

reduced shrinkage. Shrinkage was a noticeable problem in the larger pots of 100% SMC over the 9 month production period, but not in the smaller pots.

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## INFLUENCE OF pH ON ACTIVITY OF VITERRA® 2 AND EFFECTS ON GROWTH AND SHELF LIFE OF MARANTA AND PILEA<sup>1,2</sup>

CHARLES A. CONOVER AND RICHARD T. POOLE  
IFAS, University of Florida,  
Agricultural Research Center,  
Route 3, Box 580,  
Apopka, FL 32703

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**Abstract.** *Maranta leuconeura kerchoviana* E. Morr. and *Pilea cadierei* Gagnep. & Guillaume were grown with and without soil incorporated Viterra® 2 at 3.2 kg/m<sup>3</sup> at pH levels of 5.5, 6.0 and 6.5. Viterra® 2 improved growth of both species and increased shelf life by approximately 10%. Greatest effect of Viterra® 2 occurred at the lowest pH on *Pilea*, while no interactions occurred on *Maranta*. Increasing pH improved growth and root grade of *Pilea*, but pH had no effect on growth of *Maranta*. Addition of Viterra® 2 increased water content of the potting medium.

Foliage plants often receive minimal care in mass markets and are often observed wilted or in a water saturated condition. Plants with long shelf life (number of days to wilt) are important to retailers and consumers as they are easier to maintain than plants with a short shelf life. Viterra® 2 Hydrogel Soil Amendment increases the water holding capacity of growing media (1, 2) and has been recommended for extending the shelf life of potted plants.

Viterra® 2 is a granular, organic polymer, and when incorporated into the growing medium increases water holding capacity. Media amended with Viterra® 2 increases in volume by 15-25% after thorough watering because Viterra® 2 forms a gel. Almost all of this water is available to the plant.

As foliage plants should be grown at a pH range between 5.5 and 6.5, these experiments were conducted to determine whether Viterra® 2 would be effective in that pH range and beneficial to growth and shelf life of *Maranta* and *Pilea*.

#### Materials and Methods

Two 2x3 factorial experiments in randomized block design were initiated with *Maranta* and *Pilea* on September 19, 1978. Plants were grown with and without Viterra® 2 incorporated at 3.2 kg/m<sup>3</sup> at pH levels of 5.5, 6.0 and 6.5. The initial pH levels of the potting mix were obtained by

incorporation of dolomite at 0, 3.5 and 7.0 kg/m<sup>3</sup>. There were 7 replications and the experimental unit consisted of 1 *Maranta* or *Pilea* 3 to 4 leaf rooted cuttings/15 cm diameter pot. Plants were grown in a glass greenhouse shaded to provide 12 klx maximum light intensity and maintained at 13°C minimum night and 32°C maximum day temperatures. Potting medium was Florida peat and builder's sand (3:1 by volume) amended with 1.2 kg Perk and 4.2 kg Osmocote 14-6-12 (N-P-K)/m<sup>3</sup>. Growth measurements were recorded December 28, 1978. Data included plant height and width in centimeters, root grade [rated on a 1 to 5 scale where 1 = no rooting or dead roots, 3 = 50% coverage of the soil ball and 5 = 100% coverage of the soil ball (with no spaces between roots more than 1 cm)] and plant grade (rated on a scale of 1 to 5 where 1 = poor, not salable, 3 = good, salable and 5 = excellent quality). December 29, 1978 all plants were watered (pots were filled to the rim with water 3 times), drained for 24 hours and then weighed (g). Plants were placed under interior light conditions of 1.25 klx from cool, white fluorescent lamps for 12 hours/day with no watering until wilt occurred. Room temperatures were maintained at 23°C ± 1° with 50% ± 10% relative humidity. Plants were removed as wilt occurred. Plants were considered wilted when there was no wilt recovery after the 12 hour dark period. Wilted plants were weighed (g) and number of days to wilt was recorded.

