

Evaluation of Petunia Cultivars as Bedding Plants – Spring 2001

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Summary. We evaluated 35 cultivars of petunia (garden petunia) [*Petunia x hybrida* Hort. Vilm.-Andr.], in replicated class tests at the University of Florida Gulf Coast Research and Education Center at Bradenton, Fla. [lat. 27.4 N, long. 82.5 W; AHS Heat Zone 10; USDA (American Horticultural Society, 1999); USDA Cold Hardiness Zone 9b (U. S. National Arboretum, 1990) in the spring of 2001. In this report we provided objective plant measurements of vegetative and flower characteristics, earliness of flowering, flower divergence (Table 1), as well as 3 subjective ratings (late Apr., mid May, and early June) that permit readers to evaluate foliage and flower characteristics (Table 2, sprayed field) and the affects of pests (Tables 3 and 4, unsprayed field) at different times during the season, and to evaluate performance over time. Subjective ratings were on a scale from 1 to 7 with the highest rating of 7 for excellent. Cultivar performance in this trial was good in most classes; no cultivar exhibited poor overall performance. As a result, cultivar performance standards were very high in this trial, with adjusted overall performance ratings > 6.0 being considered outstanding, 5.5– 5.9 as very good, 5.4 – 5.0 as good and < 4.0 – 4.9 as fair. Cultivars were grouped into classes based on plant habit and flower color, and are listed here by performance and class order. **Outstanding** cultivars (> 6.0) were: **‘Kahuna Violet’** (Tall Spreading – dark purple, red violet class); **‘Kahuna White’** (Tall Spreading – white class); and **‘Tidal Wave Silver’** (Tall Spreading – light purple, blue violet class). **Very good** cultivars (5.6-5.9) were: **‘Wild Rose Mix’** (Grandiflora – single; mixes class); **‘Fantasy Light Lavender’** (Milliflora – single; purple, light blue violet class); **‘Symphony Pink’** (Multiflora – single; pink class); **‘Symphony Violet’** (Multiflora – single; purple, dark blue violet class); **‘Symphony Rose’** (Multiflora – single; rose class class); **‘Symphony Salmon’** (Multiflora – single; salmon class); **‘Symphony White’** (Multiflora – single; white class); **‘Ramblin’ Shades ‘O Pink’** and **‘Wave Pink experimental 99WP5’** (Spreading – pink class); **‘Avalanche Lavender’** and **‘Wave Lavender’** (Spreading – dark, blue violet class); **‘Avalanche Lilac’** (Spreading – light, blue violet class); **‘Avalanche Salmon Shades’** and **‘Ramblin’ Peach Glo’** (Spreading – salmon class); **‘Ramblin’ Burgundy Chrome’** (Tall Spreading – dark purple, red violet class). **Good** cultivars (5.4 – 5.0) were: **‘Pink Double Madness’**, **‘Satin Pink Double Madness’**, and **‘Sheer Double Madness Improved’** (Floribunda – double, pink class); **‘Celebrity Rose’** (Floribunda – single; rose class); **‘Madness Magenta’** and **‘Ultra Violet’** (Grandiflora – single; purple, dark red violet class); **‘Aladdin Yellow’** (Grandiflora – single; white/yellow class); **‘Fantasy Rose’** (Milliflora – single; rose class); **‘Symphony Purple’** (Multiflora –

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single; purple, dark blue violet class); **'Symphony Scarlet'** (Multiflora – single; red class); **'Symphony Deep Rose'** (Multiflora – single; rose class); **'Avalanche Pink'** (Spreading – pink class); **'Avalanche Cherry'** and **'Avalanche Red'** (Spreading – red class); and **'Avalanche White'** (Spreading – white class). **Fair** cultivars (< 4.0 – 4.9) were: **'Celebrity Burgundy Frost'** (Floribunda – single; purple, dark red violet /white class); and **'Ramblin' Deep Blue'** (Spreading – blue class).

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Introduction

The United States wholesale value of floricultural crops was \$4.6 billion in 2000, estimated from growers with sales = \$10,000. (United States Department of Agriculture, 2001). Bedding and garden plants comprise 50% of the floriculture value at \$2.12 billion. Florida (\$107.4 million) ranks fifth behind California, Michigan, Texas and Ohio, who together generate 42% of the bedding/garden plant wholesale value. Petunia is ranked second (\$77.2 million) and sixth (\$11.1 million) in the United States for wholesale value in flat and pot culture, respectively (United States Department of Agriculture, 1998).

Most of the bedding plant variety trials currently conducted in the United States are performed without multiple experimental units replicated in an appropriate experimental design that allows statistical analysis, thus these variety trials provide results that are of questionable scientific merit. This study was conducted to evaluate petunia performance in a seasonal replicated trial in order to provide timely evaluations that may be used by growers, landscapers, consumers and seed companies as well as the scientific community.

