

be lined out in evaluation blocks in late fall 1998 and in spring 1999.

Information generated by previous work at the NPMC with Virginia wildrye, hairy wildrye, and bottlebrush grass will be used to maintain weed-free evaluation blocks, as well as harvest and clean seed. The NPMC has been growing these three species for roadside revegetation projects. Production fields have been established by planting plugs in rows with a modified tobacco planter. Weed maintenance between rows has been accomplished through planting a cover crop or through cultivation. Seeds are harvested using a combine, and seeds are cleaned using a two-screen clipper.

Horticultural Research at The Holden Arboretum

Robert D. Marquard and Charlotte R. Chan

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Formal research at the Holden Arboretum began in 1991 with the hiring of staff with scientific training. Currently, the centerpiece of research is breeding woody ornamental plants to support our mission to develop improved plants for the landscape through breeding or selection and to make significant contributions to the plant sciences. Complementary research includes: studies of plant reproductive biology, measuring genetic diversity, estimating the heritability of important traits, utilization of biochemical markers, and developing alternative propagation methods. The current focus includes work within several genera (*Aesculus*, *Cercis*, *Hamamelis*, *Magnolia*, and *Rhododendron*).

Acquisition of germplasm has been an organizational and early research objective. In 1993, we began assembling a collection of *Hamamelis* cultivars and seed was collected from throughout the range of our native *H. virginiana*. By formal agreement, the Holden Arboretum acquired the property and germplasm accumulated by David G. Leach who was a prodigious breeder of *Rhododendron* for over 50 years. Acquired in 1986, this plant collection is one of the best for cold-hardy *Rhododendron* germplasm. Three full-time employees maintain this satellite research station of nearly 20 acres located within 30 miles of The Holden Arboretum.

At the Arboretum proper, research is conducted from the Horticulture Science Center (HSC) which was completed in early 1994. Currently, over 4000 ft² provides ample office, herbarium, darkroom, and laboratory space for research. The HSC also has a 3000 ft² headhouse and about 4500 ft² of greenhouse space to support the expanding needs of the organization.

The Corning Institute for Education and Research was designed, in part, to promote research by young scientists. This program may support graduate students who conduct research at Holden and complete class work at an appropriate college or university. Alternatively, the Corning Institute may support individuals at the post-graduate level to work with the Research staff on specific projects. A second opportunity is the R. Henry Norweb, Jr. Fellowship that typically supports individual research at the Arboretum typically during the summer. Staff selected for this program may work on a specific project of interest, bring an existing program to The Holden Arboretum, or be supported while on sabbatical leave.

Recent Publications Include:

Marquard, R.D., E.P. Davis, and E.L. Stowe. 1997. Genetic diversity among witchhazel cultivars based on randomly amplified polymorphic DNA markers. *J. Amer. Soc. Hort. Sci.* 122:529-535.

Krebs, S.L. 1996. Normal segregation of allozyme markers in complex rhododendron hybrids. *J. Hered.* 87:131-135.

Krebs, S.L. 1995. Enzyme fingerprinting of Rhododendron cultivars. *J. Amer. Rhod. Soc.* 49:210-215.

**ABSTRACTS FROM RECENT PUBLICATIONS:
Horticultural Research at The Holden Arboretum****Charlotte R. Chan and Robert D. Marquard**

The Holden Arboretum, 9500 Sperry Road, Kirtland, Ohio 44094 U.S.A.

The Holden Arboretum established in 1931, is the largest arboretum in the United States. Its mission is to promote the knowledge and appreciation of plants for personal enjoyment, inspiration, and recreation; for scientific research; and for educational and aesthetic purposes. Of the Arboretum's 3100 acres, 800 acres support collections and display gardens, while the balance comprise natural areas. The collections include nearly 8000 accessions from 76 plant families; about 700 plant species, some rare or endangered, occupy the natural areas. The education component of the mission connects the Arboretum with the public through school programs, classes, horticultural therapy, and seasonal internships. Two research fellowships are also available. The Holden Arboretum has expanded the research emphasis. The David G. Leach Research Station, part of the Arboretum since 1986, focuses on rhododendron and magnolia breeding and research. Built in 1993, the Horticulture Science Center is a modern research and production facility able to more fully implement and support a broad range of formal horticultural research. The main objective of the research program is to develop superior woody ornamentals for the landscape through hybridization. Additional research emphasizes reproductive biology and using biochemical markers (isozymes and RAPDs) to answer basic questions about the genera under study (*Aesculus*, *Hamamelis*, and *Cercis*).

Isozyme and RAPID Analyses of Witch Hazel Cultivars**Robert D. Marquard, Charlotte R Chan, Eric P. Davis, and Emily L. Stowe**

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Numerous isozyme systems were found to be polymorphic in witch hazel (*Hamamelis* spp.). However, aconitase (ACO), malate dehydrogenase, phosphoglucose isomerase (PGI), and phosphoglucomutase were most useful for identification of cultivars. From these enzyme systems, three genes were identified that control