

***Pieris* Breeding: Continuing the Legacy of**

Dr. Robert Ticknor[®]

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INTRODUCTION

Although Dr. Robert L. Ticknor's horticultural biography includes much more than *Pieris*, Dr. Ticknor's *Pieris* selections and breeding goals created many successful *Pieris* clones and the foundation for *Pieris* improvement at HortSolutions LLC.

Pieris breeding and seedling growing procedures have been published (Jaynes and Ticknor, 1984; Starrett et al., 1992; Ticknor, 1988; van Hof, 1984), and similar techniques with minor adjustments are still in use. More recent *Pieris* breeding goals have been discussed (Svenson and Mathers, 2000; Svenson and Ticknor, 1997).

Depending upon the taxonomic (Judd, 1982; van Gelderen, 1979), or text reference (Dirr, 1990; Griffiths, 1992) one presently favors, the genus *Pieris* has from 7 to 20 species or more. The most widely cultivated *Pieris* are *P. japonica* (and its cultivars), *P. formosa*, *P. floribunda*, and interspecific hybrids of these three species (Bond, 1982; Bond and Lancaster 1996; Creech, 1983; Jaynes, 1975; Kruse, 1987). There is growing interest in *P. phillyreifolia*.

POPULAR TICKNOR SELECTIONS

The recognized *Pieris japonica* clones named or selected by Dr. Robert Ticknor include: 'Flamingo', 'Valley Rose', 'Valley Valentine', and 'Valley Fire'.

Dr. Ticknor suggested the name 'Flamingo' for a pink-flowered *Pieris* clone propagated and sold by Lambert Gardens (Portland, Oregon) in the late 1950s. The clone had been selected by David Hutton from an unknown plant growing in the garden. The landscape value of 'Flamingo' was evaluated by both Dr. Ticknor at Oregon State University's North Willamette Research and Extension Center (NWREC), and by Dr. Donald Wyman of the Arnold Arboretum. 'Flamingo' helped inspire Dr. Ticknor's goal to obtain a nonfading pink-flowered form of *P. japonica*. Among the hundreds of *Pieris* clones sold commercially, 'Flamingo' is still one of the top-10 cultivars sold by Oregon nurseries.

In 1961, Dr. Ticknor evaluated seedlings from a cross between 'Flamingo' and a cultivar named 'Wada's Pink' (also known as 'Wada'). Confusion among records once suggested the cross was 'Flamingo' × 'Deep Pink' (a pink form once sold by Mitsch Nursery, Aurora, Oregon). A pink-flowered seedling was selected and clones were released to the nursery industry under the name 'Valley Rose'. Flowers of 'Valley Rose' will slowly fade to light pink or white in full sun or as the flowers age. 'Valley Rose' remains one of the top-5 *Pieris* cultivars sold by Oregon nurseries.

In the 1960s, Dr. Ticknor made numerous crosses between 'Flamingo' and 'Valley Rose' in an effort to obtain a nonfading dark-pink *Pieris* flower. One selected seedling that typically starts blooming in mid-February in Portland, Oregon, was released to the nursery industry as 'Valley Valentine'. To date, 'Valley Valentine' remains the pink-flower *Pieris* with the best fade resistance. Oregon nurseries

presently produce more 'Valley Valentine' than any other cultivar of *Pieris*, except 'Mountain Fire'. Following the success of 'Valley Valentine', Dr. Ticknor then switched his breeding goals to producing late-flowering *Pieris* with upright flower trusses and *Phytophthora* resistance.

While breeding for late-flowering *Pieris* in 1972, Dr. Ticknor selected seedlings from a *P. japonica* 'White Caps' × *P. formosa* var. *forrestii* 'Wakehurst' hybridization. One selected seedling bloomed late in the season, had white flowers with very bright red new growth, and was released to the nursery industry as *P.* 'Valley Fire'. Although 'Valley Fire' is less cold hardy compared to many other clones, it remains among the top-10 *Pieris* produced by Oregon nurseries.

OTHER TICKNOR SELECTIONS

In the 1980s, Dr. Ticknor released some pink-flowered *Pieris* with upright racemes for evaluation by several nurseries. Nearly all of these plants were seedlings from a cross between *P. japonica* 'Zebris' (also known as 'Red Mill') and a Skip March selection listed as *P. japonica* var. *yakushimensis* NA40269D. None of these seedlings are known to be commercially available.

