

DRIP IRRIGATION ON COMMERCIAL SEED CARROTS IN CENTRAL OREGON, 2005

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Abstract

Three drip-irrigated commercial seed carrot fields were evaluated for yield and seed germination compared to adjacent sprinkler-irrigated fields. Carrot seed yields were 21-24 percent higher in the three drip-irrigated fields compared to the sprinkler-irrigated fields, while percent germination was 3-5 percent higher.

Introduction

Small plot research on drip irrigation on carrot seed was conducted in 2000 and 2001 at the Central Oregon Agricultural Research Center. Initial results from this research showed increased seed yields, higher germination rates, reduced water use, and decreased disease pressure. The following year drip irrigation was placed in three commercial fields totaling 22 acres, and was expanded to a total of 400 acres on 14 commercial fields in 2005. Over the 4 years of this project in commercial fields, drip irrigation on seed carrots has increased yields by an average of 22 percent, germination by 5 percent, and decreased water usage by as much as 50 percent.

Methods and Materials

During the 2005 season, three drip-irrigated commercial seed carrot fields were evaluated for yield and seed germination compared to adjacent sprinkler-irrigated fields. The fields ranged in size from 10 to 20 acres.

The carrot fields were planted according to the seed contractor's specifications in mid-August 2004. Fields were sprinkler-irrigated in the fall and spring prior to the set up of drip-irrigation in June. Fertilizer and pesticide treatments were applied as necessary, according to contractor recommendations.

Watermark soil moisture sensors were placed in groups of three at two locations in each drip-irrigated field to track soil moisture. The Watermark sensors were installed 6 inches deep, and offset from the carrot row 6 inches. Target soil moisture levels were 45 kilopascals (kPa) for June through mid-July and 60 kPa for the remainder of the season. The higher the kPa numbers the drier the soil conditions. Carrot seed yields are optimized with a certain amount of moisture stress. Soil moisture readings were taken three times per week using a hand-held Watermark digital meter. Additionally, half of the fields were equipped with an AM 400 data logger, commonly referred to as a Hansen. The Hansen unit records soil moisture every 30 minutes and is easily accessed by growers.

Fields were harvested by grower cooperators using commercial equipment in September. Seed from the drip- and sprinkler-irrigated fields at each of the three locations was kept separate throughout harvest, storage, and seed cleaning. Seed cleaning was conducted by Central Oregon Seed (COSI) according to the contract specifications. Percent germination was analyzed following Association of Seed Analysts standards.

Results and Discussion

Carrot seed yields were 21-24 percent higher in the three drip-irrigated fields compared to the sprinkler-irrigated fields, while percent germination was 3-5 percent higher (Table 1). In a companion project conducted by Fred Crowe and Rhonda Simmons, the amount of *Xanthomonas campestris* pv *carotae* assayed from seed harvested from drip-irrigated carrot seed fields was substantially less than from paired field comparisons that were sprinkler-irrigated. Drip irrigation of carrot seed crops was beneficial by both reducing the risk that a seed lot would require hot water treatment, and by elevating the tolerance of seed lots to reduced germination from the treatment process itself. A complete report on this companion project is provided in this publication under the title “Reduced *Xanthomonas* and Increased Seed Germination from Carrot Seed Crops Irrigated by Drip vs Sprinkler, 2004 and 2005”.

Table 1. Yield, germination, and water usage in carrot seed grown under drip-irrigation and sprinkler-irrigation regimes near Madras, Oregon, 2005.

	Field 1		Field 2		Field 3	
	Drip	Sprinkled	Drip	Sprinkled	Drip	Sprinkled
Acreage	20	10.2	19.15	10	15.85	9.4
Yield (lb/acre)	402	326	496	401	349	289
% of sprinkled	123	100	124	100	121	100
% germination	91	88	92	88	----	----
% of sprinkled	103	100	105	100	----	----
Water usage (acre ft/acre)	1.19	----	1.33	----	1.48	---