

Evaluation of a New Paraquat Formulation (Gramoxone 3LB) Post-Plant Preemergence in Chickpeas

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The study objective was to evaluate crop tolerance and efficacy of a new paraquat formulation (Gramoxone® 3LB) applied post-plant preemergence in chickpeas. The paraquat formulation was evaluated alone at two different rates, 2.00 and 2.71 pt A⁻¹, and in mixture with common preemergence herbicides. Paraquat applied at planting is an alternative option to glyphosate for rotation of herbicide modes of action.

The study was established at the Palouse Conservation Farm Station (PCFS) near Pullman, WA. Treatments of Gramoxone 3LB were applied after chickpeas were seeded but prior to chickpea emergence in the spring of 2019, detailed in Table 1 and Table 2. Treatments were applied with a CO₂ powered backpack sprayer and a 6.67 ft boom with 5 Teejet 11002VS nozzles, calibrated to deliver 15 gallons per acre (GPA). Chickpea were seeded on May 3, 2019 through a Horsch drill by the PCFS farm crew into wheat residue. Chickpeas emerged May 13, 2019. The study was conducted in a randomized complete block design with 4 replications. Plots were 10 ft by 30 ft long. A burndown application of glyphosate (RT3; 32 fl oz A⁻¹), NIS (0.25% v/v), and AMS (8 lb/100 gal) was applied two weeks prior to harvest.

Common lambsquarters control was visually assessed 15, 43, and 100 days after treatment (DAT). Control of volunteer wheat and crop injury was assessed 43 DAT. Plots were harvested using a 5 ft wide Kincaid plot combine on September 5, 2019. All data was subjected to an analysis of variance using the statistical package built into the Agricultural Research Manager software system (ARM 8.5.0, Gylling Data Management).

Table 1. Treatment application details for ICB2019

Study Application	
Date	May 6, 2019
Air temperature (°F)	69
Soil temperature (°F)	57
Wind velocity (mph, direction)	0.6, NE
Cloud Cover	2
Next rain occurred on	May 14, 2019
Rain accumulation 2 WAT (IN)	0.83

Results

Common lambsquarters (CHEAL) control was 99% for all treatments 15 days after treatment (DAT). At 43 DAT, the paraquat alone treatments had reduced to 36 and 33% CHEAL control while, although not statistical different, the paraquat treatments combined with standard preemergence mixtures maintained 81 and 91% control. By 100 DAT, paraquat alone no longer had any common lambsquarters control (18 and 0%) compared to paraquat with preemergence herbicides (69 and 63%) (Table 2). Volunteer wheat control was also evaluated, and although not significantly different there was more control of volunteer wheat when preemergence herbicides were combined with the paraquat treatments.

Yields were similar among treatments and the study averaged 2,360 lb A⁻¹ (Table 2). Paraquat (Gramoxone 3LB) is an effective option for pre- or at-planting burndown and is an essential input in an integrated herbicide system to control weeds before soil residual herbicides are activated. As a contact herbicide, there is no residual control and thus must be part of a system.

Table 2. Percent common lambsquarters (CHEAL) control, and volunteer wheat control, and yield following post-plant preemergence treatments of paraquat (Gramoxone 3LB) in chickpeas. Pullman, WA, 2019. Means followed by the same letter are not significantly different ($\alpha=0.05$).

Treatment ¹	Field Rate	lb ai/A	May 21, 2019	June 18, 2019	August 14, 2019	September 5,	Yield
			(15 DAT)	(43 DAT)	(100 DAT)	2019	
			CHEAL Control	CHEAL Control	Volunteer Wheat Control	CHEAL Control	
			%	%	%	%	lb A ⁻¹
Nontreated	-	-	-	-	-	-	2570
Gramoxone 3LB NIS	2 pt/A 0.25% v/v	0.750	99	36	32	18 b	2220
Gramoxone 3LB NIS	2.71 pt/A 0.25 % v/v	1.020	99	33	27	0 b	2040
Spartan 4F Outlook	4.5 fl oz/A 21 fl oz/A	0.140 0.980	99	81	77	69 a	2760
Gramoxone 3LB NIS	2 pt/A 0.25% v/v	0.750					
UAN	0.0125% v/v						
Sharpen	2 fl oz/A	0.045					
Prowl H2O	1 pt/A	0.475	99	91	73	63 a	2220
Gramoxone 3LB MSO	2 pt/A 1% v/v	0.750					
LSD			NS	NS	NS	37.39	NS

