Tree Biology: Practical Information for Growing Healthy Trees

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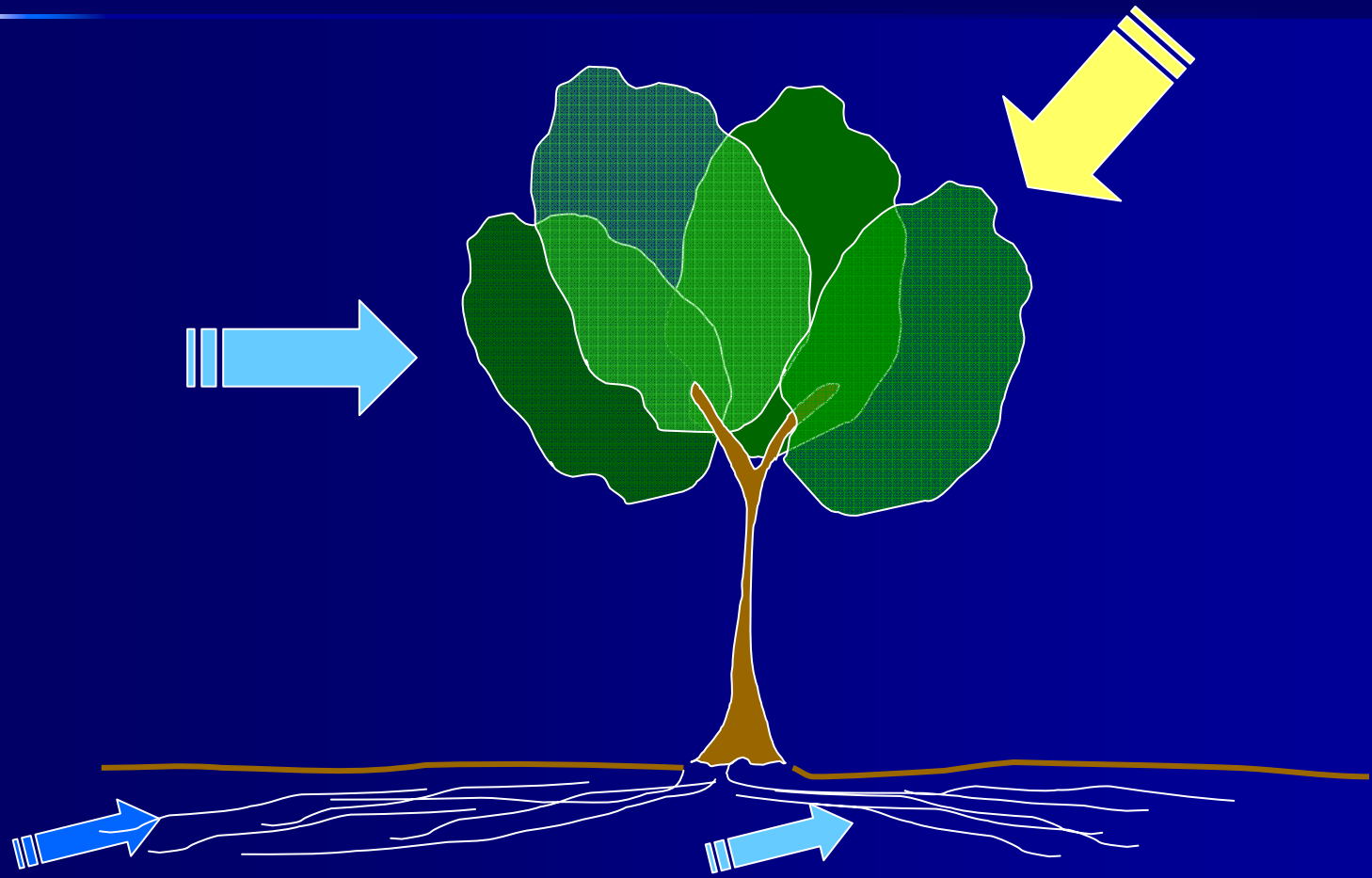
Objectives

or…

What you should remember when you go home tonight

- How does a tree grow?
- What does a tree need to grow?
- How do these things influence what I do to my tree? And vice versa!

What does a tree need?

