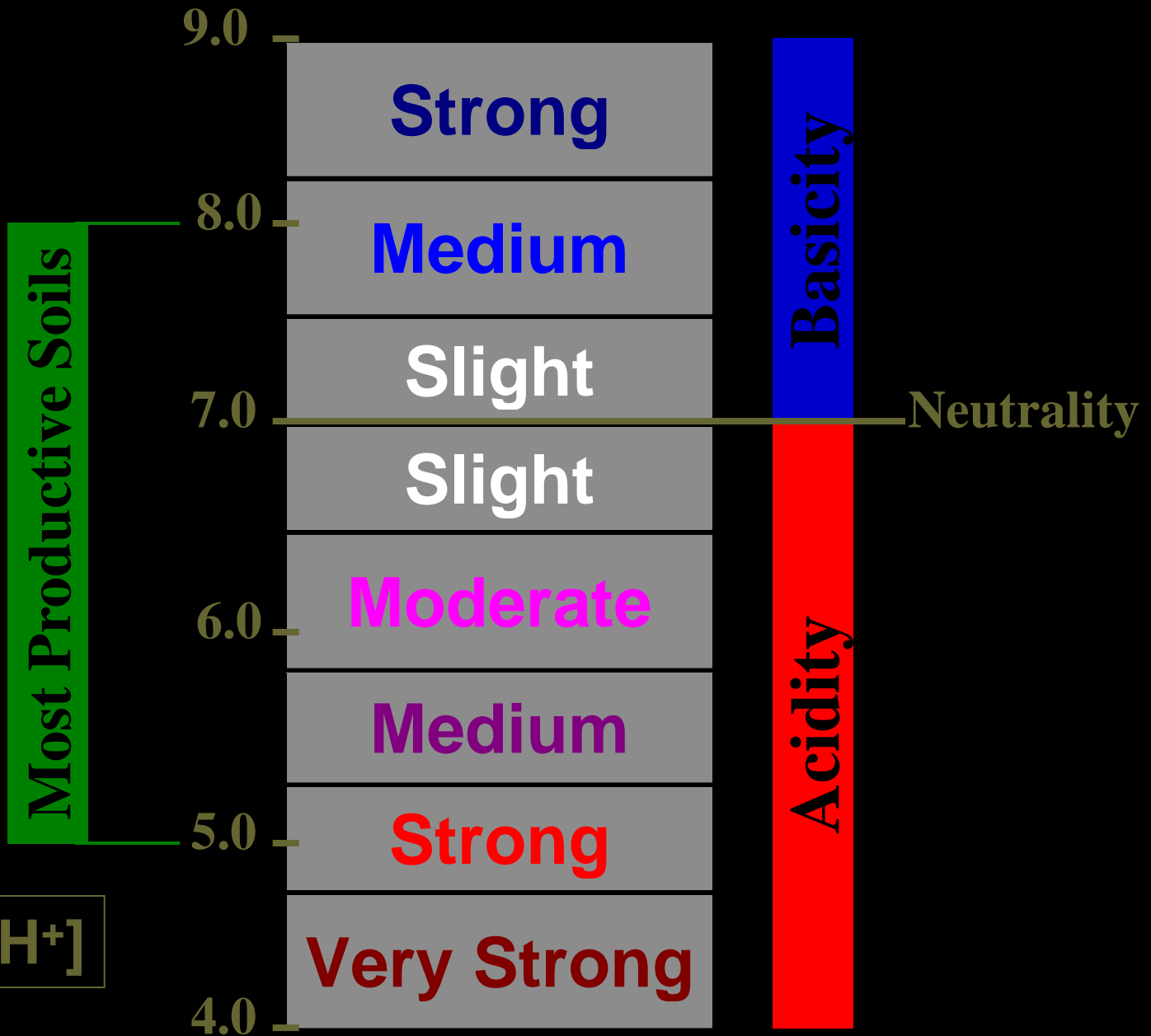


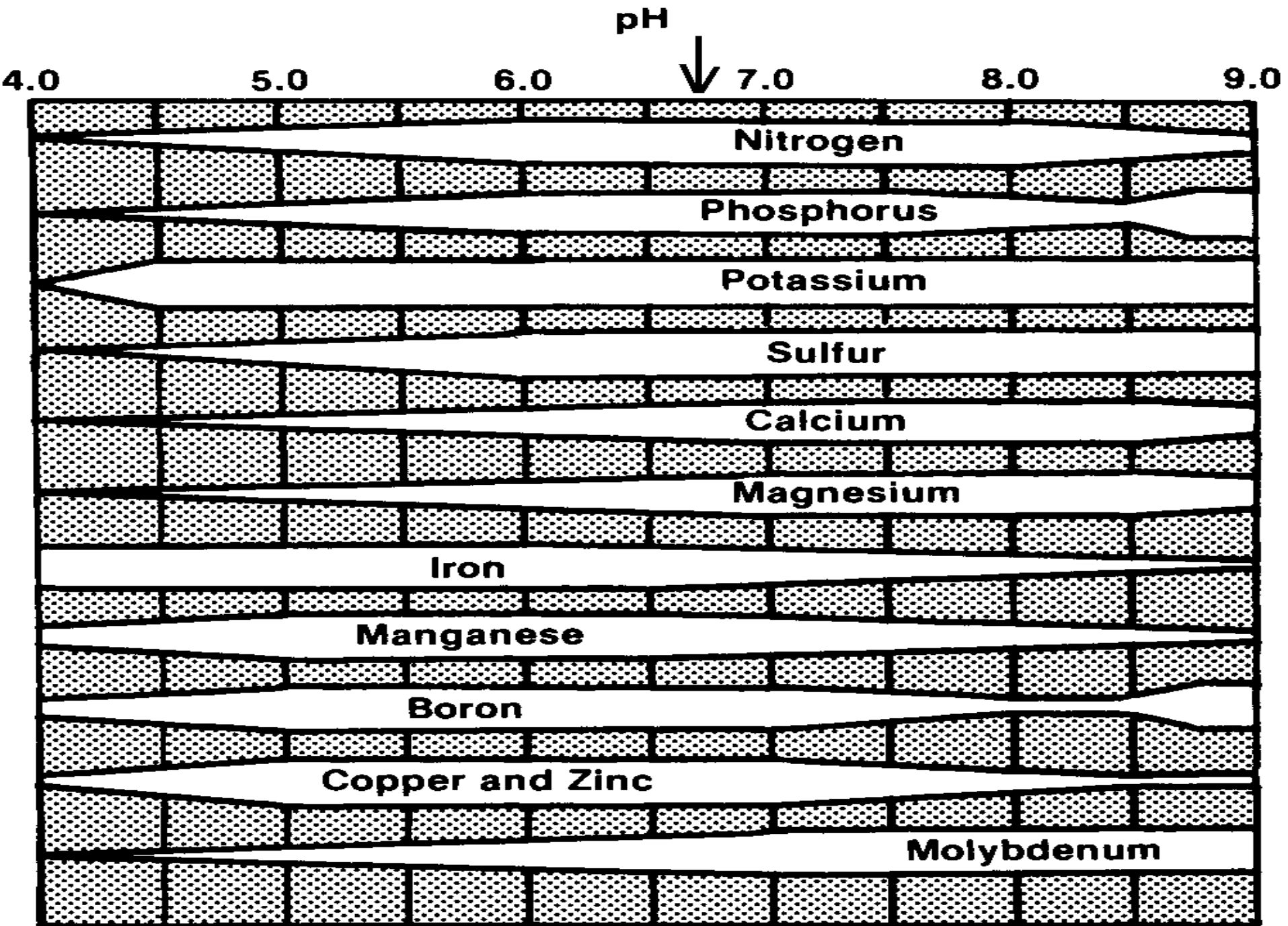
Liming and Liming Materials

pH value
defines
relative
acidity or
basicity

$$\text{pH} = -\log[\text{H}^+]$$







What Causes Soil Acidity?

