

The Elvenia J. Slosson Endowment

Breeding and Selection of Hybrid *Cantua* for Inland Valley's of California

Project period: July 1, 1999 to June 30, 2000

Preliminary Final Report, December 2002.

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This final report was due in September 2000. We apologize for the delay in writing it. The *Cantua* collection was planted on the Agricultural Experiment Station at UC Riverside in December 1999. In spring and summer, 2000, plants began to decline and die. Over the next two years we lost about one third of the plants we had set out. Others are stunted. We thought we were going to lose the whole collection. We now know that most plants died from susceptibility to *Xylella* bacteria, which also attacked the adjacent lilac planting, but to a lesser extent. *Xylella* infection was confirmed by members of the Plant Pathology and Entomology Departments. The vector, the glassy-winged sharpshooter, is common in the Riverside area in the summertime, especially in orange groves that dominate the Experiment Station. In fall 2002, it became evident that some plants would survive. In fact, some plants appear tolerant, if not resistant to *Xylella* infection. This report is based on the fact that quite a few plants were lost.

Original Summary

The Andean magic flowers (*Cantua* species and hybrids, *Polemoniaceae*) offer potential for novel, colorful, dwarf, evergreen shrubs for inland valley gardens in southern and central California, and for the nursery trade. *Cantua buxifolia* and its dwarf 'Hot Pants' grow well on the coast, but require lath-house shade inland at Riverside. *Cantua flexuosa* grows in full sun inland and offers variation in inflorescence habit, flower size and color. F1 hybrid and some backcross generations have already been made and transplanted into the Botanic Gardens. We propose to remake some critical hybrid and backcross generations to understand the genetic principles involved. This will provide larger populations from which to select desirable dwarf and medium height plants with pendulous or upright inflorescences, a range of flower size, color and anther color adapted to hot, dry growing conditions in inland valley gardens.

The original budget requested was \$20,000. The budget granted was \$11,000.

Project Description.

Plant material of all six species of *Cantua* from the Andes of Ecuador and Peru was brought together at UC Riverside Botanic Gardens by Stephen Morgan. Some were collected from the wild, while others were obtained from local nurseries or Rancho Santa Ana Botanic Gardens, when they discontinued their collection. Hummingbirds pollinate flowers of plants at Riverside, and seed set by open pollination is common. Flowers for

controlled crosses have to be protected with glassine bags. In general, pollination and seed is not difficult, but some interspecific crosses can only be made one way.

Preliminary Results:

Eighty three plants of species, interspecific F1 hybrids, and backcrosses were set out on the Agricultural Experiment Station at UC Riverside in November and December 1999 (Figure 1). Over 100 plants of species, hybrids and backcrosses were maintained in



Figure 1. Cantua planting at the Agricultural Experiment Station, UC Riverside.

the lath house at UCR Botanic Gardens. Around 30 of the plants in the field were killed by xylella in the last three years up to December 2002. Others (20) are stunted and are probably infected. However, some plants appear not to be affected by the bacterium and are growing well. The field plot is close to citrus and lilacs, and there is no shortage of sharpshooters in the area. A lesser number of plants succumbed to the disease in the lath house. This may be because there are few citrus trees in the Botanic Gardens.

The plants that survived in the field represent a range of species and hybrids, as well as flower color, shape, tube length, anther color and desirability as ornamentals. Seeds, both from controlled crosses, and from open pollination, were collected from desirable field plants and lath-house plants. Some of these have been germinated and are being flowered in pots in the lath house, as more seem to survive there than in the field. Other seeds are in cold storage. Cuttings were made of all desirable plants in the field and potted plants are maintained in the lath house.

At this stage, we are reluctant to say if specific parents, interspecific hybrids, or backcrosses generate xylella-tolerant plants. However, we hope to do this in a year's time when more plants that may be infected may have died. Despite this set back, Stephen Morgan is hopeful to obtain new hybrid combinations that fulfill the aims of the project and that are adapted to hot climates in the inland valleys. Mr. Morgan has remade some of the interspecific hybrid populations to obtain a larger number of F1 and backcross plants for selection. Due to the lack of funding, we have not, as yet, attempted the cytogenetic part of the original project. We plan to present a more complete final report in September 2003.

The Elvenia J. Slossen Endowment

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(Project period: July 1, 1999 to June 30, 2000)

Appendix to the Final Report, December 2003

From J. Giles Waines, Director, and Stephen Morgan, Curator, Botanic Gardens,
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This is an appendix to the preliminary final report for this project submitted in December 2002. After the *Cantua* parent species and hybrids were transplanted onto the UCR Agricultural Experiment Station in December 1999, some plants began to decline and die starting in summer 2000. Plant death continued through 2002, but seems to have stabilized in 2003. Tests by the Plant Pathology Department and the Entomology Department indicate that *Xylella* bacterial infection is the likely cause of plant death. Listed below are the names of parent species and hybrids that have survived and are growing in the field plot in December 2003, as reported by Mr. Morgan.

Total number plants set out in the field in 1999 = 83. Total number of living plants in field in December 2003 = 26. In addition, stock plants and new hybrid seedlings are maintained in a lath-house, where they grow well.

Hybrid plants with *Cantua candelila* 'Rancho Colorado' 15 planted out, 10 survived (= 66%).

Hybrid plants not involving *Cantua candelila* 'Rancho Colorado' 70 planted out, 16 survived (= ca. 22%).

Two pure *Cantua flexuoso* were planted out and survived.

Hybrids of *C. flexuosa* x *C. buxifolia* 'Hot Pants' 8 plants set out, 2 survived.

Open pollinated plants of *C. flexuosa* x (*C. flexuosa* x *C. buxifolia* 'Hot Pants') 46 plants were set out, 10 plants survived.

From these data, it appears that *C. candelila* 'Rancho Colorado', *C. flexuosa*, and *C. buxifolia* 'Hot Pants' are able to produce hybrid offspring, some of which appear tolerant to the bacterium, and can grow in full sun in an inland valley in southern California.

Most of the 26 plants in the field appear to be growing well. Selections were made in winter/spring 2003 and they will be confirmed in winter/spring 2004. A few desirable plants have already been released to a local breeder and nursery (RSABG). Cuttings were taken of all plants in the field and they were rooted and kept in pots in the lath-house, where they are less stressed by summer heat. Mr. Morgan plans to write an article for a horticultural journal after the 2004 season's bloom period.