A COMPARISON OF BAREROOT AND CONTAINERIZED SEEDLING PRODUCTION

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Bareroot nursery, container nursery, soil, media, pesticide use

Most nursery managers and culturists are comfortable growing bareroot seedlings. A few have become comfortable growing containerized seedlings. This discussion will compare the two systems, with a focus on SYP production, and will include a discussion on capital, equipment, space, and personnel requirements.

To briefly sum up the differences between bareroot and container nursery systems:
- Infinite possibilities are expected and usually obtained in bareroot nursery beds.
- Finite possibilities are planned and sometimes achieved in containers.

SPACE REQUIREMENTS
Space utilization varies greatly between the two nursery systems. Based on a production rate of 30 MM seedlings, the difference between the systems is large.

<table>
<thead>
<tr>
<th></th>
<th>30 MM Bareroot</th>
<th>30 MM Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Site</td>
<td>140 acres</td>
<td>50 acres</td>
</tr>
<tr>
<td>Irrigated Acres</td>
<td>72 acres</td>
<td>19 acres</td>
</tr>
<tr>
<td>Production Acres</td>
<td>45 acres</td>
<td>19 acres</td>
</tr>
<tr>
<td>Production</td>
<td>680,000/aacre</td>
<td>1,579,000/aacre</td>
</tr>
<tr>
<td>Production/site</td>
<td>214,000/aacre</td>
<td>600,000/aacre</td>
</tr>
</tbody>
</table>

CAPITAL REQUIREMENTS
Capital requirements also differ widely between bareroot and container nurseries, with each system having both advantages and disadvantages.

Bareroot system
- Requirements are soil-site specific.
- Significant land is needed for production.
- Substantial cold storage is needed following lifting.
- Standard agricultural equipment can be used for production.

Container system
- Requirements are not soil-site specific.
- Minimal land is needed for production.
- Minimal cold storage is required.
- Substantial specialized equipment is needed for production.

Cost comparison

<table>
<thead>
<tr>
<th>30 MM Production Nursery ($/1000 Seedlings)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bareroot</td>
</tr>
<tr>
<td>Land</td>
</tr>
<tr>
<td>Buildings</td>
</tr>
<tr>
<td>Materials</td>
</tr>
<tr>
<td>Equipment</td>
</tr>
</tbody>
</table>

PERSONNEL
Traditionally bareroot nurseries are managed by foresters with a strong farming background. Horticulturists are more suited to growing containerized seedlings.
EQUIPMENT REQUIREMENTS
Bareroot production relies heavily on standard farming equipment and implements. Containerized production can take advantage of either abundant labor or sophisticated and specialized equipment.

SEEDLING PRODUCTION

Growing
Sowing a bareroot crop usually requires less precision and less labor. Sowing can occur 10 to 20 times faster with just a few people. Container growing begins with precise and accurate sowing at a relatively slow pace, usually requiring a number of people.

Bareroot Soils
- Infinite possibilities of soil types exist in bareroot nursery situations.
- Continuous management of bareroot nursery soil is needed for good production.
- Bareroot soils are always changing.
- Bareroot soils should contain 1% to 3% OM at a minimum for production.

Container Soils
- Finite possibilities exist for container media mixes.
- Nurseries usually rely on a formulated media.
- Container media is usually very uniform.
- Container media is sometimes 100% OM.

Fertilization

Bareroot
- Bareroot seedling fertilization usually involves the application of standard granular fertilizer.
- Liquid nitrogen is sometimes used in bareroot situations.

Container
- Controlled release (time-release) fertilizers are often used in container nurseries.
- Water soluble formulations can also be applied to the containers.
- Chemigation is often used in container nurseries as either a supplemental fertilization or for the entire nutritional needs of the crop.

Pest Management
Pest management is an important component of both bareroot and container nursery systems. There are similarities and differences in how pesticides are used and what types are required.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Bareroot</th>
<th>Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fumigation</td>
<td>Crucial</td>
<td>Not required</td>
</tr>
<tr>
<td>Insecticides</td>
<td>Same</td>
<td>Same</td>
</tr>
<tr>
<td>Herbicides</td>
<td>Same</td>
<td>Same</td>
</tr>
<tr>
<td>Fungicides</td>
<td>Same</td>
<td>Specialized</td>
</tr>
</tbody>
</table>

LIFT, PACK, AND SHIP

Bareroot seedlings
- Fair weather is required for the operation.
- High volume production is standard.
- Lifting, packing, and shipping seedlings requires expensive equipment and is labor intensive.
- Generally packing materials are inexpensive.
- Storage and transportation are expensive

Container seedlings
- Fair weather is preferred, but not necessary for lifting.
- Equipment can be expensive, and lifting and packing is labor intensive.
- Production volume is possible, but expensive.
- Packing materials are generally expensive.
- Storage can be less expensive, but freight is more expensive than for bareroot seedlings.

The following cost comparison for lifting, shipping, and packing is based on a 30 MM production nursery with a 10 person crew:

<table>
<thead>
<tr>
<th>Bareroot seedlings</th>
<th>Container seedlings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average daily production is 300,000 to 800,000</td>
<td>Average daily production is 90,000 to 110,000</td>
</tr>
<tr>
<td>Seedlings are handled in multiples</td>
<td>Seedlings are handled individually</td>
</tr>
<tr>
<td>480,000 truck load</td>
<td>200,000 truck load</td>
</tr>
<tr>
<td>PRICE: $25 to 75/M</td>
<td>PRICE: $100 to 225/M</td>
</tr>
</tbody>
</table>

CONCLUSIONS
Successful container seedling production requires every detail of attention required by bareroot seedlings... They are just different details.