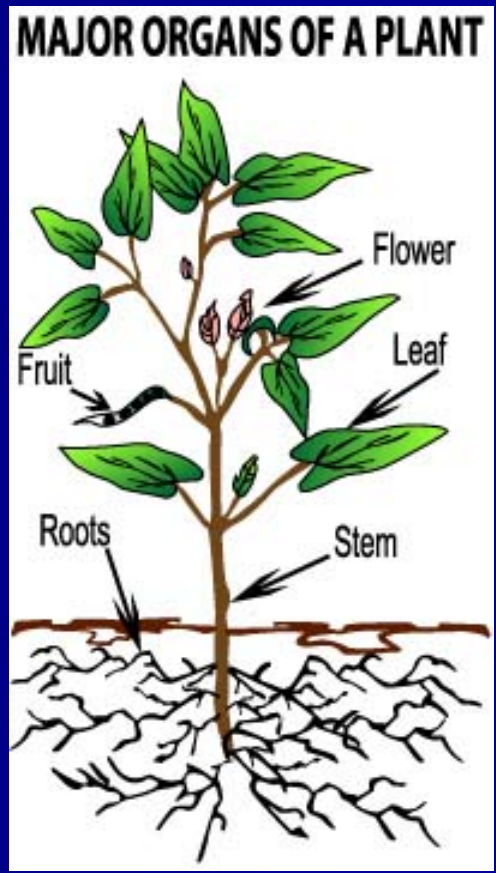


Trees need…

- Light
- Water
- Carbon Dioxide
- Space to Grow

Tree Structure

- Cells, Tissues & Organs
- 4 Organs:
  - Roots
  - Stem
  - Leaves
  - Flowers & Fruits

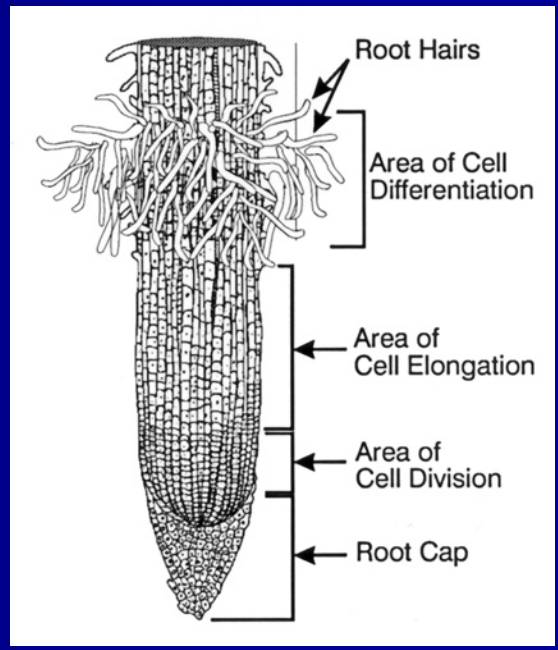


Roots

- Anchorage
- Storage
- Absorption
- Conduction

Roots: Structure and Growth

- Roots grow both in length and in width.
- Root hairs are the main location of water and mineral conduction.
- Small roots are the most important for the plant.



Roots

- Roots Are:
- Shallow
  - 90% in upper 3 ft of soil
  - 75% in upper 1ft.
- Extensive
  - Extend 2-4 times the tree's height

