

Hanging Basket Performance: Stress Or Success

Increase hanging basket sales by helping your customers maintain beautiful baskets through the summer.

by *BILL ARGO and JOHN BIERNBAUM*

FLOWERING hanging baskets need frequent watering and adequate nutrition to last the summer in good shape. This high level of maintenance may limit consumers' success with these plants and dampen their enthusiasm for buying baskets.

Changing your production practices somewhat can help. The following recommendations for improved performance of flowering hanging baskets are based on 4 years of research inves-

tigating the effects of basket type, root media, water absorbent gels, wetting agents, and fertilizers, as well as interviews with over 25 wholesale and retail hanging basket growers. Detailed information about this project can be found in Bedding Plant Foundation Inc.'s (BPF) reports No. F-061 and F-061A.

Basket Selection

The first step to better performance is basket selection.

Choose larger baskets (10- or 12-inch). An 8-inch basket holds about

45% and a 6-inch basket only 15% of the root media contained in a 10-inch basket. Less root media means less available water and increased maintenance for summer plant survival.

We found similar volumes (about 1.3 gallons) in 8 out of 10 different styles of 10-inch baskets, regardless of the type of reservoir.

Root Media Selection

Root media should have enough aeration so newly transplanted plugs or cuttings are not overwatered in February, and it should also provide enough

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water-holding capacity so mature baskets can go several days between waterings in August.

While aeration of root media has typically been growers' first concern, improving available water-holding capacity (AWHC) and rewettability is the key to better garden performance.

The AWHC is the amount of water held in the root media that is available to the plant from the time between a normal irrigation and wilt.

To determine the AWHC, use a scale with a 10-pound capacity and hanging baskets ready for sale. Impatiens and New Guinea impatiens work best because their foliage is remarkably tolerant of wilting.

Allow 3-5 baskets to dry until they wilt, then weigh each to get the wilted weight. Next, water them as a consumer probably would (with a hose and breaker) until some drainage occurs. After baskets have stopped draining, weigh each again to get the watered weight.

The difference between the wilted and watered weights is the AWHC. (1000 grams of water weight = 1 liter of water; or 1 ounce of water weight = about 1 fluid ounce of water.) Take the average weight of several baskets to determine the AWHC of your media.

The AWHC cannot be predicted from peat type, components, or amendments used in media. However, avoid polystyrene, which decreases the AWHC.

We recommend that root media in a 10-inch basket have a minimum AWHC of 60-64 fluid ounces of water for good garden performance. A saleable-size plant in a 10-inch basket will use 16-32 fluid ounces of water per day. With a 64-fluid-ounce AWHC, then, the plant should go 2-4 days between waterings.

We found, in very limited cases, that the way in which water in the media is released back to the plant also affects time between waterings. For example, two peat-perlite-vermiculite mixes differed by 16 fluid ounces AWHC, yet each went an average of 4.7 days between irrigations over 2 months. Further research needs to be done in this area.

Media Rewetting

Rewettability measures how efficiently water is absorbed by dry media. A high AWHC does not guarantee rapid water absorption when the medium is dry. As with AWHC, rewetting cannot be predicted from media components.

A wetting agent is added to most commercial growing mixes to increase rewetting ability. To maintain uniform rewetting of growing media, it may be necessary to reapply wetting agents monthly during production or at shipping. We applied Aquagro 2000 and found that it was beneficial for some root media but not others.

The need for additional wetting agent should be determined by the following test:

Weigh several baskets with dry root media and wilted plants. Water until the first signs of leaching. After drainage stops, weigh the baskets again. Then water the baskets 2-3 times within 30 minutes and weigh each a third time. A wetting agent or a better medium is



New Guinea impatiens grown in media containing an experimental resin-coated fertilizer (RCF) material from Osmocote/Sierra at three incorporation rates compared to the application of water-soluble fertilizer every 2 weeks after production (left) and no additional fertilizer applied after production (right). For the RCF treatment, no additional fertilizer was applied after planting.

needed if the increase in the amount of water held after multiple waterings is 25% greater than the weight after a single irrigation.

