Effects of tillage for herbicide incorporation on broadleaf weed control in 'Frontier' chickpeas

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A study was conducted at the Cook Agronomy Farm near Pullman, WA to evaluate herbicides for the control of broadleaf weeds. In addition, we evaluated if soil disturbance, after treatments were applied, affected product efficacy. The soil at this site is a Naff silt loam with pH of 4.8 and organic matter content of 3.0%. On May 13th, the entire trial area was sprayed with glyphosate to kill the common lambsquarters and Italian ryegrass that germinated following conventional ground preparation and rain that fell throughout April. On May 15th, the trial area received 0.57 of an inch of rainfall that most likely stimulated weed seed germination. On May 18th, 'Frontier' chickpeas were planted at a rate of 175 lb/acre at a depth of 1.5 inches using a Monosem vacuum planter with a 10-inch row spacing. The post-plant, pre-emerge application took place on May 18th and the conditions were an air temperature of 75°F, relative humidity of 34% and the wind out of the west at 4 mph. On May 19th, half of the treated area, within each block, received a roller packer treatment by driving perpendicular to the treated area. The other half of the plot remained undisturbed. The trial area was harvested with a Kincaid 8XP plot combine on September 16th.

During the two weeks after application, only 0.15 of an inch of rainfall was received. This lack of rainfall after herbicide application likely contributed to the poor weed control observed in this trial. Poor herbicide activation by insufficient rainfall is often cited by growers as the reason for using light tillage to incorporate and activate herbicides. Between May 20th and September 6th, the crop received 2.21 inches of precipitation, with rainfall events being fairly spread out. Crop injury was not noted with any treatments in this trial. The initial visual weed control rating taken on June 17th did not suggest that rolling had an impact on common lambsquarters control with the herbicides tested (Table 1). Lorox® + Spartan® and Outlook® + Spartan were providing the best control of common lambsquarters. However, on the second evaluation (June 30th), none of the treatments were providing acceptable control of common lambsquarters. Rolling did have a significant effect and plots treated with Sharpen® + Sencor®, Lorox + Spartan and Lorox + Valor®, all exhibited reduced weed control when rolled. When it came to our final evaluation on July 6th, rolling did not have a significant effect on common lambsquarters density. Rolling did not have a significant effect on yield or 100-seed-weight, thus data were combined across rolling treatments and means are composed of eight replications (Table 2). All herbicide treatments increased yield when compared to the nontreated check.

Mechanical incorporation of herbicides did not improve weed control in this study despite a lack of sufficient rainfall for herbicide activation. In 2015, a year with sufficient rainfall for post-

plant, pre-emerge herbicide activation, rolling reduced weed control with some of the herbicide treatments compared to no mechanical herbicide incorporation. Growers should be sure to check herbicide labels before using tillage to incorporate herbicides.

Table 1. Evaluation of the combination of herbicides and soil surface disturbance and their effects on common lambsquaters control in 'Frontier' chickpeas.

		Mechanical	Common lambsquarters control		Common lambsquarters
Treatment	Rate	Treatment	6/17	6/30[2]	7/6
	oz/A		----------%----------		plants per m^2
Nontreated Check	--	Not-Rolled	--	--	89 e[1]
Nontreated Check	--	Rolled	--	--	97 e
Sharpen + Sencor 75DF	2 fl oz + 8	Not-Rolled	47 bc[1]	35 c[1]	47 b-d
Sharpen + Sencor 75DF	2 fl oz + 8	Rolled	40 cd	21 e	53 cd
Lorox DF + Spartan 4F	20 + 8 fl oz	Not-Rolled	85 a	59 a	27 ab
Lorox DF + Spartan 4F	20 + 8 fl oz	Rolled	80 a	47 b	32 a-c
Lorox DF + Valor SX	20 + 2	Not-Rolled	56 b	55 ab	25 ab
Lorox DF + Valor SX	20 + 2	Rolled	45 c	34 cd	33 a-d
Lorox DF + Pursuit®	20 + 2 fl oz	Not-Rolled	32 d	27 c-e	56 d
Lorox DF + Pursuit	20 + 2 fl oz	Rolled	35 cd	24 de	55 cd
Outlook + Spartan 4F	21 fl oz + 8 fl oz	Not-Rolled	85 a	55 ab	23 a
Outlook + Spartan 4F	21 fl oz + 8 fl oz	Rolled	81 a	50 ab	20 a

[1] Means, based on four replicates, within a column, followed by the same letter are not significantly different at P=0.05 as determined by the LSMEANS test, which means that we are not confident that the difference is the result of treatment rather than experimental error or random variation associated with the experiment.

[2] Mechanical treatment had a significant (Pr>F 0.0261) effect on common lambsquarters control.

Table 2. The effect of herbicides on yield and 100-seed-weight in 'Frontier' chickpeas, September 16, 2016.

Treatment	Rate	Yield	100 Seed weight
	oz/A	lb/A	g
Nontreated Check	--	878 b[1]	38.4 a
Sharpen + Sencor 75DF	2 fl oz + 8	1302 a	39.1 a
Lorox DF + Spartan 4F	20 + 8 fl oz	1322 a	38.6 a
Lorox DF + Valor SX	20 + 2	1167 a	38.5 a
Lorox DF + Pursuit	20 + 2 fl oz	1140 a	38.6 a
Outlook + Spartan 4F	21 fl oz + 8 fl oz	1320 a	37.8 a

[1] Means, based on eight replicates, within a column, followed by the same letter are not significantly different at P = 0.05 as determined by Fisher's protected LSD test, which means that we are not confident that the difference is the result of treatment rather than experimental error or random variation associated with the experiment.