

---

# Soil Amendments Affect Azalea Performance

---

**John C. Pair**  
*Wichita, Kansas*

---

Proper soil preparation is always beneficial for success with plants, but is especially important in the case of azaleas. It is well known that azaleas require an acid soil, but there are other complex factors involved in improving the physical and biological make-up of soils which affect the growth of plants (1). Selecting the proper soil for the best root environment is ideal, but gardeners who want to grow a few azaleas may have to deal with their existing soil on site and to improve it to the best of their ability. Of primary concern is good drainage and acidification.

Addition of organic matter improves retention of moisture in light, sandy soils and also loosens heavy, clay soils by separating clay particles and cementing them together into aggregates, thus improving the structure of the soil. Organic matter also supplies nutrient elements, buffers the soil from rapid chemical changes and enriches the biological activity of the root environment. The choice of organic matter often depends on availability, but can include sphagnum peat moss (more acid than hypnum peat), rotted sawdust, composted oak leaves, pine needles, (both acidic in nature) or other well rotted materials. It is always wise to test the pH of the soil at the beginning of the preparation process and aim to bring the level down to 4.5 to 5.5 eventually for best results.

As reported earlier (2) success with azaleas in the Great Plains depends on (A) the selection of hardy species and cultivars, (B) a well drained site preferably in a location with winter shade, (C) adjustment of the soil pH, and (D) addition of generous amounts of organic matter including a mulch to retain adequate moisture. Three out of four of these requirements can be met through proper bed preparation. It is helpful to do the preparation in the fall or winter before planting the following spring. In proper bed construction the drainage will be improved through elevating the soil level, organic matter will be added and the pH adjusted well before the planting season.

In the fall of 1988 we began preparation for a new soil comparison using five white azalea cultivars. Soil was a Canadian sandy loam with a pH of 7.0 before incorporating any amendments. Organic matter sources compared were traditional sphagnum peat moss versus a Back to Earth Resources product containing cotton burrs. The material is a by-product from cotton gins in Lubbock, Texas, an area where no defoliant is used on the cotton crop, and is marketed as a soil amendment.

Each organic matter type was incorporated at 15 cubic feet per 50 square feet or approximately one third by volume. Both products were compared with and without sulfur at a rate of three pounds per 100 square feet. Combined treatments were also included and consisted of equal parts sphagnum peat plus cotton burrs with and without sulfur added. Soil pH was monitored to determine both short term and long term effects of each treatment.

Amendments were incorporated on November 30, 1988, and the following spring three replications each of five white azalea cultivars were planted in each of the treated plots. Cultivars planted were 'Kathy', 'Delaware Valley White', 'Snow', 'H. H. Hume', and 'Helen Curtis'. Observations were made on plant

condition, growth, drought stress and flowering for three years.

## Results

Soil tests indicated a fairly rapid change and considerable pH difference among treatments after only three months (Table 1). After four months sphagnum peat moss alone reduced the pH from 7.0 to 5.4. The addition of sulfur to the plot reduced the pH further to 4.4 in six months. However, amendments which included cotton burrs tended to raise the pH temporarily. Cotton burrs alone raised the pH to 8.1 initially but within a year it was back to 7.1. Dolomite added to the cotton burrs at the end of composting no doubt contributed to the rise in pH. The product is now acidified to alleviate this problem. The addition of sulfur at three pounds per 100 square feet moderated the effect of the cotton burrs to 6.5 by July, 1989. By mixing peat moss and cotton burrs plus sulfur, the pH was 5.5 after nine months. A high calcium content in our irrigation water caused the pH in all treatments to creep up over time. Annual increments of sulfur are usually necessary to maintain a pH in the ideal range, although acid mulches such as pine bark or pine needles help to alleviate alkalinity as well.

Averaged across all cultivars, growth, plant condition and flowering were best when plants were grown in soil amended with peat moss plus sulfur followed by peat moss only (Table 2). Next best were azaleas grown in plots containing peat moss and cotton burrs plus sulfur. Worst treatments were peat moss and cotton burrs (without sulfur) and cotton burrs only.