#### Results and Discussion

Addition of Viterra® 2 to the potting medium slightly improved plant grade and width of *Maranta* and height and root grade of *Pilea* (Table 1). Similar growth improvements in other plants have been attributed to improved water-plant relationships through increased water availability at lower soil tensions (2).

Soil pH had no effect on growth of *Maranta*, but width, plant grade and root grade of *Pilea* were lower at a pH of 5.5 than at 6.0 or 6.5 (Table 1). Such differences may be due to reduced nutrient availability at low pH as has been reported for other crops (3). Interactions of Viterra® 2 and pH occurred on root and plant grades of *Pilea*, with root grade being most severely affected (Table 2). At a pH of 5.5, root and plant grades were higher when Viterra® 2 was incorporated into the potting medium. Improvement in root growth was probably due to improved aeration, since the 3:1 potting medium is low in non capillary pore space and Viterra® 2 increases pore space (2).

Shelf life (number days to wilt) of *Maranta* and *Pilea* was increased by addition of Viterra® 2 to the potting medium (Table 3). However, the benefit of 2 days more

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<sup>2</sup>For English conversions of metric units used in this paper, see the table provided at the beginning of these Proceedings.

Table 1. Influence of Viterra® 2 and pH on growth of *Maranta* and *Pilea* (3 months).

| Treatments                                | <i>Maranta</i>    |               |                            |                             | <i>Pilea</i> |               |                            |                             |
|-------------------------------------------|-------------------|---------------|----------------------------|-----------------------------|--------------|---------------|----------------------------|-----------------------------|
|                                           | Ht.<br>(cm)       | Width<br>(cm) | Root <sup>z</sup><br>Grade | Plant <sup>y</sup><br>Grade | Ht.<br>(cm)  | Width<br>(cm) | Root <sup>z</sup><br>Grade | Plant <sup>y</sup><br>Grade |
| <b>Viterra® 2</b><br>(kg/m <sup>3</sup> ) |                   |               |                            |                             |              |               |                            |                             |
| 0                                         | 20 a <sup>w</sup> | 40 a          | 2.9 a                      | 4.2 a                       | 22 a         | 32 a          | 4.0 a                      | 4.2 a                       |
| 3.2                                       | 21 a              | 45 b          | 3.0 a                      | 4.6 b                       | 24 b         | 33 a          | 4.3 b                      | 4.4 a                       |
| <b>pH<sup>x</sup></b>                     |                   |               |                            |                             |              |               |                            |                             |
| 5.5                                       | 21 a              | 41 a          | 2.8 a                      | 4.4 a                       | 22 a         | 31 a          | 2.7 a                      | 4.0 a                       |
| 6.0                                       | 20 a              | 42 a          | 2.8 a                      | 4.2 a                       | 23 a         | 34 b          | 5.0 b                      | 4.5 b                       |
| 6.5                                       | 21 a              | 45 a          | 3.2 a                      | 4.6 a                       | 23 a         | 33 b          | 4.9 b                      | 4.4 b                       |

<sup>z</sup>1 = no rooting or dead roots, 3 = 50% coverage of soil ball and 5 = 100% coverage of soil ball with white healthy roots.

<sup>y</sup>1 = poor, not salable, 3 = good, salable and 5 = excellent quality.

<sup>x</sup>pH of medium adjusted initially to 5.5, 6.0 and 6.5 by incorporation of 0, 3.5 and 7.0 kg dolomite/m<sup>3</sup>, respectively.

<sup>w</sup>Mean separation between treatments within columns by Duncan's Multiple Range Test, 5% level.

