

## Phytotoxicity of Selected New Herbicides to Containerized Nursery Stock: The IR-4 Program in 2007

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**Significance to the industry:** Weed control continues to be a major expense for nursery growers, and many species still have few, if any options for chemical weed control. The IR-4 program helps to alleviate problems faced by nursery growers by adding new uses to existing pesticides or new pesticides to the nursery/landscape or any 'minor use' cropping industries. It is imperative that growers use this program because it is based largely on growers' needs. Anyone can go to the website [www.ir4.rutgers.edu](http://www.ir4.rutgers.edu) and list the needs of the operation. The objectives of the 2007 IR-4 herbicide tests were to find more postemergence herbicides (all weeds) and preemergence and postemergence herbicides for nutsedge control.

**Materials and Methods:** Four species were tested for phytotoxicity to preemergence herbicides: salvia (*Salvia nemorosa* 'May night'), pinks (*Dianthus gratianopolitanus* 'Firewitch'), purple coneflower (*Echinacea purpurea*), and miscanthus (*Miscanthus sinensis* 'Graziella') in the IR-4 program set up at Smith's Gardens, Delaware, Ohio. All plants were shifted into #2 containers in the autumn of 2006. Preemergence herbicides and rates tested were sulfentrazone + proflaminate (FMC Corp., Philadelphia, PA) at 0.375, 0.75, and 1.5 lbs ai/ac, mesotrione (Syngenta Corp., Wilmington, DE) at 0.187, 0.25, and 0.37 lbs ai/ac, dimethenamid EC (BASF Corp., Research Triangle Park, NC) at 0.97, 1.94, and 3.92 lbs ai/ac, and dimethenamid + pendimethalin (BASF) at 2.65, 5.3, and 10.6 lbs ai/ac. Mesotrione and dimethenamid EC were applied with a CO<sub>2</sub> backpack sprayer with a spray volume of 25 gal/ac at 45 psi using 8002 VS nozzles spaced 19 inches apart. Sulfentrazone + proflaminate and dimethenamid + pendimethalin were granulars that were applied using a handheld shaker jar. All herbicides were initially applied on April 24, 2007. Mesotrione was applied again on May 22, 2007 [4 weeks after treatment (WAT)], and dimethenamid + pendimethalin, sulfentrazone + proflaminate, and dimethenamid EC were applied on June 19, 2007 (8 WAT). Evaluations of phytotoxicity were evaluated at 1, 2, and 4 weeks after the first treatment (1, 2, and 4 WA1T, respectively) and 1, 2, and 4 weeks after the second treatment (1, 2, and 4 WA2T, respectively) using visual ratings on a scale of 1-10 with 1 being no phytotoxicity and 10 death. Plant growth indices (height+width+width/3) were also done at 1 WA1T and 4 WA2T.

### Results and discussion:

There was significant, although slight phytotoxicity from dimethenamid EC after 1WA1T on Salvia at the 1, 2, and 4X rates (Table 1), and also slight phytotoxicity from dimethenamid + pendimethalin at 1, 2 and 4 WA2T from the higher rates. There was little to no phytotoxicity on pinks from dimethenamid + pendimethalin or sulfentrazone + proflaminate. Sulfentrazone + proflaminate and mesotrione caused injury to purple coneflower at all rates tested, and the coneflower was unable to come back from this injury. Miscanthus showed little phytotoxicity from either mesotrione or sulfentrazone + proflaminate applications.

Purple coneflower is an herbicide sensitive species, and very few herbicides are labeled for use on purple coneflower. For this reason, it is often looked at for IR-4 trials. This was true in this trial as well. Sulfentrazone + prodiamine and mesotrione showed great promise for miscanthus. If these products get accepted by the EPA, they will be great additions for weed control in this crop. Salvia is also a sensitive species, but dimethenamid or dimethenamid + pendimethalin may show promise for this species. With the right formulation and rates, it can be used with little phytotoxicity on Salvia. There was a little burning on pinks from sulfentrazone + prodiamine, mostly after 1WAIT, and was able to recover by the second application. The second application was not as phytotoxic as the first application.