Formula For Calculating Incorporation Rate And Cost Of RCF

(RCF = Resin-Coated Fertilizer)

You must know:

- The number of 10-inch baskets filled per cubic yard of media
- The cost of the RCF per pound
- The % N of the RCF

A. To calculate grams of RCF per basket from grams N per basket:

$$\frac{(\text{desired grams N /basket})}{(\% \text{ N of RCF})} \times 100 = \text{grams of RCF/basket}$$

Example:

$$\frac{(6 \text{ grams N/basket})}{(17\% \text{ N})} \times 100 = 35 \text{ grams of RCF/basket}$$

(If top dressing, 18 grams fertilizer is about 1 tablespoon.)

B. To calculate rates of RCF in pounds per cubic yard of media from grams RCF per basket:

(grams RCF/basket) x (number of baskets filled/cubic yard) x 0.0022 = pounds/cubic yard

Example

$$(35 \text{ grams/basket}) \times (162 \text{ baskets/cubic yard}) \times 0.0022 = 12.5 \text{ pounds/cubic yard}$$

C. To convert from pounds RCF per cubic yard to grams N per basket:

$$\frac{(\text{desired pounds RCF/cubic yard})}{(\text{number of baskets filled/cubic yard})} \times (\% \text{ N of RCF}) \times 4.54 = \text{grams N/basket}$$

Example:

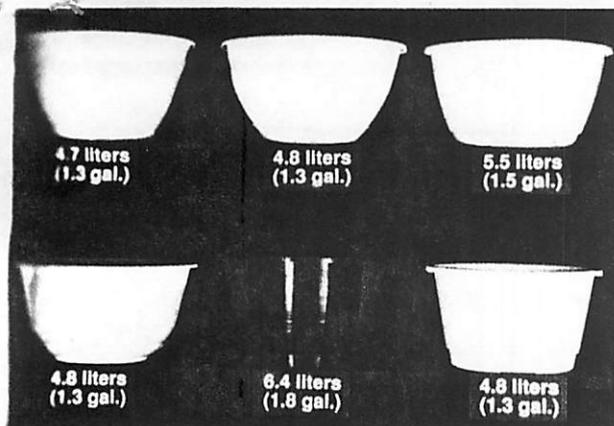
$$\frac{(12.5 \text{ pounds RCF/cubic yard})}{(162 \text{ baskets filled/cubic yard})} \times (17\% \text{ N}) \times 4.54 = 6 \text{ grams N/basket}$$

D. To calculate cost of RCF per basket:

$$\frac{(\text{incorporated pounds RCF/cubic yard})}{(\text{number of baskets filled/cubic yard})} \times (\$/\text{pound of RCF}) = \text{cost per basket}$$

Example:

$$\frac{(12.5 \text{ pounds/cubic yard})}{(162 \text{ baskets filled /cubic yard})} \times (\$1/\text{pound of RCF}) = 8\text{¢/basket}$$



The measured volume of six 10-inch basket styles used in MSU's research.

- Maintain fertility levels. Media with high AWHC do not require additional fertilizer. But because these media go longer between irrigations, it is more important not to miss a fertilization, especially early in production. It's also important

to soil test on a regular basis.

All of these methods may not be practical due to scheduling and labor concerns, but consider each. Extra effort at the start makes watering easier at the end when time is short.

Water-Soluble Fertilizer

In root media containing a preplant nutrient charge (.25 pounds available N/yd³) and an initial nutrient concentration of 100-200 ppm nitrogen and potassium with a saturated media ex-

Water Absorbent Gels

Gels are marketed to increase AWHC and extend watering intervals. We found, however, that adding Supersorb C super absorbent gel did not increase AWHC. We concluded that with a single irrigation the gel would not absorb water fast enough to affect AWHC. Gels need more time or multiple irrigations to rehydrate completely.

