Breeding Vireya Rhododendrons for Cold Hardiness

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Vireya rhododendron species and hybrids have many desirable qualities. Flower colours are often brilliant, and the combinations of colour within flowers outstanding. Vireyas produce some of the largest flowers of any rhododendrons. Many have an intense, spicy-sweet fragrance. Some, especially those from high elevations, produce small, compact plants with glossy, dark green foliage, and small flowers with deep, bright red colours. The limit to their more extensive use is lack of cold hardiness. They are used as garden plants only in tropical or sub-tropical regions where temperatures do not go below 32°F (0°C) for more than a very brief period. In colder climates, they must be grown as greenhouse or houseplants that are moved outdoors during the summer. If one could find a source of hardiness that could be transferred to the vireyas they would be of much greater horticultural value. Many vireya species grow at high elevation where frosts are common. Yet, even most of these species have little or no hardiness. Although frosts are common in the high mountains, they last for short periods, and even if the temperature drops below freezing at night it goes above freezing during the day so that the length of time below freezing is of relative short duration. One other important factor is that most of the species that are native to high elevations grow in protected microclimates. They grow under small trees and shrubs or around the edge of such vegetation where they are not exposed to the cold night sky. Very few grow out in the open.

There are a few vireyas, such as *Rhododendron kawakamii* from Taiwan, in the subsection Pseudovireya, that are native to colder regions. In my garden on the central Oregon coast it has grown well for twenty-three years, surviving temperatures below freezing for extended periods, and only suffering minor injury when exposed to 10°F (-12°C). Unfortunately *R. kawakamii* and its

relatives are reluctant to cross with the more tender vireyas, and any hybrids that might be obtained would likely be sterile.

In one of his earlier papers H. Sleumer notes the hardiness of *Rhododendron commonae*. He records it as growing at high elevation in open meadows fully exposed to the sky. He suggests that it would likely be hardy in Europe. Apparently there was an instance of it surviving out of doors over winter in Holland. I doubt that it would survive many years unprotected in Europe except in the southern sub-tropical regions. Although I have no good test on the lowest temperature *R. commonae* would survive, I suspect that it would receive a hardiness rating of approximately 20°F (-7°C). In my garden the form of *R. commonae* from the Laiagam garden in New Guinea survived 10°F (-12°C). However, it froze to the ground, and only stem portions below ground and protected by fallen leaves lived.

Rhododendron 'Tropic Alpine Survivor'

Rhododendron 'Tropic Alpine Brilliant'

Rhododendron saxifragoides grows at the highest elevation of any of the vireyas. It grows in open boggy areas fully exposed to the sky. Various collectors have reported finding the roots growing in icy soil in the morning. However, it is an extremely difficult plant to grow. Nevertheless, it is now being used to produce some easily grown outstanding hybrids that have good growth form, with glossy, deep green leaves and attractive flowers. Many

other vireya species from high elevations appear to lack much promise. Most are difficult to grow; the flowers are small, unattractive and sparsely produced. However, there are a few attractive species native to high elevations that have not been tested for hardiness which might be useful in a breeding program for hardiness.

Around 1975 Peter Sullivan made the cross *Rhododendron lochiae* x *R. pseudonitens* (*R. pseudonitens* is now considered to be synonymous with *R. commonae*). He gave seedlings and cuttings to numerous visitors. Hence the name given to this cross, 'Lawrence', in 1993, is a grex. At one time I had a collection of three or four different plants from this cross. They were practically indistinguishable from each other, and when exposed to freezing they all appeared to be equally hardy.

Rhododendron 'Tropic Alpine Nymph'

Rhododendron 'Tropic Alpine Violette'

Sullivan rated 'Lawrence' as hardy to 25°F (-4°C) and I believe this was a good estimate. I have had it survive 20°F (-7°C) for short periods, if given some protection. It would be killed by exposure to 20°F (-7°C) or 25°F (-4°C) if subjected to these temperatures for an extended period of time. The figure 25°F (-4°C) gives one some idea of hardiness in comparison with other varieties. A rating of 25°F (-4°C) is useful for comparative purposes, but it does not indicate how long a variety will survive this temperature or the effect

of growing conditions on plant hardiness. It is not possible to assign a hardiness figure that will apply to all conditions under which a plant is grown. The hardiness figures that I have given to my hybrids attempt to relate them to the hardiness of 'Lawrence'. A rating of 25°F (-4°C) suggests it is as hardy as 'Lawrence' and a rating of 23°F (-5°C) suggests that it is slightly hardier than 'Lawrence' or a rating of 28°F (-2°C) or 30°F (-1°C) indicates the plant is less hardy. Because of the extended period of mild winters on the Oregon coast it has not been possible to satisfactorily test new hybrids for hardiness. If growers were interested in testing them in regions where mild or moderate freezes were common, more accurate ratings could be assigned to them.

Would an increase in hardiness of 7°F or 10°F be of any value? The regions where such plants could be grown unprotected would still be greatly restricted. Nevertheless, the area would certainly be extended. Hybrids with just this slight increase in hardiness could probably be grown along much of the northern California and southern Oregon coast without protection, or with some minor protection during hard freezes that occur occasionally during a blast of cold arctic air. I believe that an increase in hardiness of 10°F would greatly extend the areas in New Zealand and other countries with mild climates that have occasional hard freezes.

