

## 2002 FNGA Endowed Research Project Enhancement Award Report

### “Comparison of new pre- and postemergence herbicides for control of eclipta, oxalis and spurge<sup>1</sup> in Florida”

#### – Preemergence Herbicides Final Report –

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**Abstract:** Weed control is a constant and economically significant problem for producers of containerized plant material. Preemergence herbicides can, in many cases, reduce production costs by decreasing hand-weeding requirements. New preemergence herbicide formulations, combinations and active ingredient (flumioxazin, BroadStar<sup>®</sup>) were evaluated for controlling seven common weeds from seed. Herbicides containing flumioxazin or oxyfluorfen (Goal<sup>®</sup>) were extremely effective against all of the weeds. Herbicides containing oxadiazon (Ronstar<sup>®</sup>), proflumicafone (RegalKade<sup>®</sup>) or trifluralin (Treflan<sup>®</sup>) + isoxaben (Gallery<sup>™</sup>) [=Snapshot<sup>®</sup> TG] were also effective against many of the weeds. Flumioxazin, a herbicide whose mechanism of action is thought to be similar to that of oxyfluorfen, is not currently registered for use on ornamental plants but is in the registration process.

**Objectives:** The objective of these studies was to evaluate the efficacy of herbicides formulated as granular materials for controlling weeds in soilless growing medium in containers.

**Materials and Methods:** These experiments were conducted in full sun [expt. 1] and in a shaded (60% light exclusion) greenhouse [expt. 2] at the Mid-Florida Research and Education Center in Apopka, FL. Four-inch diameter round plastic pots (Desch 11, APAC Design Ltd.) were filled with a peat:vermiculite:perlite (6:2:2, by volume, Vergro<sup>®</sup> Container Mix A, Verlite) [expt. 1] or a peat:pine bark:sand (6:4:1, by volume) growing medium (Cherry Lake Tree Farm Mix C, Florida Potting Soils). Pots were placed on black, woven polypropylene ground cloth and heavily hand-watered to settle the growing media.

Table 1. Weeds seeded into the pots at initiation of preemergence herbicide experiments.

Expt.		Scientific name	Common name	Bayer code
1	2			
	X	<i>Cardamine hirsuta</i> L.	hairy bittercress	CARHI
X		<i>Chamaesyce hirta</i> L. [syn. <i>Euphorbia hirta</i> ]	garden spurge	EPHHI
X	X	<i>Chamaesyce maculata</i> (L.) Small [syn. <i>Euphorbia maculata</i> ]	spotted spurge	EPHMA
X		<i>Eclipta prostrata</i> (L.) L. [syn. <i>E. alba</i> ]	Mascarene Island leafflower	ECLAL
	X	<i>Fatua villosa</i> (Thumb.) Nakai	fatweed, mulberry weed	FTOVI
X	X	<i>Oxalis corniculata</i> L. [syn. <i>O. stricta</i> ]	yellow woodsorrel	OXACO
	X	<i>Phyllanthus tenellus</i> Roxb.	long-stalked phyllanthus	PYLTE

<sup>1</sup> Due, in part, to FNGA funding, additional weed species were also evaluated (Table 1).

Known numbers of seeds (15 or 20, depending on species) of each of the weeds listed in Table 1 were sown in each pot and the pots were irrigated with 0.4 inch of water applied using overhead irrigation. In expt. 2, the weeds were reseeded in all herbicide treated pots at the rate of ten seeds per pot seven weeks after the herbicide treatment (WAT). The experimental unit for determining weed control efficacy for each of the weed species consisted of four [expt. 1] or three [expt. 2] pots per plot. Herbicide treatments were replicated four and three times in expt. 1 and 2, respectively.

The treatments (Table 2) were hand broadcast. Three-quarters of an inch of water was applied immediately after all the herbicides had been applied. Plots were irrigated as needed. After germination, plots were fertilized weekly 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 2. Preemergence herbicide treatments evaluated for weed control efficacy.

