SSGWO Progress Research Report

June 12, 2026

Alternative Early Season Herbicide Programs for Spinach Seed Production

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Objective

Evaluate spinach crop response and weed control from Dual Magnum and Nortron herbicide mixtures and new herbicides for potential alternatives to Ro-Neet in early season weed control of spinach seed crop.

Procedure

A field study was conducted at the OSU Vegetable Research Farm. Plots were 10' by 20' with four replications with spinach planted on two rows 20 inches apart with a precision Gaspardo planter at 10 seeds per foot on May 5, 2026. The field was irrigated 0.5 inches after application treatments and watered as needed. Rain was not significant at or near application timings.

Application details	A (Ro-Neet app)	B (all other treatments)
Date	5/5/2026	5/6/2026
Method	PPI with rototiller	PRE
Timing	Before seeding	After seeding
Temperature	70 F	73 F
Relative Humidity	61%	42%
Wind	1 mph	5 mph
Soil moisture	Dry	Dry
Cloud cover	1%	20%
GPA	20	20
Nozzle	6-8002VS	6-8002VS
Nozzle spacing	20''	20''

Visual crop injury ratings of chlorosis, necrosis, stunting, and total injury will be collected 7, 14, and 21 days after treatment (DAT) on a scale of 0 to 10, where 0 is no injury and 10 is plant death. Spinach stand count and plant biomass were collected at 35 DAT. Visual weed control ratings by species and total control will be evaluated at 7, 14, and 21 DAT on a scale of 0 to 100, where 0 is no control and 100 is full control. Weed biomass was collected on 35 DAT by randomly sampling in a 2.5 ft by 1 ft wide quadrat over each spinach row in each plot. All

collected data has been analyzed with ANOVA and mean separation test where appropriate using Tukey's HSD α=0.05.

Table 1. Treatments of herbicide mixtures and new herbicides evaluated in spinach at the OSU Vegetable Research Farm in 2026

Trt	Herbicide	Trade name	Product rate	Active ingredient rate	Timing
				lbs ai/A	
1	Nontreated	-	-	-	-
2	Handweeded check	-	-	-	-
3	Cycloate	Ro-Neet	4 pt/A	3	PPI
4	S-metolachlor	Dual Magnum	0.33 pt/A	0.31	PRE
5	S-metolachlor	Dual Magnum	0.67 pt/A	0.64	PRE
6	Ethofumesate	Nortron	1 pt/A	0.5	PRE
7	Ethofumesate	Nortron	1.88 pt/A	0.94	PRE
8	Ethofumesate	Nortron	2 pt/A	1	PRE
9	S-metolachlor + Ethofumesate	Dual Magnum + Nortron	0.33 + 1 pt/A	0.31 + 0.5	PRE
10	S-metolachlor + Ethofumesate	Dual Magnum + Nortron	0.67 + 1 pt/A	0.64 + 0.5	PRE
11	S-metolachlor + Ethofumesate	Dual Magnum + Nortron	0.33 + 1.88 pt/A	0.31 + 0.94	PRE
12	S-metolachlor + Ethofumesate	Dual Magnum + Nortron	0.67 + 1.88 pt/A	0.64 + 0.94	PRE
13	S-metolachlor + Ethofumesate	Dual Magnum + Nortron	0.33 + 2 pt/A	0.31 + 1	PRE
14	S-metolachlor + Ethofumesate	Dual Magnum + Nortron	0.67 + 2 pt/A	0.64 + 1	PRE
15	Dimethenamid-p*	Outlook	2.66 fl oz	0.125	PRE
16	Dimethenamid-p*	Outlook	5.3 fl oz	0.25	PRE
17	Metamitron*	Goltix 700 SC	31.25 fl oz	1.42	PRE
18	Metamitron*	Goltix 700 SC	62.5 fl oz	2.85	PRE
19	S-metolachlor + Metamitron*	Dual Magnum + Goltix 700 SC	0.33 pt/A + 31.25 fl oz	0.477 + 1.42	PRE
20	Ethofumesate + Metamitron *	Nortron + Goltix 700 SC	12 fl oz/A + 31.2 floz/A	+ 1.42	PRE

*, Not registered for use in spinach; PPI, pre plant incorporated before planting; PRE, pre-emergence post planting

Results and Discussion

Only visual data collected up to 21 DAT is presented. The stand count and weed biomass has been collected but not processed for weights and analysis yet.

There was no significant spinach response by any of the treatments. Early on, Dual Magnum and Nortron treatments appeared to cause stunting, and slower emergence. This response remained up to 21 DAT; however, ratings were all below 4 and no different across treatments (Figure 1). Outlook and Goltix did not cause significant spinach response and appear safe when applied preemergence (Figure 1). In a separate area, Goltix was applied postemergence over spinach and significant leaf burn was observed (Figure 2).

