Effects of Irrigation Technology and Rate on Hemp Production

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Background

Water optimization is on the mind of many currently as the amount of pressure on this resource is building in the Intermountain West. Urban growth, persistent droughts, and less snowpack are diminishing the agriculture allotment. Alternative crops may be an answer in the scope of water optimization. The hemp industry rapidly grew in Utah with over 1,200 licensed acres in 2019. As a new crop to Utah, many research-based production practices are needed, with irrigation being one of the foremost..

Definitions

Industrial Hemp: *Cannabis sativa.* This includes hemp and marijuana, but industrial hemp must be below 0.3% THC.

Cannabinoids

CBD: A cannabidiol that's non-psychoactive and reported with medical benefiting characteristics.

THC-9: Delta-9 tetrahydrocannabinol; the cannabinoid with psychoactive characteristics (highs)

Objectives

To determine effects of four irrigation sprinkler technologies, four irrigation rates, and three hemp varieties on hemp **biomass yield**, **CBD yield**, **total cannabinoid yield**, and **THC-9 percentage**

Tested Factors

Location: Wellsville, Utah

4 Irrigation sprinkler technologies: mid-elevation spray application [MESA], two low-elevation (spray application [LESA] and precision application [LEPA]), and mobile drip irrigation [MDI]

4 Irrigation rates: 100%, 75%, 50% uniform, and 50% partial (targeted to critical growth stages)

3 Hemp varieties: Abacus, Tokyo, Trump

Varieties & Irrigation Technology

Abacus: tall, lengthy growth habit. High cannabinoids. Tests hot often. Starts flowering about 2-3 weeks earlier than the rest.

Tokyo: tall, lengthy growth habit. Lower cannabinoids typically. It starts to flower about a week after Trump.

Trump: short, bushy growth habit. High cannabinoids. Starts flowering at about 14-15 hour daylength.

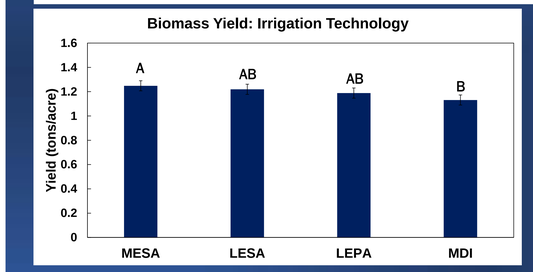
MESA Nozzle
78% irrigation efficiency
20-75 ft wetting diameter
3-6 ft above soil surface
7.5-20 ft spacing between drops

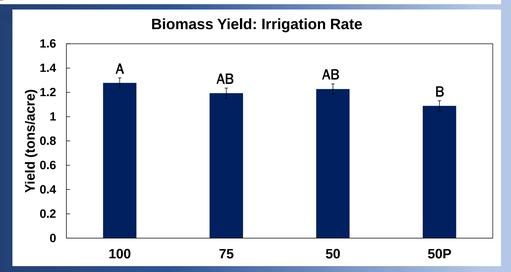
LEPA Nozzle
88% irrigation efficiency
12-30 ft wetting diameter
1-3.5 ft above soil surface
2.5-5 ft spacing between drops

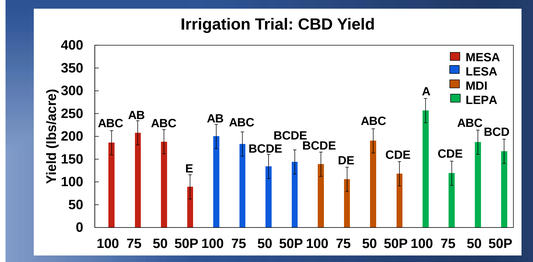
MDI Lines
97% irrigation efficiency
1-2 gallons per hour every 6 inches
1.5-3.5 ft between lines

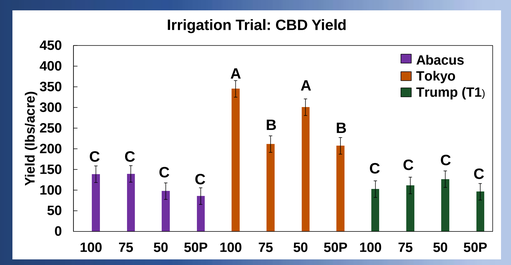
LEPA Nozzle
95% efficient, various parts to change angling of water
1-2ft above soil surface
2.5-3.5ft between drops

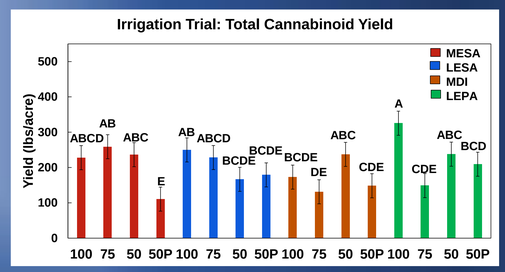
Preliminary Results

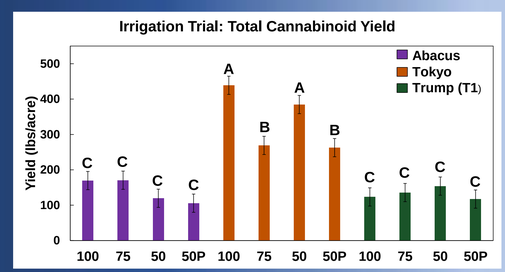


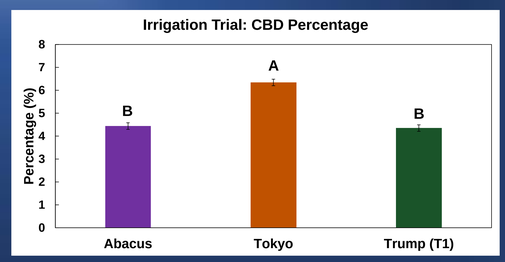


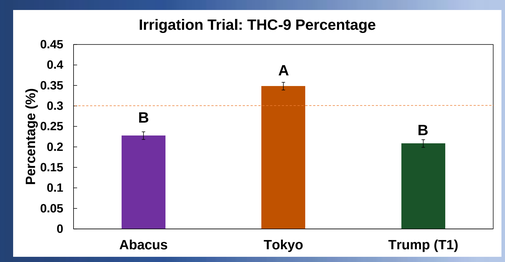












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Take Away Message

Sprinkler irrigation technologies had minor impacts on the performance of the three hemp varieties. This indicates that specialized sprinkler equipment is not necessary for hemp production. All three hemp varieties also handled water stress extremely well: all three produced equivalent total cannabinoid yield when full or half irrigation rates were used. Hemp variety impacted performance much more than irrigation practices. The abacus variety had much higher cannabinoids but was also prone to going "hot" (THC > 0.03%). This indicates high potential to improve water use efficiency with hemp and the need to improve crop genetics for hemp. The study will be repeated in 2021.