■ Rainfall

- leaches basic elements (Ca^{++} , Mg^{++} , Na^+ , K^+)

■ Acidic parent material

- granite more acidic than shale or sandstone

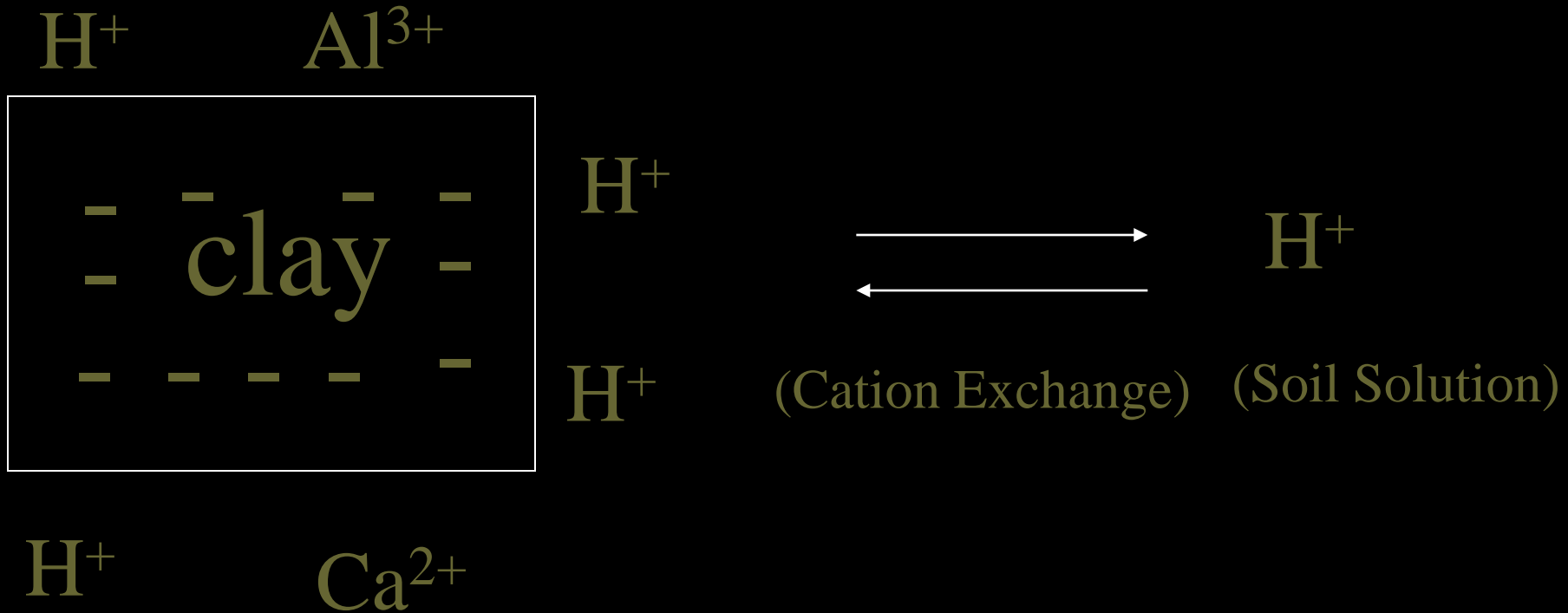
■ Organic Matter

- OM decay produce H^+

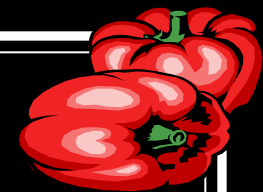
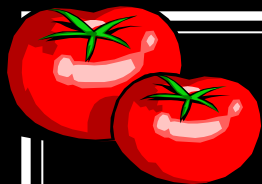
■ Harvest of high yielding crops

- most significant role

Soil Acidity



$$pH = - \log[H^+]$$



How Lime Reduces Soil Acidity

- A Ca^{2+} ion from the lime replaces two H^{+} ions on the cation exchange complex
- The H^{+} ions combine with OH^{-} to form water
- Soil pH increases because the acidity source (H^{+}) has been reduced

