

Volume 26 · Number 2 · Summer 2004

The Azalean

Journal of the Azalea Society of America



1000 Moody Bridge Road
Cleveland, SC 29635

Photographing the Glenn Dale Azaleas
Occurrence of Polyploidy in *Rhododendron luteum* Sweet, Hardy Ghent, and Rustica Hybrids

Propagating Deciduous Azaleas from Cuttings
Reviving Memories—the ASA Archives Project

President's Letter

Robert (Buddy) Lee — Independence, Louisiana

The 2004 national meeting and convention was a grand success. Thanks to everyone involved, especially Bob McWhorter and Carol Segree, for working so hard to make sure everything ran so smoothly. The wonderful tours, informative talks, and being with old friends and making new friends made this convention very memorable. The weather was favorable and the azaleas were in full bloom. And who could ever forget the famous "Pot Heads" with their outrageous costumes and gifts. Thanks again, Ben Morrison Chapter for an enjoyable convention and a job well done.

The Lake Michigan Chapter, John Migas and crew are busy getting everything ready for the 2005 convention in Holland, Michigan. They have been planning for a couple of years, and everything is falling into place. I'm assured that not only will we see lots of blooming azaleas but also thousands and thousands of blooming tulips. I can hardly wait until next spring.

Letter to the Editor

I thoroughly enjoyed "Growing Rhododendrons and Azaleas in the Midwestern Garden," by the late Charles Mann in the Spring 2004 issue of *The Azalean* [26(1): 9-10]. He had obviously learned a lot about growing our favorite plants in a challenging environment; however, I offer two short cautionary notes about mulch and ground covers.

I agree with Charles' comments about the benefits of mulch and feel the concerns he states can be overcome. Applying a heavy layer of mulch after first frost avoids the delay in hardening off for the winter, and leaving a 1" bare space around the stem eliminates the safe haven for insects that may munch the stem. A third concern is his recommending peat moss as a mulch. I much prefer using leaves, pine straw, or shredded pine

I would like to thank the board of directors and officers for two very productive board meetings this past May. Two of the motions that were adopted by the board were the Azalea City Program, chaired by Joe Schild, and the Archives Project, chaired by John Brown. A lot of time and energy has gone into both of these projects, and there is still a lot of work to be done. I have high hopes that both of these projects will be very successful. Tom Milner and Ronald Hooper are brand new members of the board, and I welcome them and look forward to working with them and hearing their new ideas. Margie Jenkins and Donald Voss are leaving the board, and I have surely enjoyed working with these two very knowledgeable and dedicated people. Thank you all.

If anyone wishes to become active with the board or with a committee, please contact me or any of the officers. This is your Society; your opinion and participation are important.

bark rather than peat moss. As well as being expensive and a non-renewable resource, after peat moss dries out, it can shed water like a duck's back.

I also agree with his suggested use of groundcovers for their utility in eliminating weeds, as well as for their general attractiveness. However, at least in our climate, I suggest avoiding vine-like groundcovers such as the *Vinca minor* and *Pachysandra terminalis* he recommended. Here, they are as aggressive as English ivy in covering up low-growing azaleas, and I actively eliminate all three. I suggest instead using any of the many available low-growing and clump-forming (or at least easy to pull) groundcovers, including the *Ajuga* he mentioned.

Sincerely,
Bob Stelloh,
Hendersonville, North Carolina
USDA Zone 7

Azalea Society of America

The Azalea Society of America, organized December 9, 1977 and incorporated in the District of Columbia, is an educational and scientific non-profit association devoted to the culture, propagation and appreciation of azaleas Subgenera *Tsutsusi* and *Pentanthera* of the genus *Rhododendron* in the Heath family (*Ericaceae*).

Officers for 2003-2004

President — Robert Lee
Vice-President — William McDavit
Secretary — John Brown
Treasurer — Robert Stelloh
Immediate Past President —
Joseph E. Schild, Jr.

Directors

Terms Expire in 2005
Leslie Ann Nanney
Joe Coleman
John Migas

Terms Expire in 2006
Robert Hobbs
Ron Hooper
Tom Milner

Chapter presidents serve as
ex-officio directors

Chapters

Brookside Gardens (chartered Aug. 1979)
Dr. Charles Evans, Pres.
Ben Morrison (chartered May 1980)
Carol Segree, Pres.

Northern Virginia (chartered May 1980)
Barry Sperling, Pres.
Louisiana (chartered June 1981)
James Campbell, Pres.

Tri-State (chartered Oct. 1981)
Robin Hahn, Pres.
Dallas Chapter (chartered May 1989)
Eugene Westlake, Vice-Pres.

Oconee Chapter (chartered Nov. 1991)
Allison Fuqua, Pres.
Vaseyi Chapter (chartered June 2001)
Ed Collins, Pres.

Lake Michigan Chapter (chartered May 2003)
John Migas, Pres.

Regular membership is open to all interested parties for an annual amount of \$25.00; life-membership for an individual is \$500.00. Members receive *The Azalean* and are eligible for participation in all activities of the Society including those of the chapter with which the member affiliates. For information and a membership application, write to the Membership Committee, Azalea Society of America, 1000 Moody Bridge Road, Cleveland, SC 29635.

The Azalean

Journal of the Azalea Society
of America

Editor

Barbara Stump

Editorial Advisory Board

Donald H. Voss
Jane Newman
Robert W. Hobbs, Ph.D

Advertising

Joseph E. Schild, Jr.

The Azalean (ISSN-1085-5343) is published quarterly (spring, summer, fall and winter) by the Azalea Society of America, Inc., 1000 Moody Bridge Road, Cleveland, SC 29635.

Additional copies of the current and back issues can be obtained from Azalean Back Issues, 1000 Moody Bridge Road, Cleveland, SC 29635; jbrown51@bellsouth.net. Please include \$1 per copy ordered, plus \$1 per order. Orders from outside the U.S., Canada, and Mexico, add \$1 per issue for postage.

Opinions and views expressed in *The Azalean* are those of the contributors or the Editor, not necessarily those of the Society, and are presented to foster a wider appreciation and knowledge of azaleas. Advertisements are presented as a service to our readers and do not imply endorsement by the Azalea Society of America. Advertising and other contributions to *The Azalean* are used exclusively to help defray the costs of publishing *The Azalean*.

Address all editorial and business correspondence to:

The Editor, *The Azalean*
101 S. Sanders
Nacogdoches, TX 75964
PH: 936-462-7195
FAX: 936-462-1842
bsstump@sbcglobal.net

Society Web site: www.azaleas.org
Mail list: azaleas@azaleas.org

Printed by:
Complete Printing
Carthage, Texas

contents

VOLUME 26

NUMBER 2

SUMMER 2004

26 President's Letter

Robert Lee

26 Letter to the Editor

28 Photographing the Glenn Dale Azaleas

Dan Krabill

31 Technical Note about 'Cinderella'

William C. Miller III

Azalea Research

**32 Occurrence of Polyploidy in *Rhododendron luteum*
Sweet, Hardy Ghent, and Rustica Hybrids**

*Tom Eeckhaut, Leen Leus, Albert De Raedt
and Erik Van Bockstaele*

Mastering Azaleas Series

39 Part 4. Propagating Deciduous Azaleas from Cuttings

Joseph E. Schild, Jr.

41 ASA Conventions

Tadeusz Dauksza

Society News

42 Reviving Our Memories—The Society's Archives Project

John Brown

43 Chapter News

44 In Memory—Dr. Eugene Aromi

Aromi's Jungle—Maarten van der Giessen

45 Azalea Mart

On the Cover



A plant acquired as Glenn Dale 'Cinderella' was photographed by Dan Krabill for his project of making a complete set of images for all the Glenn Dale azaleas (see p. 28). The pictured plant does not match the description of 'Cinderella' in Monograph 20, but it has been distributed under this name for many years. 'Cinderella' and 'Satrap' were propagated from branches of a 'Vittatum' x 'Louise' (Kaempferi) hybrid bearing flowers with the respective

color patterns described in Monograph 20. 'Vittatum' was a parent in many of the Glenn Dale crosses that produced early blooming white flowers with stripes of various colors. (Photo by Dan Krabill.)

Photographing The Glenn Dale Azaleas

Dan Krabill — McLean, Virginia

I bought my first of the 454 different Glenn Dale azaleas in approximately 1984, and began buying them in earnest in 1986 when I saw them in bloom at various nurseries in the Washington, DC, area. I kept adding more Glenn Dales over time, primarily from specialty nurseries run by ASA members, fellow azalea enthusiasts, and the plant sales and auctions of the Northern Virginia Chapter



'Dream', a cross of *simsii* x *mucronatum*. (All photos by Dan Krabill.)

of the ASA. Somewhere along the way, as I kept seeing beautiful varieties that I had previously never heard of, I began buying every Glenn Dale I could, sight unseen.

Almost from the outset, I discovered that the flowers of many of the plants I bought did not come close to matching the written descriptions in Lee's *The Azalea Book*, Galle's *Azaleas*, or Morrison's *The Glenn Dale Azaleas*, also known as Monograph 20. As a result, I have thrown out or moved aside a number of plants that were clearly misnamed and obtained replacements for many misnamed plants and plants of questionable accuracy. Over time, I have become acutely aware of the need for a collection of photographs of the Glenn Dales.

In March 2002 I bought a digital camera, and for two years I took close-up pictures of the flowers of every azalea I could. This past winter I sorted through the results of my first two years of digital photos, and counted approximately 180 good quality pictures of Glenn Dales that seemed to match the written descriptions. This spring I noticed that I had far more Glenn Dales in bud than in previous years, and focused my photographic efforts on taking pictures of as many of the Glenn Dales as possible.

Digital Photography

Digital cameras have been on the market for a number of years and have been getting better and cheaper every year. Instead of using photographic film, they somehow translate the results of each picture into millions of bits of information that are encoded and recorded on a reusable storage medium. All of this is done in a second or two, after which the camera provides a small image of the picture just taken, which provides immediate feedback on color, centering within the frame, and resolution. (I can pick out the dots in the blotch of a picture that is well focused.) If the photographer does not like the picture, it can be erased and replaced with a new picture. At the end of a picture-taking session, the pictures are downloaded to a computer and then erased from the storage medium. All of this is at an incremental cost per picture of zero, after the substantial initial investment in camera, storage medium, extra battery, and computer.

