

Tropical Heat: New Coleus Introductions From the University of Florida®

Penny Nguyen and David Clark

Department Environmental Horticulture, University of Florida, 1545 Fifield Hall, Gainesville, Florida 32611-0670

INTRODUCTION

Solenostemon scutellarioides, commonly known as coleus, is a versatile annual bedding plant that is valued for its brightly colored foliage, rapid growth rate, and superior performance in landscapes in the United States of America. Surveys conducted at University of Florida at our May 2005 field day showed that 47% of the public (home gardeners and industry) choose foliage color as the main reason for buying coleus and 21% choose coleus for highly branched growth habit. A tremendous amount of variability in this crop has allowed for the selection of coleus cultivars with many novel foliage colors, growth habits, and leaf shapes. In the 2nd year of our breeding program, over 10,000 coleus seedlings were grown and evaluated in greenhouses on a 1–5 rating scale (1 = poor; 5 = excellent) based on the following characteristics: bright and novel colors, consistency of color patterning, plant vigor, lateral branching, and time to induction of flowering. Seedlings that were eliminated early on from the program either had uninteresting foliage color, poor nonbranching growth habit, or started flowering by the time they reached 8 weeks of age. Based on total scores, approximately 250 “elite” cultivars were selected, and after vegetative propagation, cultivars that displayed poor rooting characteristics were eliminated from the trialing program (only five cultivars) and the remaining elite cultivars were then transplanted at three main trialing locations: full sun in Citra, Florida (hot sun trial), full sun in Richfield, North Carolina (cool sun trial), and under 30% shade in Gainesville, Florida (hot shade trial). Several new cultivars with excellent performance in all trials for all variables were selected, and several potential challenges were identified that we plan to work on the upcoming year. In addition, the production of cultivars with the trailing habit and brightly colored foliage by directed genetic crosses have been promising to date. Hybrid F1 seedlings with trailing habit and brighter foliage colors have been produced in the past 3 months and are now being trialed in the greenhouse.

POTENTIAL CHALLENGES AND PRELIMINARY RESULTS

Color Fading. From the inception of this breeding program, we have observed that many brightly colored coleus cultivars grown in warm, sunny environments have foliage that either burns and becomes necrotic, or transitions to completely dull green or maroon in appearance (Fig. 1A-D), with only a few that remained consistently bright (Fig. 1E-F). It appears that this characteristic may be the most difficult problem for us to solve to date, but we have made significant progress. When all observations were combined, over 80% of our elite cultivars had foliage that transitioned to dull maroon or green in appearance in all trialing locations, while less than 5% of these cultivars displayed burning and necrosis. Approximately 15% of the elite cultivars had foliage color that remained bright and consistent in all locations—most of these plants remain in the breeding program, and seeds are being produced from



Figure 1. Effects of two light intensities on coleus foliage color (A, C, E) light intensity at $4,500 \pm 500$ foot candles (fc) (B,D,F) light intensity at $9,500 \pm 500$ FC; (A-B) cultivar 03-1-13 (C-D), cultivar 03-8-3 (E-F), cultivar 04-18-1.

them for testing in our 2006 crop in order to try and increase the number of cultivars with bright color that is stable in a wide range of environments.

Groundcovers or Hanging Baskets. Currently, there are several excellent standard coleus cultivars being sold in the bedding plant markets of the southern United States. However, the number of coleus cultivars available that are groundcover or trailing habit types is limited to a handful of rangy or weak cultivars with either red or green foliage. The current industry standard for trailing coleus cultivars is 'Red Queen', which flowers continuously and has good trailing habit and vigor, but has small leaves that are dull green or purple in color. In an effort to introgress bright-colored foliage with trailing habit, a cross between 'Red Queen' (trailing habit, purple foliage) and 'Sedona' (upright habit, orange/yellow foliage) has been made, resulting in the production of F1 hybrid seeds (Fig. 2). Over 300 seedlings