Expt.		Product(s)	Active ingredient (a.i.)	a.i. concentration (%)	Product application rate (lb/acre)
1	2				
X	X	Untreated control	—	—	—
X	X	Broadstar® A 0.17 G	flumioxazin	0.17	200 lbs
	X	Broadstar® B 0.17 G	flumioxazin	0.17	200 lbs
	X	Broadstar® C 0.17 G	flumioxazin	0.17	200 lbs
	X	Broadstar® D 0.25 G	flumioxazin	0.25	150 lbs
X	X	OH2® 3G	oxyfluorfen + pendimethalin	2.0 + 1.0	100 lbs
	X	O-O Herbicide™ 3G	oxyfluorfen + oxadiazon	2.0 + 1.0	100 lbs
	X	RegalKade® 0.5G	prodiamine	0.50	300 lbs
	X	RegalKade® 0.5G + Broadstar® A 0.17G	prodiamine + flumioxazin	0.50 + 0.17	300 lbs + 200 lbs
	X	RegalStar® 1.2G	oxadiazon + prodiamine	1.0 + 0.2	200 lbs
X		Ronstar® A 2G	oxadiazon	2.0	200 lbs
X		Ronstar® B 2G	oxadiazon	2.0	200 lbs
X		Ronstar® C 2G	oxadiazon	2.0	200 lbs
	X	Rout® 3G	oxyfluorfen + oryzalin	2.0 + 1.0	100 lbs
	X	Snapshot® 2.5 TG	trifluralin + isoxaben	2.0 + 0.5	200 lbs

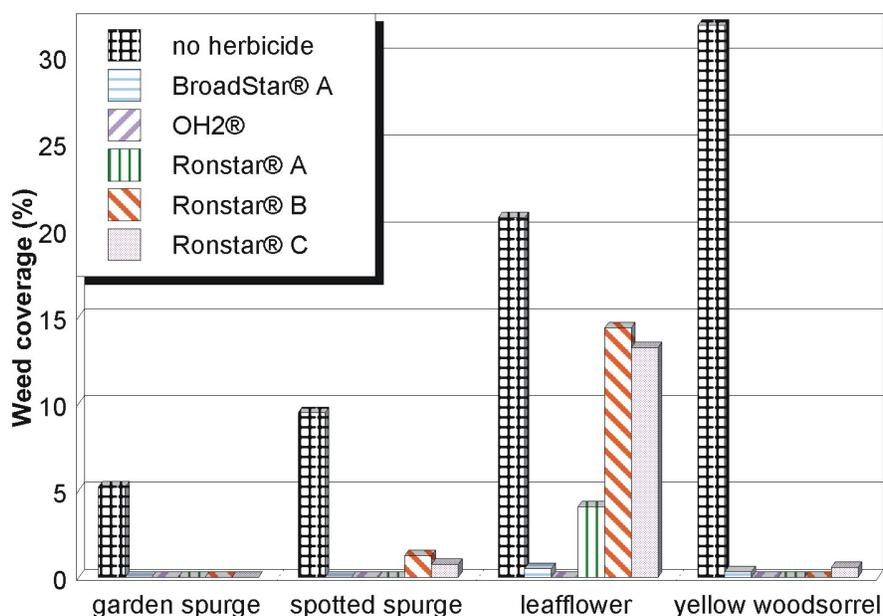
Weed seed germination was determined primarily by visually counting germinating plants; however, digital photographs were used to verify the differentiation of germination of plants from the first and second seed sowings [expt. 2]. Weed coverage was determined digitally by photographing each plot with a digital still camera (Coolpix® 5000, Nikon) and then determining the percentage weed coverage using photo editing software (PhotoPaint® 10, Corel) to quantify the number of pixels of weed surface area in each pot compared to the pot surface area.

Sixteen weeks after seeding, weeds were harvested for dry top weight determinations by cutting them at the soil line using scissors and placing them in paper bags. The weeds were dried 158°F for one week.

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 square root or inverse sine transformations.