**Table 1. Phytotoxicity evaluations for sulfentrazone+prodiamine, dimethenamid, dimethenamid+pendimethalin, and mesotrione on selected herbaceous perennials**

<i>Salvia nemorosa</i> 'May night'		Phytotoxicity visual ratings <sup>z</sup>					
Treatment	Rate	1 WA1T <sup>y</sup>	2 WA1T	4 WA1T	1 WA2T	2 WA2T	4 WA2T
Dimethenamid 1X	0.97lb ai/ac	1.9 *	1.1	1.6	1.3	1.1	1.1
Dimethenamid 2X	1.94 lb ai/ac	2.4 *	1.4	1.7	1.6	1.2	1.4
Dimethenamid 4X	3.92 lb ai/ac	2.8 *	1.4	1.8	1.6	1.1	1.4
Dimethenamid + Pendimethalin 1X	2.65 lb ai/ac	1.3	1.2	1.3	1.7	1.3	1.4
Dimethenamid + Pendimethalin 2X	5.3 lb ai/ac	1.6	1.3	1.8	1.9 *	2 *	1.9 *
Dimethenamid + Pendimethalin 4X	10.6 lb ai/ac	1.4	1.3	1.3	2.1 *	2.1 *	2.3 *
Untreated	--	1	1.1	1.2	1	1	1
<i>Dianthus gratianopolitanus</i> 'Firewitch'		Phytotoxicity visual ratings					
Treatment	Rate	1 WA1T	2 WA1T	4 WA1T	1 WA2T	2 WA2T	4 WA2T
Dimethenamid + Pendimethalin 1X	2.65 lb ai/ac	1.4	1.1	1.6	1.2	1.3	1.2
Dimethenamid + Pendimethalin 2X	5.3 lb ai/ac	1.4	1.4	1.7	1.1	1.1	1
Dimethenamid + Pendimethalin 4X	10.6 lb ai/ac	2.1 *	1.4	1.8	1.3	1	1.2
Sulfentrazone + Prodiamine 1X	0.375 lb ai/ac	1.1	1.2	1.3	1.2	1	1
Sulfentrazone + Prodiamine 2X	0.75 lb ai/ac	1.5	1.3	1.8	1.2	1	1
Sulfentrazone + Prodiamine 4X	1.5 lb ai/ac	1.4	1.3	1.3	1.1	1	1.1
Untreated	--	1	1.1	1.2	1.1	1	1
<i>Echinacea purpurea</i>		Phytotoxicity visual ratings					
Treatment	Rate	1 WA1T	2 WA1T	4 WA1T	1 WA2T	2 WA2T	4 WA2T
Sulfentrazone + Prodiamine 1X	0.375 lb ai/ac	5.8 *	6.3 *	5.3 *	4.8	4.2	3.9
Sulfentrazone + Prodiamine 2X	0.75 lb ai/ac	6.8 *	7.5 *	6.9 *	5.8	6.6 *	6.4 *
Sulfentrazone + Prodiamine 4X	1.5 lb ai/ac	8 *	9.1 *	8.9 *	9.6 *	9.6 *	9.4 *
Mesotrione 1X	0.187 lb ai/ac	3.7 *	5.3 *	6.6 *	7.1 *	6.9 *	7.6 *
Mesotrione 1.25X	0.25 lb ai/ac	5.1 *	6.2 *	7.0 *	8.1 *	8.0 *	8.9 *
Mesotrione 2 X	0.37 lb ai/ac	4.7 *	6.7 *	7.5 *	8.1 *	9.8 *	10 *
Untreated	--	1	1.4	1.8	2.6	2.6	2.3
<i>Miscanthus sinensis</i> 'Graziella'		Phytotoxicity visual ratings					
Treatment	Rate	1 WA1T	2 WA1T	4 WA1T	1 WA2T	2 WA2T	4 WA2T
Mesotrione 1X	0.187 lb ai/ac	1	1	1	1	1.3	1.3
Mesotrione 1.25X	0.25 lb ai/ac	1.1	1.1	1.1	1.1	1.1	1
Mesotrione 2 X	0.37 lb ai/ac	1.3	1.1	1.6 *	1.6 *	1.4	1.2
Sulfentrazone + Prodiamine 1X	0.375 lb ai/ac	1	1	1	1	1.1	1
Sulfentrazone + Prodiamine 2X	0.75 lb ai/ac	1	1.1	1.1	1	1	1
Sulfentrazone + Prodiamine 4X	1.5 lb ai/ac	1.1	1.1	1.1	1	1	1
Untreated	--	1	1	1	1	1	1

z = Phytotoxicity ratings based on a 1-10 scale with 1 being no phytotoxicity and 10 death

y = WA1T: weeks after 1<sup>st</sup> treatment; WA2T: weeks after 2<sup>nd</sup> treatment

\* indicates significant difference from the control using Dunnett's means separation ( $\alpha = 0.05$ )