

# 2009 - 2010 FNGLA ENDOWED RESEARCH FUND FINAL REPORT



## Breeding sterile and non-invasive *Ruellia* cultivars

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### Objectives

The FNGLA Endowed Research Fund partly supported the *Ruellia* breeding program at UF/IFAS in Gainesville. This program was initiated in 2006, aiming to create new sterile cultivars for the landscape plant industry. Goals are to release several new *Ruellia* cultivars with diverse and novel flower colors, different growth habits, all year-flowering, and no invasiveness. Breeding cycles are ongoing, involving hybridizations, induction of mutations and polyploidy, and greenhouse and field trials. To prevent invasiveness, plants are selected for sterility and no fruit formation. Selected breeding lines are evaluated in replicated multi-location trials for landscape performance and sterility before release to industry.

### Accomplishments

**Polyploidization to obtain sterile triploids:** Oryzalin treatments were applied on seedlings of five *Ruellia* breeding lines with different flowers colors to attempt polyploid induction.



**Fig. 1.** Flowers from 2X (left) and 4X (right) *Ruellia* purple, pink, white and white with purple center (clockwise from top left)

Resulting plants were grown in a greenhouse and screened for ploidy level with flow cytometry in collaboration with Dr. Henny, MREC. Tetraploid lines with flower colors of purple, pink, white and white with purple center were obtained. Tetraploid plants had larger flowers than normal diploid plants (Fig. 1). Two tetraploid lines of each flower color were selected for hybridizations aiming to obtain sterile triploids. A total of 125 manual 4X x 2X hybridizations and 225 additional interploidy hybridizations were performed during Fall 2009.

**Greenhouse Trials and Field trials:** Approximately 1000 *Ruellia* plants were obtained from hybridizations and irradiation treatments performed in 2008.

During Summer 2009, these *Ruellia* plants were evaluated for landscape performance and lack of fruiting at Citra, FL (Fig. 2). Eighty breeding lines were selected, propagated vegetatively, and grown in a greenhouse in Gainesville for further evaluations to confirm sterility.



**Fig 2.** *Ruellia* research plot in Citra, FL in 2009

**Breeding cycles and additional hybridizations:** A total of 192 additional hybridizations were performed during 2009, including interspecific combinations, crosses between tall and dwarf plants, and selfings and backcrosses. All seed obtained was sown on January 2010, and progenies are currently being evaluated in a greenhouse in Gainesville (Fig. 3). So far, many plants with different flower colors and no fruit formation have been identified. Selected plants will be trialed in the field during summer 2011. Additionally, interspecific hybrids between *R. elegans*, *R. matudae* and *R. rosea* were obtained, which are sterile and display novel flower colors not currently available in existing *Ruellia* cultivars (Fig. 4).



**Fig 3.** *Ruellia* 2010 progenies in greenhouse in Gainesville



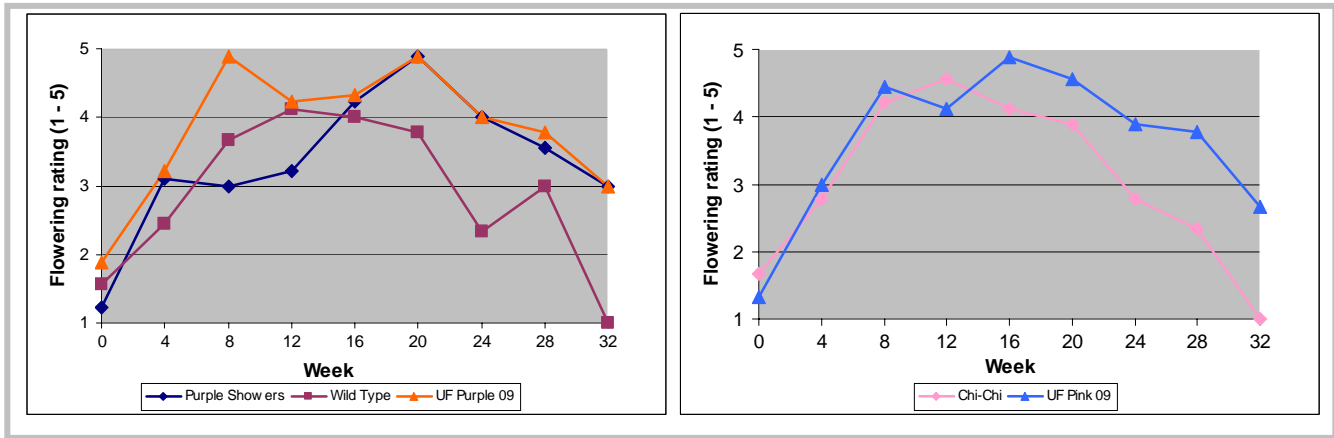
**Fig 4.** Interspecific F<sub>1</sub> hybrid with novel flower color

