ONION (*Allium cepa* cv. 'Vaquero')
Sour skin; *Burkholderia cepacia*
Soft Rot; *Pectobacterium carotovorum* subsp. *carotovorum*

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The influence of irrigation method on bacterial diseases of onions in Northeast California, 2021.

A study was conducted at the Intermountain Research and Extension Center in Tulelake, CA to compare the incidence and severity of bacterial diseases under sprinkler and drip irrigation. The experiment was arranged in a split-plot design with four blocks. Two irrigation treatments (drip and solid-set sprinkler) were assigned to main plots in a randomized complete block design and inoculation treatments (inoculated or not) were randomly assigned to subplots. Main plots were 36-ft by 90-ft and subplots were 9-ft by 90-ft. Forty-ft buffers were placed between main plots to prevent overlap of sprinklers onto adjacent plots. A long-day sweet onion variety was direct-seeded in early May into 36-in centered beds at a target seeding rate of 15 onions per bed-foot. The trial was irrigated with solid-set sprinklers from planting until the five-leaf stage to facilitate onion germination and chemigation for weed control. After the five-leaf stage, solid-set sprinklers (42-ft by 30-ft apart) were used to irrigate sprinkler plots and drip tape (two lines Netafilm Streamline spaced 15-in apart for each 36-in bed) was used to irrigate drip plots. Irrigations were scheduled using a combination of crop ET and soil moisture monitoring with WaterMark sensors. Both irrigation systems were designed to apply 0.20 in/hr and irrigations occurred simultaneously in all plots throughout the remainder of the growing season. All plots received the same amount of nitrogen fertilizer. Spinetoram insecticide was applied to suppress thrips and was the only pesticide applied after irrigation treatments began. The bacterial inoculum was applied on 8 Aug at dusk using a CO_2-pressurized backpack sprayer and a volume equivalent to 40 gal/ac. The inoculum consisted of 10^8 CFU/ml with equal parts of the two pathogens. Symptoms of bacterial disease were evaluated weekly from 10 Aug to 13 Sep by randomly selecting 25 plants per plot. The incidence of bacterial leaf blight represents the number of plants out of 25 with a rating greater than zero. Bacterial leaf blight severity represents the mean percent leaf area with symptoms. The area under disease progress curve (AUDPC) was calculated for bacterial leaf blight incidence and severity across all rating dates. Onion yield and disease levels at harvest were determined by hand-harvesting 20-ft of row from the center of each plot. Two days after harvest, all onions from a 3-ft by 20-ft sub-section in the center of each plot were cut in half to determine the incidence of bulb rot. Agronomic data collected at harvest included stand, yield, and average bulb size. Data were subjected to mixed model analysis of variance and Tukey-Kramer HSD test (JMP statistical software). Starting in early August, patchy foliar symptoms were visible throughout the study area from naturally occurring disease from *Pectobacterium carotovorum* subsp. *carotovorum*. The inoculation on 10 Aug did not influence the incidence and severity of bacterial leaf blight and bulb rot at harvest ($P \geq 0.678$; data not shown). Irrigation method affected all measured variables except onion stand. Sprinkler irrigation resulted in higher foliar symptoms and bulb rot compared to drip irrigation. Sprinkler-irrigated plots had lower bulb yield and smaller bulb size compared to drip irrigation. WaterMark soil moisture data averaged across the growing season showed soil moisture at the 8-inch depth in drip irrigated plots remained wetter with less fluctuation between irrigations compared to the sprinkler treatment. Wetter soil and less bacterial infection may explain why drip irrigation had higher bulb yield and bulb size compared sprinkler irrigation. This work is supported by a Specialty Crops Research Initiative Award 2019-51181-30013 from the USDA National Institute of Food and Agriculture.

Treatment	Leaf blight incidence AUDPC[y]	Leaf blight severity AUDPC	Total bulb yield t/A	Average bulb size ounces	Bulb rot incidence %	Onion stand # / bed ft
Solid-set Irrigation	339a[z]	269a	48.5b	9.5b	22.25a	11.3a
Drip Irrigation	96b	24b	59.1a	11.1a	0.67b	11.8a

[y] Area Under Disease Progress Curve values for leaf blight incidence and severity were calculated based on weekly visual ratings from 10 Aug to 13 Sep.

[z] Treatment means with the same letter within columns are not significantly different according to Tukey's HSD test.