Evaluation of Plantback Intervals on Vegetable Crop Yield Following Application of Chateau and V-10142

John S. Rachuy (Staff Research Associate) and Steve Fennimore (UC Weed Specialist)
University of California – Davis, Salinas, CA, 93905

Objective

Evaluation of the safest time interval for vegetable replanting following application of Chateau and V-10142.

Methods

The trial was conducted at the USDA-ARS/UCCE Spence research farm near Salinas, CA; on a loamy sand soil with a pH of 7.2 and with 1.0 % organic matter. The test plot was established using a randomized complete block design, with all treatments replicated four times. Each replicate plot consisted of three 40" wide beds by 20' long. Pre-emergence (PRE) herbicide applications of Chateau 51WG at 0.094 and 0.188 lb ai/A and V-10142 3.3FL at 0.2 and 0.4 lb ai/A were applied on March 15, April 14 and May 16 & 17, 2005, at 4, 3 and 2 months before seeding (MBS), respectively. In addition, pre-emergence applications of Chateau 51WG at 0.094 lb ai/A and V-10142 3.3FL at 0.2 lb ai/A were applied on June 15, 2005, at 1 MBS. All treatments were applied manually as a broadcast spray at 40 gpa over the tops of the peaked beds, using a handheld, single-nozzle boom attached to a CO_2 backpack sprayer. On the day following each application, the entire plot was irrigated by overhead sprinklers for 3 to 4 hours, to incorporate the treatments. Roundup Ultra was applied at 2% v/v in 22 gpa on April 26, 2005, as a spot treatment to control volunteer weeds.

On July 14, 2005, iceberg lettuce cv. 'Sniper', romaine lettuce cv. 'Green Towers', Broccoli cv. 'Marathon', spinach cv. 'Whale', and green onion cv. 'Whitespear' were mechanically planted in single lines (two separate crop lines per bed), using a tractor operated Stanhay planter. On the same day, carrot cv. 'Navajo' was mechanically planted in a single line using a manually operated Earthway seeder.

Crop stand counts were taken on August 3, 2005 (20 days after seeding (DAS)) and on each biomass sampling date (Table 1). Crop injury (foliar phytotoxicity / plant stunting) ratings, with a scale of 0-10 (0 = no injury, ≤2 = acceptable injury, 10 = dead plant) were assessed on August 3 (20 DAS) and 24 (41 DAS), 2005 (Table 2). Crop biomass samples (fresh) were collected on September 2 (50 DAS) for iceberg and romaine lettuce, September 7 (55 DAS) for spinach, September 9 (57 DAS) for broccoli and September 12 (60 DAS) for green onion and carrot. Fresh samples were placed in drying ovens for 3 – 7 days and dry weights determined (Table 3). All crop assessment data were subjected to analysis of variance, and mean separation was performed using LSD (P=0.05).

Results

Chateau:

Head Lettuce, Leaf Lettuce and Spinach – No significant plant stand reduction at either rate at any of the four plantback intervals. Found to be safe at 0.094 lb ai/ac at either 3 or 2 MBS and at 0.188 lb ai/ac at either 4 or 3 MBS. No significant biomass reduction at either rate at any of the four plantback intervals. (Tables 1, 2 & 3)

Broccoli – No significant plant stand reduction at either rate at any of the four plantback intervals. Found to be safe at 0.094 lb ai/ac at 3 MBS and at 0.188 lb ai/ac at either 4 or 3 MBS. Significantly increased biomass at 0.094 lb ai/ac at 1 MBS; otherwise, no significant biomass reduction at any other rate / plantback interval combination. (Tables 1, 2 & 3)

Green Onion and Carrot – No significant plant stand reduction at either rate at any of the four plantback intervals. Found to be safe at either rate at any of the four plantback intervals. No significant biomass reduction at either rate at any of the four plantback intervals.

V-10142:

Head and Leaf Lettuce – No significant plant stand reduction at either rate at any of the four plantback intervals. Found to be unsafe at either rate at any of the four plantback intervals, due to moderate to severe phytotoxicity and stunting. Caused significant biomass reduction in all rate / plantback interval combinations, with the exception of 0.2 lb ai/ac at 4 MBS. (Tables 1, 2 & 3)

Broccoli, Spinach, Green Onion and Carrot – Caused significant plant stand reduction in all rate / plantback interval combinations. Found to be unsafe at either rate at any of the four plantback intervals, due to moderate to severe phytotoxicity and stunting. Caused significant biomass reduction in all rate / plantback interval combinations. (Tables 1, 2 & 3)

Conclusions

Chateau at both 0.094 and 0.188 lb ai/ac appears to be safe for use within 3-4 months of planting any of these crops. Due to the severity of its phytotoxic effects, V-10142 appears to be unsafe for use on iceberg lettuce, romaine lettuce, broccoli, spinach, green onion or carrot at intervals up to four months prior to planting.

Table 1. Crop stand evaluations.

