

# RESEARCH NEWSLETTER



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hypothesis was formulated that the cause of black shoots lies in the temperature in the soil and during storage before freezing. A correlation was observed between the losses by black shoots and a temporary increase in soil temperature after a period of low temperatures, especially in lilies grown in France. The problem also occurs in lilies grown in Holland. In that case the temperatures during transport and storage are probably the cause. The physiological explanation of the problem is that the relatively low soil temperatures in fall gradually break the dormancy of the shoot. Any rise in temperature, even temperatures like 5 to 8 °C, induces the development of the new shoot.

Once this development has started it cannot be stopped and freezing these bulbs will result in black shoots.

In an experiment carried out by the export company VWS it was found that Oriental lilies that were frozen immediately upon arrival half of January showed no black shoots when the bulbs were forced in a greenhouse in August. When the bulbs were stored at 2 °C for 3 weeks before freezing a low percentage of the bulbs showed black shoots in August. Storing the bulbs at 10 to 12 °C for 3 weeks before freezing caused 100% black shoots. These results confirm the idea that a temporary rise in temperature during the cold storage before freezing is the cause of the problem. From this experiment it can be concluded that in many cases Oriental bulbs should be frozen as soon as possible after harvest. When the bulbs must be stored for some time before freezing or transported this must be done at temperatures as close to zero as possible. Whether a batch of bulbs is sensitive to black shoots can be determined by measuring the breaking index of shoot juice during the period between harvest and freezing. The breaking index is an indicator for the amount of sugar in the shoot, acting as anti-freezing agent. When the sugar level increases during this period (multiple measurements), the lilies can be frozen safely. When a decrease in sugar level is measured dormancy is broken, shoot development has started and the risk

of freezing damage is high. This method is developed by PPO.

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**100% damage by black shoots in Oriental lilies in the greenhouse in August by storing the bulbs at 10 to 12 °C for 3 weeks before freezing.**  
Photo: VWS



**No freezing damage by black shoots in lilies that were frozen immediately upon arrival (half of January).**

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## Producing and Using Bulbous Plants for Mixed Planters

By Dr. Terri Starman, Texas A&M University

Everyone knows that container gardens are the latest gardening craze. They have been popular for several years now but they are forever evolving. The first container gardens were produced in color bowls with colorful seed propagated annuals planted around a Dracaena 'Spikes' plant. Kathy Pufahl can be credited with opening our eyes to using more diverse and unusual types of plants, particularly herbaceous perennials, mixed with the annuals. She was a whiz at cramming these new and different plants into gorgeous containers. At this time I see three new trends in container gardening and the evolution of container gardens will no doubt continue. The first new trend is the increased manufacturing innovations of upscale containers made of more weather resistant materials like those made with resins. Decorative containers are selling like "hot cakes" as people's living spaces extend out from the homes and into their gardens. Decorative containers become part of the furnishings in garden rooms.

The second trend I see is using all of the different horticultural classifications of plants mixed in the same container. In addition to the seed annuals and herbaceous perennials come grasses, herbs, woody shrubs, vegetative annuals, tropicals, succulents, and, yes, bulbs. That is what our experiment was about a year ago and what this article is about – to take a look at using bulbs in mixed plantings. (See Experiment below).

Now that containers have become as beautiful as the plants, a third new trend is to simplify the plantings. One way to simplify a container garden is to use just three plant species. One plant is the "filler".

Its job is to be round and robust so it can basically fill in between plants and cover the media in the container. The second plant is the "spiller". Its job is to drape over the side of the container and softens the container's hard edge and add an element of line and length to the mixed planting. The third plant is the "thriller". Its job is to attract the consumer's eye and delight them so that they will be happy and buy more container gardens in the future. A fourth plant may be needed as another "filler" to help fill in and/or add some height depending on the container size.

A bulbous plant can make a great "thriller" plant in a container garden when it has a large colorful flower like a lily, amaryllis or dahlia; when it pops out of the ground with a splash of color like a tulip or daffodil; when it has an unusual flower form like a calla or Eucomis; or, when it has an unusual foliage form or texture like Incarvillea or Begonia. Bulb plants are also thrilling in container gardens because of their beautiful and unusual flower colors. For example, black flowers are very popular for making eye-popping mixed plantings.

