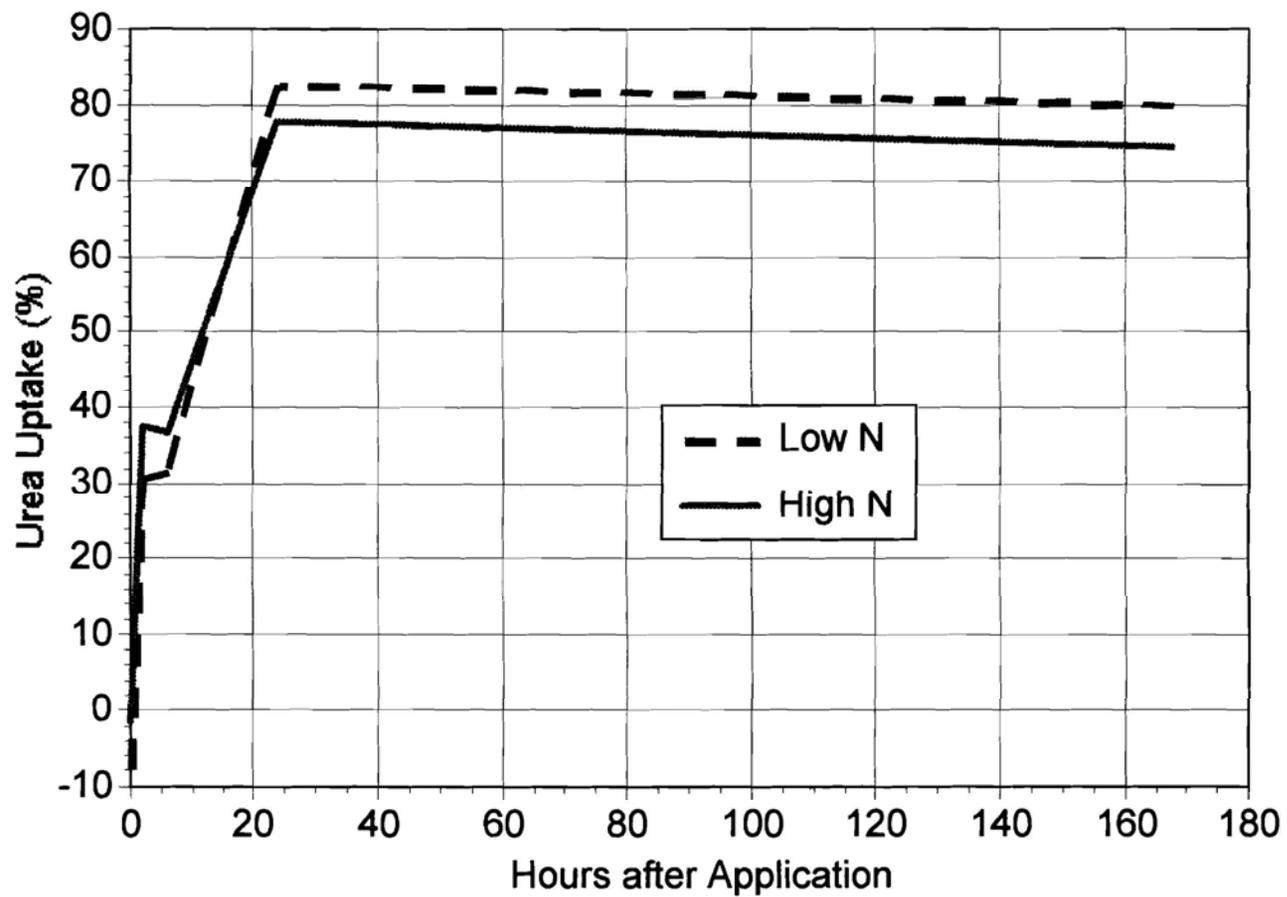


Zinc Foliar Uptake Efficiency

R. Scott Johnson
UC Extension Pomologist



Experiment 93-1 Early Maycrest



Reported Zn Uptake Efficiencies

- 2.1 to 6.5% Pistachios
- 3.5% Walnuts
- 6.0% Beans
- 0.2% Pecans
- <1.0% Citrus
- 0.2 to 14.5% Peaches



Factors Affecting Zinc Foliar Uptake

- Plant Species
- Zn Formulation
- Zn Concentration in Solution
- Length of Time for Uptake
- Zn Status of the Plant
- Leaf Age
- Additives – Surfactants, Urea etc.



