AZALEA RESEARCH

RAYMOND L. SELF[1]

Ornamental Horticulture Field Station
Mobile, Alabama

Azalea culture in containers and soil as late as 1952 involved the use of German peat as a growing medium for both containers and bed/grown azaleas. The fertilization program consisted of the use of phosphate in the soil and corrective additions of sulphur, aluminum sulphate, and frequent iron sulphate sprays to keep the soil acid (1, 2).

My research on azaleas started at the Ornamental Horticulture Field Station in Mobile in 1952. The need for lime, the detrimental effect of excess phosphorus in the soil, and the need for a micronutrient mixture to supply necessary micronutrients, either in the potting soil or in a topdressing soon became evident (5, 6, 8). Monthly applications of a complete fertilizer were also shown to prevent fall leafdrop and make azaleas more cold hardy (9). Additional applications of nitrate or sulfate of potash further hardens and increases cold resistance.

Our research also indicated the value of adding dolomite lime to the 8-8-8 and to the topdress mixture used by the nurserymen (5, 9). With the advent and acceptance of slow-release ureaform nitrogen by the nurserymen, a formulation of 12-4-6 or 12-6-6 plus micronutrients with a dolomite base was found to be equal to the 8-8-8:cottonseed meal:dolomite formulation (3). It had the advantage of being lighter in weight per NPK unit and did not culture the fungus gnat which spreads *Cylindrocladium* blights in the liner beds.

Fertility and potting mixture studies have continued throughout the years with the goal being to produce a slow-release fertilization program which could be incorporated into a mixture suitable both for rooting and growing the azaleas to maturity in the container. This has resulted in development of a potting soil fertilizer to be added to the complete mixture as follows in pounds per cubic yard: 10 dolomite, 2 superphosphate, 2 gypsum, ½ KNO_3, ¼ micronutrients (Tennessee Copper 008 modified form, or FTE 503, or equivalent), ¼ chelated iron, ⅛ chelated manganese, plus either of three slow-release programs to supply N and K: 3.5 lb ureaformaldehyde plus 2 lb fritted potash FTE 519; 2) Sulfur-Coated Urea SCU-15 at 2.5 lb plus 2 lb FTE 519 and 3) Osmocote 18-6-12 at 5 lb or Osmocote 18-5-11 at 10 lb (3). All of these slow-release programs have been highly satisfactory for azaleas and are also very satisfactory for woody ornamental rooting and production. They have been

[1] Plant Pathologist in Charge, Orn. Hort. Field Sta. of Auburn Univ. Agri. Exper. Sta. System, Mobile, Ala.

used to root azaleas directly in the container to produce finished liners and liners transplanted to 6-inch containers have produced finished plants outdoors under irrigation without additional fertilization. The 1½X rates of the materials outdoors have produced most total growth (14, 16); in the greenhouse the higher rates have resulted in some salt toxicity.

COLD DAMAGE

Sub-zero freezes in 1950 and 1962 lasting for days caused container losses, and in 1960's freeze losses were severe. Research information obtained that will aid in protecting against losses are:

1. Container color — dark cans freeze and thaw fastest; dark color metal cans build up and lose heat faster than plastic cans. Light color cans begin growth slowly in spring due to slow heating (7).

2. Mulch under cans prevent earth's heat from protecting cans (4, 7).

3. Paper barrier or other mulches around cans protect outer rows.

4. Jamming of cans close together gives protection to the inner cans of the bed.

5. Use of growing media with insulation qualities — materials with enclosed air spaces, such as coarse bagasse, peatmoss, shale, perlite, or undecomposed bark, provide minute air spaces (4). Sand, gravel, and topsoil provide no protection and their inclusion in the mix reduces its freeze resistance. In the 1960's greatest freeze injury occurred in those mixes containing topsoil or sandy clay along with the peatmoss (the organic material most used at that time).

6. High potash levels have been demonstrated to increase freeze resistance by "antifreeze" effect.

GROWING MEDIA STUDIES

Pine shavings produce a well-aerated mixture until they rot a few months later. Cedar shavings have proved very satisfactory but mahogany shavings stunt growth due to some toxic factor.

Slate (shale) that has been hammer-milled and expanded by heating to 1400°F has proved very satisfactory to increase aeration and weight of the mixture. Azaleas have been grown in slate alone without chlorosis developing in spite of an initial pH 8.2 with a slow drop to 6.5 with extensive leaching. It contains as beneficial chemical constituents 8.5% iron oxides, 1.8% calcium oxide, 0.8% magnesium oxide, and 3.7% potassium oxide (11).

A simple method of determining air and moisture-holding capacity has been developed (15). An ideal potting mixture has about 25% available air and water each. Several ratios of peat, bark, and slate have been studied and the most promising mix consists of 3 coarse bark, 1 peat, and 1 slate (12). If this mix is to be used for woody ornamentals, 1 to 2 parts sandy topsoil or coarse sand should be added to make the mix heavier. With fine bark the peat can be eliminated. The addition of topsoil or fine sand to an azalea mix serves no useful function except to make it heavier; both reduce air space and retard root development. A coarse, sharp sand would not reduce air space. Hardwood barks have not performed as well as pine bark in growing media in my experiments.

DISEASE CONTROL STUDIES

1. *Phytophthora* root rot was very severe in many ground beds and in containers in earlier years. The inclusion of lime in the fertilization program and fumigation of the liner beds has reduced losses. Copper sulfate at 1 oz/7sq ft has controlled *Phytophthora*. Drenches of Terrazole at ½ lb has given control but 1 lb rates also control *Rhizoctonia*.