(Photo 1). An example of Eucomis 'Bicolor' showing-off as a "thriller" is in this container garden. Another interesting feature of this container garden is that a microclimate was achieved within it. The taller, sun-loving plants provided shade to the shade-loving plants below them. Plants accompanying the Eucomis are Southern Maidenhair Fern, Huechera 'Amber Waves', Ajuga 'Black Scallop', Begonia 'Fimbriola Orange', Hosta 'Fragrant Bouquet', Coleus 'Sedona', Tatting Fern, Japanese Painted Fern, Streptocarpella 'Concord Blue' and Impatiens 'Infinity Salmon'.



Photo 1.

winter and spring as well. Nothing gives the feeling that spring is in the air better than spring-blooming bulbs, but there are also lots of bulbs that bloom in fall and summer too.

(Photo 3). Here is an example of a container garden that emphasizes the spring season by using a mixture of spring plants including tulips, cosmos, dusty Miller and violas.



Photo 3.

2. Unusual flowers and foliage. Contrast makes container gardens interesting. Contrast is developed by varying the shape, size, textures and color of flowers and foliage. There are so many various shapes of flowers in bulbous plants.

(Photo 4). Just look at the diversity of foliage forms in this container garden using Calla 'Captain Romance', Leucocoryne 'Andes', Incarvillea 'Del Pink', Coleus 'Dipt in Wine', Heuchera 'Amber Waves', Dahlia 'Gallery Cezanne', Salvia 'Tri Color', Lamium 'Pink Pewter', and Gaura 'Ballerina Blush'.



Photo 4.

(Photo 2). In this container garden, beautiful Calla 'Schwarzwalder' is complemented by Begonia 'Sinbad', Eranthemum 'Ebony', Dahlia 'Gallery Art Fair', Coleus 'Merlot', Ajuga 'Black Scallop', Helichrysum 'Silver Spike', Guara 'Pink Fountain', Pelargonium 'Pink Bicolor', and Impatiens 'Infinity Pink'.



Photo 2.

In addition to serving as thriller plants here is a list of more ways bulbs add to container gardens.

1. Seasonality. Container gardens are not just for summer anymore. Those gorgeous upscale containers need plants in them in fall,

Dahlias, Zantedeschia, Eucomis, Hippeastrum, Incarvillea, Begonia, and Lilium were potted with 1 bulb per 6" (15 cm) standard pot. Crocosmia and Gladiolus were potted 2-3 bulbs per 6" (15 cm) azalea pot. Imp. Orchid Nanus, Leucocoryne, and Calachortus were potted 3 bulbs per 4.5" (11 cm) geranium pot.



Photo 9.

All genera received clear water irrigation from potting until emergence. After emergence they received 200 ppm (mg/liter) 15-16-17 until 24 Mar. when the fertilizer was changed to 20-10-20. They were grown at 65 °F day / 55 °F night (18 °C day / 13 °C night) from 12 Feb to 17 Mar. and 75 °F day / 65 °F night (24 °C day / 18 °C night) after that. The first planting of bulbs received no chemical plant growth regulators. The Dahlias and Lilies in the second planting received a 4 ppm (mg/liter) Arest drench, 1.5 weeks after potting.

Companion plants to mix with the bulb plants in the container gardens arrived as rooted cuttings Weeks 2, 3 and 9. They were potted in 4.5" and 6" (11 and 15 cm) pots according to the final size of the plant. They were grown in the same greenhouse under the same temperature and fertilizer conditions as the bulbs. The first mixed containers were potted 29



Photo 10.

Mar. and we continued making containers once per week until 21 May. Mixed containers were made with fully-grown flowering bulbs and companion plants. This was done initially because we didn't know what color the bulb flowers would be or their growth habit. Later with knowledge of the color and plant form of the bulb species, we made some mixed container gardens when the bulbs were emerging. In the mixed plantings, we used an average of nine plants per 14" (36 cm) container. Please visit our web-site at <http://aggiehorticulture.tamu.edu/floriculture/container-garden/index.html> to learn more about producing mixed plantings and see all of the container gardens with bulbs that were made in this experiment.