Zinc Materials

Basic Chemicals

- Zn sulfate
- Zn oxide
- Zn carbonate
- Zn chloride
- Zn oxysulfate
- Zn nitrate

Chelates & Complexes

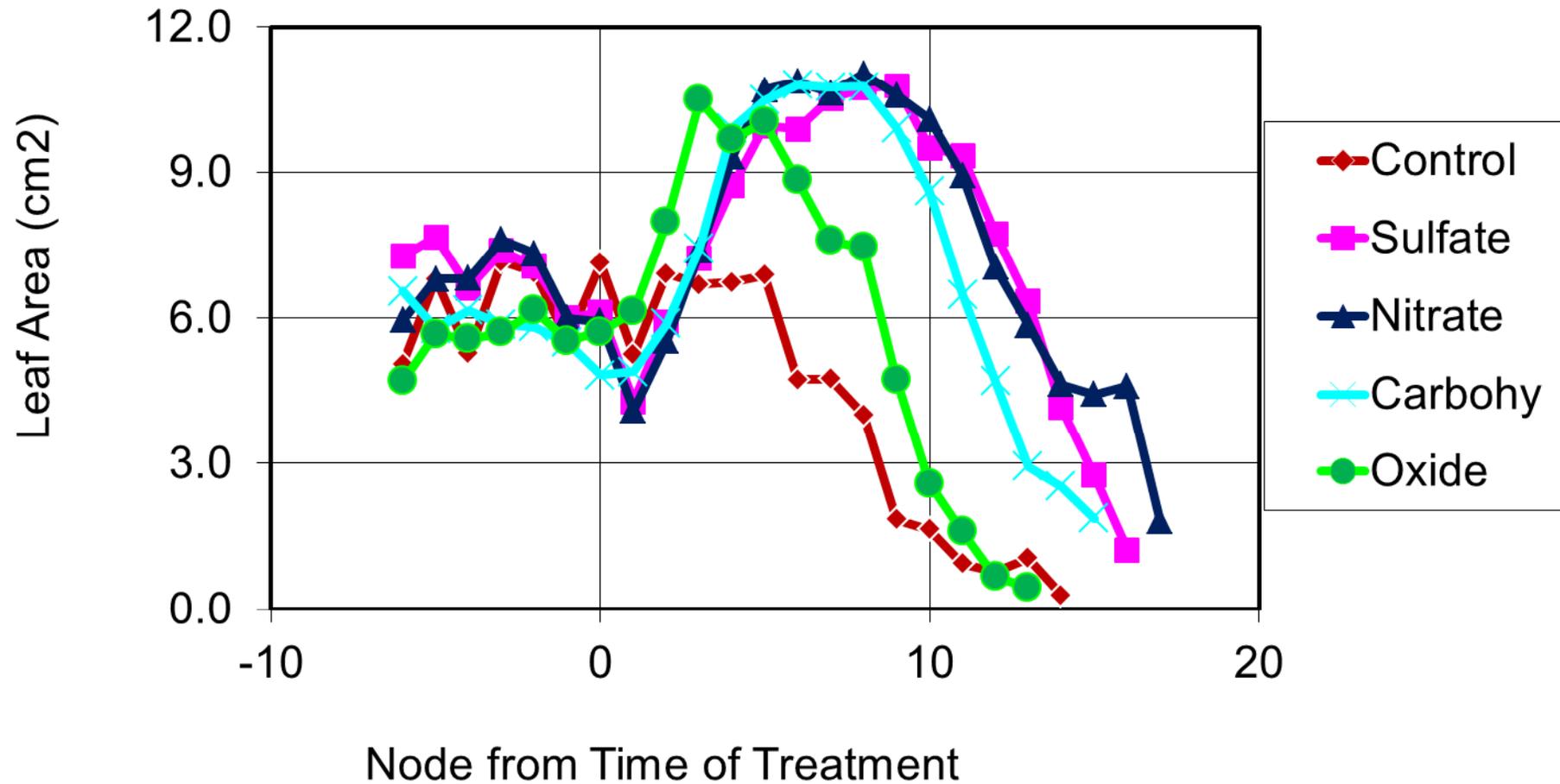
- EDTA
- Lignosulfonate
- Amino acid
- Sugar
- Citric acid
- Fulvic acid, humic acid







