Plant Selection, Forms & Sources

Warren Gold

REN capstone

November 7, 2008

This presentation will focus on principles

For specific information on species see resources on handout, books, instructors

Plant Selection: Principles

Select plant material with an eye toward:

1. Project goals & objectives
2. Horticultural criteria
3. Ecological criteria
4. Social criteria
5. Financial & availability constraints

Plant Selection: Project goals & objectives

Select plant material with an eye toward:

1. Directly fulfilling goals & objectives – ONLY!
   - Unconnected species may identify unstated goals/objectives
2. Restoration as a long term process (succession mgmt)
   - Material reasonable for successional stage(s)
   - Reservoirs of propagules for future successional stages
3. Other ecological principles influencing project
   - Biogeography, patch dynamics, etc.
4. Maintenance needs & likely support
   - How likely is maintenance relative to needs?

Plant Selection: Horticulture

2 Handouts
- Rodney’s list
- Sound Native Plants

Books
- Grow your own native landscape
- Others listed on handout

Web sites

Right plant – right place
Abiotic site characteristics important in determining plant selection (original & amended)
Abiotic site characteristics important in determining plant selection

**BELOWGROUND FACTORS**

**Moisture Considerations**
- Soil moisture constraints (too dry, too wet, timing)
- Water source (timing, chemistry)
- Soil characteristics influencing retention (texture, structure, OM, topography)
- Competition for moisture (timing)

**Soil Nutrient Considerations**
- More nutrients ≠ “better” soil
- Happy soil doesn’t always mean happy outcomes
  - Many natives tolerant of limited nutrient supply rates
  - Invasives often happy with high nutrient availability
- Soil OM is often listed a criteria – complex effects
- Soil nutrient concentrations ≠ nutrient availability
- Organic mulches can have complex effects on soil nutrients (decomposition, mineralization, microbial immobilization)

**Slope Considerations**
- Slope stability & erosion issues may influence plant species & form selection
- Identify the problem (surface erosion ≠ slope stability)
- Investigate species’ rooting characteristics & propagation (can be difficult to find information)

**Sunlight Considerations**
- Sunlight availability (too much, too little, timing, seasonal changes)
- Tolerance of extremes relative to growth stage
- Interaction with moisture & temperature

**Temperature Considerations**
- Thermal stress uncommon in Puget lowlands
- Can be a local problem in interaction with moisture and light

**Wind Considerations**
- Exacerbates drought stress in exposed locales
- Can be a problem for container stock
- Some tree species may pose eventual safety issues

**Ecological context**
Consider the ecological context when choosing plant material

1. What effects will biological interactions have on the success of selected species?
2. What ecological functions are enhanced / restored by the selection of this species?
3. What ecological role(s) does this species play?
   - At present
   - In the future
Competition
• Competitive context has a strong influence on survival
  ✓ May affect choice of plant form as well as species
• Consider details of potential competitive interactions
  ✓ What is being competed for?
  ✓ Does this shift with time (seasonal; long-term)?
• Selecting competitive species (to battle invasives)
  ✓ Carefully consider the above two questions
  ✓ Consider their long-term effects on succession (arrested?)

Herbivory
• Presence of strong herbivores can influence plant selection
  ✓ May affect choice of plant form as well as species (Cost and survival considerations)
  ✓ Timing of herbivory relative to plant activity
• Consider whether potential deterrents, protection or overplanting will be possible and sufficient for desired species
• Is herbivory desirable (driving succession)?

Habitat Factors
• Native plants for wildlife (King Co.)
• Landscaping for wildlife (Link)
• Others

Community Development / Succession
• Seed beds, seedling protection
  ✓ Will the selected species provide future beds or protection for coming species? Are these already in place?
• Pollination, seed dispersal
  ✓ Are needed pollinators or seed dispersers in place?
  ✓ Will the selected species provide habitat for such organisms?
• Soil fungi
  ✓ Are needed mycorrhizal fungi in place?
**Plant Selection: Ecology**

Some ecological factors important in determining plant selection

**Genetic Factors**
- Selection of locally-adapted races / ecotypes can be important for plant success, ecological success, & local genetic integrity
- Selection of some species with certain sources and forms (e.g., clonal species or live stakes from limited stock) can reduce genetic diversity.