Among white cultivars planted, 'Delaware Valley White' and 'H. H. Hume' grew and flowered best (Table 3). 'Snow' proved inferior to other cultivars tested in plant condition and drought stress as indicated by leaf water potential. Plant condition and leaf water were poorest in mixes containing cotton burrs, perhaps due

to the coarseness of the material. Treatments containing peat moss produced azaleas with better plant condition, less drought stress and more flowering.

#### References

- (1) Clark, J. Harold. 1982. *Getting Started with Rhododendrons and Azaleas*. Timber Press, p. 268.
- (2) Pair, John C. 1995. "Growing Evergreen Azaleas in the Great Plains". *THE AZALEAN* 17(2), pp. 34-36.

**Table 1. Effect of amendments on soil pH<sup>1</sup>**

| Treatment                                   | Rate/<br>100 sq. ft.               | Dec.<br>1988 | Jan.<br>1989 | Mar.<br>1989 | May<br>1989 | July<br>1989 | Oct.<br>1989 |
|---|------------------------------------|--------------|--------------|--------------|-------------|--------------|--------------|
| (1) Peat moss only                          | 30 cu. ft.                         | 7.1          | 5.3          | 5.4          | 5.8         | 5.9          | 6.0          |
| (2) Peat moss<br>+ sulfur                   | 30 cu. ft.<br>3 lbs.               | 7.0          | 5.5          | 5.4          | 4.4         | 4.6          | 5.3          |
| (3) Peat moss<br>+ cotton burrs             | 15 cu. ft.<br>15 cu. ft.           | 6.9          | 6.3          | 6.9          | 7.3         | 7.2          | 6.7          |
| (4) Peat moss<br>+ cotton burrs<br>+ sulfur | 15 cu. ft.<br>15 cu. ft.<br>3 lbs. | 6.9          | 6.5          | 6.6          | 5.4         | 5.5          | 6.4          |
| (5) Cotton burrs<br>+ sulfur                | 30 cu. ft.<br>3 lbs.               | 7.1          | 7.5          | 7.5          | 7.0         | 6.5          | 6.7          |
| (6) Cotton burrs only                       | 30 cu. ft.                         | 7.1          | 7.4          | 8.1          | 7.9         | 7.6          | 7.1          |

<sup>1</sup> Initial pH was 7.0 before amendments were incorporated November 30, 1988.

**Table 2. Azalea performance as affected by soil amendments**

| Treatment                       | No.<br>Surv. | Growth (in.) <sup>1</sup> |         | Plant<br>Cond. <sup>2</sup> | Leaf W<br>(MPa) | Flower<br>rating <sup>2</sup> |
|---------------------------------|--------------|---------------------------|---------|-----------------------------|-----------------|-------------------------------|
|                                 |              | Ht.                       | Sprd.   |                             |                 |                               |
| (1) Peat moss                   | 14           | 17.9 ab                   | 22.5 ab | 4.4 b                       | -1.1 c          | 5.4 a                         |
| (2) Peat + sulfur               | 15           | 18.7 a                    | 24.6 a  | 5.5 a                       | -1.1 c          | 5.8 a                         |
| (3) Peat + cotton burrs         | 14           | 13.4 c                    | 16.1 c  | 2.9 c                       | -1.5 a          | 2.9 c                         |
| (4) Peat, cotton burrs + sulfur | 15           | 16.5 b                    | 22.4 ab | 4.8 ab                      | -1.2 bc         | 5.1 ab                        |
| (5) Cotton burrs + sulfur       | 15           | 13.6 c                    | 20.8 b  | 4.3 b                       | -1.4 ab         | 4.3 b                         |
| (6) Cotton burrs only           | 10           | 11.5 c                    | 14.0 c  | 1.9 d                       | -1.6 a          | 2.3 c                         |

<sup>1</sup> Numbers followed by a common letter are not significantly different statistically at the 95% confidence level (average of five cultivars, three replications)

<sup>2</sup> Rated on scale of 0 to 9 with 0 = dead and 9 = best condition and most flowering.