Leaf Area of Individual Leaves



Comparing Zinc Formulations

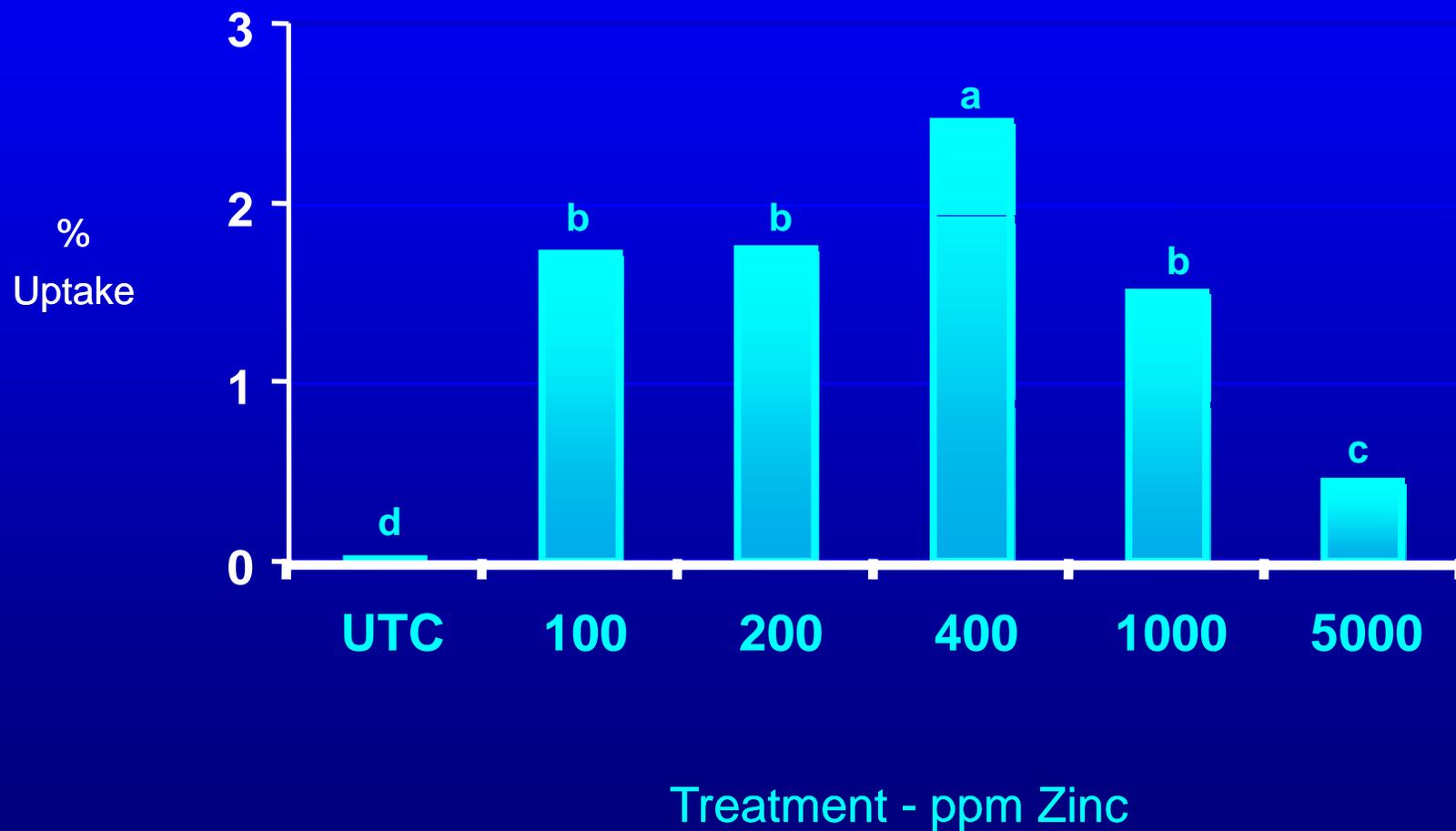
<u>Ranking</u>	<u>Formulation</u>	<u>Anion Size</u>	<u>Solubility</u> (g/100 H ₂ O)	<u>Phytotoxicity</u>
<u>Most Effective</u>	Zinc Chloride	35	432	High (58*)
<u>Almost As Good</u>	Zinc Nitrate	62	324	High (54)
	Zinc Nitrate Mix	62 & 96	324	High (59)
<u>Next Best</u>	Zinc Sulfate	96	50	Moderate (12)
	Zinc Carbohydrate	96 & ?	High	Moderate
	Zinc Polyamine	96 & 75-204	High	Moderate
	Zinc Glycine	96 & 75		Moderate (15)
<u>Less Effective</u>	Zinc EDTA	292	High	Low
	Zinc Leonardite	1000+	High	Low
	Zinc Oxysulfate	16 & 96	1.3	None
<u>Least Effective</u>	Zinc Phosphite	79	?	Low (17)
	Zinc Oxide Suspension	16	Insoluble	None



