

**Native Roadside Wildflowers in Rural Areas:  
Developing Best Management Practices for Establishment of Plantings by  
Seed and Enhancement of Naturally-Occurring Populations**

Quarterly Report

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## **Project Description**

The objectives of this project are to:

1. Evaluate stand establishment and performance over a 3-year period for plantings of Florida ecotypes of native wildflowers under simulated roadside conditions. Because of the nature of this research, plantings will be established at two University of Florida /IFAS Research & Education Centers – North Florida REC, Quincy and Indian River REC, Ft. Pierce and at the University of Florida /IFAS Plant Science Research & Education Unit in Citra, Florida.
2. Evaluate management methods that will result in preservation and spread of naturally occurring roadside wildflower populations in South Florida.
3. Individual Best Management Practices (BMPs) will be written for the species evaluated in #1; a BMP also will be written based on results of #2.
4. Inputs associated with establishment and maintenance will be used to estimate the costs needed to implement the BMPs defined in #3.

### **OBJECTIVE 1**

Wildflower experiments under simulated roadside conditions are underway at two University of Florida/IFAS Research & Education Centers—North Florida REC, Quincy and Indian River REC, Ft. Pierce—and at the University of Florida/IFAS Plant Science Unit in Citra, Florida. Experiments at these sites include research plots of wildflower species established by direct seeding as well as by transplanting seedlings. In the direct seeded and transplant plots, two mowing regimes and three establishment methods are being evaluated in a complete factorial experiment (split plot design). The two mowing regimes represent the main plot treatment and differ in the number of times each plot is mowed per year. The three establishment methods represent the subplot treatments and vary between the direct seeded and transplant plots. In the direct seeded plots, the establishment methods being evaluated are the use of herbicides (Roundup®, Plateau®, and an untreated control [mowed only]). In the transplant plots, the three establishment methods being evaluated are the use of Roundup®, a prescribed burn, and an untreated control (mowed only). A more detailed description of the experimental design can be found in previous quarterly reports.

New experiments with direct seeded plots were established in early October 2005 at Quincy, Citra, and Ft. Pierce (Table 1). Research plots were evaluated at all three sites in November 2005 and April or May 2006.

Table 1. Current Direct Seeded Experiments

Site	Species	Planting date
Quincy	<i>Coreopsis lanceolata</i> <i>Coreopsis leavenworthii</i> <i>Gaillardia pulchella</i>	October 7, 2005
Citra	<i>Coreopsis lanceolata</i> <i>Coreopsis leavenworthii</i> <i>Gaillardia pulchella</i> <i>Ipomopsis rubra</i>	October 5, 2005
Ft. Pierce	<i>Coreopsis leavenworthii</i>	October 4, 2005

At Quincy and Ft. Pierce, there are also ongoing evaluations of mowing and establishment methods for *C. leavenworthii* seedlings transplanted in spring 2005 (Table 2). At Ft. Pierce, the research plots were mowed and sprayed with Plateau<sup>®</sup> during the summer of 2005 in order to control a *Cyperus rotundus* (purple nutsedge) infestation. Transplant plots were evaluated at both sites in November 2005 and April or May 2006.

Table 2. Current Experiments with Transplanted Seedlings

Site	Species	Planting date
Quincy	<i>Coreopsis leavenworthii</i>	March 31, 2005
Ft. Pierce	<i>Coreopsis leavenworthii</i>	March-April 2005

## Results

### 2005 Direct seeded Plots

At Quincy, density of *C. lanceolata* and *C. leavenworthii* increased from  $\leq 10$  individuals/m<sup>2</sup> (0.9 individuals/ft<sup>2</sup>) in November 2005 to  $\geq 40$  individuals/m<sup>2</sup> (3.7 individuals/ft<sup>2</sup>) in April 2006 (Fig. 1). Density and percent cover of both species appeared to be higher in the Roundup<sup>®</sup> treated plots than in the control or Plateau<sup>®</sup> treatments (Fig. 1, 2). Density in the *G. pulchella* experiment remained low, with  $\leq 2$  individuals/m<sup>2</sup> (0.2 individuals/ft<sup>2</sup>) (Fig. 1) in November 2005 and April 2006. This may have been the result of the timing of germination/emergence during the drier than normal conditions in both the fall and spring.

At Citra, density of *C. lanceolata*, *C. leavenworthii*, and *I. rubra* increased from  $\leq 6$  individuals/m<sup>2</sup> (0.6 individuals/ft<sup>2</sup>) in November 2005 to 11–28 individuals/m<sup>2</sup> (1.0–2.6 individuals/ft<sup>2</sup>) (Fig. 3). No clear difference in density was apparent among establishment treatments. As in Quincy, density of *G. pulchella* remained low ( $\leq 5$  individuals/m<sup>2</sup> [0.5 individuals/ft<sup>2</sup>]; Fig. 3) for the same reason. Percent cover appeared to be higher in the Roundup<sup>®</sup> treated plots than in the control or Plateau<sup>®</sup> treatments for *C. lanceolata* and *G. pulchella*; however, no clear difference in percent cover was apparent among establishment treatments for *C. leavenworthii* or *I. rubra* (Fig. 4).

