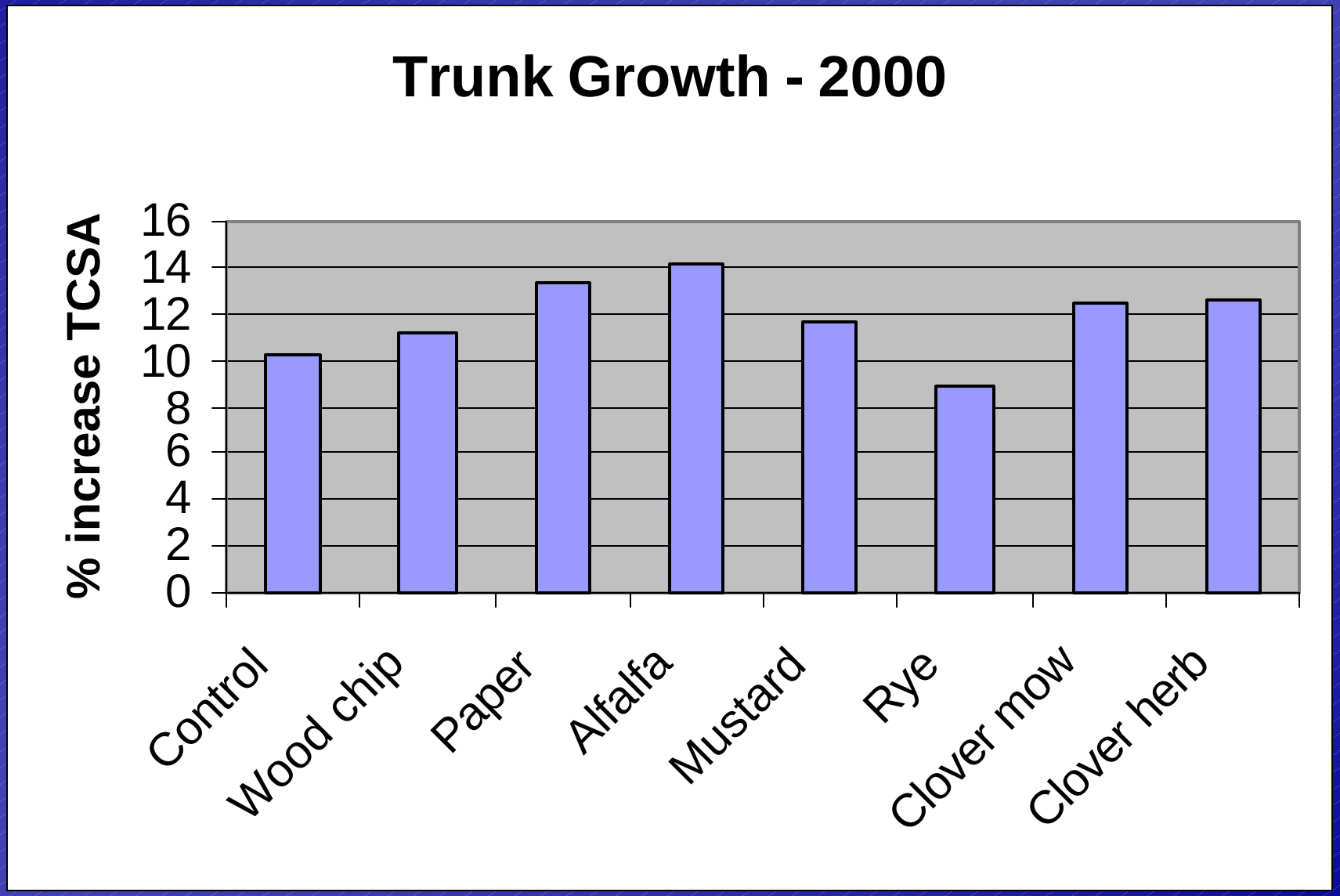
Orchard Mulching Trials – Summerland, BC

