

## **WebGRMS Mapping software: Something new for the USDA *Medicago* and *Trifolium* collections**

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Information on accessions housed in germplasm collections is just as important as the accession seed sample. The USDA National Plant Germplasm System has an online database called GRIN that allows collection users to find out specific details on individual accessions, as well as perform queries that help identify desirable accessions based on passport or evaluation data. Because many accessions were collected at a specific location, geographic and climatic information on the collecting site can yield clues to environmental adaptation. Geographic Information System (GIS) applications can visualize this kind of information as maps and graphs. The objective of this project was to develop a prototype application to demonstrate a web-based mapping and query program tailored for ex situ germplasm collections. The prototype uses data from the NPGS *Medicago* and *Trifolium* collections. Open-source software tools were used to develop the architecture of the Web-Based Genetic Resources Management System (WebGRMS) so the technology would be accessible to users without need for expensive licensing fees. PostgreSQL, an open source object-relational database, and PostGIS together manage the geospatial data. PostGIS is an open source extension of PostgreSQL for GIS applications. The MapServer developed at University of Minnesota generates maps to be displayed on a web browser by using geospatial data provided by PostGIS. Server-side scripts written in PHP generate web pages, including map display pages. Using WebGRMS, users can search for specific accessions based on geographic area, or search by setting up queries based on PI number, taxonomy, country of origin or other criteria. Results of queries can be mapped, which provide an additional dimension for understanding collection distribution within the context of climate, soils, vegetative class, etc. WebGRMS also provides a platform for tools that analyze collections for ecogeographic representation. For example, the climatic amplitude of specific species can be inferred based on data associated with actual collecting sites. The climatic amplitude of species or accessions can be compared with climates defined by map coordinates provided by the user. This would be particularly useful in identifying accessions adapted to a targeted environment. The WebGRMS prototype demonstrates the potential of developing web-based GIS applications that can be used to better utilize and conserve crop genetic resources. WebGRMS can be previewed at <http://yukon.een.orst.edu>