Treatment	Timing (Preplant)	Iceberg Lettuce # / 20ft	Iceberg Lettuce # / 3ft	Romaine Lettuce # / 20ft	Romaine Lettuce # / 3ft	Broccoli # / 20ft	Broccoli # / 3ft	Spinach # / 20ft	Spinach # / 3ft	Green Onion # / 20ft	Green Onion # / 3ft	Carrot # / 20ft	Carrot # / 3ft
		8/3	9/2	8/3	9/2	8/3	9/9	8/3	9/7	8/3	9/12	8/3	9/12
Chateau 0.094	- 4 months	61 a	11.5 a	82 a	15.3 a	68 a	10.8 ab	173 a	30.0 a	125 a	53.3 ab	66 a	27.3 a
Chateau 0.094	- 3 months	78 a	12.3 a	91 a	13.8 a	74 a	11.0 ab	170 a	31.0 a	141 a	39.8 b	66 a	16.0 ab
Chateau 0.094	- 2 months	85 a	13.0 a	94 a	15.3 a	68 a	11.8 ab	157 a	28.3 a	108 a	49.8 ab	64 a	28.8 a
Chateau 0.094	- 1 month	62 a	9.0 a	65 a	10.0 a	60 a	9.5 ab	155 a	25.5 a	104 a	46.8 ab	71 a	24.5 a
Chateau 0.188	- 4 months	68 a	10.0 a	94 a	13.3 a	54 a	11.8 ab	180 a	28.3 a	124 a	41.5 ab	65 a	21.8 a
Chateau 0.188	- 3 months	66 a	8.8 a	69 a	10.8 a	65 a	11.5 ab	158 a	30.3 a	125 a	55.0 a	73 a	23.3 a
Chateau 0.188	- 2 months	59 a	8.0 a	85 a	14.8 a	61 a	8.5 b	129 a	26.0 a	102 a	42.3 ab	61 a	20.0 a
V-10142 0.2	- 4 months	57 a	10.5 a	75 a	11.5 a	54 a	2.3 c	173 a	7.8 b	114 a	13.3 c	69 a	3.3 bc
V-10142 0.2	- 3 months	84 a	14.3 a	85 a	11.8 a	46 a	0.0 c	140 a	0.0 c	98 a	0.0 c	69 a	0.0 c
V-10142 0.2	- 2 months	71 a	13.3 a	61 a	12.3 a	67 a	0.0 c	162 a	0.0 c	109 a	0.0 c	67 a	0.0 c
V-10142 0.2	- 1 month	76 a	12.3 a	91 a	9.8 a	59 a	0.0 c	137 a	0.0 c	97 a	0.0 c	74 a	0.0 c
V-10142 0.4	- 4 months	71 a	14.5 a	80 a	11.0 a	60 a	0.0 c	144 a	0.0 c	124 a	0.0 c	65 a	0.0 c
V-10142 0.4	- 3 months	64 a	9.8 a	76 a	10.3 a	47 a	0.0 c	146 a	0.0 c	84 a	0.0 c	73 a	0.0 c
V-10142 0.4	- 2 months	84 a	13.5 a	98 a	11.8 a	60 a	0.0 c	152 a	0.0 c	95 a	0.0 c	68 a	0.0 c
Untreated	NA	82 a	13.5 a	82 a	14.0 a	68 a	12.0 a	163 a	27.3 a	110 a	46.0 ab	78 a	24.8 a
LSD 0.05		25.9	5.6	34.5	6.3	24.8	3.5	44.4	6.9	33.2	14.1	15.4	13.4

Table 2. Crop injury evaluations.