Neutralizing Acidity with Lime

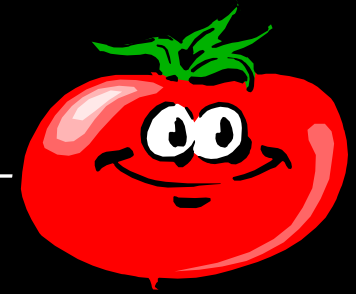


Displaces
Al & H from
Clay

Breaks down to
carbon dioxide
+ water

Combines with H^+
released from the clay
or from Al-OH
to form water

How Lime Works



H⁺

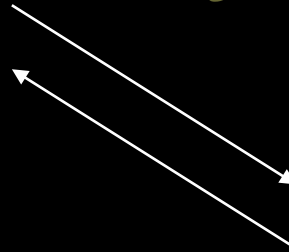
H⁺



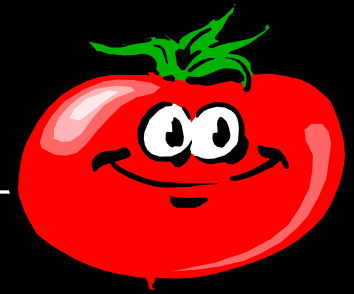
Ca²⁺

+ H₂O
(Water)

+ CO₂
(Carbon
Dioxide)



How Lime Works



Al^{+++}



H_2O



Ca^{2+}



(Water)

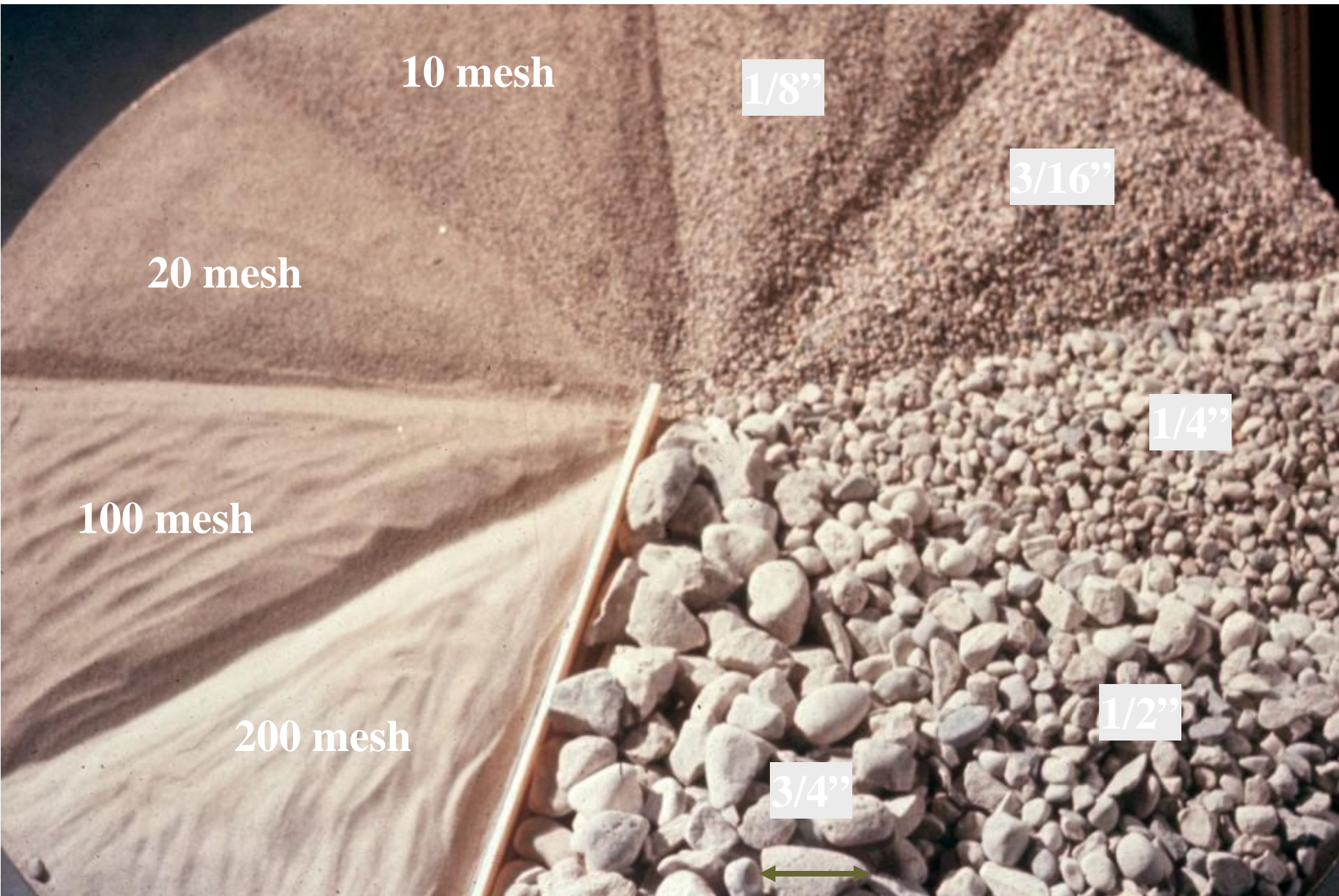
(Carbon
Dioxide)