5th Leaf Spartan / M.9

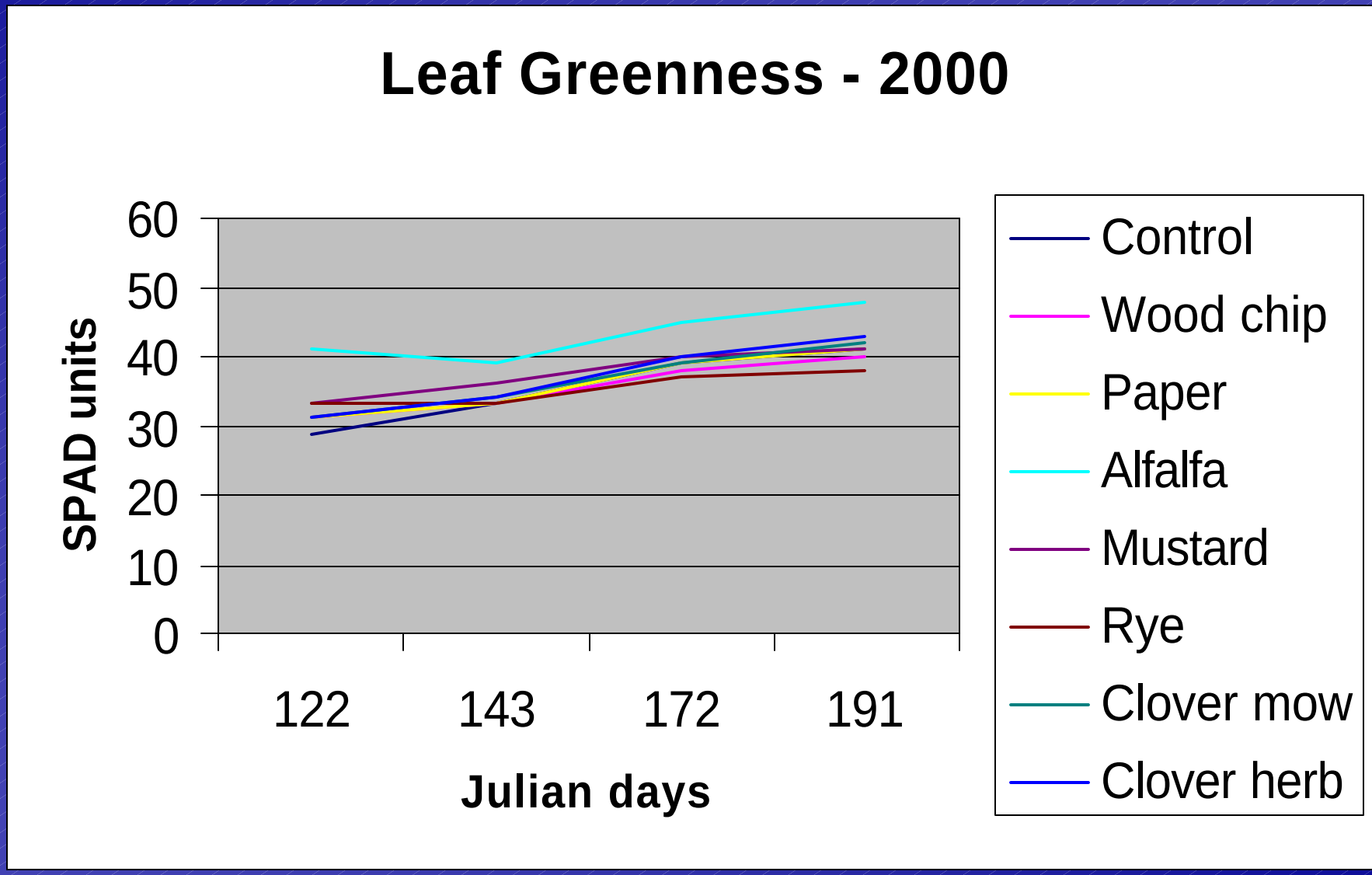
	TCSA (mm^2)	Roots ($g/0.018m^3$)	Yield (kg/tree)
1. Check (glyphosate)	1011 b	11.3 c	10.3 c
2. Biosolids (Vancouver)	1052 b	16.9 bc	11.2 bc
3. Paper mulch	1565 a	28.7 abc	13.0 ab
4. 2 + 3	1490 a	41.8 a	13.9 a
5. Composted biosolids + 3	1406 a	38.7 a	14.9 a
6. Alfalfa hay	1203 b	35.2 ab	14.0 a
7. Geotextile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

(Hogue et al., 2000)