In 1960, Dr. Ticknor had selected a seedling from a *P. formosa* var. *forrestii* × *P. japonica* hybridization. This clone has slowly spread into the nursery industry under many names, including: 'Ticknor', 'Ticknor's First', and 'Ticknor 1960'. This clone is very similar in appearance and growth to 'Forest Flame'. However, some *Pieris* cultivars in Europe sold as 'Ticknor' have pink flowers, so they must be a different clone of uncertain origin, perhaps from among the 1980s pink selections mentioned above.

A cultivar Dr. Ticknor named 'BVD' was often used as a pollen source to obtain dwarf plants. At 32-year old, the original specimen of 'BVD' is only 18 inches tall and 24 inches wide. 'BVD' has the white flowers and dull-green leaves typical of Taiwanensis Group cultivars of *P. japonica*. The origin of 'BVD' is uncertain, but it is thought to be a vegetative sport propagated by Dr. Ticknor from a specimen plant growing at Brookside Gardens (Wheaton, Maryland) in the 1960s.

Another vegetative selection propagated by Dr. Ticknor was a white-flowered form named 'UNH'. This clone was collected on the campus of the University of New Hampshire in the 1960s, and Dr. Ticknor appreciated its cold hardiness and vigor.

In 1982, Dr. Ticknor selected a pink-flowered seedling from a 'Valley Valentine' backcross and named it 'Apprentice'. Another 1982 pink-flowered seedling was selected from a *P. japonica* 'Valley Valentine' × (*P. japonica* 'Valley Valentine' × *P. japonica* 'Christmas Cheer') cross, and it was named 'Merlin'. Although no specimen of 'Merlin' remains alive, a vegetative sport of 'Merlin' was selected by Dr. Ticknor and named 'Wizard'. Both 'Apprentice' and 'Wizard' have upright racemes and bloom later than 'Valley Valentine'.

Also in 1982, Dr. Ticknor selected a white-flowered seedling from a cross between 'BVD' and an unspecified mother plant. The clone was originally designated as 'T44-82U' and was renamed 'Shears' in 1997. The compact growth and upright flower habit makes it easy to deadhead the clone using hand or power shears. The white flowers are a little more sensitive to frost burn than some other clones.

In 1992, Dr. Ticknor selected a seedling from a 'Merlin' × 'BVD' cross with light-pink flowers on upright racemes, glossy-green foliage, and a semi-dwarf growth

habit. With Dr. Svenson in 1998, this cultivar was named 'Tipper', and it is now ready for a limited release to the nursery industry. 'Tipper' can be propagated and grown using 'Valley Rose' procedures, except the plants are more compact and they bloom later in the season.

TICKNOR LEGACY SELECTIONS

In 1997, Dr. Ticknor advised Dr. Svenson in an effort to reproduce a clone similar to 'Merlin'. In 1998, a seedling was selected by Dr. Svenson and named 'Reversal'. It has light-green foliage and horizontal-to-upright racemes of dark-pink flowers. 'Reversal' has been evaluated in the landscape for 10 years in Hopewell, Oregon. Like 'Merlin', 'Reversal' is a bit difficult to propagate compared to the easily rooted cuttings of other cultivars.

Since 1998, Dr. Svenson has evaluated over 25,000 *Pieris* seedlings of various crosses and the following pink-flowered forms remain in landscape evaluations: 'Sherbet', 'Cabernet', 'Shiraz', 'Merlot', 'Shy', and 'Too Shy'. Several of these clones are presently being evaluated for production by commercial nurseries. All of the new pink-flowered clones have parentage from Dr. Ticknor selections. Japanese breeders are also introducing new pink-flowered cultivars (for example, 'Katsura').

Some new white-flowered *Pieris* that have parentage from Dr. Ticknor selections or procedures include: 'Foam', 'Reliance', 'Rescue Me', 'Echo', and 'River Run'.

'Foam' is an open-pollinated seedling selection from seed collected from a specimen of 'T44-82Q' (a Ticknor selection) growing in Hopewell, Oregon. 'Foam' has a growth habit similar to 'Shears', but with orange-bronze new foliage growth.

'Reliance' is a vegetative sport propagated from a specimen of 'UNH' growing in Hopewell, Oregon. It was selected for hardiness and reliable blooming even when not deadheaded annually.

