



RESEARCH NEWSLETTER



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Producing Potted Dahlias and Review of Cornell 2010 Dalia Growth Regulator Trials

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Dahlias are a diverse and popular class of plants grown for summer flowers in beds or containers. Cultivars are available in a wide range of plant heights, colors, and flower forms to suit almost every need.

Dahlias can be grown from vegetatively propagated plugs (liners or young plants), from seed, or from dormant tuberous roots. The latter is the most common way of producing larger plants for pot plant use whereas seed or vegetative material is more commonly used for small pot (4") or bedding plant use. This article will focus mostly on forcing from tubers and is adapted from the Dahlia chapter of the Holland Bulb Forcers Guide.

Dahlia tuberous roots are field-grown, and many are imported from Holland. The roots are not winter hardy below about zone 7-8, and so must be lifted each year. A typical yearly cycle involves planting a vegetatively propagated rooted cutting (derived from late winter-propagation from stored roots) in the late spring, followed by summer growth in the field. Tuber growth is a photoperiodic response, and is stimulated by short days. A saleable tuber results in one growing season from a rooted cutting. Lifting (in Holland) occurs in October/November, then roots are stored at ca. 5-9C through the winter. Export can occur at any time. Roots must not be allowed to freeze at any time.

Roots are planted in a minimum 6" pot, with one root per pot. More can be planted in larger pots for a spectacular display. The crown and its buds should be set just slightly above the soil surface with enough space above the soil level for application of PGR drenches. A well-drained, high quality potting mix should be used.



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Water in well, and keep soil moist but not soaking wet. Depending on your fertilizer program and watering technique, a weekly leaching may be necessary to avoid buildup of soluble salts.

Dahlias require medium to high light levels (full sun in the north). Low light levels stretch plants and cause weak growth. For northern growers, it is recommend to begin shading only after the end of April. Since tuberous root growth is stimulated by short days, Dahlia growth is strongly accelerated as daylength increases in the spring (since short days stimulate tuber growth, less energy is available for plant growth under short days; with long days, the opposite is true).

Dahlias are normally forced at moderate temperatures of 63-65F nights. Based on studies with vegetatively produced rooted cuttings, dahlias are responsive to negative DIF, with plant height decreasing as night temperatures increase relative to day temperature. Cooler temperatures (24 hour average temperature) reduce the rate of plant growth and lengthen crop time. Shoot length and flower size, however, are promoted by growth in cooler temperatures.

Pinching has been another concern. It is recommended to pinch tuber-grown dahlias under certain, specific circumstances. If there is a single shoot, it should be pinched. If there is 1 strong and 1 weak shoot, then the strong shoot should be pinched. With two or three strong, uniform shoots, no pinching is needed. Pinching is done after the 3rd or 4th pair of leaves has emerged. Pinching delays flowering by 5-10 days and resulting plants are slightly taller than non-pinched plants. In no case should more than three shoots develop from a crown, excess shoots should be

removed. Given the complexity of these instructions and the variability of shoot numbers per root, pinching takes a skilled person, and requires attention to detail.

For approximate timing purposes, the following guidelines can be used to predict the length of time to flowering of tuberous dahlias:

Bud diameter	Days to force
1/2"	14 days
5/8"	10 days
3/4"	7 days
1"	4 days

Continuous fertilization is required. A variety of approaches including topdressing (14-14-14) and/or liquid feed (ca. 200 ppm N) are appropriate once shoot growth is visible.

Growth Regulation

Growth regulation has been a major concern for potted dahlia production. Soil drenches are the classical method for height control, with the chemical used and rate depending on the cultivar. In general, soil drenches 10-14 days after planting are required. Later drenches may not be as effective, so close watch is needed. For many years, A-Rest (ancymidol) was the standard Dahlia PGR, with drench rates of 0.5 to 2 mg/pot being used, depending on the cultivar. Rates appropriate to some 20-25 cultivars can be found in the Holland Bulb Forcers Guide. While effective, the main concern with A-Rest is cost. The price of A-Rest is 17-25 cents per milligram, depending on quantity purchased. Thus, per pot, one might be using as much as \$0.50 of A-Rest!

At North Carolina State, researchers have evaluated other PGRs for use on Dahlias, including Sumagic, Bonzi and Topflor. Using 'Red Pygmy' (a dwarf cultivar), they found that very short plants (estimate less than 6-7" above the pot rim) were produced with 0.5 to 1 mg A-Rest, which is the recommended rate in the Forcer's Guide. With Bonzi, visually appealing plants were produced with 1 to 2 mg drenches. With Sumagic, nice looking plants resulted from drenches of 0.125 to 0.25 mg per pot.

With 'Golden Emblem' (a taller, more vigorous cultivar), A-Rest rates of 0.75 to 1.5 mg/pot were needed. Bonzi required at least 2 mg, more likely 4 mg/pot, and Sumagic in the approximate range of 0.5 mg/pot. Overall, 'Golden Emblem' was less responsive to PGRs than 'Red Pygmy'.

Somewhat less information is available for Topflor. Using 'Ellen Houston' the NCSU group found that 1 to 2 mg/pot Topflor to be a good starting range for grower trialing, at least in the southeast. Probably, somewhat less is needed in the north.

The Holland Bulb Forcer's Guide mentions using A-Rest foliar sprays (at 66 ppm!) on varieties that do not require growth control by drenching. While effective, this is a prohibitively costly treatment. Research on spray applications of the newer PGRs is not available, but it seems likely that between Sumagic, Bonzi and Topflor possibilities for spray usage could be found. This will require further research.