2. *Cylindrocladium* root and stem rots and leaf blights of azaleas and other ornamentals were identified in 1955 (17). Fungicidal compounds were screened for several years. Thirty minute soaks of 6 lb Zineb, 2 lb Thylate or Polyram were recommended. Many workers were allergic to Thylate. Benlate and Daconil were later researched and recommended at 1 lb/100 gal of water. Benlate was used most extensively due to its systemic activity against *Rhizoctonia, Cylindrocladium,* and *Botrytis.* For a few years it was very effective and apparently rid the treated plants of *Cylindrocladium.* Very little *Cylindrocladium* is found today (3, 10).

3. *Pestalotia* leafspot, stem blight and crown rot (plant breaks off at groundline) have become very severe on azaleas. This organism was formerly thought to be a very weak pathogen. Continual use of Benlate is postulated to have killed organisms antagonistic to the *Pestalotia*, thereby allowing it to become pathogenic. Research has shown Daconil plus a spreader-sticker to be very effective against it at 1 lb/100 gal. The organism is best controlled by using clean cuttings and a frequent preventative spray program with Daconil, Dithane M-22, or Manzate 200.

4. *Rhizoctonia* root rot has become fairly common in potting mixtures containing pine bark. Research has shown it to be controlled with Banrot, Benlate, Truban (Terrazole), or Terraclor at 1 lb of the wettable powder formulations per 100 gal of water. Terraclor has produced chlorosis on some plants when soil incorporated. Banrot at 4 to 6 oz/cu yd has stimulated azalea growth, presumably by controlling *Rhizoctonia*.

PINE BARK COMPOSTING STUDIES

Azalea mixes containing two parts fresh pine bark, one part German peat, and one part nursery grade slate were composted for approximately 1, 30, and 60 days and planted February 6-9, 1975. The test was duplicated as closely as possible in the greenhouse and outside under overhead irrigation. All treatments received the basic fertilizer previously described. Ammonium nitrate and urea were compared to ureaformaldehyde, sulfur-coated urea (SCU)-15, and Osmocote 18-6-12 and 18-5-11 at comparable rates based on 6 months release time. In the greenhouse ammonium nitrate and urea performed as well as the slow-release materials because they were not leached out. In the field, they performed very poorly due to excess leaching.

In the greenhouse, the 1X rate of the slow-release materials produced adequate growth and excess salt damage was evident at the higher rates. The 1½X rates were superior in the field with the 15 lb. rate of Osmocote 18-5-11 being superior (3).

Small piles of compost materials had no excess heat. Possibly the coating of Osmocote would deteriorate in large piles. No difference in growth rates was observed between composting dates.

LITERATURE CITED

1. Hume, H. Harold. 1931. Azaleas and Camellias. p. 55, 73.
2. Lee, F.P. et al. 1952. The Azalea Handbook. J. Amer. Hort. Soc. p. 107-108.
3. Self, R.L. 1968. *Cylindrocladium*. Twelfth An. Res. Rep., So. Nurs. Assoc. p. 12.
4. ________1964. Cold damage studies. Eighth An. Res. Rep., So. Nurs. Assoc. p. 5-6.
5. ________1962. Fertilization studies — calcium-phosphorous. Sixth An. Res. Rep., So. Nurs. Assoc. p. 5-6.
6. ________1961. Fertilization — calcium-phosphorous study. Fifth An. Res. Rep., So. Nurs. Assoc. p. 11-12.
7. ________1960. Effect of can color and ground mulch on winter injury. Fourth An. Res. Rep., So. Nurs. Assoc. p. 4-5.
8. ________1960. Fertilization — calcium-phosphorous study. Fourth An. Res. Rep., So. Nurs. Assoc. p. 4-5.
9. ________1959. Effect of late season fertilization on leafdrop of azaleas. Third An. Res. Rep., So. Nurs. Assoc. p. 8.
10. ________1959. *Cylindrocladium* leaf blight on azalea liners. Third An. Res. Rep., So. Nurs. Assoc. p. 12.
11. ________and N. A. Driskell. 1972. Processed slate as a rooting and growing medium. Seventeenth An. Res. Rep., So. Nurs. Assoc. p. 50.
12. ________and C. T. Pounders, Jr. 1975. Azalea potting mix study using two grades of pine bark as an ingredient. Twentieth An. Res. Rep., So. Nurs. Assoc. p. 4.

13. __________and C. T. Pounders, Jr. 1975. Composting of potting soils containing bark. Twentieth An. Res. Rep., So. Nurs. Assoc. p. 9.

14. __________and C. T. Pounders, Jr. 1975. Rooting of cuttings directly in growing medium containing fertilizer. Twentieth An. Res. Rep., So. Nurs. Assoc. p. 103-104.

15. __________and C. T. Pounders, Jr. 1974. Air capacity studies. Nineteenth An. Res. Rep., So. Nurs. Assoc. p. 7-9.

16. __________and C. T. Pounders, Jr. 1974. Addition of fertilizer to rooting media. Nineteenth An. Res. Rep., So. Nurs. Assoc. p. 98.

17. Timonin, M. I. and R. L. Self. 1955. *Cylindrocladium scoparium* Morgan on azaleas and other ornamentals. Plant Dis. Rept. 39:860-863.