Factors Affecting Zinc Foliar Uptake

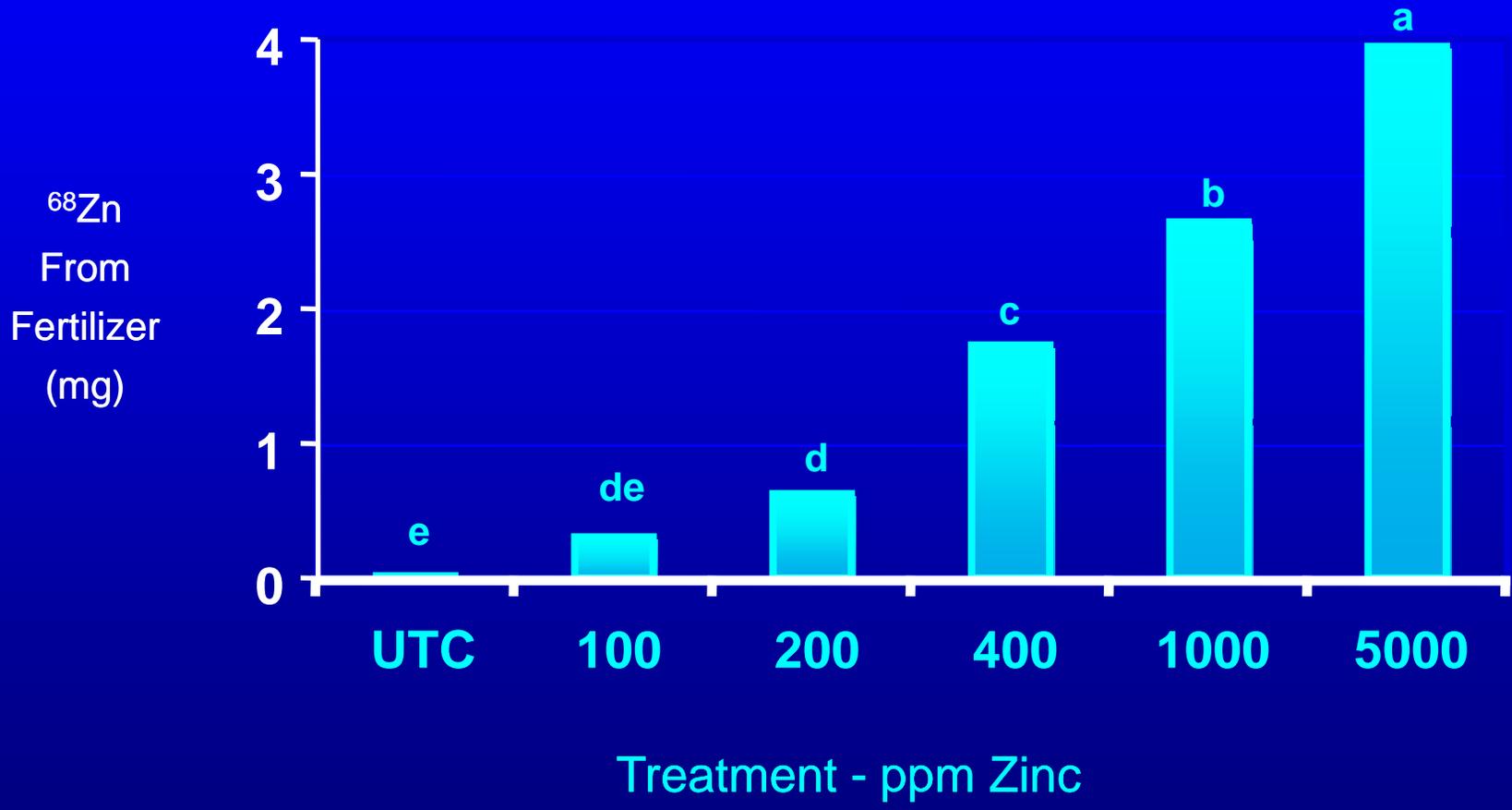
- Plant Species
- Zn Formulation
- **Zn Concentration in Solution**
- Length of Time for Uptake
- Zn Status of the Plant
- Leaf Age
- Additives – Surfactants, Urea etc.

