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RESEARCH NEWSLETTER

This Flower Bulb Research Program Newsletter is published by the Royal Dutch Wholesalers Association for Flowerbulbs and Nurserysto in cooperation with Dr. Bill Miller of Cornell University.

Bill Miller presents research update in Lisse

On 10 June, Bill Miller from Cornell University and Ernst van den Ende and Henk Gude from the PPO gave a morning research update to approximately 25-30 members of Group 1 companies at de Nachtegaal.

The group 1 research program has been active at Cornell University since late 1998, and this was an excellent opportunity to bring Group 1 members up-to-date on some of the major findings and directions of the work. Comprehensive descriptions of this work have been distributed to Group 1 companies by compact disc (CD), and the information is also available on the Bond's web site.

Topics covered in the talk included the effects of gibberellin 4+7 on lily leaf senescence, and flower longevity. Certain gibberellins are very effective in inhibiting leaf yellowing and browning, and they are also great for increasing lifespan of lily flowers. A new product, Fascination, is not available in the US and Canada, and is labeled and legal to use on pot lilies (especially oriental hybrids). Dr. Anil Ranwala of the program is continuing to look into possible uses of Fascination for cut lilies.

Miller also spoke about the Ph.D. work of Alex Chang looking into "leaf scorch", "bladverblonting", or "Upper Leaf Necrosis". Alex has very nicely shown that this is a calcium deficiency problem that is caused by very low levels of calcium in the bulbs (when harvested), as well ass "leaf overlapping" during early shoot growth. When the leaves are overlapped, water cannot be lost, and calcium is not moved into the young leaves. Alex's work has indicated that a very effective means of preventing upper leaf necrosis, even with large bulbs, is to blow air down onto the plant. Sufficient airflow to cause the upper leaves to gently move is enough. This leaf movement helps the young leaves draw water (and calcium) into them, and thereby reduces the problem.

Other topics touched upon include the use of growth regulators on pot hybrid lilies. The research program has developed great information on the use of Bonzi or Sumagic dips (before planting) for height control in a wide range of lily cultivars. Again, full details have been already given in the CD. Also, lily growth regulation is the topic of the first Research Newsletter, which should be available very soon. An update on Garry Legnani's work on low oxygen storage to reduce sprouting of dry sale lilies was also given.

A few comments on landscape perennializing by tulips, daffodils, hyacinths and special bulbs were made. This project is nearing completion, as this was the 4th flowering season in the three sites (Ithaca, Long Island, and Clemson, SC). The bottom line is that daffodils, as expected, were the best perennials. What was interesting is that a number of cultivars were really excellent in all three sites, and quite a few were not so good in all three sites. Thus, there is some consistency, and we should be able to recommend, based on real data, which are the overall best cultivars. Tulips did not fare as well, and were quite poor overall.

Hyacinths were, on balance, much better than the tulips, and the special bulbs wre very variable, depending on species.

Finally, come indications of new tulip evaluation, and growth regulator use were made, as well as the potential for using growth regulators on Tete-a-Tete narcissus….not for reducing height of the plants in the greenhouse, but to keep plants more compact in the marketing and consumer chain (even Tete-a-Tete gets very tall and floppy in the consumer's home).

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Growth Regulation for Potted Hybrid Lilies

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Introduction.

Worldwide, lilies are mainly grown as a cut flower crop. Hybrid lilies are a highly diverse group of plants that can be forced for holiday or year round sales. The vast majority of the world's breeding effort, centered in Holland, is for cut flower types. While the cultivar choices available for pot plant growers are increasing, there is substantial interest in the concept of tailoring cut flower varieties into pot plants. For forcers, the major advantages of pot hybrid lilies are the relative ease of production, high crop value per square meter, an ever-increasing variety selection, better height control possibilities (including both genetic and chemical growth regulation), excellent value for the consumer, and, in the case of Asiatic hybrids, a reasonably low greenhouse temperature requirement.

Hybrid Kinds and Cultivars.

Oriental hybrids are known for their fragrance, large, lush flowers (mainly in pink, white, red and many combinations) and their relatively long crop cycle (90-110 days) and warm growing temperature. The most commonly grown pot orientals are 'Star Gazer' and 'Mona Lisa'. Asiatic hybrids typically have little or no fragrance, smaller flowers and leaves, and come in nearly any color except blue and black. They have a much shorter cropping time than orientals (often as short as 7 weeks) and are best forced under cool temperatures. LA's are interspecific hybrids of the Easter lily and Asiatic hybrid cultivars. They combine good characteristic of each group, and typically have excellent foliage, large, prominent buds, and a medium-length crop cycle. Colors are mainly pastel pink, red, and yellow, but brighter colors are increasingly available.

Our Research.