Materials and Methods

Seeds of 36 cultivars of petunia were sown between 6 and 14 Feb. into a soil mix containing peat and vermiculite (1:1, volumetric) prepared and amended with dolomite 11.3 lbs./yd³ (6.7 kg/m³), superphosphate 5.6 lbs./yd³ (3.3 kg/m³) and hydrated lime 2.8 lbs./yd³ (1.7 kg/m³) and used for seed germination at 72 to 75 °F (22 to 24 °C) in a growth room with a photosynthetic photon flux (PPF) of 30 μmol·m⁻²·s⁻¹ for 12 h from cool-white fluorescent lamps. Immediately after germination, seedlings were transplanted into Todd ® planter flats [model 128: 1.5 inches x 1.5 inches x 2.5 inches (3.8 cm x 3.8 cm x 6.4 cm) cells; Speedling Incorporated, P. O. Box 7220, Sun City, Florida] containing the same soil mix used in sowing, and placed into a screen-sided, fiberglass-covered greenhouse. Seedlings were fertilized with a 15N-0.87P-16.5K water soluble fertilizer (15-2-20 Ca-Mg Excel; Scotts Co., Maryville, Ohio) solution applied at the rate of 250 mg·L⁻¹ twice weekly.

On 20 Mar., plugs were transplanted into raised ground beds with five plants per plot,

with one plant in the center and four plants spaced 12 inches (30.5 cm) apart from it in a staggered layout in. Beds were 32 inches wide x 8 inches high (81.3 cm x 20.3 cm), spaced 5 ft. apart from center. Irrigation water was supplied from lateral subsurface irrigation ditches 42 ft apart. Nutricote ® 13N-5.7P-10.8 K fertilizer (13-13-13 100-d slow release type with micronutrients; Florikan, Sarasota, Florida) was applied by hand to each plant on the soil surface approximately an inch from the plant stem under the plastic mulch at 262 lb/row acre (294 kg·ha⁻¹) of nitrogen. Beds were fumigated > 14 d prior to planting with a mixture of 66% methyl bromide and 33% chloropicrin at 392 kg·ha⁻¹ (350 lb/acre) and covered with white-on-black polyethylene film. Subsurface seepage irrigation water was supplied from lateral ditches spaced 12.8 m (42 ft) apart (Howe and Waters, 1997).

Integrated pest management was employed to determine when pesticide applications were needed to control arthropod pests and plant pathogens. Temperature @ 2 ft (61.0 cm) during the remainder of the experiment ranged from a low of 3.8 °C (39 °F) to a high of 34.2 °C (94 °F) for the ratings period in the sprayed lands. Total rainfall of 35.1 cm (13.8 inches) occurred through 6 June. Only 0.02 cm (0.01 inches) fell in April. Three plants per plot were selected (30 April) from the center and edge of each plot, and the plant height (from the stem base to the inflorescence tip) and plant width were recorded for each plot. Plants in each plot were selected from the same positions in that plot. Days from sowing to first open flower and flower divergence were recorded. Flower divergence represents the number of days required for the first plant in a plot to unfurl the first flower to the last plant to unfurl its first flower in that plot. Subjective ratings for foliage and flower quality were made for each cultivar on 24 Apr., 11 May and 2 June. Average foliage and flower ratings represent relative cultivar quality within a class, measured in a field sprayed on demand, following pest scouting. Pest symptoms were rated on 20/27 Apr., May 20 and 7 June in an unsprayed field (simulating a homeowner environment). Where necessary, the causal agents were confirmed by plant a pathologist or entomologist. Each cultivar was rated on a 1 to 7 scale with the highest rating of 7 for excellent. Plant characteristics that merited a 7 were: (1) all plants in a plot had full and uniform foliage; (2) foliage and flowers were free of pest symptoms; (3) plants were free of abnormalities or weaknesses such as lodging; and (4) flowers were numerous and uniformly distributed over the plant.

In order to provide meaningful performance comparisons, cultivars were divided into classes based on color and plant growth habit. Color hues with similar shades and tints were grouped together into one class. The choice of best of class for 2001 was determined by comparing the adjusted overall performance ratings. This value was arrived at using the formula $OP = (Q + P)/2$, where Q = overall foliage/flower ratings (Table 2) and P = overall pest ratings (Table 4). $OP_{adj} = Q + P_{adj}/2$, where $P_{adj} = P - (dp \times dpf)$; and where dp = number of dead plants/plot and dpf = dead plant factor. The value dpf = number plants per plot/highest rating possible (7). Petunia dpf was 5 plants/7, or 0.71. It was necessary to use OP_{adj} , as opposed to OP, to account for plant loss due to soilborne disease. The cultivar with the highest adjusted overall performance received best of class honors. Differences in these ratings may not be statistically significant. If two or more cultivars had equal overall ratings, another rating category, such as overall

foliage/flower ratings (Table 2) was used to make the choice, and so forth, until a better performer was selected. This type of choice is necessary in order to select a single cultivar every season as the standard by which all others in the class may be compared in future seasons, thus limiting the number of cultivars necessary in a trial. If a class only contains one cultivar, that cultivar becomes the uncontested best of class.