Peach Seedlings - $^{68}\text{ZnSO}_4$ Rate
 ^{68}Zn Taken Up by Plant as % of Applied



Peach Seedlings - $^{68}\text{ZnSO}_4$ Rate

^{68}Zn in Untreated Plant Organs





Factors Affecting Zinc Foliar Uptake

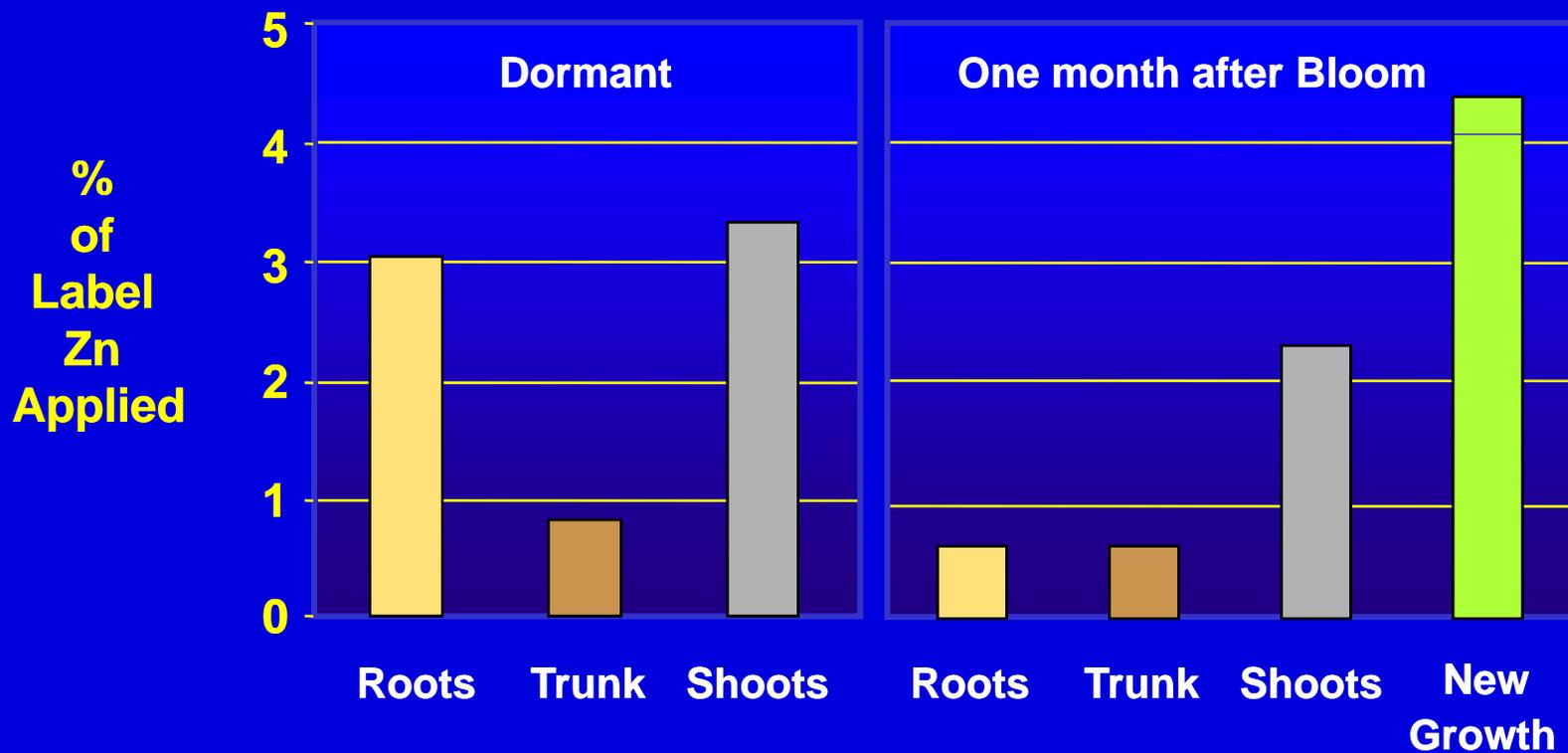
- Plant Species
- Zn Formulation
- Zn Concentration in Solution
- **Length of Time for Uptake**
- Zn Status of the Plant
- Leaf Age
- Additives – Surfactants, Urea etc.