Vireyas make excellent container plants for decks or patios. An increase in hardiness of only 10°F would extend the length of time that they could remain out of doors unprotected. Vireya roots can withstand freezing. Most of my selection for hardiness was with the plants growing in containers. If the plants are hardy to 25°F (-4°C) the roots survive in soil that is frozen solid. In selecting for hardiness within a narrow range of temperatures it is helpful to work with containerized plants. If the temperature threatens to drop lower than the known death point the plants can easily be moved to a warmer location.

Rhododendron 'Tropic Alpine Gold'

Rhododendron 'Tropic Alpine Joli'

Named Hybrids That Were Selected For Hardiness

I decided that it would be useful to select names for hybrids that indicated that the reason for their development was hardiness. Since the source for hardiness was alpine plants from the tropics the first part of the name of each hybrid is "Tropic Alpine".

'Tropic Alpine Survivor' ([*R. lochiae* x *R. zoelleri*] x *R. commonae*) 1985.

This cross was my first attempt to breed for hardiness. A plant of *R. zoelleri* x *R. lochiae* was in bloom and since this hybrid has good vigour and is a good bloomer, I crossed it with the 'Dolo Pass' form of *R. commonae*. The cross yielded over 300 seedlings. I wanted to expose them to temperatures in the mid 20s°F (-7°C) to kill the most tender seedlings. Unfortunately, when I wanted to test them it was a warm winter, so I took three flats of seedlings to my son's garden in Albany, Oregon, in the Willamette Valley where colder temperatures are more common. After a number of seedlings were killed I brought them home and discarded all dead and severely damaged seedlings. After several good test years only one plant remained. It had survived 20°F (-7°C) but was severely frozen back. I would rate it as slightly hardier than 'Lawrence'. *Rhododendron zoelleri* x *R. lochiae* was not a good choice as parent.It was used for the worst possible reason - it happened to be in bloom at the time. Nevertheless, the one remaining seedling has good vigour and

produces an abundance of medium-sized red flowers with recurved petals. A plant in full bloom can be quite striking. The curve in the petals produces an unusual effect. However, little gain was made in achieving greater hardiness.

'Tropic Alpine Brilliant' ([*R. lochiae* a *R. pseudonitens*] x *R. commonae*) 1986. This cross produced twenty seedlings that were planted in a sandy loam in the open garden. The plants produced larger flowers than *R. commonae*, were uninjured by 25°F (-4°C), and were only moderately injured by20°F (-7°C). The gain in hardiness was offset by the smaller flowers. The plant that was named survived 20°F (-7°C) better than any of the others. If properly pruned this hybrid would make an attractive small container plant for growing on the deck.

'Tropic Alpine Ruby' (*R. wrightianum* v. *cyclopense* x *R. commonae*) 1986.
This cross produced approximately twenty seedlings that were planted in a sandy loam in the garden. They were uninjured at 25°F (-4°C) but at 20°F (-7°C) they froze to near the ground; however, most of them regrew from the uninjured lower part of the plants. This is an attractive, vigorous, and free blooming plant that produces an abundance of tubular, pendant, deep red flowers. It makes a good container plant for the deck or patio. In mild climates with only light frosts it could remain outdoors all year, and in colder climates with a short growing season its hardiness would increase the length of time that it could remain outside.

'Tropic Alpine Nymph' (*R. gracilentum* x *R. commonae*) 1989.
This cross produced only four seedlings. They were planted in the garden and ignored for a number of years. The seedlings resembled *R. gracilentum* but grew much faster and had two to five flowers in a truss compared to *R. gracilentum* which has one or two flowers in a truss. It is more vigorous and much easier to grow than *R. gracilentum*. This hybrid was more or less on its own in the garden and I do not have good records of its hardiness. The period during which it survived without any care was relatively warm. After they were

dug and put into containers they survived temperatures in the mid-20s. I estimate that it deserves a hardiness rating of about 25°F (-4°C).

'Tropic Alpine Medley' (['Belisar' x (*R. lochiae* x *R. pseudonitens*)] x [*R. commonae* 1990 x *R. commonae*, cream flowered]) 1997.
White and cream forms of *R. commonae* have been reported and I was fortunate in obtaining the so-called cream form which in my plant is really a light yellow. The unnamed (['Belisar' x (*R. lochiae* x R. *pseudonitens*)] x *R. commonae*, red flowered) hybrid is one of my crosses. It has orange flowers and is hardy to the mid-20s. When crossed with "cream" *R. commonae* it produced hybrids with a wide range of colour and size. Colours ranged from orange, to clear yellow, to white, blends of light yellow and pink and pure pink. After exposure to 25-26°F (-4°C), sixty of 100 seedlings were discarded because of freeze damage. One of the most vigorous and rapidly growing plants produced abundant trusses of flowers that were soft pink with a light blend of cream. This plant was selected to be named. It is very showy when covered with flowers. The remaining seedlings are in a bed in the garden. Their colour range is so great that it is hard to resist naming several more of them. Also, some could be useful in further breeding. We lack a "hardy" white vireya hybrid. So I have crossed a white flowered seedling with a tender vireya which has large fragrant white flowers.

