

Data Collection System for Landscape Daylilies

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A not-for-profit research organization (All-America Daylily Selection Council) has been organized to evaluate daylily cultivar performance. Procedures for evaluating daylilies are described along with a list of high-performance cultivars.

INTRODUCTION

Stating the problem simply, we have too many daylilies. Since the turn of the century some 1,700 hybridizers have created millions of daylily seedlings—37,000 of them have been registered and introduced. Today, we estimate that approximately 13,000 of these cultivars are still in commercial circulation. To further complicate the issue 270 hybridizers are adding over 1,000 new cultivars to the inventory each year.

In questionnaires circulated in 1987, industry respondents pinpointed the problem. “We don’t buy daylilies by name— just by color.” Pressed further, they said, “How can you pick a winner with so many unknowns?” They had been burned by purchasing daylilies with poor performance.

In the late 1980s, ‘Stella de Oro’ changed much of that indifference to registered, named stock. It provided good, overall performance and a long season of bloom. Suddenly commercial interests began looking around for the next hot prospect. But as the 1987 questionnaires showed, only a few of those people even knew the names of the old standbys: ‘Hyperion’, ‘Aztec Gold’, ‘Mary Todd’.

In 1987, using questionnaire responses to determine what various segments of the industry and its public were concerned about, a test program was devised and came to be known as called the All-America Daylily Selection Council. In 1988, it was reviewed by test specialists and horticultural statisticians at North Carolina State University. What emerged was a three-tiered screening and evaluation system.

SCREENING AND EVALUATION SYSTEM

Tier 1. You can think of our test program as a series of screens, graduating from coarse to fine. At Tier 1, some 50 cutting-edge daylily sites are regularly visited. These are owned by growers, hybridizers, and advanced collectors. At this level, the data taken is primarily concerned with five drop-dead criteria. Failure of any one of these is enough to condemn a cultivar. They are: bloom beauty, foliage appearance, sunfastness, bloom-stalk height (not in foliage) and spent blooms (appearance when closing).

At the Tier 1 level, all observations are noted and computer loaded. Often as many as 20 single sightings will be recorded. If, over time, a particular cultivar demon-

strates worthy performance, it will be advanced to Tier 2. Unfortunately, 95% of Tier 1 plants are rejected. Most are beautiful enough but lack balanced performance. To date we have looked at over 6,000 daylilies at the Tier 1 level.

Tier 2. Qualifying daylilies go on to three Tier 2 test sites in North and South Carolina. These are located in USDA Hardiness Zones 6, 7, and 8. Tier 2 testing is a 2-year-long process. It's a continuous examination of some 52 performance characteristics.

In addition to the field trials, each cultivar is color verified using the *Royal Horticultural Society Colour Charts*. There are many major patterns to be found in daylily blooms. Between major and minor patterns, color readings are taken on 26 different features—right down to eyes, halos, veining, midribs, watermarks, and picotees. This is done to phenotypically fingerprint a daylily for possible patenting.

By the time this tier of testing has been completed, 97% of the candidates will have been eliminated. To date, 800 cultivars have advanced to Tier 2. Three hundred of those have gone on to Tier 3 testing. A portion of each award candidate's fans are sent to tissue culture labs for preliminary micropropagation suitability tests. The rest go to some 16 test sites located from USDA Zone 10 in California to Zone 3 in Edmonton, Canada. Each cooperator uses a handbook that establishes a common test protocol. What's more, each cooperator must sign a contract that outlines the test procedures to be respected and the penalties for failure to perform.

Tier 3. Tier 3 testing looks at some 26 performance characteristics. In addition, we're very interested in breadth of performance. That is, across how many USDA Hardiness Zones will this cultivar show top-notch, balanced performance? If a daylily gives us strong performance across five or more hardiness zones, it may qualify for our All-America Award. But we're also vitally interested in strong regional performances. If a cultivar finds its highest expression in three or more hardiness zones, it will become a candidate for our Star Performer Award.

Like Tier 2, this final tier of tests also runs for 2 years. At the end of these three evaluation tiers, over 99% of the plants will have been rejected. Based on our experience thus far, of the 13,000 daylilies in the marketplace, 12,000 probably will be rated average to poor, 1,000 good, and 200 excellent. Unfortunately, not all of those 200 cultivars will automatically become award winners. To reach that level, a daylily must be capable of high plant production through natural division or tissue culture.

CRITICAL PERFORMANCE CHARACTERISTICS

Performance Verification. The most important result of our work has been to establish a general, multi-zonal performance standard for daylilies. The chart labeled "AADSC Performance Verification Comparisons" focuses on the most critical performance characteristics. A comparison is made between an average daylily and 'Stella de Oro' and 'Black Eyed Stella®'. Note that average performance is determined from all of our computerized data.