At Ft. Pierce in November 2005, density of *C. leavenworthii* was relatively high in the Roundup<sup>®</sup> and control treatments in contrast to the Plateau<sup>®</sup> treatments (Fig. 5). While Plateau<sup>®</sup> does not affect germination, seedlings apparently were quite sensitive to Plateau<sup>®</sup>. Since November 2005, density has decreased in the Roundup<sup>®</sup> and control treatments, most likely due to self-thinning. Percent cover increased between November 2005 and May 2006, indicating that the individual wildflowers that survived grew larger (Fig. 6). Percent cover appeared to be higher in the Roundup<sup>®</sup> plots than in the control plots (Fig. 6).

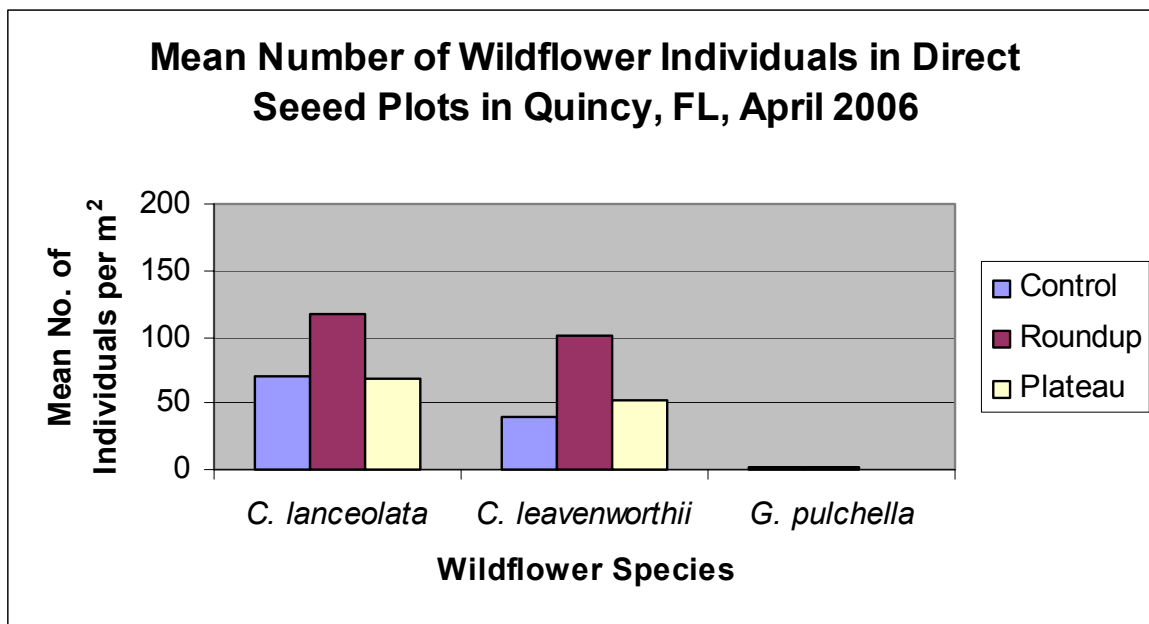


Fig. 1. Wildflower individuals in Quincy, FL.

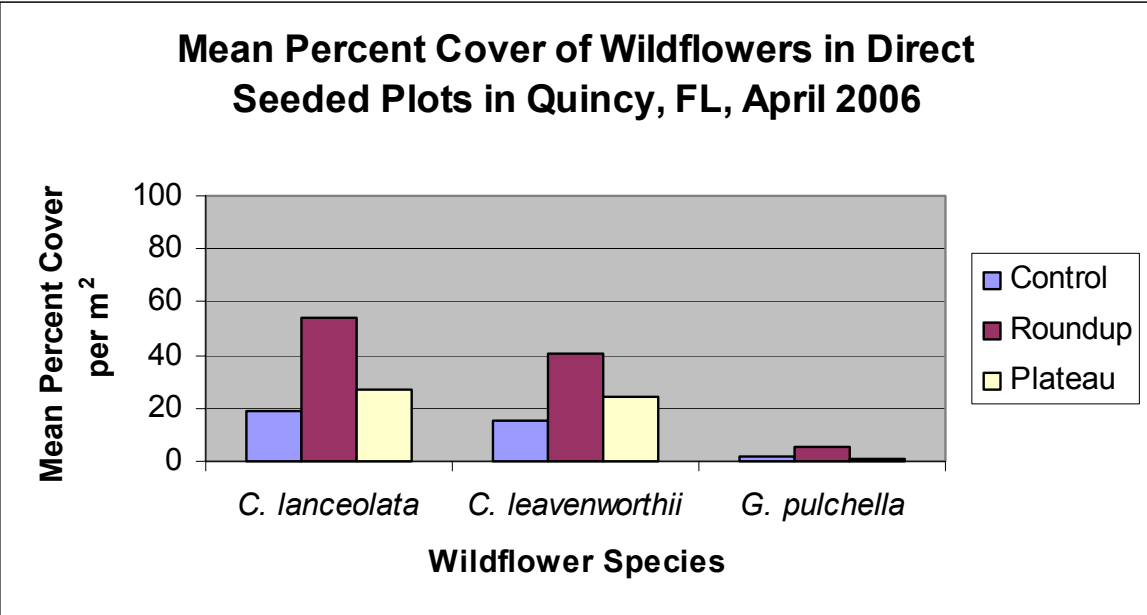


Fig. 2. Wildflower percent cover in Quincy, FL.

