first published by Cassell, reprinted by Exbury Gardens, 1987, p. 35. This book is an invaluable source of information on Mr. Lionel de Rothschild's life and work, Exbury, and highly practical rhododendron culture. The book is a well-produced, hard-cover edition of 138 pages including 20 fine black-and-white illustrations, plus 65 full-page color plates of plants in bloom. Peter Barber had served as a major in the army with Edmund de Rothschild, and later become Managing Director of Exbury Gardens.

(2) Berrisford, Judith. *Rhododendrons and Azaleas*. London: Faber and Faber, 1964, p. 45.

(3) Berrisford, *ibid.*

(4) Berrisford, *Op. Cit.*, p. 46.

(5) Phillips and Barber, *Op. Cit.*, p. 35.

(6) In 1926 (Mr. Lionel) acquired most of the collection of Thomas Lowinsky, one of the leading amateurs of the day and a RHS gold medallist, whose fine garden at Tittenhurst, Sunninghill, was celebrated also for some of the rarer forms of conifer, such as the curious pendulous cedars and the very odd weeping wellingtonias, or 'ghost trees'." Phillips and Barber, *Op. Cit.*, p. 26.

(7) *Year Book of the Rhododendron Association*, 1934: pp. 113-114.

(8) Phillips and Barber, *Op. Cit.*, p. 20.

(9) Communiqé from Mr. Nicholas de Rothschild, 9 October 1996.

(10) Letter from William C. Miller III, 12 May 1996.

(11) Exbury Gardens, [Christina Dykes and Charles Orr-Ewing, produced by Exbury Gardens.] "An Introduction."

(12) Communiqé from Mr. Lionel de Rothschild, 10 June 1996.

Jaacquelyn Kuehn *writes from her home in western Pennsylvania, where she is eagerly anticipating the first blossoming of her young deciduous azaleas this spring. She is currently the editor-in-chief of Pomona, journal of the North American Fruit Explorers (NAFEX).*

Photographs by the author

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PINE BARK AND AZALEAS

Larry Brown

Hammond, Louisiana

Use of pine bark in container culture of azaleas

As anyone who has grown ornamental plants in containers in the southeastern United States knows, milled pine bark is a great ingredient for a growth medium. Its qualities include good drainage and heat release, acidity, lack of toxicity, and very slow decomposition rate. And anywhere that pine trees are harvested in quantity it has the additional advantage of wide availability and low cost.

The pine bark that I will be referring to throughout this article is described as being run once through a hammermill and at least six months old. This results in a range of particle sizes that is considerably coarser than bark that is usually sold as potting medium for greenhouse plants or houseplants. The coarser bark is considered a necessity for growing healthy plants in containers in full sun in the South. If you are growing azaleas under less severe conditions, a finer bark may be more desirable.

Azaleas can grow very well in 100% pine bark. However, one drawback to such use is the low water holding capacity of pure bark. Another property, which can be either a plus or a minus, is its light weight. For shipping, light weight is desirable, but plants in pure bark are easily blown over,

Plants grown in 100% bark or very coarse bark may also have difficulty in becoming established when planted out, especially into heavy soils. The roots can easily dry out before they grow beyond the original container volume, even if the surrounding soil is moist enough. Addition of up to 10% sand to the container medium helps overcome these problems.

Several years ago I compared the growth of various plants in media containing pine bark, 10% sand, and Canadian peat in percentages ranging from 0 to 90%. The results of these tests are shown in Table 1 (1).

Results obtained in two separate tests in consecutive years are shown as "Test I" and "Test II".

TABLE 1

Weight of prunings from 'Carror' azalea plants grown in various media and pruned at 4" height after one season of growth.(1)

PERCENTAGES			FRESH WEIGHT (g.)	
PEAT	PINE BARK	SAND	TEST I	TEST II
0	90	10	33	63
5	85	10	52	73
10	80	10	55	84
20	70	10	55	84
40	50	10	68	92
90	0	10	76	100

Under the conditions of these tests, growth and quality of azaleas increased with each increase in peat percentage. Since cost also increases with increasing peat, use of 10% peat was probably a good compromise between best growth and lowest cost. If cost is not a major consideration, use more peat.

I must hasten to add that another characteristic of pine bark is its inertness. Its decomposition rate is so slow that it makes negligible amounts of essential nutrients available to the plant. These elements (nitrogen, phosphorous, potassium, calcium, magnesium, sulfur, iron, manganese, copper, zinc, boron, and molybdenum) must all be added either by incorporation in the growth medium, application on the surface, dissolved in the irrigation water, or a combination of these methods. There is an almost infinite number of fertilizer combinations that can be satisfactory.