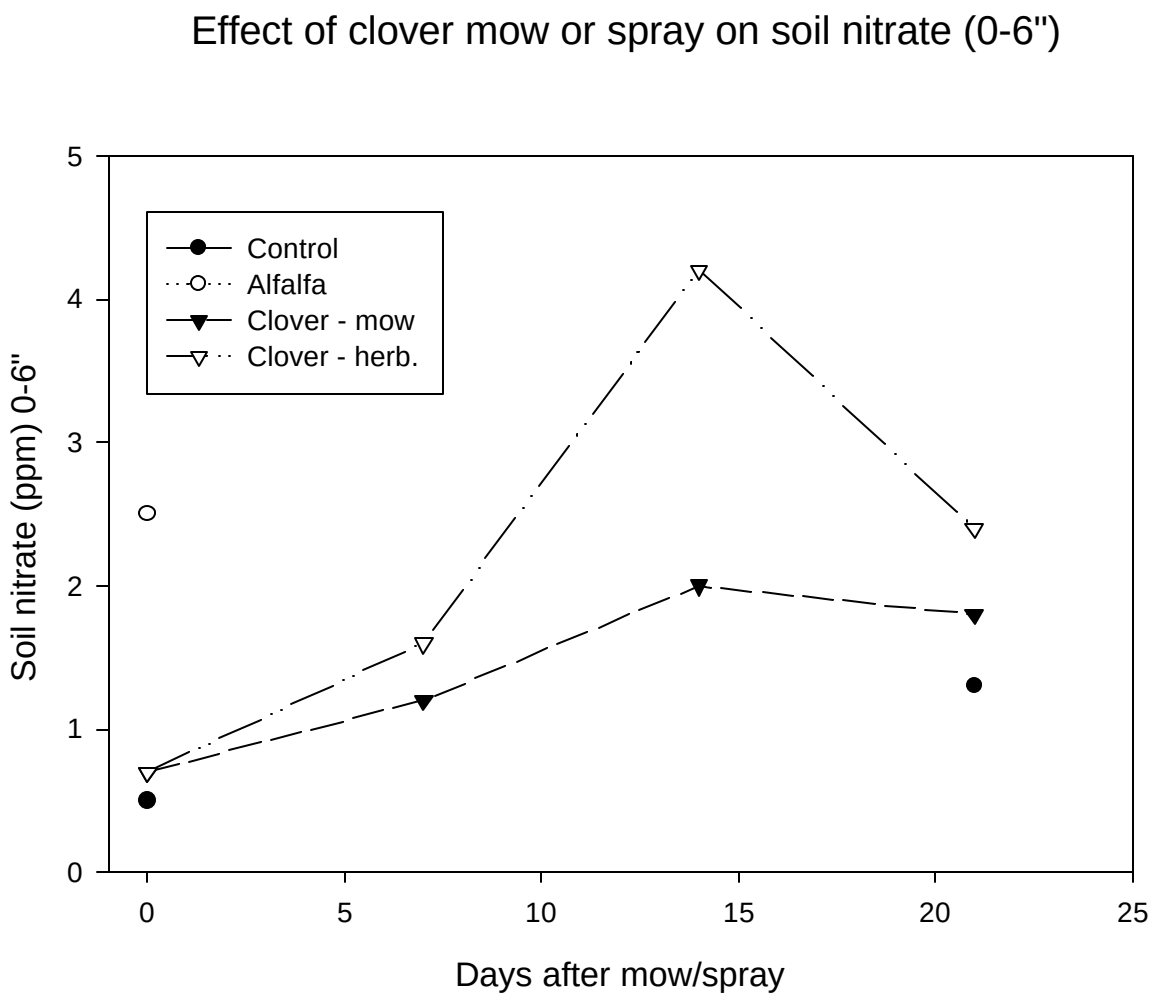
WVC Mulch Trial



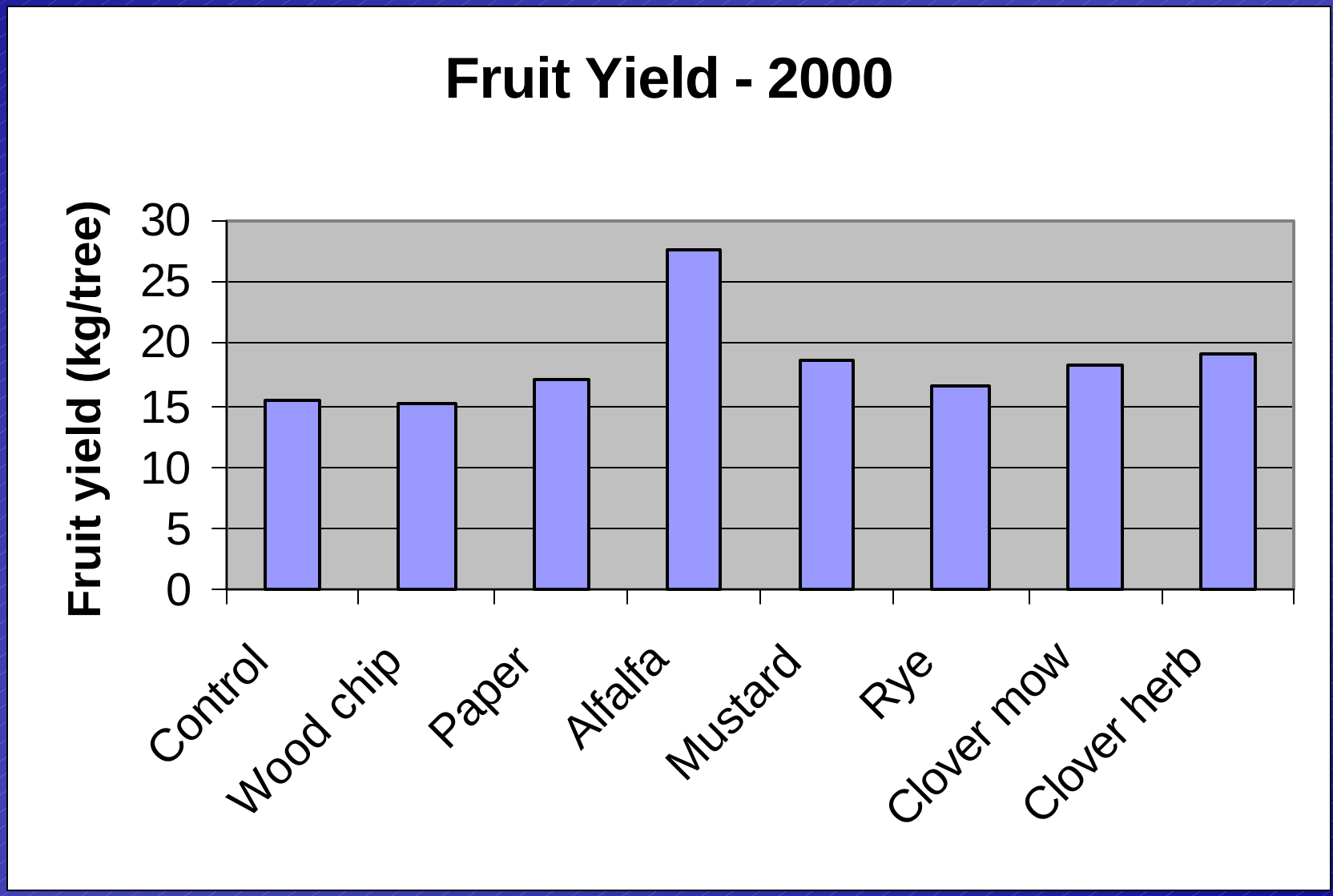
