

Tuesday Afternoon, December 5, 1989

The Tuesday afternoon session convened at 1:30 p.m. with Charles Hildebrant serving as Moderator.

**NEW FRONTIERS WITH DAYLILIES:
FROM A HYBRIDIZER'S PERSPECTIVE**

DARREL APPS

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Next year, 1990, marks the 100th anniversary of *Hemerocallis* (daylily) hybridizing. In circa 1890, George Yeld, an English school teacher, made crosses of *Hemerocallis lilioasphodelus* with *Hemerocallis middendorffii* (5). Two years later in 1892 he officially announced the first daylily cultivar, 'Apricot'.

Today there are over 30,000 registered cultivars and nearly 200 active hybridizers. Last year alone 189 different breeders named 1116 new daylilies. Although marketing statistics are not available, daylilies are thought by many to be the number one perennial plant sold in the United States. One of the reasons for their recent popularity is the color diversity in new cultivars; this is especially surprising since the original 23 species were primarily yellow and orange. Today the only color missing is true blue. The fact that daylilies are not native to the North American continent makes their recent widespread acceptance even more intriguing!

DAYLILY MILESTONES

There are several milestones in the advancement of this genus:

1. The first hybrid cross in 1890 by George Yeld (5).
2. The importation of species from Asian countries to the United States. Dr. Albert Newton Steward, living in China, sent more than 50 importations to Dr. A. B. Stout at the New York Botanical Garden from 1924 to 1942 (6).
3. Dr. A. B. Stout published the book *Daylilies* in 1934 (7). This is primarily a record of *Hemerocallis* species and early species hybrids.

4. The American Hemerocallis Society was formed in 1946 and focused special attention on this genus (9).

5. Several individuals began hybridizing daylilies in the United States. Dr. Ezra Krause, a native of Michigan was one of the most prominent (3).

6. A University of Minnesota student Robert Schreiner flowered several colchicine-induced tetraploids in 1947 (8).

7. Dr. Charles Heuser and this author published their work on tissue culturing the first hybrid daylily in the Canadian Journal of Botany in 1974 (4).

8. Dr. Michael Kasha from Florida State University, and his graduate student, Kathryn Bisset, published a paper on the color chemistry of modern daylilies in 1976 (2).

9. This author proposed a system for Selecting Daylilies with Commercial Value that was published in the 1984 IPPS Combined Proceedings (1).

The potential for new cultivar development and the subsequent replacement of inferior named forms is particularly rapid within this genus. Each decade the top 100 listed on the popularity poll is virtually replaced with another 100. Tissue culture propagation has further speeded up the process (at this point in time tissue culture isolation is estimated to be only 50% successful). Because there is a large number of breeders, improvements are rapid with both diploid and tetraploid forms. Individual breeders work intensively with many different forms: dormant, semievergreens, evergreens, large flowers (4½ in. >), small flowers (3-4½ in.), miniatures flowers (<3 in.), heights from 9 to 48 in., hardy forms, tender forms, all colors, single flowers, and double flowers.

Briefly here are the steps I take from hybridizing to the introduction of new cultivars:

1. Hybridizing. Crosses are made from 9 to 11 a.m. each day. In the mid-Atlantic states daylilies can be crossed from May to September. I work with both diploids and tetraploids and successfully store frozen pollen from one season to the next. Pollen sterility and incompatibility limit "takes", often to 30% or less. All crosses are tagged with a permanent marking pen.

2. Collecting seeds. Seeds mature in approximately 60 days. Seed pods are harvested when the pod cracks. Seeds are usually shiny black—a very few cultivars produce tan seeds. I do not allow seeds to dry or to shrink. They are stored in sealed containers and refrigerated until they are planted.

3. Planting seeds. Because of the difficulty with weeds all of my seedlings are now grown in pots until the ramets are ¾ in. across. Seeds are started in 4x4x4½ in. deep plastic pots (Nupot 12),

usually no more than 30 seeds per pot. Each pot is separately labeled with the cross. All seeds are planted in the winter such that the seeds will receive stratification of at least 6 weeks (seeds from evergreen parents do not need to be stratified), usually at temperatures just above freezing. Seeds are sown 2 to 3 times their thickness. Germination occurs in 10 to 14 days at temperatures above 70°F. Weed-free soilless media are used (either Promix or Sunshine Mix depending on the availability and cost).

4. Transplanting. Six to eight weeks after sowing the seedlings are pricked off and planted individually into 3x3x3¼ in. deep plastic pots (Nupot 16) using the same media as above. Seedlings are irrigated regularly and fertilized with Peter's 20-20-20 every 2 weeks. I produce 3000 to 5000 transplants each year.

