The flower of ‘Evita’ is representative of many other spring cacti cultivars.

Spring cactus, also called Easter cactus (Rhipsalidopsis or
ods at moderate temperatures. Crops exposed to these condi-
sions in a greenhouse generally

Michigan State University research results in understanding flowering requirements of spring cacti.

Flowering Spring Cactus
Spring cactus, such as ‘Rood’, can make an appealing, colorful potted plant for late winter and early spring sales. (Photos courtesy of Erik Runkle)

By Charles Rohwer, Erik Runkle and Royal Heins

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crop cultivation

Dipping pads in a 400-ppm bleach solution (1:250 dilution of 10-percent bleach) containing a wetting agent immediately before sticking also helps prevent losses in propagation.

Cuttings can be stuck into plug trays, or they may be stuck directly into the finish container. Each plug or 4- to 5-inch pot may contain 1-4 cuttings. Using two or more cuttings per plug or pot produces a fuller and sturdier finished plant. A well-drained medium should be used, and bottom heat (75-77°F) should be maintained during rooting. Excessive watering during propagation will lead to poor rooting and rot.

As the cuttings root, they will start to grow a new pad or flower. To promote branching, the first new pad or flower should be removed when it is large enough to handle and be fully removed without causing damage to the cutting. If plugs are used, transplant the plug to a finish pot when one new pad has waterings, but do not stress the plant, especially during flower induction and expansion. Maintain EC between 0.5 and 0.8 (1:2 soil:water extract). It is important to maintain soil pH above 6.0 to avoid micronutrient (iron and manganese) accumulation and toxicity, which manifests itself as chlorotic or necrotic margins on the pads. It is recommended to terminate fertilization 2-4 weeks prior to the beginning of flower induction treatments to inhibit vegetative growth and promote flowering. Fertilization should resume during the forcing period following cold treatment.

LIGHT

Spring cactus should be grown under relatively high light levels. Maintain a maximum light intensity at solar noon of 4,000-5,000 foot-candles. Light above 5,000 foot-candles, coupled with high temperatures, may cause pads to yellow and abscise. If plants start to turn yellow, reduce light levels to 2,000 foot-candles or less. Maintain EC between 0.5 and 0.8 (1:2 soil:water extract). It is important to maintain soil pH above 6.0 to avoid micronutrient (iron and manganese) accumulation and toxicity, which manifests itself as chlorotic or necrotic margins on the pads. It is recommended to terminate fertilization 2-4 weeks prior to the beginning of flower induction treatments to inhibit vegetative growth and promote flowering. Fertilization should resume during the forcing period following cold treatment.

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Propagation of spring cacti in 72-cell plug trays in The Netherlands. Note that three cuttings were stuck into each cell to produce a stronger and fuller crop at finish.

NUTRITION AND WATERING

Nutritional requirements for spring cactus are not unique. Constant liquid feeding with 125-200 ppm nitrogen is adequate. Allow soil to dry between low from high light levels and temperatures, reduce light to as low as 1,500 foot-candles.

Photoperiodic lighting that delivers at least 10 foot-candles is adequate for long-day treatments, but using supplemental lighting with high-pressure sodium lamps (such as 450 foot-candles) will
Although a minor crop in the United States, spring cactus is produced in large numbers in Denmark and The Netherlands.

**LEVELING**

Plants are leveled, or twisted, to promote growth and create a stronger plant when natural light conditions are low. Supplemental light is sometimes provided in the form of artificial light or by using black tunnels to shade the plants.

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Spring cactus can be pinched (also called twisted or leveled) to create a more uniform, upright plant and to stimulate branching. Plant on the left is before leveling, plant on the right is after leveling.
Figure 1. A general production schedule to produce flowering spring cactus in Northern latitudes on various dates in early spring. NI = 4-hour night interruption.

