Poinsettia Produced at Reduced Substrate Moisture Content
Yanjun Guo, Dr. Terri Starman, and Dr. Charlie Hall
Texas A&M University, Horticulture Department

Abstract:
The objective was to determine the effect of soil moisture content (SMC) during poinsettia (*Euphorbia pulcherrima* ‘Freedom Red’) greenhouse production on plant quality and postproduction longevity. Two SMC levels (20% and 40%) were applied during total production (TP, 14 weeks), vegetative production (VP, week 33 to 39), and reproductive production (RP, week 40 to 47). The treatments were: 40/40 = TP at 40% SMC; 20/20 = TP at 20% SMC; 40/20 = VP at 40% + RP at 20%; 20/40 = VP at 20% + RP at 40%. After 24h simulated shipping in the dark, plants were evaluated for five weeks in a simulated retail environment with three packaging treatments: N: no packaging; C: pot cover only; and CS: pot cover and sleeve. Growth index (GI), and leaf greenness (SPAD) were measured weekly. Bract number, leaf number, internode length, and dry weight (DW) were measured at week 47. Plant DW, internode length, and GI were reduced in 20/20 and 40/20 compared to 40/40. 20/20 or 40/20 produced more compact plant with earlier bract coloring, without reduction in bract and leaf number. Compared to 40/40, 20/20 could save up to 49.23% greenhouse production cost. After five weeks of postharvest, CS packaged plants had more leaf abscission and the lowest SPAD reading, regardless of SMC treatment. 40/40 had the lowest bract number. In summary, reducing SMC to 20% during total production or during the reproductive stage reduced water usage and produced more compact plants with greater postproduction quality.

Ex ante: Reduced SMC Pros and Cons

**Pros**
- More compact plant = no PGR
- Reduce irrigation water usage
- Acclimate plant to water deficit environment = better postproduction quality
- Lower production cost

**Cons**
- Reduce bract and leaf surface area
- Less fertilizer input = reduce leaf greenness
- Leaf drop = lower total leaf number
- Lower visual quality

Methods and Materials:
Greenhouse Production: week 33 – 47, irrigation treatment started at week 35.
Irrigation treatments:
1. 40% SMC week 35-47, (40/40)
2. 20% SMC week 35-47, (20/20)
3. 40% SMC week 35-39, 20% SMC week 40-47, (40/20)
4. 20% SMC week 35-39, 40% SMC week 40-47, (20/40)

Treatments changed at the beginning of the short days (week 40).
Four blocks, 15 reps/trt., RCBD, total 240 plants
Simulated shipping: 48h, in dark, 20.19 °C
Postproduction: Lab, week 47-52 (5 weeks).
Postproduction packaging treatment:
1. Pot cover and sleeves (CS)
2. Pot cover only (C)
3. Remove pot cover and sleeves after simulated shipping (N)

Two factor factorial experiment design, 5 reps for each treatments combination (4x3x5=60).

Results

![Fig. 1. Effects of four SMC treatments (40/40, 20/20, 40/20, 20/40/40% SMC) on weekly growth index (GI = plant height/2 + (plant width 1 + plant width 2)/4) from production week 36 to production week 47 of poinsettia (*Euphorbia pulcherrima* ‘Freedom Red’). The arrow is denotes week 39 when SMC treatment changed.](image)
Fig. 2. Effects of four SMC treatments (40/40, 20/20, 40/20, 20/40% SMC) on internode length at week 47.

Fig. 3. Effects of four SMC treatments (40/40, 20/20, 40/20, 20/40% SMC) on leaf no., bract no. and bract + leaf no. at week 47.

Fig. 4. Effects of four SMC treatments (40/40, 20/20, 40/20, 20/40% SMC) on bracts coloring process during week 44, 45, and 46 for poinsettia (Euphorbia pulcherrima ‘Freedom Red’).

Fig. 5. Cost of poinsettia (Euphorbia pulcherrima ‘Freedom Red’) to four substrate moisture content (SMC) treatments (40/40, 20/40, 40/20, 20/20% SMC) in 14 weeks of greenhouse production.

Table 1. Effects of four SMC treatments (40/40, 20/20, 40/20 20/40% SMC) or three packages methods [pot covering only (C), pot covering and sleeves (CS), or nothing (N)] on leaf no., SPAD, bracts without necrosis no., and total bracts no. at week 1, 2017.

<table>
<thead>
<tr>
<th>Postproduction harvest week 1 (2017)</th>
<th>Trt.</th>
<th>Leaf no.</th>
<th>SPAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>49.4 a</td>
<td>52.8 a</td>
<td></td>
</tr>
<tr>
<td>CS</td>
<td>37.2 b</td>
<td>47.5 b</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>46.2 a</td>
<td>51.8 a</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trt.</th>
<th>Braacts without necrosis no.</th>
<th>Total Braacts no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>40/40</td>
<td>23.1 b</td>
<td>28.5 b</td>
</tr>
<tr>
<td>20/20</td>
<td>31.5 a</td>
<td>38.1 a</td>
</tr>
<tr>
<td>40/20</td>
<td>29.1 a</td>
<td>35.4 a</td>
</tr>
<tr>
<td>20/40</td>
<td>29.1 a</td>
<td>34.6 a</td>
</tr>
</tbody>
</table>

Conclusion:
20/20 and 40/20 produce more compact plants compared to 40/40 and 20/40 treatments. 20/20 and 40/20 had earlier bract coloring without reduction in bract and leaf number. Compared to 40/40, 20/20 or 40/20 could save 49% or 39% greenhouse production costs.

After 5 weeks postproduction:
- CS packaging reduced plant quality by increasing leaf abscission and lowering leaf SPAD reading
- 40/40 had lower quality: lower total bract number, and more bracts with necrosis.