Bloom Beauty. This can be a difficult category in that the definition of beauty is conditioned by the cultivars ultimate use. If the daylily is to be used within several feet of the viewer as a stand-alone specimen, then the end user will want to be close enough to see his/her share of those 17 gorgeous patterns that are to be found in

the bloom face. If the daylily is moved back as little as 10 ft from the viewer, many of those subtle but highly enriching patterns and embellishments virtually disappear. At the extreme end of this spectrum, are the departments of transportation. DOTs are increasingly drawn to the daylily because of its low-maintenance/high performance values. However, at 55 mph and set back 20 to 100 ft from the roadway, beauty translates into “carrying power”—the ability to be seen.

Bloom Period. In our research we have found a very peculiar split in daylily performance that appears to run along genetic lines. It has caused us to make a distinction between “landscape” and “specimen” daylilies.

What we call a “landscape” daylily is most often rated only “Good” (that is, a cut below Excellent) on bloom beauty. But it will give you from 100 to 300 days of bloom in USDA Hardiness Zones 4 to 10, plus excellent foliage, and high fan increase rates. “Specimens”, on the other hand, are selected primarily for bloom beauty. Unfortunately most “specimens” bloom for only 21 days. Our Council tries to advance only those “specimen” cultivars that will bloom for 40 to 80 days. Thus the sales opportunities are 2 to 4 times greater.

ADBI (Average Daily Bloom Intensity). It’s one thing to announce that a daylily will bloom for 300 days, it’s another to neglect mentioning how much bloom it carries each day over those 300 days. In this category, we’re looking at first-year performance as that’s what most of you will be dealing with. An ADBI of 1.0 means a bloom production of one bloom per day per plant. In their second year ‘Stella de Oro’ and ‘Black Eyed Stella®’s’ ADBIs will jump to 8.0 or as much as 600 to 800 blooms per season. We have tested several daylilies that will give an ADBI of 16 in the second year, but they can only sustain that show for 30 or 40 days.

Foliage Appearance. Hateful as it may sound, daylilies without bloom are simply tall grass to the casual viewer. During a single growth season, foliage can be without accompanying bloom for 10% to 90% of the time (depending, of course, upon the bloom performance of the chosen cultivar). The prudent buyer should look for good foliage shape, a rich green color, and high-density foliage.

Time to Achieve Mature Clump Shape. Maturity, in terms of overall plant performance, generally occurs in the third year of undisturbed growth. Maturity, in terms of clump shape, occurs earlier. In the latter case, we are concerned with how long it takes a clump’s foliage to gracefully fill a gallon container. ‘Black Eyed Stella®’ demonstrates excellent clump shape. We know that some daylilies will never achieve this objective. If, for example, in 1985 you purchased 10 ‘Stella de Oros’ and 10 ‘Cornwalls’, today you would probably have over a million fans of ‘Stella de Oro’. ‘Cornwall’ would not only have less than 100 fans but its foliage would be sparse as well.

Sunfastness. Bleaching degrades beauty. Generally, you will see this effect around five in the afternoon. With some cultivars it can occur as early as 10 AM We measure this phenomenon on a scale of 1 to 5. If a cultivar drops to a rating of 3, 4, or 5, it will not receive our recommendation nor will your customers want it.

Fan Increase Rate. If you want to destroy a grower’s livelihood, sell him/her daylilies that drop below an annual 300% fan increase rate. The replacement rate

simply isn't there for a good harvest plus follow-on crops. In large-scale landscaping jobs, a high fan increase rate combined with good foliage appearance will ensure that your daylilies will serve as excellent ground cover regardless of bloom performance. In many such situations, what the client may be searching for is anywhere from 500 to 100,000 daylilies. Given the right plant, a site will fill in much faster with high fan increase cultivars. It means that by the beginning of the second bloom season you will have a happy client whose project has reached virtual maturity.

We've also found that when you launch an All-America daylily, you'll need plenty of stock. Two weeks after 'Black Eyed Stella®' was introduced, the licensed growers had sold 160,000. Shortly thereafter they passed a half million. Two million are projected by 1996. And they are struggling to keep up with the demand from an aroused gardening public. To better gauge the depth of the marketplace for superior daylilies it is estimated that over 10 million 'Stella de Oro's' have been sold since 1975 and it is still very much in demand.

Spent Bloom Persistence and Messiness. It is worth dallying here long enough to show you some examples of good and bad spent bloom habit. Some spent blooms will drape over the buds below and prevent them from opening. Other cultivars will not drop their spent blooms for up to 5 days. In a short time, the plant will have a trashy look. We call those that drop their spent blooms in 1 to 2 days "self-cleaners."

Insects and Diseases. Daylilies for the most part do not have any real problems with insects or diseases. Nonetheless, we continue to screen for them.