Each class was analyzed as a separate experiment. A randomized complete block experimental design was used with three blocks each containing six plants that represented the experimental unit. All data were analyzed by analysis of variance (ANOVA) methods, and means of dependent variables significant at the 0.05 level of probability were separated using Duncan's multiple range test (PROC ANOVA, SAS Institute, Cary, North Carolina).

Results and Discussion

Floribunda – double, pink – class. Plant height ranged from 16 cm (6.3 inches) for 'Satin Pink Double Madness' to 19 cm (7.5 inches) for 'Pink Double Madness'. Plant width ranged from 32 cm (12.6 inches) for 'Satin Pink Double Madness' and 'Sheer Double Madness Improved' to 35 cm (13.8 inches) for 'Pink Double Madness'. Flower diameter ranged from 6.1 cm (2.4 inches) for 'Pink Double Madness' and 'Satin Pink Double Madness' to 6.4 cm (2.5 inches) for 'Sheer Double Madness Improved'. The first open flower ranged from 47 d for 'Pink Double Madness' to 59 d for 'Sheer Double Madness Improved'. Flower divergence ranged from 4.0 d for 'Satin Pink Double Madness' to 7.3 d for 'Sheer Double Madness Improved'. Average foliage ratings ranged from 4.0 for 'Pink Double Madness' to 4.5 for 'Sheer Double Madness Improved'. Average flower ratings ranged from 3.5 for 'Sheer Double Madness Improved' to 4.7 for 'Pink Double Madness'. Overall foliage/flower ratings ranged from 4.0 for 'Sheer Double Madness Improved' to 4.3 for 'Pink Double Madness'. Overall foliage pest ratings ranged from 5.8 for 'Pink Double Madness' to 6.3 for 'Satin Pink Double Madness'. Overall flower pest ratings ranged from 6.2 for 'Sheer Double Madness Improved' to 6.4 for 'Pink Double Madness'. Overall foliage/flower pest ratings ranged from 6.2 for 'Pink Double Madness' and 'Sheer Double Madness Improved' to 6.4 for 'Satin Pink Double Madness'. Adjusted overall performance ratings ranged from 5.0 for 'Sheer Double Madness Improved' to 5.2 for 'Pink Double Madness' and 'Satin Pink Double Madness'. 'Pink Double Madness' (Ball Seed) was best of class ⁷.

⁷ Both 'Pink Double Madness' and 'Satin Pink Double Madness' had an adjusted overall rating of 5.2. 'Pink Double Madness' was chosen best of class based on the higher overall foliage/flower ratings (Table 2) of 4.3..5

Floribunda – single; purple, dark red violet /white class. Plant height was 15 cm (5.9 inches) for 'Celebrity Burgundy Frost', plant width was 38 cm (14.9 inches), and flower diameter was 6.2 cm (2.4 inches). The first open flower was 50 d, and flower divergence was 2.3 d. The average foliage rating was 5.3 and the average flower rating was 3.3. The overall foliage/flower rating was 4.3. The overall foliage pest rating was 6.5, and the overall flower pest rating was 6.0. The overall foliage/flower pest rating was 6.2. The adjusted overall performance rating was 4.8. 'Celebrity Burgundy Frost' (Bodger Seeds) was best of class, uncontested.

Floribunda – single; rose class. Plant height was 14 cm (5.5 inches) for 'Celebrity Rose', plant width was 37 cm (14.6 inches), and flower diameter was 5.9 cm (2.3 inches).

The first open flower was 44 d, and flower divergence was 4.8 d. The average foliage rating was 5.1, and the average flower rating was 4.7. The overall foliage/flower rating was 4.9. The overall foliage pest rating was 6.5, and the overall flower pest rating was 5.7. The overall foliage/flower pest rating was 6.1. The adjusted overall performance rating was 5.3. ‘Celebrity Rose’ (Bodger Seeds) was best of class, uncontested.

Grandiflora – single; mixes class. Plant height was 20 cm (7.9 inches) for ‘Wild Rose Mix’, plant width was 40 cm (15.7 inches), and flower diameter was 7.6 cm (3.0 inches). The first open flower was 46 d, and flower divergence was 6.5 d. The average foliage rating was 4.8, and the average flower rating was 4.9. The overall foliage/flower rating was 4.8. The overall foliage pest rating was 6.5, and the overall flower pest rating was 5.8. The overall foliage/flower pest rating was 6.2. The adjusted overall performance rating was 5.5. ‘Wild Rose Mix’ (PanAmerican Seed) was best of class, uncontested.