The gel we used increased days between watering by 25% (1 day) under average conditions over 2 months. But, under conditions of high water loss, it had no effect on the time to wilt.

The amount of water a super absorbent gel can absorb is reduced by increasing concentrations of fertilizer salts, especially calcium and magnesium salts. Water quality, fertilizer type and concentration, and irrigation frequency affect hydration and may explain why some growers see benefits from gels while others do not.

Special Care Tips

For high AWHC media, production management strategies can help prevent problems from overwatering early in production.

- Transplant larger plant material that has a more developed root system.

- Control watering during the first weeks after transplanting - especially for slow-starters such as New Guinea impatiens or Nonstop begonias. For example, keep baskets on a bench or floor so water can be applied as needed.

- Water by weighing: Don't water until a basket reaches a target weight based on the AWHC of the media - say, when 60%-70% of AWHC has been used by the plant.

- Reduce the effect of the reservoir by removing external saucers for production. Remember to reattach them before shipping. With saucerless baskets, choose an insert without a capillary column so the media doesn't come into contact with water in the reservoir.

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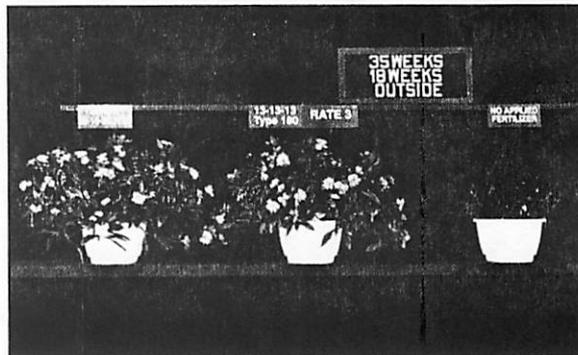
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New Guinea *impatiens* grown in media containing Nutricote 13-13-13 at an incorporation rate of 15 lbs./yd³ (5.5 grams N/basket) compared to the application of water-soluble fertilizer every 2 weeks after production (left), or no additional fertilizer applied after production (right). For the RCF treatment, no additional fertilizer was applied after planting.



tract, an additional 1.5 grams N from a balanced water-soluble fertilizer is sufficient to finish a hanging basket in 12 weeks if there is little or no leaching. This is equivalent to the application of 6 quarts of a 250 ppm N fertilizer solution. More fertilizer is needed

if leaching occurs.

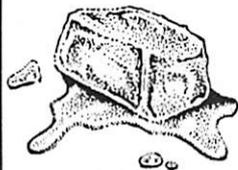
For soil testing, we recommend the following electrical conductivity (EC) levels for all species. For an SME (saturated media extract) test, maintain a root zone EC between

1.3 and 2.5 mS/cm. Maintain EC between 0.5 and 1.0 mS/cm for a 1:2 (volume:volume) media to water test.

After production, 5-6 grams of N are required to maintain growth and flowering of hanging basket plants for about 20 weeks outside. This corresponds to 64 fluid ounces of 300 ppm N fertilizer solution applied every 2 weeks for 20 weeks with some leaching.

A teaspoon of 20% N water-soluble fertilizer dissolved in 1 gallon of water will supply about 300 ppm N. Since most media in a 10-inch basket will absorb about 64 fluid ounces of water at each irrigation, it is sufficient to apply the fertilizer as a normal irrigation once every 2 weeks. This recommendation worked for all six species we tested.

