

Pixie, a dwarf grapevine for research

Genetics & Breeding

Research Team Members:

Peter Cousins, USDA ARS, Grape Genetics Research Unit, 630 W. North Street, Geneva, NY, 14456
peter.cousins@ars.usda.gov

David Tricoli, The Ralph M. Parsons Foundation Plant Transformation Facility, University of California, 192 Robbins Hall,
Davis, CA, 95616

In 2006 ARS released Pixie, a dwarf grapevine for research. Pixie has a natural mutation that shortens the internodes and causes the vine to produce flowers instead of tendrils. As a result, Pixie vines are quite small and are easy to cultivate in a greenhouse or growth chamber. The vines constantly produce flowers and many vines have fruit at all stages of development on the plant simultaneously.

Because of their small size and continuous flowering habit, Pixie vines may be useful in viticulture and grapevine biology research and teaching. The semidominant character of the dwarfing phenotype suggests that there is an opportunity for using Pixie in accelerating backcrossing or pseudobackcrossing following the method of Ryder (1985). Dwarf plants with rapid flowering (which carry the mutant allele) are used to advance generations in crosses with wild type plants. In the final generation the dwarf plants would be avoided by using a seed treatment protocol that is below the germination induction threshold for embryos with the mutant allele. In a greenhouse or growth chamber Pixie vines can be cultivated to produce clusters of any age at any time of year. This provides an opportunity to use Pixie vines to teach grape growth, development, and morphology without regard to seasons. Plant pathologists have expressed interest in using Pixie vines to investigate the interaction of grapevines with fungi, oomycetes, and other disease causing organisms and physiologists have already acquired Pixie vines for research. It is known that plant growth regulators play a role in signaling in grapevine/pathogen interactions and in many aspects of berry development, so consideration of the GAI mutation is important in the development of Pixie as a model system.



Pixie grapevine. Note shortened internodes and clusters at multiple stages of development born simultaneously on one plant (insets).

Image by J. Ogradnick, Cornell University.

The Pixie grape variety was released in August 2006 by the USDA Agricultural Research Service without any intellectual property restrictions. Plant material, including cuttings, plants, pollen, and seeds, are available upon request to the corresponding author. David Tricoli and staff of The Ralph M. Parsons Plant Transformation Facility maintain Pixie germplasm in several forms and are investigating Pixie transformation and other aspects of genetic improvement. The USDA ARS National Clonal Germplasm Repository, Davis, California, a part of the National Plant Germplasm System, holds Pixie as accession DVIT 3321.

Reference:

Ryder, E. J. 1985. Use of early flowering genes to reduce flowering time in backcrossing, with special application to lettuce breeding. *J. Amer. Soc. Hort. Sci.* 110:570-573.

