



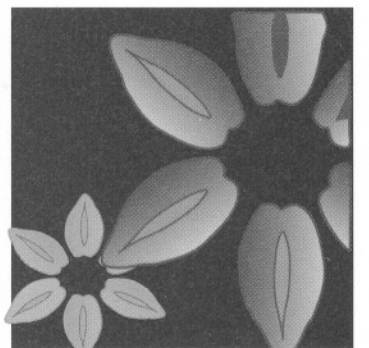
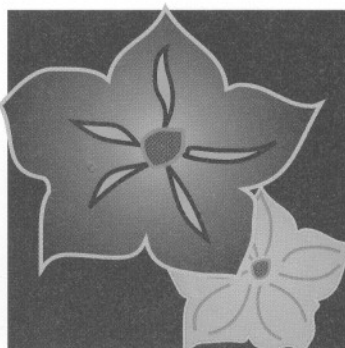
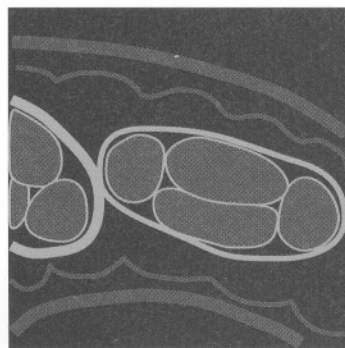
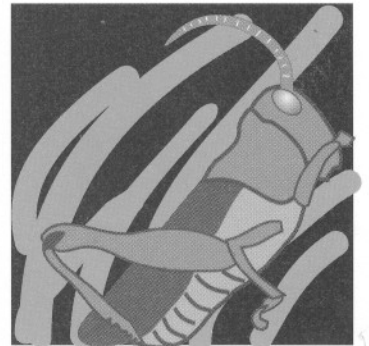
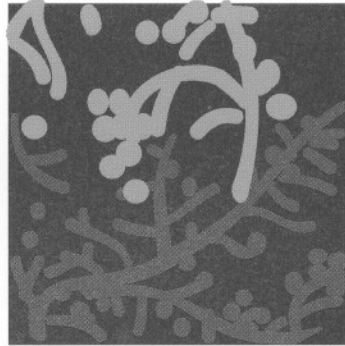
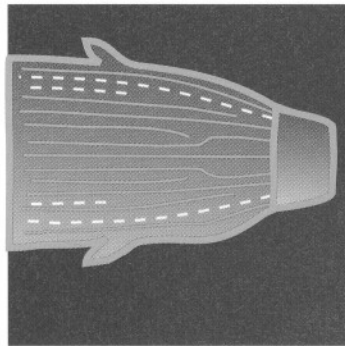
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Systematic Collections of the Agricultural Research Service





Potato Herbarium

By David M. Spooner and John B. Bamberg

- Location** U.S. Department of Agriculture, Potato Introduction Station, 4312 Highway 42, Sturgeon Bay, WI 54235-9620
- Loans** Short-term loans of duplicate herbarium specimens to recognized institutions and scientists
- Associated libraries** An extensive collection of topographic and road maps and gazetteers of Latin America and a taxonomic literature collection of the genus *Solanum* section *Petota*. These library materials are available in the office of the ARS potato taxonomist at the Department of Horticulture, University of Wisconsin-Madison.
- Number of accessions** 4,308 germplasm accessions of 146 species of *Solanum* section *Petota*; 14,270 herbarium sheets
- Types** Photographs of 273 holotype, isotype, lectotype, or syntype collections of *Solanum* section *Petota*
- Curators**
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- Home page** <<http://www.ars-grin.gov/ars/MidWest/NR6/index.html>>
(URL is case sensitive; follow exact capitalization.)

Background *Solanum tuberosum* (Solanaceae) is 1 species of a group of 7 cultivated and 216 additional tuber-bearing and 9 non-tuber-bearing wild relatives classified in the genus *Solanum* section *Petota*, according to the latest taxonomic review published by Hawkes in 1990. The nine non-tuber-bearing species are classified by a separate system; each species is placed in one of three sections—*Etuberosum* (Bukasov and Kameraz) A. Child, *Juglandifolium* (Rydb.) A. Child,



Figure 19. Corolla colors and shapes used in morphological classification in *Solanum* sect. *Petota*. Top left, *S. bulbocastanum* Dunal (from Mexico). Top right, *S. paucijugum* Bitter (Ecuador), showing polymorphisms within populations. Bottom left, *Solanum tuberosum* L. (cultivated and widespread). Bottom right, *S. columbianum* Dunal (Venezuela, Columbia, Ecuador).

and *Lycopersicum* (Mill.) Wettst. Classification of the non-tuber-bearing species is done on the basis of morphology (fig. 19) and chloroplast DNA. The section *Petota* of the genus *Solanum* is found from the southwestern United States to southern Chile. Seventy-two taxonomists have described 531 taxa in the section *Petota*.

