Utilizing the National Plant Germplasm System for Medicinal Plant Research

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The National Plant Germplasm System (NPGS) is a cooperative effort by public (State and Federal) and private organizations to preserve the genetic diversity of plants by long-term storage of germplasm in regional germplasm repositories throughout the United States. A summary of the holdings of the NPGS as of October 2006 includes 216 families, 1,917 genera, 11,857 species, and 474,621 accessions.

The NPGS is managed by a standard database, the Germplasm Resources Information Network’s (GRIN), which is used to manage all documentation pertaining to individual accessions. The GRIN mission also supports three other projects: the National Animal Germplasm System, the National Microbial Germplasm Program, and the National Invertebrate Germplasm Program. The GRIN database is managed by the Database Management Unit, while the acquisition of plants is managed by the Plant Exchange Office. GRIN provides personnel to the National Genetic Resources Program and germplasm users’ continuous access to the databases for the maintenance of passport, characterization, evaluation, inventory, and distribution data important for the effective management and utilization of national germplasm collections.

The North Central Regional Plant Introduction Station (NCRPIS), located in Ames Iowa, was founded in 1948, and is one of four plant introduction stations and over 25 active germplasm conservation sites of NPGS. It is a joint venture among the USDA-ARS Plant Introduction Research Unit, the Agricultural Experiment Stations of the 12 North Central States, and Iowa State University. The NCRPIS germplasm repository specializes in the conservation of agronomic and horticultural crops that are maintained as seeds and require pollination control to preserve their genetic integrity. The medicinal collection, the newest germplasm collection held at the NCRPIS, is now in its second year of operation and funded by both USDA/ARS and the National Institute of Health, Office of Dietary Supplements.

The mission of the NPGS includes: (1) the conservation of diverse crop germplasm through collection, acquisition, and exploration; (2) conducting a variety of germplasm related research; and (3) encouraging the use of germplasm collections and associated information for research, crop improvement, and product development. The process includes:

- Collection of germplasm through acquisition and/or plant exploration. New germplasm (accessions) enter NPGS through collection, donation by foreign cooperators or international germplasm collections. An identifying number such as the Plant Introduction number (PI number) is assigned to each accession.
- Regeneration and evaluation of germplasm including dormancy, viability, and pathogen studies when appropriate.
- Pollination controlled propagation in screened field cages utilizing a wide variety of pollinators including but not limited to honey bees, bumblebees, blue bottle flies, house flies, Osma bees, and alfalfa leafcutter bees. Harvesting, drying, cleaning, picking, and processing seed utilizing a wide variety of specialized seed equipment.
- Long-term seed storage under controlled temperature/humidity conditions.
- Seed imaging and germination testing.
- International distribution.

The medicinal collection has recently been utilized for a wide range of research projects. These include but are not limited to, animal and human efficacy studies, analyses of metabolites of interest to the phytopharmaceutical industry, identification and synthesis of new compounds, genetic population studies, and ornamental breeding studies.

In order to efficiently prioritize future collection efforts, an extensive medicinal species database (6,018 taxa) has been compiled from 29 international medicinal plant compendia. The list has been correlated to current NPGS accessions via the GRIN database for identification of gaps in collection holdings. These gaps will help identify priority species for future collection and acquisition efforts. Of the 6,018 taxa identified, approximately 26% are currently available via GRIN.
Initial collection, regeneration, and acquisition emphasis has been focused primarily on three genera, *Echinacea*, *Hypericum*, and *Actaea*. All three genera are currently listed in the top ten selling North American botanical products (Blumenthal 2005).

To search and order germplasm holdings:
- Go to website: http://www.ars-grin.gov/npgs/
- Click Request Germplasm located on the left menu bar
- Click Search for in the right column unless requesting from a foreign country in which case review information in the left column
- Enter the name of your accession in the text search query box such as *Echinacea purpurea* and press submit text query
- You will be given a list of accessions to choose from; click on accessions to learn more about availability, inventory, evaluation data and source history, including a map feature (map it)
- Under Availability you can request the germplasm

REFERENCES

*(2004–2006 publications directly associated with NCRPIS Hypericum and Echinacea accessions)*


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