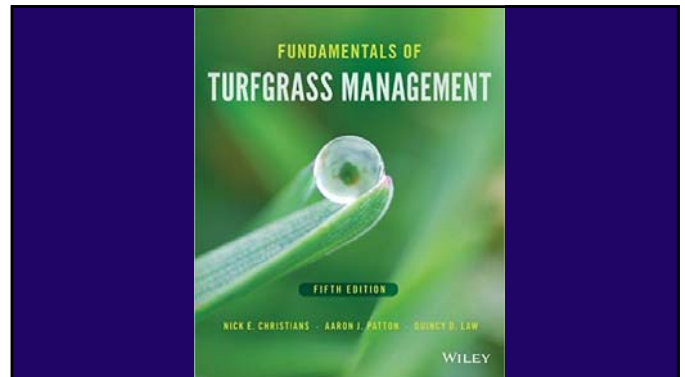


WHAT'S THE DEAL WITH CALCIUM?

NICK CHRISTIANS
IOWA STATE UNIVERSITY

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EVERYONE WANTS TO SELL ME CALCIUM. DO I NEED IT OR NOT?

3

17 ESSENTIAL ELEMENTS

- CARBON C
- HYDROGEN H
- OXYGEN O
- PHOSPHORUS P
- POTASSIUM K
- NITROGEN N
- SULFUR S
- CALCIUM Ca
- IRON Fe
- MAGNESIUM Mg
- BORON B
- MANGANESE Mn
- COPPER Cu
- ZINC Zn
- MOLYBDENUM Mo
- CHLORINE Cl
- NICKEL Ni

4

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MACRONUTRIENTS

- 1000 mg/kg (PPM) or more
- C, H, O, N, P, K, S, Mg, AND Ca

MICRONUTRIENTS

- Less than 100 mg/kg (PPM)
- Mo, Cu, Zn, Mn, B, Fe, Cl, and Ni

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CALCIUM (Ca)

- Cell wall formation
- Cell division
- Osmotic balance
- Membrane stabilization

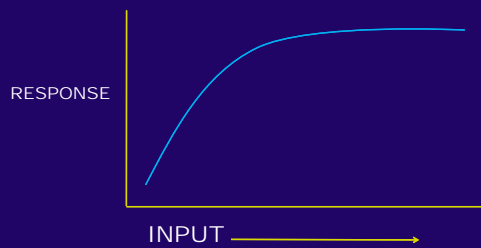
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CALCIUM (Ca)

- YOUNGER LEAVES TURN REDDISH-BROWN
- FADES TO RED
- LOW pH AND LOW CEC

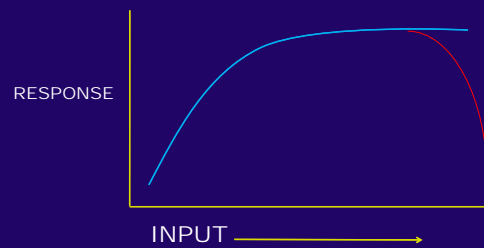
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CURVE OF DIMINISHING RETURNS



9

CURVE OF DIMINISHING RETURNS



10

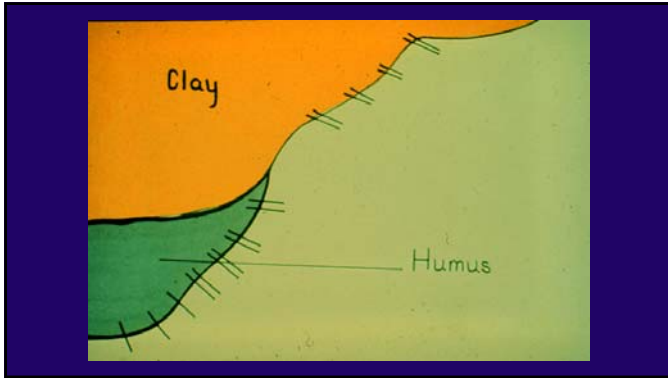
CATION EXCHANGE CAPACITY (CEC)