Grandiflora – single; purple, dark red violet class. Plant height ranged from 16 cm (6.3 inches) for ‘Madness Magenta’ to 22 cm (8.7 inches) for ‘Ultra Violet’. Plant width ranged from 39 cm (15.4 inches) for ‘Madness Magenta’ to 40 cm (15.7 inches) for ‘Ultra Violet’. Flower diameter ranged from 6.8 cm (2.7 inches) for ‘Madness Magenta’ to 8.8 cm (3.5 inches) for ‘Ultra Violet’. The first open flower was 48 d for ‘Madness Magenta’ and ‘Ultra Violet’, and flower divergence ranged from 4.0 d for ‘Ultra Violet’ to 9.5 d for ‘Madness Magenta’. Average foliage ratings ranged from 4.5 for ‘Ultra Violet’ to 4.9 for ‘Madness Magenta’. Average flower ratings ranged from 4.7 for ‘Madness Magenta’ to 4.9 for ‘Ultra Violet’. Overall foliage/flower ratings ranged from 4.7 for ‘Ultra Violet’ to 4.8 for ‘Madness Magenta’. Overall foliage pest ratings ranged from 6.4 for ‘Madness Magenta’ to 6.6 for ‘Ultra Violet’. Overall flower pest ratings ranged from 5.8 for ‘Madness Magenta’ to 6.2 for ‘Ultra Violet’. Overall foliage/flower pest ratings ranged from 6.1 for ‘Madness Magenta’ to 6.4 for ‘Ultra Violet’. The adjusted overall performance ratings ranged from 5.3 for ‘Madness Magenta’ to 5.4 for ‘Ultra Violet’. ‘Ultra Violet’ (Goldsmith Seeds) was best of class.

Grandiflora – single; white/yellow class. Plant height was 21 cm (8.3 inches) for ‘Aladdin Yellow’, plant width was 35 cm (13.8 inches), and flower diameter was 6.9 cm (2.7 inches). The first open flower was 52 d, and flower divergence was 3.5 d. The average foliage rating was 4.7, and the average flower rating was 4.9. The overall foliage/flower rating was 4.8. The overall foliage pest rating was 6.1, and the overall flower pest rating was 5.7. The overall foliage/flower pest rating was 5.9. The adjusted overall performance rating was 5.1. ‘Aladdin Yellow’ (Bodger Seeds) was best of class.

Milliflora – single; purple, light blue violet class. Plant height was 16 cm (6.3 inches) for ‘Fantasy Light Lavender’, plant width was 35 cm (13.8 inches), and flower diameter was 3.8 cm (1.5 inches). The first open flower was 47 d, and flower divergence was 6.5 d. The average foliage rating was 5.8, and the average flower rating was 4.6. The overall foliage/flower rating was 5.2. The overall foliage pest rating was 6.8, and the overall flower pest rating was 5.7. The overall foliage/flower pest rating was 6.2. The adjusted overall performance rating was 5.7. ‘Fantasy Light Lavender’ (Goldsmith Seeds) was best of class, uncontested.

Milliflora – single; rose class. Plant height was 14 cm (5.5 inches) for ‘Fantasy Rose’, plant width was 32 cm (12.6 inches), and flower diameter was 4.3 cm (1.7 inches). The first open flower was 41 d, and flower divergence was 3.3 d. The average foliage

rating was 4.9, and the average flower rating was 3.9. The overall foliage/flower rating was 4.4. The overall foliage pest rating was 6.8, and the overall flower pest rating was 5.7. The overall foliage/flower pest rating was 6.2. The adjusted overall performance rating was 5.3. 'Fantasy Rose' (Goldsmith Seeds) was best of class, uncontested.

Multiflora – single; pink class. Plant height was 16 cm (6.3 inches) for 'Symphony Pink', plant width was 40 cm (15.7 inches), and flower diameter was 6.0 cm (2.4 inches). The first open flower was 44 d, and flower divergence was 4.0 d. The average foliage rating was 5.1, and the average flower rating was 5.0. The overall foliage/flower rating was 5.1. The overall foliage pest rating was 6.5, and the overall flower pest rating was 6.5. The overall foliage/flower pest rating was 6.5. The adjusted overall performance rating was 5.6. 'Symphony Pink' (American Takii) was best of class, uncontested.

Multiflora – single; purple, dark blue violet class. Plant height ranged from 20 cm (7.9 inches) for 'Symphony Violet' to 21 cm (8.3 inches) for 'Symphony Purple'. Plant width ranged from 33 cm (13.0 inches) for 'Symphony Violet' to 35 cm (13.8 inches) for 'Symphony Purple'. Flower diameter ranged from 5.4 cm (2.1 inches) for 'Symphony Violet' to 5.9 cm (2.3 inches) for 'Symphony Purple'. The first open flower ranged from 44 d for 'Symphony Violet' to 45 d for 'Symphony Purple'. Flower divergence was 5.8 d for 'Symphony Purple' and 'Symphony Violet'. Average foliage ratings ranged from 3.9 for 'Symphony Violet' to 4.6 for 'Symphony Purple'. Average flower ratings ranged from 5.3 for 'Symphony Violet' to 5.5 for 'Symphony Purple'. Overall foliage/flower ratings ranged from 4.6 for 'Symphony Violet' to 5.1 for 'Symphony Purple'. Overall foliage pest ratings ranged from 6.1 for 'Symphony Purple' to 6.3 for 'Symphony Violet'. Overall flower pest ratings ranged from 5.7 for 'Symphony Purple' to 6.4 for 'Symphony Violet'. Overall foliage/flower pest ratings ranged from 5.9 for 'Symphony Purple' to 6.4 for 'Symphony Violet'. The adjusted overall performance ratings ranged from 5.3 for 'Symphony Purple' to 5.5 for 'Symphony Violet'. 'Symphony Violet' (American Takii) was best of class..7

