Palm Anatomy

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Terminology

• **xylem**: water conducting tissue

• **phloem**: carbohydrate conducting tissue

• **vascular bundle**: strand of conducting tissue - palms *only*
  - also contains fibers; surrounded by parenchyma

• **vascular cambium**: lateral meristem which produces xylem and phloem in **broadleaf trees only**

• **apical meristem**: forms primary tissues of stem or root in **both** palms and broadleaf trees
**Palms**

- no vascular cambium
- xylem and phloem in same vascular bundle
- no new xylem or phloem produced

**Broadleaf**

- has vascular cambium
- cambium separates xylem and phloem
- new xylem to inside & new phloem to outside
Epidermis (Pseudobark)

Pygmy date palm

vascular bundles evenly distributed throughout cylinder
Palm Stem (Trunk)

- palms do not compartmentalize wounds
- no healing!!!
Palm Stem (Trunk)

• trunk surface varies among species
  *Phoenix* (knobby) vs. *Roystonea* (smooth)

• all palms with a crownshaft are self-cleaning (*Roystonea, Wodyetia*)

• other palms may or may not be self-cleaning

• cannot determine age of palm based on stem height or diameter (life span)
### Palm Meristems

<table>
<thead>
<tr>
<th>Palms</th>
<th>Broadleaf Trees</th>
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<tbody>
<tr>
<td>• one apical meristem (bud/heart) per stem</td>
<td>• multiple apical meristems</td>
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<td>• lateral meristems only at base of clustering palm species</td>
<td>• multiple lateral meristems – branching</td>
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<td>• exception: <em>Hyphaene</em>, has aerial branching</td>
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Palm Meristems

Clustering vs. Single vs. Multiple Singles Planted

- Clustering palms have lateral meristem at base only; common root system with multiple stems
- No lateral meristem in single-stem palm.
Apical Meristem & Palm Leaves

• number of leaves produced and retained is function of species and environment, especially nutrition

• in general, for every visible leaf, equal number of leaves in development in apical meristem (bud or heart)

• damage to bud affects leaves that will emerge later
Longitudinal cross-section through bud
Palmate leaf
(Fan palms)

Costapalmate leaf
(Sabal palm)

Pinnate leaf
(Date palm)

figure: Broschat and Meerow, 2000
Palm Leaves

• Three main types of palm leaf blades:
  1) fan
    a) palmate – *Washingtonia robusta*
    b) costapalmate – *Sabal palmetto*
  2) feather
    a) pinnate – *Phoenix dactylifera*
    b) bipinnate – *Caryota mitis*
  3) entire - *Chamaedorea geonomiformis*
Palm Roots

• root initiation zone is specialized area at base of stem (trunk)
• all palm roots are adventitious since all originate from the stem
• no root hairs
• no secondary thickening of roots
• no root grafting
• significant lateral growth (50 ft or more)
Know your palm

- Palm height
- Growth rate
- Hardiness Zone
- Salt tolerance
- Light requirements
- Nutritional needs
- Human hazards
- Major Pest problems
- Major Disease or Physiological problems
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