**Table 3. Growth, flowering and leaf water potential of white azalea cultivars**

| Cultivar          | No. Surv. | Growth (in.) <sup>1</sup> |        | Plant Cond. <sup>2</sup> | Leafwater potential (MPa) | Flower rating <sup>2</sup> |
|-------------------|-----------|---------------------------|--------|--------------------------|---------------------------|----------------------------|
|                   |           | Ht.                       | Sprd.  |                          |                           |                            |
| Kathy             | 18        | 13.4 b                    | 20.3 b | 3.7 b                    | -1.5 b                    | 3.3 b                      |
| Del. Valley White | 17        | 18.7 a                    | 23.7 a | 5.3 a                    | -1.1 a                    | 5.8 a                      |
| H.H. Hume         | 18        | 18.7 a                    | 26.1 a | 5.1 a                    | -1.1 a                    | 5.4 a                      |
| Helen Curtis      | 15        | 12.6 b                    | 13.7 c | 2.9 bc                   | -1.3 b                    | 3.4 b                      |
| Snow              | 15        | 13.3 b                    | 16.8 c | 2.8 c                    | -1.8 c                    | 4.1 b                      |

<sup>1</sup> Average of 3 replications in each of 6 soil amendments (= 18 total). Numbers in a column followed by a common letter are not significantly different at the 95% confidence level.

<sup>2</sup> Rated on scale of 0 to 9 with 0 = dead and 9 = best condition and most flowering. □

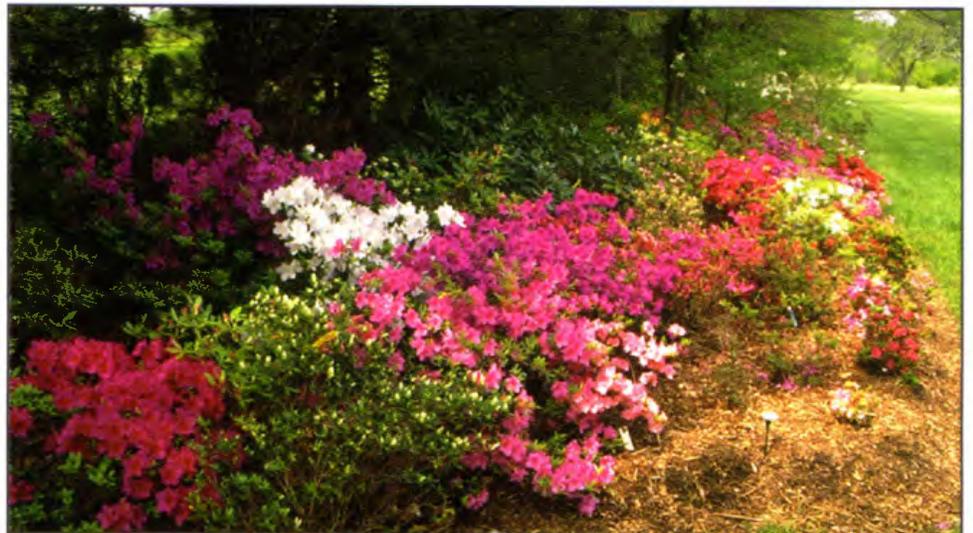


*Sphagnum peat moss preferred*



*Peat moss 1/3 by volume incorporated*

*John C. Pair, Ph.D. is a Research Horticulturist at the Kansas State University Horticulture Research Center at Wichita, Kansas. Primary responsibilities are woody plant evaluations for adaptability to zone 6a with emphasis on cold hardiness, heat and drought tolerance and other environmental factors including site selection and cultural requirements for commercial production and consumer use. A major goal is to enhance the selection of ornamental plants for the Great Plains region.*



*Azaleas after planting in well-prepared bed*

*Photographs by the author*