Multiflora – single; red class. Plant height was 13 cm (5.1 inches) for 'Symphony Scarlet', plant width was 33 cm (13.0 inches), and flower diameter was 6.0 cm (2.4 inches). The first open flower was 44 d, and flower divergence was 3.8 d. The average foliage rating was 3.9, and the average flower rating was 4.4. The overall foliage/flower rating was 4.2. The overall foliage pest rating was 6.4, and the overall flower pest rating was 6.5. The overall foliage/flower pest rating was 6.4. The adjusted overall performance rating was 5.1. 'Symphony Scarlet' (American Takii) was best of class.

Multiflora – single; rose class. Plant height ranged from 18 cm (7.1 inches) for 'Symphony Rose' to 20 cm (7.9 inches) for 'Symphony Deep Rose'. Plant width ranged from to 33 cm (13.0 inches) for 'Symphony Rose' to 38 cm (15.0 inches) for 'Symphony Deep Rose'. Flower diameter ranged from 5.9 cm (2.3 inches) for 'Symphony Deep Rose' to 6.1 cm (2.4 inches) for 'Symphony Rose'. The first open flower ranged from 47 d for 'Symphony Deep Rose' to 48 d for 'Symphony Rose'. Flower divergence ranged from 3.3 d for 'Symphony Rose' to 7.0 d for 'Symphony Deep Rose'. Average foliage ratings ranged from 4.2 for 'Symphony Deep Rose' to 4.8 for 'Symphony Rose'. Average flower ratings ranged from 5.3 for 'Symphony Deep Rose' to 5.7 for 'Symphony Rose'. Overall foliage/flower ratings ranged from 4.8 for 'Symphony Deep Rose' to 5.2 for 'Symphony Rose'. Overall foliage pest ratings ranged from 6.2 for 'Symphony Deep Rose' to 6.5 for 'Symphony Rose'. The overall flower pest rating was

5.8 for 'Symphony Deep Rose' and 'Symphony Rose'. Overall foliage/flower pest ratings ranged from 6.0 for 'Symphony Deep Rose' to 6.1 for 'Symphony Rose'. The adjusted overall performance ratings ranged from 5.4 for 'Symphony Deep Rose' to 5.7 for 'Symphony Rose'. 'Symphony Rose' (American Takii) was best of class.

Multiflora – single; salmon class. Plant height was 14 cm (5.5 inches) for 'Symphony Salmon', plant width was 34 cm (13.4 inches), and flower diameter was 5.1 cm (2.0 inches). The first open flower was 44 d, and flower divergence was 3.3 d. The average foliage rating was 5.2, and the average flower rating was 4.6. The overall foliage/flower rating was 4.9. The overall foliage pest rating was 6.4, and the overall flower pest rating was 6.3. The overall foliage/flower pest rating was 6.4. The adjusted overall performance rating was 5.6. 'Symphony Salmon' (American Takii) was best of class.

Multiflora – single; white class. Plant height was 21 cm (8.3 inches) for 'Symphony White', plant width was 39 cm (15.4 inches), and flower diameter was 6.5 cm (2.6 inches). The first open flower was 46 d, and flower divergence was 6.8 d. The average foliage rating was 5.4, and the average flower rating was 4.9. The overall foliage/flower rating was 5.2. The overall foliage pest rating was 6.3, and the overall flower pest rating was 6.0. The overall foliage/flower pest rating was 6.2. The adjusted overall performance rating was 5.5. 'Symphony White' (American Takii) was best of class.

Spreading – blue class. Plant height was 13 cm (5.1 inches) for 'Ramblin' Deep Blue', plant width was 51 cm (20.1 inches), and flower diameter was 6.1 cm (2.4 inches). The first open flower was 57 d, and flower divergence was 9.3 d. The average foliage rating was 3.9, and the average flower rating was 4.5. The overall foliage/flower rating was 4.2. The overall foliage pest rating was 5.7, and the overall flower pest rating was 6.6. The overall foliage/flower pest rating was 6.0. The adjusted overall performance rating was 4.8. 'Ramblin' Deep Blue' (Goldsmith Seeds) was best of class.