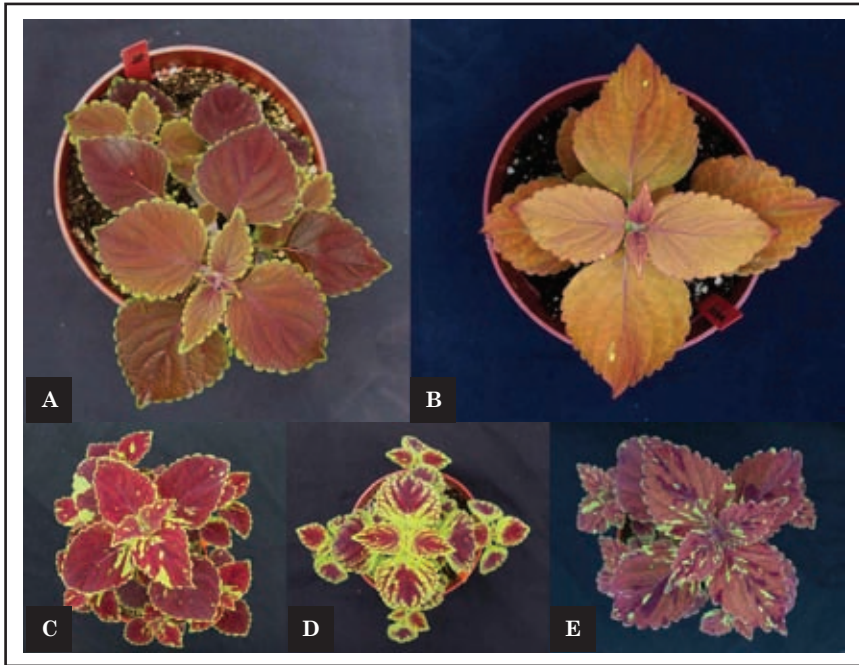


Figure 2. Top row left to right. Parental plants used in the directed genetic crosses to produce F1 hybrids. (A) Commercial trailing cultivar ‘Red Queen’, (B) commercial standard upright cultivar ‘Sedona’, (C, D, E bottom row) F1 hybrids from ‘Red Queen’ (♀) × ‘Sedona’ (♂) crosses.

of the crosses were planted 4 weeks ago and are being compared with seedlings produced from self-pollinating the two parents. Preliminary observations confirm that several of the F1 hybrid seedlings have both trailing habit and brighter foliage color than seedlings produced from self-pollinating ‘Red Queen’, but none of these seedlings have foliage color as bright as the seedlings produced from self-pollinating ‘Sedona’. We are currently screening all of the F1 hybrids in the greenhouse and will produce F2 generation seeds by self-pollinating F1 individuals with trailing habit and brighter foliage color than ‘Red Queen’. We hope to trial these selections in hanging baskets and in our sun and shade trials in 2006.

Plant Vigor and Branched Growth Habit. It is evident that developing a wide range of vigor in coleus is not problematic for our breeding program. Plants that were vigorous growers as seedlings continued to grow strong as mature plants, while weaker growing seedlings were less vigorous mature plants. Plants with less vigor got off to a poor start after planting in the field in April and continued to grow slowly throughout the season in all locations tested. Although many of these plants reached maturity in Florida plantings, they were usually too weak to avoid being overtaken by weeds in North Carolina. The most vigorous cultivars grew so large under Florida conditions that they would likely require landscape maintenance for pruning, but these cultivars performed well under the cooler conditions of North Carolina. Cultivars that are best suited for growth in Florida that require low amounts of landscape maintenance often had inconsistent performance in North Carolina.

It also appears that developing coleus cultivars that are highly branched is also achievable through our program. We were able to determine that seedlings showing highly branched plant architecture almost exclusively displayed this characteristic within the first 8 weeks of seedling growth, thus providing an easy method to screen for during the early stages of evaluation. These cultivars continued to be highly branched throughout the season in all trials; thus most elite cultivars had branching patterns suitable for both landscape use and for production of an economically feasible number of vegetative propagules on stock plants.

Late Flowering Cultivars. Coleus cultivars that initiate flowering early and often are usually not desirable for landscape use for two main reasons: (1) Initiation of flowering and seed set induces stored reserves to be mobilized from leaves to these reproductive tissues, thus reducing foliage visual quality, and (2) To avoid reductions in foliage quality due to this altered source : sink ratio, consumers or landscape professionals must spend effort to prune flowers to maintain desirable foliage. Therefore, we have given much attention to the selection of coleus cultivars that either flower late in the season or do not initiate flowers. Although we have eliminated several seedlings from the program due to early flowering characteristics, we have had little trouble isolating cultivars that flower late in the season. A small number of cultivars that have not flowered as of late August 2005 have also been selected, and many of these have proven to retain excellent foliage color characteristics throughout the season. Unfortunately, these cultivars may prove to be terminal in our breeding program, because it may prove too difficult to get seeds from these plants to incorporate into the future of our program without conducting work on identifying the flowering signals. We will continue to select against early flowering cultivars in the future to allow for gradual gains to be made over time.

