

## **Bayer Herbicides for Natural Area Weed Management – New Albany Golf Course**

**Bayer Protocol #:** HE16USASPX

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Note<sup>1</sup>: This report uses the, *Summary of Herbicide Mechanism of Action (MOA) According to the Herbicide Resistance Action Committee (HRAC) and Weed Science Society of America (WSSA) Classification system* ([wssa.net/wp-content/uploads/HerbicideMOAClassification.pdf](http://wssa.net/wp-content/uploads/HerbicideMOAClassification.pdf)) and specifically the WSSA number classification system ex. microtubule assembly inhibitors as group 3.

Note<sup>2</sup>: All rated score evaluations of phytotoxicity were measured on a 1 to 10 scale, where 1 is significant damage, 6=min. acceptable and 9-10=equal or better than control (Bayer CropScience LP evaluation scale). All rated score evaluations of efficacy were measured on a 0 to 10 scale, where 10 represents complete control and  $\geq 7$  represents commercially acceptable weed control and 0 no control (Barolli et al., 2005; Collins et al. 1999; Duray and Davies, 1989; Mathers and Case, 2010; Samtami et al., 2007). Each interval of efficacy scoring represents a 10% loss of weed control over the test plot ex. 9 would be 10% cover, 7 would be 30%, etc.

### **Goal and Impact:**

Previous studies for indaziflam formulations on ornamentals have focused on nursery and lawn care sites. Specific uses in natural sites has not been investigated thoroughly. Approximately 15,000 golf courses in the United States constitute a sizeable acreage, particularly in urban and suburban areas (Nelson, 1997). Opportunities to naturalize exist within many golf courses, and these are becoming increasingly significant in landscape conservation. Nelson (1997) outlined three general types of natural areas commonly found on golf courses: (1) grasslands, including wildflower areas; (2) riparian areas, including streams, shorelines, and wetlands; and (3) forested areas. Natural sites typically have vegetation that is native to a particular

geography and are maintained with a minimum of inputs. The natural area type used in this study is grassland/ wildflower area. Weed control needs to be carefully considered in natural areas. Many plants considered weeds are in fact valuable herbs and forbes within the community. For instance, milkweed might be considered undesirable by some for aesthetic reasons, but this plant is critical for the reproduction cycle of monarch butterflies. The overall goal of this research was to provide weed control options beyond the current practice of mowing two times per year.

**Objectives:** The following objectives were outlined by Bayer CropScience LP: 1) evaluate use of Specticle FLO and Specticle G in "natural areas" adjacent to golf course fairways for phytotoxicity and efficacy; 2) increase the number of labeled plants; and, 3) determine the duration of phytotoxicity.

### **Materials and Methods:**

The trial was initiated at the New Albany Golf Course, New Albany, OH, on April 20, 2016. Winds were 5 mph out of the SE, it was sunny and 63.5° F within 10 days after initiation 0.4 inches of rain fell (April 30, 2016). Sixteen two meter by five meter plots with one foot buffers in between were staked out in an area that was mowed in Fall 2015 but had not been mowed in 2016 (Fig. 1). Four replicates were conducted as blocks which contained all four treatments including an untreated control. Treatment location in a block and block location were decided using a random number generator. Liquid applications were applied via CO<sub>2</sub> backpack sprayer delivering 25 gal/ac (R&D Sprayers, Opelousas, LA 70570) equipped with 8002 vs nozzles (TeeJet, East North Avenue, Carol Stream, IL 60116 ) operated at 45-50 psi with nozzle spacing 18" apart. The granular, of "verge" formulation, 200 lb/ac Specticle G (indaziflam) (Bayer Crop Science Inc, Research Triangle Park, NC) was applied via a handheld shaker jar after pre-weighing the amounts required for each pot area. The two liquid treatments were Specticle Flo (indaziflam) (Bayer) at 9 oz/acre, and Barricade 65WG (prodiamine) (Syngenta Crop Protection, LLC, Greensboro, NC) at 0.5 lb. a.i. /acre. Phytotoxicity and efficacy were evaluated on the rated scores described in the foreword. Evaluations were made weekly for the first three weeks after treatment (WAT) and at two week intervals thereafter until the end of the study at three months (July 13, 2016). At initiation the native species present were creeping red fescue, chewings fescue and sheep fescue, and Kentucky blue grass. Chess and smooth brome were just emerging. The blocks were layout north to south for optimal light during the study.



**Fig. 1 (Above).** Bayer herbicides for natural area weed management trial was initiated on April 20, 2016 at the New Albany Country Club, New Albany, OH. Yellow stakes were used to mark the corners of plots. Plots have one foot buffers between each.

According to AccuWeather (<http://www.accuweather.com/en/us/new-albany-oh/43054/june-weather/2086484?monyr=6/1/2016&view=table>). April and May, 2016 were drier and cooler than normal by -2 °F and -3 °F and -1.09 and -1.43 inches, respectively. June was +1°F above normal and had +1.21 inches of rainfall above normal. July was +2°F above average for the month and was -2.3 inches of rainfall drier. There were no record highs or lows of temperature or rainfall events during this experiment.

