CCAP 2004-2005
Final Report
November 30, 2005

Project Title: Native Wildflower Seed Production – Establishing a Seed Production Planting of Phlox via Transplants

Starting Date: September 1, 2004 **Ending Date**: September 1, 2005

Type of Project: Alternative Crop Production **Location:** Univ. of Florida/IFAS, North Florida Res. & Edu. Ctr., Quincy

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1. Introduction

Production of Florida ecotypes of native wildflower seed is a fledgling industry in Florida but one with great potential for small farmers. Demand far exceeds supply and is expected to for the foreseeable future. The average net return per acre for native wildflower seed production is $1500 (Les Harrison, Florida Dept. Agric. Cons. Serv. [FDACS], personal communication), with this rate expected to increase over time as production methods become more efficient.

Drummond or Annual Phlox (*Phlox drummondii* Hook.) is one of the species being produced in Florida. Wildflowers derived from Florida seed often perform better and/or are more sustainable than those derived from nonFlorida seed. Florida Department of Transportation roadside vegetation specialists have noted the superior performance/sustainability of the Florida ecotype of Drummond Phlox compared to Drummond Phlox grown from seed purchased from an out-of-state supplier (Dick Bush, William Moriaty; personal communications).

Drummond Phlox has indeterminate flowering and explosively dehiscent seed capsules, so it must be grown on fabric mulch to realize substantial seed yields. It is grown in rows formed by 2- to 3-inch gaps that are left between parallel strips of landscape fabric. Seed is vacuumed off the fabric over several weeks during mid-spring to early summer.

In our previous CCAP-funded study, Drummond Phlox seed production plots were established by direct seeding in mid-October 2003. However, weed interference and poor seedling emergence resulted in crop failure. The herbicides Raptor and Pursuit provided good to excellent weed control for 1 month after application in mid-October. After that, control of cool season weeds declined over time despite reapplication. Phytotoxic effects (stunting, chlorosis) became evident in January of the following year. Applying Snapshot TG in late January did not prevent additional emergence of cool season weeds but weed control after a March application was fair through April.

2. Objectives

In the current study, Drummond Phlox was established by transplants. Reliance on predicted seed germination—which can be affected by biotic and abiotic factors—would not be a concern, and weed control should be much less of a problem as a preemergent herbicide regime can be started soon after transplanting.

a. Evaluate efficacy and phytotoxicity of chemical weed control in Drummond Phlox grown for seed production when plantings are established via transplants.

b. Evaluate effect of supplemental fertilizer on yield and quality of Drummond Phlox seed.

3. Approach Taken to Realize Objectives

Seed of Drummond Phlox were sown in a greenhouse on July 29, 2004. Individual seedlings were transplanted to cell packs (1020 trays; 48 cells/tray) on August 24. Weekly bottom fertilization of seedlings with 100 ppm N (Peter's 15-30-15) began on August 11. Plants were not fertilized the week of September 13 to slow down their development. Seedlings were transplanted 6 inches on center on October 5, 2004; seedlings were flowering. Each plot consisted of a 10-ft long by 3-inch wide row. Seedlings that died due to disease or uprooting (seedlings were leggy and some lodged and uprooted during storms) were replaced through November 17. Rows were established by leaving a gap between two parallel strips of 6-ft wide landscape fabric. Drip tape (Ro-Drip®, 8 mil, 40 gal/hr; Roberts Irrigation Co., San Marcos, CA) was laid under the edge of the fabric immediately adjacent to the row; plants were irrigated as needed.

Based on results of previous research, there were two fertilizer treatments (fertilized; nonfertilized) and two weed management regimes (hand weeded; Snapshot TG [isoxaben + trifluralin; DowElanco] at 200 lb/product [4 lb ai] /acre). Weed management regimes were completed randomized within each row, with only one row being fertigated. Weekly fertigation began on April 5 and was continued through June 30 so that 200 lb N/acre was applied. The water soluble fertilizer is a 10-30-20 + minors (Southern Agric. Insecticides, Palmetto, FL). Hand weeded plots were weeded on November 26, January 5, March 5, and

April 28. Snapshot TG was applied to weed-free plots on October 7 and January 6. Time needed to hand weed plots was recorded. Weed control was evaluated on November 22 and March 4. Plant quality was evaluated on March 4. Dispersed seed were harvested off the landscape fabric every 3–4 days from May 3 to July 5. Ten-foot long wood barriers were used to contain dispersed seed within a plot.

Germination and viability testing were conducted by Mid-West Seed Services, Inc. (Brookings, SD). Seed from Snapshot TG plots were not subjected to germination testing because there too few seed for an accurate analysis.