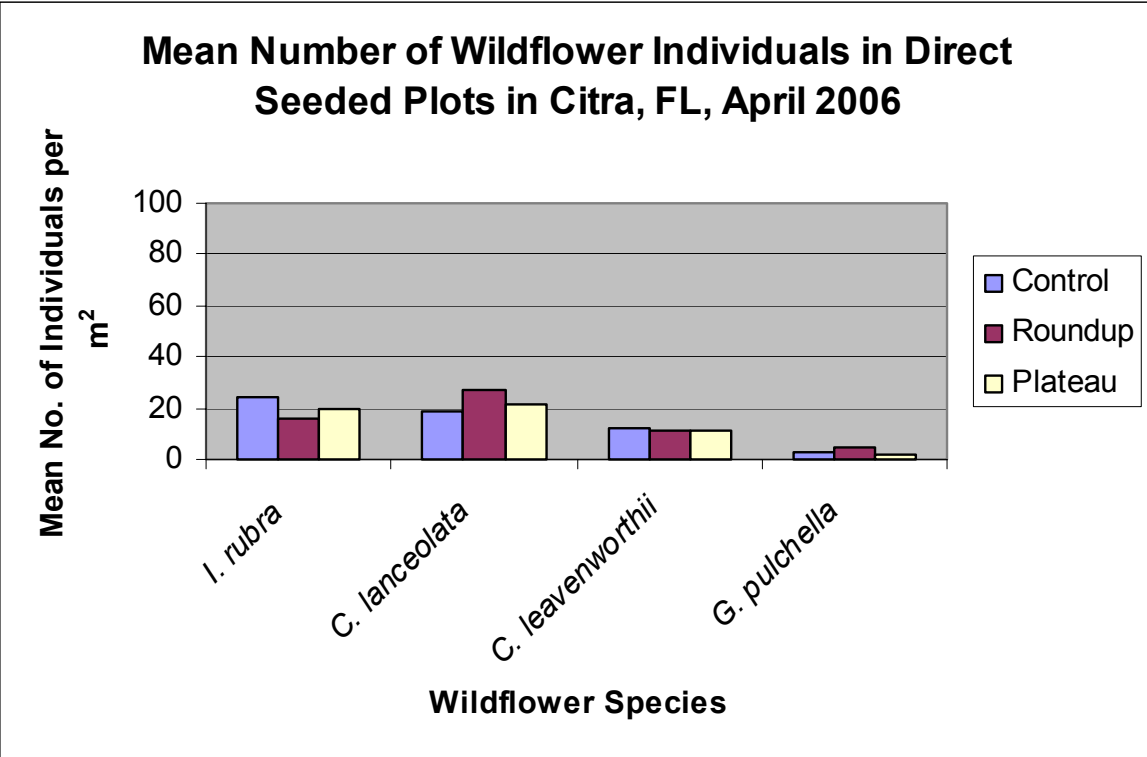


Fig. 3. Wildflower individuals in Citra, FL.