WVC Mulch Trial



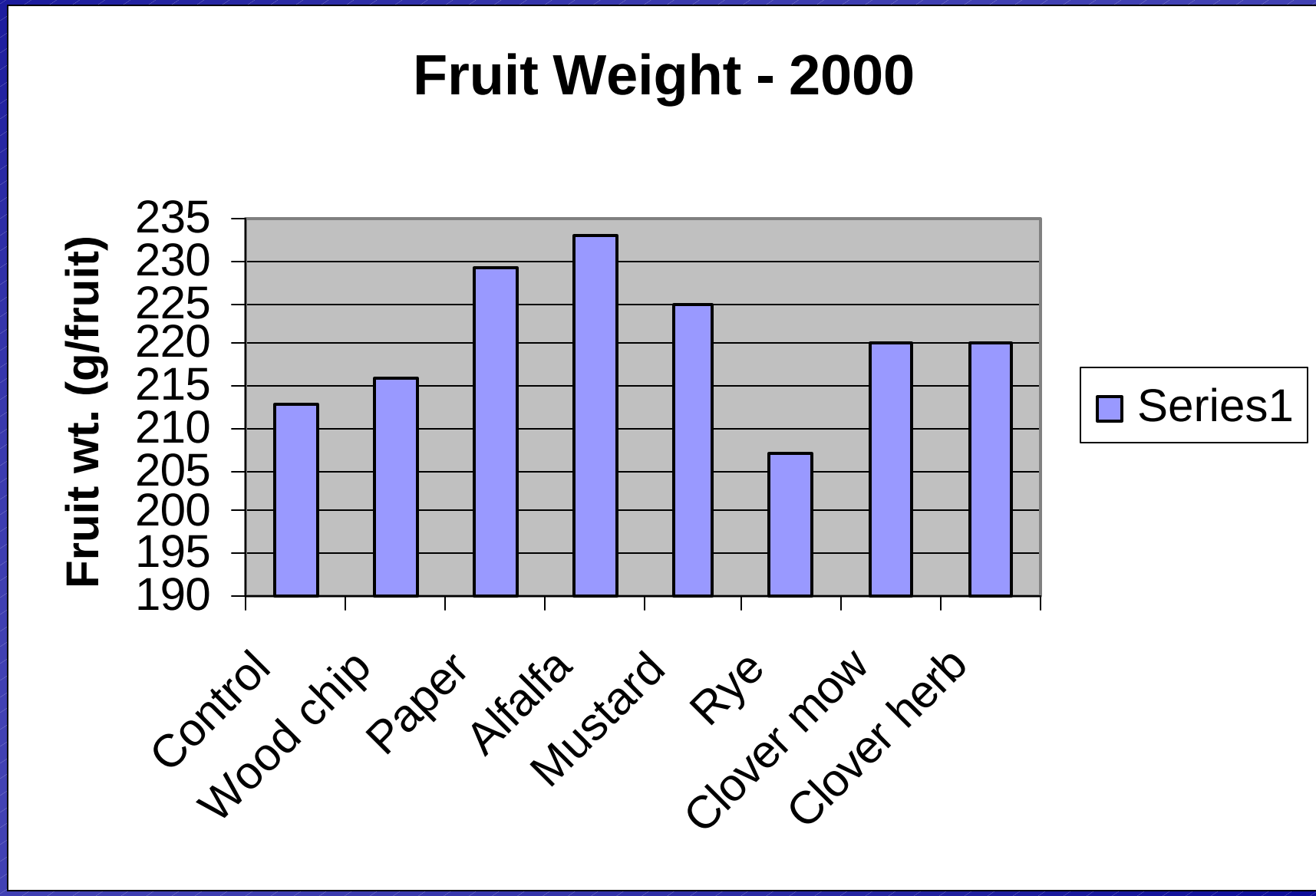
WVC Mulch Trial
Managing clover for N release



