

## Digital Tools for the Assessment of Annual Bluegrass Ecology

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Annual bluegrass (*Poa annua* L.) is the most troublesome weed in turfgrass systems and the second most troublesome weed across all grass crops. Controlling annual bluegrass is exceptionally complicated due to the existence of both annual and weak perennial biotypes and its high genetic adaptability to new environments. Additionally, the prolific seed production allows for rapid development of herbicide resistance. A garden study was initiated in November 2020 in the field to assess the development, reproduction, and survival of ten annual bluegrass populations from different climates within the continental US. Collected data in 2021 included growth rate, biomass production, ground cover, plant morphology, flowering time, seed production, morphology, and both winter survival and summer survival of plants. With a goal to collect a large number of data points, digital images, and turf height measurements were collected throughout the experiment as well as high-resolution scans of seeds produced. In our experiment, digital images were obtained with a custom light box and analyzed to determine plant ground cover on a weekly basis to calculate growth rate. A turf height tester was used for measuring plant height using a laser distance measuring device. Digital scans of seeds were used to determine seed phenotypic characteristics such as length, width, area, and circularity. Finally, 27 variables collected in this experiment were represented on a single chart using a dimensionality reduction method—Principal Component Analysis.