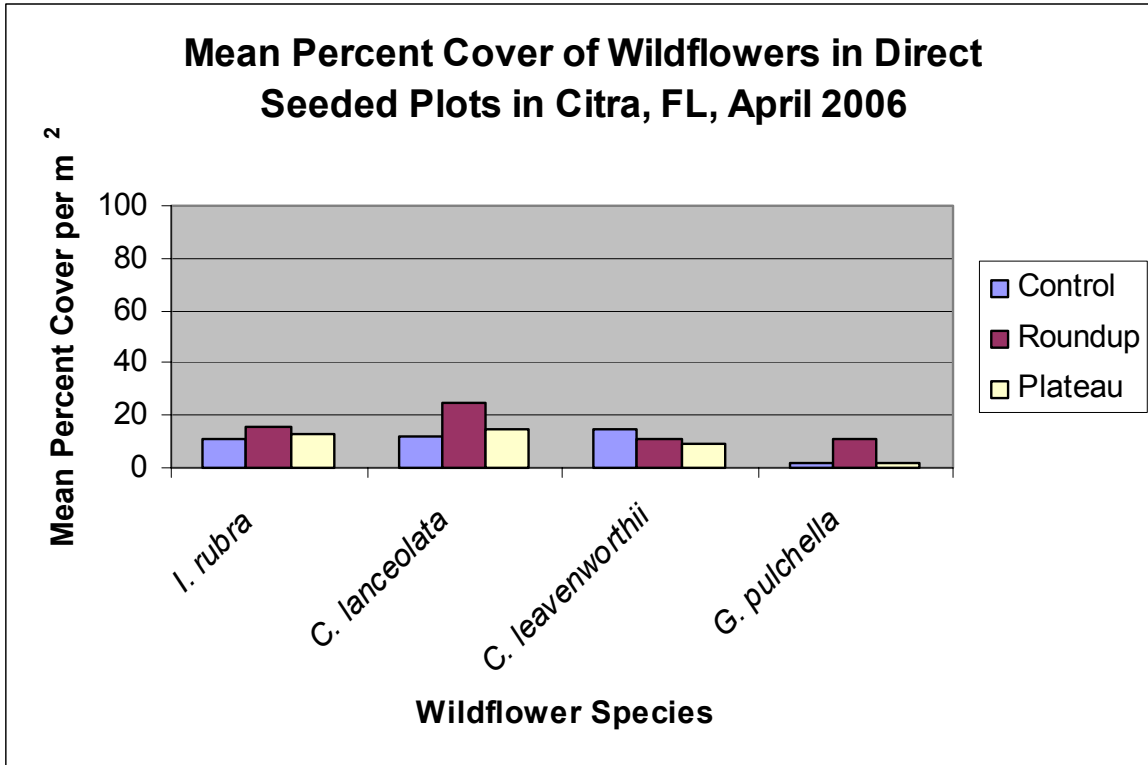


Fig. 4. Wildflower percent cover in Citra, FL.

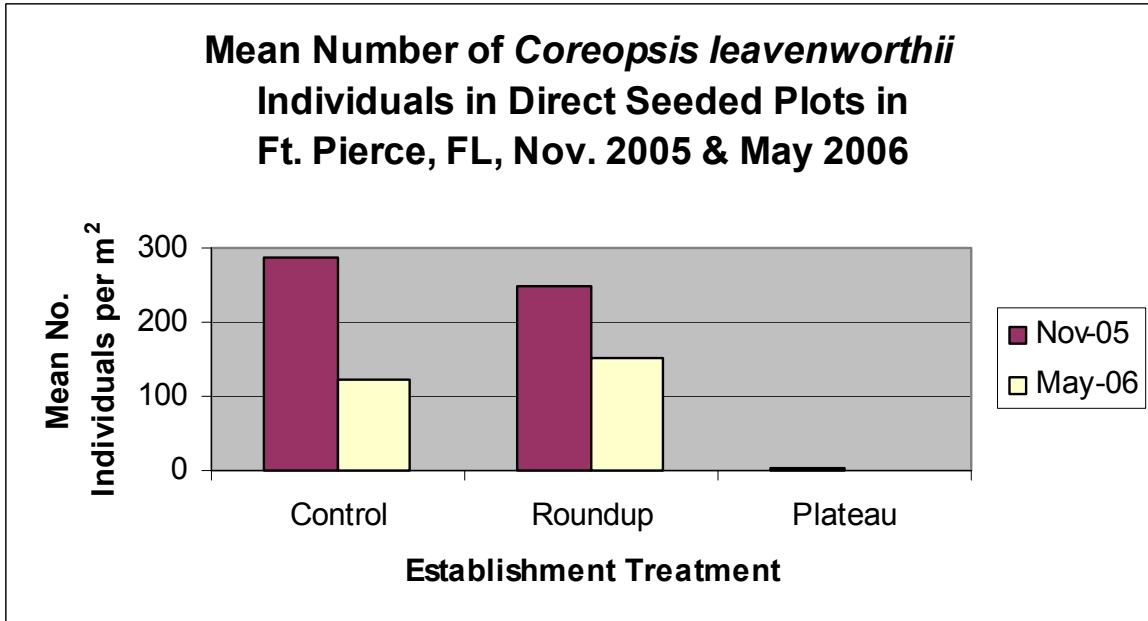


Fig. 5. Wildflower individuals in Ft. Pierce, FL.

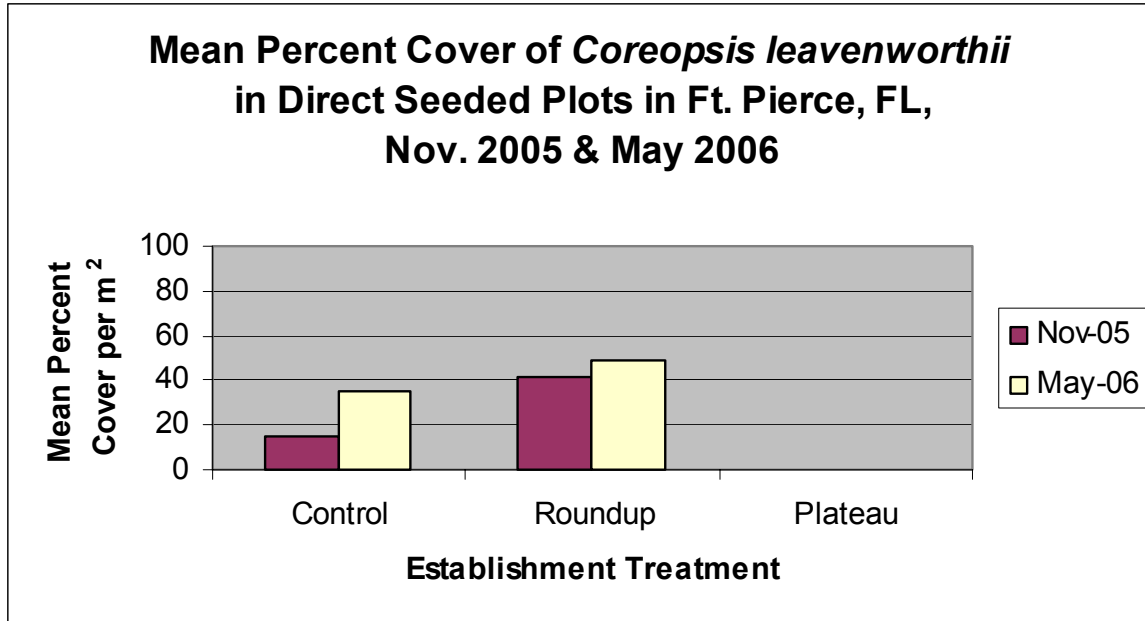


Fig. 6. Wildflower percent cover in Ft. Pierce, FL.

