

DRIP IRRIGATION OF SEED CARROTS IN CENTRAL OREGON: PRELIMINARY DATA ON THE EFFECT OF IRRIGATION THRESHOLD ON SEED YIELD

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Introduction

Drip irrigation of carrot seed may offer benefits in terms of increased yield of pure-live-seed, decreased disease pressure, and decreased water and fertilizer use. Carrot seed is an important crop in central Oregon. For this reason, work was initiated with seed carrots to observe potential benefits of drip irrigation and to familiarize experiment station personnel and area farmers with drip irrigation. This is a work in progress so only preliminary data will be presented in this report. At the end of the coming season we will have 2 years of data, and analysis for seed-borne diseases in hand for a more thorough analysis.

Methods

Hybrid carrots were sown on 17 August 1999. Four female rows were alternated with two male rows with one blank row between the female and male rows. Drip tape (Rainbird, R-095132-65-25, delivers 0.25 gal/min/100 ft.) was shanked in 4 inches below and 2 inches to the side of each row ahead of planting. All plots were watered with the drip system. Plots were all watered uniformly in the fall at an irrigation threshold of -60 kPa as measured with granular matrix sensors (Watermark, Irrrometer Corp., Riverside, CA). Treatments of -15, -30, -60, -90, and -120 kPa irrigation thresholds were imposed the following spring starting April 20. Three watermark sensors were placed at a depth of 8 inches and read thrice weekly. Plots were irrigated for an 8-hour set whenever the soil water potential came within 10 percent of the irrigation threshold. For comparison a sprinkle irrigated plot was maintained near the drip irrigated plots. The sprinkle irrigated plot was watered at a threshold of -60 kPa.

Twenty feet of the inner female rows were hand-harvested for seed yield as the plots matured in September of 2000. Whole plants were uprooted, placed in large polyethylene bags, and allowed to dry before being threshed in a stationary thresher. Weight per seed was determined from 100 seed counts and germination counts were made according to AOSA standards for carrot.

Results and Discussion

Average irrigation frequency for the months of May and June is shown in Figure 1. Seed yield per plant declined with irrigation threshold (Fig. 2). However, because plant population tended to be higher in the drier treatments, seed yield per acre was not very sensitive to irrigation threshold in this study (Fig. 3). Note that the drip irrigated plots had numerically greater yields than did the nearby sprinkle plot. Within the drip plots, germination percentage tended to be greater at the extremes and less in the middle of the range of irrigation thresholds (Fig. 4). Seed from the drip area had numerically greater germination rates than did seed from

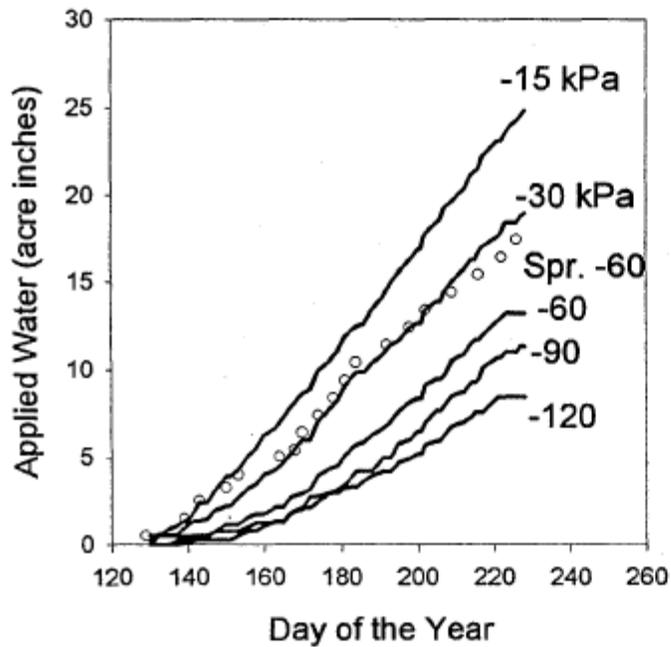


Figure 1. Applied water from early May through mid-August for each treatment in a drip irrigation trial where irrigation threshold was varied from -15 to -120 kPa soil water potential. The trial was conducted at the Madras experiment station in 2000 with seed carrots. Values for a sprinkle check plot are shown with a dotted line.