### Results and Discussion:

All phytotoxicity evaluations of Specticle G and Barricade 65WG were better than minimally acceptable (Table 1). Specticle Flo evaluations were above minimally acceptable except for 11 WAT when it dropped to 5.8 (Table 1). Initial damage by all three herbicides was observed at 7 WAT and persisted until the end of the study, 13 WAT (Table 1). On average, phytotoxicity levels caused by all three herbicides were equivalent and or just slightly higher than the control. No phytotoxicity was observed in the control (Table 1). There was no phytotoxicity that would prevent the superintendent from using the Bayer products in the natural areas of the course (Table 1).

Specticle G lost efficacious weed control by 5 WAT (Table 2) (Fig. 2B). Specticle Flo and Barricade provided equivalent commercially acceptable weed control throughout the study, 13 WAT (Table 2). The control lost efficacy by 2 WAT (Table 2). Based on the results of this study, Specticle Flo sprayed over the top in the spring

would provide acceptable broadleaf weed control in natural areas of golf courses season long without causing unacceptable levels of phytotoxicity.

All treatments impacted broadleaf weed invasion; especially prevalent was milkweed (Fig. 2A, B, C and D) in early evaluations. Chess (Fig. 3) and yellow nutsedge (Fig. 4) were considered native species and not scored as part of efficacy ratings. Clover and wild carrot (Fig. 5), milkweed and dogbane were all considered in the efficacy scoring. Dogbane became the more prevalent as the trial progressed (Fig. 6 A, B and C). Limiting milkweed, dogbane and other broadleaf weeds in the natural areas at the golf courses was important. The superintendent had indicated that woody stalks left behind in the fall, was limiting how many natural areas the golf course could install as the patrons of the course found these unattractive.

**Table 1.** Bayer natural area trial initiated April 20, 2016 at New Albany Country Club, New Albany, OH means of phytotoxicity by treatment and evaluation date. Averages for each treatment are also listed. Bolded values indicate when injury occurred above acceptable.

Treatment	Rate/ac	1 WAT	2 WAT	3 WAT	5 WAT	7 WAT	9 WAT	11 WAT	13 WAT	Average
Control	--	10 <sup>2</sup> a <sup>x</sup>	10a	10a	10a	10a	10a	10a	10a	10a
Specticle G	200 lb	9.5ab	9.5a	9.5a	10a	7.5b	7.8b	9.8a	7.5b	8.9b
Specticle Flo	9 oz	8.5b	10a	10a	10a	8.3b	8.8ab	<b>5.8c</b>	8.3b	8.7b
Barricade 65WG	0.5 lb	8.0b	10a	10a	10a	7.8b	7.5b	8.3b	7.8b	8.6b

Z = Ratings are based on a scale of 1-10 where 1=significant damage, 6=min. acceptable damage and 9-10=equal or better than control.

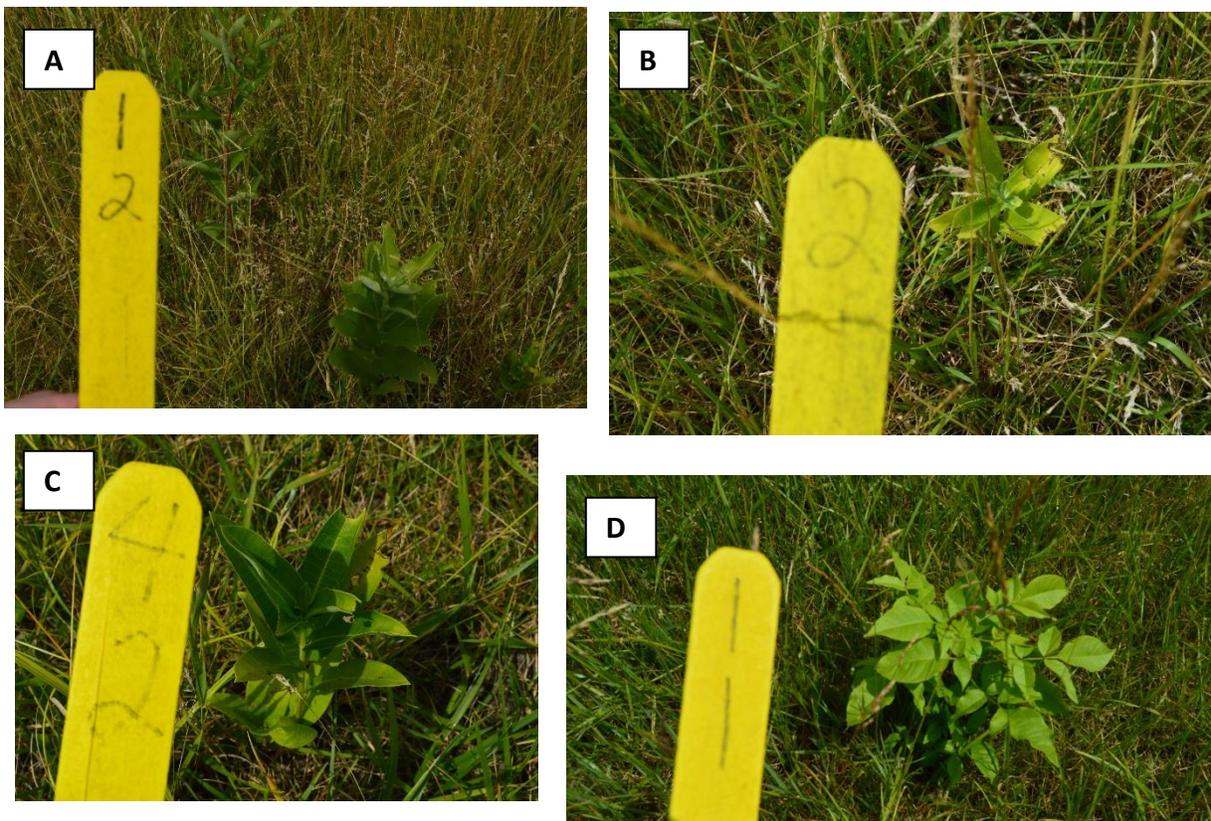
X = Treatments with different letters signify phytotoxicity was statistically different at p=0.05 using LS means.