'Tropic Alpine Violette' (*R. commonae*, Laiagam form x *R. leptanthum*) 1995.
Late one fall I noticed that the 'Laiagam' form of *R. commonae* was in bloom in the garden. The only vireya in bloom that could be used as the pollen parent was *R. leptanthum*. To my surprise, seedpods ripened during the winter and the seed was sown the following spring. Ten seedlings were obtained and planted in a flat. Of the ten seedlings nine were vigorous and made rapid growth, while one grew into a small, more compact plant. The following winter we had a good freeze down to the mid-20s. All of the nine vigorous plants were severely damaged but the small plant was uninjured. The large plants were destroyed and the small plant was retained. It branched naturally (I like to see the natural growth habit in new hybrids), and produced

a nice-shaped, compact plant. When it bloomed almost every branch produced a bud. The flowers were something of a surprise. They were bluish pink, an unusual colour for a vireya. It may be stretching a point to call the colour violet and name the hybrid 'Violette'; however, it is an unusual shade of pink that tends towards the lavender. This was the first time that I used the 'Laiagam' form of *R. commonae*, which I suspect may be slightly hardier than the 'Dolo Pass' form. I rate the hybrid as hardy to 25&degF (-4°C).

'Tropic Alpine Gold' ('Belisar' x *R. commonae*, cream flowered) 1997.
Five seedlings from this cross grown in a flat in the front yard fully exposed to the night sky survived a freeze of 25°F (-4°C) much better than expected. There was only a small amount of foliar damage. When they bloomed they produced a very happy surprise. The flowers were produced in abundance (one truss had eleven flowers) and were a good-sized, deep pure yellow. One plant grew more rapidly than the others and it was selected to be named. Further testing for hardiness would be highly desirable.

'Tropic Alpine Joli' (*R. commonae*, cream flowered x 'Tropic Alpine Nymph') 1997.
A very unusual variety. The cream and pink stripes of the pendant flowers produce a very striking effect. The depth of the pink stripe varies. At times it is a deep pink and at other times it is a light pink. The depth of colour may be related to temperatures. If left to grow without any pruning or attempt to shape the plant it is open and rather straggly. Approximately twenty-five seedlings were exposed to 25-26°F (-4°C). Some plants were killed and others badly damaged. Only the hardiest 50 per cent were retained. The plant selected to be named had the most flowers per truss and was a good deep pink. I rate it as hardy to 25°F (-4°C). However, this hybrid was grown during a particularly warm period and should receive more testing.

Rhododendron 'Tropic Alpine Medley'

Rhododendron 'Tropic Alpine Ruby'

Obtaining Greater Hardiness.

Where does one go from here? It has been demonstrated that low levels of hardiness can be introduced into a wide variety of vireya hybrids, but there seems to be a barrier at about 20°F (-7°C) that so far has not been broken. What are some possibilities?

1. Simple selection. For example, cross two unrelated vireya hybrids that are hardy to 20°F (-7°C) and expose their progeny to 18°F (-8°C). Cross any that happen to survive, and select their progeny for hardiness. This method would require much time and labour and it may not be possible to reach the desired level of hardiness.

2. Test the high elevation species that so far have been neglected. I don't see much hope with this approach. However, I was completely wrong about *R. saxifragoides*. I assumed that it was worthless in breeding because of the difficulty in growing the species. The one hybrid that I had grown (*R. lochiae* x *R. saxifragoides*) was worthless: slow growing, subject to dieback, producing only a few inferior flowers after many years, and plants were killed in the mid-20s. Os Blumhardt in New Zealand and Bill Moyles in Oakland, California, have produced beautiful *R. saxifragoides* hybrids that are easy to grow and produce an

abundance of bright coloured flowers. So far I have no information on their hardiness but I would expect it to be within about the same range as *R. commonae* hybrids. Some combinations of *R. commonae* and *R. saxifragoides* hybrids would be worth trying.

3. Unexpected sources of hardiness. Look for hardiness in vireyas from areas that are sub-tropical or tropical. This seems unlikely to provide anything with worthwhile hardiness. However, (*R. brookeanum*, Bako 3 x *R. aurigeranum*) was among the very few vireyas that survived the mid-20s in Peter Schick's garden in Fort Bragg, California, during his deep freeze. The *R. brookeanum* came from sea level in Borneo and one would expect it to be extremely tender.

4. Crosses with non-vireyas. I don't see much hope here. The few hybrids that have been produced have not resulted in any breakthroughs that I am aware of.

5. Genetic modification. Transfer a gene or genes from some extremely hardy plant into vireyas. I suspect that this method has the best possibility of success.

What is needed more than anything else is new people who are interested in this problem. It is a fun project, and even if you don't succeed in producing that vireya hybrid with beautiful, huge, fragrant flowers on compact plants hardy to -20°F (-29°C), you can have a lot of fun trying and you might discover something totally unexpected.

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