¹ Gramoxone 3LB was always added last in the mixing order

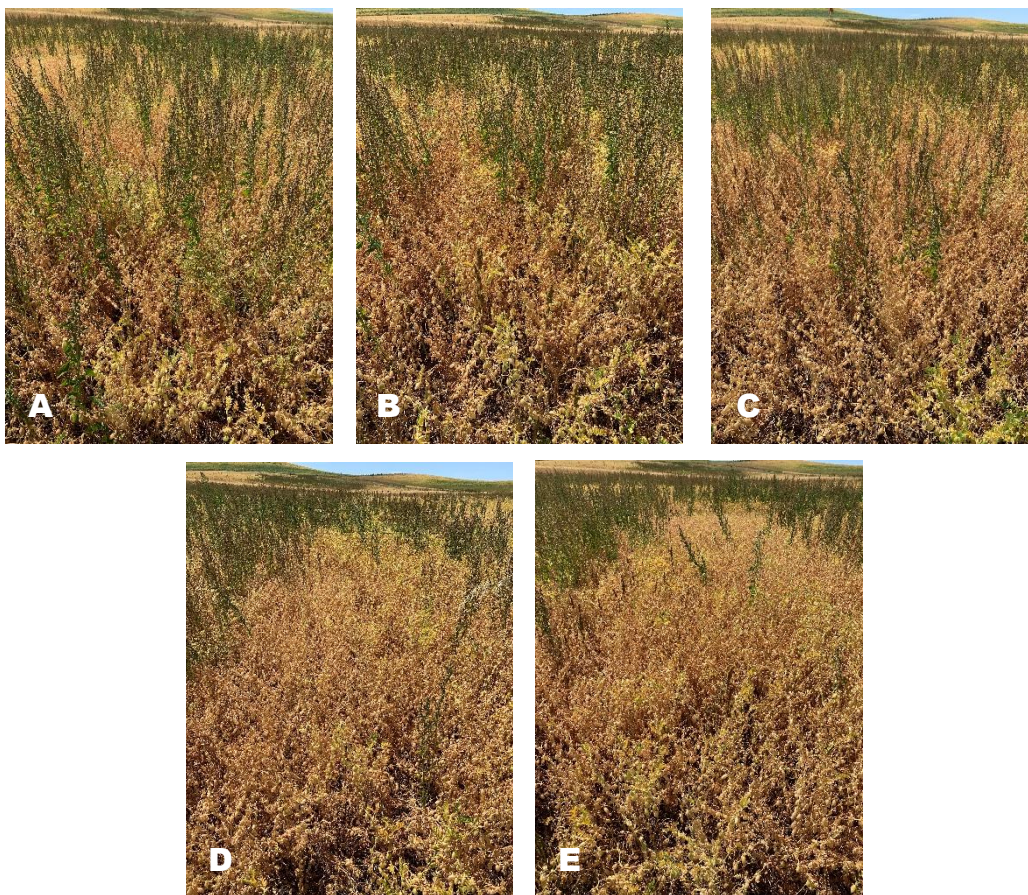


Figure 1. Common lambsquarters pressure by treatment at harvest 122 DAT (September 5, 2019). A) Nontreated, B) Gramoxone 3LB 2 pt A⁻¹, C) Gramoxone 3LB 2.71 pt A⁻¹, D) Spartan 4F + Outlook + Gramoxone 3LB, and E) Sharpen + Prowl H2O + Gramoxone 3LB.

Disclaimer

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