Mulching Reduces Water Use of Containerized Plants

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SUMMARY. Colorful baskets of flowering annuals are popular with home gardeners, but these containerized plants require frequent waterings. Mulching of field soils is a proven way to conserve soil moisture. This study was conducted to see if mulching would reduce the need to irrigate containerized plants. Adding either pine bark or sphagnum moss mulch to potted 'Impulse Rose' impatiens (*Impatiens wallerana*) plants reduced the frequency of irrigations when the plants were small and had not yet reached canopy closure. Mulching had no effect on plant height or flowering.

Home gardeners frequently plant flowering annual plants in hanging baskets and containers to provide color in residential landscapes. Despite their popularity, these plantings are highly vulnerable to water stress due to the reduced soil volume and intensified soil temperatures in containers (Brass et al., 1996). In addition, the soilless growth media typically used in containers often make daily watering a necessity (Whitcomb, 1991). Under average outdoor conditions, medium-sized flowering plants in 10-inch (25-cm) hanging baskets may use as much

as 32 fl oz (950 mL) of water daily (Professional Plant Growers Association, 1992).

Impatiens plants are often used in hanging baskets and containers, and they have been the best selling flowering annual in the U.S. for many years (Behe et al., 1999; Professional Plant Growers Association, 1992). To grow and bloom well, impatiens require regular, frequent watering. Although impatiens foliage is relatively tolerant of wilting, water stress can cause impatiens flowers and buds to drop (Argo and Biernbaum, n.d.). The efficacy of various practices to reduce water stress in containerized impatiens, including foliar application of antitranspirants and incorporation of hydrophilic polymers in the growth medium, varies (Blodgett et al., 1995; Hummel, 1990).

Many types of mulches have been shown to be beneficial in reducing the water use of outdoor garden and landscape plants (Ashworth and Harrison, 1983; Robinson, 1988), but the ability of mulches to reduce the water requirements of plants in containers is largely unknown. We conducted this study to determine if applying organic mulch to the surface of the growing medium of containerized impatiens would reduce their water requirements. If effective, this simple practice could be beneficial to individual gardeners, reducing the time required to monitor containers or improving the appearance of their plants.

Materials and methods

EXPERIMENT 1. The experimental design was a randomized complete block design with three treatments and six blocks. The experimental unit was one pot, thus resulting in 18 pots for the experiment. The treatments were control (no mulch), pine bark mulch, and sphagnum moss mulch. The pine bark mulch had particle sizes between 0.2 and 0.4 inch (5 and 10 mm). Seedlings of 'Impulse Rose' impatiens were transplanted, three per pot, into 7.5-inch (19-cm) azalea pots filled with a medium of 55% peat, 30% pumice, and 15% sand (by volume) to within 1 inch (2.5 cm) of the pot rim, leaving space for water application. For the pine bark and sphagnum moss treatments, the space for water application was filled with 0.75 inch (2 cm) of premoistened mulch. Plants were grown in a laboratory at 75 °F (24 °C)

under cool-white fluorescent lamps (75 $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$) for 14 h daily and irrigated with a 20-20-20 (20N-8.8P-16.6K) liquid fertilizer solution [0.06 oz/gal (0.45 g·L⁻¹)] at each irrigation for the duration of the experiment.

Each container (pot, plant, growth medium, and mulch, if present) was weighed daily and irrigated to container capacity when it had lost 60% of its weight at saturation, based on a predetermined average weight at saturation for the pots by treatment. Number of days between irrigations was recorded. Plants filled the containers and were harvested at 5 weeks. Plant height was recorded at harvest. Visual appearance of flowering was also noted at harvest. Treatment means were separated using Duncan's multiple range test.

EXPERIMENTS 2 AND 3. Experiment 1 was repeated with the following changes. Only one seedling was planted per pot. Plants were fertilized with slow-release 14N-6.2P-11.6K fertilizer incorporated into the potting medium at 2 oz/ft³ (2 kg·m⁻³) at planting. Plants were watered with tap water at each irrigation. With only one plant per pot, plants filled the pots and were harvested at 8 or 7 weeks, respectively.

Results and discussion

Mulching was effective in reducing the need for irrigation. The interval between irrigations before canopy closure (when the foliage completely covered the growth medium surface) was significantly lengthened by the application of either the pine bark or sphagnum moss mulches (Table 1). In the first two experiments, the response with sphagnum moss was greater than with pine bark (Table 1). For example, in Expt. 1, plants with sphagnum moss needed to be watered 34% less often than plants without mulch, while plants with pine bark mulch required watering about 20% less often than plants without mulch. In Expt. 3, both mulches were equally effective, with mulched plants requiring watering an average of 13% less often than plants without mulch.

The greatest effect of the mulch on increasing the number of days between waterings was observed before the plants had grown enough to cover the surface of the growing medium. After canopy closure, there was no difference in days between irrigations

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Table 1. Effect of organic mulching treatments on watering requirements before and after canopy closure and on growth of 'Impulse Rose' impatiens.

Treatment	Time between irrigations before closure (d)			Time between irrigations after closure (d)	Ht at harvest (cm)*
	Expt. 1	Expt. 2	Expt. 3	Expt. 3	Expt. 3
Control	6.6 c ^y	6.8 c	4.6 b	3.7 a	14.4 a
Pine bark	8.2 b	7.6 b	5.3 a	3.1 a	15.8 a
Sphagnum moss	9.9 a	8.6 a	5.3 a	3.3 a	14.3 a

*2.54 cm = 1.0 inch.

^yWithin a column, mean separation with Duncan's multiple range test at $P < 0.05$.

(Expt. 3 data are shown as an example). Argo and Biernbaum (1994) showed that intervals between irrigations of easter lilies (*Lilium longiflorum*) could be reduced by using pot covers that served as evaporation barriers.

Plant height was unaffected by the mulch treatments (Table 1; data for Expt. 3 are shown as an example). Before canopy closure, plants with mulch needed fewer waterings, yet grew as well as plants without mulch. In addition, all of the plants in all treatments in all three experiments flowered profusely.

These results indicate that mulching containerized plants may help save water during the early phases of growth for plants that develop a full canopy covering the growing medium, but may not once such plants are fully established. For upright plants that do not produce a dense canopy at the container surface, mulching might be very effective in reducing irrigation frequency before establishment and throughout the growing season. This information could be especially useful for individual consumers and Master Gardeners.

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