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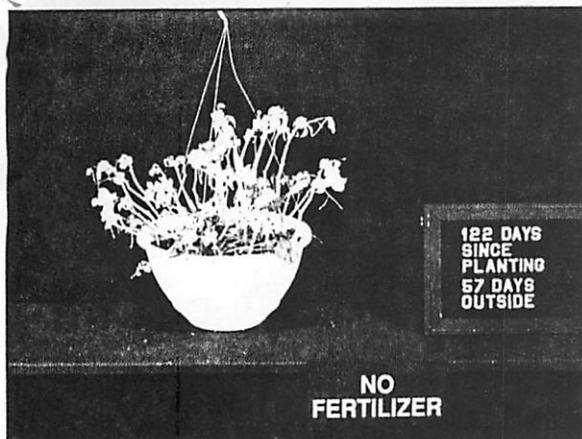
Rather than depend on the consumer to fertilize the basket during the summer, you could use resin coated fertilizer (RCF) to maintain fertility levels. We tested the following two application methods.

1. Incorporation prior to planting. We recommend incorporating 6-7 grams N of an 8- to 9-month material (>180 days) per 10-inch basket for summer-long quality similar to that obtained from applying water-soluble fertilizer regularly.

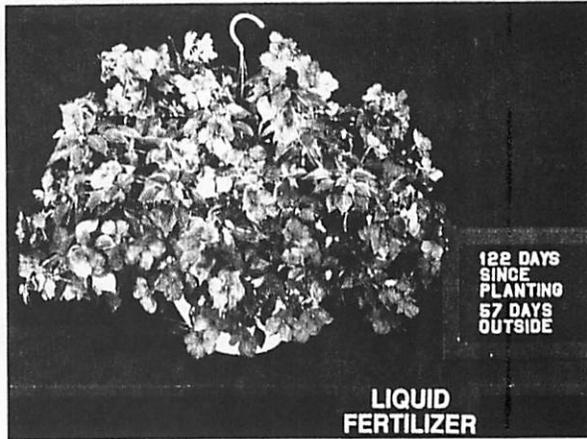
Plant quality decreases if the amount of N applied from the RCF is decreased, but it is still better than if no fertilizer was applied at all.

The weight of fertilizer necessary for this incorporation rate depends on the percent N in the RCF. The higher the percent N, the less fertilizer required. If a shorter-term release material is used, decrease the incorporation rate accordingly. For example, RCF with 13% N requires 19 pounds per cubic yard, while RCF with 18% N requires 14 pounds per cubic yard for a similar incorporation rate of 7 grams per basket (see sidebar to calculate incorporation rates).

If RCF is to be of long-term benefit



Here's what a basket looks like after 7 weeks if no additional fertilizer is applied after production.



Here's the difference applying fertilizer every 2 weeks as a normal irrigation can make.

to the consumer, it should have a release rate of at least 6 months. An important difference between the two major RCF materials, Osmocote/Sierra and Nutricote, is initial release rate.

Osmocote/Sierra materials have a designed initial release of fertilizer salts, due to imperfections in the resin coat of some of the prills. This can be detrimental to fertilizer-sensitive crops unless baskets are leached in production.

Nutricote materials exhibit no high

initial release, but some materials decreased growth of fertilizer-sensitive crops later in production because of high soluble salts at the rates incorporated. Only the 13-13-13 (180-day) material incorporated at 5.5 grams N per 10-inch basket (15 pounds per cubic yard) produced and maintained all species well throughout the summer.

Because temperature largely controls the release rate of fertilizer salts in RCFs, high greenhouse temperatures

in April-May can cause a high release rate detrimental to the basket crop.

We found, however, that by irrigating when air temperature is peaking rather than early in the day, as is customary, desirable root media temperature can be maintained. Any plant stress resulting from the cold water should not be a problem since growers are trying to control rather than maximize plant growth at this stage.

