

Foliar Nutrient Application Update: Opportunities & Solutions

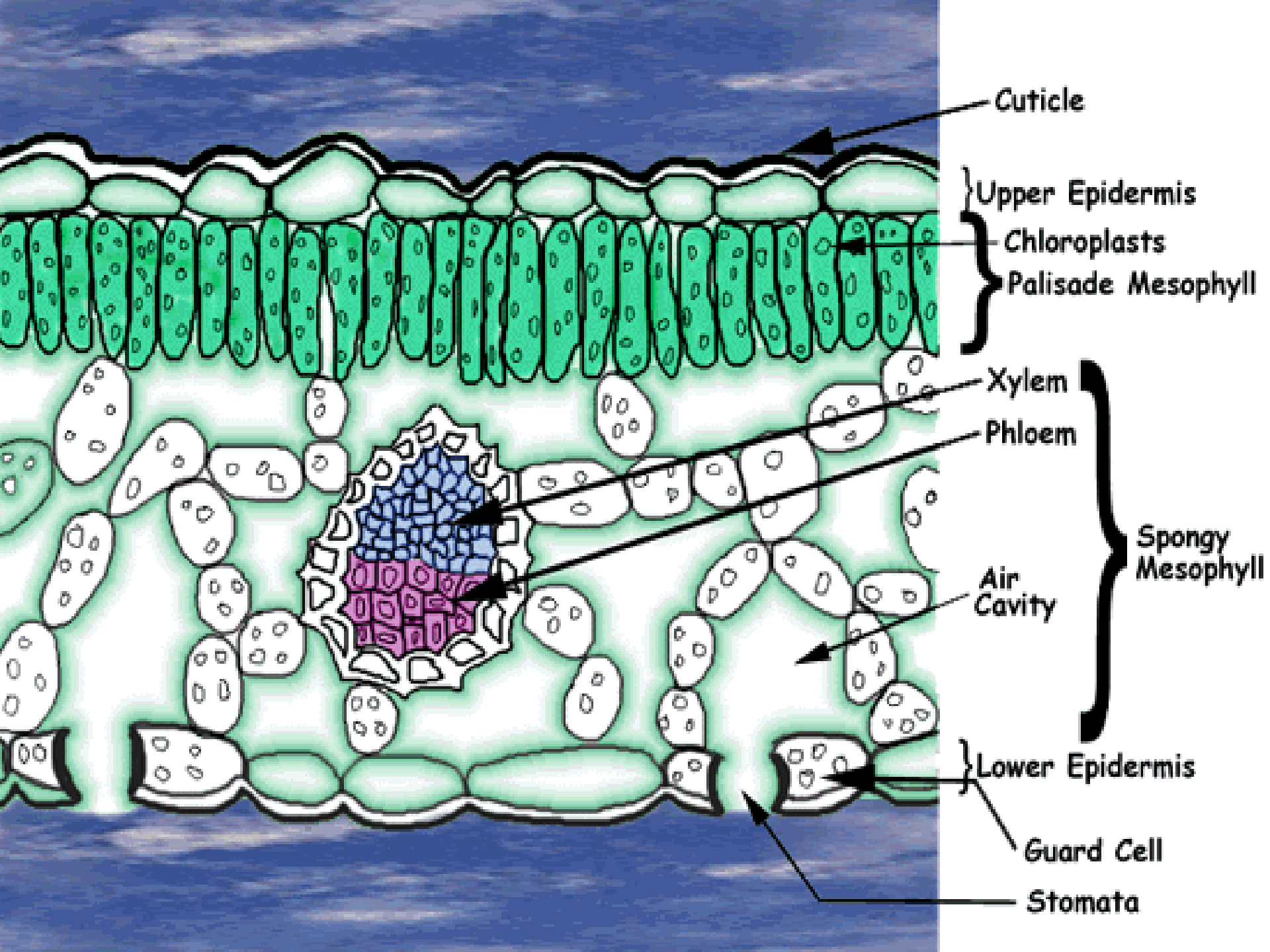
**Scott Johnson
Patrick Brown
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Dept of Plant Sciences**

Foliar Nutrient Uptake Principles

Nitrogen & Zinc

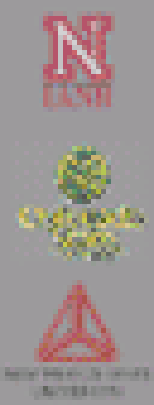
1. Cuticle biology





Lipophilic herbicide moves slower through the cutin and faster through the wax.

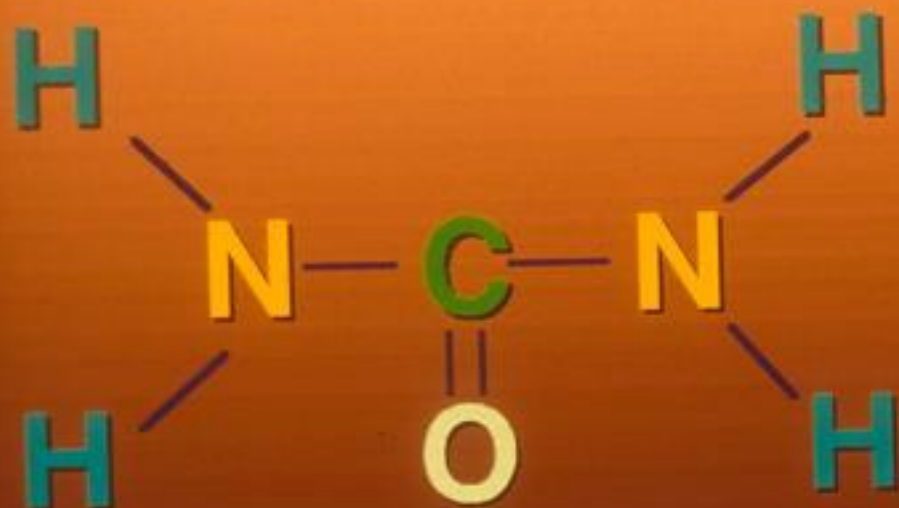
Hydrophilic herbicide moves slower through the wax regions and faster through the cutin.



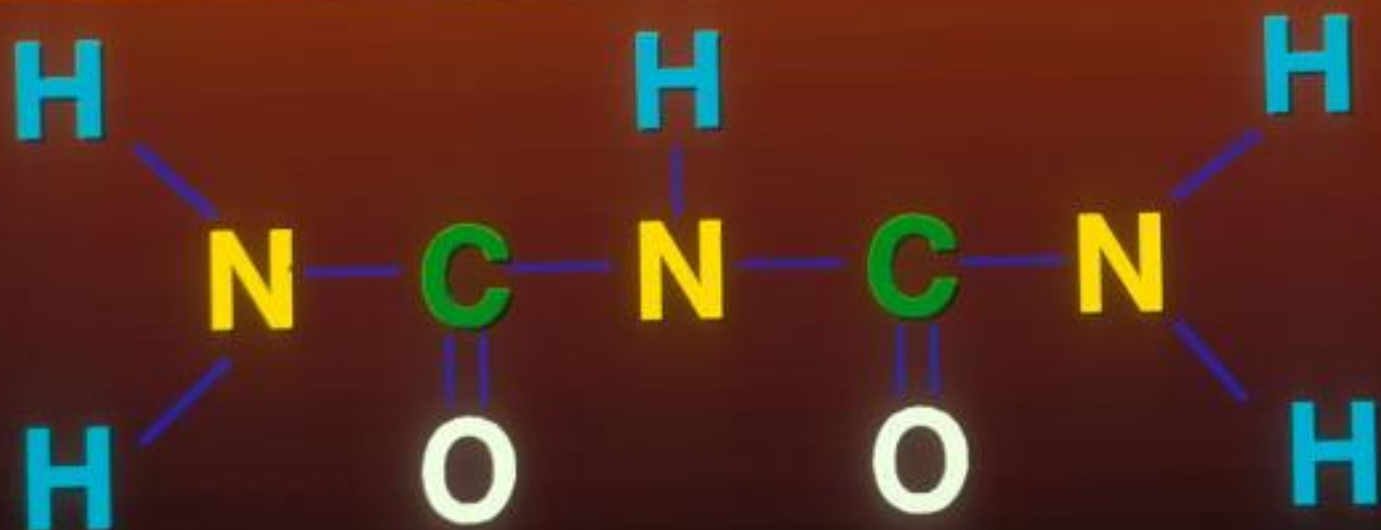
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1. Cuticle biology
2. Smaller molecules = Better uptake
3. More soluble materials = Better uptake

