

Elvenia J. Slosson Endowment Fund

Project Title: Development of Red and Yellow Delphiniums for California Home Gardens, Nurseries and Seed Houses.

Investigator: J. Giles Waines, Department of Botany & Plant Sciences, University of California, Riverside, CA 92521-0124.

Tel: 951-827-3706, Fax: 951-827-4437, E-mail: giles.waines@ucr.edu

This is a **progress report** for the work performed from **July 1, 2006 to June 30, 2007**.

Original Project Summary and Introduction: This project will cross California wild diploid species of *Delphinium* (Ranunculaceae) with yellow, scarlet, red and blue flower colors. The F1 hybrids will have their chromosome numbers doubled up with colchicines to produce allotetraploid plants. These allotetraploids will be crossed to white and blue tetraploid garden delphiniums adapted to California growing conditions. The resultant three way crosses are expected to exchange flower color genes, as they did for Dr. Legro in the Netherlands in the 1960s. That project resulted in a few red garden delphinium cultivars released in northwestern Europe, which are propagated asexually. In California, we will select for seed propagation, which is the preferred method, as well as root divisions. Seed propagation will reduce virus infection and provide a method to select for mildew resistance.

Goals/Objectives:

Interspecific Diploid Crosses: In winter-spring 2007 reciprocal interspecific crosses were made between *D. nudicaule* with orange flower color, *D. luteum* with yellow flower color, *D. parishii* with pale blue flower color, *D. parryi* with pale-blue flower color, and *D. cardinale* with red flower color. Seemingly good F1 seeds were produced, and they will be germinated in winter-spring 2007-2008. Many of the plants of these diploid California native wild delphiniums over-summered as dormant rootstocks and re-sprouted with the winter rains in November-December 2007. They will be used to make additional interspecific F1 hybrid crosses in 2008.

Flowering times out doors among these diploid species were of interest. The first to flower at Riverside in mid February 2007, was *D. luteum*, closely followed by *D. nudicaule*, both from northern California. The next in March were *D. parryi* and *D. parishii* from southern California, and finally in April-May *D. cardinale* from southern California.

Disease: *D. luteum* is very susceptible to mildew in southern California.

Interspecific Diploid X Tetraploid Crosses: In spring 2006, reciprocal interspecific crosses were made between red and yellow California diploid wild delphiniums and white or pale-blue flowered tetraploid California garden delphiniums. Seemingly good F1

seed was produced, but in winter-spring **2007** no seeds germinated. On closer inspection, the small delphinium seeds appeared a little shriveled.

Discussion: The lack of germination of seed from the diploid x tetraploid crosses may have been due to seed dormancy. The pots were kept and signs of germination will be looked for in winter-spring-2008.

Alternatively, and more probably, there may be a barrier to hybridization between species with different ploidy levels. On close reading of Dr. R.A.H. Legro's 1961 publication he reported extensively on this phenomenon in his delphinium crosses. I originally thought by using different diploid and tetraploid seed or plant sources I might get around this barrier that Legro encountered, but possibly not. The way Legro got around it was to make the diploid interspecific F1 hybrids into allopolyploids using colchicine, or to germinate seeds of diploid species and use colchicine to make the seedlings autopolyploids and to then cross the autopolyploids among themselves, or to cross them to white and pale-blue tetraploid garden plants. I shall attempt both of these approaches in winter-spring 2008.

Clearly, not being able to obtain triploid seedlings between wild diploids and garden tetraploids is a set back I did not fully consider in my original proposal and it will put back the time table a year from the original one proposed. However, I and a graduate student, were able to make interspecific diploid F1 hybrid crosses in spring 2007. The hybrid seed looks good and hopefully some of these should germinate in winter-spring 2008. Interspecific diploid delphinium hybrid swarms are reported in the Jepson Manual and in the earlier Flora of Southern California, possibly mediated my hummingbird visits to delphinium flowers.

Plan of work for 2007-2008:

- 1). Germinate diploid interspecific hybrid seed and double up the chromosome number with colchicine to produce allotetraploid plants and seeds. Cross them to garden tetraploids.
- 2). Germinate diploid seeds, treat with colchicine to produce autotetraploid plants and cross these to garden tetraploids.

Request For Funding: None. Since I am still at the stage where I have to make either allotetraploid or autotetraploid plants with colchicine, and use these in crosses, I have sufficient funding to do this without requesting more. I hope by not asking for funding now, I might be able to defer funding for a later year when there will be a larger number of interspecific plants to grow and screen.

Reference:

Legro, R.A.H. 1961. Species hybrids in delphinium. *Euphytica* 10:1-23.