

Cowpea Cover Crop Mulch for Weed Control in Desert Pepper Production

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Introduction

With the decreasing availability of herbicides labeled for use in vegetable production, sustainable options need to be developed that can reduce herbicide input while maintaining acceptable weed control. One option available to growers is the use of a cover crop mulch for weed control. Cowpea (*Vigna unguiculata*) is a natural fit for a desert vegetable production systems. Cowpea is adapted to growth in the hot, dry climates found in the summer in the Coachella valley. Some varieties of cowpea produce abundant biomass that could be used as mulch in the following crop.

Objectives

1. Determine the influence of a cowpea cover crop mulch on season-long weed control in bell pepper production.
2. Investigate the influence of a cowpea cover crop mulch on pepper plant growth and pepper production.

Materials and Methods

A two year trial was conducted at the Coachella Valley Agricultural Research Station in Thermal, CA.

Treatments included: conventional bare ground (BG) with hand weeding, BG with no weed control, Cowpea mulch (CP) with hand weeding, CP with no weed control. Treatments were arranged in a randomized, complete block design with four replications. Cowpea (var, Iron Clay) was planted on July 7, 1997, and July 10, 1998. Bell pepper (var. Keystone) plants were transplanted into 76 cm beds on one foot spacing on Sept. 2, 1997, and Sept. 22, 1998. Peppers were harvested on Dec. 18, 1997, and Dec. 15, 1998. Data collected included cowpea biomass at the beginning and end of the season and weed emergence and pepper plant height on two week intervals.

Results and Discussion

At pepper transplanting, the cowpea biomass was 610 and 713 g m⁻¹ bed. The cowpea mulch reduced weed pressure throughout both seasons (Table 1). At harvest, the number of weeds emerged was reduced by approximately 80 and 90% compared to non-weeded bare

ground controls for 1997 and 1998, respectively. Pepper plant growth was not inhibited by the cowpea mulch with plants generally taller in the mulch plots (Table 2). At harvest, the mulch plots supported, in general, more pepper plant dry weight and significantly less weed dry weight than the bare ground plots (Table 3). Total pepper weight and number of peppers produced in the mulch plots was greater than in the bare ground plots (Table 3). In conclusion, cowpea mulch provided season-long weed control without herbicides and increased pepper production

Table 1. Weed emergence in cowpea mulch and bare ground non-weeded plots. Data represents number of weeds per meter of bed.

Treatment	3 WAT ¹		5 WAT		7 WAT		Harvest	
	1997	1998	1997	1998	1997	1998	1997	1998
Cowpea	13.8 a ²	7.5 x	25.5 a	8.0 x	15.5 a	7.5 x	48.0 a	9.5 x
Bare Ground	299.0 b	142.0 y	211.2 b	120.5 y	200.0 b	84.8 y	244.0 b	110.5 y

¹WAT, weeks after transplanting. ²Means separated within columns with LSD at $p < 0.05$.

compared to conventional production systems.

Table 2. Growth of pepper plants over the season. Data represents plant height (cm).

Treatment	3 WAT ¹		5 WAT		7 WAT		Harvest	
	1997	1998	1997	1998	1997	1998	1997	1998
CP, Weeded	nt ²	20.8 x ³	28.4 a	25.6 x	30.8 a	26.5 x	32.4 a	28.3 x
CP, non-Weeded	nt	20.8 x	27.0 a	24.4 xy	29.5 a	26.9 x	30.1 a	28.0 x
BG, Weeded	nt	18.0 x	20.6 b	20.9 y	21.9 b	22.5 y	24.2 b	24.0 x
BG, non-Weeded	nt	19.6 x	19.5 b	20.8 y	21.1 b	24.3 xy	26.1 b	25.1 x

¹WAT, weeks after transplanting. ²nt, not tested. ³Means separated within columns with LSD at $p < 0.05$.

Table 3. Weed and pepper plant dry weight at harvest. Total pepper weight and peppers per plant for the 1998 season.

Treatment	Weed Dry Wt. at Harvest (g m ⁻¹ bed)		Pepper Plant Dry Weight at Harvest (g plant ⁻¹)		Pepper Production (g plant ⁻¹) 1998	Pepper Production (fruit plant ⁻¹) 1998
	1997	1998	1997	1998		
CP, Weeded	nt ¹	nt	14.7 a	7.1 x	147.9 a	2.6 ab
CP, non-Weeded	12.2 a ²	7.0 x	16.3 a	6.5 x	120.9 a	2.7 a
BG, Weeded	nt	nt	9.9 ab	4.6 y	81.3 b	2.1 ab
BG, non-Weeded	37.1 b	72.1 y	5.4 b	4.1 y	69.7 b	1.7 b

¹nt, not tested. ²Means separated within columns with LSD at $p < 0.05$.