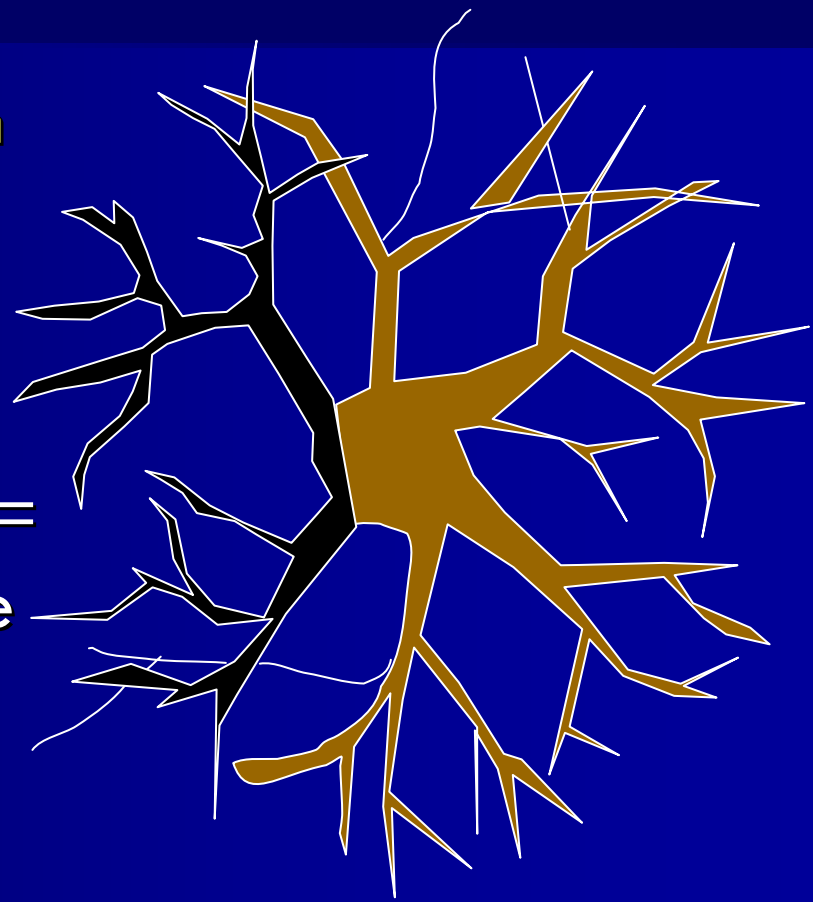
- Roots Need:
- Space
- Oxygen
- Water

Roots

- Roots hold the structure of the tree upright
- Even small roots are important
  - 2” diameter root can support 2 elephants