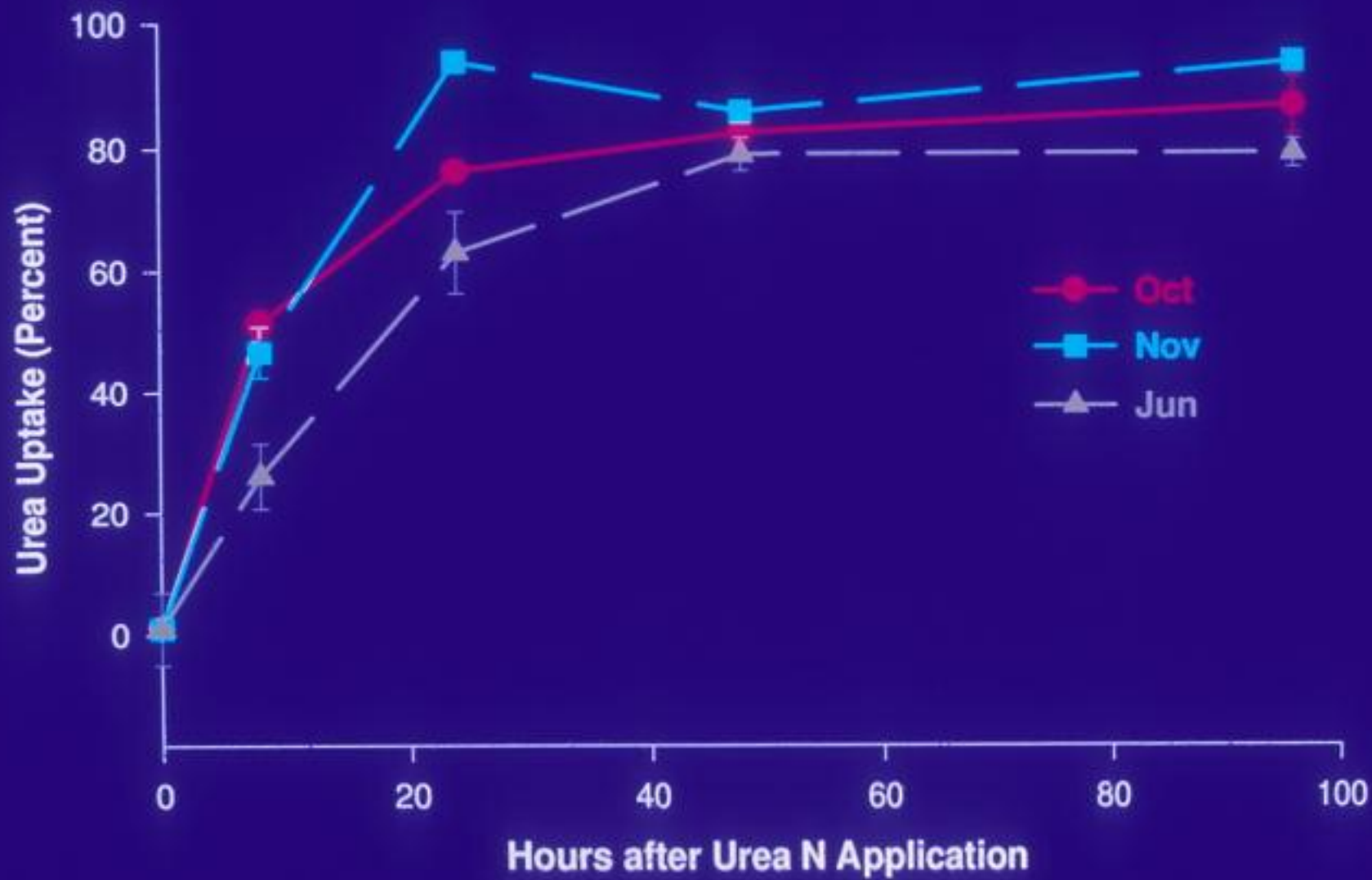


Urea



Biuret

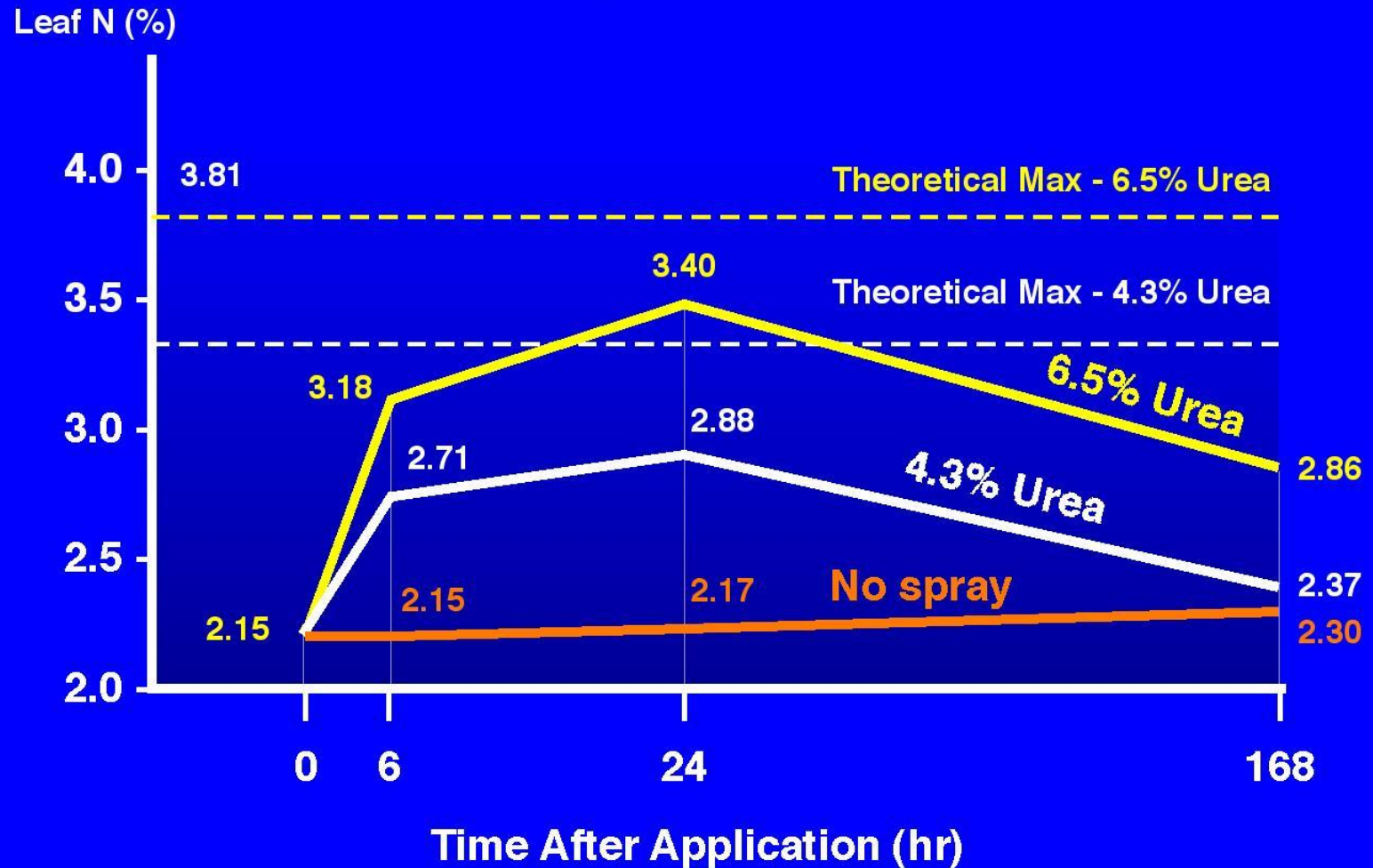






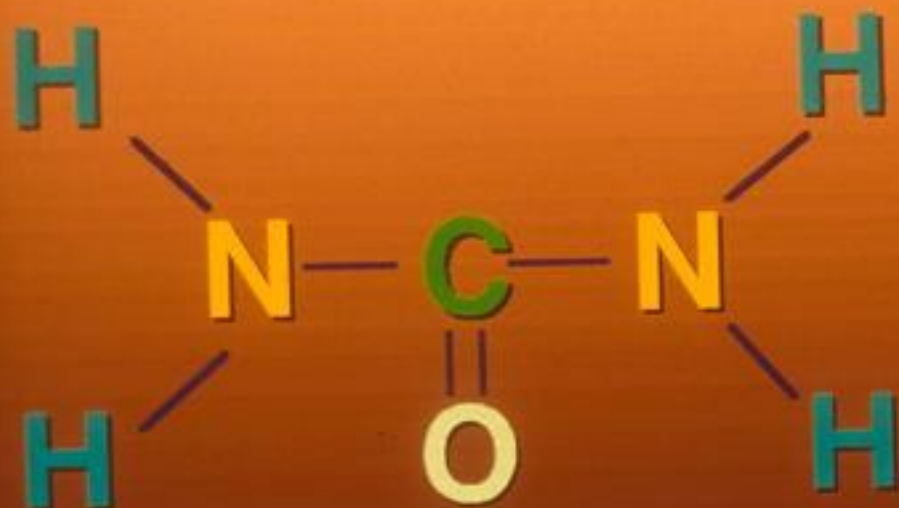


Changes in Peach Leaf N After Urea Spray in Late September

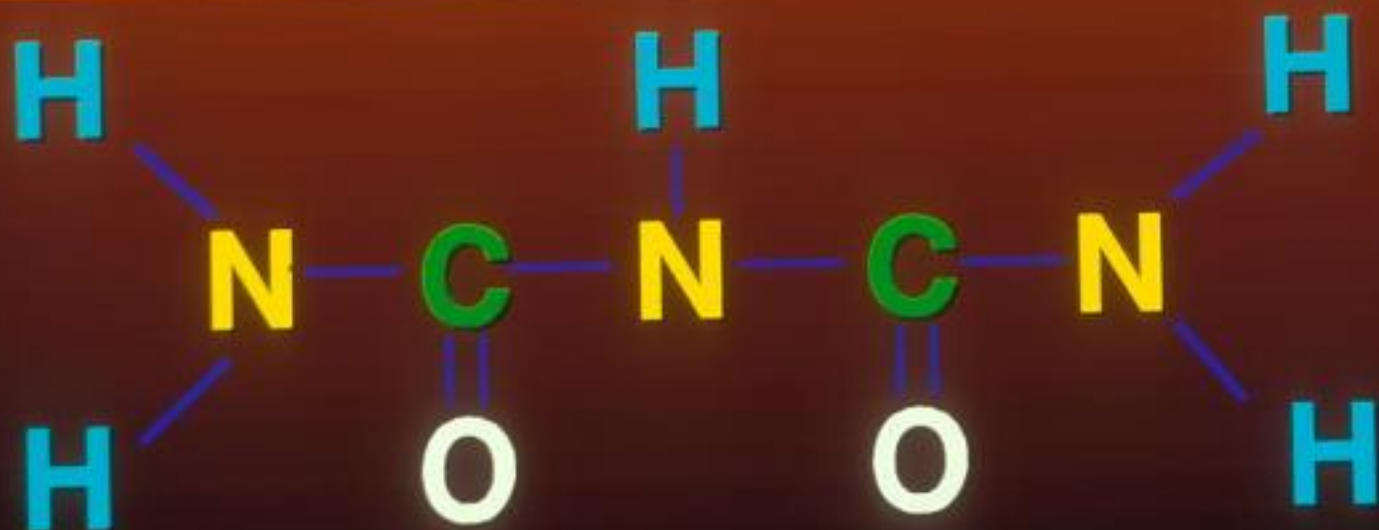








Urea



Biuret





METEOR

ZINC
SULPHATE

ROYAL
POTS

20018
HASTER
SPRAY

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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











