

The USDA National Plant Germplasm System

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Humanity's survival depends on crops--the thin green line standing between us and calamity. To meet ever increasing human needs crops, such as forages, must become increasingly more productive, mainly through genetic gains which exploit diverse plant genetic resources (PGR), the raw materials for crop breeding. The 19 genebanks of the USDA Agricultural Research Service's National Plant Germplasm System (NPGS) conserve and facilitate the use of more than 580,000 samples of PGR from more than 15,700 species. The NPGS genebanks acquire, maintain, regenerate/increase, document, distribute, characterize, evaluate, and genetically enhance PGR. They also conduct research that improves the efficiency and effectiveness of PGR management and adds value to the PGR conserved. An average of more than 250,000 NPGS PGR samples are distributed to researchers and breeders every year. Increasingly the data associated with PGR have appreciated in value which, in the future, might equal that of the PGR itself. The current challenges to the NPGS include a mismatch between its operational capacity and demands for PGR and associated information; a generational transition in personnel; devising more effective long-term storage methods and capacities; developing and implementing best management practices for managing PGR with genetically engineered traits and the occurrence of adventitious presence; and acquiring and conserving additional PGR, especially of crop wild relatives.

Forage genetic resources of the USDA National Plant Germplasm System

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Forages help sustain livestock industries by providing fodder directly-grazed from pastures or by hay, haylage or silage harvested and brought to animals. In 2016, the United States grew close to 90 million acres of forage crops. In addition, nearly 155 million acres are managed for grazing by the Bureau of Land Management. The impact of forages on a global scale is much greater and probably impossible to quantify precisely. The ever-changing agricultural production landscape (e.g., emerging diseases/insect pests and abiotic stressors) drives a constant demand for improved, productive and high-quality forages. Plant breeders in the public and private sectors have the difficult task of incorporating 'new' improved traits and commonly mine plant germplasm collections in search of useful genetic diversity. At the present, the USDA National Plant Germplasm System (NPGS) conserves over 587,000 accessions and, estimating conservatively, close to 10% of these are primary forages and relatives. The NPGS sites responsible for managing most of the forage germplasm include the Western Regional Plant Introduction Station in Pullman, WA, and the Plant Genetic Resources Conservation Unit in Griffin, GA but many other sites also conserve forage genetic resources. The collections at these sites are mainly native and introduced grass (Poaceae > 23,000 acc.) or legume (Fabaceae > 20,000 acc.) crops and their related taxa, but also would include other important forbs (e.g., crucifers). The accessions are represented by taxa in 22 plant families which are grouped and managed at their respective sites by their habit (annual vs. perennial) and whether they are grown during the warm or cool seasons. Major forage crops in the NPGS include cool season (*Festuca* [2,619 acc.], *Poa* [2,175 acc.]) and warm season grasses (*Paspalum* [1,423 acc.], *Panicum* [778 acc.]) as well as noteworthy legume collections (*Medicago* [8,617 acc.], and *Trifolium* [7,144 acc.]). Responsibilities of the repositories include the acquisition, regeneration, characterization, evaluation and distribution of the germplasm to stakeholders worldwide. The Germplasm Resources Information Network (GRIN) Global database is the primary tool utilized by Curators to manage the genetic resources and their associated information and is accessed by stakeholders for information as well as for germplasm requests.