

Plant Quadrat Image analysis

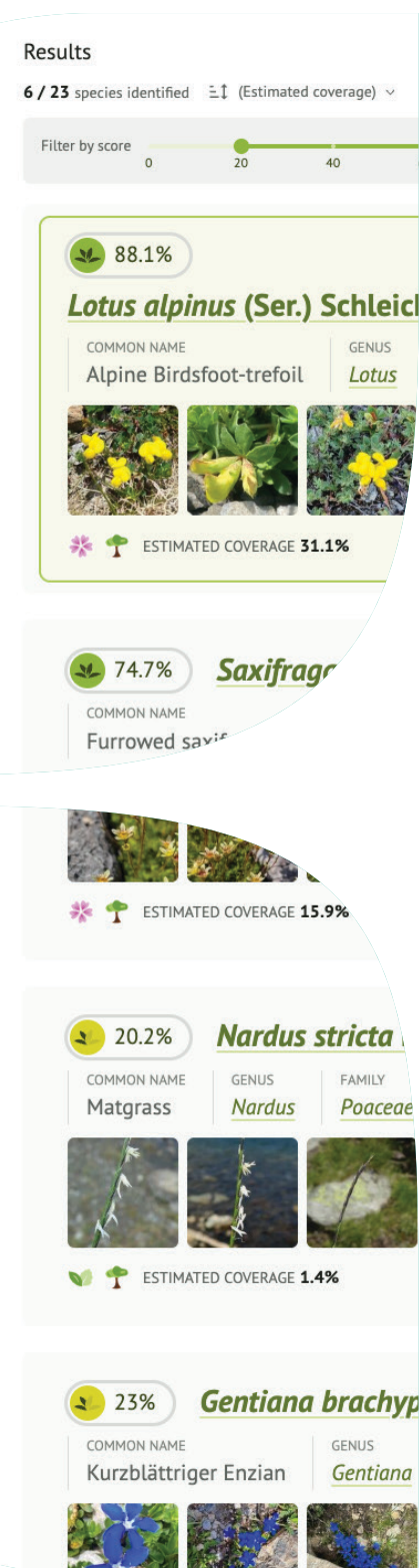
DESCRIPTION

The Plant Quadrat Image analysis tool is an innovative digital functionality co-developed through the GUARDEN and MAMBO projects by CIRAD, INRIA, and consortium partners. Available on the Pl@ntNet platform, which extends the widely used Pl@ntNet species identification service, it transforms a simple photograph of a quadrat or habitat into a structured description of the entire plant community present, shifting the focus from individual species recognition to plant community-level analysis.

A vertical image of a 50 × 50 cm plot is automatically tiled and analysed by a deep learning model covering several tens of thousands of species. The result is presented as a ranked list of probable species accompanied by identification confidence scores. To support transparency and validation, the tool can indicate within the image where the signal of each species is strongest, giving practitioners immediate, field-ready feedback. Basic cover proxies, such as vegetation fraction by species, are also computed to support condition measurements. A filtering function is currently under development to remove non-higher plants (algae, mosses, lichens) and abiotic content (soil, rock) to reduce false detections.

The Plant Quadrat Image analysis tool supports semi-automated workflows combining AI-driven species recognition with a human-in-the-loop validation process, enabling standardised biodiversity monitoring aligned with modern habitat assessment frameworks. It is scalable from punctual plots of 50 × 50 cm to visual data streams of several kilometres, and is capable of managing several thousands of visual records per day. Quadrat data collected through the tool can also be integrated into GeoPl@ntNet's platform, which produces species distribution maps at local and national scales.





BENEFITS OF USING THE TECHNOLOGY

The Plant Quadrat Image analysis tool delivers plot-level results in seconds, turning what has traditionally been a bottleneck, expert time spent transcribing and checking species lists, into a rapid, repeatable step that scales across sites and seasons. By enforcing a consistent pipeline and metadata standard, it improves comparability over time and between teams, while export-ready outputs, species lists, confidence scores, and coverage proxies, can be fed directly into statutory reporting, trend analyses, and restoration tracking without additional preprocessing. Managers gain faster evidence for decisions such as adjusting grazing or managing invasive species; researchers gain harmonised inputs for ecological models; and biodiversity portals gain a semi-automated validation workflow that still preserves room for expert review where confidence is low. Integration with remote sensing workflows is currently being evaluated, with the potential to enable analysis of canopy data and vegetation structure at large scale, providing reliable indicators of habitat status. All data generated through the tool is available under a Creative Commons licence, supporting open data sharing across teams and institutions.

TARGET USERS

- Reserve and site managers, Natura 2000 officers, public agencies, NGOs, and consultants delivering habitat assessments
- Academic ecologists and students using batch workflows to accelerate quadrat-based surveys and reproduce analyses
- National biodiversity portals and research projects integrating the API for guided community identification
- Citizen science coordinators running structured, seasonal monitoring campaigns that complement expert surveys
- SMEs and solution providers integrating AI-assisted plant community features into field apps or dashboards
- Data engineers and modellers fusing outputs with remote sensing layers for habitat condition metrics

