Herbicide application timings in chickpeas

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A field study was conducted on the WSU Cook Agronomy Farm near Pullman, WA to evaluate different herbicide application timings for the control of broadleaf weeds in chickpeas. Lack of rainfall to activate herbicides after application has been problematic in recent years. Early pre-plant applications might have more opportunity to be activated by rainfall than herbicides applied post-plant, pre-emerge. The soil at this site is a Naff silt loam with pH of 4.8 and organic matter content of 3.0%. The pre-plant applications took place on April 7th and 28th using a CO_2 backpack sprayer set to deliver 10 gpa at 2.3 mph and 40 psi. Conditions on April 7th were an air temperature of 60°F, relative humidity of 40% and the wind was calm. Conditions on April 28th were an air temperature of 59°F, relative humidity of 48% and the wind out of the west at 4 mph. 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 in. 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 71°F, relative humidity of 36% and the wind out of the west at 4 mph. The trial area was harvested with a Kincaid 8XP plot combine on September 15th.

Within two weeks of application, treatments applied on April 7th received a total of 0.36 inches of rain, treatments applied on April 28th received a total of 0.94 inch of rain, and treatments applied on May 18th received 0.15 inches of rain. Between May 20th and September 6th, the crop received a total of 2.21 inches of rain, with rainfall events being fairly spread out. Common lambsquarters was the only broadleaf weed uniformly distributed within the trial area. Crop injury was not noted with any treatments in this trial. Based on visual ratings, Spartan® and Sencor® generally provided the best control of common lambsquarters, Valor was intermediate and Lorox® provided very little control (Table 1). On the June 30th rating date, Sencor applied on May 18th was providing less control than on the two application dates in April.

Common lambsquarters density counts were taken on July 6th. Statistical analysis suggested that application date was not significant, so treatment means are averaged over the three dates (Table 2). Sencor, Spartan and Valor significantly reduced the density of common lambsquarters when compared to Lorox. Lorox's activity on lambsquarters was between the other three herbicides and the nontreated check. Yield and 100-seed-weight were not affected by herbicide application date, thus treatment means were averaged over application date (Table 3). Spartan- and Valor®-treated plots yielded better than the nontreated check plots. Lorox- and Sencor-treated plots yielded similarly to the nontreated check plots. There were no differences noted among 100-seed-weight when compared among all herbicide treatments and the nontreated check.

Timely rains after the pre-plant herbicide applications provided good weed control from these early treatments. Even though we only received 0.15 inches of rainfall within the two weeks after the at-plant herbicide application, three days prior to planting we received 0.57 inches of rainfall, which may have helped to activate the post-plant pre-emerge treatments. Thus, in this study, all three herbicide application timings provided similar control of common lambsquarters.

Table 1. Herbicide, application date and their effects on common lambsquarters control in 'Frontier' chickpeas

			Common lambsquarters control	
Treatment	Rate	Application Date	6/17	6/30[1]
	oz/A		----------%----------	
Lorox DF	20	4/7	26 d[2]	17 d[2]
Lorox DF	20	4/28	55 b-d	30 cd
Lorox DF	20	5/18	50 cd	22 cd
Sencor 75DF	8	4/7	91 a	81 a
Sencor 75DF	8	4/28	95 a	87 a
Sencor 75DF	8	5/18	75 a-c	52 bc
Spartan 4F	8 fl oz	4/7	96 a	85 a
Spartan 4F	8 fl oz	4/28	94 a	82 a
Spartan 4F	8 fl oz	5/18	95 a	79 ab
Valor SX	2	4/7	82 ab	66 ab
Valor SX	2	4/28	80 a-c	56 bc
Valor SX	2	5/18	52 b-d	52 bc

[1] Herbicide application date had a significant (Pr>F 0.0467) effect on common lambsquarters control

[2] Means, based on four replicates, within a column, followed by the same letter are not significantly different at P = 0.05 as determined by 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.

Table 2. Herbicide application and its effect on common lambsquarters abundance in 'Frontier' chickpeas

		Common lambsquarters
	Rate	7/6
Treatment	oz/A	plants per m^2
Spartan 4F	8 fl oz	3 ab[1]
Sencor 75DF	8	6 b
Valor SX	2	8 b
Lorox DF	20	23 c
Nontreated Check	--	40 d

[1] Means, based on twelve replicates, within a column, followed by the same letter are not significantly different at P = 0.05 as determined by 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.

Table 3. Herbicide application and its effect on yield and seed weight in 'Frontier' chickpeas, September 15, 2016.

Treatment	Rate	Yield	100-seed-weight
	oz/A	lb/A	g
Lorox DF	20	697 b[1]	36.3 a
Sencor 75DF	8	829 b	37.1 a
Spartan 4F	8 fl oz	1330 a	38.5 a
Valor SX	2	1330 a	37.6 a
Nontreated Check	--	675 b	37.0 a

[1] Means, based on twelve replicates, within a column, followed by the same letter are not significantly different at P = 0.05 as determined by 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.