Spreading – pink class. Plant height ranged from 8 cm (3.1 inches) for 'Wave Pink experimental 99WP5' to 12 cm (4.7 inches) for 'Ramblin' Shades 'O Pink' and 'Avalanche Pink'. Plant width ranged from 54 cm (21.3 inches) for 'Avalanche Pink' to 65 cm (25.6 inches) for 'Wave Pink experimental 99WP5'. Flower diameter ranged from 5.4 cm (2.1 inches) for 'Avalanche Pink' and 'Wave Pink experimental 99WP5' to 5.9 cm (2.3 inches) for 'Ramblin' Shades 'O Pink'. The first open flower ranged from 49 d for 'Avalanche Pink' to 73 d for 'Wave Pink experimental 99WP5'. Flower divergence ranged from 4.3 d for 'Avalanche Pink' to 7.8 d for 'Wave Pink experimental 99WP5'. Average foliage ratings ranged from 5.4 for 'Avalanche Pink' to 6.3 for 'Ramblin' Shades 'O Pink'. Average flower ratings ranged from 4.0 for 'Wave Pink experimental 99WP5' to 4.6 for 'Ramblin' Shades 'O Pink'. Overall foliage/flower ratings ranged from 4.8 for 'Avalanche Pink' and 'Wave Pink experimental 99WP5' to 5.4 for 'Ramblin' Shades 'O Pink'. Overall foliage pest ratings ranged from 6.0 for 'Avalanche Pink' to 6.6 for 'Wave Pink experimental 99WP5'. Overall flower pest ratings ranged from 5.9 for 'Ramblin' Shades 'O Pink' to 6.7 for 'Wave Pink experimental 99WP5'. Overall foliage/flower pest ratings ranged from 6.2 for 'Ramblin' Shades 'O Pink' to 6.7 for 'Wave Pink experimental 99WP5'. The adjusted overall performance ratings ranged from 5.2 for 'Avalanche Pink' to 5.8 for 'Ramblin' Shades 'O Pink'. 'Ramblin' Shades 'O Pink' (Goldsmith Seeds) was best of class.

Spreading – dark, blue violet class. Plant height ranged from 9 cm (3.5 inches) for

'Wave Lavender' to 15 cm (5.9 inches) for 'Avalanche Lavender'. Plant width ranged from to 59 cm (23.2 inches) for 'Avalanche Lavender' to 66 cm (26.0 inches) for 'Wave Lavender'. Flower diameter ranged from 5.8 cm (2.3 inches) for 'Wave Lavender' to 6.1 cm (2.4 inches) for 'Avalanche Lavender'. The first open flower ranged from 52 d for 'Avalanche Lavender' to 60 d for 'Wave Lavender'. Flower divergence ranged from 7.3 d for 'Wave Lavender' to 4.5 d for 'Avalanche Lavender'. Average foliage ratings ranged from 5.7 for 'Wave Lavender' to 5.8 for 'Avalanche Lavender'. Average flower ratings ranged from 4.7 for 'Wave Lavender' to 5.1 for 'Avalanche Lavender'. Overall foliage/flower ratings ranged from 5.2 for 'Wave Lavender' to 5.4 for 'Avalanche Lavender'. Overall foliage pest ratings ranged from 6.3 for 'Avalanche Lavender' to 6.7 for 'Wave Lavender'. Overall flower pest ratings ranged from 6.1 for 'Avalanche Lavender' to 6.2 for 'Avalanche Lavender'. Overall foliage/flower pest ratings ranged from 6.3 for 'Avalanche Lavender' to 6.4 for 'Wave Lavender'. The adjusted overall performance rating was 5.8 for 'Avalanche Lavender' and 'Wave Lavender'. 'Avalanche Lavender' (Bodger Seeds) was best of class 8.

Spreading – light, blue violet class. Plant height was 18 cm (7.1 inches) for 'Avalanche Lilac', plant width was 63 cm (24.8 inches), and flower diameter was 5.6 cm. Both 'Avalanche Lavender' and 'Wave Lavender' had an adjusted overall rating of 5.8. 'Avalanche Lavender' was chosen best of class based on the higher overall foliage/flower ratings (Table 2) of 5.4.9 (2.2 inches). The first open flower was 47 d, and flower divergence was 6.3 d. The average foliage rating was 5.7, and the average flower rating was 5.0. The overall foliage/flower rating was 5.3. The overall foliage pest rating was 6.2, and the overall flower pest rating was 6.7. The overall foliage/flower pest rating was 6.5. The adjusted overall performance rating was 5.9. 'Avalanche Lilac' (Bodger Seeds) was best of class, uncontested.

Spreading – red class. Plant height ranged from 11 cm (4.3 inches) for 'Avalanche Cherry' to 13 cm (4.7 inches) for 'Avalanche Red'. Plant width ranged from to 42 cm (16.5 inches) for 'Avalanche Red' to 59 cm (23.2 inches) for 'Avalanche Cherry'. Flower diameter ranged from 4.5 cm (1.8 inches) for 'Avalanche Red' to 6.4 cm (2.5 inches) for 'Avalanche Cherry'. The first open flower ranged from 50 d for 'Avalanche Cherry' to 52 d for 'Avalanche Red'. Flower divergence ranged from 8.0 d for 'Avalanche Cherry' to 9.3 d for 'Avalanche Red'. Average foliage ratings ranged from 4.4 for 'Avalanche Red' to 5.1 for 'Avalanche Cherry'. Average flower ratings ranged from 4.1 for 'Avalanche Red' to 4.7 for 'Avalanche Cherry'. Overall foliage/flower ratings ranged from 4.3 for 'Avalanche Red' to 4.9 for 'Avalanche Cherry'. Overall foliage pest ratings ranged from 6.2 for 'Avalanche Red' to 6.3 for 'Avalanche Cherry'. Overall flower pest ratings ranged from 5.9 for 'Avalanche Cherry' to 6.2 for 'Avalanche Red'. The overall foliage/flower pest rating was 6.2 for 'Avalanche Cherry' and 'Avalanche Red'. The adjusted overall performance ratings ranged from 5.2 for 'Avalanche Red' to 5.4 for 'Avalanche Cherry'. 'Avalanche Cherry' (Bodger Seeds) was best of class.