<table>
<thead>
<tr>
<th>Market Date</th>
<th>Propagation and Bulking</th>
<th>Level Plants (if needed)</th>
<th>Start Short Days</th>
<th>Start Cooling</th>
<th>Start Forcing</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 15</td>
<td>March-April</td>
<td>July 14-21</td>
<td>Aug. 28</td>
<td>Oct. 9</td>
<td>Dec. 4</td>
</tr>
<tr>
<td>February 15</td>
<td>April-May</td>
<td>Aug. 14-21</td>
<td>Sept. 30</td>
<td>Nov. 11</td>
<td>Jan. 6</td>
</tr>
<tr>
<td>March 15</td>
<td>May-June</td>
<td>Sept. 11-18</td>
<td>NA</td>
<td>Dec. 11</td>
<td>Feb. 5</td>
</tr>
</tbody>
</table>

Production parameter

<table>
<thead>
<tr>
<th>Temperature (°F)</th>
<th>75-77</th>
<th>68</th>
<th>50-55</th>
<th>66</th>
</tr>
</thead>
<tbody>
<tr>
<td>initially 68</td>
<td>once rooted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photoperiod</td>
<td>14 hours or longer or NI</td>
<td>14 hours or longer or NI</td>
<td>10 hours or less</td>
<td>Natural days (short days)</td>
</tr>
<tr>
<td>Production time (approx.)</td>
<td>4-8 weeks before short days</td>
<td>6 weeks before cooling</td>
<td>4-6 weeks</td>
<td>6-8 weeks</td>
</tr>
</tbody>
</table>

of leveling depends on growing temperature, because temperature influences growth rate. A new set of pads will form after leveling, and these should be close to full size when induction begins. Flowers will appear on these pads that form prior to induction. Depending on plant architecture and pot size, plants are typically leveled so 2-4 tiers of mature pads remain on the plant after leveling. Small, high light levels, shade may be provided during cooling to reduce solar heating of the plants. Preliminary research results suggest that plants may be cooled for a short time in a cooler if greenhouse temperatures cannot be maintained. Cooling plants for up to 4-6 weeks in a dark cooler may be used on an experimental basis if night temperatures cannot be maintained below 55° F.

Following cool treatment,
FLOWER INDUCTION

Flowering is promoted mostly by short days at cool temperatures followed by long days at moderate temperatures. Optimum temperatures for the cool treatment are 46-55°F. If these temperatures are difficult to maintain because of forcing under long-day photoperiods, it is required for rapid production of numerous buds. It has been recommended to raise temperatures slowly (5°F per day) following the cool treatment to prevent bud drop; but in our experiments we have not found this to be necessary.

To produce flowering plants in March or later, induce plants to flower by using a minimum of 6-8
crop cultivation

Spring cactus flowers most uniformly when plants are exposed to short days followed by cool temperatures. Top: ‘Jan’ provided short days for 0-6 weeks, then cooled at 50° F for six weeks. Bottom: ‘Jan’ provided with short days but cooled at 55° F for six weeks. Photos were taken approximately seven weeks after the end of the cooling treatment.

weeks of cool temperatures under natural photoperiods, then provide long days at warmer temperatures. To create long days, use night interruption (from 10 p.m. to 2 a.m.) or day-extension lighting to create a 14-hour photoperiod. This is a time-intensive process. However, if the ideal growing environments and space are available (i.e., proper temperature, photoperiod and cooling for each phase of production), this plant can be a unique and desirable potted plant for late winter.
To produce flowering plants in January and February, provide six weeks of artificial short days (10 hours or less) prior to the cool treatment. Supplemental lighting during the short-day treatment increases the number of buds produced during forcing.

Figure 1, left, provides a schedule for growing spring cacti to flower for different dates. Plants are marketed when flower buds are ½- to 1-inch long. Some cultivars (usually red-flowered cultivars, for example, 'Jan' and 'Rood') respond better to early-season forcing than others (e.g., 'Phoenix' and 'Capella').

Unlike the Christmas and Thanksgiving cacti, spring cacti typically are not treated with benzyladenine (BA) to increase bud count. However, BA has been shown to increase bud count when applied to plants 12 days after the beginning of the forcing treatment. Exact application timing is crucial, and bud drop is increased. The flowers of spring cacti are less sensitive to ethylene than those of Schlumbergera cacti, so anti-ethylene agents are typically not applied.

Production of spring cactus is a winter/early spring production.