Before I bought my camera, I asked for advice through the ASA e-mail discussion forum. Several people offered advice, and each recommended his camera. This says something good about the quality being provided by several different companies. Eventually, I bought a Canon G2, on the basis of a review in *PC World* that said the Canon provided the best reproduction of color of all the cameras in its price class that they tested. It also has a great feature that I did not realize was an important one—an LCD monitor that swivels and twists so that when I take a close up of a flower (just about the only kind of picture I take), I can stand or kneel comfortably without having to get myself directly behind the camera. Despite the fact that my camera dropped in price



'Content', a light purple sister seedling of the popular white azalea 'Glacier'.

substantially before it was replaced by a new model, I am totally satisfied with my choice and the timing of my purchase.

I have made many mistakes in taking pictures of azaleas, many more than once and have learned a number of helpful techniques through trial and error. The simplest thing is that I must use the macro focus switch in taking pictures up close and make sure that it stays on. My first day of digital photographs had to be thrown away, as have parts of many other sessions, because the macro switch was off. Also, many of my early pictures were out of focus, despite use of the macro switch. The automatic focus mechanism in my camera was focusing, in many cases, on the anthers of the flower, which of course stick out, rather than the petal. I solved this by fixing the automatic focus on the top or side of the flower, and then centering the flower in the frame before taking the picture.



This photo of 'Acrobat' shows the mallow purple sarding on the white flowers.

Color is a constant problem. I have to work for a living, and therefore I am usually not available to take pictures between 10:00 am and 3:00 pm when the light is best for providing accurate reproduction of color. As a result, I have taken a lot of pictures in which pinks have been too purplish and yellowish pinks have been too orangy. In some cases I have picked a flower and put it in front of the computer screen to determine which of several pictures of the same plant provided the most accurate reproduction of color.

Sunlight can provide striking photographs, but it often introduces problems. Red colors in particular do not come out well for me if taken in direct sunlight. Generally, I have had the best results taking pictures on cloudy days or in the shade. Larry Martin of the Northern Virginia Chapter of ASA moves his containerized plants into the shade to take pictures, but I grow plants in the ground and therefore cannot move them. I do pull off flowers and move them to the shade. I also bend branches and sometimes stand between the flower and the sun.

My computer software provides the opportunity to adjust the color, and also to touch up flaws in flowers. So far, I have been a purist and stuck with what the camera has provided me, preferring my photography over my artwork.

With digital photographs, there are no negatives or hard copies of pictures, unless you print them or have prints made. I have panicked on occasion, thinking I might erase all my digital photos from the computer. Now I back everything up at regular intervals on an external hard drive that can be attached to another computer, and I have created CDs of my better pictures for various purposes.

Some long-time film photographers complain that the quality of digital photographs is not as good as film photographs. One reason why many digital photos are not



'Surprise' is red with irregular white margins and bears a strong resemblance to 'Ben Morrison'.

good is that people do not take the time to set up before taking pictures that many film photographers do. In my case, the lack of set-up time is a result of the benefits of digital photography – zero incremental cost for each picture, immediate feedback on the results, the opportunity to re-take if a picture does not turn out, and the opportunity to take 100 or so pictures in a session. In my view, when I do not do things wrong and when light and flower conditions are good, the results are often excellent.

Flowers

This year was my best year by far for Glenn Dale blooms. One factor is that all of my plants, many of which I bought in 3-inch pots or got from cuttings, were a year older and larger. More importantly, we had about 25 trees cut down during the last two summers. The added sunlight has been great for azalea blooms. Finally, we had a lot of rain last year, a fairly mild winter, and no late frost this spring.

Every flower is different, and flowers on the same plant differ from year to year. This is particularly the case with many of the Glenn Dales, presumably due to the Satsuki parentage of many varieties. For varieties having white flowers with colored flakes, stripes, and sectors, there is a great deal of variety in the patterns, in addition to solid colored sports and solid white flowers. Some varieties having colored borders and white centers some years do not have white centers other years. This year two Glenn Dale varieties that are supposed to have hose-in-hose flowers seemed to bloom initially with single flowers, and later with hose-in-hose flowers. I will have to look at those plants more carefully next year.

When a bud first blooms, the flower is usually nearly perfect, although it may take a day or so to bloom fully. Most flowers begin to deteriorate within a few days, or sooner, depending on the weather, even when the overall effect of the plant from a distance is still beautiful. Also, color can change over the short life of a flower. Fortunately, from the point of view of the photographer, not all buds bloom at the same time, so a short business trip or a rainy day or two may not ruin the opportunity to take a good picture of a plant for the year. The flowers of some varieties have stayed in nearly perfect condition for me longer than others, perhaps due in part to location within the yard, but primarily, I suspect, because the flowers of some varieties stand up better over time than others.

This year, the flowers of some varieties were spotted or otherwise flawed before they bloomed (with petal blight), presumably due to the combination of unusually hot weather and rain in early and mid-May. Also, it seems that insects or malnutrition can ruin all of the blooms of some varieties, particularly small plants blooming for the first time.

The Results

As I mentioned at the outset, it has been particularly difficult to get cor-

rectly named plants of some of the Glenn Dale varieties. The variability of flowers from year to year and the propensity of many varieties to throw off sports have contributed to this problem. I also suspect the large number of 454 varieties and the lack of a photographic reference source has contributed to some propagators being careless.

I started this year with 436 of the 454 Glenn Dales, at least nominally, and added one more this spring. I knew then that the names of many of my plants were of questionable accuracy, but did not realize how many. This year the blooms of about 15 plants were so far from the written descriptions that they were immediately thrown away. Fortunately, I already had replacements in hand for the majority of them, although most of the replacements have not yet bloomed for me. Another 50 or so varieties that have bloomed for me are of questionable accuracy, and I will need to observe them more closely next year.

There were several additional cases of different plants of the same name having significantly different flower characteristics such as color, size and shape, bloom time, or more than one of these characteristics. In most cases, one of the plants clearly does not match the written description. In a few cases, I have not yet determined which of my plants, if any, is "correct."

I have taken approximately 2,500 pictures of Glenn Dales over the last three years, mostly at my home but also at the US National Arboretum and private homes that were on this year's ASA Convention tours. In photographing the Glenn Dales, I have tried to take pictures of flowers that had stripes or flakes, a white center, etc., if that was part of the written description, even if not all flowers on the plant had those characteristics. Given the zero incremental cost of each picture, I took pictures of a number of imperfect flowers, on the belief that a picture of a flawed flower is more useful than no picture

at all. I will be looking to upgrade the quality of many of my pictures in future years.

I have compared my pictures to written descriptions and photos taken by others, and have selected approximately 900 pictures on the basis of photographic quality, accurate representation of the flowers, and conformity to the written descriptions. The next step, for some varieties, will be to compare the colors in my pictures to the RHS color chart, using the translation of Morrison's original color descriptions that was prepared by Don Voss and included in *The Glenn Dales Revised* by West and Miller.

'Cinnabar' provides an interesting example of two different plants in my garden with the same name. Morrison's description of the flowers is white with stripes and shading of spinel red (purplish red). My initial plant had flowers the last two years that match that description. I have another 'Cinnabar' plant that has dark orangish red or brownish red stripes, as does Jane Newman of the Northern Virginia Chapter of ASA. 'Cinnabar' is a mineral, mercury sulfide, which is variously described as being bright scarlet, cinnamon red to brick red, or cochineal red to brownish red, which is consistent with my second plant. It is puzzling to think that Morrison might have named a plant 'Cinnabar' that did not have any cinnabar coloring.

'Serenade' provides another interesting example of different plants seeming to have the same name. My first 'Serenade' meets Morrison's written description in the original Monograph 20, an early-blooming rose pink (purplish pink) similar to 'Dream'. Malcolm Clark, my source for the plant, said he got it from a source that was usually quite accurate. The "corrected" description of 'Serenade' in *The Glenn Dales Revised* is of a later blooming salmon pink sister of 'Fashion'. Jane Newman had drawn the same conclusion earlier, based on her experiences in buying 'Serenade' from more than one

source and having each plant resemble 'Fashion' rather than 'Dream'.

This article includes digital photos of four varieties of Glenn Dales, plus the photo of 'Cinderella' on the cover of this issue of *The Azalean*. All are available from multiple sources within the ASA, and some are available at commercial garden centers.

'Dream' is the best-known of the 10 Glenn Dale azaleas from the cross *simsii* x *mucronatum*. Others include 'Allure' and 'Serenity'. All have early-blooming rose pink flowers of varying shades. Two years ago I moved them all together. They provided a stunning display in mid- to late April, but they were out of the way and no one saw them. Early this spring I moved them to the front of our house and am happy with the result.

'Cinderella' is one of two named varieties that came from the same seedling. The plant pictured on the cover does not match the description of 'Cinderella' in Monograph 20, but has been distributed as 'Cinderella' for many years if not from the outset. The early-blooming white flowers with red stripes are striking. It is one of a number of early-blooming white Glenn Dales having stripes of various colors that have 'Vittatum' as a parent.

'Content' is a light purple sister seedling of the widely-planted white Glenn Dale 'Glacier'. The picture shown on the cover was taken in 2002.

'Acrobat' is a low-growing azalea having white flowers heavily striped and sanded with mallow purple. It has a light greenish blotch that for some reason showed up quite prominently in my pictures last year. The greenish blotch was much more muted in my picture this year, which is shown here. It bloomed for me in McLean, Virginia, on May 13 this year and May 18 last year.

'Surprise' is a very attractive red with irregular white margins. It has a strong resemblance to 'Ben Morrison', which was created by

Morrison but not included in the Glenn Dales. 'Surprise' has been easy to photograph despite the red color, and its blooms last longer than many. It bloomed for me on May 9 each of the last two years.

I am working on creating a CD of pictures of Glenn Dale azaleas, to consist of many of my digital photos and hopefully a number of slides taken over a period of years by Jane Newman that are being scanned into digital form by Don Hyatt. I anticipate that the CD will include roughly 500 pictures of approximately 350 varieties of Glenn Dales. Details will be published in a future volume of *The Azalean*, and also on the ASA e-mail discussion forum.

The initial CD will not be a finished product. I hope that people who receive the CD will provide feedback on the accuracy, and especially any inaccuracies, of the plant names. Future editions will include more varieties, improved pictures, and corrections of any misnamed plants.

The reason for all the effort, first in growing the plants and then in photographing them, is that some of the Glenn Dales are among the most attractive azaleas in the market. My hope is that these pictures will be useful to people in identifying Glenn Dale azaleas, and in reducing the propagation and distribution of misnamed plants. More broadly, I hope this effort will contribute to the preservation, distribution, and planting of this wonderful group of azaleas.

Dan Krabill, currently vice-president and formerly president of the Northern Virginia Chapter of the ASA, has been a member of the ASA since 1987. He grows approximately 1,000 varieties of azaleas at his home in McLean, Virginia. When not digging in the dirt or taking pictures of the results, he is a management consultant to the banking industry. This article is his first attempt at publishing outside of the field of banking and finance.