The U.S. Potato Introduction Station Herbarium (PTIS) serves the National Research Support Program-6 (NRSP-6; formerly known as the Inter-Regional Potato Introduction Project, IR-1). NRSP-6 is part of the U.S. germplasm system and is the sole genebank for wild and cultivated potatoes in the United States. The genebank and herbarium are devoted entirely to wild and cultivated potatoes (*Solanum* section *Petota*). NRSP-6 is charged with the introduction, preservation, classification, evaluation, and distribution of potato germplasm worldwide. The potato research group of NRSP-6 includes John B. Bamberg (director of the genebank), Robert H. Hanneman (germplasm enhancement), and David M. Spooner (taxonomist).

NRSP-6 was created in 1948. PTIS was created in the early 1950's and has served the taxonomic research needs of various visiting researchers. In 1987, NRSP-6 incorporated a new position of collector and taxonomist to serve the genebank, and external funds from the U.S. Germplasm System were provided for the development of PTIS.

NRSP-6 has greatly benefitted from germplasm collections from many donors worldwide. These include collections of the following persons: Donovan Correll, Jack Hawkes, J. Peter Hjerting, Luis Lopez, Carlos M. Ochoa, Katsuo A. Okada and Andrea Clausen, T. Richard Tarn, and Donald Ugent. More recent collections by NRSP-6 staff and international collaborators are from Argentina, Bolivia, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Mexico, and Venezuela.

NRSP-6 maintains 4,308 accessions of 146 species of *Solanum* section *Petota*; 3,584 of these have at least 1 herbarium voucher. In total, 14,270 herbarium sheets are maintained, incorporating duplicates and sheets not represented by germplasm collections. NRSP-6 has photographs of 273 type collections of taxa of section *Petota*; long-term plans are to expand this photographic collection so that it includes all nomenclatural types. An extensive collection of topographic and road maps and gazetteers of Latin America is also maintained at PTIS.

The cabinet room at PTIS contains nine full-height steel herbarium cabinets of specimens and a table for specimen preparation and examination. Additional specimens are located in the offices of the NRSP-6 taxonomist at the Department of Horticulture, University of Wisconsin-Madison. These offices contain two full-height steel herbarium cabinets of specimens. Both locations have quarter-height, sealed, wooden cabinets to accommodate oversized herbarium sheets. The herbarium office at PTIS includes a computer, and all germplasm and herbarium holdings are entered on a DBASE IV file, freely available upon request. The workroom contains a modern stereoscopic microscope with fiber-optic ring-light illumination on a boom stand, a modern optical microscope with oil immersion objectives, and a camera adapter.

PTIS also includes all of the U.S. Department of Interior gazetteers of place names in Argentina, Bolivia, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Mexico, and Venezuela and gazetteers and atlases purchased in foreign countries. It has a collection of all regional and comprehensive taxonomic treatments of *Solanum* section *Petota*. A collection of all original descriptions of 531 scientific names in *Solanum* section *Petota* and other potato systematic literature is maintained in the office of the taxonomist in Madison, WI. The map, gazetteer, and atlas coverage is expanded as field trips progress.

PTIS and all associated facilities are open year-round during normal working hours and are accessible to all interested researchers. The herbarium is staffed full-time by John Bamberg, the director of NRSP-6, and occasionally each year by David Spooner. Bamberg should be contacted for requests for the catalog of germplasm and for germplasm samples. The catalog and the samples are free. Bamberg should also be contacted regarding regulations for donations of potato germplasm, which must first pass through U.S. quarantine. Spooner should be contacted for herbarium loans. The collection welcomes specimens of *Solanum* section *Petota* as gifts for determination. While one herbarium voucher must remain at NRSP-6 to serve the daily needs of the genebank, duplicate herbarium specimens are available for short-term loan.

Identification Service

NRSP-6 collections are used in breeding and many other studies worldwide. Since 1950, NRSP-6 has distributed 150,000 samples of germplasm, but demand has increased so rapidly that orders within the past 10 years account for nearly half of this total. NRSP-6 germplasm has been used in more than 1,765 published research papers and 190 masters or doctoral theses. The majority of the authors of these works requested identifications.

Research

S*olanum* section *Petota* has been the subject of intensive taxonomic research by many taxonomists worldwide. There are many discrepancies among treatments regarding species boundaries, taxonomic ranks assigned to taxa, assignment of species to series, and hypotheses of hybridization. The extensive variation of taxa in *Solanum* section *Petota* makes the construction of keys difficult, and independent identifications of some problematic groups by different taxonomists frequently differ. If many taxa are of recent origin and interspecific hybridization is common, an easily used taxonomic treatment may be an elusive goal. Current research is reinvestigating alternative systematic hypotheses with combined morphological and molecular approaches.

Selected Achievements

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| 1987–1995 | Increased the number of germplasm holdings from 3,884 accessions to 4,369 accessions |
| 1987–1995 | Used morphological and molecular data to provide new insights into the systematic and evolutionary relationships of species in <i>Solanum</i> section <i>Petota</i> |
| 1990–1994 | Developed PTIS, including computerizing the collection information and increasing the size of the herbarium from 4,500 to 14,500 specimens |
| 1990–1995 | Initiated the Association of Potato Intergenebank Collaborators (APIC), a worldwide consortium of potato genebank leaders who are cooperating on common problems of potato germplasm management. These problems are related to documentation of passport and evaluation data, germplasm backup, preservation, collection, genebank technology, and research |