### 2005 Transplant Plots

At Quincy, density of *C. leavenworthii* increased between November 2005 and April 2006 in Roundup<sup>®</sup> plots due to recruitment of seedlings germinating from the seed bank (Fig. 7). Density in the control and burn plots seemed to remain the same from November 2005 to April 2006 (Fig. 7). Percent cover seemed to increase slightly in the control and burn plots, while percent cover tripled in the Roundup<sup>®</sup> plots from November 2005 to April 2006 (Fig. 8).

At Ft. Pierce, none of the original *C. leavenworthii* seedlings that had been transplanted in spring 2005 were present in November 2005 or May 2006. Plant loss was a result of these plantings being sprayed with Plateau<sup>®</sup>, which was applied to control a severe infestation of *Cyperus rotundus*. However, seedlings that germinated from the seed bank were present in most of the plots by November 2005, with more seedlings in the Roundup<sup>®</sup> plots than in the control or burn plots (Fig. 9). By May 2006, only the Roundup<sup>®</sup> plots had >1 individual/m<sup>2</sup> (0.1 individuals/ft<sup>2</sup>) (Fig. 9). Seedlings appear to have died due to extremely dry field conditions. Percent cover seemed to be slightly higher in the Roundup<sup>®</sup> plots than in the control or burn plots in May 2006, but was lower than percent cover in May 2005 (Fig. 10).

### Seed Bank Study

A seed bank study is being conducted in Gainesville to complement the field research in Quincy, Ft. Pierce, and Citra. Soil cores from each plot are being collected every fall and spring and placed in pots in the greenhouse to determine the species composition and estimate the concentration of seed in the seed bank. Results from the seed bank study will be analyzed during summer 2006 and included in the next quarterly grant report. Additionally, soil samples taken for nutrient analysis have been submitted to the Soil and Water Science Department of the Institute of Food and Agricultural Sciences at the University of Florida.

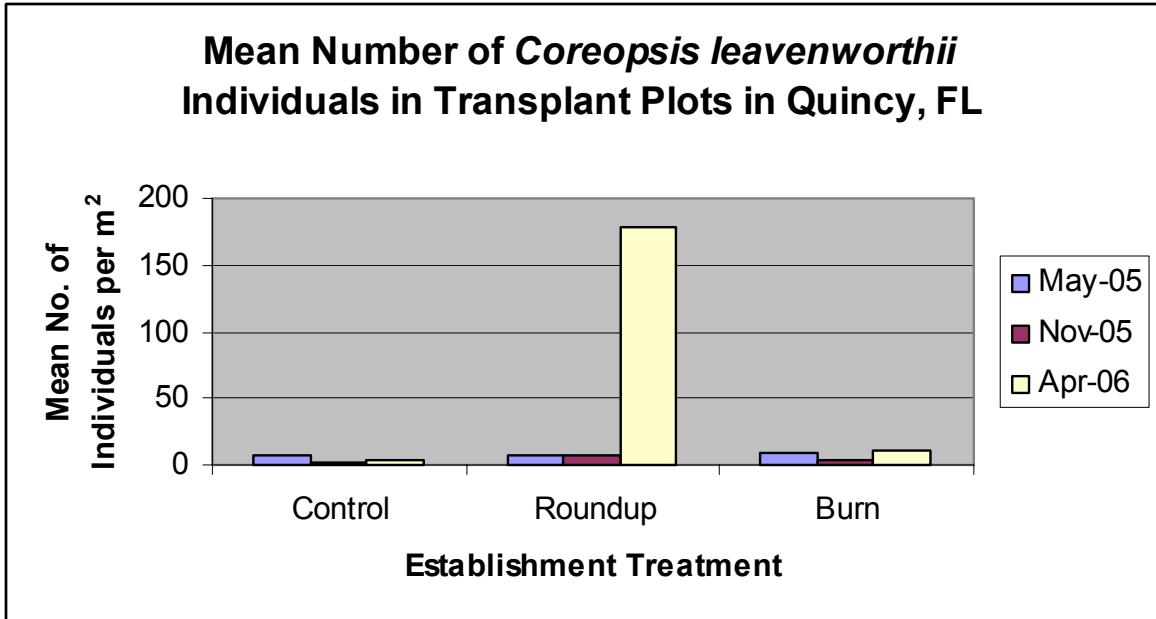


Fig. 7. Wildflower individuals in Quincy, FL.

