

of the seed for germination or (for lack of a better phrase) for maturation of the rhizome prior to flowering. We were looking for a treatment regime that would “trick” the *in vitro* trillium rhizomes. We were searching for a cold-warm cycling regime that the rhizomes could be subjected to that would result in “mature” rhizomes that would be ready to flower once planted/potted out. We had been chilling (4 °C) the rhizomes for 10 to 12 weeks and were having very little success with establishing the rhizomes. We cut a rhizome that had been chilled for 10 weeks, stained it with iodine to visualize the presence of starch, and to our surprise there was very little stain response. An experiment was set up to examine starch level in rhizomes over time. Rhizomes that had been either cold treated (4 °C) or warm treated (greenhouse) were harvested weekly and stained with iodine to visualize starch. While the iodine staining was very crude, making it difficult to draw any but the grossest conclusions, it appeared that the *in vitro* rhizomes contained starch but that the starch dissipated over an 8-week cold or warm treatment post culture.

Judge Them by Their Appearance: Trialing Landscape Shrubs at Longwood Gardens

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GENERAL INTRODUCTION

The shrub trials at Longwood Gardens were started in 1997 with the objective to provide information to the industry and amateur growers alike on what happens to a plant *after* it leaves the nursery — in other words, to answer the question: “how well does it do in a typical landscape situation?” The difference between our trials and others, and our strength as we see it, is that as well as being conducted over a long period of time, we use a great range of people to evaluate these plants. Our evaluators include students, staff, and volunteers, who between them demonstrate a variety of horticultural expertise and experience: they are our representative sample of the general gardening public. This makes for a reliable and exciting long-term study.

HISTORY

The construction of the site for the plant trials began in 1996 with the selection of four sites, designated fields A–D, comprising nearly 7 acres in the nursery area of the gardens. The fields were not tilled, grass was eliminated by herbicides to make the planting beds, and 3–4 inches of mulch were added. Planting began shortly afterwards, in 1997.

Each field was divided into numbered rows of planting beds 12 ft wide separated by 8-ft grass strips. A brass tag mounted on a fiberglass stake every 10 ft along the row indicates distance from the beginning of the row and an additional sign marks every 50 ft. Each shrub is assigned a specific location and a location number, which makes navigation in the fields logical and straightforward.

It had been decided that a large proportion of the plants would be commonly used and commercially available, a good number would be commercially available but less widely used, and a small proportion would originate from wild-collected seed, seed exchanges with other botanical gardens world-wide, or other noncom-

Table 1. Genera with more than 20 taxa per genus.

Genus	Taxa (no.)
<i>Ilex</i>	117
<i>Viburnum</i>	110
<i>Buddleja</i>	79
<i>Spiraea</i>	75
<i>Syringa</i>	66
<i>Berberis</i>	51
<i>Hydrangea</i>	46
<i>Cornus</i>	40
<i>Hypericum</i>	40
<i>Deutzia</i>	39
<i>Philadelphus</i>	38
<i>Prunus</i>	38
<i>Forsythia</i>	36
<i>Potentilla</i>	29
<i>Sambucus</i>	28
<i>Cotoneaster</i>	23
<i>Callicarpa</i>	20
<i>Clethra</i>	20
<i>Vaccinium</i>	20

mercial sources. The commercial sources range from large landscape suppliers to small, specialist nurseries. Plants grown from seed were grown in the nursery for around 2 years before planting. Other plants bought in or donated by some of the larger nurseries were kept in the nursery until ready for planting.

There is a total head count of over 1300 taxa, and three specimens of each plant were installed. Only broad-leaved plants with potential ornamental qualities were included, and plants were spaced 4, 6, or 12 ft apart depending on the expected final spread of the mature shrub. In some instances plants were doubled on the row, providing north and south planting spaces for those that prefer north-facing conditions. Other than those in the north-facing spaces that have more shelter because of the double planting, all other shrubs must be happy in full sun to survive.

There are 100 genera in all, with 19 main groups of genera that have more than 20 taxa per genus (Table 1).

The establishment phase lasted for 2 years. During this time there were some losses due to a particularly hard winter; these were replaced, but after this phase further losses were no longer replaced

and any plants that died were deemed to have failed.

Since the point of the shrub trials is to test these plants for landscape use, the minimum of maintenance has been given, they have just had what would be expected in the typical landscape setting. They were irrigated, mulched, and weeded during the establishment phase, irrigation was discontinued after this, and mulching and weeding continue as necessary. Cut-back shrubs such as *Cornus* or *Vitex* are pruned annually. Shrubs that need thinning such as *Philadelphus* or *Deutzia* may have a third of the growth removed each year but aside from that, as a general rule, only winter-caused injury or diseased material is pruned. Pests and diseases are not controlled, but merely observed and recorded. As each genus is recorded and published it will be replaced with another so that the process can continue indefinitely.