Lime Materials:

Effectiveness is Determined:

- **Particle Size**
- **Neutralizing Power**



10 mesh

1/8"

3/16"

20 mesh

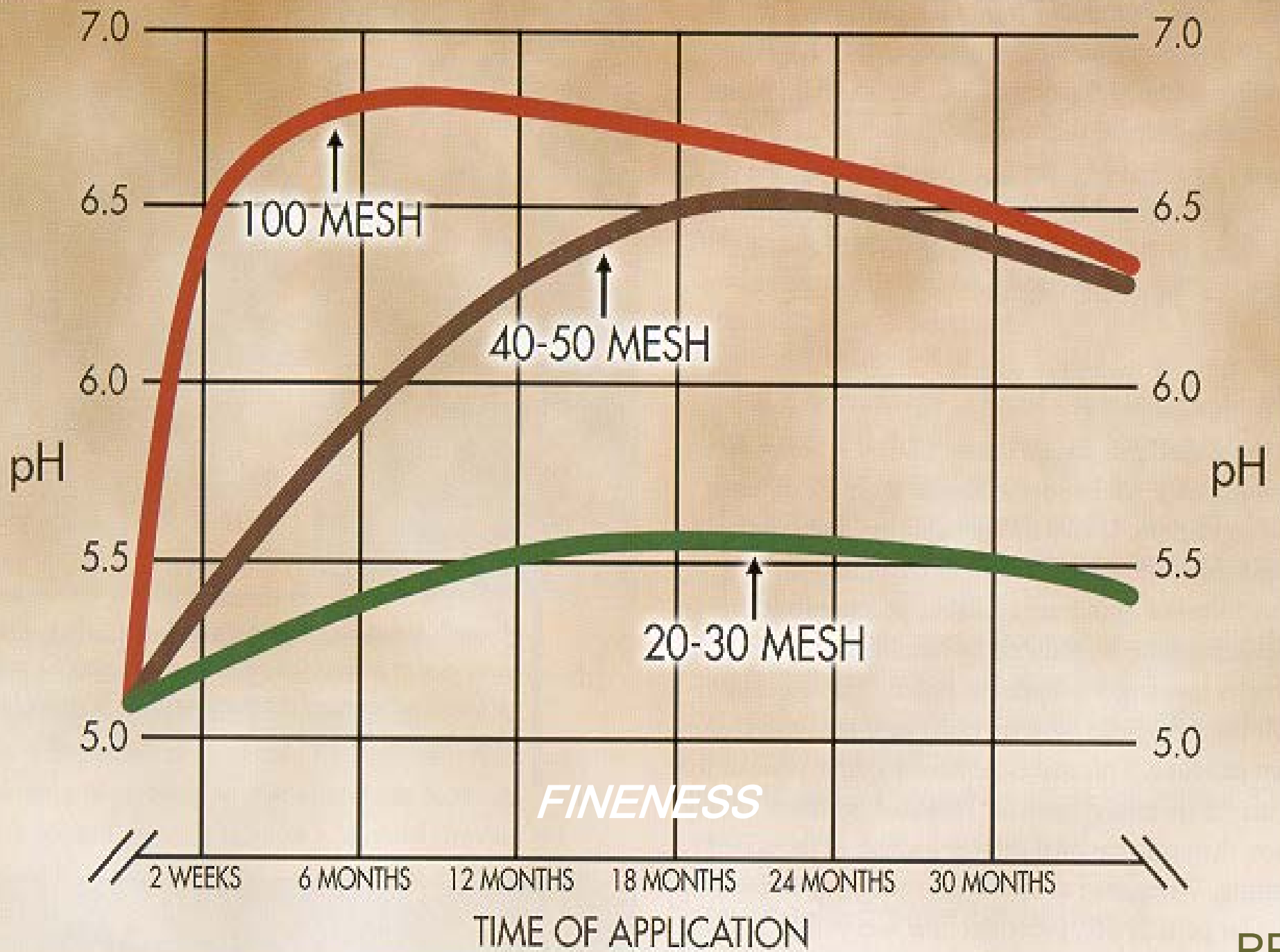
1/4"

