Growth of Azalea, *[Rhododendron obtusum* (Lindl)]* Planch. cv. Coral Bell*] and Wax Myrtle *[Myrica cerifera L.] as Affected by Capillary Watering, Media Type and Depth¹

S. I. Patel and J. H. Tinga²

*University of Georgia, Athens*

Abstract. The avg wt increase of subirrigated dormant azalea tops after 75 days was 4.5g and of wax myrtle was 10.0g. The wax myrtle in a 30 cm deep perlite and peat medium produced the greatest fresh and dry wt which was twice as heavy as plants grown in a sand and bark medium. The peat, sand and soil and the peat and sand media produced the greatest new shoot number in azalea. The wax myrtle had greater shoot length in perlite, sand and soil, and the perlite and peat medium at 30cm depth, than in the peat and sand or the sand and coarse bark media. The azalea produced 5 shoots per plant which averaged 23cm in length, while wax myrtle produced 4 shoots with 41 cm in length. There was a decrease in soluble salt level and media pH but an increase in % media moisture with greater sampling depth from surface to bottom. Subirrigation may be beneficial for a wide variety of plants and cultural conditions since it provided a precise amount of water at all times.

In 1943 Moinant (9) described subirrigation as a possible method for consistent supply of water to a plant container. Habermann (5) and Post and Seeley (11) explained subirrigation benefits as a uniform supply of water and nutrient with economy of fertilizer. Seeley (13) suggested capillary watering of pot plants. Better greenhouse crop production of *Matthiola* and Pink China asters was found in the 3 Iowa soils using capillary watering (15). Hammer and Boodley (6) confirmed the work of Ward (16) that subirrigation was extremely valuable in the culture of carnations. The capillary watering method required little attention and has been satisfactory for pots ranging in diameter from 10.6 to 22.9 cm (7). Patel and Tinga (10) showed that the new growth of subirrigated plants of *Flex crenata* was greater when the soil depth was at least 20 cm from water level to soil surface.

Many of the recent advances in the culture of container grown plants have been based on the use of large volumes of water and well drained media. The correct amount of water is rarely applied at the proper times for optimum growth. At present, little work has been done to determine the suitability of various media for subirrigation in container grown nursery plants. The objectives of the study were to determine a) the value of subirrigation, b) depth of media to use and c) soil media compaction.

Materials and Methods

The experiment was conducted for 75 days during winter at the Horticulture greenhouse in Athens, Georgia. A subirrigation bud 1.2m wide and 7.5m long was prepared by spreading 2 layers of 4 mil black polyethylene film in greenhouse benches.

A pan holding 2.5 cm of water depth was formed. Forty plants each of azalea and wax myrtle were arrayed, selected and potted in the a) peat, sand soil (1:1:1), b) peat, sand (1:1), c) sand, bark (1:1) and d) perlite, peat (1:1) media and placed on the pan of water at constant level. The containers were clear polyethylene bags of 20 or 30 cm depth. Three holes, each 1 cm in diam were made in the bottom of each plastic bag. The media were uniformly packed and were equal in vol and wt within the same media depth. The sand and Cecil clay loam soil were heated to 70°C for 3 hours to control weed seeds. The min night temp of the greenhouse was 15°C.

Dolomitic limestone (10 mesh) was added at the rate of 5g per liter to each container. Perk, Trace Element Mixture was added at the 1/2 KG per cubic meter of the potting soil. Fifty ml of solution containing 200-86-166 ppm of water soluble N-P-K fertilizer was applied weekly to the surface of the medium of each container.

The first 2 days after being placed in the pan the containers were watered from overhead to establish capillarity. Tap water was used for maintaining the water level.

The experimental design was a 4(media) x 2(depth) x 2(species) factorial in randomized complete block with 5 replications and analyzed using standard methods (3, 14).

The plants were cut at the soil surface after 75 days of growth and total fresh and dry wt of tops and roots, length and number of shoots were recorded. Soil moisture content present at different distances from the water table in each medium was determined by gravimetric method. Soluble salt readings were taken at different media depths by using the RDB 15 Solubridge Soil Tester (Beckman Instrument, Inc.). A corning pH meter, Model 10, was used to determine the media pH. Soil particle size distribution (Table 3) of 4 media was determined by the standard method of Chapman and Pratt (1).

