Identification of a Gene Affecting Pedicel Orientation in Tomato

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Abstract. A mutant of the tomato (Lycopersicon esculentum Mill. cv. Flora-Dade) was characterized by straight pedicels oriented in an upright position. A genetic study indicated the mutant character was controlled by a single recessive gene, which has been tentatively designated as upright pedicel (up). The up locus is linked to the jointless pedicel (j-2) character of Flora-Dade, with a crossover distance of 8.5 units.

Several plants observed in 1976 in a commercial planting of Flora-Dade tomato in Haywood County, North Carolina, differed strikingly from Flora-Dade in orientation of fruit pedicels. Instead of curving downward with fruit held in a pendant position, pedicels were straight and were oriented upright (upright pedicel) so that blossom ends of young fruit were pointed upward (Fig. 1). All of the upright pedicel plants had the jointless pedicel (j-2) and resembled Flora-Dade (3) in other plant and fruit characteristics.


Additional index words. Lycopersicon esculentum, plant genetics

Table 2. Yield and days to flower of relayed and monocropped tomato cultivars in Experiment 1 and 2.

<table>
<thead>
<tr>
<th>Entries</th>
<th>Marketable yield (MT/ha)</th>
<th>Culls (MT/ha)</th>
<th>Days to flower</th>
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<tbody>
<tr>
<td></td>
<td>Monoculture</td>
<td>Relay</td>
<td>Monoculture</td>
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<tr>
<td>Experiment 1*</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>11d-0-2-4</td>
<td>86</td>
<td>54</td>
<td>4</td>
</tr>
<tr>
<td>122-0-1-3</td>
<td>70</td>
<td>47</td>
<td>5</td>
</tr>
<tr>
<td>123-4-11</td>
<td>56</td>
<td>60</td>
<td>2</td>
</tr>
<tr>
<td>Divisoria 2</td>
<td>46</td>
<td>46</td>
<td>1</td>
</tr>
<tr>
<td>Nagcarlan</td>
<td>43</td>
<td>58</td>
<td>1</td>
</tr>
<tr>
<td>KL 2</td>
<td>28</td>
<td>28</td>
<td>1</td>
</tr>
<tr>
<td>Avg</td>
<td>55</td>
<td>49</td>
<td>2</td>
</tr>
<tr>
<td>Experiment 2*</td>
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<tr>
<td>11d-0-2-4</td>
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<td>23</td>
<td>12</td>
</tr>
<tr>
<td>122-0-1-3</td>
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<td>10</td>
</tr>
<tr>
<td>123-4-11</td>
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<td>9</td>
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<tr>
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<td>42</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>Nagcarlan</td>
<td>41</td>
<td>25</td>
<td>6</td>
</tr>
<tr>
<td>KL 2</td>
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<td>14</td>
<td>4</td>
</tr>
<tr>
<td>Avg</td>
<td>46</td>
<td>22</td>
<td>8</td>
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</table>


**Literature Cited**


Fig. 1. Normal ‘Flora-Dade’ tomato (left) and upright pedicel (up) mutant (right). As fruits set, pedicels bend from the normal, downward curving position (A) to an upright position (B).
Table 1. Inheritance of upright pedicel (up) and jointless pedicel (j-2) from crosses involving a ‘Flora-Dade’ mutant (up/j-2) and ‘Walter’ (up+/j-2+).

<table>
<thead>
<tr>
<th>Generation</th>
<th>Normal jointed (up+/j-2+)</th>
<th>Normal jointless (up+/j-2)</th>
<th>Upright jointed (up+/j-2)</th>
<th>Upright jointless (up+j-2)</th>
<th>X²</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>F₁ (up)</td>
<td>all</td>
<td>all</td>
<td>all</td>
<td>all</td>
<td></td>
<td></td>
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<tr>
<td>F₁ (Walter)</td>
<td>all</td>
<td>all</td>
<td>all</td>
<td>all</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F₂</td>
<td>observed 173</td>
<td>6</td>
<td>10</td>
<td>55</td>
<td>179.08</td>
<td>&lt;.01</td>
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<tr>
<td></td>
<td>expected 137</td>
<td>46</td>
<td>46</td>
<td>15</td>
<td></td>
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<tr>
<td>F₂ × P₁</td>
<td>observed 117</td>
<td>9</td>
<td>12</td>
<td>108</td>
<td>169.90</td>
<td>&lt;.01</td>
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<tr>
<td></td>
<td>expected 61.5</td>
<td>61.5</td>
<td>61.5</td>
<td>61.5</td>
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</tr>
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</table>