Technical Note About 'Cinderella'

William C. Miller III
Bethesda, Maryland

The relationship of 'Cinderella' and Satrap was reported in considerable detail by Rothe and Miller in "The Most Unusual Striped Flower," *The Azalean*, 1988 10(1) 5-8. 'Cinderella' and 'Satrap' are both derived from the same plant (B32140) that was initially withdrawn due to its instability owing probably to its 'Vittatum' heritage. 'Cinderella' should be so red that it appears to be white stripes on a red flower. The existing line of six specimens of B32140 at Glenn Dale continued to demonstrate the extreme variability with the production (in order of frequency) of red stripes on a white background (Satrap), red selfs (unnamed), and an irregular white margin version (unnamed but nice and available from Mike White as "Sport of Satrap"). A flower described as white stripes on a red background ('Cinderella') was comparatively rare in my observations of these plants.

Careless selection of wood for propagation and failure to "rogue" out sports could both contribute to a loss of the true 'Cinderella'. There is also the possibility that folks had the correct 'Cinderella' initially only to lose it over time due to reversion.

You are cordially invited to join the



American
Rhododendron
Society

Annual Subscription of \$35 (USA)
Benefits: quarterly journal, seed exchange,
chapter affiliation, conventions

Dues may be sent to:
Laura Grant, Executive Director
P.O. Box 525
Niagara Falls, NY 14304-0525 USA

ARS Website: <http://www.rhododendron.org>

Occurrence of Polyploidy in *Rhododendron luteum* Sweet, Hardy Ghent, and Rustica Hybrids

Tom G. R. Eeckhaut, Leen W. H. Leus, Albert C. De Raedt
and Erik J. Van Bockstaele—Ghent, Belgium

Abstract

By means of flow-cytometric measurements, *Rhododendron luteum* Sweet, Pentanthera, Hardy Ghent, and Rustica hybrids were found to be polyploid. For *R. luteum* this was in contrast with earlier publications. Most of the hybrids tested were tetraploid though triploidy seemed to occur regularly. Diploidy did not occur. The ploidy level of other Pentanthera species matches literature data. The results imply a strong relationship between Hardy Ghent and Rustica hybrids and tetraploid Pentanthera species. The discovery of polyploids offers multiple perspectives for further breeding, including interspecific hybridization and optimization of ploidy-level-influenced growth vigor.

Introduction

Polyploidy is a very useful tool in plant breeding, since it may allow plant breeders to overcome barriers to hybridization (dissolving interploidy blocks), to restore hybrid fertility by the creation of allopolyploids, to develop sterile cultivars (meiosis being prevented by complications due to the presence of multiple homologous chromosomes), to enhance pest resistance and disease tolerance in allopolyploids by the additive effect of defense chemicals inherited by both parents, or to create larger plants with an enhanced vigor (Stebbins, 1971). The connection between ploidy level and plant cell size has not fully been elucidated yet, though ploidy level clearly exerts an important control on cell size (Kondorosi *et al.*, 2000). Sometimes chimeras occur; if the chimerism is periclinal, histogenic layers and the resulting somatic tissues show different ploidy levels since leaves originate from the L_I + L_{II}, anther filaments from the L_{II}, and roots from the L_{III} layer (Tilney-Basset, 1986).

Polyploidy has been realized in several ornamental crops such as *Alstroemeria* (Lu and Bridgen, 1997), *Syringa* (Rose *et al.*, 2000a), *Buddleja* (Rose *et al.*, 2000b), *Cyclamen persicum* (Takamura and Miyajima, 1996) and *Rosa* (Roberts *et al.*, 1990). Polyploidization attempts in *Rhododendron* are numerous (Paden, 1990; Eiselein 1994a, b; Kehr, 1996; Väinölä, 2000; Eeckhaut *et al.*, 2001).

Ploidy analysis by conventional chromosome counting is time consuming and laborious (Martens and Reisch, 1988; Owen and Miller, 1993). Flow cytometry

offers a valuable, rapid, simple, accurate and fairly cheap alternative; it involves the analysis of fluorescence and light-scattering properties of single particles during their passage within a narrow, precisely defined, liquid stream (Galbraith *et al.*, 1983; Dolezel *et al.*, 1989; Dolezel, 1991). Heller (1973) was the first to use this technique for DNA analysis in plant cells; later on it was used for differ-

Partial Glossary—Genetics Terms

Chimera. A plant or plant organ consisting of tissues of more than one genetic composition and origin (*Hortus Third*, p. 1212). A **periclinal chimera** would be one on the surface of a plant.

Ghent, Belgium (**Gent**, in Dutch) has been a center for azalea hybridizing in Europe since the early 1800s (Galle, p. 81).

Ghent hybrids (in Holland sometimes known as the **Pontic hybrids**). A consolidation of a number of deciduous azalea hybrid groups developed in Belgium, including the Mortier hybrids, (crosses of the Flame and Pinxterbloom azaleas—*Rhododendron calendulaceum* × *R. periclymenoides*); the Ornatum hybrids (crosses of *R. calendulaceum*, *R. viscosum*, and *R. luteum*; the Viscosepalum hybrids (*R. molle* × *R. viscosum*); and M.L. Verschaffelt's crosses of Mortier's seedlings with Ornatus, Pontic azalea (*R. luteum*), and Flame and Pinxterbloom azaleas. In 1850 there were 500 named Ghent hybrids; today, 100 are listed, with perhaps 25 commonly grown (Galle, p. 81).

Heterochromatic. Having or consisting of different or contrasting colors.

Histogenic. Of or pertaining to the process of tissue development and differentiation.

Homologous. Corresponding in basic type of structure and deriving from a common primitive origin.

Ploidy. Chromosomes, through which heredity is transmitted by way of genes, occur within the nucleus of each living cell of the plant body in sets which are known technically as genomes. Ploidy, as used in *Hortus Third*, refers to the degree of duplication of genomes or of individual chromosomes making up the genome. Normally each vegetative cell of the plant body contains two genomes and the plant is known as a **diploid**. Continued duplication of genomes leads to

the formation of **polyploid** plants with three (**triploid**), four (**tetraploid**), etc. sets of chromosomes. If the genomes are dissimilar, derived from parents belonging to different species, the plant is an **allopolyploid**. Many species of plants are known or thought to be of polyploid origin, but the details of their origin are lost in antiquity, and for all practical purposes they are considered to be normal diploids. While the plant breeder needs acquaintance with the complexities and subtleties of polyploidy, especially as these relate to sterility and the expression of desired traits, most horticulturists need only recognize that polyploidy, and in particular allopolyploidy, is a widespread phenomenon in the plant kingdom.... In the horticultural trade, polyploidy tends to be publicized only in those instances where it confers desirable characteristics such as gigantism of floral parts, increased vigor, or adaptability to a wide range of soils and climate. (Hortus Third, p. 887)

Related terms: **Aneuploidy**. Characterizing an organism that does not contain an exact multiple of the basic set of chromosomes. (Helms, Ted, 2000, NDSU). **Mixoploidy**. Containing cells with chromosome numbers that deviate from the normal tetraploid. (S. Jelenic et al., p. 14).

Rustica Flora Pleno hybrids, were introduced into Belgium about 1890 by Charles Vuylsteke, who acquired them from Louis de Smet, also of Belgium. Their origin is probably unknown, possibly Double Ghent azalea crosses with the Japanese azalea (Galle, p. 89).

Somatic. Of or pertaining to any of the cells of an organism that become differentiated into the tissues, organs, etc.

Transposon. A segment of DNA that moves to a new location in a chromosome, or to another chromosome or cell, and alters the existing genetic instructions, sometimes producing significant changes.

References

Bailey, L.F. and E. Z. Bailey (comp.) 1976. *Hortus Third: A Concise Dictionary of Plants Cultivated in the United States and Canada*. Revised expanded edition: The Staff of the Liberty Hyde Bailey Hortorium, Cornell University. New York: Macmillan Publishing Co.

Galle, Fred C. 1987. *Azaleas*. Revised and enlarged edition. Portland: Timber Press.

Helms, Ted. 2000. North Dakota State University. "Polyploidy and Aneuploidy in Advanced Genetics." www.ag.ndsu.nodak.edu/plantsci/adv_genetics/genetics/poly/poly01.htm .

Jelenić, Srećko. Jasna Berljak, Dražena Papeš, and Sibila Jelaska. 2001. "Mixoploidy and Chimeric Structures in Somaclones of Potato (*Solanum tuberosum* L.) cv. Bintje." *Food Technology and Biotechnology*. 39 (1): 13-17.

Definitions not otherwise credited are from:
Neufeldt, Victoria, ed. 1988. *Webster's New World Dictionary*. 3rd College Edition. New York: Webster's New World.

ent plant species (Galbraith, 1990; Arumuganathan and Earle, 1991; Bennett and Leitch, 1995).

The genus *Rhododendron* (\pm 1000 species) is divided into eight subgenera, the four most important subgenera being Tsutsusi (evergreen azaleas except Brachycalyx section), Pentanthera (deciduous azaleas), Rhododendron (lepidote *Rhododendrons*) and Hymenanthes (elepidote *Rhododendrons*) (Chamberlain *et al.*, 1996). Hymenanthes are evergreen and have large non-scaly leaves; Rhododendrons (subgenus) have smaller scaly leaves, are usually evergreen, but occasionally are semi-deciduous. Species and hybrids of these two subgenera comprise what gardeners refer to loosely as rhododendrons, while Pentanthera and Tsutsusi comprise the azaleas. The Pentanthera subgenus is confined to 30 species divided over four sections. The deciduous azaleas are generally taller, upright plants with less branching than in the evergreen species. The leaves are often much larger than those of the evergreen species, and they are usually not glossy. The flowers of most species have relatively long, narrow tubes. Colors include white and a variety of tones, from pale to strong, in the yellows, oranges, yellowish pinks, reds, pinks, purples, and purplish pinks (Voss, 2001).