Ziaon 4

Ziaon 4

Ziaon 4

Ziaon 4

UTC

Treated

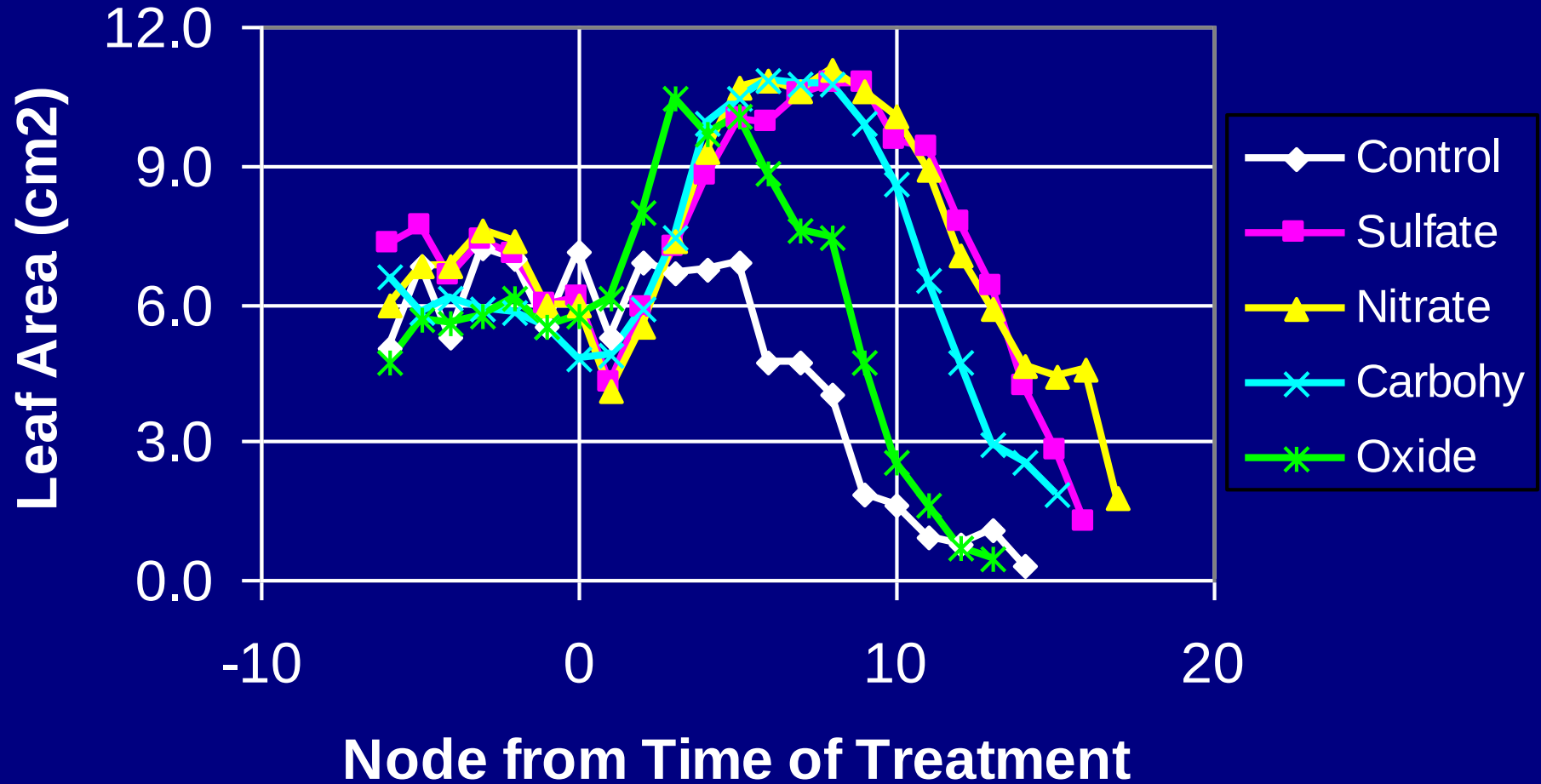


UTC

Treated



Leaf Area of Individual Leaves

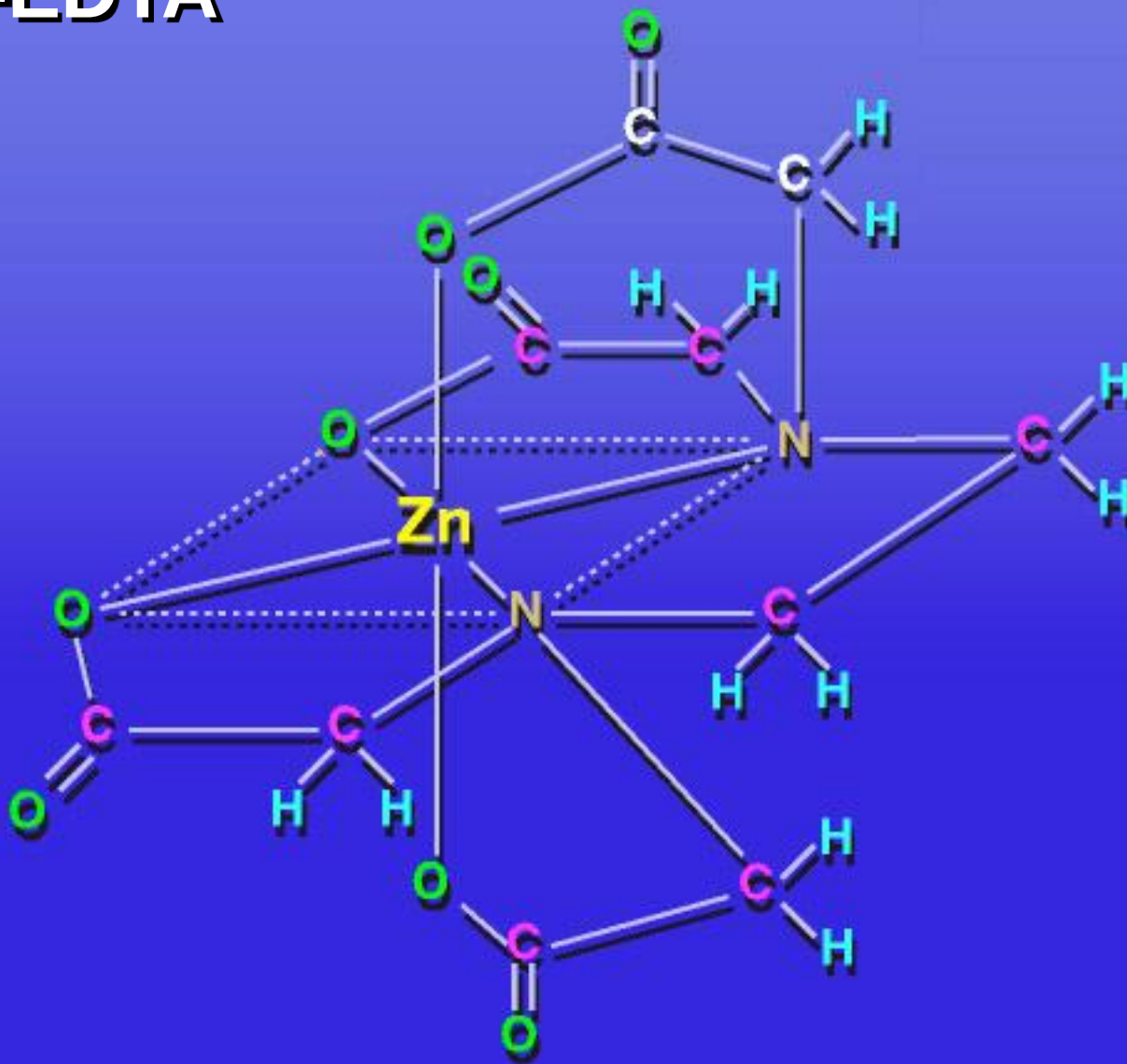


Comparing Zinc Formulations

Most Effective = Sulfate – 36%
Polyamine
Nitrate
Carbohydrate