The water desorption (Fig. 1) curves were characterized from the mean value of 3 replications for all media using equipment of Soil Moisture Equipment Co., Santa Barbara, CA. The method followed was that of Richards (12)

Results and Discussion

Plant growth: Azalea plants increased 4.5g in fresh wt in 75 days. Wax myrtle increased 10.0g and 5 shoots in fresh wt in 75 days.

1Received for publication June 1, 1973. This research was part of a thesis submitted to the graduate school, University of Georgia, by the senior author in partial fulfillment of requirements for the M.S. degree.

2Graduate assistant and professor in the Department of Horticulture, respectively.

3Perk, manufactured by Florida Agricultural Supply Co., Division: Wilson & Toomer Fertilizer Co., Jacksonville.
days, while the wax myrtle increased 10.1g (Table 1). Plants were in a dormant condition at the beginning of the experiment. The mean fresh wt of tops of azalea from all 4 media at 20 cm depth was 4.3g and from 30 cm depth was 4.8g. The fresh wt of tops of azalea plants grown in sand and bark was the least of the 4 media. This medium had the largest pore spaces (Table 3), the poorest capillarity and the lowest water content (Fig. 1). The results disagree with the several citations made by McGuire (8), as the irrigation method and particle size of the media varied.

The significantly greatest fresh and dry wt of azalea roots was found in peat and perlite medium at 20 cm depth and in peat and sand media at 30 cm depth (Table 1). The results of earlier work (2, 8) indicated that these media were suitable for many plants.

Azalea plants produced avg 5 shoots with 23 cm in length, while wax myrtle produced avg 4 shoots with 41 cm in length per plant.

The perlite and peat medium had a higher % of water than the other 3 media. The sand and bark held least and the peat and sand; and the peat, sand and soil media held intermediate amounts per unit wt (Fig. 1). Similar results have been presented by Furuta (4) and Waters et al. (17).

The soluble salt concn was greater near the surface of the depth avg 10.5g. The dry wt of tops of azalea and wax myrtle were 31 and 26 percent of the fresh wt, respectively.

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### Table 1. Fresh and dry wt (g) of azalea and wax myrtle tops (shoots) and roots at 2 depths and 4 media after 75 days of subirrigation.

<table>
<thead>
<tr>
<th>Media at 20cm depth</th>
<th>Media at 30cm depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peat sand soil</td>
<td>Peat sand Sand bark Perlite peat</td>
</tr>
<tr>
<td>Peat sand sand bark Perlite peat</td>
<td></td>
</tr>
<tr>
<td>Azalea fresh wt</td>
<td>5.7e 5.1f 11.2d 8.3efg 4.6fg</td>
</tr>
<tr>
<td>Azalea dry wt</td>
<td>7.1f 11.2d 8.3efg 4.6fg</td>
</tr>
<tr>
<td>Wax myrtle fresh wt</td>
<td>10.4c 8.2d 11.9c 15.8a</td>
</tr>
<tr>
<td>Wax myrtle dry wt</td>
<td>11.5g 14.2b 7.7g 19.7a</td>
</tr>
</tbody>
</table>

*Mean separation within fresh or dry wt by Duncan's multiple range test, 5% level.*

Wax myrtle plants at 30 cm depth produced plants of significantly greater wt than the media depth of 20 cm. The significantly greatest top growth occurred in the peat, sand and soil and the peat and perlite at 20 or 30 cm media depth (Table 1). The results are in agreement with those of several previous workers (8). The sand and bark a well drained medium (Table 3) produced plants with significantly less fresh wt. The growth of plants in the peat and sand was intermediate. Wax myrtle tops fresh wt at 20 cm depth in all 4 media avg 9.6g and at 30 cm depth avg 10.5g. The dry wt of tops of azalea and wax myrtle were 31 and 26 percent of the fresh wt, respectively.

