

2002 FNGA Endowed Research Project Enhancement Award Report

“Comparison of new pre- and postemergence herbicides for control of eclipta, oxalis and spurge¹ in Florida”

– Postemergence Herbicide Report –

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Abstract: Postemergence herbicides, especially those with residual weed control activity, can be useful tools in weed management programs. Postemergence broadleaf weed herbicides are used to control existing weeds and are most commonly used around woody plant materials and in noncrop areas. New postemergence herbicide formulations (glyphosate in diammonium salt form, Touchdown[®] Pro), combinations (SureGuard[™] + Roundup Pro[®]), and active ingredient (flumioxazin, BroadStar[®]/SureGuard[™]) were evaluated for controlling four established weeds. BroadStar[®] and SureGuard[™] were not very effective as postemergence herbicides but SureGuard[®] significantly enhanced control of garden spurge when combined with Roundup Pro[®]. Neither Roundup Pro[®] or Touchdown[®] Pro were effective in controlling the test weeds (< 6" in height or stem length) when applied at the rate of 1 pt/acre. At 2 pts/acre, Touchdown[®] Pro was still ineffective but Roundup Pro[®] provided good to excellent control of three of the four weeds. Trying to control larger weeds (> 6" in height or stem length), Touchdown[®] Pro was effective but Roundup Pro[®] was not. The combination of Surflan[®] and Princep[®] was only effective in controlling Mascarene Island leafflower (*Eclipta prostrata*). It should be noted that at the time of herbicide application, the weeds were not very actively growing. Further research is needed to determine if these differences are consistent.

Objectives: The objective of this study was to evaluate the efficacy of some postemergence herbicides for controlling established weeds.

Materials and Methods: This experiment was conducted at the Mid-Florida Research and Education Center in Apopka, FL. Seed of the four weeds listed in Table 1 were sown in flats during May 2002. When the seedlings were about ½ inch “tall” they were transplanted one per pot into four-inch diameter round plastic pots (Desch 11, APAC Design Ltd.) filled with a peat:vermiculite:perlite potting medium (6:2:2, by volume, Vergro[®] Container Mix A, Verlite). The pots were placed in a full sun production area mulched with pine bark. The pots were irrigated daily using overhead sprinklers. Plots were fertilized as needed with a 20N-4.4P-16.6K soluble fertilizer containing micronutrients (Masterblend[®] 20-10-20, Masterblend) applied at a rate of one Tbl/gal.

Table 1. Weeds treated with postemergence herbicide.

Scientific name	Common name
<i>Chamaesyce hirta</i> L. [syn. <i>Euphorbia hirta</i>]	garden spurge
<i>Chamaesyce maculata</i> (L.) Small [syn. <i>Euphorbia maculata</i>]	spotted spurge
<i>Eclipta prostrata</i> (L.) L. [syn. <i>E. alba</i>]	Mascarene Island leafflower
<i>Oxalis corniculata</i> L. [syn. <i>O. stricta</i>]	yellow woodsorrel

¹ Due, in part, to FNGA funding, two species of spurge were evaluated (Table 1).

Weeds were grown on until October 2002 when they were separated into two groups. One group contained plants less than six inches in height or stem length and the other contained plants greater than 6" in height or stem length. For the glyphosate treatments, five pots of same-sized plants of each weed were then placed into the center of each three foot by three foot square plot (20 pots/plot). The less than 6" plants were treated with the 1 and 2 pt/acre rates and the greater than 6" plants were treated with the 4 and 8 pt/acre rates (Table 2). These treatments were replicated four times. The weeds in the plots treated with the other herbicides were of various sizes and averaged about 5" in height or stem length. As in the glyphosate-treated plots, five plants of each weed species were placed in each plot; however, these other herbicide treatments were replicated only three times.

The one granular treatment (Table 2) was hand broadcast and then watered in with 0.5" of water applied using watering cans. The other treatments were applied at a pressure of 16-17 psi using a 2-liter beverage bottle-based hand-held compressed-air sprayer with a flat fan nozzle (LF-3, Delavan Spray Technologies). The spray treatments were applied at the rate of 20 gallons/acre. A three-sided 3 ft × 3 ft plastic-covered PVC pipe frame was placed around each plot to avoid spray drift.

Table 2. Postemergence herbicide treatments evaluated for weed control efficacy.