Among deciduous azaleas, many hybrid groups have been created since the 19th century (De Raedt and De Groote, 2000). In Gent, between 1804 and 1834, a baker named P. Mortier began producing the Ghent hybrid azaleas (the so-called *Azalea mortieriana*). He used three American species: *R. calendulaceum*, *R. periclymenoides*, and *R. speciosum* and the scented *R. luteum* from around the Black Sea to produce some robust, sweetly scented, and hardy plants. Other species possibly involved in the development of Hardy Ghent are *R. prinophyllum*, *R. viscosum*, *R. canescens*, *R. flammeum*, *R. occidentale*, and *R. molle*. The Double Ghent hybrids originated about 1853 near Frankfurt and were mainly propagated by Louis Van Houtte. In 1888 Charles Vuylsteke introduced double forms called the Rustica hybrids (probably Double Ghent hybrids \times *R. molle* ssp. *japonicum*) that were originally bred by Louis Desmet. Louis Van Houtte also introduced Mollis hybrids, a complex group derived mainly from *R. molle* ssp. *japonicum* but confusing due to the vicissitudes of the names of the Chinese and Japanese azaleas and the early history of their introduction and breeding. The Mollis hybrids are generally not as hardy as the Ghent, due to their *R. molle* parentage, and are best grown on their own roots. Knap Hill hybrids were developed by Anthony Waterer and son by crossing Ghent Hybrids with *R. molle* var. *molle*, *R. occidentale*, and other species.

The first chromosome study of rhododendrons was published by Sax in 1930. The chromosome number of 360 *Rhododendron* species has been determined by counting (Janaki Ammal *et al.*, 1950; McAllister, 1993).

The basic chromosome number (x) within the genus is 13. Different species were found to be polyploid; however, species that are classified within the *Pentanthera* subgenus were found to be diploid, except for the tetraploids *R. calendulaceum* and *R. canadense*. The aim of this research was a flow cytometrical control of the ploidy level of Hardy Ghent and Rustica hybrids and their presumable ancestors (if available).

Materials and methods

Plant material

Species: In the literature, the only *Pentanthera* species described as tetraploids are *R. calendulaceum* Torr. and *R. canadense* Torr. (Janaki Ammal *et al.*, 1950). Therefore *R. calendulaceum* leaf material was used in control samples. Species that were collected for ploidy measurement included *R. luteum* Sweet (gathered from three different and independent sources), *R. prinophyllum* Millais, *R. viscosum* Torr., *R. occidentale* A. Gray, *R. canescens* Sweet and *R. periclymenoides* Shinners. Besides leaves, flower (anther filaments) and root material was harvested and flow cytometric measurements were performed in order to detect possible (periclinal) chimerism.

Hybrids: Nuclear suspensions from leaf material of Hardy Ghent 'Nancy Waterer', 'Unique', 'Narcissiflorum', 'Jozef Baumann', 'Maja', 'Rosetta', 'Mina Van Houtte', 'Daviesii', 'Semiramis', 'Quadricolor', 'Souvenir du President Carnot', 'Marie Verschaffelt', 'Batholo Lazarri', 'Guelder Rose', 'Gloria Mundi', 'Coccinea Major', 'Raphaël De Smet', 'General Trauff', 'Graff von Meran', 'Goldlack', and 'Van Houtte Flore Pleno' and Rustica hybrids 'Norma', 'Phebe', 'Fenelon' and 'Racine' were tested.

Ploidy measurement

To determine the ploidy level, a flow cytometer, Partec PAS (particle analyzing system) III, was used as described by De Schepper *et al.* (2001). From young leaves on control plants (with known ploidy level) and from plants with the unknown ploidy level, 5 mm discs were punched. The sample was chopped with a sharp razor blade in 250 µl buffer solution, containing 0.1 M citric acid and 0.5 % Tween 20 (pH ± 2.5) for the isolation of the nuclei. The chopped sample was passed through a nylon filter of 100 µm mesh size. Afterwards, 500 µl of the second buffer, containing 0.4 M Na₂HPO₄ and 2 mg/l DAPI (4', 6'-diamidino-2-phenylindol) (pH ± 8.5) was passed through the filter to get the staining. The pH of the mixture of both buffers was 7, which is the optimal pH for the staining with DAPI (Otto, 1990).

After filtration, the nuclear suspensions were passed through the flow chamber, filled with a sheath fluid (de-ionized water). The nuclei traversed the focus of an intense beam of light, produced by a high-pressure mercury vapor damp lamp. At a wavelength of 365 nm the nuclei, stained with DAPI, fluoresced. The excitation

light was collected by a lens and converted to pulses of electrical current by a photomultiplier. The electronic signals were then digitized and the binary data stored as one-dimensional histograms. The fluorescence intensity is linearly correlated with the amount of DNA that was stained with DAPI.

The first sample measured in the flow cytometer was the external standard (control plant). The use of flow cytometry is a relative measurement; the first sample should gauge the apparatus for the plants to measure. The voltage of the photomultiplier, which transfers the DAPI-fluorescence (depending on the DNA content) into an electrical current, was adjusted in such a way that a diploid peak (standard) is fixed at position 100. A haploid peak will in that case occur at position 50, a tetraploid peak at position 200. The measurement of the external standard was repeated after every 10-12 measurements of plants with unknown ploidy level, to correct the voltage of the photomultiplier if necessary. Peak shifts were corrected by adding an internal standard (a diploid *Lolium multiflorum* 'Bellem'—Italian ryegrass—nuclear suspension) to the samples. Each plant was measured until two unequivocal results were obtained (two samples were not always sufficient due to occasional high nuclear suspension viscosity, resulting in broad and indefinable peak patterns).

Results

Species: With the exception of *R. prinophyllum*, root material was hard to measure and gave unclear results. The determination of nuclear DNA content of leaves and filaments was easier to establish, though multiple measurements were required to obtain the results. Especially *R. viscosum* nuclear suspensions seemed to inhibit sheath flow by a high viscosity. Results are presented in Table 1 and Figure 1. All *R. luteum* and *R. calendulaceum* samples were found to be tetraploid. All other species were diploid as expected.

Hybrids: All genotypes were compared to the tetraploid *R. calendulaceum* standard. Sixteen Hardy Ghent hybrids and two Rustica hybrids turned out to be tetraploid, whereas five Hardy Ghent hybrids and two Rustica hybrids were found to be triploids (Table 2; Figure 2). The triploid hybrids are 'Mina Van Houtte', 'Daviesii',

Table 1. Ploidy Measurement of *Pentathera* Species

Species	2n (leaves)	* measurement unclear	
		2n (anther filaments)	2n (roots)
<i>R. calendulaceum</i>	4x	4x	*
<i>R. luteum</i>	4x	4x	*
<i>R. prinophyllum</i>	2x	2x	2x
<i>R. viscosum</i>	2x	2x	*
<i>R. occidentale</i>	2x	2x	*
<i>R. canescens</i>	2x	○	*

'Quadriflorum', 'Gloria Mundi', 'Van Houtte Flore Pleno', 'Norma' and 'Phebe'. Ploidy peaks were found to shift during successive measurements towards higher ploidy levels. In order to avoid the need for continuous calibration between every measurement by an external standard sample (*R. calendulaceum*) an internal standard (a *Lolium multiflorum* 'Bellem' nuclear suspension) was added to each sample (Figure 2). The ratio between the sample peak fluorescence (SPF) and the grass peak fluorescence (GPF), as interpreted from the X-axis, compared to the ratio between the *R. calendulaceum* peak and the grass peak fluorescence, gave a more trustworthy indication of the ploidy level of the sample. Results, however, were found to be similar to those results obtained after measuring without internal standards (Table 2). Two groups can clearly be distinguished: the largest group has a SPF/GPF ratio of 0.68-0.80, comparable to (or slightly higher than) the *R. calendulaceum* SPF/GPF ratio of 0.70, whereas the ratios of the smallest group vary between 0.49 and 0.58. The ratios of the smallest group are 70-83% of the *R. calendulaceum* ratio; therefore, it may be assumed that the smallest group contains triploids and the largest group holds tetraploids.

Discussion

Our results imply a very strong influence of tetraploid species during the development of Hardy Ghent and Rustica hybrids. The botanical species *R. luteum* appears to be tetraploid, which is contradictory to previous results obtained by chromosome counting (Janaki Ammal *et al.*, 1950). This was observed on samples collected on three different genotypes (seedlings growing at different places). This also explains why most of Hardy Ghent and Rustica hybrids, measured in this experiment and derived from

crosses involving *R. luteum* and *R. calendulaceum*, are tetraploid. Mixoploidy was not observed. Since most hybrids had already been created in the 19th century, exact parental data usually are missing. We suspect that molecular analysis would reveal a closer relationship of the hybrid groups with *R. calendulaceum* and *R. luteum* (and *R. canadense* and other possible tetraploids) than with diploid botanical species. This is especially important regarding *R. luteum*, which has so far incorrectly been described as a diploid species, and has probably been underestimated in the past. All other measured species were diploid, which was in agreement with earlier publications. A thorough ploidy screening for all 30 *Pentanthera* species and other hybrid groups is highly recommended, to find out whether even more species are polyploid. Considering ploidy levels, most *Rhododendron* breeders still directly or indirectly rely on the data presented by Janaki Ammal (1950) that appear not entirely trust-

worthy, most probably due to the unavailability of flow cytometry as an accurate, quick, and reliable screening tool at the time.

Some hybrids are triploid, indicating the presence of diploid species in their ancestry, which did not establish an aberrant morphology or growth vigor compared to the tetraploids. Apart from *R. luteum*, *Pentanthera* species that were tested and that are possibly involved in the creation of the hybrids were diploid. These data suggest that the origin of tetraploid hybrids is confined to tetraploid species (*R. luteum* and *R. calendulaceum*) whereas triploid hybrids were derived from crosses with diploid species. When regarding the ancestry of the triploid hybrids, some interesting data are revealed. *R. 'Daviesii'* is often described as a *R. viscosum* x *R. molle* seedling. *R. molle* had no part in our experiments but is described as diploid. Probably '*Daviesii*' results from an interploidy pollination and therefore the *viscosum* x *molle* percentage appears questionable (unless

Table 2. SPF/GPF* Ratios and Ploidy Level for All Hardy Ghent and Rustica Hybrids Examined

(SPF: sample peak fluorescence GPF: grass peak fluorescence)

Hybrid	Ratio SPF/GPF	2n (leaf)	Hybrid	Ratio SPF/GPF	2n (leaf)
<i>R. calendulaceum</i> (2n=4x)	0.70	4x	'Batholo Lazarri'	0.72	4x
'Guelder Rose'			'Gloria Mundi'	0.75	4x
'Nancy Waterer'	0.75	4x	'Coccinea Major'	0.58	3x
'Unique'	0.68	4x	'Raphaël De Smet'	0.76	4x
'Narcissiflorum'	0.74	4x	'General Trauff'	0.74	4x
'Jozef Baumann'	0.75	4x	'Graff von Meran'	0.72	4x
'Maja'	0.76	4x	'Goldlack'	0.72	4x
'Rosetta'	0.75	4x	'Van Houtte Flore Pleno'	0.71	4x
'Mina Van Houtte'	0.54	3x			
'Daviesii'	0.55	3x			
'Semiramis'	0.77	4x			
'Quadriflorum'	0.50	3x	'Norma'	0.51	3x
'Souvenir du Pres. Carnot'	0.71	4x	'Phebe'	0.49	3x
			'Fenelon'	0.70	4x
'Marie Verschaffelt'	0.76	4x	'Racine'	0.80	4x

R. molle is not a diploid). ‘Gloria Mundi’ is suspected to be a cultivated *R. calendulaceum* type; however, in that case we would have expected a tetraploid ploidy level.