2010 Cornell Dahlia PGR Trials

Introduction: Most Dahia growth regulator recommendations are based on A-Rest. Initial studies indicated that Bonzi and Topflor offer much better growth control at a lower cost, but there is a general lack of information concerning their use. This work was conducted to highlight the potential for use of these products on Dahlias grown in larger ("nursery") containers.

What we did: Bare root dahlias (see list below) were planted on 21 May 2010 into "3-quart gallon" black nursery pots, using Lambert LM11 mix and were grown in a 72 F day greenhouse (60 F nights), although temperatures frequently exceeded these set points. On 4 June, pots were drenched (180 ml/pot) with the treatments listed below. Water was withheld from the pots for 4 days after the drenches. There were 5 plants per treatment and 5 treatments: Control (drenched with water), 1 and 2 mg/pot of Bonzi and 1 and 2 mg/pot Topflor.

Cultivars. There were 6 cultivars, with a range of growth and vigor characteristics:

Heatwave	Tall, vigorous
Munchen	Compact
Settler's Pride	Intermediate
Oriental Dream	Intermediate
Karma Fuchsiana	Tall, vigorous
Kelvin Floodlight	Tall, vigorous

Results

As an initial experiment, we learned quite a lot about Dahlias (and realize we have a lot more to learn!). Plants generally grew well, but by the end of the experiment several had succumbed to various root rots. Also, plants were variable, but as pointed out above, this



was to be expected. The experiment was started quite late in the season, with planting on 21 May. Plants were held in the greenhouse throughout the crop. Quality would probably have been better if started earlier, or grown in a covered, open side structure.

When given as media drenches, both Bonzi and Topflor were very effective as growth regulators, but at the same rates, Topflor was *much* more powerful than Bonzi. The effect was seen in total plant dwarfing, but also with delayed flowering. One can see in the photos some extreme effects from the Topflor, especially. (Unfortunately, some of the photos were taken late, but the overall plant size is still apparent).

Rates will vary by cultivar, but it seems likely that Topflor rates (in northern climates similar to Ithaca NY) will be in the 0.5-1 mg/pot range, depending on cultivar. For example, 'Oriental Dream' was quite nice with 1 mg/pot Topflor, whereas most other cultivars will need less. Under similar conditions, Bonzi rates would probably be in the 1-2 mg/pot. Interestingly enough, these are very similar rates as we see for pot tulips. It is clear either of these materials will prove effective for dahlia growers and allow production of more compact plants that should be more attractive and better withstand shipping stress.

A second set of studies (with Topflor only) is currently underway at Cornell. We are using reduced rates to 0.25, 0.5, 0.75 and 1 mg/pot, and are growing plants semi-outdoors (an open side plastic house). Results will be forthcoming.

Effects of Bonzi or Topflor drenches on growth and final height of several Dahlia cultivars grown from bare roots Planted 21 May, drenched 4 June.

Cultivar	Treatment	Total plant height (cm)	Foliage height (cm)	Flower stem length (cm)
Heatwave	Control	54.6	45.7	14.0
	1 mg Bonzi drench	50.7	32.0	19.7
	2 mg Bonzi Drench	41.7	30.0	17.0
	1 mg Topflor drench	25.4	19.7	7.3
	2 mg Topflor Drench	21.9	15.0	9.3
Karma Fuchsi-ana	Control	66.7	51.3	23.3
	1 mg Bonzi drench	58.7	36.0	26.7
	2 mg Bonzi Drench	55.3	43.0	15.5
	1 mg Topflor drench	29.1	20.5	11.3
	2 mg Topflor Drench	30.5	16.5	18.5
Munchen	Control	32.5	15.8	16.3
	1 mg Bonzi drench	30.6	15.0	16.3
	2 mg Bonzi Drench	22.1	9.3	17.0
	1 mg Topflor drench	14.0	4.5	17.0
	2 mg Topflor Drench	13.8	5.0	15.0
Oriental Dream	Control	47.0	39.5	13.0
	1 mg Bonzi drench	38.2	31.3	10.5
	2 mg Bonzi Drench	32.3	18.7	15.0
	1 mg Topflor drench	26.9	22.3	8.8
	2 mg Topflor Drench	25.8	17.8	11.3
Settler's Pride	Control	54.2	51.0	10.0
	1 mg Bonzi drench	47.3	43.0	7.0
	2 mg Bonzi Drench	---	---	---
	1 mg Topflor drench	25.4	22.5	8.5
	2 mg Topflor Drench	28.0	20.0	11.0

Total plant height is height from pot rim to the tallest part of the plant (usually the flower). Foliage height is from pot rim to the top of the leaves. Flower stem length is the length of the stem from the flower down to its point of attachment to the main plant.



Dahlia Heatwave. L to R: Control, 1, 2, mg/pot Bonzi drench, 1, 2 mg/pot Topflor drench. Experiment 2010-D1.



Dahlia Munchen. L to R: Control, 1, 2, mg/pot Bonzi drench, 1, 2 mg/pot Topflor drench. Experiment 2010-D1. Image 0898.



Dahlia Karma Fuchiana. L to R: Control, 1, 2, mg/pot Bonzi drench, 1, 2 mg/pot Topflor drench. Experiment 2010-D1. Image 0943.



Dahlia Oriental Dream. L to R: Control, 1, 2, mg/pot Bonzi drench, 1, 2 mg/pot Topflor drench. Experiment 2010-D1. Image 0876.



Dahlia Kelvin Floodlight. L to R: Control, 1, 2, mg/pot Bonzi drench, 1, 2 mg/pot Topflor drench. Experiment 2010-D1. Image 0954.



Dahlia Settler's Pride. L to R: Control, 1, 2, mg/pot Bonzi drench, 1, 2 mg/pot Topflor drench. Experiment 2010-D1. Image 0887.