

about May 10, 1981, 100,000 grapevine grafts were placed in the house for callusing (callusing boxes). Here excessive temperatures played an important part in the callusing procedure. Callusing temperatures must be maintained at 86°F. (or 30°C.) day and night over a period of 3 to 4 days or until the interior of all the callusing boxes reaches the above temperatures. This was accomplished by completely sealing the greenhouse for 3 days and then ventilating on the 4th day to lower the interior temperature gradually to 72°F. More shading had to be applied during this period for fear of burning the new developing vine growths

CONCLUSIONS

The structure overall proved to be very efficient for propagation. A few problems have to be worked out but these are minor when compared to the amount of fuel savings over the year. According to last winter's fuel savings, we estimate that the structure will pay for itself in fuel savings alone in about four years.

JACK ALEXANDER: Could you give us heating cost figures?

ARTHUR OSLACH. It costs us \$758 in back-up fuel for last year. This same boiler was in a similar nonsolar glass structure 3 years ago and it cost \$4,000 to operate. December and January are the worst months.

DAVE EMMONS. Why not use double poly which is cheaper?

ARTHUR OSLACH: I wanted something that was more permanent for propagation and also had a high R-factor to it.

EXPERIENCES IN BREEDING AZALEAS AND RHODODENDRONS

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My goal in breeding ornamental plants has been to produce hybrids which can make it commercially. Some hybridizers make crosses for their own satisfaction; some do it as a joint activity with other hobbyists. But mine is a full-time occupation and I have hoped to produce new rhododendrons for very cold climates that would be profitable for commercial growers and present no problems in production. The records

show that the most cold-hardy rhododendrons are also usually the most heat-tolerant, so I am always hoping that some of my hybrids will be equally useful in the south, and some of them have proved to be so.

The rhododendron cultivar 'Roseum Elegans' is still the best seller in the northeastern United States. It was introduced in England by Anthony Waterer some time before 1851. It's a dirty magenta-pink and it grows far too large for contemporary houses and gardens. But it's hardy and it roots easily. It's one of the group of so-called "ironclads" which means that it can be grown just about anywhere that rhododendrons can be grown at all in cold climates.

My cultivar 'Spring Frolic' by contrast is a pale pink with almost exactly the same dense growth habit as 'Roseum Elegans'. It bloomed after 28 degrees below zero in 1963 in the mountains of western Pennsylvania, and again in 1977 after the coldest winter the Cleveland Weather Bureau has recorded in 102 years. 'Spring Frolic' also roots very easily. It, however, won't quickly outgrow a single story house or a small garden. It makes up fast enough as a small plant to be commercially practical, but a 30 year old specimen I have is less than 6 feet tall. It blooms at an earlier and better season than 'Roseum Elegans'. An array of deeper pinks with pretty much the same characteristics as 'Roseum Elegans' is available that blooms both earlier and later.

The second best seller in the cold northeast is probably 'Nova Zembla'; this was introduced in 1902 in Holland by Koster's, so it's only been on the market 80 years. Keep in mind now, if you will, that we're talking this afternoon about the hardiest category of ornamental shrubs. These rhododendrons are more bud hardy than forsythia. They're almost as hardy as lilacs. In the case of 'Nova Zembla', the color is badly flawed by blue; the plant will swamp a single story house in 15 years; and it blooms at the end of May with 99% of the other rhododendrons now in commerce.

'Sumatra' is an alternative that, in my judgement, is much better suited to the ending years of the 20th century. It's a clear scarlet; it's such a dense grower that it would be a good evergreen if it never bloomed; it matures at about 3 feet, so it's an ideal foundation plant; and it blooms two weeks earlier than the hybrids now in commerce. This one, however, will always have to bring a price premium. You can't get this super-dense, twiggy growth along with the production of an 18- to 24-inch budded plant from a rooted cutting in two years. However, these dwarf scarlets have never before been available in hardy form for cold climates, and the tender counter-

parts have sold well in the mild climates of the west coast and England

Incidentally, if you're wondering how I got the dwarfness and the clear scarlet color into 'Sumatra', it came from *R. forrestii*, which was introduced from the mountains of Yunnan Province in China by George Forrest. It took 2 generations and 20 years to produce 'Sumatra', but it was worth it.

The standard white in commerce was introduced about the time of the Civil War under the Latin sounding name of 'Catawbiense Album'. It's a pretty good rhododendron, but it's not the easiest to propagate, as a young plant it is a bit slow, both in budding and in growth, and as an old plant it reaches a height of 15 feet with no trouble at all. It's a good cemetery plant because it blooms right on the button at Memorial Day, or it would be a good hybrid for the purpose if it didn't grow so large.

