NAPPN Annual Conference Abstract: Leveraging morphometric, biochemical, and spectral data to predict yields of high-cannabinoid hemp

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Hemp (*Cannabis sativa* L. <0.3% THC) is a versatile crop cultivated for grain, fiber, and cannabinoids used for health and wellness purposes. Following the passage of the 2018 Farm Bill, which removed hemp from the controlled substances list, there is potential for expanded hemp acreage and a concomitant need to breed cultivars with suitable agronomic performance in US growing regions. Understanding the relationships between morphological, biochemical, and spectral traits with respect to yield will allow for high-throughput phenotyping and advanced breeding efforts. For five years, the Cornell Hemp research team has evaluated high-cannabinoid hemp cultivars in replicated field trials, with populations originating from both commercial sources and the Cornell Hemp Breeding Program. These field trials evaluated plants for phenotypic traits, including plant height, morphology, flowering time, cannabinoid concentration, and total biomass yield. We have also determined key morphometric measurements that are correlated with end-of-season biomass yield. Also, both floral and foliar cannabinoid samples were correlated with end-of-season whole plant biomass cannabinoid concentration. To improve phenotyping efficiency, an unmanned aerial vehicle (UAV)-based multispectral system was deployed to characterize morphological and biochemical traits over time. These datasets are being used to develop high-throughput phenotyping methods to predict biomass yield, and in the future cannabinoid concentration and flowering time.