CONCLUSIONS AND RECOMMENDATIONS

It is apparent to us that the incredible amount of genetic variation available in coleus is capable of producing a number of excellent cultivars for use in the cutting propagated bedding plant industry. Advanced cultivars that have highly branched plant architecture and late-season flowering are attainable through standard selection practices for these characteristics. A more difficult characteristic to obtain in these cultivars is brightly colored foliage that stays bright and consistent over a wide range of environmental conditions. After screening over 10,000 seedlings in 2005, we were able to select for approximately 40 cultivars that had the complete combination of characteristics we were looking for. These cultivars are well branched and have brightly colored foliage in sun and shade under both hot Florida conditions and cooler conditions of North Carolina. We have received a great deal of interest in these cultivars from three major bedding plant breeding/production companies, and we are currently working to allow each company to test these cultivars independently. In 2006, we hope to have initial data back from these companies to determine whether any of these cultivars have commercial utility. Directed genetic crosses to produce coleus cultivars with bright-colored foliage and trailing habit for use in hanging baskets and as groundcovers have been quite successful to date. Tests to determine color stability of these plants are currently underway, and cultivars with the best trailing habit and brightest foliage colors are being advanced in our breeding program for the upcoming year. Cultivars resulting from

these efforts will fill a valuable niche in the landscape industry, which is continuously searching for groundcover plants that produce good color in shady environments. Our program strives to produce new and better coleus selections for the commercial arena as well as producing information for the academic field. Our goal for the coleus-breeding program is to generate new selections that will meet today's demands in ornamental excellence.

The China Connection — People, Plants, and Plans of a Horticultural Giant®

David L. Creech

Stephen F. Austin University Mast Arboretum, PO Box 13000, Nacogdoches, Texas 75962

INTRODUCTION

China's incredible growth and development in the past decade has been the subject of many television specials and print media articles. The facts and figures are astounding: Seventy-five percent of the world's cranes, 40% of the world's concrete, and 16,000 new joint ventures last year alone. China is about to become the big consumer of world oil and steel and graduates 160,000 new engineers each year. These graduates enter an economy boasting a growth rate in the double-digit range. In the midst of all this change, the central government has embraced the regreening of China's industrial base with unimaginable vigor. The "golden triangle" of eastern China is marked by the huge population that lies in and between Nanjing, Shanghai, and Ningbo — an area considered a major economic engine of Eastern China. This region has endured disturbance for thousands of years, but only in the last two decades has it seen a surge in population, the result of an amazing rural to urban migration, a migration driven by the promise of an industrialized China. The area is comparable in many respects to the southeastern U.S. [U.S.D.A. Hardiness Zone 7–9 with 1016–1524 mm (40–60 inches) rainfall per year, with substantial summer rains and drier winters].

The landscape of the watershed and floodplains of the Yangtze is a sight to behold. Attractive concrete apartments are commingled with government buildings, shops, factories, and fruit, vegetable, fish, and animal farms. One thing is apparent: China's land use planners have not shortchanged trees as a part of the picture.

China celebrates the idea that cities featuring refined parks, tree-lined streets, and plenty of vegetation are better than those that don't. Urban landscapers focus their energy on highways, roads, parks, river walks, plazas, canals, and waterways. In fact, China mandates that citizens of large cities be within a thousand meters of a grandiose park. This is horticulture at its biggest. Main thoroughfares in city and urban environs often sport wonderful tiers of vegetation. These tree and shrub plantings take in the gamut of ultimate plant sizes, from small shrub/tree plantings to broad, long landscapes of trees destined to be patriarchs that will provide shade and comfort for citizens in these huge cities. With three million new cars on the roads in China each year, urban planners are in a hurry to make the changes needed for their industrious and very crowded citizens. A center medium of trees and shrubs, then two to four lanes for vehicular traffic, a line of vegetation, bicycle