Less Effective = EDTA
Leonardite
Neutral Zn – 52%
ZnO Suspensions

Zn-EDTA



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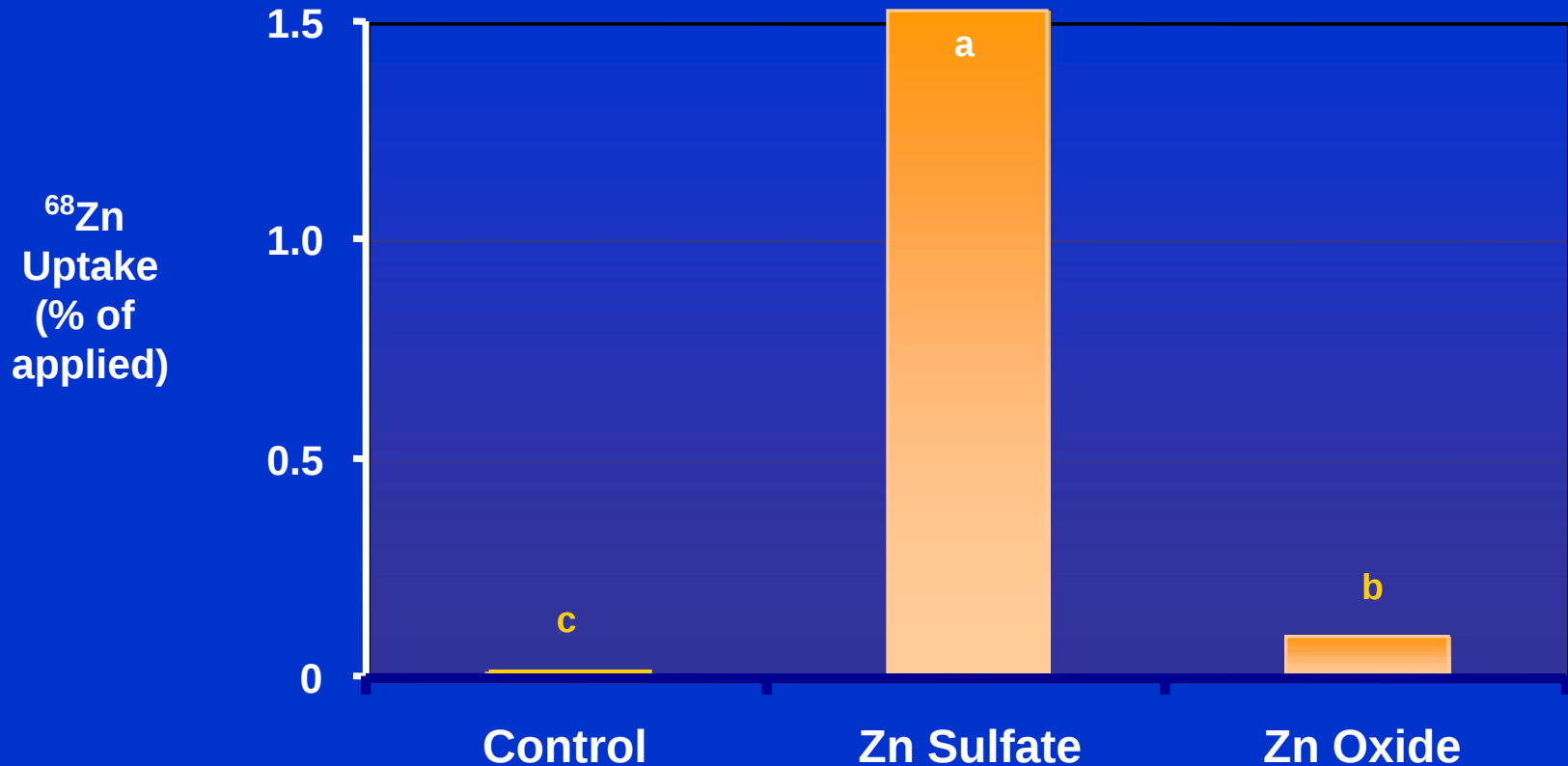
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Labeled ^{68}Zn Sulfate vs. ^{68}Zn Oxide

