Supporting Information: Drip Fertigation Trial

SI.1 Large Temperature Differences in Feedstock

Density differences between urine and water have been identified as a potential source of variability in previous experiments. In a farm setting with pure urine, these differences are greatest when using water warmed by the sun on a hot day, and cold ground-store urine. To test this scenario with the maximum realistic temperature difference, water was heated to approximately 30 C (86 F), and urine was chilled to approximately 10 C (50 F), and the experimental procedure repeated for 1X advance time. The results of this experiment were similar to the three other 1X advance time trials done (Fig. S1), and had the same conductivity DU (Table S1). Interestingly, the volume DU for this trial was 0.82, lower than all other trials and below the accepted limit of 0.85 for uniform distribution (Cahn, 2018).

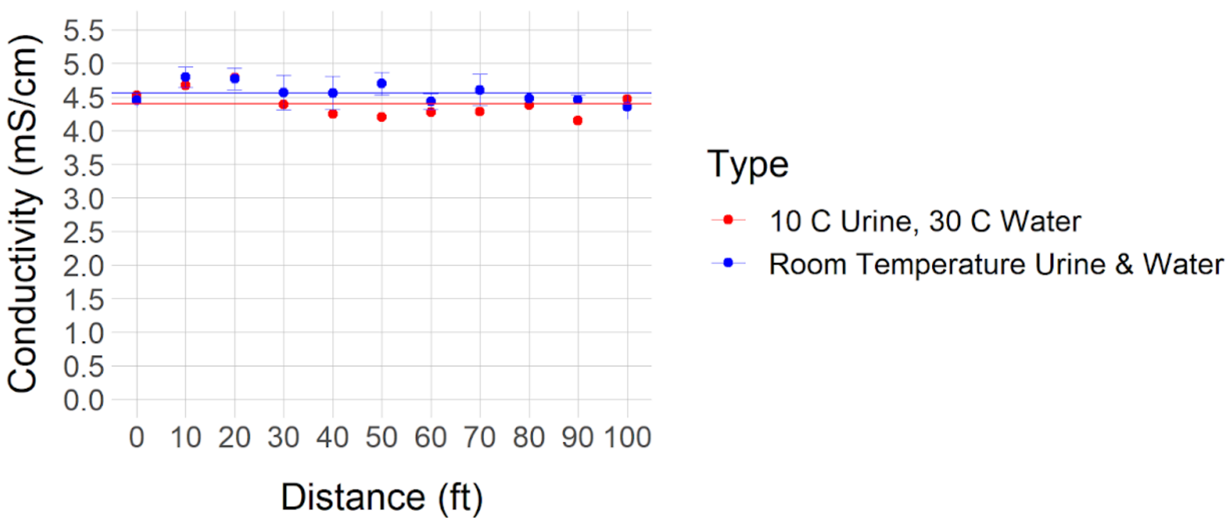

Figure S1: Conductivities of 1X advance time trials using cold urine and warm water (raw data), and room temperature urine and water (averaged values)