5. Lining out. When the individual seedlings reach a ramet width of ¾ in. or greater they are large enough to be lined out in the field. When they are taken out of the pot most roots are found in the bottom portion. This is important because after they are planted the roots will be 3 to 4 in. below the surface and free of injury from pre-emergent herbicides. Rows are spaced 12 in. apart and seedlings are planted 6 in. apart in the row. Aisle spaces 2 to 3 ft. wide are left every few feet so that seedlings are easily reached for hybridizing. Plants are then watered in and Surflan applied at ½ the recommended rate. Generally seedlings from seeds sown during the winter are ready to line out by August 1 of the same year. I try to have all seedlings in place by September 15 so that they have time to "root in" before winter.

6. Growing. About one-half of the seedlings lined out will bloom the following summer. All are kept two full growing seasons for final evaluation. All of my soil has been amended with 4 to 6 in. of mushroom compost that is rototilled into the top layer. Each bed receives 3 pounds of 10-10-10 fertilizer per 100 sq ft about May 1. Earlier fertilizing tends to push soft growth and makes plants susceptible to late spring frosts. Plants are irrigated whenever moisture is inadequate. During the second growing season slugs are often problems. They are controlled with baits of metaldehyde and Sevin. Some years thrips need to be controlled. I use three different chemicals, Diazinon WP on May 1, Orthene WP on June 1 and Maverik WP on July 1.

7. Selecting new cultivars. Basically I look for new flower color breaks, wide petalled forms and flowers with heavy substance. I do not like to select a daylily for naming unless it flowers for 4 or more weeks and has 20 or more buds per scape. I am especially interested in vigorous, disease-free plants that increase rapidly (2 to 3 new ramets each year). Often I reject a beautiful flowering plant if the

foliage is not a deep green color and attractive all season. I can anticipate 1 to 5 introduceable seedlings per 1000 seedlings.

8. Marketing. There are many potential markets available to hybridizers. An obvious one is the 5000 members of the American Hemerocallis Society. Breeders can usually sell 30 to 50 plants of each introduction for \$50 to \$200 during the first year of introduction. The market preference is currently for large-flowered yellows, pinks, and pastels shades. Miniatures are more difficult to sell.

Recently wholesale nurseries are beginning to purchase exclusive rights for un-introduced seedlings. The amount charged is usually based on the number of plants available. The bottom price is usually \$1,000 and can be considerably higher for seedlings with rebloom.

Mailorder nurseries have had good success in selling these highly photogenic plants. Cover shots can generate 3000 to 5000 sales of a new cultivar. In order to get that number tissue culture techniques are usually necessary. Once a daylily is on the cover of a major mailorder catalog its sales potential is greatly increased in all of the other markets.

Landscape contractors usually do not purchase new introductions. Several do buy seedling discards. There is considerable controversy over this practice. Many hybridizers feel that 40 to 60 percent of their seedlings are better than those older cultivars presently being sold. Since all seedlings have to be dug this helps pay for removing them.

Garden centers are more likely to purchase named cultivars that have been introduced for a few years. Several garden centers in the eastern United States market will pay \$2.00 to \$10.00 per fan. Many hybridizers purchase many new cultivars each year to maintain an up-to-date gene pool. Each year they discard a number of older introductions by selling them to garden centers.

Large tissue culture laboratories are beginning to purchase exclusive new daylily cultivars for their own markets. Because there are many new daylilies to choose from, they usually try to purchase from established, well known breeders.

Not unlike the "you pick" market for fruits and vegetables are "daylily digs". During bloom season customers are allowed in seedling daylily fields to choose the daylily they want a staff member to dig. Some are sold bareroot and others with soil.

The Chicago Botanical Garden is an example of a public institution that has started a plant introduction program called Chicagoland Grows. Daylilies will be one of their new offerings. Daylilies are also being sought internationally: West Germany, Australia, New

Zealand, Japan and England are examples of countries that are beginning to import new introductions.

SOME NEWER DAYLILIES WITH GOOD POTENTIAL

Because of the large number of new plants introduced each year it is difficult for nurserymen to have the knowledge to select the most outstanding new hybrids. Here are just a few cultivars that perform well in many regions of the United States:

- 'Atlanta Full House'—single, yellow, tetraploid
- 'Beauty to Behold'—single, yellow, diploid
- 'Condilla'—double, gold, diploid
- 'Barbara Mitchell'—single, lavender-pink, diploid
- 'Siloam Show Girl'—single, red, diploid
- 'Super Purple'—single, red-purple, diploid
- 'Window Dressing'—single, white, diploid

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