Applied to Dormant Nursery Trees



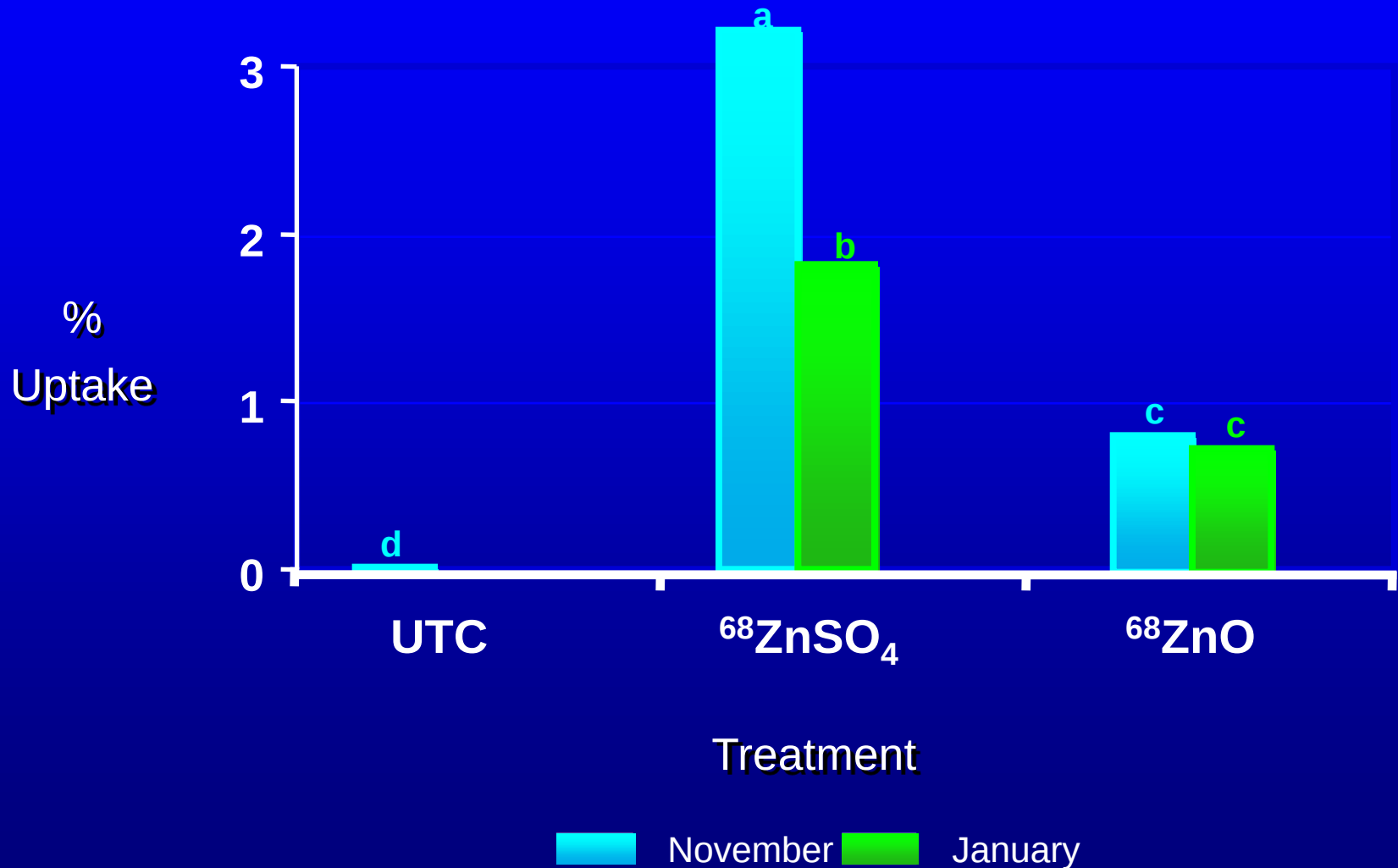






Nursery Trees in Pots - Application to Dormant Shoots

$^{68}\text{ZnSO}_4$ vs. ^{68}ZnO - % of Applied Taken Up



Foliar Nutrient Uptake Principles

Nitrogen & Zinc

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4. Longer time on leaf or shoot = Better uptake