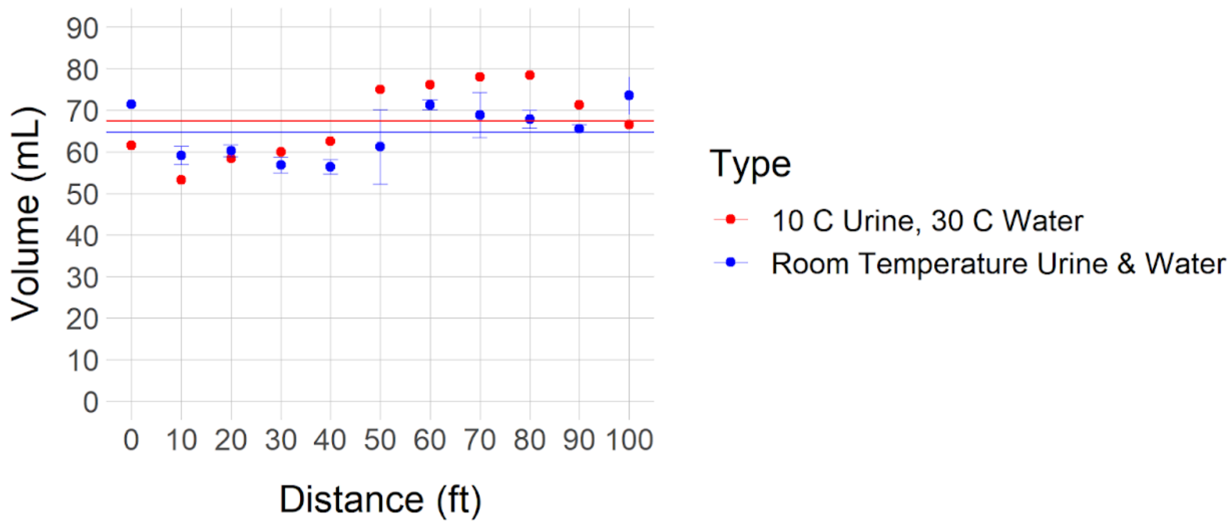

Figure S2: Volumes of 1X advance time trials using cold urine and warm water (raw data), and room temperature urine and water (averaged values)

Table S1: Conductivity DU for 1X advance time trials using a) room temperature water and urine and b) warm water and cold urine.

	Distribution Uniformity	
Feed Type	Conductivity (mS/cm)	Volume (mL)
Room Temperature Feedstock	0.95	0.87
10 C Urine, 30 C Water	0.95	0.82

SI.2 Volume and Conductivity Correlation

Fig. S3 shows a slightly negative correlation between conductivity and total volume deposited. This indicates that the lower the total volume released by the emitter, the greater the favoritism towards urine became. This is likely due to density differences between urine and water. A linear regression was performed on each advanced time, and found for all advance time that volume had a significant effect on conductivity, and that 25.95%, 50.8%, and 34.76% of the variance in conductivity for 1X, 2X, and 3X respectively was explained by volume changes.