**Plant Selection: Information Sources**

See handout on information sources and resources on class web site

**Plant Selection: Social considerations**

Some human / social considerations in determining plant selection

**Safety**
- Some projects require plant selection that considers aspects of public safety
  - Dense vegetation and safety view corridors
  - Woody material fall
  - Hazards for children

**Impact Management**
- Some projects require plant selection that help to manage human movement and impact
  - Dense or thorny vegetation to deter paths

**Plant Selection: Commercial considerations**

Some commercial considerations in determining plant selection

**Availability**
- Rapid commercial acquisition can be difficult
- Limited number of growers / distributors
- Native plant growing remains more project (order) - based
- Orders usually placed months (or years) prior to delivery
- Material of local provenance not always available

**Plant Selection: Commercial considerations**

Some commercial considerations in determining plant selection

**Financial**
- Limited market – commercial material can be expensive
- Species with less expensive available forms may be preferred (salvage, stakes, bare root, overstock, seed, etc.)

**Plant Selection: Social considerations**

Some human / social considerations in determining plant selection

**Aesthetics**
- Some projects require plant selection that considers aesthetic needs of stakeholders
  - View corridors
  - Color and texture

**Cultural / Educational**
- Some projects require plant selection that fulfill cultural and/or educational objectives
  - Plant selection for cultural importance (display or use)
  - Plant selection for educational use
### Plant Forms & Sources in Restoration Projects

**Handouts**
- Which native plants should I use? (Leigh 1999)
- Advantages and disadvantages of different forms of planting material (Ewing)
- Plants available for use in native plant projects in western Washington (Sound Native Plants)
- Live stakes and cuttings (Sound Native Plants)
- Salvaging native plants (Sound Native Plants)

### Plant Forms & Restoration Projects

Understanding of plant horticulture & propagation is important in the selection of plant form to use
- Wide variety of forms based upon sexual and vegetative propagation
- Wide variety of lingo
- No one form is best – it depends
- Forms available vary with time & serendipity
- Some forms may or may not be interchangeable for project goals & objectives

### Whole Plants (in soil)
- Container plants
- Ball & burlap (B&B)
- Seedlings (liners)
- Plugs (in trays)
- Tree tubes

### Whole Plants (bare roots)
- Bare root plants
- Seedlings (sets, divisions)

### Transplants
- Salvage plants
- Divisions (e.g., rhizomatous plants)
- Pull-ups (live-rooted saplings)
- Cores; sod

### Sexual Propagules
- Seeds
- Haying
- Soil seed bank

### Vegetative Reproduction
- Live stakes (hardwood cuttings)
- Layering (stems, tips, etc.)
- Bulbs, rhizomes, corms

### Plant forms & restoration projects

<table>
<thead>
<tr>
<th>Form</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containers</td>
<td>Immediate size impact; storage &amp; transport easy; available year round</td>
<td>Expensive; hidden root problems; root system adjusted to artificial conditions</td>
</tr>
</tbody>
</table>

### Plant forms & restoration projects

<table>
<thead>
<tr>
<th>Form</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containers</td>
<td>Immediate size impact; storage &amp; transport easy; available year round</td>
<td>Expensive; hidden root problems; root system adjusted to artificial conditions</td>
</tr>
<tr>
<td>Bare root</td>
<td>Cheap; lightweight (transport); easy to store (sawdust beds)</td>
<td>Limited timing (available in winter; plant before active); limited species</td>
</tr>
</tbody>
</table>
## Plant forms & restoration projects

<table>
<thead>
<tr>
<th>Form</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containers</td>
<td>Immediate size impact; storage &amp; transport easy; available year round</td>
<td>Expensive; hidden root problems; root system adjusted to artificial conditions</td>
</tr>
<tr>
<td>Bare root</td>
<td>Cheap; lightweight (transport); easy to store (sawdust beds)</td>
<td>Limited timing (available in winter; plant before active); limited species</td>
</tr>
<tr>
<td>Salvage</td>
<td>Free; moral satisfaction; can be moderately large</td>
<td>Unpredictable availability; some species better than others (timing important); often need to replant quickly</td>
</tr>
</tbody>
</table>

### Layering

- **Pros**: Free; rapid spread (bioengineering)
- **Cons**: Limited species

### Plugs (in trays)

- **Pros**: Cheap; easy; rapid establishment for some rhizomatous species
- **Cons**: Root problems in small soil volume

### Cores

- **Pros**: Cheap; easy; comes with native soil; rapid establishment for some rhizomatous species
- **Cons**: Weeds may come along; damage to harvest areas

### Live stakes

- **Pros**: Cheap to free; easy & fast (rapid planting with volunteers); rapid establishment & cover
- **Cons**: Limited species; timing critical (harvest when dormant, plant before leaf-out); low genetic diversity

### Seed

- **Pros**: Cheap to free; easy to transport, store & distribute
- **Cons**: High mortality (predation, disease, germination); slow establishment; not good in wetlands

---

[Diagram of layering]

---

[Diagram of live stakes]