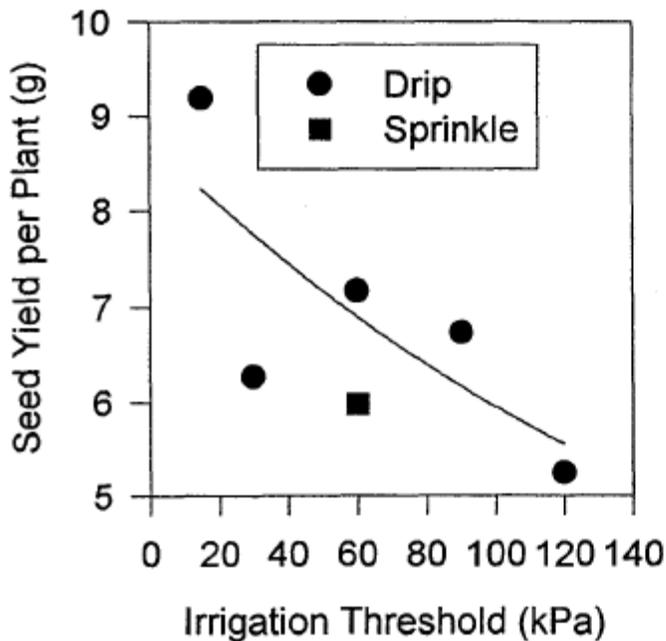


Figure 2. Seed yield per plant versus irrigation threshold for seed carrots grown at the Madras experiment station in 2000. The data for sprinkle irrigation was gathered from a nearby sprinkle plot irrigated at -60 kPa.

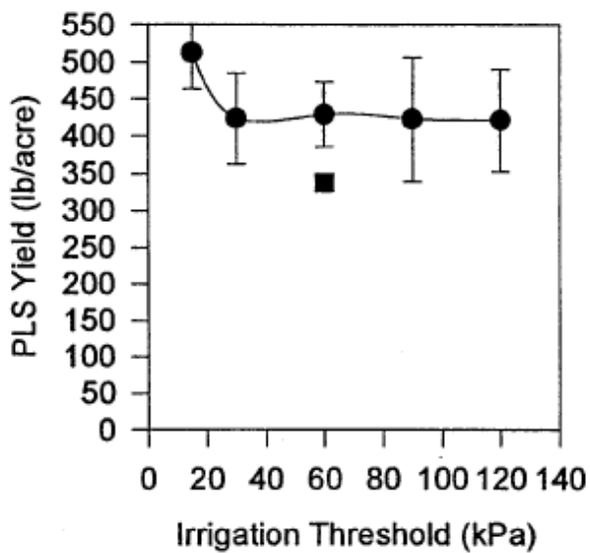


Figure 3. Seed yield per acre versus irrigation threshold for seed carrots grown at the Madras experiment station in 2000. The data for sprinkle irrigation was gathered from a nearby sprinkle plot irrigated at -60 kPa. Plant population tended to be greater in the drier plots, compensating for the lower seed yield per plant in those plots.

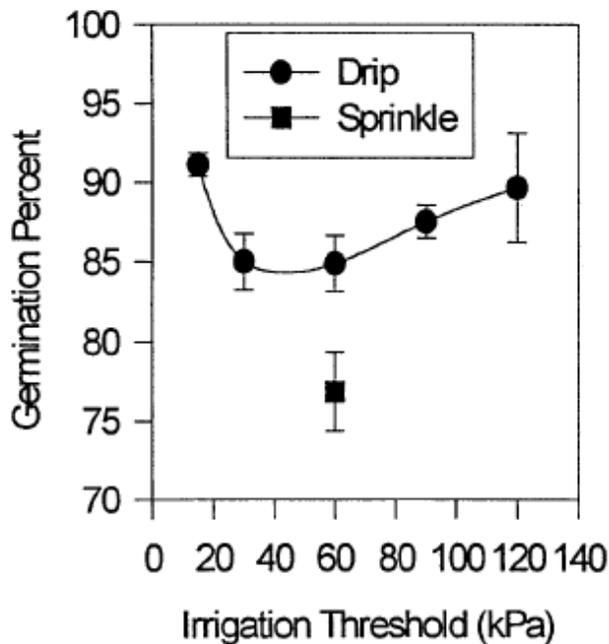


Figure 4. Seed germination versus irrigation threshold for seed carrots grown at the Madras experiment station in 2000. The data for sprinkle irrigation was gathered from a nearby sprinkle plot irrigated at -60 kPa.