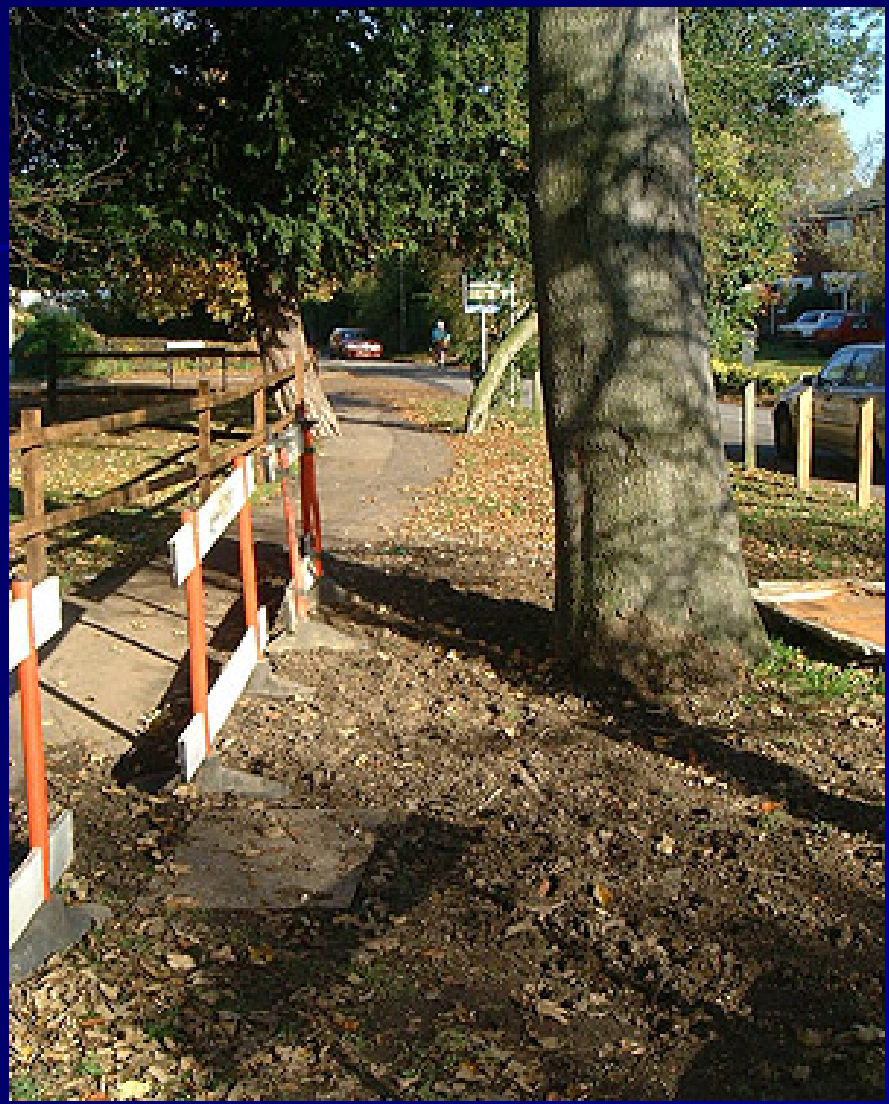
Roots

- How much of a root system can I damage?
- A single branch root = altered health and vigor
- Two or more branch roots = declining and unstable tree

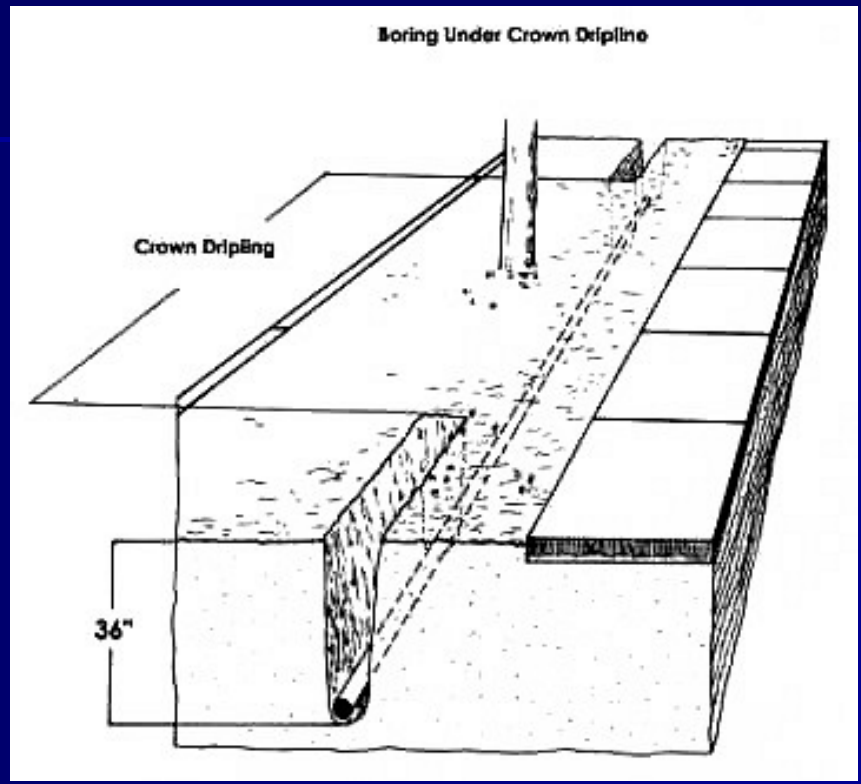


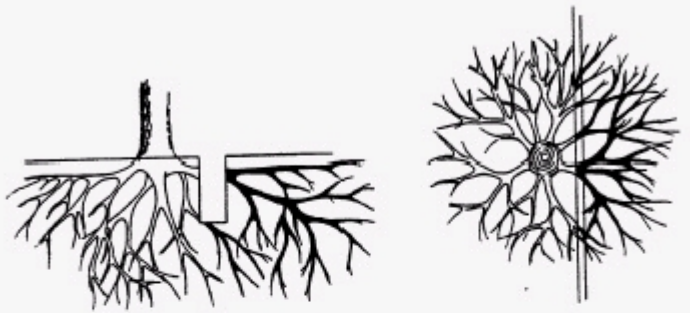
Practical Information

- The front yard of your house has a beautiful, large oak tree. It's the reason you bought your property.
- The electric company has decided to place their utility wires underground and will need to replace the service to your house with buried wires.
- They give you two options for the trench that must be dug within 5 feet of the oak tree's trunk:
  - Ditch-witch = low cost
  - Tunnel = higher cost
- Which will you choose and why?