Spreading – salmon class. Plant height ranged from 11 cm (4.3 inches) for 'Ramblin' Peach Glo' to 13 cm (5.1 inches) for 'Avalanche Salmon Shades'. Plant width ranged from to 52 cm (20.5 inches) for 'Avalanche Salmon Shades' to 59 cm (23.2 inches) for 'Ramblin' Peach Glo'. Flower diameter ranged from 4.9 cm (1.9 inches) for 'Avalanche Salmon Shades' to 6.1 cm (2.4 inches) for 'Ramblin' Peach Glo'. The first open flower ranged from 51 d for 'Avalanche Salmon Shades' to 56 d for 'Ramblin' Peach Glo'.

Flower divergence ranged from 2.8 d for 'Avalanche Salmon Shades' to 16 d for 'Ramblin' Peach Glo'. Average foliage ratings ranged from 5.4 for 'Avalanche Salmon Shades' to 5.7 for 'Ramblin' Peach Glo'. Average flower ratings ranged from 4.6 for 'Ramblin' Peach Glo' to 5.5 for 'Avalanche Salmon Shades'. Overall foliage/flower ratings ranged from 5.1 for 'Ramblin' Peach Glo' to 5.5 for 'Avalanche Salmon Shades'. The overall foliage pest rating was 6.2 for 'Avalanche Salmon Shades' and 'Ramblin' Peach Glo'. Overall flower pest ratings ranged from 6.2 for 'Ramblin' Peach Glo' to 6.6 for 'Avalanche Salmon Shades'. Overall foliage/flower pest ratings ranged from 6.2 for 'Ramblin' Peach Glo' to 6.3 for 'Avalanche Salmon Shades'. The adjusted overall performance ratings ranged from 5.6 for 'Ramblin' Peach Glo' to 5.9 for 'Avalanche Salmon Shades'. 'Avalanche Salmon Shades' (Bodger Seeds) was best of class.

Spreading – white class. Plant height was 15 cm (5.9 inches) for 'Avalanche White', plant width was 60 cm (32.6 inches), and flower diameter was 5.8 cm (2.3 inches). The first open flower was 51 d, and flower divergence was 9.8 d. The average foliage rating was 5.4, and the average flower rating was 4.6. The overall foliage/flower rating was 5.0..10

The overall foliage pest rating was 5.9, and the overall flower pest rating was 5.9. The overall foliage/flower pest rating was 5.9. The adjusted overall performance rating was 5.1. 'Avalanche White' (Bodger Seeds) was best of class.

Tall Spreading – light purple, blue violet class. Plant height was 23 cm (9.1 inches) for 'Tidal Wave Silver', plant width was 89 cm (35 inches), and flower diameter was 5.9 cm (2.3 inches). The first open flower was 6.4 d, and flower divergence was 12.3 d. The average foliage rating was 6.2, and the average flower rating was 4.6. The overall foliage/flower rating was 5.4. The overall foliage pest rating was 6.6, and the overall flower pest rating was 6.4. The overall foliage/flower pest rating was 6.5. The adjusted overall performance rating was 6.0. 'Tidal Wave Silver' (PanAmerican Seed) was best of class, uncontested.

Tall Spreading – dark purple, red violet class. Plant height ranged from 18 cm (7.1 inches) for 'Ramblin' Burgundy Chrome' to 35 cm (13.8 inches) for 'Kahuna Violet'. Plant width ranged from to 75 cm (29.5 inches) for 'Ramblin' Burgundy Chrome' to 80 cm (31.5 inches) for 'Kahuna Violet'. Flower diameter ranged from 4.5 cm (1.8 inches) for 'Kahuna Violet' to 5.3 cm (2.1 inches) for 'Ramblin' Burgundy Chrome'. The first open flower ranged from 45 d for 'Kahuna Violet' to 58 d for 'Ramblin' Burgundy Chrome'. Flower divergence ranged from 3.5 d for 'Kahuna Violet' to 5.3 d for 'Ramblin' Burgundy Chrome'. Average foliage ratings ranged from 5.2 for 'Ramblin' Burgundy Chrome' to 5.7 for 'Kahuna Violet'. Average flower ratings ranged from 4.7 for 'Ramblin' Burgundy Chrome' to 5.9 for 'Kahuna Violet'. Overall foliage/flower ratings ranged from 5.0 for 'Ramblin' Burgundy Chrome' to 5.8 for 'Kahuna Violet'. Overall foliage pest ratings ranged from 6.1 for 'Ramblin' Burgundy Chrome' to 6.3 for 'Kahuna Violet'. Overall flower pest ratings ranged from 5.9 for 'Ramblin' Burgundy Chrome' to 6.2 for 'Kahuna Violet'. Overall foliage/flower pest ratings ranged from 6.0 for 'Ramblin' Burgundy Chrome' to 6.3 for 'Kahuna Violet'. The adjusted overall performance ratings ranged from 5.5 for 'Ramblin' Burgundy Chrome' to 6.0 for 'Kahuna Violet'. 'Kahuna Violet' (Syngenta Seeds) was best of class.

