

Reporters such as luciferase enable the study of dynamic responses in plants. However, it is necessary to accurately quantify the reporter activity. This project establishes a method, AutoLuc, that, in a high-throughput manner captures and quantifies the luciferase activity from plants. The AutoLuc pipeline provides an automatic analysis of luciferase-based images. This pipeline performs image processing, quantification, and reporting. This year, I have advanced the image processing aspects of AutoLuc, enabling the automatic selection of regions of interest that are based on individual plants. Prior to this approach regions were selected manually and variation in regions between individuals could reduce the reproducibility of the results. In addition to region identification, the preprocessing steps of AutoLuc include background subtraction and normalization across the series of images. I have further enhanced the reporting features of AutoLuc to enable grouping plants into sets, for example, all plants on a plate or in a treatment. This grouping allows the signal from all plants in a set to be combined into a single graph. Additional metrics (e.g., average signal and standard deviation) can be calculated for each set. One advantage of AutoLuc is that it provides the flexibility for user-based adjustment so that the user can switch to manual evaluation when automated analysis is not optimal. When the user is manually creating the groups AutoLuc provides information to aid the user in selecting regions. AutoLuc is freely available on GitHub and video tutorials are provided to facilitate first-time users. Continued improvements will include user interface enhancements.