100 mesh

1/2"

200 mesh

3/4"



AgLime Mesh Size Specifications: Virginia

Ground Limestone

Mesh

Guar. to Pass

20

90%

60

50%

100

30%

Pulverized Lime

20

95%

100

70%

Neutralizing Power or Calcium Carbonate Equivalency (CCE)

- **CaCO₃ set to 100.**
- **All other materials compared to it.**

Neutralizing Value (CCE) of Pure Compounds

Forms of Lime	Molecular Weight	Neutralizing Value
CaCO₃	100	100
MgCO₃	84	119
Ca(OH)₂	74	135
CaO	56	178

Lime Neutralizing Power

■ Purity:

- minimum calcium carbonate equivalency (CCE) of 85%



Properties of various lime materials

Material	Chemical Formula	CCE	Comments
Calcitic	CaCO₃	100	Supplies Ca
Dolomitic	CaCO₃ + Ca·MgCO₃	109	Supplies Ca & Mg
Burned	CaO	150-175	Absorbes H₂O
Hydrated	Ca(OH)₂	120-135	quickly, caustic
Marl	CaCO₃	70-90	Unconsolidated

Which Lime Should I Use?

■ **Dolomitic**

■ **Calcitic**

■ **Hydrated**

■ **Burned**

■ **Suspension**

■ **Pelleted**

■ **Ag**

■ **Marl**

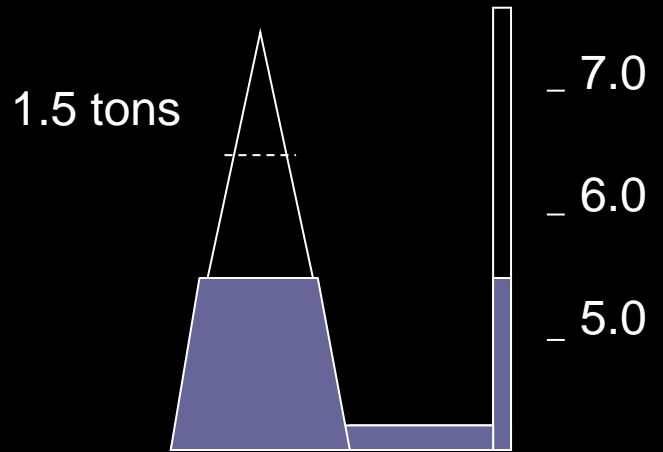
Liming

**When is the best
time to apply?**

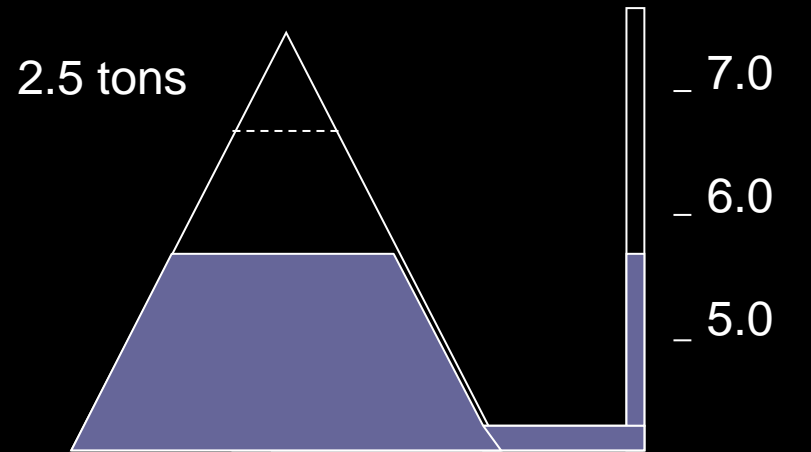
Apply Lime Well Ahead of Planting



Sandy Loam



Silt Loam



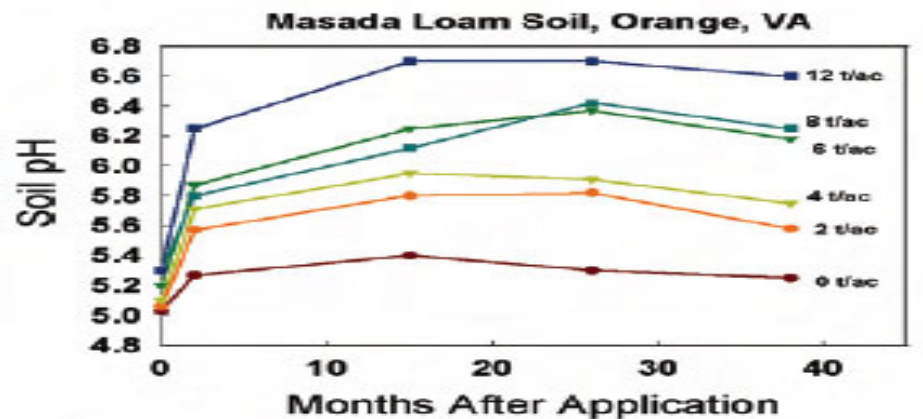
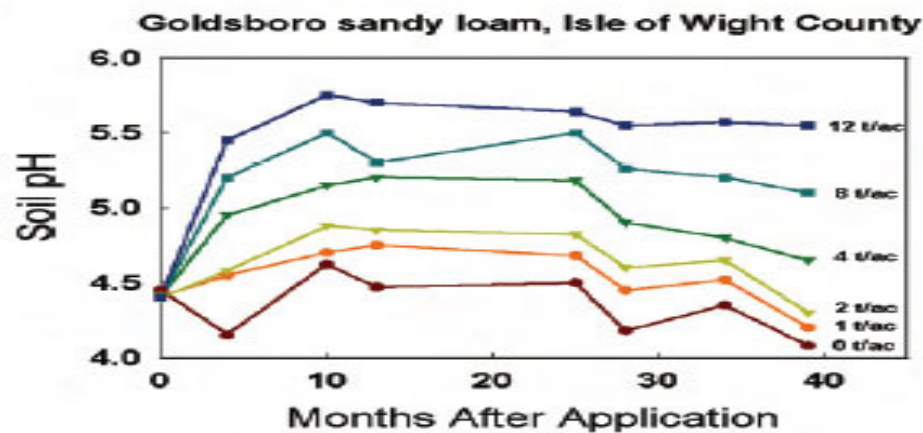
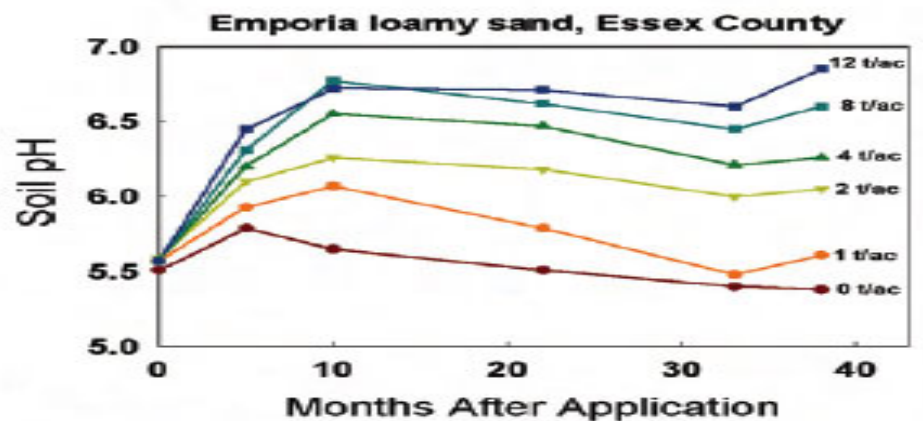


Fig. 9. Change in soil pH with time in various soils as affected by the rate of dolomitic limestone applied (S.M. Nagle, M.S. Thesis, Virginia Tech).