Evaluation of fall and spring applied herbicide treatments for weed control in dry peas at Hettinger, ND

A trial was conducted to evaluate fall and spring herbicide treatments for weed control in dry peas. In the fall, on November, 15, 2023, herbicides were applied to a field with a known infestation of downy brome. Fall applied herbicides included glyphosate alone (Roundup PowerMax 3 at 22 oz/A) and tank-mixed with Anthem Flex (carfentrazone plus pyroxasulfone) at 4 oz/A, and Fierce (flumioxazin plus pyroxasulfone) at 6, 7.5, and 9 oz/A (Table 1 and 2). Dry peas were planted using a no-till drill on May 1, 2024 at a depth of 2 inches. The prior crop was spring wheat. Spring herbicide treatments were applied on the same day after planting. Spring herbicide treatments included glyphosate alone and tank-mixed with Anthem Flex (4 oz/A), and Spartan Elite (sulfentrazone plus s-metolachlor) at 32 oz/A. There were also treatments with combined fall and spring applications. These included fall application of Anthem Flex (2.5 oz/A) followed by spring application of Anthem Flex (2 oz/A), and fall Anthem Flex (4 oz/A) followed in spring with Spartan Charge (sulfentrazone plus carfentrazone) (5 oz/A). All treatments were applied with AMS (8.5 LB/100gal) and an HSMOC (1% v/v).

A fall application of glyphosate alone controlled downy brome at 96%, but did not control any other spring emerging weeds. A spring application of glyphosate controlled downy brome at 86% and controlled some of the broadleaf weeds that had emerged prior to application. Fall application of Anthem Flex plus glyphosate controlled downy brome at 100% at either 4 or 2.5 oz/A. At 34 DAT, fall application of Anthem Flex provided better control of both kochia and green foxtail, but not common lambsquarters, when compared with spring application of glyphosate alone. A spring application of Anthem Flex resulted in better control of kochia, common lambsquarters, and green foxtail compared with fall application. The winter of 2023-24 had little snow cover and may have resulted in increased degradation of Anthem Flex applied in the fall which reduced weed control with this timing. The sequential application of Anthem Flex in fall and spring resulted in similar weed control when compared with the spring application. The sequential application of fall Anthem Flex followed by spring Spartan Charge resulted in similar weed control to the spring Anthem Flex treatment. Spring application of Spartan Elite resulted in the best weed control for all three spring annual weeds evaluated in this trial, along with 95% control of downy brome. Fall application of Fierce plus glyphosate controlled downy brome 96 to 100%. Control of spring weeds was generally similar to the fall application of Anthem Flex for kochia and green foxtail, but control was greater for common lambsquarters when Fierce was applied at 9 oz/A. Weed competition reduced dry pea stand in the untreated and fall glyphosate alone treatments compared with other treatments. Pea height was also reduced in the untreated control and in fall and spring glyphosate alone treatments. It was also less in treatments applied only in the spring, likely due to competition with downy brome that was present at time of planting. This was also evident when looking at pea yields. The highest yielding treatments included a combination of fall and spring applied herbicides. Fall application, by them self, had slightly reduced yield comped with the combination treatments likely due to reduced control on spring weeds. Spring applications alone also yielded slightly less than the combination treatments likely due to the competition from downy brome at time of planting, even though spring treatments were all effective at controlling downy brome. Downy brome was able to remove water and nutrient resources prior to treatment, which reduced access of these resources for the pea crop. This shows the importance of controlling downy brome in the fall.