WVC Mulch Trial

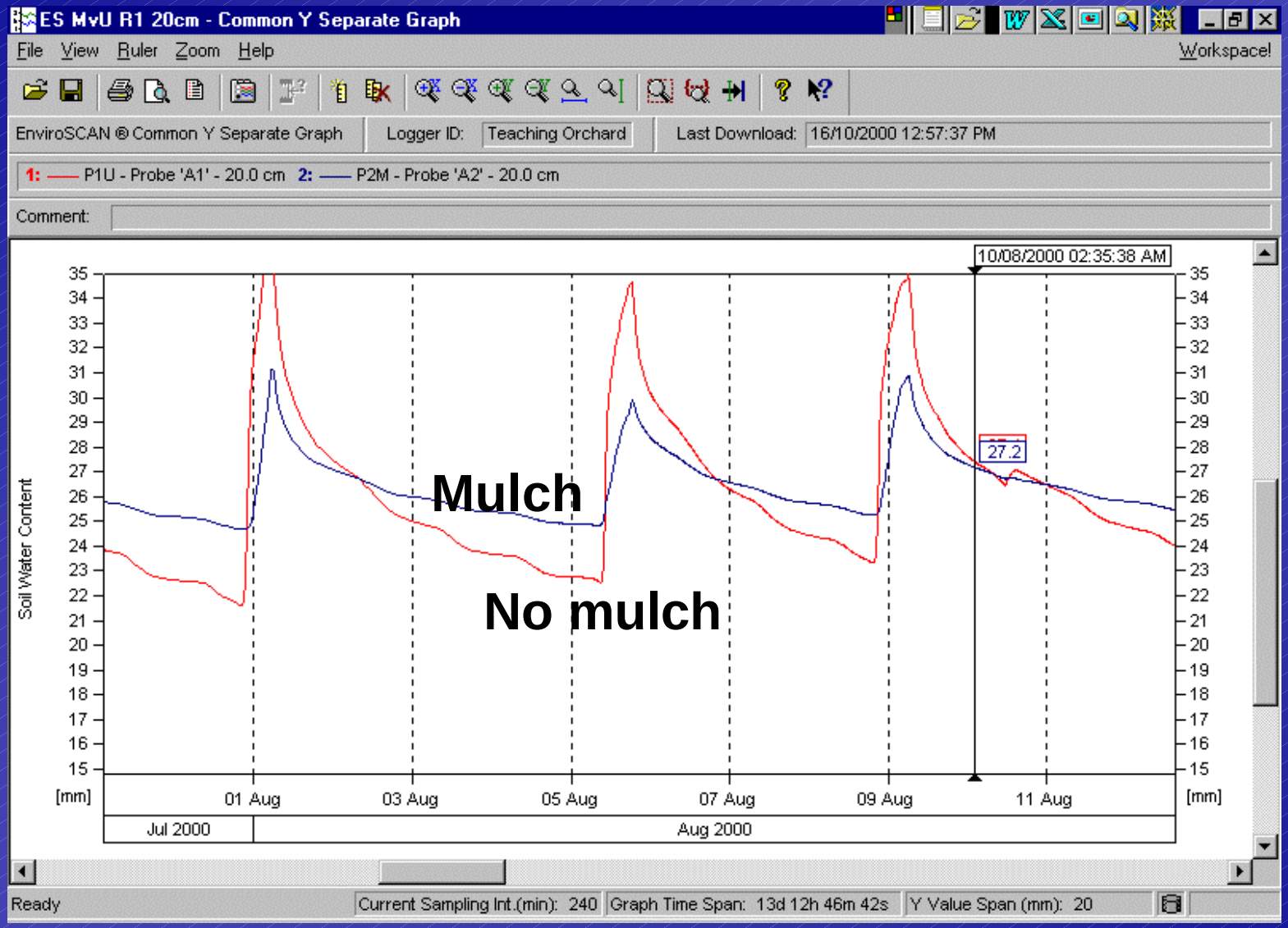


WVC Mulch Trial



Enviroscan Mulch Trial

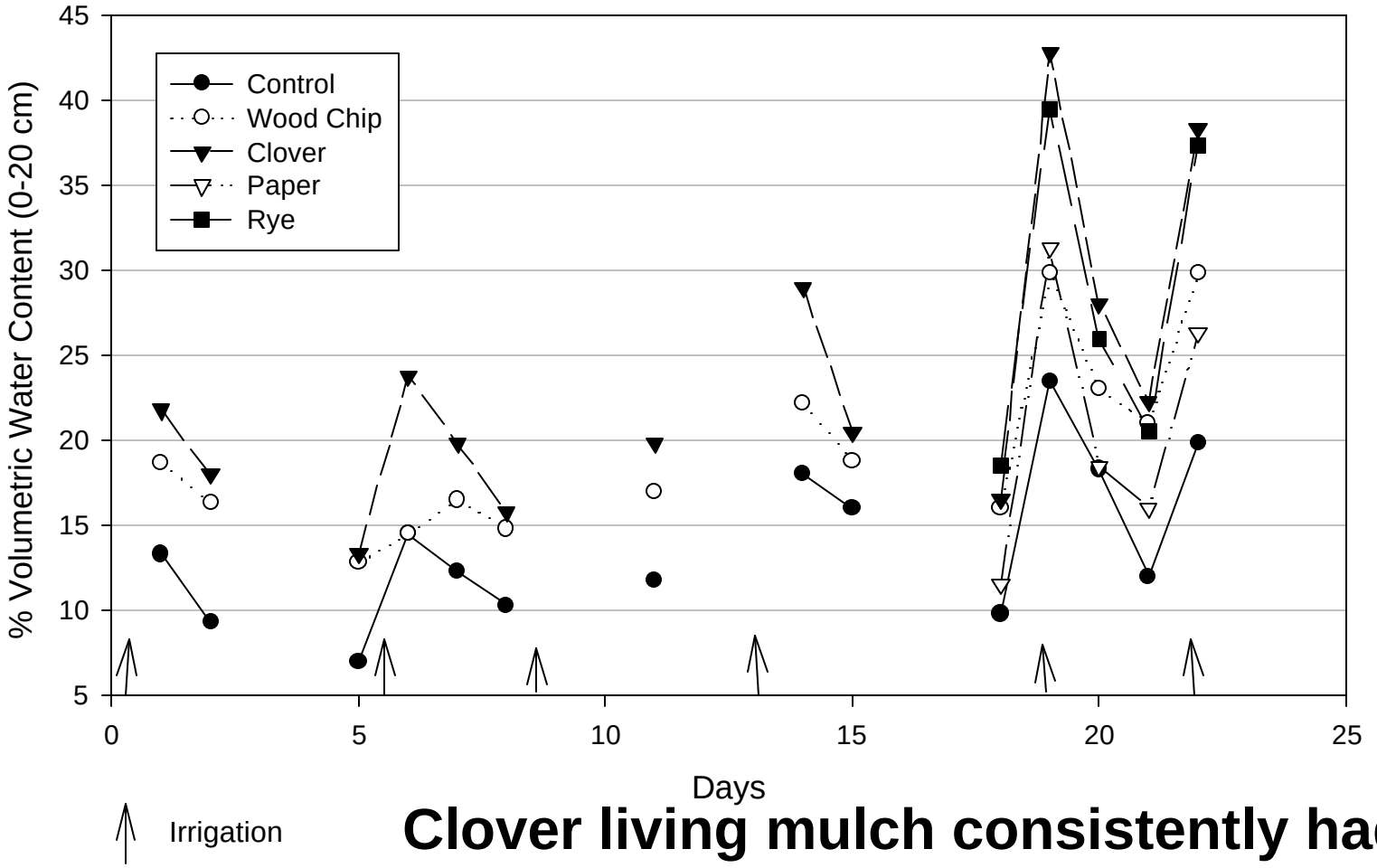