**Results: Expt. 1.** At 21 days after sowing, germination of all four weeds in the untreated plots was about 50% (data not shown). All of the herbicides provided excellent control of garden spurge and yellow woodsorrel (Fig. 1). Interestingly, the two experimental formulations of Ronstar® (B, C) did not control spotted spurge and leafy spurge as well as the current formulation. BroadStar® was as effective as OH2® and Ronstar® in controlling all four weeds. The weed top dry weights exhibited similar results (data not shown). **Expt. 2.** Hairy bittercress was controlled by all herbicide treatments, but RegalKade® alone, RegalStar® and Snapshot® did not control it as well as the other treatments (Fig. 2). All of the treatments gave excellent control (>90%) of fatweed except Snapshot®, which provided somewhat less control. Long-stalked phyllanthus control was 100% for most of the treatments. Snapshot® did not control phyllanthus as well as those treatments but was more effective than RegalKade®. All of the treatments were excellent in controlling spotted spurge. Statistically, control using O-O Herbicide® was less than for the other treatments. Yellow woodsorrel was controlled almost 100% by all treatments. For all four weeds, dry weed weights were the same and less than the untreated controls for the herbicide-treated plots.

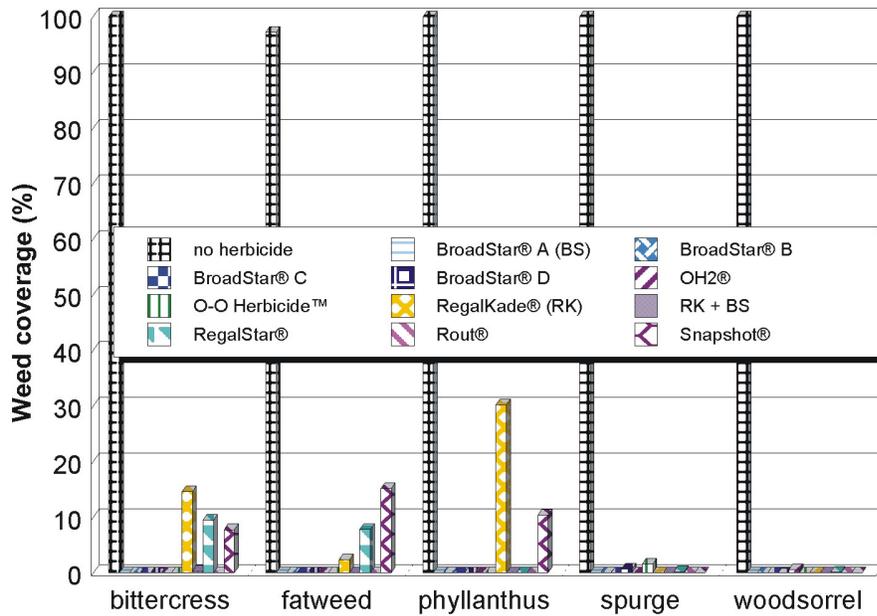
**Experiment 1**



**Figure 1.** Weed coverage in plots 16 weeks after herbicide applications.

**Conclusions: Expt. 1.** BroadStar®, OH® and Ronstar® were all effective in keeping the four weeds from becoming established from seed present at time of herbicide application. Formulation can significantly affect herbicide efficacy (Ronstar® A, B, C). **Expt. 2.** All of the preemergence herbicides reduced weed competition by the five weeds tested. In fact, all of the herbicides containing flumioxazin or oxyfluorfen essentially killed all germinating weed seeds, even those from the second sowing seven WAT. **Overall.** We have many preemergence herbicides presently or possibly soon-to-be available (BroadStar®) to control a number of the most common weed pests encountered in containerized ornamental plant production in Florida. Any new formulations and/or products should be tested for efficacy prior to commercial release.

**Experiment 2**



**Figure 2.** Weed coverage in plots 16 weeks after herbicide applications

to Aventis Environmental Science (now Bayer Environmental Science), Florida Nurserymen and Growers Association, Florida Potting Soils, Jeff Hardig, Rosa Resindez, Valent USA, and Verlite Corporation, for support of this research.

**Recommendations:** For crops that can tolerate flumioxazin or oxyfluorfen, broad preemergence weed control can be successful if the herbicides are present at the time of weed seed germination. For crops that can tolerate oxadiazon, good control of many weeds is also possible. For sensitive crops, there may be effective alternatives to those active ingredients; however, the materials must be selected based on knowing what weeds will likely be present.

**Acknowledgements:**

Appreciation is extended

to Aventis Environmental Science (now Bayer Environmental Science), Florida Nurserymen and Growers Association, Florida Potting Soils, Jeff Hardig, Rosa Resindez, Valent USA, and Verlite Corporation, for support of this research.