**Multi-location field trials:** During Summer 2009, a trial was conducted at four locations in FL (Citra, Balm, Fort Pierce and Quincy) to compare two commercial *Ruellia* cultivars ('Purple Showers' and pink 'Chichi'), the *R. tweediana* purple wild type considered a Category I invasive plant, and a purple and a pink breeding line bred at Gainesville. At each location plants were grown in a randomized plot design with three replications of three plants, and data was compiled every four weeks from May to December 2009. Photos of one plant for each cultivar and breeding lines at peak flowering in July are shown (Fig. 5).



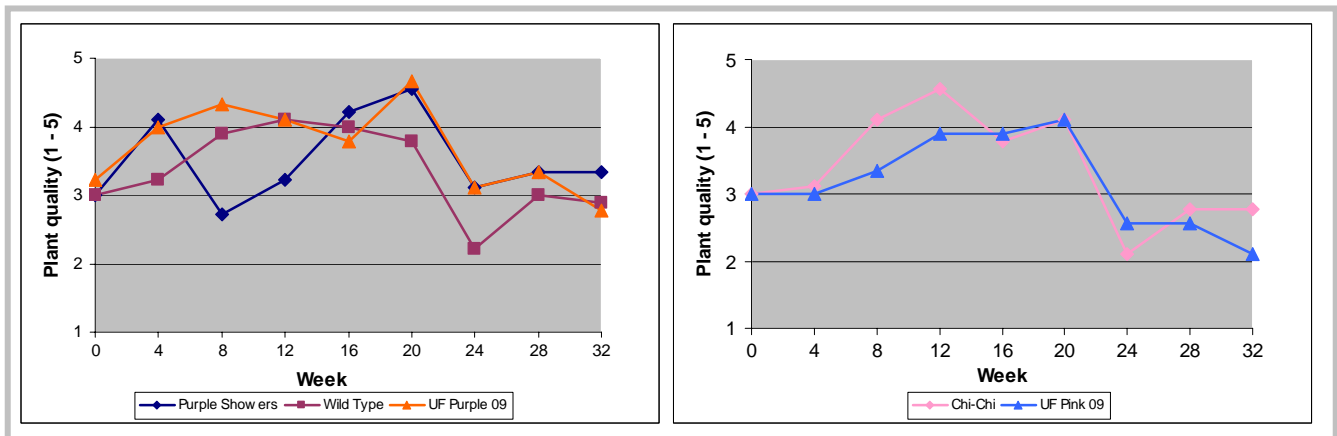
**Fig 5.** *Ruellia* 'Purple Showers' (top left), UF purple breeding line (top right), 'Chichi' (bottom left) and UF pink breeding line (bottom right).

Flowering was evaluated with a rating of 1 to 5, where 1 = no flowers or flower buds; 2 = flower buds visible, but no open flowers; 3 = one to several open flowers; 4 = many open flowers, average to good flowering; and 5 = abundant flowering, possible peak bloom (not including spent flowers). Both UF lines had comparable or better flowering than commercial cultivars. Data for Central FL (Citra) are shown (Fig. 6).



