Evaluating RPAS flight parameters on individual plant mapping accuracy

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ABSTRACT

The presented research identifies the growing conditions and remotely piloted aircraft system (RPAS) parameters required to effectively map and monitor individual plants. Milkweed are used as a test species due to their unique size and shape as well as their role as a food source for Monarch larvae, a butterfly species that has seen recent declines of up to 90%. A Leica GS CS15 global navigation satellite system receiver and base station were used to establish permanent plots (n=29; 4m²) in an abandoned field known to have milkweed presence. The plot corners provided ground control points for image registration. Field measurements were taken over 9 visits from July 29th to September 26th, 2016, whereby milkweed height, leafspan, and plant count were measured. Immediately after field measurements were taken, the Aeryon Labs SkyRanger RPAS with a visible spectrum payload was flown at multiple heights over each plot. Preliminary results show milkweed leafspan had little correlation to plant height, and a Pearson correlation coefficient = 0.64 between milkweed field sample count and image interpretation count was attained without coregistration of field plots and RPAS imagery. In this presentation new findings will be presented in our effort to identify 1) the ideal temporal period for RPAS milkweed mapping; 2) the ideal sensing platform height, spatial resolution, image overlap, and other remote sensing parameters for milkweed detection; and 3) spatial analysis of milkweed change over the growing season. While the presented research assesses the use of RPAS as a cost-effective conservation strategy to map and monitor Monarch habitat, it is situated in a broader Early Researcher Award funded project that seeks to evaluate the capacity of RPAS derived imagery to quantify pollination, erosion, carbon storage, and biodiversity in agricultural landscapes and link RPAS data to biophysical models and models of human decision-making.