THE ABILITY TO EXCHANGE CATIONS

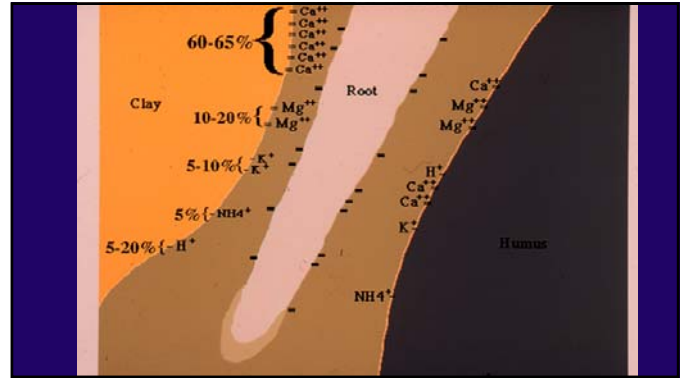
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ELEMENT	SYMBOL	CATION
Hydrogen	H	H ⁺
Calcium	Ca	Ca ⁺⁺
Magnesium	Mg	Mg ⁺⁺
Potassium	K	K ⁺
Sodium	Na	Na ⁺

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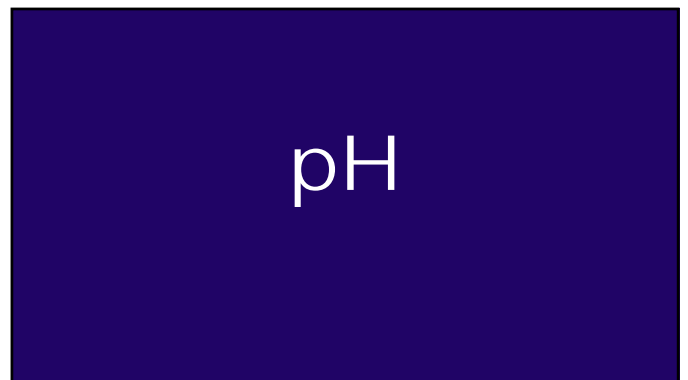


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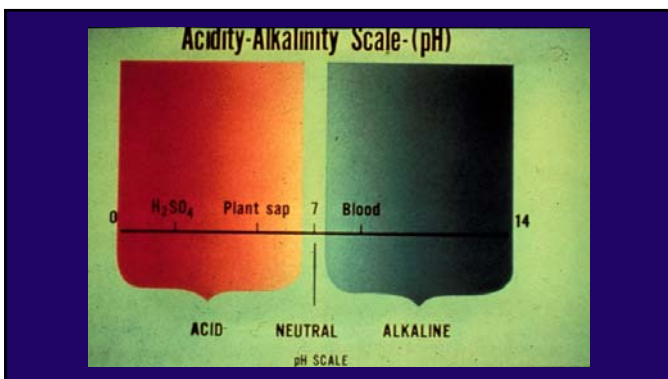
CATION EXCHANGE CAPACITY

SOIL TYPE	meq/100g
• SAND	• <1 - 8
• CLAY	• 80 - 120
• ORGANIC MATTER	• 150 - 500
• CLAY LOAM SOIL	• 25 - 30
• SAND GREEN	• <1 - 14

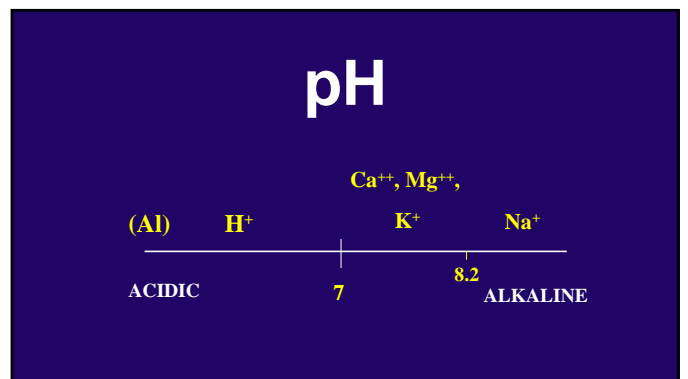
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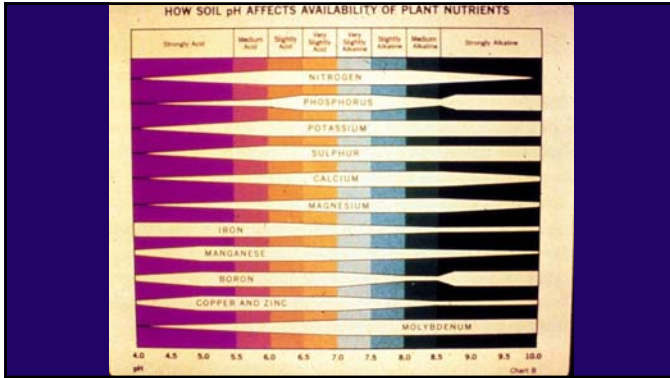
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LIMING