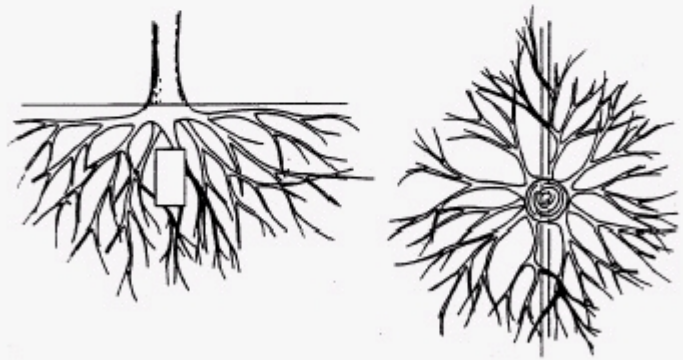



ASHBOURNE


Boring Under Crown Dripline
Crown Dripline
36"



TRENCHING IMPACTS



BORING IMPACTS

Source: COA

Leaves

- Food
- Regulate water movement and loss
- Oxygen is a by-product

Leaves

- Structure
  - Chloroplasts capture light energy and convert to sugars
  - Stomates regulate water movement
- Growth
  - Annually, from buds

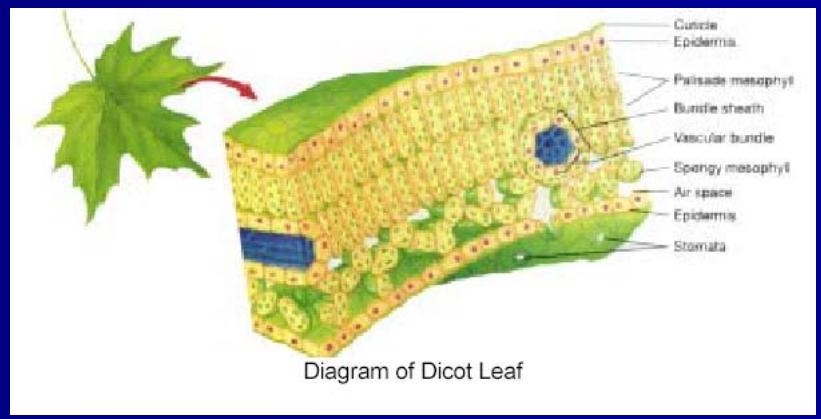
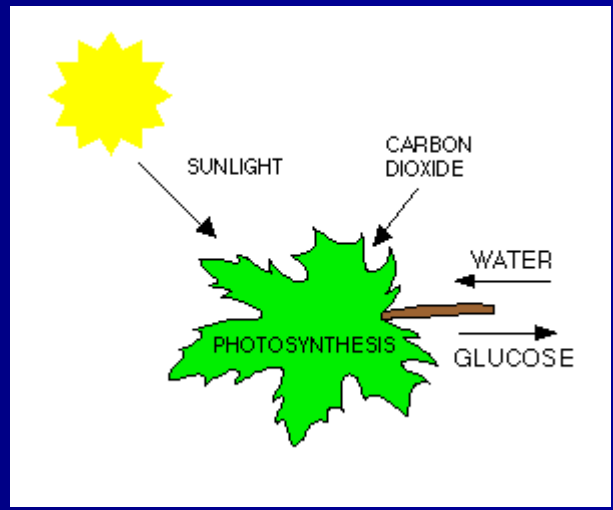


Diagram of Dicot Leaf

Light + Water + CO_2

- Photosynthesis produces glucose
- A by-product of photosynthesis is oxygen



Leaves

- No more than 25% of the crown can be removed during one season if thinning is deemed necessary.
- Topping, Heading, Limbing are drastic reductions to the tree crown and are devastating to tree health