'Finlandia', however, roots like a weed, is a cleaner white, grows half the size, has a finer foliage texture, and lasts much longer in bloom because of its heavy flower substance. It's also guaranteed to be just as hardy as the 130-year-old 'Catawbiense Album,' which means that it's satisfactory in a Zone 5a climate. Some of you from the relatively mild East Coast are familiar with the Dexter and with the Gable hybrid rhododendrons. Both the Dexter and the Gable hybrids were produced in a zone 7a climate, 20° warmer in winter than the new hybrids. Their breeders didn't claim them to be, and didn't intend them to be, suitable for colder parts of the Northeast.

But there are myriad traps for the hybridizer aiming at widespread commercial distribution, and you may be interested in knowing a few of the sorts that may not be so obvious.

One of my most attractive earlier hybrids was named 'Limelight'. It was one of those rhododendrons with style, a crisp flower outline, an attractive pale yellow truss and it was bud hardy to at least 20° below zero. The original plant was normal in vigor. But with some hybrids there is a difference between the selected seedling and plants propagated from it by rooted cuttings.

Propagated plants of 'Limelight' failed to produce adequate root systems. At about 18 inches they developed enough wind resistance to rock back and forth in the ground. The result was that all propagated plants died at about 18 inches. This hybrid would have to be grafted to be a successful commercial rhododendron, and there aren't many volume wholesalers left who know how to graft even if it would be commercially practical.

When 'Tahiti' came along, I was rather pleased with it. It was a unique color, it was a bud hardy to about -16°F; it had

good foliage, and visitors liked it. After I released it to my introducers, it became apparent that it was worthless. It propagated routinely in a Nearing frame for me, but it dropped its leaves under glass with heat in the greenhouse, and failed completely.

Another which did exactly the same thing was 'Serenata' which at the time was a novelty hardy throughout the Northeast. I hoped it would be a test as to whether the public in the East would accept a flat-topped truss. By the first of the year the greenhouse propagator had a miniature forest of naked stems in the bench.

One of the oddest faults I encountered was with a hybrid called 'Virginia Leach'. This was gratifyingly different for a hardy hybrid, and seemingly a winner in every way, until I waded out through snow one cold January day, and found every leaf on the propagated plants sticking straight up in the air like rabbit ears. The original seedling was the same way. The plants presented the appearance of brown skeletons. So this one had to be discarded.

It is generally true that like does tend to beget like, so it is well to avoid the known but hidden faults of potential parents. 'Mrs. Furnival' is usually regarded as hard to root by many west coast propagators. Its progeny tend to be hard to root too. A 'Mrs. Furnival' hybrid that came through -28° in 1963 and bloomed well but absolutely refused to root at the usual propagating season by any method, but it rooted fine the first week in July. Nonetheless, few commercial growers are willing to deviate from their standard propagating procedures. A sure kiss of death for a new hybrid is any difficulty with propagation.

'Spellbinder' is one of the most striking rhododendrons which have appeared among my hybrids. The trusses of silvery pink flowers are huge. 'Spellbinder' is hardy as an oak and it blooms extra early, right after *R. mucronulatum*. But it has not one, but two faults as a commercial rhododendron. It's hard to root, but an equal handicap is that the leaves are so large the cuttings take up too much expensive space in a greenhouse propagating bench. It is a novel hybrid in every way for the Northeast, but unless tissue propagation overcomes its drawbacks, I think 'Spellbinder' will always be a hobbyists' hybrid.

Every breeder has endless offers from hobbyists to test his productions for him. The problem is that those making the proposition are often not competent growers or are otherwise unqualified to evaluate the rhododendron performance under their conditions. All the same, for gross defects which may

appear in dissimilar climates, enthusiasts can be quite helpful. Here is a case in point 'Vernus' distinguished itself in the only batch of small seedlings I have ever bought. They came from Tony Shammarello many years ago. It has done quite well in commerce, both in the Northeast and overseas, because it is ironclad hardy, and it blooms with the dogwoods and the daffodils. But it is virtually useless in the South, because it blooms partially in the fall, so that the remainder of the buds are frozen over winter. Another unseen defect, which was not apparent when I named it is that it is not tolerant of the growing site. It must have sun to remain presentable; even in light shade it becomes lanky as it grows about five feet tall. Still, it is a useful and attractive shrub in the right situation.

The most bizarre and extreme example of out of season bloom occurred with a hybrid I called 'Athens'. It was a nice, rounded, semi-dwarf which bloomed very early every spring. Seven years ago, to my astonishment, it abruptly began blooming in the fall and scarcely at all in the spring, whereas it originally held the distinction of being the first of all the broadleaved hybrids to flower. In 1974 it became the last, flowering in October, so I renamed it 'Last Hurrah'. One nurseryman is promoting it as a fall blooming plant, but the problem is that its performance will probably vary with the climate, so it may well be neither fish nor fowl in some regions. I think this was pretty close to the ultimate in concealed faults of new hybrids.

A rhododendron I like very much is 'Party Pink'. It is as hardy as any rhododendron that grows; it is exceptionally free flowering; vigorous yet dense and sturdily branched. However, this hybrid seems to over-respond to forcing fertilizer by becoming a tall, lanky container plant, especially in the south. So we have another of the hidden faults that confound the breeder and irritate the introducer. However, I figure this is one for which the breeder should be excused.