Tall Spreading – white class. Plant height was 29 cm (11.4 inches) for 'Kahuna White', plant width was 76 cm (29.9 inches), and flower diameter was 6.9 cm (2.7

inches). The first open flower was 54 d, and flower divergence was 7.0 d. The average foliage rating was 6.5, and the average flower rating was 5.9. The overall foliage/flower rating was 6.2. The overall foliage pest rating was 6.7, and the overall flower pest rating was 6.6. The overall foliage/flower pest rating was 6.6. The adjusted overall performance rating was 6.4. 'Kahuna White' (Syngenta Seeds) was best of class.

Conclusions and Comments

Overall Performance and Best of Class Cultivars

While early or late season performance, a particular plant height, or shade of the same color may be a selection criteria outweighing seasonal performance, the combined foliage and flower ratings represent an overall view of performance for each cultivar in its class over the entire season. We consider cultivars with an adjusted overall performance rating > 6.0 as outstanding, 5.5– 5.9 as very good performers, 5.4 – 5.0 as good and < 4.0 – 4.9 as fair. This is a summary of cultivar selections listed by performance and class order, with best of class indicated with an asterisk (*): **Outstanding** cultivars (> 6.0) were: **'Kahuna Violet'*** (Tall Spreading – dark purple, red violet class); **'Kahuna White'*** (Tall Spreading – white class); and **'Tidal Wave Silver'*** (Tall Spreading – light purple, blue violet class). **Very good** cultivars (5.5-5.9) were: **'Wild Rose Mix'*** (Grandiflora – single; mixes class); **'Fantasy Light Lavender'*** (Milliflora – single; purple, light blue violet class); **'Symphony Pink'*** (Multiflora – single; pink class); **'Symphony Violet'*** (Multiflora – single; purple, dark blue violet class); **'Symphony Rose'*** (Multiflora – single; rose class); **'Symphony Salmon'*** (Multiflora – single; salmon class); **'Symphony White'*** (Multiflora – single; white class); **'Ramblin' Shades 'O Pink'*** and **'Wave Pink experimental 99WP5'** (Spreading – pink class); **'Avalanche Lavender'*** and **'Wave Lavender'** (Spreading – dark, blue violet class); **'Avalanche Lilac'*** (Spreading – light, blue violet class); **'Avalanche Salmon Shades'*** and **'Ramblin' Peach Glo'** (Spreading – salmon class); **'Ramblin' Burgundy Chrome'** (Tall Spreading – dark purple, red violet class). **Good** cultivars (5.4 – 5.0) were: **'Pink Double Madness'***, **'Satin Pink Double Madness'**, and **'Sheer Double Madness Improved'** (Floribunda – double, pink class); **'Celebrity Rose'*** (Floribunda – single; rose class); **'Madness Magenta'** and **'Ultra Violet'*** (Grandiflora – single; purple, dark red violet class); **'Aladdin Yellow'*** (Grandiflora – single; white/yellow class); **'Fantasy Rose'*** (Milliflora – single; rose class); **'Symphony Purple'** (Multiflora – single; purple, dark blue violet class); **'Symphony Scarlet'*** (Multiflora – single; red class); **'Symphony Deep Rose'** (Multiflora – single; rose class); **'Avalanche Pink'** (Spreading – pink class); **'Avalanche Cherry'*** and **'Avalanche Red'** (Spreading – red class); and **'Avalanche White'*** (Spreading – white class). **Fair** cultivars (< 4.0 – 4.9) were: **'Celebrity Burgundy Frost'*** (Floribunda – single; purple, dark red violet /white class); and **'Ramblin' Deep Blue'*** (Spreading – blue class).

Pest evaluations in the unsprayed field

Plant pests – arthropods. Symptoms were relatively minor, and the foliage and flower quality affected by these pests remained generally good to excellent all season. Lepidopterous larvae, flea hoppers and leafminers were detected on foliage, while thrips left their feeding scars on the flowers.

Plant pests – disease. Disease symptoms on foliage did not appear to lower quality until

the end of the season (early June). Foliar spots and blight lowered foliage quality to an unacceptable level in some cases. However, other cultivars maintained high quality all season. Flower symptoms were primarily caused by gray mold, but average ratings were fair to very good.

Note

The information in this report is a summary of experimental results and does not provide recommendations for crop production. Where trade names are used, no discrimination is intended or endorsement implied..12

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