



Summary of PIP Pulsator Drip Irrigation vs. Conventional Drip Irrigation on Greenhouse-grown Cannabis

Summer 2016 in McKinleyville, Humboldt County, California

Kendall Ford 1/24/2017

The PIP pulsating drip irrigation vs. conventional drip irrigation study was carried out on one marijuana harvest during the 2016 growing season in Humboldt County, California. The conditions on the pulsator side of the greenhouse versus conditions on the conventional drip system side were the same.

We planted 80 total OG marijuana clones into 3.0 cubic foot bags (one plant per bag) of King's Mix soil by Royal Gold (a Humboldt County local soil company). The bags are semi-gusseted and purposefully designed to also serve as growing pots. 40 plants were irrigated using pulsators and 40 using standard drip irrigation.

The greenhouse is 32 feet wide by 60 feet long with low-profile, quonset-style roof. The length runs east to west. The southern half (16' x 60') was pulsator-dedicated while the northern 16' x 60' was conventional-drip-dedicated.

All plants were irrigated 3 to 5 times a week. Both sides were always watered on the same days but not with equal flow rates or time. Pulsators were maintained at 25 to 30 psi through a hose regulator while the conventional drippers were open-ended and inherently utilize heavy flows with less pressure.

All nutrients were top-dressed to each plant in equal amounts by scratching in the dry amendments (bat guano, seabird guano, earthworm castings etc.). Although not certified organic by any qualifying agency, organic growing practices were rigidly followed. Pesticides and fungicides used included Pest Out (cottonseed oil, clove oil, garlic oil, etc.), rosemary oil, neem oil, and Organicide (sesame oil and fish oil).

The greenhouse was light-deprived between 6/24/2016 and 9/9/2016 to force the flower cycle of all plants.

As the plants were harvested, the larger fan leaves (water leaves and sun leaves) were removed and the plants were hung upside down on horizontal wires in a climate-controlled room with targeted relative humidity at 40% and held for two weeks between 30% and 50% relative humidity. All the flower material was shucked from the branches by a gloved hand and boxed up in opaque polypropylene totes.

The total yield was 89.25 pounds: 49.25 pounds from the pulsator side and 40 pounds from the conventional side, or 55.2% pulsator and 44.8% conventional of the total harvest. Pulsators produced 1.23 times more than the conventionals, which translates to a 23% increase in yield where pulsators were used.



Also notable:

- 1) With conventional drip irrigation, the soil was not uniformly moist. The conventional drippers over-saturated the immediate surroundings of the drip sites, while leaving the rest of the surface soil dry. Wet soil (and sometimes too wet) was found 3 to 4 inches below the dry surface soil.
- 2) Water from the conventional drippers would leak out of the bottom of the pots due to overwatering and channeling. Channeling occurs when the water finds an easy path through the soil and out the bottom of the bag.
- 3) On the other hand, the pulsators moistened nearly all the surface soil in the pots.
- 4) The pulsators uniformly wet the soil from top to bottom without any saturation, channeling, or bottom leakage. This was true even after 14 hours of continuous watering on one occasion.
- 5) However, 5% of the pulsators needed a finger flick at start of each watering session to jumpstart them into pulsating.
- 6) Bud quality was uniform between conventional grow and pulsator grow.
- 7) I used far less water on the pulsator side relative to the conventional side. Unfortunately, I couldn't quantify the difference.



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