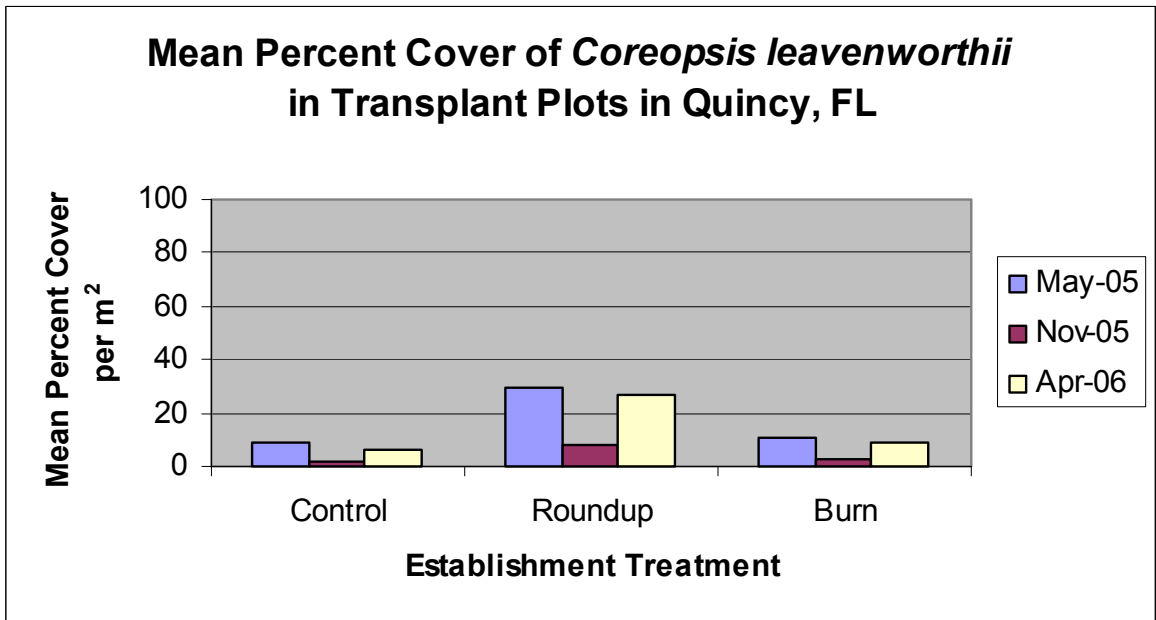


Fig. 8. Wildflower percent cover in Quincy, FL.

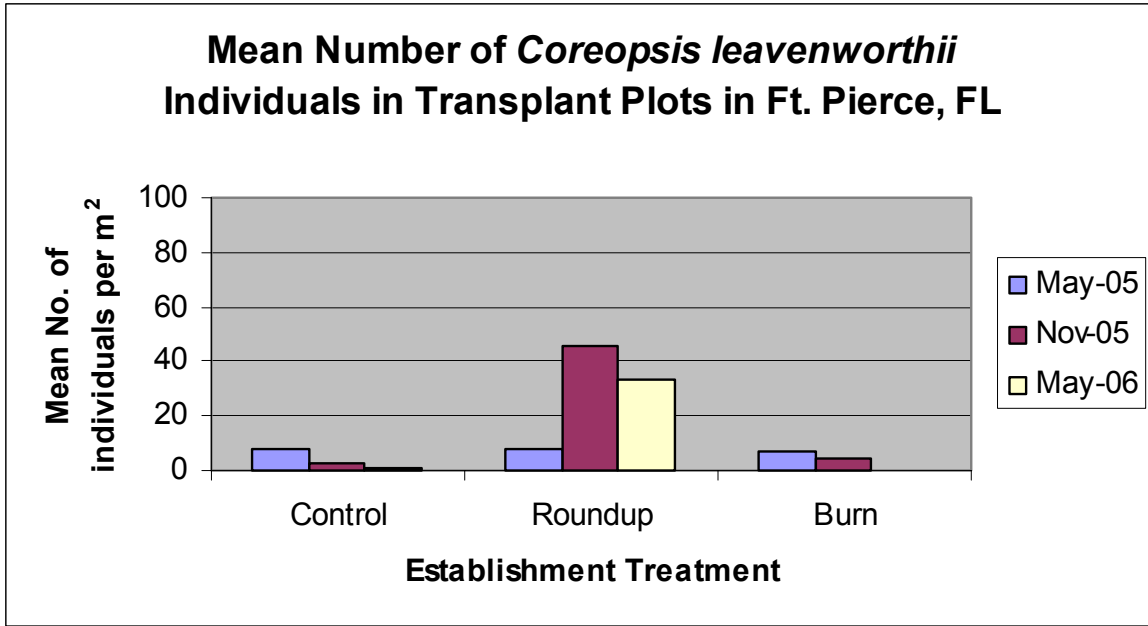


Fig. 9. Wildflower individuals in Ft. Pierce, FL.