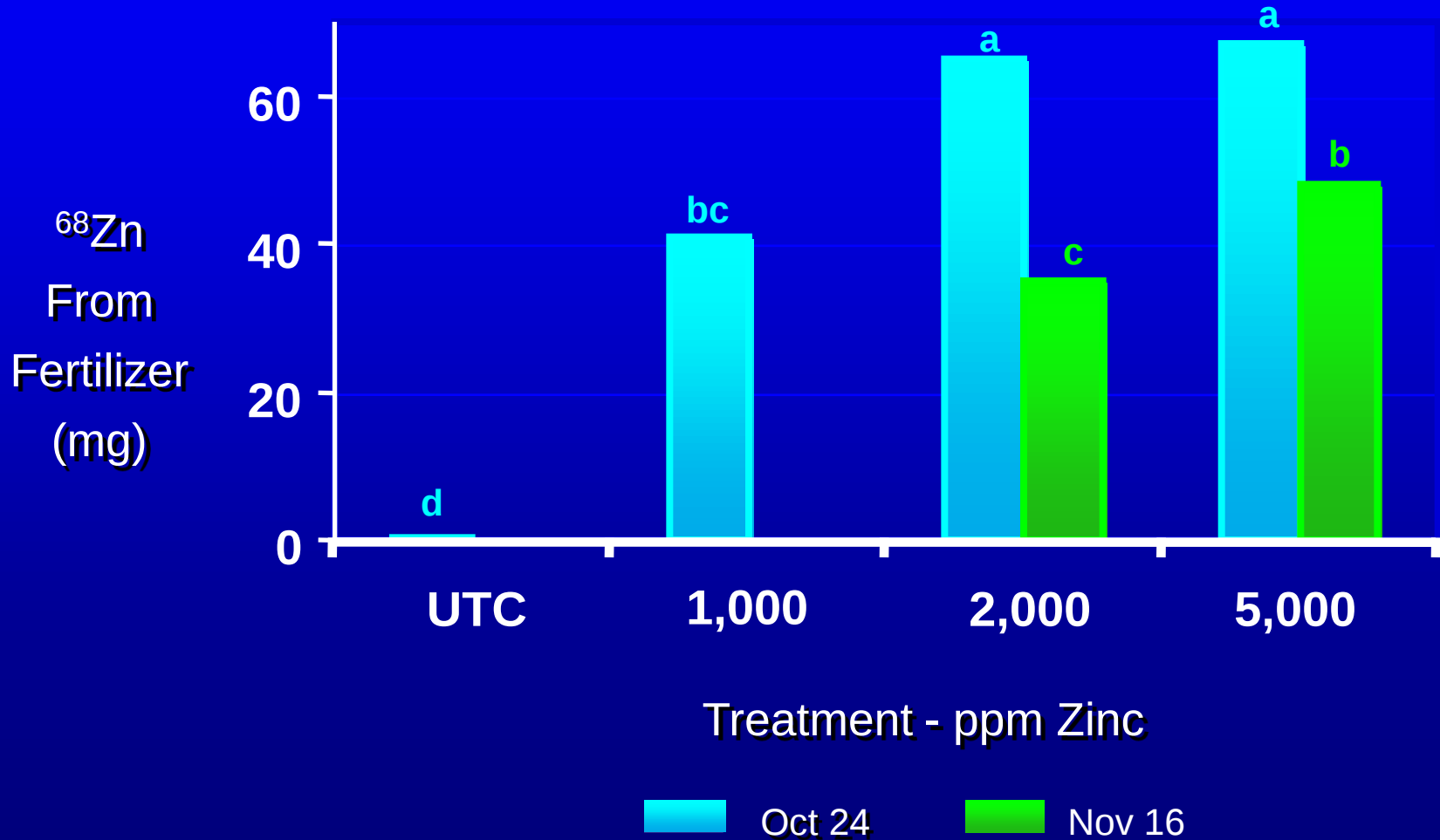






Nursery Trees in Pots - Fall Foliar $^{68}\text{ZnSO}_4$

Rates and Timing - ^{68}Zn in Plant



Foliar Nutrient Uptake Principles

Nitrogen & Zinc

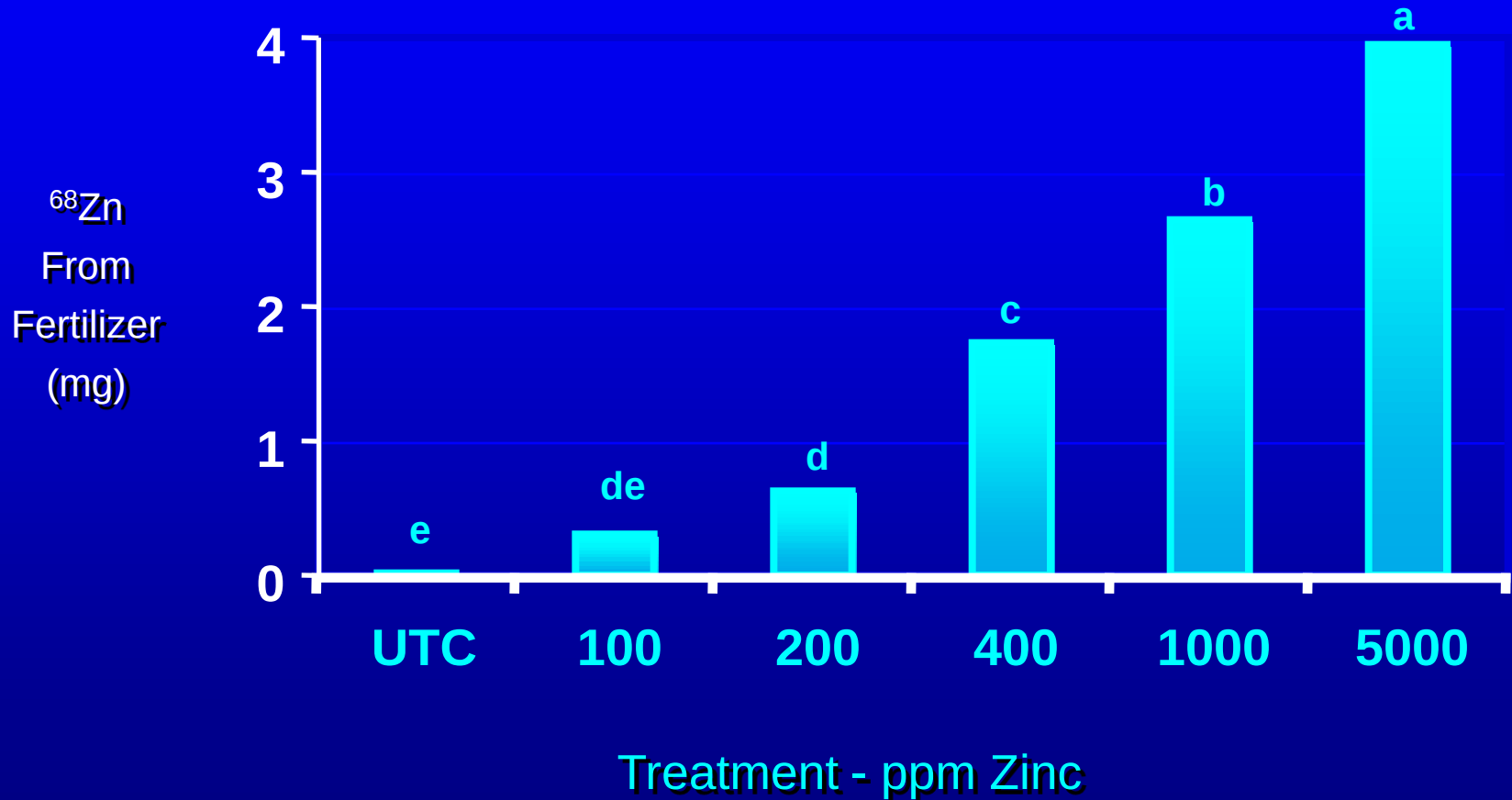
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2. Smaller molecules = Better uptake
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4. Longer time on leaf or shoot = Better uptake
5. Optimum rate