Treatment	Timing (Preplant)	Iceberg Lettuce 8/3	Iceberg Lettuce 8/24	Romaine Lettuce 8/3	Romaine Lettuce 8/24	Broccoli 8/3	Broccoli 8/24	Spinach 8/3	Spinach 8/24	Green Onion 8/3	Green Onion 8/24	Carrot 8/3	Carrot 8/24
		0 – 10 [A]											
Chateau 0.094	- 4 months	1.6 ef	2.3 cd	2.0 d-g	2.3 de	0.4 d	2.8 bcd	0.4 c	2.4 b	0.3 d	0.5 b	0.5 b	1.1 cd
Chateau 0.094	- 3 months	1.4 ef	1.1 de	1.5 fg	1.3 ef	0.0 d	0.9 de	0.0 c	0.8 bc	0.8 cd	0.5 b	2.3 b	1.0 cd
Chateau 0.094	- 2 months	1.0 ef	2.0 cd	1.0 fg	1.3 ef	0.3 d	2.1 cd	1.3 c	1.4 bc	1.6 cd	0.9 b	0.8 b	1.0 cd
Chateau 0.094	- 1 month	4.0 c	3.4 c	3.9 cde	3.5 cd	2.4 c	3.5 bc	0.6 c	2.8 b	2.4 c	1.5 b	1.4 b	1.4 cd
Chateau 0.188	- 4 months	1.9 e	1.9 cd	1.8 efg	1.8 def	0.0 d	1.1 de	0.0 c	1.3 bc	0.9 cd	1.1 b	0.6 b	1.3 cd
Chateau 0.188	- 3 months	2.3 de	1.9 cd	2.4 def	1.9 def	0.3 d	1.8 cde	0.0 c	1.6 bc	0.8 cd	0.5 b	0.5 b	0.3 d
Chateau 0.188	- 2 months	3.6 cd	3.5 c	2.5 def	2.1 de	3.1 c	4.6 b	1.3 c	2.1 b	2.4 c	1.8 b	1.3 b	2.0 c
V-10142 0.2	- 4 months	4.5 bc	5.3 b	4.1 bcd	5.1 bc	5.3 b	8.2 a	4.6 b	8.1 a	4.5 b	8.0 a	4.9 a	7.9 b
V-10142 0.2	- 3 months	6.3 a	5.8 b	5.9 abc	5.6 b	6.8 ab	9.4 a	6.8 a	9.4 a	6.1 ab	10.0 a	6.4 a	9.5 a
V-10142 0.2	- 2 months	6.0 ab	5.9 b	6.3 ab	6.1 b	6.8 ab	9.4 a	6.6 a	9.4 a	5.9 ab	10.0 a	6.4 a	9.6 a
V-10142 0.2	- 1 month	7.0 a	6.3 b	6.1 ab	5.4 bc	7.0 a	9.6 a	7.0 a	9.6 a	6.4 a	7.8 a	6.6 a	9.6 a
V-10142 0.4	- 4 months	6.5 a	8.5 a	6.6 a	8.6 a	7.0 a	9.6 a	7.0 a	9.5 a	6.4 a	10.0 a	5.4 a	9.7 a
V-10142 0.4	- 3 months	7.6 a	9.3 a	7.5 a	8.9 a	7.8 a	9.7 a	6.8 a	9.5 a	6.4 a	10.0 a	6.8 a	9.7 a
V-10142 0.4	- 2 months	7.4 a	8.7 a	7.1 a	8.1 a	7.3 a	9.6 a	7.0 a	9.4 a	6.5 a	10.0 a	7.0 a	9.7 a
Untreated	NA	0.0 f	0.0 e	0.0 g	0.0 f	0.0 d	0.0 e	0.0 c	0.0 c	0.0 d	0.0 b	0.0 b	0.0 d
LSD 0.05		1.7	1.7	2.3	2.0	1.6	1.9	1.6	2.1	1.7	2.4	2.3	1.5

[A] Rating scale: 0 = no injury; ≤2 = commercially acceptable; 10 = dead plants

Table 3. Crop biomass (dry weight / plant) evaluations.

Treatment	Timing (Preplant)	Iceberg Lettuce 9/6	Romaine Lettuce 9/6	Broccoli 9/13	Spinach 9/12	Green Onion 9/15	Carrot 9/16
		grams / plant					
Chateau 0.094	- 4 months	3.4 ab	3.2 bc	41.1 ab	12.1 ab	6.2 b	19.3 a
Chateau 0.094	- 3 months	4.1 a	3.8 abc	39.8 b	11.8 b	8.7 a	27.8 a
Chateau 0.094	- 2 months	2.9 ab	3.3 bc	38.3 b	13.3 ab	6.8 ab	20.9 a
Chateau 0.094	- 1 month	3.4 ab	4.5 ab	54.8 a	14.7 a	7.0 ab	22.3 a
Chateau 0.188	- 4 months	4.5 a	5.0 a	38.7 b	13.2 ab	7.9 ab	22.9 a
Chateau 0.188	- 3 months	4.1 a	4.1 abc	37.4 b	12.3 ab	6.3 b	20.5 a
Chateau 0.188	- 2 months	3.7 ab	4.3 ab	46.0 ab	14.3 ab	7.7 ab	24.5 a
V-10142 0.2	- 4 months	2.3 bc	2.6 cd	10.6 c	3.0 c	1.6 c	7.5 b
V-10142 0.2	- 3 months	1.2 cd	1.4 de	0.0 c	0.0 d	0.0 c	0.0 b
V-10142 0.2	- 2 months	1.2 cd	1.4 de	0.0 c	0.0 d	0.0 c	0.0 b
V-10142 0.2	- 1 month	0.7 cd	1.4 de	0.0 c	0.0 d	0.0 c	0.0 b
V-10142 0.4	- 4 months	0.5 d	0.4 e	0.0 c	0.0 d	0.0 c	0.0 b
V-10142 0.4	- 3 months	0.2 d	0.4 e	0.0 c	0.0 d	0.0 c	0.0 b
V-10142 0.4	- 2 months	0.3 d	0.9 e	0.0 c	0.0 d	0.0 c	0.0 b
Untreated	NA	3.5 ab	3.5 abc	36.8 b	13.3 ab	7.4 ab	20.9 a
LSD 0.05		1.7	1.5	14.1	2.8	1.8	9.3