Distribution and Ecotypic Differentiation of *Fragaria chiloensis* in Chile

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Two botanical forms of *F. chiloensis* ssp. *chiloensis* have been recognized in Chile (Staudt, 1962): *F. patagonica* (referred to as Lahuen in Chile), for the wild taxon with red small fruit common in Chile and Argentina, and *F. chiloensis* (previously referred to as Quelghen or Kellen in Chile), for the cultivated taxon of white and large fruit size, which is found in Chile, Peru, Ecuador and Colombia, probably carried from Chile by the Spanish conquerors (Hancock et al., 1999). The latter was domesticated by ancient inhabitants of Chile before the arrival of Spanish conquerors, and is still cultivated in small plantings [e.g. at Buchupureo (lat. 36°S), Callele (lat. 37°30′S), Puerto Saavedra (lat. 38°46′S), Carahue (lat. 37°30′S)] along the coast of central-south Chile, in Mediterranean type climates.

*F. chiloensis* f. *patagonica* is distributed in a wide range of climatic and ecological conditions, along the coastal lands and the Andes mountains, between lat. 35°30′S and 47°33′S and between sea level and 1850 m elevation (Lavin et al., 2000). It is found in Mediterranean, marine and polar type climates, and in various soil types and plant communities. *F. chiloensis* f. *chiloensis* is generally found near water between see level and 500 m (Lavin et al., 2000).

Materials and Methods

A morphometric analysis of 66 Chilean accessions of *Fragaria chiloensis* (L.) Duch. was performed to assess phenotypical differences among them. Accessions were collected in expeditions in 1993 between 41° and 47°S. Plants were planted in plastic bags and placed in rised beds outdoors. A selection of eleven accessions of each cluster (PCs), and accessions of each accession (PCs).

### Table 1. Mean values (=SE) of relevant characters related with the two first principal components (PCs), and accessions of each cluster (PCs).

<table>
<thead>
<tr>
<th>Character</th>
<th>Cluster no. 1</th>
<th>Cluster no. 2</th>
<th>Cluster no. 3</th>
<th>Cluster no. 4</th>
<th>Cluster no. 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(11)</td>
<td>(28)</td>
<td>(3)</td>
<td>(3)</td>
<td>(3)</td>
</tr>
<tr>
<td>First PC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of the stipule</td>
<td>1.4 ± 0.06</td>
<td>1.1 ± 0.04</td>
<td>1.5 ± 0.09</td>
<td>0.9 ± 0.15</td>
<td>1.3 ± 0.29</td>
</tr>
<tr>
<td>Length of leaflets</td>
<td>3.8 ± 0.09</td>
<td>3.1 ± 0.07</td>
<td>3.1 ± 0.09</td>
<td>2.7 ± 0.23</td>
<td>4.4 ± 0.26</td>
</tr>
<tr>
<td>Width of leaflets</td>
<td>3.3 ± 0.08</td>
<td>2.6 ± 0.06</td>
<td>2.7 ± 0.06</td>
<td>2.3 ± 0.09</td>
<td>3.8 ± 0.26</td>
</tr>
<tr>
<td>Length of petals</td>
<td>8.1 ± 0.50</td>
<td>7.1 ± 0.33</td>
<td>5.5 ± 0.29</td>
<td>5.1 ± 0.20</td>
<td>11.1 ± 0.70</td>
</tr>
<tr>
<td>Fruit polar diameter</td>
<td>1.7 ± 0.07</td>
<td>1.7 ± 0.04</td>
<td>1.7 ± 0.17</td>
<td>1.6 ± 0.23</td>
<td>2.8 ± 0.23</td>
</tr>
<tr>
<td>Fruit equatorial diameter</td>
<td>1.5 ± 0.06</td>
<td>1.4 ± 0.04</td>
<td>1.4 ± 0.09</td>
<td>1.3 ± 0.19</td>
<td>2.3 ± 0.12</td>
</tr>
<tr>
<td>Fruit yield</td>
<td>11.1 ± 2.32</td>
<td>13.0 ± 1.05</td>
<td>4.9 ± 0.89</td>
<td>2.5 ± 0.82</td>
<td>35.7 ± 4.19</td>
</tr>
<tr>
<td>Fruit weight</td>
<td>1.3 ± 0.06</td>
<td>1.3 ± 0.06</td>
<td>1.4 ± 0.30</td>
<td>1.0 ± 0.23</td>
<td>5.5 ± 0.30</td>
</tr>
<tr>
<td>Second PC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of fruit per plant</td>
<td>9.2 ± 2.02</td>
<td>9.9 ± 0.78</td>
<td>4.0 ± 1.18</td>
<td>2.5 ± 0.82</td>
<td>5.7 ± 0.95</td>
</tr>
</tbody>
</table>

Values in parenthesis are the number of accessions in each cluster.

### Table 2. Length of the flowering period, and number and percentage (in parentheses) of 56 accessions of *F. chiloensis* in each category. The study was conducted between September 1994 and August 1995.

<table>
<thead>
<tr>
<th>Length of the flowering period (months)</th>
<th>Accessions (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11–12</td>
<td>7 (12.5)</td>
</tr>
<tr>
<td>9–10</td>
<td>10 (17.9)</td>
</tr>
<tr>
<td>7–8</td>
<td>8 (14.3)</td>
</tr>
<tr>
<td>5–6</td>
<td>11 (19.6)</td>
</tr>
<tr>
<td>3–4</td>
<td>9 (16.1)</td>
</tr>
<tr>
<td>1–2</td>
<td>5 (8.9)</td>
</tr>
<tr>
<td>&lt;1</td>
<td>6 (10.7)</td>
</tr>
</tbody>
</table>

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quantitative characteristics were evaluated in
ten plants of each accession; mean values (of the
10 plants) were used in a principal component
and cluster analysis.

Results and Discussion

The first two principal components (PCs)
explained 37.6% and the next five PCs, with
eigenvalues >1, explained 36.2% of the total
variation. Cluster analysis identified four groups
of *F. chiloensis* f. *patagonica* (cluster 1 to 4), sug-
gesting that important phenotypical differences
exist among accessions of the wild taxon (Table
1). Three accessions of the cultivated taxon of *F.
chiloensis* (f. *chiloensis*) formed a fifth cluster at
great distance from clusters containing the wild
taxons. The other 18 accessions did not form any
cluster. Flowering period differed greatly among
accessions of *F. chiloensis* f. *patagonica* (Table
2). A high percentage of accessions (28.6%) showed
flowering periods of >9 months, which
suggests a day-neutral response to photoperiod.

The fruit production period of these accessions
lasted 6 months (from October to April). Other
accessions exhibited shorter flowering period
(1 to 2 months).

Accessions of *F. chiloensis* also showed
large differences in leaf photosynthetic capacity
(*A*<sub>max</sub>). Larger values of *A*<sub>max</sub> were observed in
accessions of *F. chiloensis* f. *patagonica* where
seven accessions showed greater *A*<sub>max</sub> than *F.
×ananassa* (Table 3).

Literature Cited

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