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### Table 2. Soluble salts index and media pH as affected by media type sampling depths and media depths after 60 days during capillary watering.

<table>
<thead>
<tr>
<th>Media at 20cm depth</th>
<th>Media at 30cm depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peat sand soil</td>
<td>Peat sand Sand bark Perlite peat</td>
</tr>
<tr>
<td>Peat sand sand bark Perlite peat</td>
<td></td>
</tr>
<tr>
<td>Sampling depth 0.0 - 1.2cm</td>
<td></td>
</tr>
<tr>
<td>0.86 0.32 0.55 0.85</td>
<td></td>
</tr>
<tr>
<td>(6.9) (7.0) (7.5) (7.4)</td>
<td></td>
</tr>
<tr>
<td>1.2 - 2.5cm</td>
<td></td>
</tr>
<tr>
<td>0.27 0.15 0.23 0.25</td>
<td></td>
</tr>
<tr>
<td>(6.5) (7.0) (7.5) (7.2)</td>
<td></td>
</tr>
<tr>
<td>2.5 - 3.7cm</td>
<td></td>
</tr>
<tr>
<td>0.12 0.12 0.05 0.14</td>
<td></td>
</tr>
<tr>
<td>(6.0) (6.5) (7.3) (7.1)</td>
<td></td>
</tr>
<tr>
<td>3.7 - 5.0cm</td>
<td></td>
</tr>
<tr>
<td>0.05 0.05 0.05 0.05</td>
<td></td>
</tr>
<tr>
<td>(5.6) (5.8) (7.1) (6.5)</td>
<td></td>
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</tbody>
</table>

*Conductivity on solubridge at 1:2, soil:water ratio. Dial reading in millimhos. Media pH readings are in parenthesis.*
Crude Oil, Neutral Lipids, Glycolipids, and Phospholipids in Maturing Sweet Corn (Zea mays L.)

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Abstract. Seven mutant maize genotypes with sweet corn backgrounds and 4 commercially grown sweet corn cultivars were harvested from 18-45 days after pollination (DAP). The lipids were extracted with chloroform-methanol 2:1 (v/v) and separated on a silicic acid column into neutral lipids, glycolipids and phospholipids. Mutant genotypes influenced lipid development while inbred lines seemed important in amount of oil synthesized by the kernel. Crude oil and neutral lipids increased from 18-45 DAP while phospholipid and glycolipid values (mg/10 g fresh weight basis) were higher 23-28 DAP which is the prime processing time. During the developmental period studied, neutral lipids, phospholipids and glycolipids amount to 63, 20, and 12% respectively of the crude oil extracted. About 5% of the crude oil was lost in the separation procedure.

Corn is known to differ in both the amount of oil and its fatty acid composition (4, 5, 10) and these differences are considered to be gene-controlled. The genetic control of oil content is suggested by results obtained from long-term mass and recurrent selection done in Illinois and Iowa (3, 9). It was found, for example, that the percentage of oleic acid was lower and linoleic acid higher in the mature kernel and germ of Illinois High Oil (IHO) and Reverse High Oil (RHO). Although a simultaneous reduction was observed in the endosperm size of IHO, this finding was not universal when considering also the high oil selection study conducted by Alexander and Seif (1). The fatty acid composition and the nature of the lipids of the corn germ and endosperm were found to be different (6, 7). Weber, (12, 13) reported that triglycerides constituted 10-17% in the neutral oils. The nature of the lipids in the developing corn kernel. Lipid and oil synthesis in the developing sweet corn kernel. Lipid and neutral lipids increased from 18-45 DAP while phospholipid and glycolipid values (mg/10 g fresh weight basis) were higher 23-28 DAP which is the prime processing time. During the developmental period studied, neutral lipids, phospholipids and glycolipids amount to 63, 20, and 12% respectively of the crude oil extracted. About 5% of the crude oil was lost in the separation procedure.

7Received for publication June 18, 1973. Scientific Article No. A1909, Contribution No. 4828 of the Agriculture Experiment Station, Department of Horticulture.
8Literature Cited