A delightful dwarf variegated leaf rhododendron represents yet another problem. The contrast between the green and the yellow parts of the leaves was emphatic, and the result was striking. The plant was moved to the open field and within two weeks the yellow parts of the leaves had browned or fallen away from sunburn, and there was a drastic decline in its health. This rhododendron was produced from a cross between two of my dwarf hybrids and it did seem promising not only to me but to visitors as well. If I had propagated it in the original ground bed and distributed it, the result would have been a total failure. The moral is always to grow some plants of a new hybrid with full field exposure before deciding its worth.

Some hybrids which are conspicuously handsome plants in the north are disfigured by leaf spots in the south and on the west coast. An example is a pretty little dooryard shrub which came from a cross of *R. carolinianum* with *R. hanceanum* var *nanum*. With too much exposure, or in humid climates, the fresh green leaves so freely produced soon become rusty and unattractive. I have noticed that glossy leaved rhododendrons tend to do this. In any event, it's still another of the hidden faults that plague the breeder.

It pays to think ahead about competition when making crosses. To my mind, there is an exceptionally attractive little dooryard rhododendron which resulted from a cross of *R. keleticum* with *R. carolinianum*. It is faultlessly evergreen the year around but it has the misfortune to bloom in the evergreen azalea season. Visiting commercial nurserymen often say that they can produce the same ornamental effect with an azalea in a third of the time at a third of the cost. So this will be, at best, a hobbyists' rhododendron if in fact it achieves any distribution at all.

We've been talking about the faults and the misfits that bedevil the rhododendron breeder. Let's turn to the positive progress that has been made.

'Malta' is an extremely early, scaly leaved hybrid which is mature at about 6 feet. 'Malta' came from 'Pioneer', self-pollinated, but to my mind it is a great improvement over its parent. Being sexually incomplete, as you can see, it sets no seeds so it covers itself with flowers every year. It is emphatically evergreen, whereas 'Pioneer' is deciduous as soon as it gets any size and its color is a clear pink with white intermingled, not the bluish pink of 'Pioneer'. It is a super-performer in the North, but like practically all scaly leaved hybrids, it loses its dense habit in the South.

Before we turn from these somewhat special scaly leaved rhododendrons, I'd like to mention a couple of dooryard hybrids. These are little 18- to 24-inch miniatures, hardy versions of a tender type that is popular in Europe.

'Tow Head' is the only one that has been named. I have perhaps a half dozen of these early flowering dooryard hybrids in various colors but I've never released any of them because there seems to be very little commercial interest in them. Hobbyists, however, are enthusiastic. To the best of my knowledge, 'Tow Head' is the first hybrid of *R. ludlowii*, a diminutive species from 14,000 feet in southeastern Tibet.

Turning now to the conventional large leaved rhododendrons, there have been no hardy yellows at all for cold climates. But quite a lot of progress has been made. The precur-

sor is the same for both anthocyanin and yellow pigments, and there is not a limitless supply. In most of the Northeast we probably must accept the anthocyanin along with the hardiness requirement, and this means an automatic reduction in the precursor available to produce yellow.

The cultivar 'Nile' is a denser grower and altogether a better evergreen than most this color. However, it's not by any means the deepest of the yellows.

'Good Hope' is my own favorite. It's an exceptionally handsome shrub out of bloom as well as in, as it grows for me, but Ted Richardson and Ted Van Veen both tell me the foliage spots for them. So it will only be good for the Northeast. If it weren't for the complete absence of any yellow rhododendrons at all in cold climates, I would think it should be discontinued.

Perhaps I should qualify the absence of yellow rhododendrons just a little bit. There is a British hybrid called 'Golds-worth Yellow' which will grow in the mildest climates as far north as Boston, but it's hardly yellow, and almost all specialists agree that it's not a good garden hybrid. So, if you can call it competition, this is the only one in commerce for any part of the Northeast.

One of my own goals has been to try to produce hardy versions with the same decorative garden effects as are available from tender hybrids on the West Coast and in England. We have no rhododendrons with bold blotches in the cold Northeast, but an as yet unnamed cultivar [('Mrs. Furnival' × 'Catglas') × G.B.M. #66-2] provides a striking contrast.

Rhododendrons with orange flowers are unknown in the Northeast, so of course that is a strong incentive to produce them. The best I have today is a cultivar 'Poppinjay' a unique color.

ED MEZITT: How are you doing with your *Rhododendron yakusimanum* crosses?

DAVID LEACH: I have only had one *R. yakusimanum* cross that was worth anything the first generation. The results have improved in the second generation and I am getting what I want in the third.

CARMINE RAGONESE: How do you propagate your rhododendrons?

DAVID LEACH: I feel old fashioned to tell you. I still use an 18 hour soak with IBA at 150 to 400 ppm and root in a Nearing propagation frame. It is quite satisfactory for the quantities I require.