*Ratios for single genes:

<table>
<thead>
<tr>
<th>Observed</th>
<th>Expected</th>
<th>X²</th>
<th>P</th>
</tr>
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<tbody>
<tr>
<td>F₁ normal vs. upright jointed vs. jointless</td>
<td>179.65</td>
<td>183.61</td>
<td>0.35</td>
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<tr>
<td>F₁ × P₁ normal vs. upright jointed vs. jointless</td>
<td>126.120</td>
<td>123:123</td>
<td>0.15</td>
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</table>

1 Assuming 2 recessive genes segregating independently.

Promotion of Flowering in *Spathiphyllum ‘Mauna Loa’* with Gibberellic Acid

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Additional index words: inflorescence, growth regulators

Abstract. *Spathiphyllum ‘Mauna Loa’* seedlings flowered after a single spray of gibberellic acid (GA₃) at 250, 500 or 1000 mg/liter. Significantly more inflorescences per plant were produced at the 1000 mg/liter treatment. Severe flower distortion, consisting of either curved peduncles or spathes with extra appendages, was observed on 15% of all GA₃-treated plants.

*Spathiphyllum ‘Mauna Loa’,* Araceae, is an important tropical foliage plant which has attractive foliage and produces flowers consisting of a showy white spathe and spadix. Most *Spathiphyllum* are grown from seed and may require 9-15 months to reach flowering size. Mature flowering plants, regardless of size, usually do not flower from August through January. As a result, *Spathiphyllum* often are sold without flowers. The ability to induce flowering in larger plants or small seedlings could increase the market potential of this crop on a year round basis.

Previous studies have shown GA₃ at 100-1000 mg/liter induces flowering in *Caladium* (2), *Dieffenbachia* (3) and other members of the Araceae (1, 4, 5). This study was initiated to determine if GA₃ would stimulate flowering in *Spathiphyllum ‘Mauna Loa’.*

In the initial experiment 40 eight-month old plants were transplanted into 15 cm pots in September 1979 containing a 2 Florida sedge peat:1 pine bark:1 Cypress shavings (by volume) medium amended with 4.2 kg/m³ dolomite, 1.8 kg/m³ Perk (a micronutrient source) and 5.9 kg/m³ Osmocote (14N-6P-11.6K). Plants were sprayed once until runoff (about 250 ml per treatment) with either 0, 250, 500, or 1000 mg/liter GA₃ using Tween 20 at 0.5 ml/liter as a wetting agent. Each treatment consisted of 10 plants in a randomized block design in a greenhouse with a temperature range of 18-32°C. Flowering was determined weekly.

Flower buds were visible after 8 weeks and plants receiving 500 mg/liter GA₃ had up has been tentatively chosen for upright pedicel in accordance with accepted rules of nomenclature for gene symbols in tomato (1).

Linkage of up to j-2 was indicated by a deficiency of recombiant phenotypes in test cross and F₁ populations. The percent recombination in the test cross population indicated up to be 8.5 crossover units from j-2.

Literature Cited


Table 1. Effect of GA₃ on flowering of *Spathiphyllum ‘Mauna Loa’.*²

<table>
<thead>
<tr>
<th>GA₃ (mg/liter)</th>
<th>0</th>
<th>0</th>
<th>0</th>
<th>0</th>
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<tbody>
<tr>
<td>10</td>
<td>250</td>
<td>0</td>
<td>0</td>
<td>30</td>
<td>70</td>
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<tr>
<td>14</td>
<td>500</td>
<td>20</td>
<td>50</td>
<td>70</td>
<td>100</td>
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</tr>
<tr>
<td>16</td>
<td>1000</td>
<td>0</td>
<td>60</td>
<td>90</td>
<td>100</td>
<td>100</td>
</tr>
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</table>

*Plants in 15 cm pots with 10 reps per treatment.

Fig. 1. *Spathiphyllum ‘Mauna Loa’* in 15 cm pot 18 wk after a single 1000 mg/liter GA₃ spray.