Recovery of Labelled ^{68}Zn Sulfate Applied to Leaves of One-Year-Old Peach Trees in the Fall

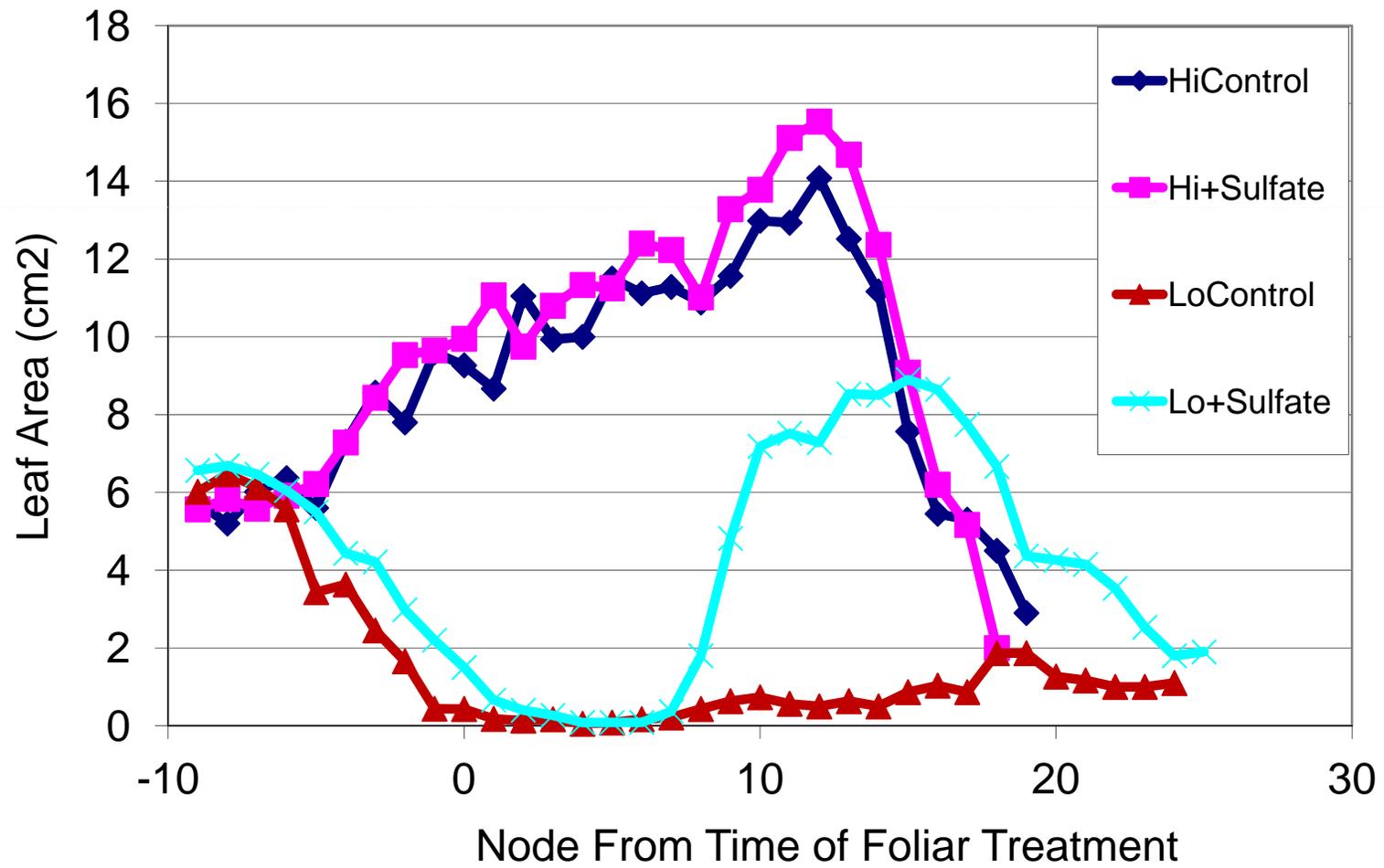


Factors Affecting Zinc Foliar Uptake

- Plant Species
- Zn Formulation
- Zn Concentration in Solution
- Length of Time for Uptake
- **Zn Status of the Plant**
- Leaf Age
- Additives – Surfactants, Urea etc.



Zinc Status Experiment





Zinc Status Experiment

High Zinc – 6.0% Uptake of Foliar ^{68}Zn

Low Zinc – 7.2% Uptake of Foliar ^{68}Zn



Factors Affecting Zinc Foliar Uptake

- Plant Species
- Zn Formulation
- Zn Concentration in Solution
- Length of Time for Uptake
- Zn Status of the Plant
- Leaf Age
- Additives – Surfactants, Urea etc.



Zinc Uptake and Leaf Age

(From work of Patrick Brown)