Since 1998, our group's research at Cornell has been generously supported by the Netherlands' bulb export industry. One of our objectives has been to develop guidelines for increasing the array of lilies that could be adapted to pot culture. Since excessive height is an issue, we are conducting extensive trials with pre-plant bulb dips into two commonly used growth retardants, Bonzi (paclobutrazole) and Sumagic (uniconazole). Typically, our experiments are started in early spring (February or March). Bulbs are dipped for 1 minute into a range of concentrations of Bonzi or Sumagic to determine dose response of the cultivars we are using. Plants are planted into 15 cm pots, in MetroMix 360, and grown with a greenhouse temperature of 17C (night temperature, days are usually warmer, especially as the crop grows).

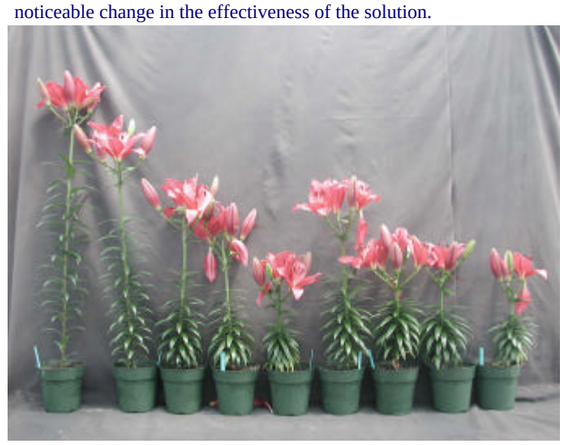
Making Use of Growth Regulator Bulb dips.

Excellent and sometimes startling effective height control is obtained by dipping bulbs into Bonzi or Sumagic solutions prior to planting. As mentioned above, we typically use a 1 minute dip. There is very little additional height reduction when 5 minute dips are used. We do, however, recommend that growers be consistent and keep to a single protocol, within 1 to 5 minutes.

Optimum dip rates vary by cultivar, bulb size, and growth regulator product used. Cultivar variability is a difficulty with PGR dips, and each cultivar needs to be tested individually. In general, larger bulbs need higher concentrations than smaller bulbs, mainly due to the more vigorous and larger plants that develop from larger bulbs. Orientals require somewhat higher dip rates than LA's; Asiatics require the least of all, and in many cases Asiatics are "hyper sensitive" to dips.

We recommend thinking of bulb dips as the tool to provide 60-80% of needed height control. We commonly see the effects of a dip "wearing off" in the last few weeks of crop growth. In cultivars such as 'Fangio' or 'Tresor', this leads to substantial stretching of the "neck" (see photos). Thus, be prepared for a late season foliar spray of Ancymidol (A-Rest) or Sumagic to control this stretch.

Of course, economics must be considered. The key to cost effectiveness is how many times a dip solution can be used. We have evaluated this, and our recent work indicates that if a Bonzi or Sumagic solution is used up to 15 times within a short time period, there is no noticeable change in the effectiveness of the solution.



Effect of pre-plant bulb dips on size 14/16 'Fangio' LA-hybrid lily. Treatments are (L to R): Control, Bonzi at 50, 100, 200, or 300 ppm, and Sumagic at 2.5, 5, 7.5 or 10 ppm given as a 1 minute dip.

This, of course, has important consequences for the cost of bulb dips, and makes them very economically attractive. We would generally caution to not use “old” solutions, or ones kept in light. Our previous research indicates that 5 to 7 day old, used solution is less effective than freshly prepared solution.

What concentration to use for your cultivars? In Table 1, we have listed suggested starting points for the main classes of lily. The second table (Table 2) provides a more detailed breakdown of more than 20 cultivars, based on ongoing research at Cornell. The photos that follow show a variety of cultivars, and their appearance at flowering.

Effect of pre-plant bulb dips on size 16/18 ‘Helvetia’ Oriental hybrid lily. Treatments are (L to R): Control, Bonzi at 50, 100, 200, or 300 ppm, and Sumagic at 2.5, 5, 7.5 or 10 ppm given as a 1 minute dip.

Other Height Control Methods.

Soil drenches. While soil drenches are often effective, they are used less commonly than pre-plant dips. One reason is the unevenness of rooting in hybrid lilies, especially oriental hybrids, where roots only develop after plants are at least 15-20 cm tall. Drenches simply cannot be absorbed in the absence of roots.

Sprays. While much of the height control requirement can be met through dips, sprays can also be a critical component of height management in pot lilies, especially to control late-crop stretch as the dip begins to wear off. A-Rest (Ancymidol) is broadly effective at 33 ppm, and Sumagic at rates of 2-5 ppm. Sumagic is becoming more commonly used, due to reduced cost per plant. It is critical to spray so that the crop is evenly covered with a volume of 2 qts/100 sq. ft. Using a uniform spray volumes assures even coverage of the crop. Although Sumagic is absorbed only by stems and roots, it is important to spray *the crop*, rather than the stems *per se*.

Additional tips.