Use of pine bark in landscape planting

Pine bark is widely used as a mulching material and is very effective because of the same properties that make it a good container medium ingredient. If weed control is a primary reason for mulching, only very large bark particles should be used; otherwise weeds can grow right in the mulch.

Compared to other organic materials, bark is considered a relatively poor material to incorporate into a landscape soil. Except for very fine particles, bark acts somewhat like an equal amount of gravel when mixed with a mineral soil.

Theoretically, a bark and soil mixture would have to be at least 80% bark (and therefore not more than 20% soil) to be a medium that provides better aeration than the soil alone. This is because the large pore spaces (i.e., the spaces that are filled with air after irrigation water drains away) are no more than 25% of the total volume of bark. If all of these large pore spaces are filled with soil, aeration is poor.

The research that I will use to suggest how pine bark might be used for azalea planting was not done with azaleas as the test plant. Blueberry (*Vaccinium ashei*) was used instead. It may seem like quite a leap to compare blueberries and azaleas, but actually they are closely related, both belonging to the heath family *(Ericaceae)*. Both have a fine and slow-developing root system and their cultural requirements are quite similar.

My hypothesis for this work was based on the previous explanation that bark is not considered to be a good material for incorporation, but is a good medium by itself. In a preliminary test, holes 15" in diameter and six inches deep were dug in a fine sandy loam field soil with a low organic matter content. Blueberry plants from three-quart containers were planted in these holes with one and one-half gallons of bark placed as shown in Table 2. Additional explanation may be needed for the placement in treatments three and four: the bark was placed in a layer extending from the root ball of the plant to the sides of the hole.

A year after planting, the plants were rated for quality of top growth. Then they were carefully dug and root development beyond the original rootball was evaluated. The average ratings are shown in Table 2. (Unpublished data, Hammond Research Station.)

These ratings tend to indicate that the layered bark (including that on the surface) improved top growth the first year after planting and that the layers one inch and three inches deep greatly improved root growth during that first year. The hypothesis that roots would grow throughout the bark layers much faster than into the surrounding soil was borne out.

After this preliminary test, a larger planting was made using the same basic treatments plus one with incorporated peat. In this study, the planting holes were 18" in diameter and three gallons of bark per plant were used for treatments two through five. Peat was used at one and one-half gallons per plant in order for the cost of the materials to be more nearly equal.

TABLE 2
Effects of pine bark on growth of blueberry plants in the field

TREATMENT	TOP RATING[1]	ROOT RATING[2]
(1) No bark	1.6	0.8
(2) Bark on surface (mulch)	3.5	2.4
(3) Bark layer 1" below surface	3.4	4.6
(4) Bark layer 3" below surface	3.6	4.2
(5) Bark mixed with soil	2.3	1.8

[1] Rated on a scale of 0 - 10: 0 = dead, 10 = excellent quality

[2] Rated on a scale of 0 - 10: 0 = roots not extending beyond original pot medium, 10 = roots extending to extremities of planting hole.

The only records taken in this test were yield of berries, which generally appeared to reflect plant size. The first year yield was highest with bark layered three inches deep and lowest with both incorporated materials. The second year yields followed a similar pattern except that incorporated peat was alone as the poorest treatment. Heavy production began the third year and all treatments utilizing pine bark (including incorporated bark) yielded much more than incorporated peat, which was only slightly better than the control treatment with no additive.

Well, that seems to refute what I said earlier about bark not being a good material for incorporation. Perhaps tests that so indicated were of too short a duration and, perhaps, during the second year of my test, bark began to act like organic matter should and

provided some soil improvement or even nutrient availability to the plant.

If this were a scientific article I would have to look up references for the statements I have made and would have to indicate the statistical probability that the figures shown could have occurred by chance, and I certainly couldn't extrapolate from blueberries to azaleas. So be advised that this is not a scientific paper and is intended only to stimulate your own experimentation. The fact is that no other situation is exactly like yours, so even the most exacting conclusions of research may not apply without modification.

Reference:

(1) Progress Report, Jan. 1983-Dec. 1984. Hammond Research Station, LA Agr. Exp. Sta. pp.32-37.