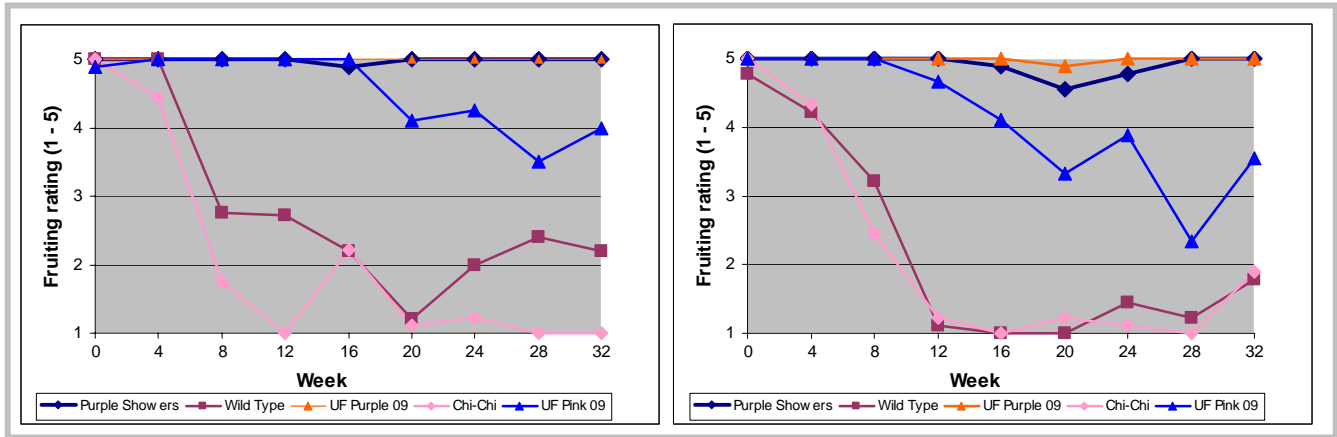
**Fig 6.** Flower rating of *Ruellia* cultivars, wild type and UF breeding lines at Citra, FL in 2009

Landscape performance was evaluated with a rating of 1 to 5, where 1 = very poor quality, not acceptable, severe leaf necrosis or chlorosis, poor form; 2 = poor quality, not acceptable, large areas of necrosis or chlorosis, poor form; 3 = acceptable quality, somewhat desirable form and color; 4 = very good quality, very acceptable and desirable color and form; and 5 = excellent quality, perfect condition, premium color and form, peak landscape performance. Similarly, both UF lines had comparable or better performance than commercial cultivars. Data for Central FL (Citra) are shown (Fig. 7).



**Fig 7.** Plant quality of *Ruellia* cultivars, wild type and UF breeding lines at Citra, FL in 2009

Fruiting was evaluated with a rating of 1 to 5, where 1= more than 50 fruit; 2 = approximately 20 - 50 fruits; 3 = approximately 10 - 20 fruits; 4 = less than 10 fruits; and 5 = no fruits (not including dehisced capsules). As expected, at all locations both the purple wild type and 'Chichi' had abundant fruit production. Surprisingly, although 'Purple Showers' is marketed as sterile, it had production of a few fruits at all locations. Seed obtained was germinated and was viable, indicating that 'Purple Showers' has low female fertility. The UF purple and pink breeding lines had very low and low female fertilities, respectively. Data for North FL (Quincy) and South FL (Fort Pierce) are shown (Fig. 8).



**Fig 8.** Fruiting of *Ruellia* cultivars, wild type and UF breeding lines at North (left) and South (right) FL in 2009. 1 = more than 50 fruits; 5 = no fruits

## Conclusions

This project is progressing successfully towards developing less invasive breeding lines of *Ruellia* with different flower colors, as well as new hybrids with novel colors. New progenies will be evaluated in a multi-location trial in Summer 2011. It is expected that breeding lines in different flower colors with good landscape performance and sterility (or very low female fertility) will be available for commercial trials by the end of the year for potential new cultivar release.

## Acknowledgements

The author would like to thank funding from FNGLA, and to colleagues, technicians and students who contributed during greenhouse and field research at four UF locations.



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