Weed pressure in the field was high, mainly dominated by pigweeds and lamsbquarters. Hairy nightshade, Shepherd's purse, and common groundsel were also present. In the 400's block, some plots had areas with bindweed which may have affected stand and spinach establishment.

Dual Magnum alone resulted in similar control to Ro-Neet; however, Nortron alone had poor weed control compared to Ro-Neet. The herbicide mixtures of Dual Magnum and Nortron only outperformed the Nortron alone treatments (Figure 3). The Dual Magnum mixture with the 0.67 pt/A appeared to provide numerically higher weed control than the 0.33 pt/A.

Outlook and Goltix performed like the standard treatment of Ro-Neet only at the higher application rate when applied alone (Figure 3 and 4). The herbicide mixtures of Goltix with Dual Magnum and Nortron did not appear to improve the visual weed control levels (Figure 4).

Throughout the entire plots, pigweeds were controlled greater than lambsquarters (data not shown). Additional data still needs to be collected and analyzed, however, no herbicide treatment caused significant spinach response. Weed control was adequate and no treatment stood out over the standard of Ro-Neet. Our field was particularly weedy, and additional post emergence herbicides would be necessary to achieve full control of weeds.

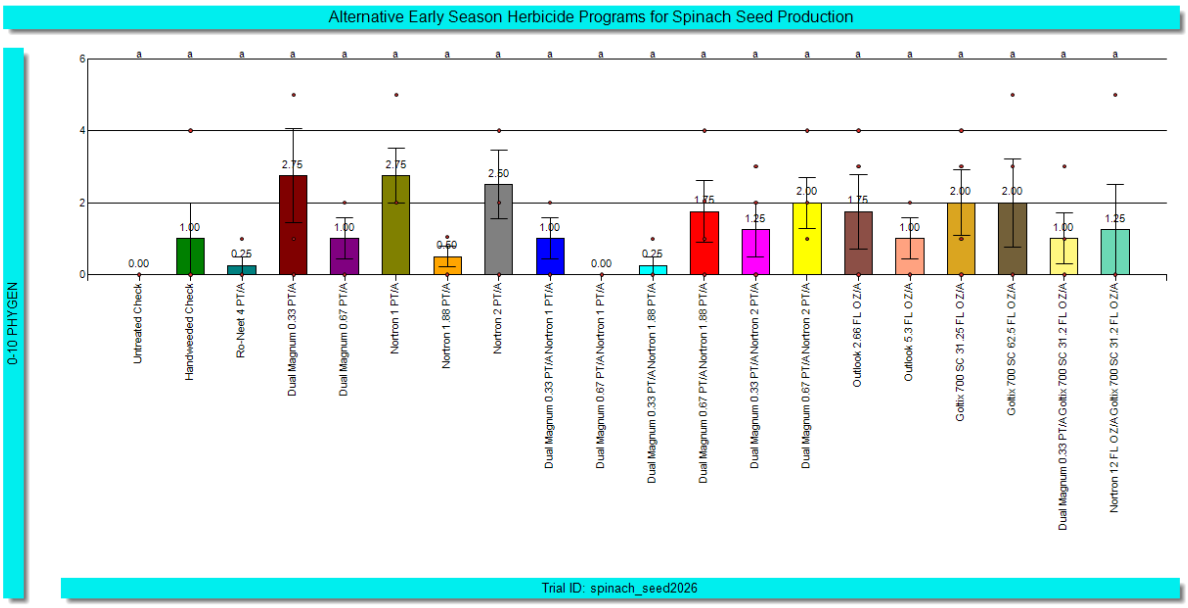

Figure 1. Visual phytotoxicity ratings at 21 days after treatment (5/28/2026). Ratings are on a 0 to 10 scale where 0 is no injury and 10 is plant death. Means with different letters on top are different after Tukey's HSD α=0.05.

Figure 2. Goltix (metamitron; PSII inhibitor) injury when applied POST at 31.2 fl oz/A on 2-3 leaf spinach. When Goltix is applied PRE at 31.2 and 62.5 fl oz/A, no injury is observed.