Using RCF under conditions of no

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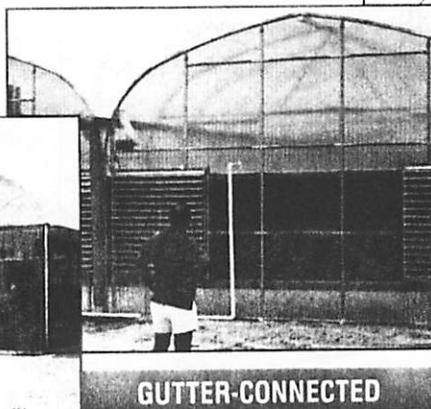
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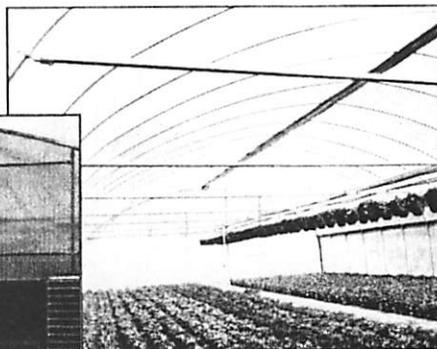
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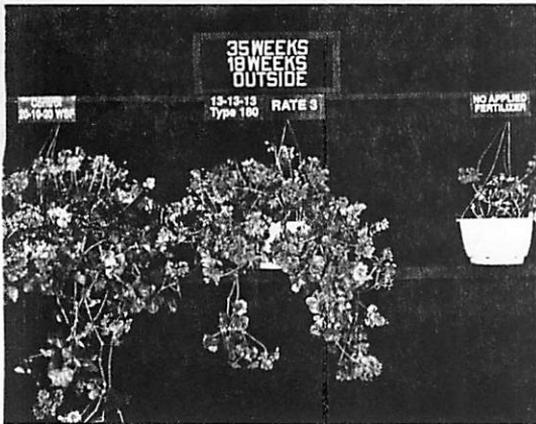


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Ivy geraniums grown in media containing Nutricote 13-13-13 at an incorporation rate of 15 lbs./yd³ (5.5 grams N/basket) compared to the application of water-soluble fertilizer every 2 weeks after production (left), or no additional fertilizer applied after production (right). For the RCF treatment, no additional fertilizer was applied after planting.

leaching typically did not require additional applications of water-soluble fertilizer to be made during produc-

tion. Instead, high levels of soluble salts were often present. As with any fertility program, soil test regularly to determine whether to leach, apply more fertilizer, or irrigate.

2. *Top dressing RCF.* Another way to apply RCF is for the wholesaler to top dress it just prior to shipping or the retailer to do so at the time of purchase. A high initial release of soluble salts at this time is not harmful because of plant size and leaching that is generally occurring.

A shorter-term release rate material can be used. The rate should be 3-5 grams N. A tablespoon of RCF containing 17% N (about 18 grams containing 3 grams N) per basket will maintain fertility through most of the summer. Some liquid fertilizer may be necessary in late summer and early fall to sustain new growth.

A 2-tablespoon rate (36 grams with 17%, or 5 grams, N) should sustain plants through the summer. As with incorporation of RCF, the higher the percent N, the less material needed.

Growers typically cite cost of RCF as a concern. RCF costing \$1 per pound and containing 17% N incorporated at a rate of 6-7 grams N will add 8¢-9¢ to the production cost of a basket.

Consumer Education

Educating consumers about proper watering and fertilization will decrease plant stress and increase consumers' success with hanging baskets.

Tell them to water baskets until drainage occurs. After watering, the baskets should be heavy (5-7 pounds), since 64 ounces of water weigh about 4 pounds. If the basket is still light, they should water it several more times about 5 minutes apart or dip it into a bucket of water for 10 minutes. A well-watered basket should go 2-4 days between waterings.

Consumers also must get the facts on fertilizing baskets through the summer. They need adequate plant care instructions that include fertilization techniques to ensure they care for their baskets properly. Watering is not the only problem. Many consumers do not know hanging baskets require fertilizer during the summer. **GG**

About the authors: Bill Argo is a graduate research assistant and John Biernbaum is associate professor of horticulture at Michigan State University. This research was funded by the Western Michigan Bedding Plant Association; the Bedding Plant Foundation, Inc.; the American Floral Endowment; Grace Sierra; Planteo, Inc.; Partek, Inc.; and hanging basket producers throughout Michigan.

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