Before discussing heat and cold tolerance we need to mention dormant and evergreen. A helpful rule of thumb that we use is: There are no evergreens in USDA Hardiness Zone 5 and northward; conversely, there are no dormants in the deep south. This is because the evergreens burn off in the cold north and the dormants die when they don't get adequate cold temperatures.

Cold Tolerance. Evergreens tend to be associated with cold tenderness much more often than dormants. In our test program we do not permit cooperators to protect their plants with foam blankets, mulch, etc. We rogue out tender stock through direct exposure. Unfortunately, in the popular literature, an unconscious but persistent linkage has been forged between all evergreens and cold tenderness. This has not been borne out in test. Recently, 'Persian Market', a well-known evergreen, was under heavy consideration for an All-America Award. It is successfully grown as far north as Zone 2. In North America the hardest places to grow daylilies are those areas that do not enjoy long periods of continuous snow cover, perhaps the two toughest zones in which to grow tender daylilies are Zones 4 and 5.

Heat Tolerance. This poses a different type of problem in daylilies. If one compares the performances of 'Stella de Oro' and 'Black Eyed Stella®' throughout most of their common range, they are very similar. This is not particularly surprising as 'Black Eyed Stella®' is the progeny of 'Stella de Oro'. The further south one pushes 'Black Eyed Stella®' the better its performance, whereas 'Stella de Oro's' bloom output drops once into Zones 8B, 9, and 10. Generally speaking, prolonged temperatures of 100 degrees will shut down bloom production in many daylilies. 'Stella de Oro' exhibits this problem.

Table 1. AADSC performance verification comparisons.

Category	Average daylily	'Stella de Oro'	'Black Eyed Stella®'
Bloom beauty	Fair-good	Good	Good-excellent
Bloom period (by USDA Zones of top performance)	21 days (Zones 6-8)	100-180 days (Zones 5-10)	100-271 days (Zones 5-10)
1st year ADBI*	.4	.4	.4
Foliage appearance (Scale: poor-excellent)	Fair-good	Good-excellent	Excellent
Time to achieve mature clump shape	1 year plus	By onset of first bloom	By onset of first bloom
Sunfastness (scale: 1.0-5.0, 1.0=high)**	1.8	1.8	1.0
Fan increase rate***	200%	700%-1000%	800%-1200%
Spent bloom persistence (1-2 days=self-cleaner)	2.4 days	1-2 days	1.2 days
Spent bloom messiness	Good	Excellent	Excellent
Resistance to insect damage	Good	Excellent	Excellent
Cold tolerance	Good	Excellent	Excellent
Heat tolerance	Good	Fair	Excellent
Resistance to spring sickness	Good	Excellent	Excellent

* Average daily bloom intensity (or total bud count ÷ day in bloom ÷ number of plants). A "1.0" equals one bloom per day per scape.

** The Council will not recommend a daylily that consistently scores 3.0 or less due to "bleaching" or "slicking."

*** Fan increase rates of 300% or less are not productive enough for commercial enterprises. Interestingly, cultivars with such marginal fan increase rates also do poorly in tissue culture.

As mentioned earlier, there seems to be a genetic split between "landscape" and "specimen" daylilies. This very crowded, unconventional genealogical chart (Fig. 1) confirms the idea that "good parents are important." What do these 33 important landscape cultivars have in common? Almost everyone of them share these