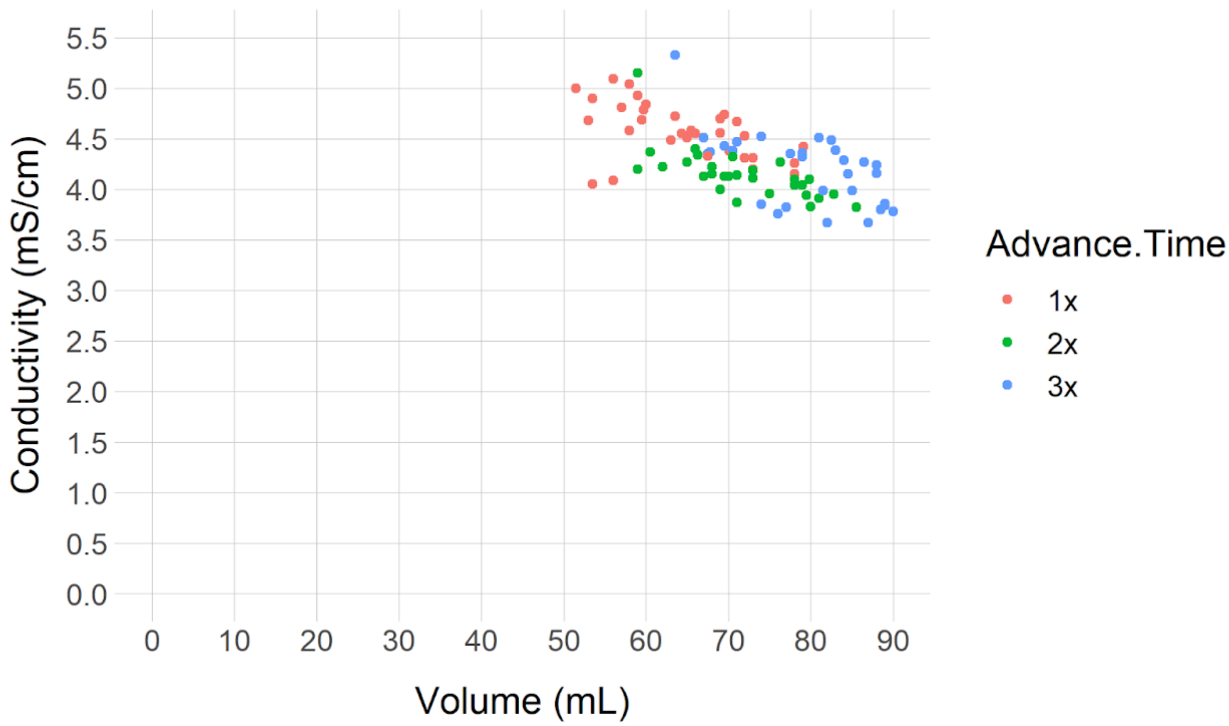

Figure S3: Relationship between conductivity and volume measurements for 1X, 2X, and 3X advance time.

SI.3 “Mass” of Fertilizer Deposited

Fig. S4 shows the product of conductivity and total volume deposited for each sample by advance time. This measurement is a proxy for mass, since conductivity is approximately linear to concentration in dilute solutions (Zhang et al, 2020). SI.2 outlines how conductivity and volume measurements in this experiment were determined to be significantly related. Therefore, “mass” can be used to condense these two measurements in a concept that is familiar to non-experts. These measurements (Fig. S3) follow similar trends seen in both mass and volume, and have similar distribution uniformities (Table S2).

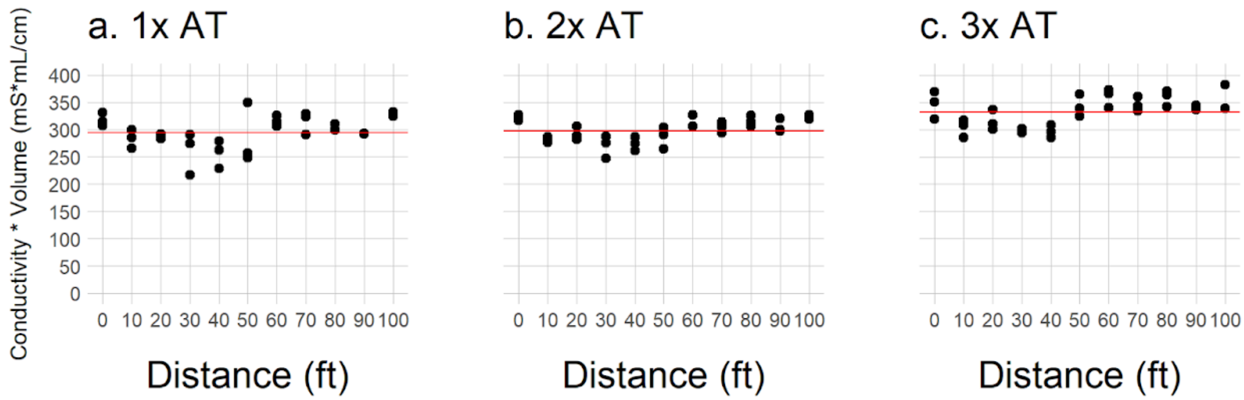

Figure S4: Conductivity * Volume (proxy for mass) for advance time (AT) of a) 1X, b) 2X, c) 3X with standard error, compared to average conductivity * volume.

Table S2: Distribution Uniformities for “Mass” (Conductivity * Volume) of fertilizer deposited for advance time (AT) of a) 1X, b) 2X, and c) 3X.

	Distribution Uniformity
Advanced Time	Conductivity* Volume (mS-mL/cm)
1x	0.89
2x	0.93
3x	0.90