4. Research Results

Weed control about 6 weeks after the first application of Snapshot TG was slightly better (but not statistically significant) than in hand weeded plots (Table 1). However, about 1 month after the second application, Snapshot TG did not provide acceptable weed control and it severely injured most plants. By June, many plants in Snapshot-treated plots had died, and those that remained were small. In several of these plots, all plants were dead. However, there tended to be a few more plants in Snapshot TG/fertigated plots than in Snapshot TG/nonfertigated plots. The poor quality of surviving plants and the lack of plants in some plots exacerbated the poor weed control. Soil disturbance due to replacing dead or uprooted plants might have contributed to poor weed control in some instances because the herbicide layer was disturbed.

Table 1. Effect of Snapshot TG on weed control and plant quality in Drummond Phlox seed production plots; seedlings were planted on October 5, 2004. Snapshot TG was applied on October 7.

	Hand weeded		Snapshot TG	
Date	Weed Control[z]	Quality[y]	Weed Control[z]	Quality[y]
Nov. 22	76	---	86	---
Mar. 4	79	17	22	79

[z] Weed control rated from 0–100 percent weed coverage, increments of 10.

[y] Plant quality rated from 0–100, with 0=all plants in plot look normal and healthy to 100=all plants in plot were dead; increments of 10.

The estimated number of man-hours required for hand weeding a 100-ft row ranged from 0.4 to 1.8 (Table 2). Considering that there would be many such rows in a 1-acre production area clearly shows the need for an efficacious preemergent herbicide program.

The greatest number of seed were harvested on May 24, June 9 and June 17, regardless of treatment (results not shown). Best yields were in hand weeded plots (Table 3); yields in Snapshot-treated plots were nil due to phytotoxicity. Although fertilization appeared to enhance estimated yields, substantial plot-to-plot variation precluded detection of a significant fertilizer effect. Germination and viability were not affected by fertilization.

Overall means were as follows: percent germination of viable seed – 94.2 ± 0.0; percent viable seed – 94.2 ± 3.3; percent of abnormal seedlings – 2.9 ± 1.0.

Table 2. Estimated number of man-hours required to hand weed a 100-ft row of Drummond Phlox that had not been treated with any herbicide. Seedlings were planted October 5, 2004; weekly fertigation began on April 5, 2005.

Date	Fertigated row	Nonfert. row
Nov. 26	0.5	0.5
Jan. 5	0.4	1.6
Mar. 5	0.4	0.4
Apr. 28	1.8	1.4

Table 3. Effect of supplemental fertilization (200 lb N/acre) and weed control regime on estimated yield (mean lb per acre ± std. dev.). Seedlings were planted October 5, 2004; weekly fertigation began on April 5, 2005; Snapshot TG was applied on October 7 and January 6.

	Estimated yield (lb/acre)
Hand weed/fert.	51.5 ± 34.9
Hand weed/nonfert.	36.2 ± 19.8
SSTG/fert.	0.8 ± 1.6
SSTG/nonfert.	0.3 ± 0.4

5. Accomplishments

Snapshot TG, despite showing some promise for preemergent weed control in our previous work, caused unacceptable injury to Drummond Phlox when it was applied twice, the first application being 2 days after transplanting. There was some preliminary evidence that fertilization enhances yield.

6. Publication – None

7. Professional Presentations – None

8. **Student Participation** –Two college students

9. **Conclusion**

Snapshot TG at 200 lb product per acre is not an option for cool season weed control in Drummond Phlox established by transplants when it is first applied to seedlings 2 days after transplanting. Applying Snapshot TG later after transplanting, when seedlings are much more developed and have better root systems, might be an option in mid-spring to control warm season weeds, if the weeds to be controlled are susceptible to Snapshot TG. The stunting that we observed in Snapshot TG plots was likely a symptom of Drummond Phlox seedling sensitivity to trifluralin, the major component of Snapshot TG. Trifluralin acts by inhibiting growth of root meristems, which ultimately kills germinating weeds of susceptible species but stunts growth of sensitive seedlings and plants. However, we clearly showed the need for using a preemergent herbicide program to control cool season weeds as it could save a substantial amount of labor required for hand weeding. The herbicide(s) should be able to be applied within a few days after transplanting before weeds emerge, and should not be a dintroaniline herbicide (class of herbicides to which trifluralin belongs).

Further research needs to be conducted to determine the effect of supplemental fertilization on yield as there was some evidence that fertilization increased yield.

10. **References** – None