Precooling. Most Asiatic hybrids are precooled at least 6 weeks at 34-36F. Orientals and LA’s are cooled 8-10 weeks at 34-35F. Additional time at these temperatures can be used for short-term holding. For later plantings (past January), bulbs are frozen-in at 28-29F (Asiatics and LA’s) or 30-31F (Orientals). Usually, the freezing process is done by the bulb supplier, and periodic shipments to the forcer are arranged.

Bulb Arrival, Planting and Growth. If bulbs arrive frozen, they should be thawed gradually in a cooler. In North America, lilies are commonly planted in 15 cm diameter pots, that are “deep”, to allow deeper planting and better stem root development. A variety of soilless, well drained mixes are appropriate. Fertilizer regimes commonly are 200 ppm N at each irrigation, with occasional (weekly) application of clear water. Asiatics are commonly forced at 15-16C, LA’s at 16-17C, and Orientals at 16-18C.

Postharvest quality and use of gibberellin4+7. In the last few years, the beneficial effects of gibberellin 4+7-containing products has been studied and publicized. In North America, a commercial product, Fascination, is now legal to use on lilies.

Fascination is a combination of gibberellin (GA_{4+7}) and cytokinin (benzyladenine) that has two main effects on hybrid lilies: 1) it is a powerful inhibitor of leaf yellowing, and 2) it substantially improves flower longevity. Fascination also allows hybrid lilies to tolerate short-term dark cold storage (2-4C, for up to 2 weeks). While this is an excellent tool, it should not be abused, and it is always best to minimize cold-storage. In most cases, a foliar spray of 25 mg/L (ppm) of the gibberellin 4+7 component within 2 weeks of harvest is sufficient. Caution must be used on types that continue stem elongation throughout the whole crop (for example, longiflorums, Asiatic and LA-hybrids), as unwanted stem elongation can occur.

Table 1. Suggested starting concentration ranges for dipping hybrid lilies:

	Bonzi	Sumagic
Oriental hybrids	200-300 ppm	5-10 ppm
LA-hybrids	150-250 ppm	2.5-5 ppm
Asiatic hybrids	50-100 ppm	1-2.5 ppm

Effect of pre-plant bulb dips on size 14/16 ‘Royal Perfume’ LA- hybrid lily. Treatments are (L to R): Control, Bonzi at 50, 100, 200, or 300 ppm, and Sumagic at 2.5, 5, 7.5 or 10 ppm given as a 1 minute dip.

Table 2. Use guidelines for Bonzi and Sumagic pre-plant dips for several hybrid lily cultivars. Bulbs should be dipped for 1 minute in the concentration (parts per million) indicated in the table. These are starting points, based on spring crops grown in 6” pots with Ithaca, NY growing conditions and assuming final sized plant of 16” (plant plus pot totals 22”). Supplemental spray treatments to control stretch late in the crop may be necessary, and crops should be monitored carefully to anticipate this need.

	Size (cm)	Bonzi (ppm)	Sumagic (ppm)
	Oriental hybrids		
Alliance	14/16	100-150	2.5-5
Aubade	14/16	100-200	5
Helvetia	14/16	100-150	2.5
Muscadet	14/16	300	5-7.5
Star Gazer	12/14	50-100	2.5
Star Gazer	14/16	200-300	7.5-10
Star Gazer	16/18	---	10
Tom Pouce	14/16	50-100	2.5
	Asiatic hybrids		
Amarone	14/16	100	<2.5
Colosseo*	12/14	300	5.0-7.5
Gironde *	14/16	300	7.5
Tresor*	14/16	300	2.5
Vermeer*	14/16	200	2.5-5
Vivaldi	14/16	200	<2.5
	LA Hybrids		
Bestseller	12/14	---	5-7.5
Ceb. Dazzle	14/16	300	2.5-5
Fangio *	14/16	300	7.5
Royal Dream	14/16	100-200	<2.5
Royal Fantasy	14/16	100	1-1.5
Royal Parade	14/16	100-200	<2.5
Royal Perfume	14/16	200-300	<2.5
Salmon Classic	14/16	---	7.5-10
Samor *	14/16	100-200	2.5-5

Note: Plants marked with an asterisk (*) are especially prone to stretch late in the crop; be wary of the need for a late-season foliar Sumagic spray.

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Effect of pre-plant bulb dips on size 14/16 ‘Star Gazer’ Oriental hybrid lily. Treatments are (L to R): Control, Bonzi at 50, 100, 200, or 300 ppm, and Sumagic at 2.5, 5, 7.5 or 10 ppm given as a 1 minute dip.

Effect of pre-plant bulb dips on size 12/14 ‘Vermeer’ Asiatic hybrid lily. Treatments are (L to R): Control, Bonzi at 50, 100, 200, or 300 ppm, and Sumagic at 2.5, 5, 7.5 or 10 ppm given as a 1 minute dip.