

**Project Number:** 13K-3419-3298

**Title:** Herbicide Combinations for Weed Control in Ornamental Bulbs

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**Accomplishments:** Two projects are underway: the full trial at WSU Mount Vernon NWREC and the partial trial at WSU Puyallup. The focus of the trial is to test the effects of several herbicide combinations in ornamental bulb crops.

Mount Vernon. Herbicides were applied November 19, 2008 prior to emergence of bulb foliage. Roundup at 2 pt/a was applied to all plots (including the weedy checks) to control emerged weeds. Weed control (%) was evaluated February 3, March 31, and April 24, 2009. Flowers were counted and stem length of five random blooms were measured (daffodil, April 3; tulip, April 30; and iris, May 19 (number) and May 28 (height), 2009). Bulbs were harvested June 17, July 7, and July 31 for tulip, daffodil, and iris, respectively. Bulbs were cleaned and sized, but yield data is still being analyzed. The trial was a split-plot randomized complete block with four replicates.

Weed control in early February (1) was poor, primarily due to poor control of ivyleaf speedwell in the plots. By late March (2), however, Roundup applied in November had killed the ivyleaf speedwell in most plots, and residual products were providing good to excellent weed control. By late April (3), weed control with several products was beginning to drop off, including Callisto at both rates, Devrinol at both rates, and Pendulum Aquacap at both rates. Combination treatments were still providing excellent weed control (>90%) by the April evaluation. No treatments caused visible foliar injury to any bulb species. There were also no significant differences in bloom parameters by herbicide treatment. Bulb yield parameters are still being analyzed.

Puyallup. The iris and tulip bulbs were treated with an in-furrow 18" wide band of Par-Flo 4F at 192 fl oz/1000ft of row prior to hilling to control soil-borne diseases. During the growing season, foliar applications of 26GT were made to control foliar diseases. Herbicides were applied December 3, 2008 prior to emergence of bulb foliage. Roundup at 2 pt/a was applied to all plots (including the weedy checks) to control emerged weeds. Weed control (%) was evaluated January 30, March 3, and April 23, 2009. Flowers were counted and stem length of five random blooms were measured (daffodil and tulip, April 29, 2009; iris May 28, 2009). Bulbs were harvested during summer, 2009, then brought up to WSU Mount Vernon NWREC for cleaning and sizing. Bulb yield data is still being analyzed. The trial was a split-plot randomized complete block with four replicates.

Weed control was excellent with all four treatments through the early March evaluation (2), after which Devrinol began to lose control of shepherd's-purse, spring whitlowgrass, and minerslettuce. By late April (3), weed control was below 80% for Devrinol treatments. Surflan was still holding most weeds back (>90% control) by the April evaluation. No treatments caused visible foliar injury to any bulb species. There were also no significant differences in bloom parameters by herbicide treatment.

Product comparisons between Puyallup and Mount Vernon: There were no clear similarities between the same treatments at the two sites. That is, Devrinol was controlling 84 to 86% of the weeds at Mount Vernon while the same treatments were controlling 75 to 76% of the weeds at Puyallup. Surflan, however, was responding about the same at both sites, with 90 to 94% weed control at Puyallup and 95 to 99% weed control at Mount Vernon. This difference is not what one would expect, based on sandier soil at Puyallup compared to Mount Vernon (sandier soils normally have less herbicide adsorption, resulting in greater

herbicide activity). Potential for leaching out of the weed zone may account for the comparatively poorer weed control at Puyallup, however, particularly with Devrinol. These differences could also be explained because the weed species differed between the two sites. Once the bulb data is analyzed, comparisons will be made between these two sites to determine the effect (if any) by the herbicides on the bulb crop itself.

Table 1. Weed control in ornamental bulbs (tulip, daffodil, and iris) after treatment with various herbicides.