Unlike members of the other subgenera, Pentantheras occur naturally at distinct places, widely scattered over the globe: the Caucasian region, Eastern North America, Western North America, and the Far East. As a result, Pentantheras do not seem to form a distinct group like Tsutsusi, Hymenanthes, or Rhododendron on morphological or on molecular levels (Kron, 1993; 2000). Polyploidization has occurred at least two developmental centers: the Caucasian region (*R. luteum*) and Eastern North America (*R. calendulaceum*). This is not surprising, since recurrent formation of polyploidy has been described in numerous crops (Leitch and Bennett, 1997; Soltis and Soltis, 2000). Gene silencing, gene diversification, and/or chromosomal translocation can be assumed to have influenced subsequent species development since they are the usual consequences of polyploid formation (Soltis and Soltis, 1993). Upon allopolyploid formation, dormant transposons may be activated by a genomic shock due to a difference in repetitive elements between two parental genomes (McClintock, 1984); this causes an expansion of heterochromatic knobs leading to increased chromosome length (Comai, 2000). This may be an explanation for the slightly increased ploidy level (> 4x) that was found in most tetraploids, compared to *R. calendulaceum*. Possibly hybridization with other tetraploids (creating the Hardy Ghent hybrid group) caused limited knob formation, thus extending the nuclear genome slightly. Aneuploidy due to chromosomal addition appears unlikely because of complete plant fertility.

The higher ploidy level of certain groups of deciduous azaleas can be part of the explanation for crossing incongruity with evergreen azaleas (Tsutsusi), which mostly are diploid (De Schepper *et al.*, 2001). However, crossing barriers occurs to the same extent when tetraploid Tsutsusi genotypes are pollinated by *R. luteum* or Hardy Ghent hybrids (Eeckhaut, data unpublished).

Bilateral crosses are impeded by Tsutsusi pollen tube growth inhibition in the Pentanthera style (Ureshino *et al.*, 2000). The extent to which this inhibition is caused by ploidy differences, is unknown. However, Rouse (1993) describes a higher congruity of Tsutsusi species with (diploid) *R. occidentale*. Therefore, pollination of *R. luteum* or other tetraploids with diploid pollen might be a means to circumvent tube growth problems and to induce seed set. Tetraploid pollen donors can be created through chromosome doubling as described in Vaïnola (2000) or Eeckhaut *et al.* (2001). Next to the efficiency improvement (or establishment) of deciduous x evergreen azalea crossing, the data obtained in this research may also be of interest for azaleodendron breeding. The very confined number of azaleodendrons obtained so

far (Salley and Greer, 1992) might be caused by different ploidy levels; chromosome doubling of rhododendrons or selection of tetraploid rhododendrons may enhance breeding efficiency significantly.

Acknowledgments

The authors wish to thank Hilde Carlier for technical assistance and Dr. ir. Johan Van Huylenbroeck for internal revision of the manuscript.

References

- Arumuganathan K., Earle E. 1991. “Estimation of Nuclear DNA Content of Plants by Flow Cytometry.” *Plant Molecular Biology Reports*. 9: 229-233.
- Bennett M., Leitch I. 1995. “Nuclear DNA Amount in Angiosperms.” *Annals of Botany*. 76: 113-176.
- Chamberlain D., Hyam G., Argent G., Fairweather G., Walter K. 1996. *The Genus Rhododendron. Its Classification & Synonymy*. Edinburgh: Royal Botanical Garden. 181 pp.
- Comai L. 2000. “Genetic and Epigenetic Interactions in Allopolyploid Plants.” *Plant Molecular Biology*. 43: 387-399.
- De Raedt A., De Groote S. 2000. *De Harde Gentse Oostakker*: Geers Offset. 189 pp.
- De Schepper S., Leus L., Mertens M., Van Bockstaele E., De Loose M. 2001. “Flow Cytometric Analysis of Ploidy in Rhododendron (Subgenus Tsutsusi).” *HortScience*. 36: 125-127.
- Dolezel J. 1991. “Flow Cytometric Analysis of Nuclear DNA Content in Higher Plants.” *Phytochemical Analysis*. 2: 143-154.
- Dolezel J., Binarova P., Lucretti S. 1989. “Analysis of Nuclear DNA Content in Plant Cells By Flow Cytometry.” *Biologia Plantarum*. 31: 113-120.
- Eeckhaut T., Samyn G., Van Bockstaele E. 2001. “In Vitro Polyploidy Induction in *Rhododendron Simsii* Hybrids.” *Acta Horticulturae*. 572: 43-49.
- Eiselein J. 1994a. “An Improved Chromosome Staining Method Applied to the Study of Colchicine Effects in Rhododendron.” *Journal of the American Rhododendron Society*. 48: 143-146.
- Eiselein J. 1994b. “A Study of Chromosome Yields and Growth Responses in Colchicine Treatment.” *Journal of the American Rhododendron Society*. 48: 205-209.
- Galbraith D., Harkins K., Maddox J., Ayres N., Sharma D., Firoozabady E. 1983. “Rapid Flow Cytometrical Analysis of the Cell Cycle in Intact Plant Tissues.” *Science*. 220: 1049-1051.
- Galbraith D. 1990. “Flow Cytometric Analysis of Plant Genomes.” *Methods in Cell Biology*. 33: 549-561.
- Heller F. 1973. “DNA-Bestimmungen an Keimwurzellen von Vicia faba mit Hilfe der Impulszytometrie.” *Berichten der Deutschen Botanischen Gesellschaft*. 86: 437-441.
- Janaki Ammal E., Enoch I., Bridgewater M. 1950. *Chromosome Numbers in Species of Rhododendron. The Rhododendron Yearbook*. London: Royal Horticultural Society, 78-91.

- Kehr A. 1996. "Polyploids in Rhododendron Breeding." *Journal of the American Rhododendron Society*. 50: 215-217.
- Kondorosi E., Roudier F., Gendreau E. 2000. "Plant Cell-size Control: Growing by Ploidy?" *Current Opinion in Plant Biology*. 3: 488-492.
- Kron K. 1993. "A Revision of Rhododendron Section Pentanthera." *Edinburgh Journal of Botany*. 50: 249-364.
- Kron K. 2000. "Evolutionary Relationships of Azaleas and Rhododendrons." In: Jacobs R., ed. *Jaarboek van de Belgische Dendrologische Vereniging*. Bonheiden: 30-40.
- Leitch I., Bennett M. 1997. "Polyploidy in Angiosperms." *Trends in Plant Science*. 2: 470-476.
- Lu C., Bridgen M. 1997. "Chromosome Doubling and Fertility Study of *Alstroemeria aurea* x *A. caryophyllea*." *Euphytica*. 94: 75-81.
- Martens M., Reisch B. 1988. "An Improved Technique for Counting Chromosomes in Grapes." *HortScience*. 23: 896-899.
- McAllister H. 1993. "Chromosome Numbers in Rhododendrons." In: *Rhododendrons with Camellias and Magnolias*. London: Royal Horticultural Society, 24-30.
- McClintock B. 1984. "The Significance of Responses of the Genome to Challenge." *Science*. 226: 792-801.
- Otto F. 1990. "DAPI Staining of Fixed Cells for High-Resolution Flow Cytometry of Nuclear DNA." In: Darzynkiewicz Z., Crissman H., eds. *Methods in Cell Biology*. New York: Academic Press, Vol. 33: 105-110.
- Owen H., Miller A. 1993. "A Comparison of Staining Techniques for Somatic Chromosomes of Strawberry." *HortScience*. 28: 155-156.
- Paden D. 1990. "Doubling Chromosomes with Colchicine Treatment In Vitro as Determined by Chloroplast Number in Epidermal Guard Cells." *Journal of the American Rhododendron Society*. 44: 162-165.
- Roberts A., Lloyd D., Short K. 1990. "In Vitro Procedures for the Induction of Tetraploidy in aDiploid Rose." *Euphytica*. 49: 33-38.
- Rose J., Kubba J., Tobutt K. 2000a. "Chromosome Doubling in Sterile *Syringa vulgaris* x *S. pinnatifolia* Hybrids by In Vitro Culture of Nodal Explants." *Plant Cell Tissue and Organ Culture*. 63: 127-132.
- Rose J., Kubba J., Tobutt K. 2000b. "Induction of Tetraploidy in *Buddleia globosa*." *Plant Cell Tissue and Organ Culture*. 63: 121-125.
- Rouse J. 1993. "Inter- and Intraspecific Pollinations Involving Rhododendron Species." *Journal of the American Rhododendron Society*. 47: 23-45.
- Salley H., Greer H. 1992. *Rhododendron Hybrids*. 2nd ed. Portland: Timber Press, 344 pp.
- Sax K. 1930. "Chromosomal Stability in the Genus Rhododendron." *American Journal of Botany*. 17: 247-251.
- Soltis D., Soltis P. 1993. "Molecular Data and the Dynamic Nature of Polyploidy." *Critical Reviews in Plant Sciences*. 12: 243-273.
- Soltis P., Soltis D. 2000. "The Role of Genetic and Genomic Attributes in the Success of Polyploids." *Proceedings of the National Academy of Sciences*. 97: 7051-7057.
- Stebbins G. 1971. *Chromosomal Evolution of Higher Plants*. London: Edward Arnold Ltd. 216 pp.
- Takamura T., Miyajima I. 1996. "Colchicine Induced Tetraploids in Yellow-flowered Cyclamens and Their Characteristics." *Scientia Horticulturae*. 65: 305-312.
- Tilney-Bassett R. 1986. *Plant Chimeras*. London: Edward Arnold Publishers. 199 pp.
- Ureshino K., Kawai M., Miyajima I. 2000. "Factors of Unilateral Cross Incompatibility Between Several Evergreen Azalea Species and *Rhododendron japonicum flavum*." *Journal of the Japanese Society for Horticultural Science*. 69: 261-265.
- Vainola A. 2000. "Polyploidization and Early Screening of Rhododendron Hybrids." *Euphytica*. 112: 239-244.
- Voss D. 2001. "What is an Azalea?" *Journal of the American Rhododendron Society*. 55: 188-192.