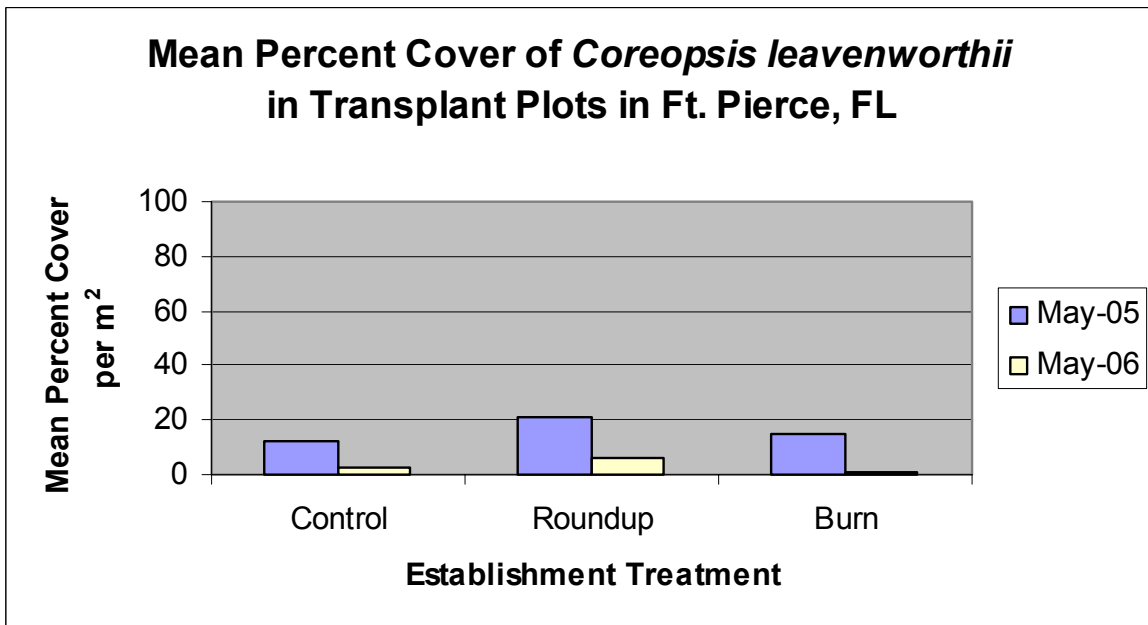


Fig. 10. Wildflower percent cover in Ft. Pierce, FL.

## OBJECTIVE 2

Three sites with naturally occurring wildflower populations on the Florida Turnpike were located in December 2004. All sites are in northern Miami-Dade County in close proximity to each other. *Flaveria linearis* occurs on two sites and *Coreopsis leavenworthii* occurs on the third site. In December 2004, areas with dense concentrations of the targeted wildflower species were delineated with flagging tape to prevent future mowing. The sites were evaluated in March, May, August, and December 2005 and in March of 2006. A more detailed description of the sampling methods can be found in the August 2005 quarterly report. A plant species list was compiled for each site and included in the November 2005 quarterly report.

Mowing was excluded from the two *F. linearis* sites from December 2004 to August 2005. The area was mowed from September to December 2005, after the wildflowers had flowered and produced seed. Mowing was excluded again in December 2005. At the *C. leavenworthii* site, mowing was excluded as above; however, the site was not mowed from August to December 2005 even though the flags to exclude mowing were removed. Mowing was probably hindered due to high water levels and the presence of large debris left by the hurricanes. By February 2006, the large debris had been removed and the tall, woody shrubs had been cut back. Also, the *Panicum repens* (torpedograss) invading part of the site had been sprayed.

### Results

At all three sites, wildflower density appeared to be higher in March 2006 than in December 2005 (Fig. 12). At the I-75 junction *F. linearis* site, there was a large increase in density due to seedlings recruiting in areas of soil disturbance caused by the mower tires (Fig. 12). At the *C. leavenworthii* site, density seemed to increase due to seedlings germinating from the soil seed bank. The fluctuation in density at the *F. linearis* sites may reflect the current mowing cycle as well as local soil disturbances. At the *C. leavenworthii* site, the fluctuation in density may reflect the phenology of the species, which produces most of its flowers from March to May. Plants that have produced seeds often die, and the population seems to be sustained by new recruits from the soil seed bank. Also, *C. leavenworthii* was absent in some plots where it had been observed previously; these plots appear to have been sprayed with herbicide because of the presence of *Panicum repens*. Percent cover at these sites appeared to be higher in March 2006 than in December 2005, but similar to the percent cover observed in March 2005 (Fig. 13).

## OBJECTIVES 3 AND 4

Work on these objectives will not begin until much later in the project.