Treatment	Rate product/a	Weed control <sup>a</sup>		
		1 %	2 %	3 %
<b>Puyallup</b>				
Devrinol	4 lb	96 ab	93 b	75 b
Devrinol	8 lb	98 ab	95 ab	76 b
Surflan	1.5 pt	99 a	96 ab	90 a
Surflan	3 pt	99 a	98 a	94 a
Weedy check	---	95 b	76 c	50 c
<b>Mount Vernon</b>				
Callisto	5 floz	64	81 de	81 fg
Callisto	8 floz	59	83 cde	76 g
Devrinol	4 lb	51	80 e	84 ef
Devrinol	8 lb	64	88 a-e	86 def
Surflan	1.5 pt	71	90 a-d	95 ab
Surflan	3 pt	63	94 ab	99 a
Pennant Magnum	2 pt	68	91 abc	94 abc
Pennant Magnum	2.5 pt	69	93 ab	93 a-d
Pendulum Aquacap	4 pt	64	85 b-e	85 ef
Pendulum Aquacap	6 pt	58	91 abc	88 c-f
Callisto + Devrinol	5 floz + 4 lb	56	95 a	98 a
Callisto + Surflan	5 floz + 1.5 pt	45	95 a	96 ab
Callisto + Pennant Magnum	5 floz + 2 pt	54	94 ab	94 abc
Callisto + Pendulum Aquacap	5 floz + 4 pt	58	94 ab	94 abc
Devrinol + Surflan	4 lb + 1.5 pt	53	94 ab	99 a
Devrinol + Pennant Magnum	4 lb + 2 pt	61	93 ab	93 a-d
Devrinol + Pendulum Aquacap	4 lb + 4 pt	46	89 a-e	90 b-e
Surflan + Pennant Magnum	1.5 pt + 2 pt	61	95 a	98 a
Devrinol + Surflan + Pennant Magnum	4 lb + 1.5 pt + 2 pt	56	95 a	99 a
Weedy check	---	46	61 f	63 h

Means in the same column followed by the same letter are not significantly different ( $P < 0.05$ ).

<sup>a</sup>Weed Control 1 = January 30 (P) and February 3 (MV); Weed Control 2 = March 3 (P) and March 31 (MV); Weed Control 3 = April 23 (P) and April 24 (MV).

Table 2. Flower number and flower stem length after treatment with various herbicides.

Treatment	Rate product/a	Flower number <sup>a</sup>			Stem length <sup>b</sup>		
		Daffodil no./plot	Tulip no./plot	Iris no./plot	Daffodil inches	Tulip inches	Iris inches
<b>Puyallup</b>							
Devrinol	4 lb	33	33	24	21	17	15
Devrinol	8 lb	33	32	24	21	17	14
Surflan	1.5 pt	37	34	23	21	17	15
Surflan	3 pt	32	35	24	21	16	14
Weedy check	---	34	32	22	21	17	15
<b>Mount Vernon</b>							
Callisto	5 floz	28	36	27	14	18	10
Callisto	8 floz	31	36	25	15	17	13
Devrinol	4 lb	27	35	26	14	17	13
Devrinol	8 lb	25	36	23	14	17	13
Surflan	1.5 pt	27	36	23	14	18	13
Surflan	3 pt	24	35	25	14	18	13
Pennant Magnum	2 pt	29	35	23	14	17	13
Pennant Magnum	2.5 pt	27	34	24	14	16	9
Pendulum Aquacap	4 pt	23	37	22	14	18	13
Pendulum Aquacap	6 pt	24	36	24	14	17	13
Callisto + Devrinol	5 floz + 4 lb	28	35	22	14	17	13
Callisto + Surflan	5 floz + 1.5 pt	25	35	23	14	18	13
Callisto + Pennant Magnum	5 floz + 2 pt	26	37	23	14	16	13
Callisto + Pendulum Aquacap	5 floz + 4 pt	28	37	24	14	17	13
Devrinol + Surflan	4 lb + 1.5 pt	25	37	25	14	18	10
Devrinol + Pennant Magnum	4 lb + 2 pt	28	35	24	14	18	13
Devrinol + Pendulum Aquacap	4 lb + 4 pt	24	33	24	14	18	13
Surflan + Pennant Magnum	1.5 pt + 2 pt	28	36	25	14	18	13
Devrinol + Surflan + Pennant Magnum	4 lb + 1.5 pt + 2 pt	27	35	23	14	18	13
Hand weeded	---	25	35	26	15	18	13

Means in the same column followed by the same letter are not significantly different ( $P < 0.05$ ).

<sup>a</sup>Flower number for daffodil = April 29 (P) and April 3 (MV), for tulip = April 29 (P) and April 30 (MV), and for iris = May 28 (P) and May 19 (MV).

<sup>b</sup>Flower height for daffodil = April 29 (P) and April 3 (MV), for tulip = April 29 (P) and April 30 (MV), and for iris = May 28 (P) and May 28 (MV).