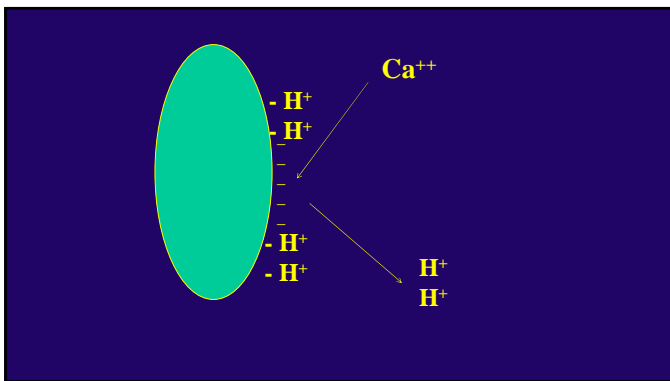
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LIME
 CALCIUM
 CARBONATE
 CaCO_3

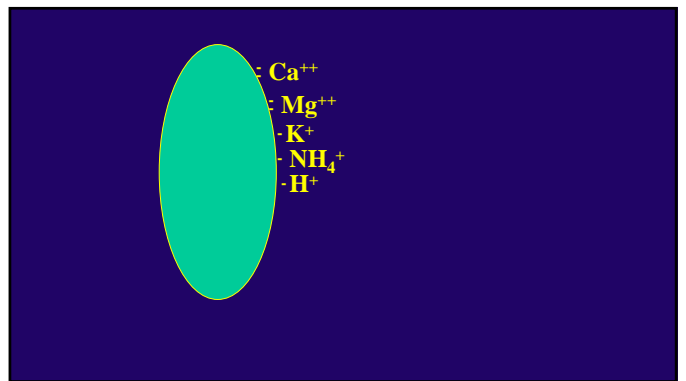
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LIME
 RAISES
 pH

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23



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RESEARCH ON CALCIUM AT IOWA STATE UNIVERSITY

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Rod St. John

- Sales to turf industry in mid 90's
- Strong emphasis on Ca
 - High markup
- Good soils background

26

Rod St. John

- Began MS in 2000
 - Ca uptake from sand media
- Ph.D in 2002
 - Soil testing
 - Ca/Mg ratios etc.

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ROD'S RESEARCH

- Ca sources applied to grass grown on silica and calcareous sand

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ROD'S RESEARCH

- IN CALCAREOUS SOIL
 - Did not increase in Ca content of turfgrass,
 - Did not increase quality of turfgrass,
 - May have negatively interacted with Mg & K.

Ca DID IMPROVE GRASS ON SILICA SAND

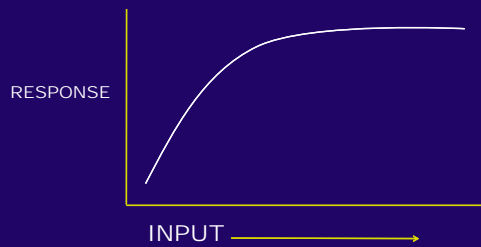
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ROD'S RESEARCH

- Ca/Mg ratios
- VARIED CEC SITES THROUGH WIDE RANGE OF RATIOS
- HAD AN EFFECT ONLY AT VERY EXTREME RATIOS

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CURVE OF DIMINISHING RETURNS



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CURVE OF DIMINISHING RETURNS

IF YOU HAVE ENOUGH
MORE IS NOT GOING TO HELP

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Ca/Mg Ratios

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RESEARCH SHOWS

- CALCIUM NOT NEEDED IN HIGH pH, calcareous soils
- CALCIUM NEEDED IN SILICA SAND
- Ca/Mg RATIOS CAN VARY WIDELY

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WHERE Ca IS NEEDED

- DO I NEED AN EXPENSIVE Ca SOURCE?
- CALCIUM NEEDED IN SILICA SAND
- LIME CAN DO IT CHEAPLY

35

THINGS TO WATCH FOR

- Ca SOLUTIONS CONTAINING N (urea)
- APPLY A STRIP ON GREEN
- IT IS THE N, NOT THE Ca

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BOTTOM LINE

IF YOU NEED IT USE IT
low pH and low CEC
LIME (CaCO_3)
IF YOU DON'T NEED, SAVE YOUR
MONEY