DING (**D**ogs **I**nvestigating **N**eophyte **G**radients) Group 2
DING (**D**etermining **I**sotopic **N**iches in **G**ardens) IsoCamp 2018

Research Question: We assessed how water isotopes vary in non-native vines along a light-temperature gradient. We identified how ^{13}C an ^{15}N vary among three non-native ivies along the same light-temperature gradient.

Methods: Leaves from three, non-native vines were collected from Thure Cerling's garden. Temperature (C°) and irradiance data (photons $m^{-2} s^{-1}$) were recorded for a 8 hour daylight period (Figure 1). Water samples were extracted from Virginia Creeper, and the source water to plants was measured as Cerling's tap water and compared to the local meteoric water line.

We measured $d^{18}O$ and $d^{2}H$ from extracted waters in VA along a light and temperature gradient (Figure 1). We predicted that differences in $d^{18}O$ and $d^{2}H$ would be driven by transpiration, causing evaporative enrichment in the leaves relative to the water source. We predicted that sun leaves would experience greater evaporative enrichment than shade leaves. We also measured $d^{13}C$ and $d^{15}N$ in leaves of Virginia Creeper and two other vines.

Results

Temperature (C°) and irradiance were highest during the afternoon hours. The ^{13}C and ^{15}N ratios of the three vines clustered based on species (Figure 2. Boston Ivy from the shade is depleted in $d^{13}C$ more so than the other ivies. Virginia Creeper is enriched ^{18}O and ^{2}H relative to the water source (Figure 3). The shade leaf showed the greatest isotopic enrichment (dD and d18O) compared to moderate and full sun leaves. Moderate and full sun leaves showed very similar dD and 18O values.

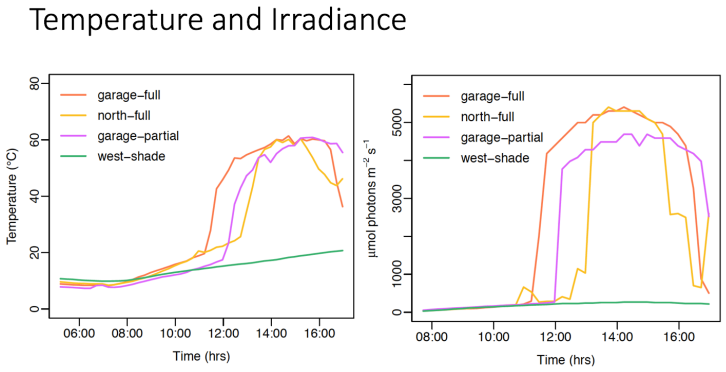

Figure 1

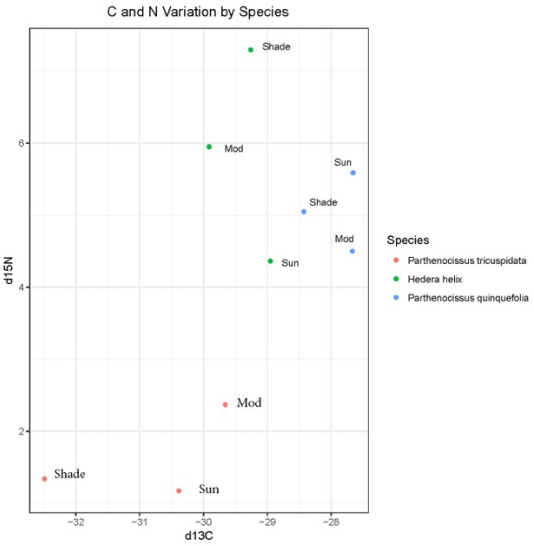

Figure 2

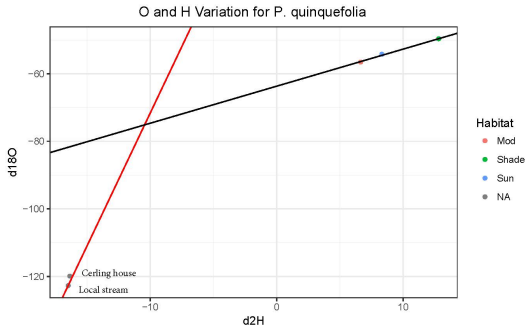

Figure 3

Interpretation

We hypothesize that the shade leaf is more isotopically enriched because it experiences less extreme temperatures, and may leave its stomata open throughout the day, whereas full sun and moderate sun leaves may close their stomata more to reduce water loss. Therefore, leaves in higher sun and temperature experience less isotopic enrichment from evaporative loss of water. The depleted $d^{13}C$ values support our prediction that shade leaves are doing more transpiration, leading to $d^{2}H$ and $d^{18}O$ enrichment and $d^{13}C$ depletion.