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Irrigation Strategies for Organic June-Bearing Strawberry (cv. Clery) Improving Nutrient Management

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INTRODUCTION

Optimal nutrient uptake by plants can be difficult to obtain in drip irrigated crops cultivated on plastic mulch raised bed. Soil areas underneath the plastic mulch slowly dry out as a result of the inability of drip irrigation to apply water effectively in those areas (Boivin and Deschênes, 2011) (Figure 1). Nutrient from fertilizer cannot be solubilized if kept in dry soil (Landry and Boivin, 2014). Supplemental fertilizing is necessary to fulfill strawberry nutrient needs. Growers can use soluble organic fertilizer, but issues regarding drip emitters plugging and water application uniformity must be considered. The objectives were evaluating irrigation strategies providing adequate soil moisture, enhancing strawberry nutrients uptake related to enhanced water availability, measuring the impacts of those irrigation strategies on strawberry yield and measuring the economic outcomes of those strategies.

METHODS

A two years study (2015-2016) was conducted in Saint-Bruno-de-Montarville (Québec, Canada) at the IRDA experimental farm on a June-bearing strawberry field cv. Clery established in August 2014. Irrigation was carried out with four different treatments: **1. One drip tape, 2. Two drip tapes, 3. Two drip tapes with fertigation, 4. Dripper stakes**. Irrigation events occurred when a threshold value was reached by tensiometers. The amount of water provided for each irrigation event was determined by soil physical parameters (same values for all four treatments). Soil volumetric water content (VWC) of half the raised bed was measured with TDR probes (CS605, Campbell Scientific, USA) (Figure 2).

Figure 1. Raised bed areas (yellow) out of reach of the irrigation water

Figure 2. TDR probes inserted inside half of the raised bed

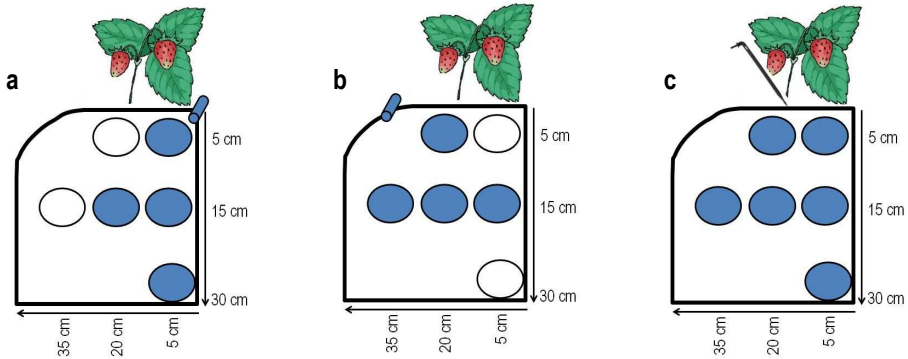

Figure 3. Volumetric water content (VWC) patterns in response to irrigation (blue = VWC variations, white = constant VWC) (a. One drip tape (treatment 1), b. Two drip tapes (treatments 2 and 3), c. Dripper stakes (treatment 4))

RESULTS AND DISCUSSION

VWC patterns in response to irrigation, obtained with the TDR probes, are quite similar to prior observations (Boivin and Deschênes, 2011; Landry and Boivin, 2014). The irrigation water tends to infiltrate the soil matrix towards the bottom rather than the sides of the raised bed. VWC patterns of the different treatments are presented in Figure 3. The one drip tape treatment (1) applied water in the center part of the raised bed, as described previously. A slow drying up of the entire soil beneath the plastic mulch was observed with this irrigation management. The two drip tapes treatments (2 and 3) applied water more uniformly in the 0-15 cm soil layer, where the maximum root density is located (Boivin and Deschênes, 2011). Using two drip tapes, instead of one, allowed VWC constancy within the raised bed for the entire season. An optimal VWC pattern was observed with the dripper stakes treatment (4). A slight VWC build up occurred for the entire soil of the raised bed. This particular irrigation method was tried mainly for providing water directly underneath the strawberry plant, in the center of the rooting system. Although the interesting results of the dripper stakes, this is not an actual irrigation method used by field strawberry growers. The best VWC pattern was observed with the two drip tapes treatments (2 and 3).

CONCLUSIONS

Analyses of other data are undergoing. The VWC patterns are only one parameter considered in the comparison between the four irrigation treatments. Main parameters that still have to be analysed are total and marketable yield, leaf nitrogen content, dry biomass, plant physiological development and water use efficiency.

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