**Percentage of total work completed as of August 9, 2006: 37%**

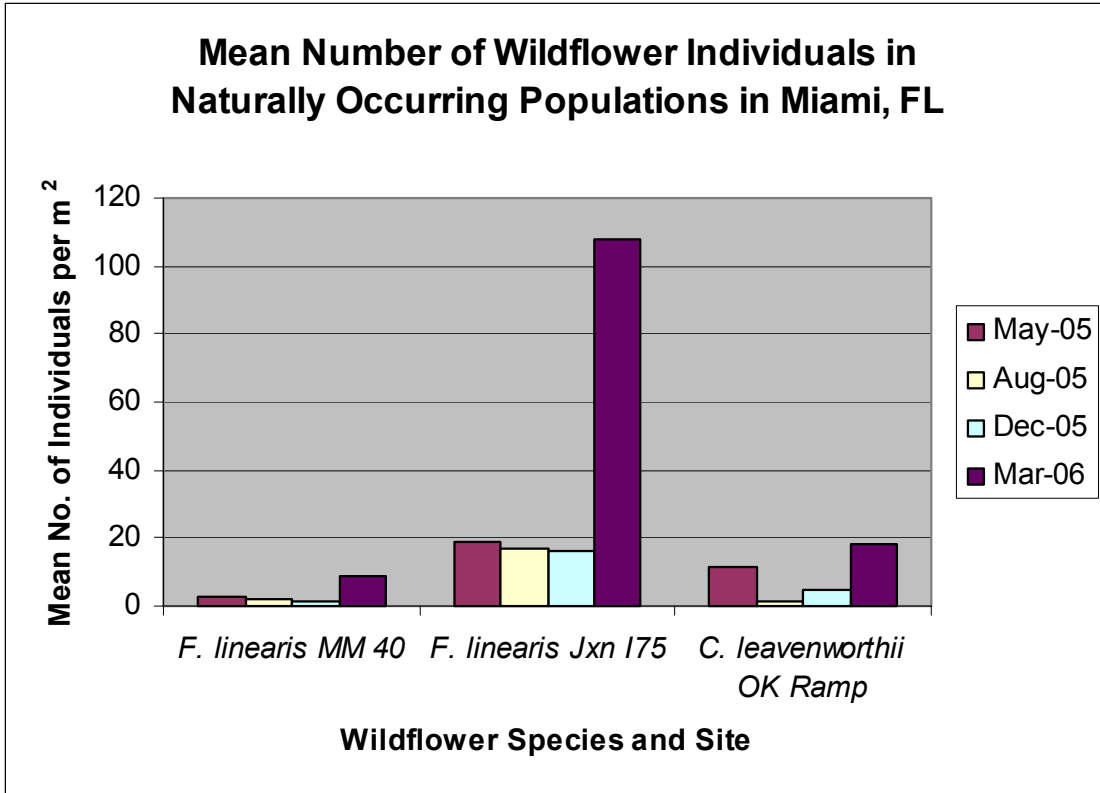


Fig. 12. Wildflower individuals in Miami, FL.

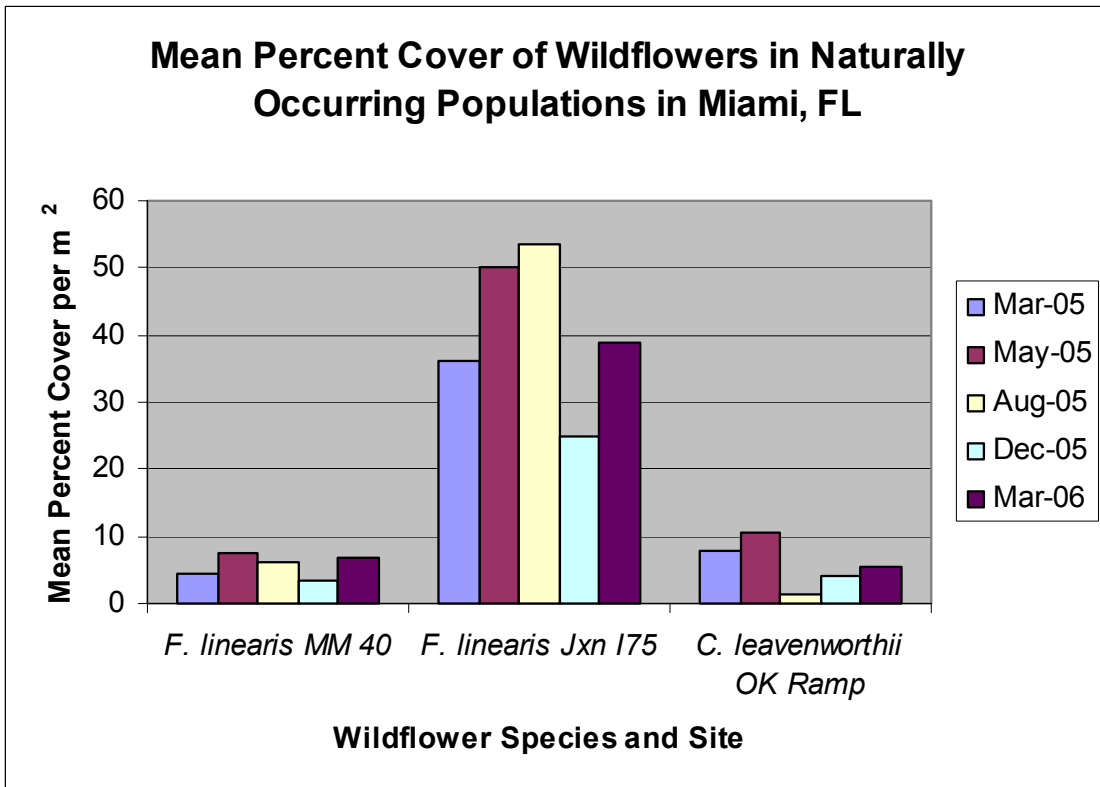


Fig. 13. Wildflower percent cover in Miami, FL.