

CUCUMBER, SQUASH, AND WATERMELON TRANSPLANT TOLERANCE TO PREPLANT APPLICATIONS OF 2,4-D

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Introduction

In reduced tillage operations the lack of soil disturbance will often leave winter annual weeds that may interfere with vegetable production. Vegetable production that includes fumigation results in several weeks from time of bed formation and mulch laying to crop transplant which results in germination of weeds in the row middles. In commercial bareground vegetable production it is not always possible to prepare the ground and pull the beds just prior to transplant. If the beds are prepared early it may be necessary to make a herbicide application to control weeds that have germinated. The ability to make a pre-transplant broadcast application of a herbicide in each of these situations would be economical to growers if there are no effects on the desired crops. While non-selective herbicides such as glyphosate (Roundup WeatherMax[®]) and paraquat (Gramoxone Inteon[®]) are commonly used in these situations, they will not completely control winter annual weeds such as cutleaf evening primrose. 2,4-D is effective on many winter annual weeds and will provide additional control of problematic species when used in combination with non-selective herbicides. Our objectives were to determine the effect of 2,4-D on transplant cucumber and watermelon in bareground production systems and transplant cucumber and squash in plastic mulch production systems.

Materials and Methods

Bareground Production. A study was conducted in TyTy, GA during the spring of 2006 on a Tifton Sandy Loam soil having 1.3% organic matter and a pH of 6.4. The study was a split plot arranged in a randomized complete

block with four replications. 2,4-D was applied at 1 and 2 pt/A at four timings: 3, 2, 1, and 0 weeks before crop transplant (WBP). A non-treated check was included for comparison purposes. The 0 WBP applications were made in the morning followed by 0.4 inches of irrigation followed by transplanting of cucumber and watermelon. Each plot was three 6 foot wide beds, one bed each for cucumber and watermelon transplants and one bed for growth of watermelon vines, by 20 feet in length. Twenty 'Thunder' cucumber seedlings were transplanted on one bed while on another bed 5 'Sweet Delight' watermelon were transplanted. A single pollinator plant, 'Mardi Gras', was placed at the beginning of each watermelon plot. Data collected was yield and crop injury (on a 0 to 100 scale where 0 = no injury and 100 = complete crop death).

Mulch Production. A study was conducted in TyTy, GA during the spring of 2006 on a Tifton Sandy Loam soil having 1.3% organic matter and a pH of 6.4. The study was a randomized complete block design with four replications. Each plot was 6 feet wide by 20 feet long. Land was prepared conventionally and plastic mulch laid prior to 2,4-D application. On day one 2,4-D was applied at 1 and 2 pt/A over top of the plastic mulch followed by 0.4 inches of irrigation on day two followed by the transplanting of 'Thunder' cucumber and 'Enterprise' squash on day three. A non-treated check was included for comparison purposes. Data collected was yield and crop injury (on a 0 to 100 scale where 0 = no injury and 100 = complete crop death).

Results and Discussion

Bareground Production (Table 1). All applications of 2,4-D caused 29 to 56% injury to cucumber, 2 weeks after transplanting (WAP). 2,4-D at 1 pt/A caused 32 to 80% injury to cucumber while 2,4-D at 2 pt/A caused 69 to 91% injury, 4 WAP. All applications of 2,4-D reduced cucumber fruit number 48 to 97% and total yield 52 to 97%. All applications of 2,4-D caused 42 to 70% injury to watermelon, 2 WAP. 2,4-D at 1 pt/A caused 36 to 69% injury to watermelon while 2 pt/A caused 59 to 86% injury, 4 WAP. 2,4-D at 1 pt/A reduced total watermelon yield 38 to 46% while 2 pt/A reduced yield 60 to 66%.

Mulch Production (Table 2). Rated 4 WAP, cucumber was injured 40 and 78% and their

height reduced 58 and 75% when 2,4-D at 1 and 2 pt/A, respectively, was applied pre-transplant overtop of mulch. Squash was injured 37 and 53% and their height reduced 38 and 59% from 2,4-D at 1 and 2 pt/A, respectively. Cucumber yield was reduced 58 and 70% and squash yield reduced 46 and 61% from 2,4-D at 1 and 2 pt/A, respectively, applied pre-transplant.

Conclusions

Application of 2,4-D prior to transplanting in bareground or mulch production systems will cause severe injury and yield loss of cucumber, squash, and watermelon. Application of 2,4-D should not be made in the same growing season as the grower wishes to plant cucurbit crops.

Table 1. Bareground production: cucumber and watermelon transplant injury and yield as affected by pre-transplant applications of 2,4-D.^z

2,4-D		Cucumber				Watermelon		
Rate	Timing	Injury		Yield		Injury		Yield
pt/A	WBP ^x	2 WAP ^y	4 WAP	fruit/A	ton/A	2 WAP	4 WAP	ton/A
		%		(1000s)		%		
1	3	30 c	32 d	11.7 b	2.7 b	51 b	40 de	10.4 b
1	2	29 c	34 d	12.3 b	2.9 b	42 c	36 e	12.1 b
1	1	38 bc	55 c	8.2 bc	2.0 bc	52 b	61 c	10.5 b
1	0	46 b	80 ab	2.5 de	0.7 cd	52 b	69 abc	12.0 b
2	3	44 b	79 ab	4.2 cde	1.1 cd	64 a	84 ab	7.7 b
2	2	41 b	69 bc	6.7 cd	1.8 bc	54 b	59 cd	7.8 b
2	1	42 b	78 ab	2.7 de	0.8 cd	55 b	64 bc	7.2 b
2	0	56 a	91 a	0.7 e	0.2 d	70 a	86 a	6.5 b
Non-treated		0 d	0 e	23.7 a	6.0 a	0 d	0 f	19.3 a

^z Values followed by the same letter are not different as determined by Fisher's Protected LSD at $p \leq 0.05$.

^y WAP = weeks after planting; injury based on visual scale of 0 to 100 where 0 = no injury and 100 = complete crop death.

^x WBP = weeks before planting; 0 WBP application made just prior to crop transplant.

Table 2. Mulch production: cucumber and squash transplant injury, height, and yield as affected by pre-transplant applications of 2,4-D.^z

2,4-D		Cucumber				Squash			
pt/A	4 WAP ^y	Injury	Height	Fruit	Total	Injury	Height	Fruit	Total
		%	cm	number	yield	%	cm	number	yield
1		40 b	6.0 b	8.8 b	1.8 b	38 b	8.6 b	33.5 b	3.5 b
2		78 a	3.6 b	5.6 b	1.2 b	53 a	5.8 c	23.1 c	2.5 c
Non-treated		0 c	14.2 a	19.5 a	4.1 a	0 c	13.9 a	48.5 a	6.4 a

^z Values followed by the same letter are not different as determined by Fisher's Protected LSD at $p \leq 0.05$.

^y WAP = weeks after planting; injury based on visual scale of 0 to 100 where 0 = no injury and 100 = complete crop death.