WVC – Enviroscan Results



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

Effect of Mulch on Soil Moisture - Hydrosense meter

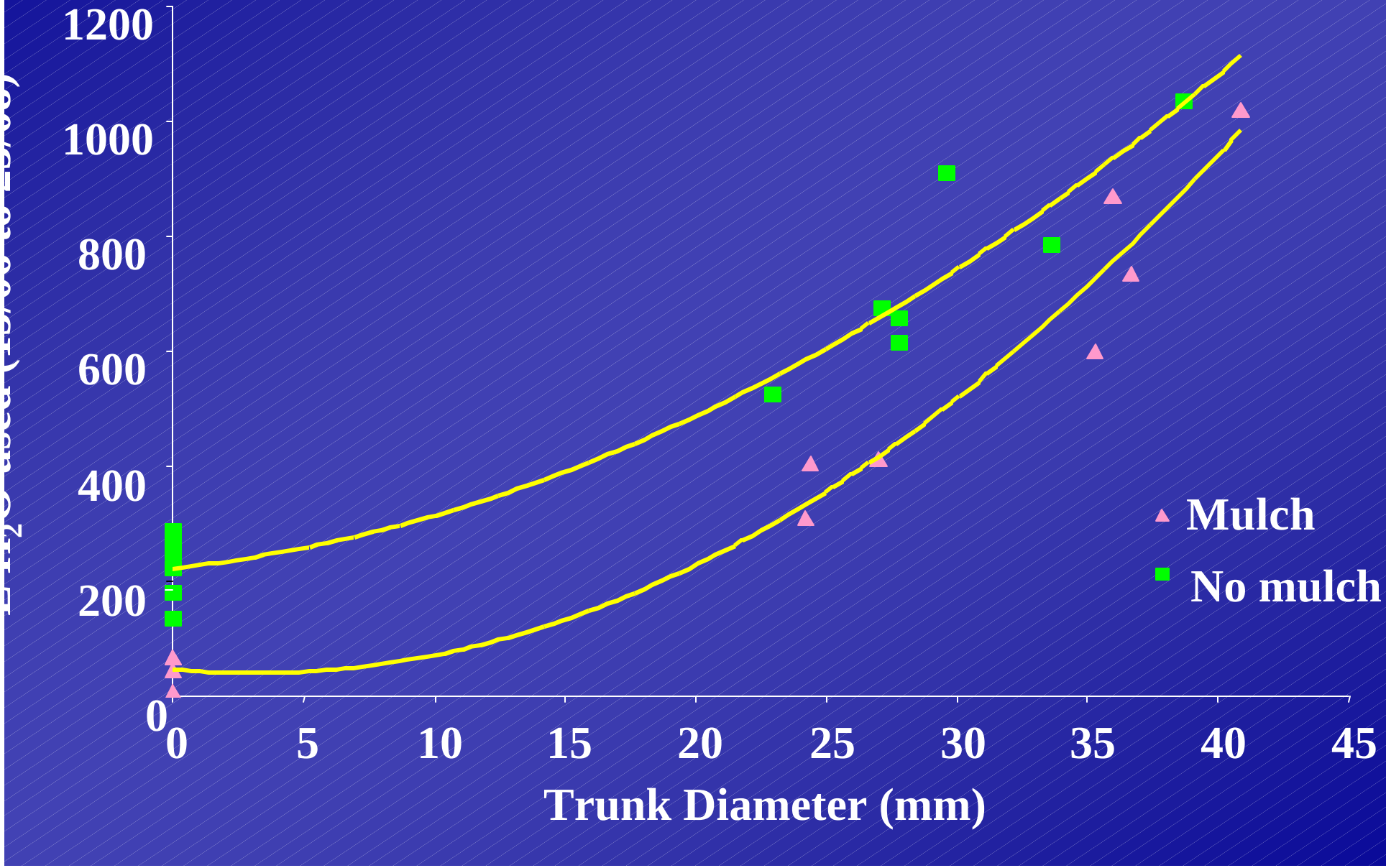
Red Delicious/M26 -- Pogue sandy loam
WVC Auvil Orchard, E. Wenatchee, WA Summer 2000