DATA COLLECTION

The establishment phase lasted for the first 2 years, and then the data collection began in 1999 to 2000. A computer database was developed in which the evaluators, now mostly students, record their observations under the following categories: size,

growth habit, stems, foliage, flowers, fruiting, overall rating, environmental injury, and pests, and pathogens. The date the information was recorded is always entered before their comments, and other information was pre-entered, such as plant name, location and accession number, source, and number of plants.

The evaluators are encouraged to compare plants with each other. They use an overall rating system that is intended to promote these comparisons but also provide an abstract and relative rating system, where (1) denotes an “unattractive” appearance, (2) denotes an “acceptable” appearance, (3) denotes an “attractive” appearance, (4) denotes a “very attractive” appearance, and (5) denotes the “best of class,” or most attractive plant in the group.

In the first instance, out in the field, the evaluators fill in a data sheet, and when they return to the office their data is transferred into the database. Students rotate through the department constantly, so the aim is to have them out in the field collecting data regularly, in order that a complete picture can be built up of each plant throughout the year. This data collection phase has continued to the present, and it now overlaps with the summary and publication phase of the trials.

SUMMARY AND PUBLICATION

Once a substantial amount of information has been gathered on a particular genus, a report for each plant within that genus is electronically generated. This lists all the data that have been entered for that particular plant. At this point one of our volunteers takes over. She writes a one-page summary on each plant using the information in the report. The information from the summary is then used by the curatorial intern as part of her research for a paper on a particular genus or group of plants in the shrub trials, and a number of papers have been written and subsequently published by *The American Nurseryman*. Articles written and published so far presented results for *Berberis*, *Buddleja*, *Cornus*, and *Prunus*, with those for *Vitex* to be published soon. Each article focused on a different aspect of the plant group: for example, the articles on *Buddleja* concentrated on its flowering habits and seed production, while that on *Cornus* concentrated on stem color. In this way the results of the trials are given first to the industry and then to the public at large via the website.

Summaries of each plant in specific plant groups are also published on our website <www.longwoodgardens.org/Plants&Horticulture/PlantEvaluationShrubTrials/Intro.htm>. Shrub groups that have been summarized and published on the web include *Buddleja* and *Ilex verticillata*, with shrub dogwoods to be added shortly.

CONCLUSION

The shrub trials here have generated much interest and have been successful in relating information to the industry as well as the general gardening public. Its strength is that while based on subjective experience and views of the evaluators, the results have an impartiality that is unlikely to be found in nursery catalogues and similar trade publications.

An experience of a plant is a complex thing: what appeals to one person may not appeal to another. However, tastes change over time and our group of evaluators will undoubtedly reflect the wider view. The results should therefore be useful to both the industry and the consumer, as the former need to know what is desired by the consumer, and the latter benefit from knowing which plants look best, and will do best for them in typical local conditions.

As a privileged link between the industry on the one hand and the study of plants on the other, Longwood is in an ideal position to mount this sort of study and will itself reflect and be guided by its discoveries, as well as sharing them with the horticultural and gardening world at large.

Conifer Propagation®

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INTRODUCTION

Propagation of rooted cuttings at Blue Sterling Nursery has always been a top priority both to ensure proper cultivar nomenclature and as a means to control quality. We have used many different methods and experimented many different ways. Out of the many factors to consider while propagating, timing and the space needed were definitely the biggest. The balancing of space available vs. amount needed always seemed to be an issue. Then there was the timing aspect to think about; plants all have a time when taking cuttings is most successful. And all of this is still somewhat based on actual demand or potential demand of that item years before it is saleable. With owners (Jim and Barb) always traveling across the globe searching for new and unusual plants, there always seemed to be more things added. It was very common to receive one 6-inch plant with the expectation of getting 500 cuttings ASAP because of the potential sales value. When talking about a dwarf cultivar it takes multiple cuts to even get 25 cuttings. Sometimes that meant we had to actively force certain plants to continually be able to get cutting wood. So needless to say we had to be very flexible both in timing and also space. While the propagation of most items was well within the proper time frame for great success, others were nowhere close. So like the rest of you, we always had to improvise. Mother Nature doesn't always like to be fooled, and you know how she can get.

GOALS

- Ensuring proper nomenclature of each cutting.
- Achieving highest percentage of success on all cultivars.
- Provide top quality liners to production department.
- Doing all of above as efficiently as possible.

EARLY FACILITY (CIRCA 1983–2000)

- 25 ft × 100 ft arched steel structure with two layers of clear poly.
- Raised benches separated into eight different zones each with controllable under bench heat.
- Each zone had separate misting capabilities controlled by electronic leaf devices.
- Cooling and venting was by two huge fans on the west end and shutters on east end.
- Two oil-fired hot air heaters connected with poly tube for better heat distribution.