'Rescue Me', 'Echo', and 'River Run' are open-pollinated seedlings selected in 2002 from a specimen of 'Brouwer's Beauty' growing in Hopewell, Oregon. These cultivars may have improved lacebug resistance compared to most cultivars of *P. japonica*. All have reliable white flowers with upright racemes, colorful new foliage growth, dwarf growth habits, and are easily rooted from cuttings.

PIERIS BREEDING GOALS

Over the last 40 years or more, many breeding goals for *Pieris* have been identified and recent studies add to or adjust those goals (Svenson and Mathers, 2000). A current list of breeding goals for *Pieris* is shown in Table 1.

Aside from improving ornamental characteristics of interest, resistance to diseases and pests, and a need to reduce labor cost for landscape maintenance are adjusting research goals.

Pieris are susceptible to infection by several species of *Phytophthora* (including *P. ramorum*) which cause root rot and stem dieback diseases. While Dr. Ticknor's procedures for *Pieris* development included exposure of young seedlings to *Phytophthora* inoculum, it does not appear that this procedure produced any cultivars with a general resistance to *Phytophthora* infections. Screening of seed sources and new species is needed in search of improved *Phytophthora* resistance or tolerance. It is hoped that the development of polyploid cultivars may also improve *Phytophthora* resistance.

Table 1. List of *Pieris* improvement goals.

Flowers	Plant Form
Pink flowers on late-blooming cultivars	Dwarf and miniature forms
Yellow flowers	Tree forms
Larger flower size (tetraploids)	Colorful bark on tree forms
Flower resistance to frost burn	
Longer bloom duration	Pest Resistance
Improved or stronger flower scent	Improved resistance to lacebugs
	Improved resistance to root weevils
	Improved resistance to scale
Flower Buds	Disease Resistance
Deep maroon or black flower buds	Improved resistance to all <i>Phytophthora</i>
Deep maroon or black calyx and racemes	Improved resistance to leaf spot
Rust or orange flower calyx and racemes	Improved resistance to <i>Botryosphaeria</i>
Seeds and Seed Capsules	Environmental and Cultural Factors
Sterile cultivars (triploids)	Improved tolerance of deep shade and full sun
Self-deadheading cultivars (triploids)	Improved cold hardiness
Colorful seed pods	Improved tolerance of high pH soils
Foliage Characteristics	Improved tolerance of high salinity
Longer foliage retention	Improved tolerance to drought
Wavy leaf margins	Improved tolerance to wet soils
Colorful indumentum	Improved ability to root cuttings
Red, orange, bronze, and yellow new foliage	Improved multiplication in micropropagation
Improved variation in leaf size and shape	Increased branching following pruning

Pieris are also susceptible to leaf spots caused by various fungal organisms and to stem die-back caused by infections of *Botryosphaeria* species. Refusing to use susceptible cultivars as parentage in breeding *Pieris* does appear to improve resistance to these diseases.

The primary insect pests of *Pieris* are various species of root weevils, lacebugs, and scale. Lacebugs (*Stephanitis takeyai*) appear to be the most widespread problem. *Pieris floribunda* seedlings are usually resistant to lacebug infestations, and hybrids with this species also show improved lacebug resistance (for example, ‘Brouwer’s Beauty’).

Unightly seed pods needing removal in spring is perhaps the single greatest landscape maintenance expense for *Pieris*. Cultivars that naturally abort and drop flower racemes at the end of the blooming season would eliminate the deadheading labor costs. The development of triploid cultivars by breeding tetraploids with traditional diploids could produce the desired self-cleaning cultivars.

To date, dark-cream- to yellow-flowered seedlings have been produced, but the plants had poor cold hardiness and little tolerance to full-sun conditions.

Pink flowers on late-blooming cultivars remains an elusive goal. The pattern suggests a possible linkage between early bloom and pink flower color.

Pieris species are more susceptible to foliar chlorosis and root rot diseases when grown on soils with a pH above 6.2. Cultivars avoiding foliar chlorosis when grown in high pH soils have been obtained. However, tolerance to high pH does not appear to improve resistance to root rots.

As an evergreen plant with a variety of shapes, forms, and colors and multiple-season interest, the possibilities for *Pieris* improvement have been relatively unexplored. Using traditional breeding procedures combined with genetic engineering techniques, desired traits should be obtainable.

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