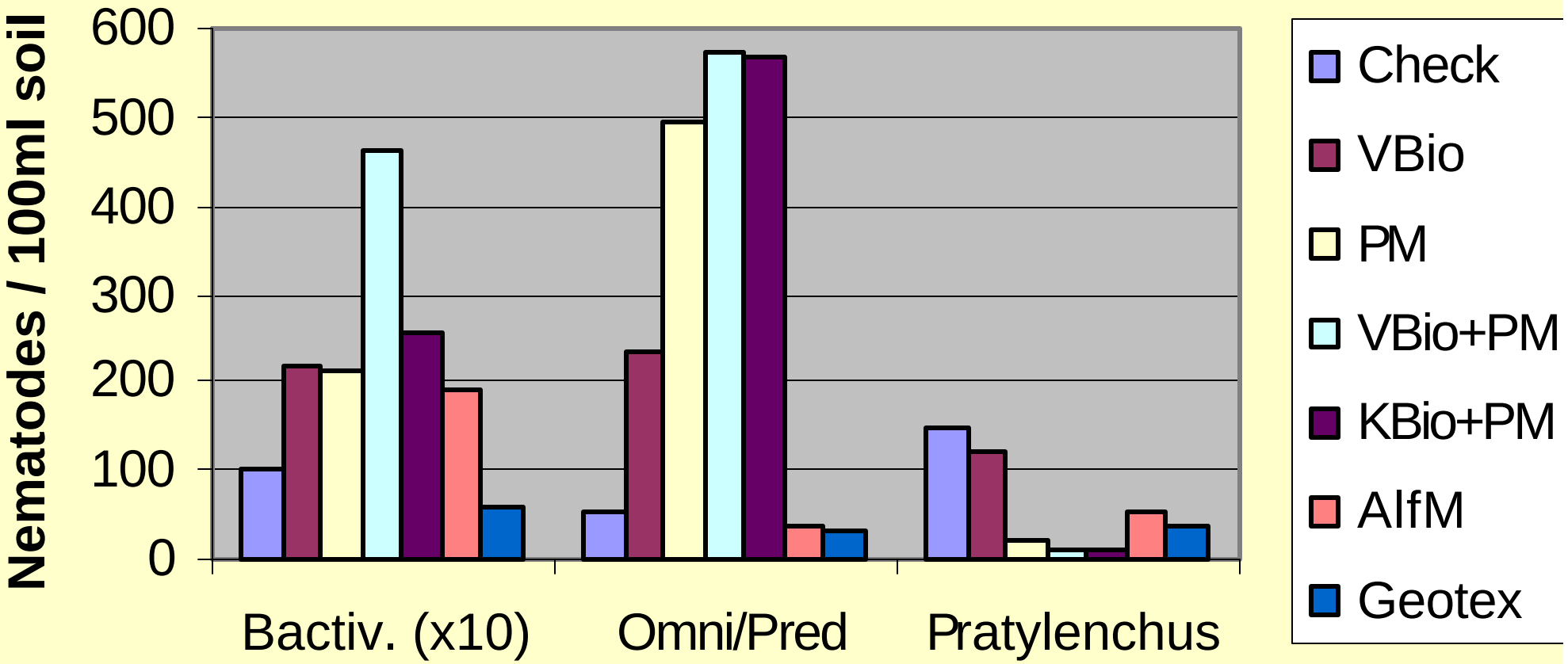
Clover living mulch consistently had the highest soil moisture.

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