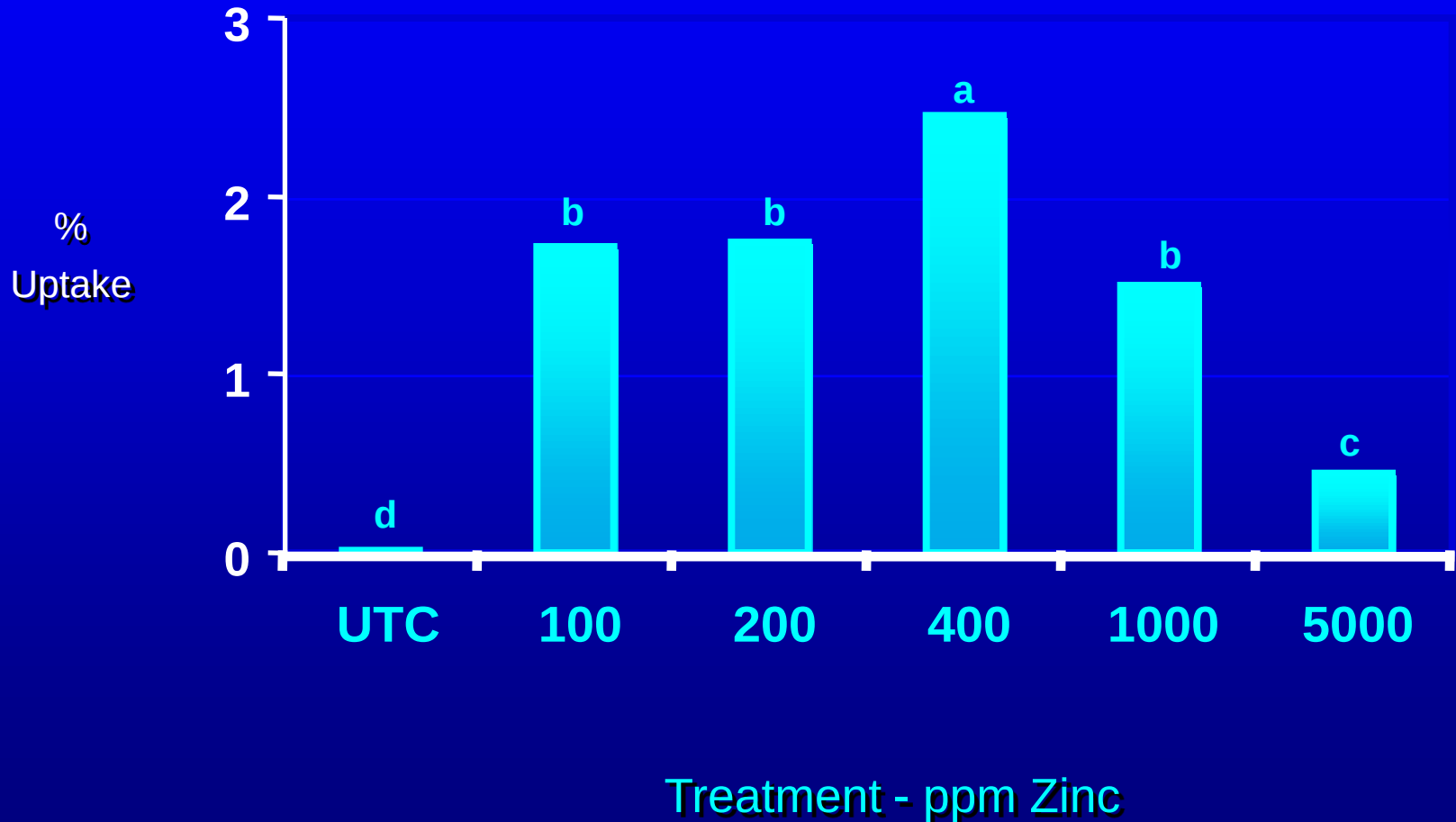


Peach Seedlings - $^{68}\text{ZnSO}_4$ Rate

^{68}Zn in Untreated Plant Organs



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



200 ppm

1



2



3



4



5



6



400 ppm

1



2



3



4



5



6



1,000 ppm



5,000 ppm



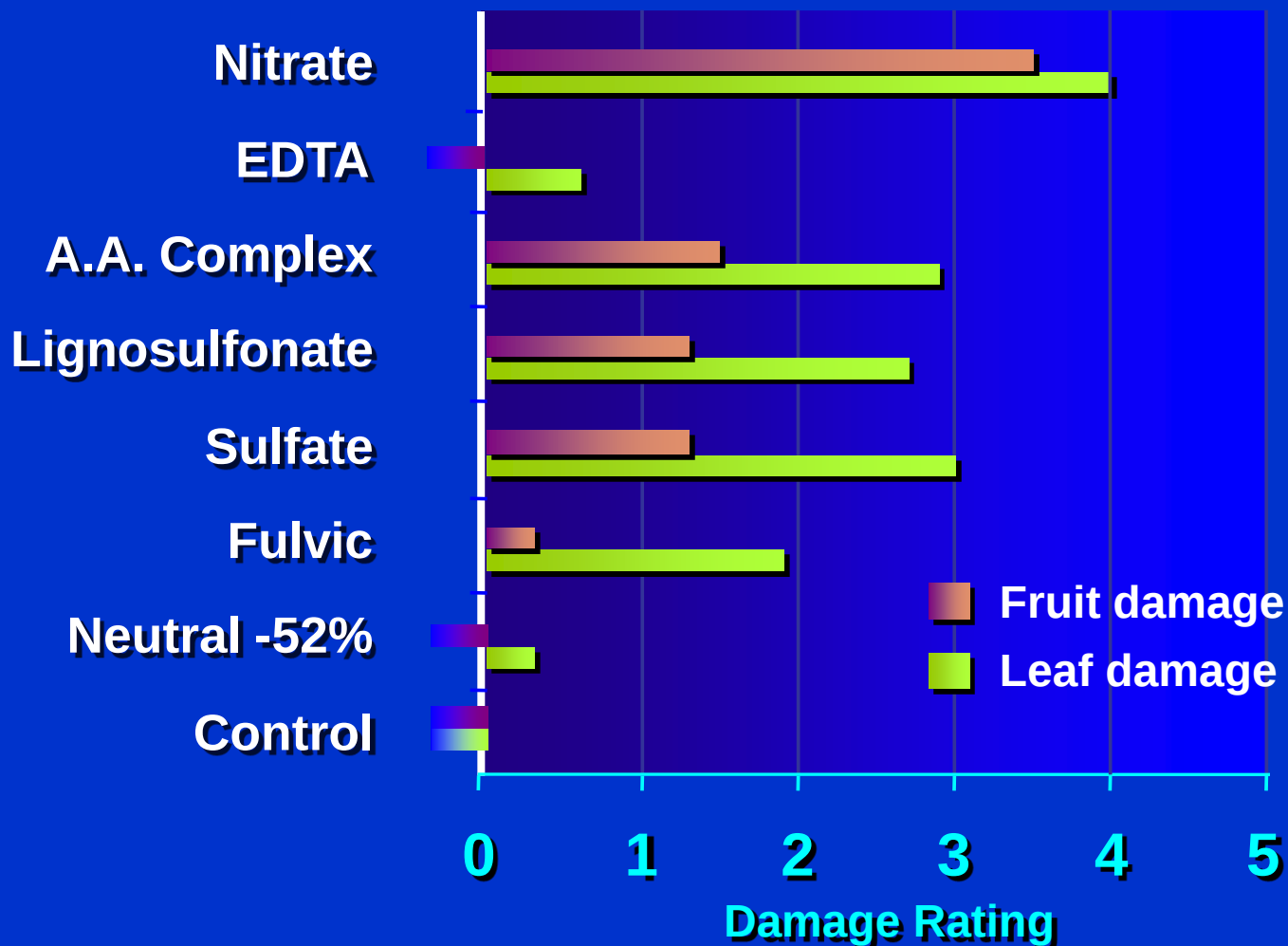








**Leaf & Fruit Damage on Peach, Plum and Apricot Trees
Sprayed in April with Different Formulations of Zn at 1,000 ppm**

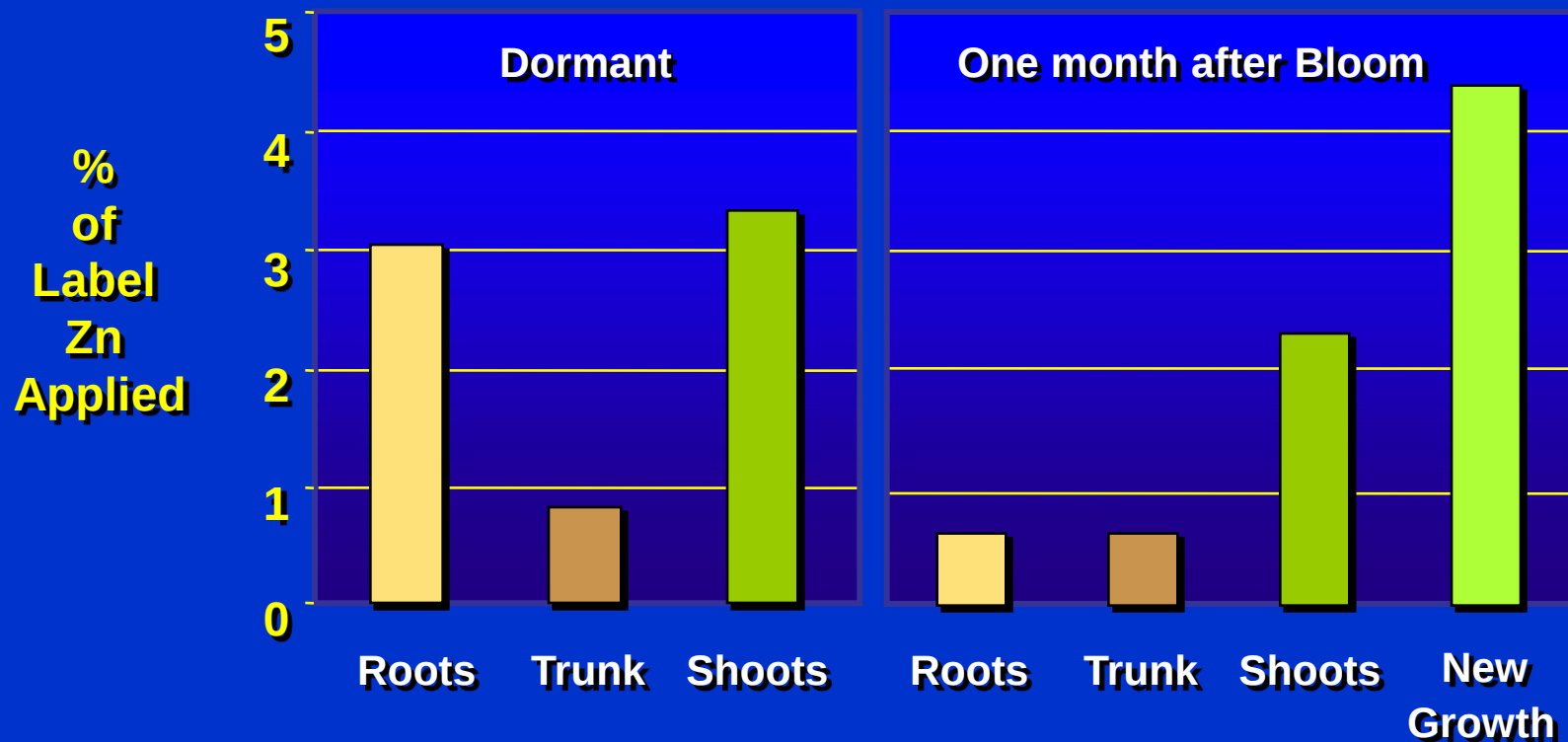


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Recovery of Labelled ^{68}Zn Sulfate Applied to Leaves of One-Year-Old Peach Trees in the Fall

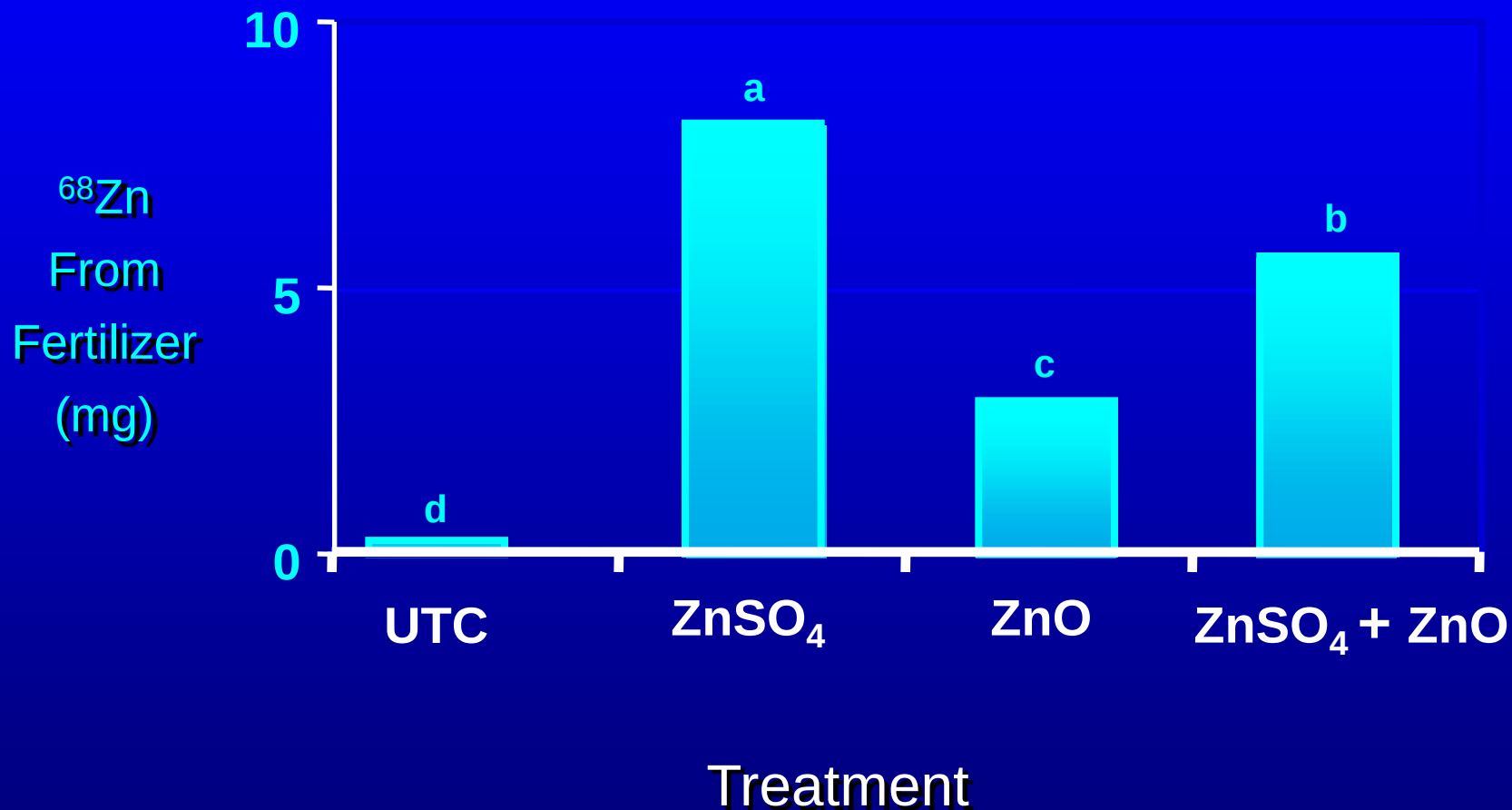






Peach Seedlings - $^{68}\text{ZnSO}_4$ vs ^{68}ZnO

^{68}Zn in New Growth and Roots



5 Year Zinc



Nutrient Elements in Stone Fruit

Level in leaves

	PEACHES AND NECTARINES				PLUMS		
	Deficient below	Optimum range	Toxic over		Deficient below	Optimum range	Toxic over
	%	%	%		%	%	%
N	2.3	2.6 - 3.0	-		-	2.3 - 2.8	-
P	-	0.1 - 0.3	-		-	0.1 - 0.3	-
K	1.0	Over 1.2	-		1.0	Over 1.1	-
Ca	-	Over 1.0	-		-	Over 1.0	-
Mg	0.25	Over 0.25	-		0.25	Over 0.25	-
Cl	-	-	0.3		-	-	0.3
S	-	-	-		-	-	-
	p p m						
Fe	60	Over 60	-		-	-	-
Mn	20	Over 20	-		20	Over 20	-
Zn	15	Over 20	-		18	Over 18	-
B	18	20 - 80	100		25	30 - 60	80
Cu	-	Over 4	-		4	Over 4	-
Mo	-	-	-		-	-	-

Cost of Zinc Materials - October 2007