Tom Eeckhaut, Ph.D. and Master in Applied Biological Sciences; Leen Leus, Master in Applied Biological Sciences and Ph.D. student; Erik Van Bockstaele, Ph.D. and Master in Applied Biological Sciences and professor in Department of Plant Production, University of Ghent are all employed in the Department of Plant Genetics and Breeding of the Centre of Agricultural Research (abbreviated DvP-CLO in Dutch) in Gent (Ghent), Belgium.

Erik is chief of staff, while Leen and Tom are performing scientific research. The DvP-CLO is a Flemish (Dutch-speaking part of Belgium) governmental research institution. Erik manages about 100 people, 30 of whom are academics.

Tom's Ph.D. research project covered interspecific breeding between Belgian pot azaleas and yellow flowering species belonging to different subgenera or sections of Rhododendron (Hymenanthes, Rhododendron, Pentathera, Vireya). He is now performing interspecific crosses between wild and cultivated roses.

Leen has practical experience with flow cytometry, and she assisted in interpretation of the ploidy histograms for this paper. She is currently working on a project regarding development of bioassays to determine resistance of roses against several fungal pathogens.

Albert De Raedt provided the research team with the plant material. For the past 20 years he has collected many deciduous azaleas, especially Hardy Ghent and Rustica hybrids, in his magnificent garden. Here, he maintains an extensive gene pool that he is willing to "share" with the researchers on this project, and the team has collaborated on several occasions. In 2000 he published a monograph on the Hardy Ghent azaleas.

Figure 1. Flow-cytometrical Patterns of *R. Calendulaceum*, *R. Luteum* and *R. Prinophyllum*
 Leaves, Anther Filaments, and Roots.

The sample peak is indicated by arrow. Peaks on the extreme left are caused by debris fluorescence (d).
 X-axis: fluorescence (channel number); Y-axis: number of nuclei.

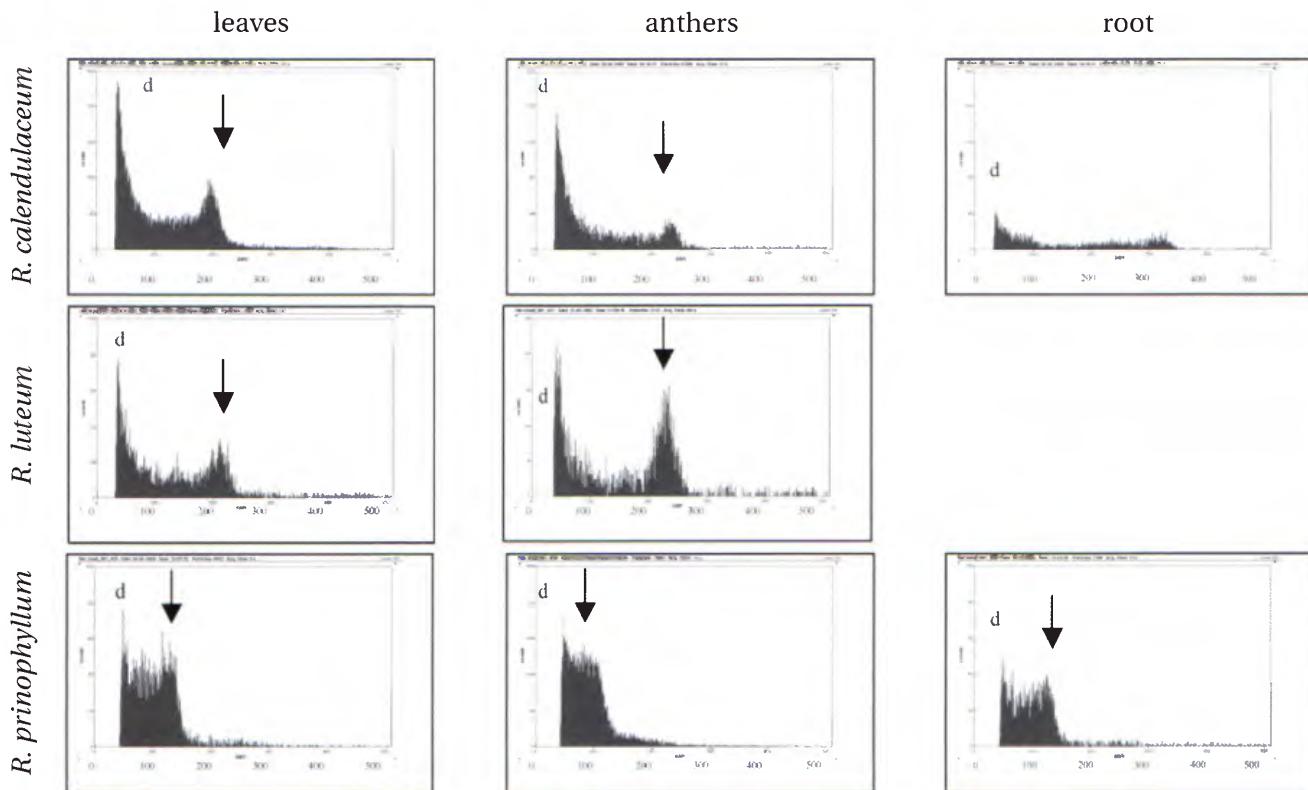
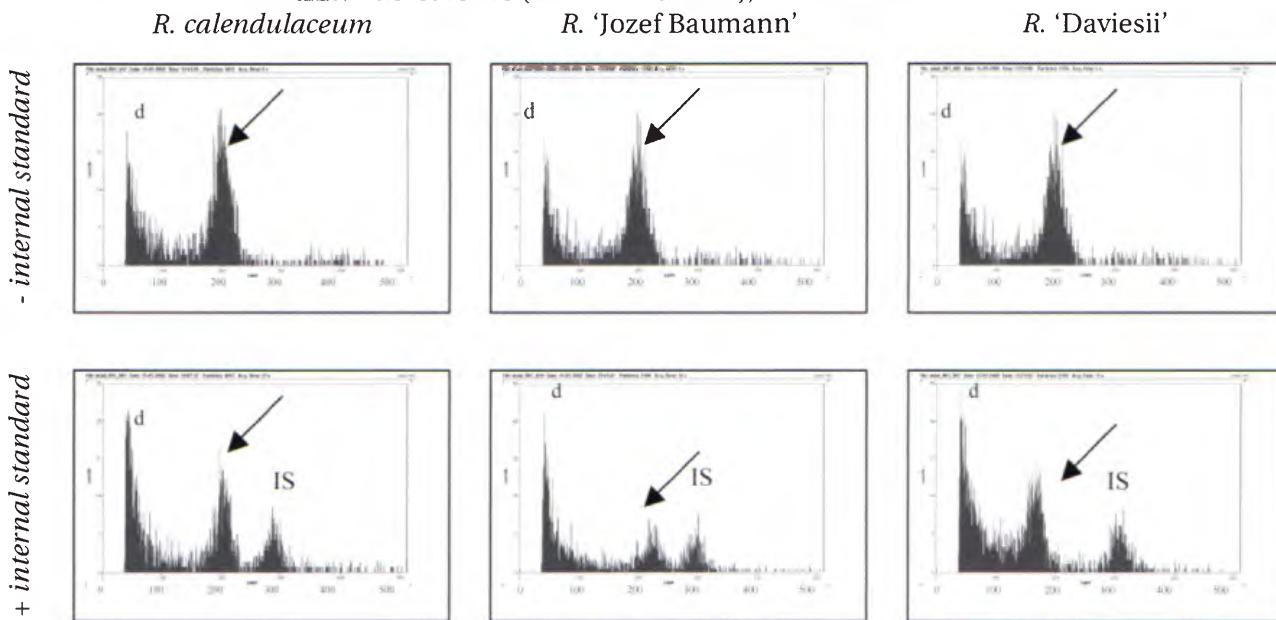


Figure 2. Flow-cytometrical Patterns of *R. Calendulaceum*, *R. 'Jozef Baumann'*, and *R. 'Daviesii'*, Without and With
 the Application of an Internal *Lolium* Standard (IS)

The sample peak is indicated by the arrow. Peaks on the extreme left are caused by debris fluorescence (d).
 X-axis: fluorescence (channel number); Y-axis: number of nuclei.



Mastering Azaleas

Part 4. Propagating Deciduous Azaleas from Cuttings

Joseph E. Schild, Jr. — Hixson, Tennessee

We continue this series of articles on propagation of azaleas with a few methods on cloning deciduous forms. Though the basic process is the same as for the evergreen azaleas, we differ slightly in the methods and timing. The methods mentioned in the previous article will also work for the deciduous cultivars; but, from the standpoint of achieving success, propagating deciduous azaleas is a more difficult task.

We will discuss several tried-and-true methods in this article. All work, some better than others, and some may seem to defy logic. After 35 years of propagation trials, I have learned an important lesson, and that is to never, ever, say "never" or "no way" to a method until it has been tried. Experimenting with methodology is important to the knowledge base, and sharing these ideas allows more people to learn.

When to Take Cuttings

I am sure you have heard the phrase, "Timing is everything." With deciduous azaleas, that saying rings very true. Normally, one will look for new growth shoots that are soft, pliable, but not too soft. Confused? The new shoot should bend to between 45 and 90 degrees without breaking, but not be so soft as to wrap a finger or wilt quickly. This works well when collecting cuttings in your own garden, but what about when you are 100 or more miles from home?

The simple answer would be to take the cuttings anyway and properly bag, tag, and refrigerate them in an ice cooler until they can be stuck. I have done this with very mixed

results. Some of the species present a broad window of opportunity for taking cuttings and root well with a high percentage of plants breaking dormancy the following year. (We will discuss the dormancy issue later.) Some species have a very narrow window of opportunity, only 6 to 10 days, thus making it difficult to measure timing on a yearly basis, as each season is different. *Rhododendron cumberlandense*, *R. calendulaceum*, *R. prunifolium*, and *R. flammeum* seem to fall into this latter category.

Basic Bucket Method

Okay, so given these possible problems, you still wish to root deciduous azaleas? Let us look at the equipment you may need to be successful. The simplest method I know is one using a 5-gallon bucket, shredded peat moss, Perlite®, composted pine bark fines, some polyethylene, a very large rubber band or elastic, and rooting hormone. This method was devised by Olin Holsomback of Ringgold, Georgia, and he has rooted rhododendron and deciduous azaleas for many years using it.

The bucket becomes a mini-greenhouse or sweatbox. The mixture for the soilless medium is 20% peat moss, 25% Perlite®, and 55% pine bark fines. This mixture is pre-moistened, not saturated, and firmed in to about 8" deep in the bucket. To aid in wetting the mixture, I use a few drops of dishwashing detergent in the water to act as a wetting agent. An important note here is there are no drain holes in the bucket.