William L. "Larry" Brown *is retired after 34 years as Associate Professor of Horticulture, Hammond Research Station, Louisisana Agricultural Experiment Station, Louisana State University Agricultural Center, 21549 Old Covington Highway, Hammond, LA 70403. His favorite projects involved forcing of azalea pot plants without cold, production of tree forms by grafting, and breeding of summer and fall flowering azaleas.* ❑

In Praise of the EZcart

Robert Stelloh

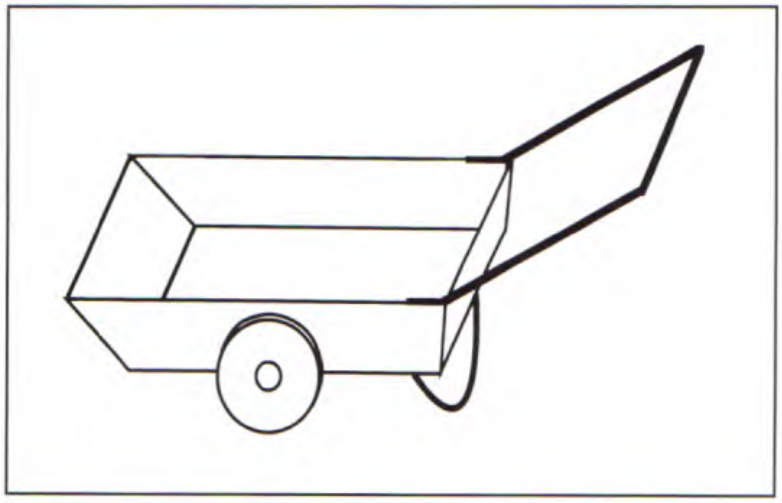
Hendersonville, NC

One day last year, the other volunteers working on the George Harding Memorial Azalea Garden were surprised and amused when Milt Lerner brought a new garden cart to the work site. It was called an "EZcart," and it looked more like something a child might use at the beach than a serious gardening tool. After trying it, mostly to humor him, within a few weeks we each had one, and at least one person bought several of them.

The EZcart is just under two feet wide by just over two feet long by seven inches high. Three sides slope very slightly outward, and the front slopes forward at a 45" angle. It is made of a thin, hard and very strong plastic, probably fiberglass. The handle is the same size as the cart, made of 3/4-inch pipe, and bends up to be two feet off the ground when the cart is at rest. The two black plastic wheels are one foot in diameter, so the bottom of the cart is only five inches from the ground and the top is one foot from the ground. The cart rests on a pipe skid at the rear. The sketch shows the overall shape of the cart and the arrangement of its parts.

As an engineer, I admired the attention to detail that is apparent in the design of the EZcart, from the shallow form-fitting packaging it comes in, to the use of thumb screws instead of ordinary nuts and bolts throughout that permit assembly without tools. As a gardener, I admire the strength and utility of the EZcart. While it has a stated capacity of about 100 pounds, my wife and I have carried at least twice that much in the course of using it as a ball cart for some balled and burlapped Japanese maples we moved. With a very heavy load it bends and squeaks somewhat and it pulls better than it pushes over soft or uneven surfaces, but it doesn't break.

The biggest plants I ordinarily move are "1-man trees" (about 75-pound root balls), and the rootballs of these Japanese maples ranged from 150 to 300 pounds—while I could roll them, or drag them with great difficulty, I definitely couldn't lift them. We had no problem moving them with the EZcart, however. For each one, we dug a flat ramp the width of the cart from ground level to slightly below the bottom of the root ball, tipped the tree back, ran the sloping front of the cart under the root ball, tipped the tree onto the cart, and dragged it off to its new home. One person can do all of this, although it is much easier with one person handling the tree and one person handling the cart. Then, after digging a hole for the tree, we dug a similar ramp for the cart, and reversed the process to ease the ball out of the cart into the hole, without ever lifting the tree, and with no trauma to the root ball from dropping it. It should work similarly for stones which are too heavy to lift, yet too small for heavy equipment.



We have also used the EZcart with great success for ordinary wheelbarrow or garden cart tasks,such as moving small plants, leaves, garden trash, dirt, gravel, stones, mulch, firewood, tree trunks and tools. While it won't hold as much as a wheelbarrow or a large garden cart, being so close to the ground makes it much easier to shovel into or to lift heavy things into. When it comes to unloading, it is about as easy to tip a load out as with a wheelbarrow, and much easier than with a large garden cart. In short, the EZcart is a great addition to your arsenal of garden tools, and it costs around $25.00 from Home Depot, Lowes, Sears, etc. ❑