**Table 2.** Bayer natural area trial initiated April 20, 2016 at New Albany Country Club, New Albany, OH means of efficacy by treatment and evaluation date. Averages for each treatment are also listed. Bolded values indicate when weed control dropped below commercially acceptable.

Treatment	Rate/ac	1 WAT	2 WAT	3 WAT	5 WAT	7 WAT	9 WAT	11 WAT	13 WAT	Average
Control	--	10.0 <sup>2</sup> a	<b>6.5b</b>	<b>5.0b</b>	<b>3.5c</b>	<b>4.2c</b>	<b>4.2c</b>	<b>4.5b</b>	<b>4.2c</b>	<b>5.3c</b>
Specticle G	200 lb	10.0a	8.2a	7.2a	<b>6.0b</b>	<b>6.2b</b>	<b>6.8b</b>	7.2a	<b>6.5b</b>	7.3b
Specticle Flo	9 oz	10.0a	9.2a	8.8a	7.8a	9.0a	8.5a	7.8a	8.0a	8.6a
Barricade 65WG	0.5 lb	10.0a	9.0a	8.0a	7.5a	8.2a	7.2ab	7.0a	8.2a	8.1a

Z = Ratings are based on a 0-10 scale with 10 being complete control, 0 no weed control, and  $\geq 7$  commercially acceptable control. Ratings are averaged over four replications.

X = Treatments with different letters signify efficacy was statistically different at p=0.05 using LS means.



**Fig. 2. A, B, C and D.** The control treatment (A) and (D) at 11 WAT (June 29, 2016) had several milkweed (*Asclepias syriaca*) plants and native woody plant seedlings invading. The Specticle G treatment plots (B) severely impacted milkweed plants attempting to grow 11 WAT. Barricade 65WG (C) was not as effective in later evaluation dates in preventing growth of broadleaf weeds as was Specticle G. Photos by: h. Mathers



**Fig. 3.** Chess (*Bromus secalinus*) was shown here in the Specticle G plot at 3 WAT was considered a native species.



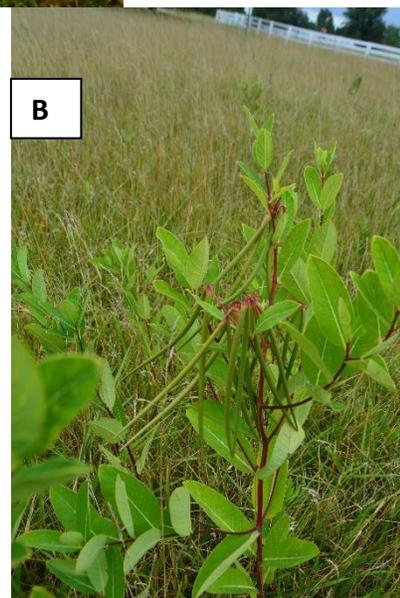
**Fig. 4. (Above)** Yellow nutsedge, *Cyperus esculentus* L., shown here at 3 WAT in the Specticle G treatment was considered a native species and not scored as part of efficacy ratings.



**Fig. 5. (Above)** Clover and wild carrot shown above were scored as part of efficacy as invading species.



**Fig. 6 A, B. and C.** Dogbane (*Apocynum androsaemifolium*) shown in **A.** just above the tag indicating this photo was taken in a control on June 16 (9 WAT) and **B.** (July, 2016) became a more dominant species on the site versus milkweed to the right of the tag in **A.**, as the trial progressed **C.** June 16, 2016. Dogbane is distinguished from milkweed by its reddish stems and pencil-like seed pods. Photos by: H. Mathers



### Conclusions

Specticle Flo provided acceptable efficacy and phytotoxicity to be used as an herbicide in natural grassland areas of golf course.

### References:

Nelson, M. 1997. Establishing natural areas on the golf course. USGA Green Section Record. January/February Vol 35(6): 7-11.