Tolerance of Chickpea to Paraquat Applied At-Cracking

ICB4016

Central Farm Research Farm in Pomeroy, WA

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Methods

The study was established at the Central Ferry Research Farm near Pomeroy, WA. Treatments were applied post emergence (POST) at several different crop stages, detailed in Table 1 and Table 2. The study was conducted in a randomized complete block with 4 replications. Plots were 10' by 30' long and were supplemented with irrigation. Lorox (2.5 lb A^{-1}) and Outlook (21 fl oz A^{-1}) were applied pre-emergence (PRE) at planting to establish a weed free trial. Irrigation was shut-off two weeks before harvest. Trial was hand weeded July 5, 2016. Irrigation was shut-off three weeks before harvest. Glyphosate at 32 fl oz A^{-1} with ammonium sulfate at 3 lb/100 gal was applied 14 days before harvest as a burn down application.

Crop injury was visually rated 2 and 51 days after treatment (DAT) of application A (Table 2). Common lambsquarters control was visually assessed 2 DAT of application A (Table 2). Plots were harvested using a plot combine on September 26, 2016. All data were 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).

Results

No herbicide was applied for application timing B**.**

On June 7, 2016, crop injury depended on application timing. Crop injury 4 days after treatment for paraquat (73%) and paraquat with the addition of NIS (54%) applied 10 days after crop-cracking (application D) were significantly greater than the nontreated and the other paraquat treatments made at earlier days (Table 2). At 6 and 14 days after treatment, significant crop injury was also present for treatments of paraquat (34%) and paraquat with NIS (36%) applied at 7 days after crop-cracking (application C) and paraquat (31%) applied at cracking (application A) (Table 2). Crop injury for all other treatments made at crop-cracking (application A) was not significantly different from the nontreated.

On July 14, 2016, no significant crop injury was present for any application timing.

There was no significant difference in pest pressure between treatments.

Yield was not significantly different between treatments indicating chickpeas can regenerate after injury caused by paraquat when compared to a nontreated control in a weed free environment.

Table 1. *Treatment application details*

Study Application	**A**	**B**	**C**	**D**
Date	May 24, 2016	Not Applied	June 1, 2016	June 3, 2016
Application volume (GPA)	15		15	15
Crop Stage	At Cracking	4 DA Crack	7 DA Crack	10 DA Crack
Air temperature (˚F)	59		62	78
Soil temperature (˚F)	57		64	70
Wind velocity (mph, direction)	7, S		9, S	4, NW
Next rain occurred on	June 10, 2016		June 10, 2016	June 10, 2016

Table 2. *Percent crop injury, pest pressure, and yield for chickpeas following applications of paraquat with and without a nonionic surfactant at different application timings. Central Ferry, WA, 2016. Means followed by the same letter are not statistically significantly different (α=0.05).*

Treatment	**Application Code**	**Rate**		***June 7, 2016***		***June 7, 2016***	***July 14, 2016***	***September 20, 2016***
				Crop Injury		**Pest Pressure**	**Crop Injury**	**Yield**
			lb ai/A	**%**	**DAT**	**%**	**%**	**lb/A**
Nontreated		-	-	0 a	-	0	0	1140
Paraquat (Gramoxone)	A	8 fl oz/A	0.125	31 ab	14	2	10	1380
Paraquat (Gramoxone) NIS	A A	8 fl oz/A 0.25 % v/v	0.125	14 a	14	2	15	1390
Paraquat (Gramoxone)	B	8 fl oz/A	0.125	0 a	-	2	3	1320
Paraquat (Gramoxone) NIS	B B	8 fl oz/A 0.25 % v/v	0.125	1 c	-	1	10	1160
Paraquat (Gramoxone)	C	8 fl oz/A	0.125	34 ab	6	1	5	1110
Paraquat (Gramoxone) NIS	C C	8 fl oz/A 0.25 % v/v	0.125	36 ab	6	2	9	1250
Paraquat (Gramoxone)	D	8 fl oz/A	0.125	73 c	4	4	3	1390
Paraquat (Gramoxone) NIS	D D	8 fl oz/A 0.25 % v/v	0.125	54 bc	4	4	19	1090
Paraquat (Gramoxone)	A	16 fl oz/A	0.250	14 a	14	0	8	1390
Paraquat (Gramoxone) NIS	A A	16 fl oz/A 0.25 % v/v	0.250	14 a	14	0	1	1440
Sharpen NIS	A A	2 fl oz/A 0.25 % v/v	0.045	8 a	14	0	8	1330

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