Pistachio

Young Leaves – 6.5% Zn Uptake

Mature Leaves – 2.1% Zn Uptake

Walnut

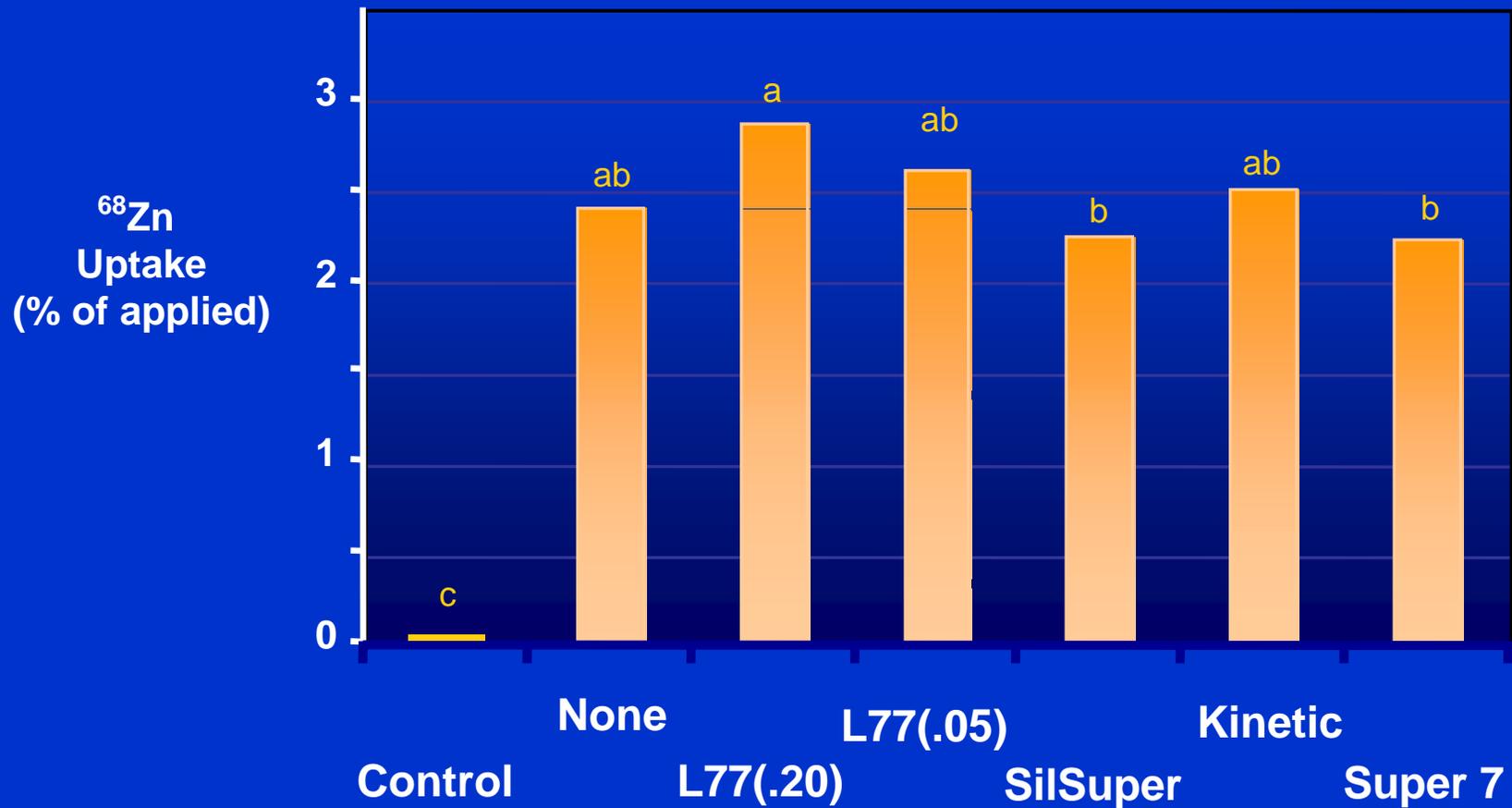
No Difference

Factors Affecting Zinc Foliar Uptake

- Plant Species
- Zn Formulation
- Zn Concentration in Solution
- Length of Time for Uptake
- Zn Status of the Plant
- Leaf Age
- Additives – Surfactants, Urea etc.



Surfactants Added to ⁶⁸Zn Sulfate











Factors Affecting Zinc Foliar Uptake

- Plant Species
- Zn Formulation
- Zn Concentration in Solution
- Length of Time for Uptake
- Zn Status of the Plant
- Leaf Age
- Additives – Surfactants, Urea etc.

Zinc Fertilization

- Apply if symptoms appear or leaf Zn < 10 to 12 ppm or Sept shoot Zn < 20 ppm
- If needed in mature trees – spray 4 to 8 lbs/acre of zinc sulfate (36% Zn) in early fall – can be applied with urea







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Varieties

Pruning & Training

Pollination

Thinning

Girdling

Nutrition & Fertilization

Irrigation

Rootstocks

Nemaguard has been the standard rootstock in California peach, plum and nectarine orchards for many years. Recently, a variety of new rootstocks have become available from numerous breeding programs around the world. This section provides information on the characteristics of these stocks.



SEARCH FOR ROOTSTOCK BY:

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MORE INFORMATION:

- [NC-140 Rootstock Trials](#)
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