Select cuttings that should be about 3" to 4" long, then pinch out

the terminal bud and strip all but the top three leaves. Keep the cuttings cool and moist, but not standing in water. With a nail or other probe, make holes about 2" apart in the firmed medium in the bucket for the cuttings. I have used a number of different rooting aids or hormones and all work equally well for specific species. For simplicity here, I will use Hormodin® 3, a talc based product with 0.8% active IBA (8,000 ppm).

Since the hormone is expensive at around \$20 for an 8-ounce tin, I remove what I think I will need for a particular time and reseal the tin. I wear rubber gloves for protection. A large-mouthed plastic pill bottle works well as a container for the hormone. I plunge the fresh cutting into water to moisten it, and then into the hormone powder about 1", tap the cutting to remove the excess, and stick it in one of holes pre-punched in the planting medium. Once I have all the cuttings stuck, I give them a mist of water, place a sheet of poly over the bucket top and use a large rubber band or length of elastic to secure it in place. I then put the bucket in a shady spot out of direct sun and just forget it for about two months.

Propagation Under Mist

I still use the above method on some species, but prefer to use the mist system of rooting propagation, since I root in numbers that prohibit a couple of hundred buckets sitting around under the trees. A very simple mist system may be constructed with an up-front cost of perhaps \$200 to \$300, depending upon your water and power source, construction skills, and room for the system.

A mist system contains the following items: a 24-hour timer, a cycling timer, low voltage solenoid valve, low voltage power supply, low voltage wire, a water strainer, PVC pipe and fittings, PVC solvent and glue, mist heads, containers for the rooting medium, shade cloth, and polyethylene sheeting. As a structure, I have a greenhouse set up for the purpose, but a simple structure may be made from 1-inch black plastic pipe, some 2" x 6" pressure treated wood of what ever length you need, pipe clamps, nails or screws, and a plan. (See photo of a simple, multi-purpose structure.)

A complete mist system may be purchased from any number of sources, but I have listed one in the resources section at the end. It is a product called Mist-O-Matic, and has a simple controller that uses a stainless-steel screen to activate the solenoid valve with a mercury switch. This system eliminates the timers, but you must still purchase and install the valves, water filter, and heads.

For containers, I use plastic inserts in standard 1020 flats. I prefer to use at least 3" x 3" deep inserts to keep the cuttings at least 1" from the bottom. My soilless mixture is the same as described above for the bucket method, but I do fill the inserts, drench them, and allow to drain for about 48 hours before sticking cuttings. One of the inexpensive plastic mortar mixing boxes works well for drenching from the bottom. A child's wading pool will also work.

Following the same cutting and sticking method as above, I put two cuttings in each insert to cut down on space needed. As each flat is filled, it goes into the misting house or frame. Again, the area must be out of direct sun or properly shaded. Since my frames are in full sun, I use two layers of 55% shade cloth to protect the cuttings from direct sun.

Aftercare

Now comes the hard part, the waiting. *Patience is the mark of a good propagator and is never more important than when propagating deciduous azaleas.* Once the cuttings have rooted, they need to be inspired to put out new growth before we allow them to go dormant for winter. I use a string of incandescent lights about 3' over the flats and give them a light feeding of liquid fertilizer. Bulb sizes of 60 to 75 watts work. A cold frame to over-winter the rooted cuttings for protection is needed.



Schild Poly Huts, 6' wide by 28' long, used both for rooting cuttings and for holding potted azaleas. It serves as a cold frame when covered with white poly or as a shade frame when covered with shade cloth. This structure can hold 1800 azaleas planned in 4-inch square pots. The arches or bows are fixed on 4' centers. The PVC purlin down the center also serves as the irrigation or mist source, and is clamped to the bows. (Photo by Joe Schild.)

Yes, dormancy is key to success. Deciduous azaleas do not like their roots disturbed, so do not repot them after rooting. When the small plants break dormancy in the spring and put out new growth, then and only then replant them into larger containers using pine bark with perhaps a little Perlite®.

Other Methods

Other methods abound for rooting deciduous azaleas. Mike Creel of South Carolina has been very successful rooting hardwood cuttings using plastic jugs, two liter cola

bottles, and plastic pots. His soilless mixtures and the use of *mycorrhizae* seem to be the key. Past articles and data posted to the ASA e-mail discussion forum provide details of his methods.

There are some methods that are slightly exotic using DMSO and KIBA, but for the beginner I have chosen not to expand upon them here. As you gain success and wish to experiment with other methods, please try them with caution.

For many years, I used a modified Nearing Frame to root cuttings. In the structure I built from plans given me by Clifton Gann, I rooted thousands of azaleas and other shrubs. To save money, I built my frame from lumber out of packing crates I treated with Copper Napthenate to keep the wood from rotting. If you would like a copy of the plans, contact me.

Keep in mind that the small cuttings are susceptible to disease and insects while the plants are young, so periodic inspection is needed. Remove any dead cuttings and their fallen leaves. Look for insect damage and spray with the proper insecticide at the labeled rate. Handle and use all chemicals with caution and per instructions, even household bleach.

Note: The mention of brand names in the context of this article does not represent endorsement of the products, but only illustrates products that may be used.

Resources

1. For most materials needed, Morton's Horticultural Products, Inc. 1-800-473-7753, Web site <http://www.mortonproducts.com> E-mail: mortonprod@blomand.net They also have a printed catalog.
2. Dirr, Michael A. and Charles W. Heuser, Jr. 1987. *The Reference Manual of Woody Plant*

Propagation, From Seed to Tissue Culture. Athens, Georgia: Varsity Press, Inc.

3. Galle, Fred C. 1987. *Azaleas*. Revised and Enlarged Edition. Portland: Timber Press.

Joe Schild has been an avid grower, propagator, and breeder of azaleas for nearly 35 years. He has owned and operated a niche nursery specializing in the species for over 14 years. Joe is the current president of the Tennessee Valley Chapter-ARS, immediate past president of the ASA (2001-2003) and a member of the Tennessee Nursery

& Landscape Association. He says he is better known as an azalea nut and chases the natives' bloom each year with many fellow enthusiasts. Contact him at:

1705 Longview Street
Hixson, TN 37343
423-842-9686
azaleajoe@mindspring.com

ASA Conventions

Tadeusz Dauksza — Orland Park, Illinois

There's nothing quite like an Azalea Society of America convention! It's a great big family reunion of sorts, an exciting kaleidoscope of sights, sounds, and smells, and an unusual exposure to the world of rhododendrons, azaleas, annuals and perennials, woodland flowers, trees and other shrubs, all rolled up into one wonderful experience.

These conventions are many things. They are hectic, informative, nostalgic, very friendly, fun. There are so many other memories: Seminars by great speakers about subjects they know first hand from experience. Happy hours. Waiting in line. Book sales. Eating. Clapping. Getting up early. Going to bed late. Losing your nametag. Speeches. Reports. Laughing. Reminiscing. Taking pictures. Packing and Unpacking. Rain, heat. Meetings. Door prizes. Auctions. Awards. Checking in and out. Rushing to catch the plane. Looking for the best and closest parking place. Loading up the copious amount of plants that you bought. Elevator rides. Trying to read-decipher plant tags. Trying as heck to recall people's names.

You ooh and ah through gardens and arboreta that you wished your garden would look like but never does. You jot down the names of countless azaleas, rhodies, companion plants. You see breathtaking sights—mountains, lakes, sunrises and sunsets.

And then there's the plant sale! A no-holds-barred battle royal of normally nice, civil folks temporarily crazed by the thought that someone else might get the plants he or she can't live without. Waiting for the plant sale to open (usually after dinner) is like watching a group of great white sharks circling for the kill on the Discovery Channel. The tactics of the veteran plant sale shopper in out-maneuvering and out-conning, by saying "That plant does not do well," should be studied as to what drives us to this madness. Azaleaphiles go to great lengths in driving long, long distances, emptying the trunks of cars for more room, and packing the plants (UPS should study the methods). What's the normal response you usually hear? "I don't know where I am going to plant these!"

But the main attraction of the convention is the people. ASA members are the greatest in the world. I never met a member I didn't like. Nowhere is the charm and friendliness of members more apparent than at our conventions. Attendees come from all areas of this globe and all walks of life. Some are professional, many are amateurs. You see old friends and make many, many new ones. You place their faces with the articles that they wrote in *The Azalean*, their gardens that you have visited on the tours, and you thank them for sharing their corner of the world with you. You meet our "volunteer lead-

ers." You hear about where we're heading and where we have been. You hobnob with the greats, and the greats-to-be. You talk with legends. You stand and pay tribute to the people who have made our Society what it is today.

A lot of truly dedicated people knock themselves out to make our conventions exciting and trouble-free. They spend an unbelievable number of hours to accommodate a very diverse group of people. It's a frustrating, Herculean task; but somehow, they do it, never asking for a dime in return. We are lucky that we have human beings like that. If you like azaleas, you'll like an ASA convention. If you like new things, new places, new excitement, you'll enjoy an ASA convention. If you like people, you'll love an ASA convention.

On behalf of the Lake Michigan Chapter of ASA, I cordially welcome you to attend the annual ASA convention scheduled for May 19-22, 2005, in Holland, Michigan. Registration details will be available soon on the Society Web site, www.azaleas.org and in the Winter 2004 issue of *The Azalean*.

Tadeusz Dauksza is a board member of the Lake Michigan Chapter of the ASA and the membership renewal chair of the Midwest Chapter of the American Rhododendron Society.

Society News

Reviving Our Memories—The Society's Archives Project

John Brown — Cleveland, South Carolina

When past-president Bill Bode turned over two boxes of files to your brand new, never been one before, secretary, I thought that two boxes didn't make much of a history for a Society that was approaching its 25th year. Occasionally, on plant hunting trips with Bob Stelloh

out that the university has a great deal of interest in archiving in general, and in our needs in particular. A committee authorized by the ASA board came to an agreement with the university, under which the university agreed to store, protect, and make available to Society members and others, the materials and paraphernalia of the ASA. John Brown (chair), Dr. Don Moreland, Dr. Charles Evans, Dr. Bob Hobbs, president Buddy Lee, and treasurer Bob Stelloh are on the committee.