Table 2. Interaction of Viterra® 2 and pH on root and plant grade of *Pilea* (3 months).

| pH <sup>x</sup> | Root grade <sup>z</sup><br>(kg/m <sup>3</sup> ) |       | Plant grade <sup>y</sup><br>(kg/m <sup>3</sup> ) |       |
|-----------------|-------------------------------------------------|-------|--------------------------------------------------|-------|
|                 | 0                                               | 3.2   | 0                                                | 3.2   |
| 5.5             | 2.3 a <sup>w</sup>                              | 3.1 b | 3.6 a                                            | 4.4 b |
| 6.0             | 5.0 c                                           | 4.9 c | 4.7 b                                            | 4.3 b |
| 6.5             | 4.9 c                                           | 4.9 c | 4.3 b                                            | 4.6 b |

<sup>z</sup>1 = no rooting or dead roots, 3 = 50% coverage of soil ball and 5 = 100% coverage of soil ball with white healthy roots.

<sup>y</sup>1 = poor, not salable, 3 = good, salable and 5 = excellent quality.

<sup>x</sup>pH of medium adjusted initially to 5.5, 6.0 and 6.5 by incorporation of 0, 3.5 and 7.0 kg dolomite/m<sup>3</sup>, respectively.

<sup>w</sup>Mean separation by Duncan's Multiple Range Test, 5% level.

after 2 weeks with *Pilea* and 7 days more after 6 weeks with *Maranta* seemed insignificant when compared to the additional cost of \$31.52 per cubic meter for Viterra® 2 amended potting media. Pots containing Viterra® 2 amended soil contained more water (as determined by pot weight) but was of limited benefit as shown by wilting data. Viterra® 2

grown plants were larger, which would account for lack of greater improvement in number of days to wilt.

Influence of soil pH on amount of water contained within pots was variable, but was not related to presence or absence of Viterra® 2 (Table 3). Thus, in these experiments, pH levels between 5.5 and 6.5 did not seem to affect Viterra® 2's ability to retain water.

Viterra® 2 incorporated into potting media used to grow *Maranta* and *Pilea* was beneficial in increasing growth and in improving shelf life; however, the small growth increases and limited shelf life extension compared to cost, makes it doubtful that use of Viterra® 2 can be justified for these crops.

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Table 3. Influence of Viterra® 2 and pH on shelf life of *Maranta* and *Pilea*.

| Treatments                                | <i>Maranta</i>                |                     |                                | <i>Pilea</i>                  |                     |                                |
|-------------------------------------------|-------------------------------|---------------------|--------------------------------|-------------------------------|---------------------|--------------------------------|
|                                           | Wt. pre- <sup>z</sup><br>wilt | No. days<br>to wilt | Wt. post- <sup>y</sup><br>wilt | Wt. pre- <sup>z</sup><br>wilt | No. days<br>to wilt | Wt. post- <sup>y</sup><br>wilt |
| <b>Viterra® 2</b><br>(kg/m <sup>3</sup> ) |                               |                     |                                |                               |                     |                                |
| 0                                         | 1499 a <sup>w</sup>           | 42 a                | 740 a                          | 1421 a                        | 14 a                | 811 a                          |
| 3.2                                       | 1640 b                        | 49 b                | 779 b                          | 1630 b                        | 16 b                | 820 a                          |
| <b>pH<sup>x</sup></b>                     |                               |                     |                                |                               |                     |                                |
| 5.5                                       | 1571 a                        | 46 a                | 757 a                          | 1528 ab                       | 16 b                | 833 b                          |
| 6.0                                       | 1556 a                        | 46 a                | 753 a                          | 1465 a                        | 14 a                | 796 a                          |
| 6.5                                       | 1581 a                        | 44 a                | 767 a                          | 1583 b                        | 15 b                | 819 ab                         |

<sup>z</sup>Weight (g) of both plant and pot after leaching and draining.

<sup>y</sup>Weight (g) of both plant and pot weighed immediately after wilt.

<sup>x</sup>pH of medium adjusted initially to 5.5, 6.0 and 6.5 by incorporation of 0, 3.5 and 7.0 kg dolomite/m<sup>3</sup>, respectively.

<sup>w</sup>Mean separation between treatments within columns by Duncan's Multiple Range Test, 5% level.