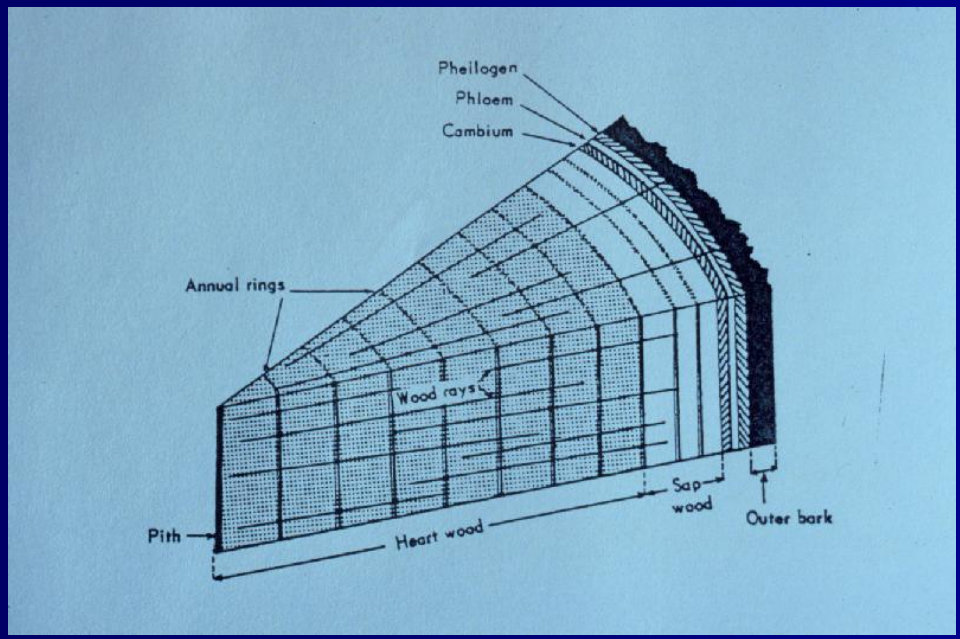
A well pruned tree looks like… a tree!!

Heading or Topping will shorten the life of a tree.

Stem & Branches

- Support
- Transport – water, sugar, minerals
- Attachment site for leaves

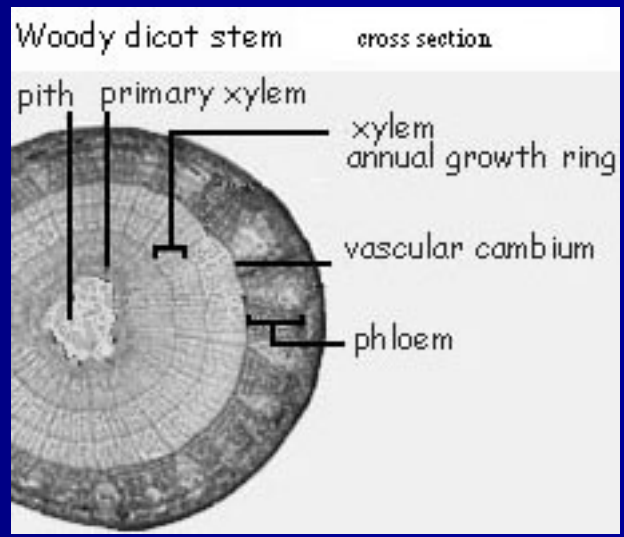
Stems



- Structure
  - Bark
  - Cork Cambium
  - Phloem
  - Vascular Cambium ("Growth Tissue")
  - Xylem
  - Heartwood

Stems

- Growth
  - Lateral growth occurs between the xylem and phloem
  - Vertical growth occurs at the apical meristem: Buds



Stems

- Damage to stems may result in damage to the conductive tissues within the stem.
- Less conductive tissues means less material can be transported up or down. This slows the growth of the tree.

Stem damage caused by Emerald Ash Borer.

Practical Information

Transpiration-Cohesion-Tension Theory

Or

How does water get way up there?

To Review:

- Roots
  - Small roots are very important
  - Damage to 2 branch roots will affect vigor
- Stems
  - Thin layer of phloem cells near bark delivers food to whole tree
  - Damage to cells just under the bark can affect health
- Leaves
  - Produce all food necessary for whole tree
  - Heading, Topping or any drastic removal of 25% of leaves or more will begin a decline in tree's vitality

Resources

- Tree Owner's Manual for the Northeastern and Midwestern US.

  www.treeownersmanual.info

If you are thinking a year ahead, sow a seed.
If you are thinking ten years ahead, plant a tree.
If you are thinking one hundred years ahead, educate the people.
-- Chinese Poet, 500 BC