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 Thatuna silt loam with pH of 4.8 and organic matter content of 3.0%. The pre-plant applications took place on April 10th and 23rd using a CO_2 backpack sprayer set to deliver 10 gpa at 2.3 mph and 40 psi. Conditions on April 10th were an air temperature of 66°F, relative humidity of 30% and the wind out of the west at 7 mph. Conditions on April 23rd were an air temperature of 55°F, relative humidity of 30% and the wind out of the west at 6 mph. On May 7th, the entire trial area was sprayed with glyphosate to kill the Italian ryegrass that germinated following ground preparation and rain that fell the beginning of April. On May 11th, '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 11th and the conditions were an air temperature of 73°F, relative humidity of 26% and the wind out of the northeast at 2 mph. The trial area was harvested with a Zurn 150 plot combine on September 4th.

Treatments applied on April 10th received 0.11 inches of rain on them on the 11th. The treatments applied on April 23rd essentially had no rain on them until May 12th. On May 12th, 0.38 inches of rain fell. Between May 12th and June 2nd, the crop received the majority of its precipitation in the amount of 2.47 inches. While there was no evidence of crop injury from any of the treatments and their various timings, there was some sort of background issue over the majority of the trial, which was the result of either a lack of adequate soil moisture or a residual herbicide affecting chickpea growth and development. Regardless of application date, within a particular herbicide, common lambsquarters control was similar, thus results are averaged over the three timings (Table 1). Lorox® applied at 20.0 oz/A did not provide commercially acceptable control of common lambsquarters, while Sencor®, Spartan® and Valor® did. Mayweed chamomile control was different in that there was a significant interaction between the herbicide used and date of application (Table 2). This was especially true for the Lorox and Sencor treatments. Lorox only provided commercially acceptable control from the May 11 application. Sencor provided commercially acceptable control from the April 23 and May 11 applications. Spartan and Valor provided excellent control regardless of application date.

Plant density counts were taken for both weeds on June 26th. The counts suggested that application date was not significant, so treatment means are averaged over the three dates (Table 3). 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. Spartan and Valor provided the greatest reduction in mayweed chamomile density. Sencor's activity was similar to Spartan and Valor, but also similar to Lorox, which provided the least reduction in mayweed chamomile density when compared to the nontreated check. Yield and 100-seed-weight were not affected by herbicide application date, thus treatment means over application date were averaged (Table 4). All herbicides significantly improved yield when compared to the nontreated check. Lorox-treated plots did not yield as well as the Sencor-, Spartan- or Valor-treated plots, which all yielded similarly. All herbicide treatments increased 100-seed-weight when compared to the nontreated check, with the exception of Lorox.

Because conditions were mostly dry prior to planting and sufficient rainfall was received to activate the herbicides applied post-plant pre-emerge, no benefit was observed in this study for the early pre-plant treatments. In fact, mayweed chamomile control was reduced with early pre-plant applications of Lorox or Sencor.

Table 1. Herbicide application and its effect on common lambsquarters control in Frontier chickpeas

		Common lambsquarters
	Rate	Control (0 to 100)
Treatment	oz/A	6/19
Nontreated Check		--
Lorox DF	20.0	50 c[1]
Sencor DF	8.0	91 ab
Spartan 4F	8.0	96 a
Valor SX	2.0	79 b

[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 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.

Table 2. Herbicide application date and its effect on mayweed chamomile control in Frontier chickpeas

			Mayweed chamomile
	Rate	Application	control (0 to 100)
Treatment	oz/A	Date	6/19
Nontreated Check			--
Lorox DF	20.0	4/10	60 bc[1]
Lorox DF	20.0	4/23	36 c
Lorox DF	20.0	5/11	94 a
Sencor DF	8.0	4/10	64 b
Sencor DF	8.0	4/23	81 a
Sencor DF	8.0	5/11	94 a
Spartan 4F	8.0	4/10	100 a
Spartan 4F	8.0	4/23	96 a
Spartan 4F	8.0	5/11	97 a
Valor SX	2.0	4/10	90 a
Valor SX	2.0	4/23	80 a
Valor SX	2.0	5/11	100 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 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.

Table 3. Herbicide application and its effect on common lambsquarters and mayweed chamomile abundance in Frontier chickpea

		Common lambsquarters	Mayweed chamomile
	Rate	Number of plants per square meter	
Treatment	oz/A	----------6/26----------	
Nontreated Check		48 a[1]	77 a
Lorox DF	20.0	13 b	9 b
Sencor DF	8.0	0 c	3 bc
Spartan 4F	8.0	0 c	0 c
Valor SX	2.0	2 c	1 c

[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 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.

Table 4. Herbicide application and its effect on yield and seed weight in Frontier chickpea

	Rate	Yield (lb/A)	100-seed-weight (g)
Treatment	oz/A	----------9/4----------	
Nontreated Check		84 c	33.7 c
Lorox DF	20.0	421 b	35.4 bc
Sencor DF	8.0	904 a	38.1 a
Spartan 4F	8.0	948 a	37.3 ab
Valor SX	2.0	889 a	37.2 ab

[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 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.