These people have made the Archives Project a reality, left to right: Carolyn Argentati, associate vice provost and deputy director of libraries; Dr. Don Moreland, NC State USDA professor emeritus and founder with his wife Verdi, of the Moreland Library Faculty Fellows Endowment; John Brown, ASA secretary; Jeanne Hammer, ASA member and new library staff member; Lois Fischer Black, assistant head and curator or special collections.

and others, we would discuss the idea of having a permanent home for Society materials, but nothing much happened until I received an e-mail from Dr. Don Moreland. The e-mail said that North Carolina State University at Raleigh, North Carolina, had a set of the Society's journal, *The Azalean*, through the year 2000 thanks to the efforts of Jim Thornton, Murray Sheffield, and the Hobbses, and that he wanted to order all the missing issues. After discussions with the treasurer, we decided to give them the issues, and ask if NCSU had any interest in becoming archivists for the Society. It turned

Progress to Date

So far, some 20-odd boxes of materials have arrived at my door. This includes a mountain of material from Bob and Bee Hobbs; boxes from our historian, Buck Claggett; old rosters from Frank Bryan; computer disks from Alice and Graham Holland; and Satsuki research papers from Mal Clark, our president in 1987-1988 and 1991-1995. I am taking these materials to the professional archivists at NCSU as I receive them. We will begin to find out where the blanks are, as their work of organizing and reviewing proceeds.

The Society owes a debt of gratitude to Dr. Don Moreland and the people at the D. H. Hill Library at NCSU. Don acted as liaison between the committee and the library to ensure the project would be successful. Under the direction of Lois Fischer Black, assistant head and curator of collections, our papers will be sorted and made available to us in a useful form. The entire library staff has already demonstrated their support.



Long-time ASA member and leader Malcolm Clark, middle, is shown reviewing part of his research material on Satsuki before giving them to the Archives Project while his niece Lynn Medlin and John Brown look on.

How You Can Help

If you have any documents or other materials that could be included in the archives, please contact John Brown (864-836-6898 or jbrown51@bellsouth.net.) We would like to have (preferably as originals) any national documents, chapter papers (newsletters, bylaws, functions, pictures) and convention memorabilia (schedules, talks, tour descriptions, badges, pins, etc.).



Archival storage means keeping materials organized and safe in a temperature-controlled but accessible environment. Lois Fischer Black shows John Brown a sample storage box for ASA documents, which Mike Watts (left) special collections assistant and researcher will catalog for the Society.
(All photos by Bob Stelloh.)

Ben Morrison Chapter

Co-Editors: Bob Hobbs —

rwhobbs@mindspring.com

Carol Flowers —

dflowers@bellatlantic.net

The chapter held its annual meeting to elect officers, exchange cuttings, and picnic June 27 at Rosa Gardens, the home of **Rob and Rosa McWhorter**. It was a great time to welcome new members **Rudine McCluan** of Crofton and **Rick and Margaret Blackwell** of Tracy's Landing. Members were invited to send their "cutting wish lists" to Bob by June 21st. The business meeting included the report on the 2004 convention by Carol Segree, election of officers, and the report on the US National Arboretum cooperator's program. If you wish to know more about this latter program, contact **Dave and Eileen Holm**, who have led the Ben Morrison Chapter efforts (daholm@chesapeake.net).

The new officers for 2004-2005 are:

President — **Carol Segree**

Vice-president — **Dave Holm**

Treasurer — **Carol Flowers**

Secretary — **Dale Flowers**

One special note about the convention in Bowie: Now it can be told; the famous and most entertaining Pot Heads who handed out the wonderful door prizes were none other than **Gray Carter** and **Jim Duffy**.

Lake Michigan Chapter

Reported by Tadeuz Dauksaz —

td@att.com

The chapter continues to prepare for the 2005 convention to be held in Holland, Michigan. More details will be forthcoming in the Fall and Winter 2004 issues of *The Azalean*, on the ASA Web site, and on the chapter's Web site, www.azaleas-lake-michigan.org. See your first official

invitation in the article by Tadeuz Dauksza (see p. 41).

Northern Virginia Chapter

Phil and Frances Louer,

Newsletter Editors

plouer@msn.com

April 18, 2004, the business meeting included president Barry Sperling's report on his delivery of the informational flyer about growing azaleas to several local nurseries for distribution to their azalea customers. **Don Hyatt** shared his enthusiasm for native azaleas, stirring everyone to become interested in seeing these native beauties in their natural environment. He told of the many beautiful spots nearby in Virginia, West Virginia, and North Carolina, and who to contact and when to go see them for the maximum experience. Don also gave every member who attended some rooted azalea seedlings. **Carolyn Beck** and her mother brought companion plants for door prizes, and **Jane Newman** brought cuttings from her "Sundance" magnolia for those who wanted to try rooting one.

The annual cutting exchange picnic was held July 11 at the home of **Bob and Eve Harrison** near Harper's Ferry, West Virginia. Members were reminded about hints for taking cuttings in the July "Azalea Clipper." Members were able to see native azaleas in the mountains.

Oconee Chapter

Frank Bryan, Newsletter Editor

Rudie2rudie@aol.com

The weekend of May 22-23 was a "triple-header" for chapter members. First, the annual cutting party was held May 22, earlier than usual to ensure optimum time to collect native and deciduous azalea cuttings.

Joe and Donna Coleman hosted this event at their home in Lithonia, Georgia. Since it coincided with the meeting and cutting party for the Azalea Chapter of the ARS, members of both societies mingled and were able to meet new and old friends. Oconee Chapter provided a printout of hints on propagating and how to take cuttings.

The regular chapter meeting on Sunday, May 23, was held at Rockdale County Cooperative Extension Service Office in Conyers, Georgia. **Joe Coleman** presented the first of two programs: He showed his slides of highlights of the ASA 2004 convention in Bowie, Maryland, and led the discussion that followed. Then **Joe and Frank Bryan** described and showed what they are doing to keep records of their azalea collections. Approaches for labeling plants in the garden were also demonstrated and discussed. Members were encouraged to bring their own examples of record keeping materials.

President Allison Fuqua reminded members that the sticking time for native azalea cuttings is very short. While the cuttings can be placed in the refrigerator in a plastic bag with a wet piece of paper for a couple of weeks and still be usable, throw out any that wilt.

See ASA City Program

guidelines and application at

<http://www.azaleas.org/azaleacity.html>

Applications are being accepted now by mail to:

Joe Schild Committee Chairman

1705 Longview Street

Hixson, TN 37343

423-842-9686

You can e-mail Joe on this topic at azaleacity@mindspring.com

More information coming in the Fall issue of *The Azalean*.

In Memory *Aromi's Jungle*

Maarten van der Giessen — Semmes, Alabama

"Man, Sub-creator, the refracted light
Through whom is splintered from a single white
To many hues, endlessly combined
In living shapes that move from mind to mind"

J.R.R. Tolkien

Dr. Eugene Aromi departed this world July 7th, 2004. He left behind his wife Jane, two daughters, ten grandchildren, and over 140 of the most beautiful azaleas on earth.

I had worked with Dr. Aromi for four or five years before I began to understand the forces that drove him to hybridize year after year, mixing the colors in his mind to create a living canvas of flowers. Driving down the highway to look at another group of azaleas, he told me how he became an education professor at the University of South Alabama where he taught for 24 years. Aromi was a painter, receiving his MA from the University of Alabama in 1951. He taught painting at Copiah-Lincoln Junior College in Mississippi and Hewitt Trussville in Alabama where he became interested in the process of how students learn. He returned to the University of Alabama and received his doctorate in education in 1960.

So, when Aromi and his wife began making crosses in 1969, it was with the eye of a painter and the inquisitiveness of a teacher that he applied his skills. His service in the Philippines during World War II had instilled a toughness in him that is characteristic of his generation, blending with his experiences to create a resilience that was to last 35 years. A naturally soft-spoken and unassuming person, he released his passion into his hobby, hybridizing thousands of azaleas in their small suburban back yard. His daughter, Jeanette, remembers that the neighborhood children teased her and called their yard "The Jungle" when she was a child.

And What Came Out of "The Jungle"?

Dr. Aromi's studbook logs 1074 crosses between 1969 and 2003. He named 109 deciduous and 31 evergreen azaleas. His deciduous hybrids have been widely distributed throughout the nursery industry, popularizing a previously obscure group of plants in the South. His new release 'Glory Be' is a Rhododendron Society of America's 'Rhododendron of the Year' for 2004. His evergreen hybrids, apparently doomed to anonymity in the 1970s, have become my fastest selling group of azaleas.

"The Jungle" is almost empty now. A few towering natives stand in the side yard as sole reminders of where they originated. A circle of Aromi evergreens rings an Okame cherry in the front of their small home. Jane talks about finally making room for the grandchildren to play. Yet five miles away in my nursery over 1000 of his seedlings have yet to be described. Public collections of Dr. Aromi's work are

being established in Mobile and Huntsville in Alabama, and Nacogdoches, Texas. In Charleston, South Carolina, thousands of his new hybrids are being readied for market. Dr. Aromi bequeathed such a wealth of plants to us that it will take the remainder of my lifetime to count its fruits. And every spring Aromi will teach. He'll teach about patience, persistence, and the beauty of the world in which we live. Such is the power of Aromi's jungle.

Maarten van der Giessen is the vice-president of van der Giessen Nursery, Inc. a Mobile, Alabama, area wholesale grower of azalea and woody ornamental liners and containers since 1990. Maarten and his father, Peter, have been working on azalea evaluations at their nursery since 1994 to provide new and exciting selections to the industry. Maarten has been collecting his friend Dr. Aromi's hybrids to ensure they survive in the trade.

To learn more about the Aromi hybrids, see the article by Frank Bryan, "Eugene Aromi, Hybridizer." *The Azalean*. 2003. 25(2): 30-31, 38-41, which contains a listing of the then-known Aromi hybrids, both evergreen and deciduous.

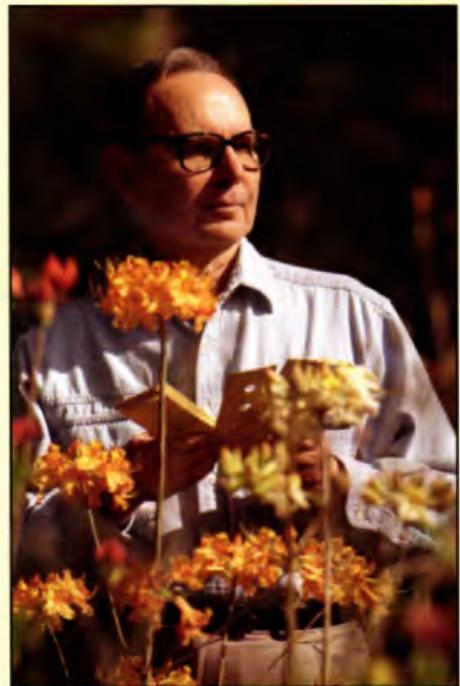


Photo by Mike Kitrell, courtesy of
Mobile Register