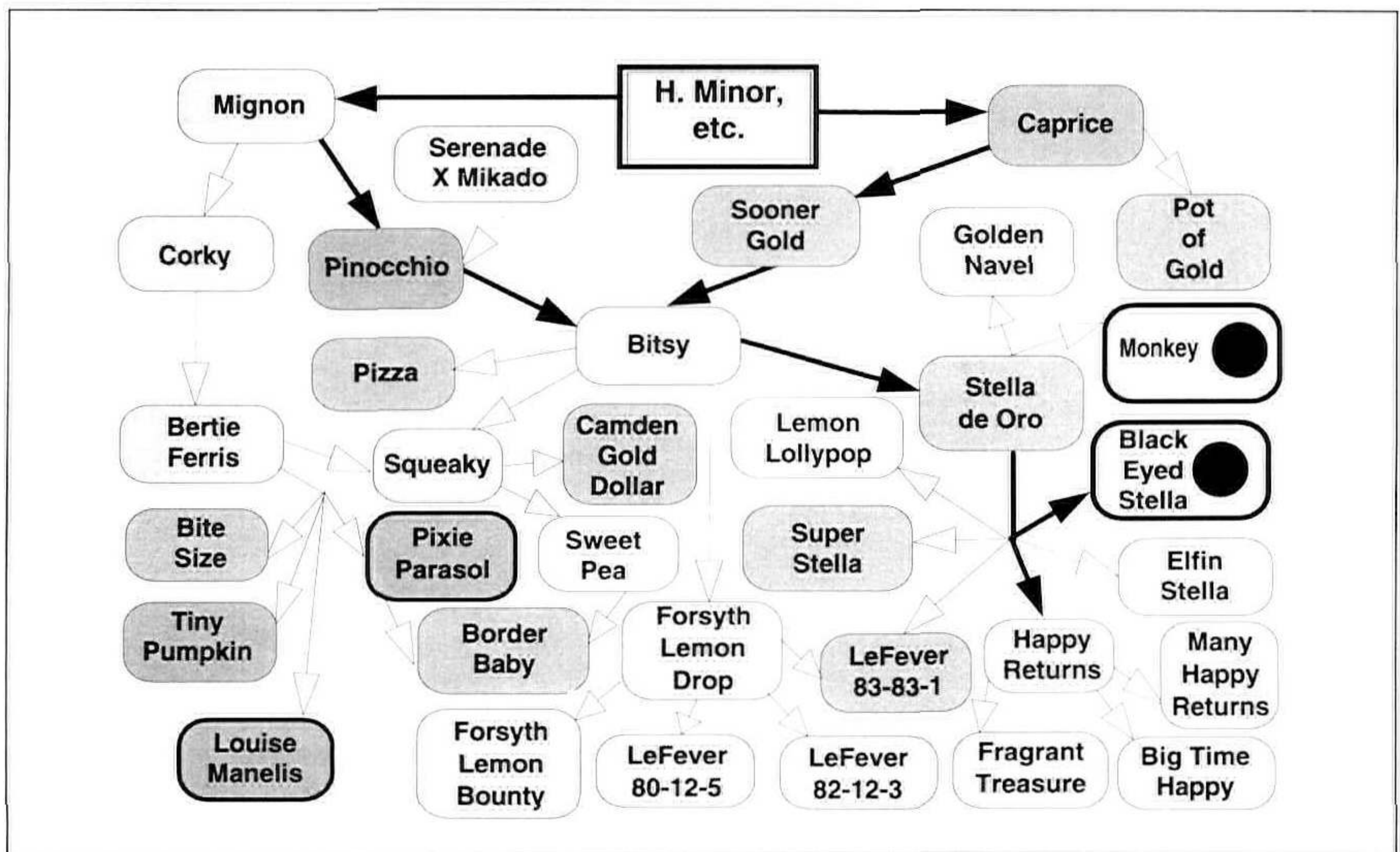


Figure 1. A family of high performance cultivars.

characteristics: as depicted, their carotene-based pigments usually produce only yellows, oranges, and golds; they have fibrous root systems; they have very long bloom periods; and they have very high bud counts. They also are very reluctant to transfer these admirable qualities to other non-landscape lines.

Nonetheless, four of the cultivars shown ('Louise Manelis', 'Pixie Parasol', 'Monkey', and 'Black Eyed Stella®') are color breakthroughs. 'Monkey' and 'Black Eyed Stella®' because of their red eyezones. 'Louise Manelis' is a shrimp pink and 'Pixie Parasol' is an apricot peach pink. This fact gives us hope that hybridizers will eventually bring a richer variety of color into this high performance genetic matrix. Because the difference in performance today is so extreme, we have had to create two different categories of cultivars: specimen and landscape. Each may contend for our two main sets of awards: All-America and Star Performer.

PICKING A WINNER

Once we have tabulated all of the test results, our computer program assigns weighted multipliers to the most critical performance characteristics. Seventy percent of our weighting is assigned to four performance features: Bloom Beauty (25%), Foliage Appearance (15%), Bloom Period Length (15%), and Fan Increase (15%). For commercial enterprises, those are the predominant make or break factors that determine success in the marketplace. The other factors are Spent Bloom (5%), Abscission (5%), Average Daily Bloom Intensity (10%), Sunfast (5%), and Fragrance (5%).

According to our charter, it is our purpose to locate, test, and publicize not only our All-America Award winners but top regional performers—our Star Performers. The industry and the gardening public need to know about both.

An All-America daylily must have an overall composite score of 85% and span at least five contiguous hardiness zones and show balanced performance throughout its range. A Star Performer must score at least an 80% in our rating system

throughout its range. In sharp contrast, the average daylily tested to date will have a peak performance that spans two zones but will not get much above 50%. Out of our first test cycle we found that these daylilies qualify as award candidates. The first group are landscape cultivars: 'Bitsy', 'Forsyth Lemon Drop', 'Lemon Lollipop', 'Leprechaun's Wealth', 'May May', 'So Sweet', 'Stella de Oro', 'Yellow Bouquet', and 'Yellow Lollipop'. Among the specimen, these have proven to be top-notch daylilies: 'Becky Lynn', 'Brocaded Gown', 'Charles Johnston', 'Chorus Line', 'Jen Melon', 'Lullaby Baby', 'Persian Market', 'Tender Love', and 'White Temptation'.