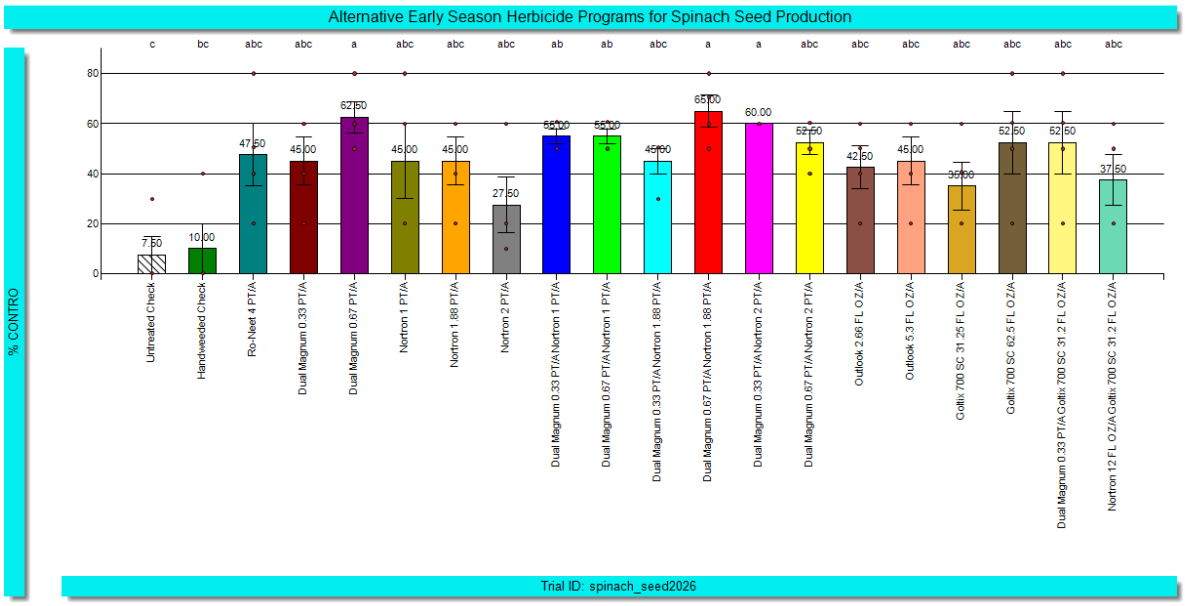

Figure 3. Visual weed control 14 days after treatment (5/21/2026). Ratings are on a 0 to 100 scale where 0 is no control and 100 is complete control. Means with different letters on top are different after Tukey's HSD α=0.05.

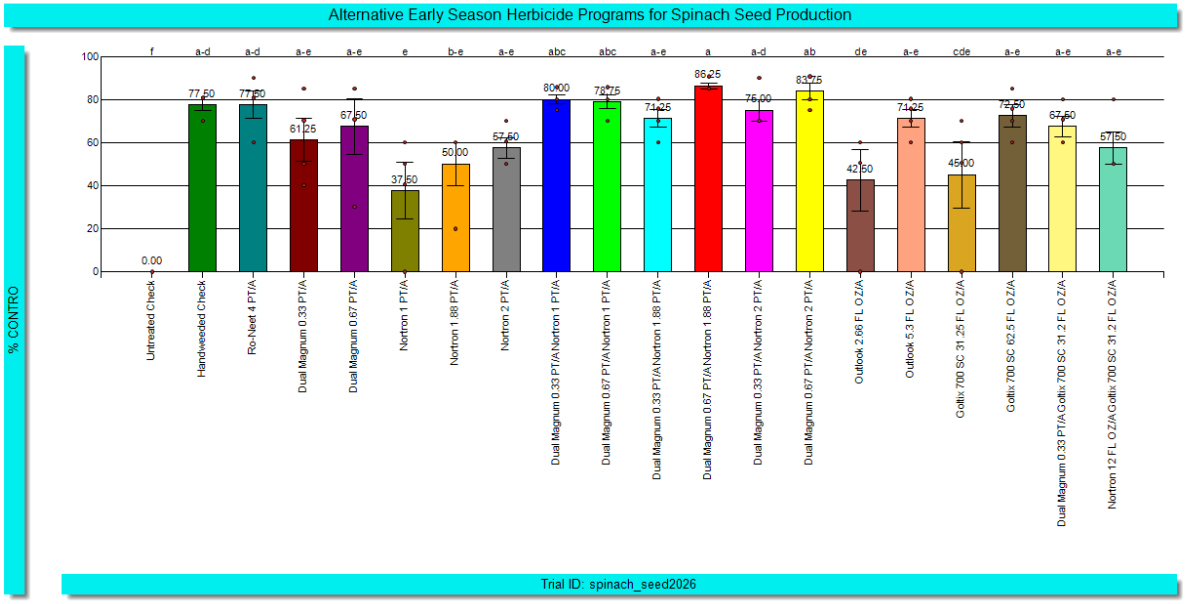

Figure 4. Visual weed control 21 days after treatment (5/28/2026). Ratings are on a 0 to 100 scale where 0 is no control and 100 is complete control. Means with different letters on top are different after Tukey's HSD α=0.05.