Table 1. Comparison of fall and spring herbicide applications for weed control in dry pea at Hettinger, ND, 2024

				Downy brome		Kochia		Lambsquarters		Green foxtail		Dry Pea		
		Rate	Timing	0 DAT	21 DAT	21 DAT	34 DAT	21 DAT	34 DAT	21 DAT	34 DAT	Stand	Height	Yield
Treatment		oz/A		% control								plt/ft^2	IN	LB/A
1	Untreated	-	-	0	0	0	0	0	0	0	0	3.7c	7e	4d
2	Glyphosate	22	Fall	96b	96bcd	0e	0	0d	0e	0e	0e	4.8c	18cd	947c
3	Glyphosate	22	Spring	0	86e	81d	47e	81bc	66bcd	0e	0e	6.6ab	18cd	1672abc
4	Anthem Flex	4	Fall	100a	100a	85d	71d	75c	62d	67d	75bcd	7.1ab	21abc	1734abc
	Glyphosate	22	Fall											
5	Anthem Flex	4	Spring	0c	93d	95ab	89ab	100a	86a	90a	83ab	6.4ab	19bcd	1234bc
	Glyphosate	22	Spring											
6	Anthem Flex	2.5	Fall	100a	100a	94abc	88abc	92ab	78ab	81b	79abc	6.7ab	22ab	2224a
	Glyphosate	22	Fall											
	Anthem Flex	2	Spring											
	Glyphosate	22	Spring											
7	Anthem Flex	4	Fall	100a	99abc	95ab	86bc	88b	78ab	79b	76bcd	7.8a	23a	2005ab
	Glyphosate	22	Fall											
	Spartan Charge	5	Spring											
	Glyphosate	22	Spring											
8	Glyphosate	22	Spring	0c	95cd	98a	97a	101a	89a	94a	88a	7.0ab	18d	1649abc
	Spartan Elite	32	Spring											
9	Fierce	6	Fall	99a	100a	90a-d	82bcd	85bc	63cd	71cd	70cd	6.3b	19bcd	1082bc
	Glyphosate	22	Fall											
10	Fierce	7.5	Fall	98a	96bcd	87bcd	75d	89b	68bcd	70cd	66d	6.9ab	21ab	1528abc
	Glyphosate	22	Fall											
11	Fierce	9	Fall	100a	99abc	85cd	79cd	90ab	76abc	76bc	67d	7.4ab	21ab	1748abc
	Glyphosate	22	Fall											
LSD P=.05				2.1	4.1	9.5	9.4	11.1	14.2	7.4	10.6	1.19	2.42	788.6
Standard Deviation				1.4	2.8	6.5	6.4	7.6	9.8	5.1	7.3	0.96	1.81	540.4
CV				2.09	2.87	8.06	9.05	9.56	14.63	8.16	12.15	14.95	10.44	32.2
Treatment F				4396	10.62	79.07	79.46	52.28	26.55	178.6	78.92	3.50	4.60	3.57
Treatment Prob(F)				0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0052	0.0022	0.0061

Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

Table 2. Application environment and equipment for preemergence application of herbicide treatments for weed control in dry peas.

Application Description			Application equipment		
Date	Nov-15-2023	May-1-2024	Equipment Type	Tractor mounted	Tractor mounted
Start Time	2:15 PM	10:41 AM	Operation Pressure	44 PSI	38 PSI
Stop Time	2:30 PM	10:51 AM	Nozzle Model	11002DG	DG11002
Temperature Start, Stop	62.2, 63.5 F	59.7, 50.8 F	Nozzle Spacing	20 IN	20.0 IN
% Relative Humidity Start, Stop	25.9, 28.2	35.2, 40.5	% Coverage	100	100
Wind Velocity+Dir. Start	6.3 MPH, WSW	1.1 MPH, ENE	Boom Length	100 IN	100 IN
Wind Velocity+Dir. Stop	4.6 MPH, WSW	2.7 MPH, ENE	Boom Height	20 IN	20 IN
Wind Velocity+Dir. Max	6.3 MPH, WSW	4.8 MPH, ENE	Ground Speed	4.2 MPH	4 MPH
Wet Leaves (Y/N)	N, no	N, no	Carrier	WATER	WATER
Soil Temperature	38 F	47 F	Application Amount	10 GAL/AC	10 GAL/AC
Soil Moisture	DRY	DRY	Mix Size	2.0 L	2.0 L
% Ground Cover	80	95	Propellant	CO2	CO2
% Cloud Cover	80	95	Tank Mix (Y/N)	Y, yes	Y, yes