### Problem of black shoots in Oriental Lilies closer to a solution

By Henk Gude and Hans Kok, Applied Plant Research (PPO), Lisse, The Netherlands

Many Oriental lily bulbs are lost during storage by so-called 'black shoots', a severe form of freezing damage where the entire shoot inside the bulb is destroyed and turns black. The problem is increasing and causes great financial losses. In a meeting with Dutch lily exporters and researchers from PPO the



Photo 8.

(Photo 8). With the proper timing, container gardens filled with bulbous plants and a few perennials can be sold at the stage seen in the first photo and then the consumer can enjoy “growing” it for several weeks. This container garden has Calla ‘Pink Persuasion’, Liliium ‘Salmon Classic’, Dahlia ‘Gallery Leonardo’, Pulmonaria ‘Raspberry Splash’ and Hosta ‘Fragrant Bouquet’ planted in it. Container gardens do not have to have a lot of color or contrast to be beautiful. Simple mixed plantings are easy to do with bulbous plants. Just add one other species to a bulb plant in a classy container to add value to the completed product. It works especially well if the bulb flower lasts a long time and the under-story plant has long lasting foliage.

(Photo 9 and 10). Some examples are calla under planted with Japanese painted fern and amaryllis with Maidenhair fern.

The experiment.

The bulbs arrived 10 Feb. 2004. The lilies were stored at 34 °F (1 °C) until potting. The rest of the bulbs were stored at 45 °F (7 °C) until potting. Two pot dates were used. Half of the bulbs of each species were potted week 7 (12 Feb to 16 Feb) the other half were potted week 13 (26 Mar.)

.One exception was the second planting of Eucomis, Hippeastrum, Imp. Orchid Nanus, Leucocoryne, Calochortus, and Gladiolus. They were potted early (week 11) because of mold on the bulbs. The mold was treated with a Cleary's 3336 bulb dip.

(Photo 5). In this container garden, contrast of flower form and color makes it exciting. Streptocarpella ‘Conord Blue’ flowers are tiny and nodding, Begonia ‘Fimbriata Yellow’ has bold flowers, Calla ‘Captain Romance’ has unusual shaped flowers, and Liliium ‘Salmon Classic’ flowers are up-facing. Other plants are Galadiolus ‘Muriel’, Hosta ‘Fragrant Bouquet’, Acalypha ‘Copper Leaf’, Scaevola ‘Whirlwind White’, and Begonia ‘Sinbad’.



Photo 5.

(Photo 6). Various plant postures and foliage shapes, sizes and textures rather than color create interest and beauty in this container garden.



Photo 6.

Plants include Carex ‘Toffee Twist’, Calochortus ‘Cupido’, Gypsophila ‘Festive Star’, Japanese painted fern, Calla ‘Schwarzwalder’, Trifolium ‘Dark Dancer’ and Eranthemum ‘Ebony’.

(Photo 7). Pattern in the Pulmonaria ‘Raspberry Splash’ foliage adds interest to this creative container garden. Color is echoed with white striped flowers of Amaryllis ‘Baby Star’, white spots on the foliage, and the white container. This repetition of color and line of the Cyperus Isodadus create rhythm in this container garden. Other plants are Fuchsia ‘Autmale’ and Hedera ‘Melanie’.



Photo 7.

3. An element of life.

Its fun to watch a garden grow even when the garden is in a container. Bulbous species are ideally suited to be “timed” in a container garden so the consumer sees them grow into a flowering plant. Consumers and growers as well, must realize and accept that the plants in a container garden will continue to grow, flower, and change positions slightly. Nothing lasts forever and container gardens are no exception. Some plants will need to be pruned and deadheaded to keep them fresh and in shape. At times some plants will have to be discarded and new plants planted in their place. This can be an opportunity to change spent plants out for plants of the current season. This is a “win-win” situation for the consumer who gets an updated container garden and the grower who gets to sell more plants.