Active ingredient (a.i.)	Product(s)	a.i. concentration (%)	Product application rate (amount/acre)
—	Untreated control	—	—
flumioxazin	Broadstar [®] 0.17G	0.17	200 lbs ^z
flumioxazin	SureGuard [™] 51WDG	51	12 oz ^z
flumioxazin + glyphosate	Sureguard [™] 51WDG + Roundup Pro [®] 4L	51 + 41	12 oz +2 pts ^z
glyphosate	Roundup Pro [®] 4L	41	1 pt ^y
glyphosate	Roundup Pro [®] 4L	41	2 pts ^y
glyphosate	Roundup Pro [®] 4L	41	4 pts ^x
glyphosate	Roundup Pro [®] 4L	41	8 pts ^x
glyphosate	Touchdown [®] Pro 3L	28.3	1 pt ^y
glyphosate	Touchdown [®] Pro 3L	28.3	2 pts ^y
glyphosate	Touchdown [®] Pro 3L	28.3	4 pts ^x
glyphosate	Touchdown [®] Pro 3L	28.3	8 pts ^x
oryzalin + simazine	Surflan [®] 4AS + Princep [®] 4L	40.4 + 41.9	4 pt + 4 pt ^z

^z Applied to weeds averaging about 5" in height or stem length.

^y Applied to weeds less than 6" in height or stem length.

^x Applied to weeds greater than 6" in height or stem length.

Weed death was determined by visual inspection and a weed was not considered dead until all of the aboveground tissue was necrotic. Data were analyzed by analysis of variance and means separations were by Duncan's new multiple range test ($P \leq 0.05$). When necessary to approximate normal distributions, percentage data were transformed using the inverse sine transformation.

Results: The WDG and G formulations of flumioxazin applied alone were not effective as postemergence herbicides except in the case of the WDG formulation applied to Mascarene Island leafflower (Table 3). Roundup Pro[®] applied at the 1 pt/acre rate was ineffective; however, at the 2 pt/acre rate it was quite effective killing the weeds except for garden spurge. Garden spurge control increased significantly when SureGuard[™] was combined with the Roundup Pro[®]. Interestingly, Roundup Pro[®] at the 4 and 8 pts/acre rates did not control any of the weeds. This may well have been due to the larger size of the weeds treated at these rates. The results with Touchdown[®] Pro were quite the opposite of those with Roundup Pro[®]. At the two low application rates, Touchdown[®] Pro was ineffective but at the two high rates control was significant for all four weeds. The Surflan[®] + Princep[®] combination was only effective controlling Mascarene Island leafflower.

Table 3. Evaluation of postemergence herbicides for efficacy of weed control.

Product(s) ^y	Plant death (%) ^z			
	garden spurge	Mascarene Island leafflower	spotted spurge	yellow woodsorrel
Untreated control	0.0 d ^x	0.0 d	0.0 c	0.0 c
Broadstar [®]	0.0 d	0.0 d	8.5 c	18.9 bc
Sureguard [™]	5.3 cd	50.0 bc	27.6 bc	0.0 c
Sureguard [™] + Roundup Pro [®]	88.7 ab	94.7 a	94.7 a	100.0 a
Roundup Pro [®] (1pt/A)	0.0 d	0.0 d	1.3 c	0.0 c
Roundup Pro [®] (2pt/A)	25.0 c	94.9 a	75.0 ab	97.6 a
Roundup Pro [®] (4 pt/A)	0.0 d	1.3 d	0.0 c	1.3 c
Roundup Pro [®] (8 pt/A)	0.0 d	8.0 cd	1.3 c	1.3 c
Touchdown [®] Pro (1 pt/A)	0.0 d	1.3 d	0.0 c	0.0 c
Touchdown [®] Pro (2 pt/A)	0.0 d	0.0 d	0.0 c	0.0 c
Touchdown [®] Pro (4 pt/A)	81.6 b	50.0 bc	88.7 a	50.0 b
Touchdown [®] Pro (8pt/A)	100.0 a	100.0 a	100.0 a	100.0 a
Surflan [®] AS + Princep [®] L	0.0 d	81.6 ab	0.0 c	0.0 c

^z Data within columns were transformed using arcsin transformation prior to analysis.

^y See table one for detailed formulation and application rate information.

^x Mean separation within columns by protected Duncan's new multiple range test ($P \leq 0.05$).

Conclusions: It should be noted that by the time (16 October) that the weeds had grown sufficiently so that there were enough plants >6" in height or stem length to conduct this test, the weeds were exhibiting little active growth. Despite the fact that Touchdown[®] Pro has only 3 lbs of a.i./gallon

compared to 4 lbs of a.i./gallon for Roundup Pro[®] and, therefore, glyphosate was applied at only $\frac{3}{4}$ of the Roundup Pro[®] rates in the Touchdown[®] Pro plots, Touchdown[®] Pro was more effective controlling the larger weeds. This, and the lack of weed control at the two low Touchdown[®] Pro rates, suggests that there may be significant weed control differences between the two forms of glyphosate. This may also indicate that multiple factors (e.g., weed species, weed growth stage, application rates, etc.) should all be considered when choosing a postemergence herbicide. In addition, the use of SureGuard[®] with Roundup Pro[®] might be justified when trying for postemergence control of garden spurge.

Recommendations: These results are preliminary and need to be repeated. However, the two new herbicides, Touchdown[®] Pro and SureGuard[®], appear to have some usefulness for postemergence weed control.

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