GRIN-Taxonomy Crop Wild Relative (CWR) Inventory

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http://www.ars-grin.gov/~sbmljw/cgi-bin/taxcwr.pl

GRIN-Taxonomy Crop Wild Relative (CWR) Inventory

1. PEO Project initiated in 2008 to assess CWR germplasm needs for NPGS
2. Identify CWR by "gene pool" status
3. Initial work prioritized by economic value of crops
4. Supporting data gleaned from multiple sources
5. Sought external review of treatment

Defining Classification Criteria for CWR

Gene Pool Concept – Harlan & de Wet. 1971. Toward a rational classification of cultivated plants. Taxon 20: 509–517.

Taxon Group Concept – Maxted & al. 2006. Towards a definition of a crop wild relative. Biodiversity & Conservation 15: 2673–2685.

Genetic Relative Classification Criteria

Primary – Taxa that cross readily with the crop (or can be predicted to do so based on their taxonomic relationships), yielding (or being expected to yield) fertile hybrids with good chromosome pairing, making gene transfer through hybridization simple.

Secondary – Taxa that will successfully cross with the crop (or can be predicted to do so based on their taxonomic relationships), but yield (or would be expected to yield) partially or mostly sterile hybrids with poor chromosome pairing, making gene transfer through hybridization difficult.

Tertiary – Taxa that can be crossed with the crop (or can be predicted to do so based on their taxonomic relationships), but hybrids are (or are expected to be) lethal or completely sterile. Special breeding techniques, some yet to be developed, are required for gene transfer.

Genetic Relative Classification Criteria

Graftstock – Taxa used as rootstocks for grafting scions of a crop, or used as genetic resources in the breeding of such rootstocks.

Data Elements Collected

1. Taxonomic or phylogenetic relationship of crop and CWR
2. Genetic relative status of CWR
3. Geographical distribution of CWR
4. Passport data of crop and CWR accessions

Crop Genera Already Treated

Cereal: *Avena, Hordeum, Oryza, Sorghum, Triticum, Zea*
Fiber: *Gossypium, Linum*
Forage: *Medicago*
Fruit/Nut: *Actinidia, Ananas, Carica, Carya, Castanea, Citrus, Citrullus, Corylus, Eriobotrya, Fragaria, Juglans, Malus, Olea, Persea, Phoenix, Pistacia, Prunus, Pyrus, Ribes, Solanum, Theobroma, Vaccinium, Vitis*
Oilseed: *Brassica, Carthamus, Crambe, Helianthus, Olea*
Pseudocereal: *Chenopodium*
Pulse: *Arachis, Cicer, Glycine, Lens, Lupinus*
Vegetable: *Allium, Asparagus, Beta, Brassica, Capsicum, Cichorium, Cucumis, Cucurbita, Cynara, Daucus, Eruca, Ipomoea, Lactuca, Pastinaca, Phaseolus, Rheum, Pisum, Raphanus, Sechium, Solanum, Spinacia, Vicia, Vigna*
Other: *Coffea, Humulus, Manihot, Nicotiana, Saccharum, Sinapis*

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  - World Economic Plants in GRIN
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  - Federal and State Noxious Weeds in GRIN
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Query all GRIN Taxonomy for Plants:

Advanced queries - species data, multiple criteria
Simple queries - species data, single criterion
Queries of family and generic data

Query specialized parts of GRIN Taxonomy for Plants:

Economic Plants
Crop Wild Relatives
Noxious Weeds - Federal and State (U.S.A.)
Rare Plants
From Seed Associations' Web Page
NRCS/PEAS Database Nomenclature
Rhizobial Nodulation Data in GRIN

Cite as:
USDA, ARS, National Genetic Resources Program.
Germplasm Resources Information Network - (GRIN) [Online Database].
National Germplasm Resources Laboratory, Beltsville, Maryland.
URL: http://www.ars-grin.gov/cgi-bin/npgs/html/queries.pl?language=en (11 June 2014)

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- GRIN TAXONOMY for PLANTS Home
- About GRIN TAXONOMY for PLANTS
- **Queries**
- Compare List to GRIN TAXONOMY for PLANTS
- Downloads
- Link to Us
- Related Links
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Query Crop Relatives in GRIN

Enter search criteria below.
Any or all fields can be searched. Wild cards (*) are accepted.

submit query | clear form

Crop:
ALL
AJI – Capsicum baccatum var. pendulum
ALFALFA – Medicago sativa subsp. sativa
ALMOND – Prunus dulcis
APPLE – Malus domestica
APRICOT – Prunus armeniaca
ARTICHOKE – Cynara cardunculus
ARUGULA – Eruca vesicaria subsp. sativa
ASPARAGUS – Asparagus officinalis
AVOCADO – Persea americana
(Use shift or control key to make multiple selections.)

Genus name: (e.g. *Oryza* [without author])
Note: Only returns CWR in that genus. Select by crop to return all CWR of its crops.

Genetic relative status: primary ☑ secondary ☑ tertiary ☑ graftstock ☑

Family(ies):
ALL FAMILIES
all pteridophytes
all gymnosperms
all angiosperms
Abietaceae
Abolbodaceae
Abrophyllaceae
(Use shift or control key to make multiple selections.)

Native distribution:
Continent: ALL CONTINENTS
Region: ALL REGIONS
Country(ies):
ALL COUNTRIES
Afghanistan
Albania
Algeria
American Samoa
Andorra
Angola
(Use shift or control key to make multiple selections.)

State/Province: (e.g. Alabama)

Include non-native distribution ☐

Follow links for a) **GRIN taxon reports** or b) **to view literature supporting this gene pool classification** (Place cursor over highlighted items for explanation.)

Crop: ALFALFA

(compiled by Dr. Blanca León; reviewed by Dr. Stephanie L. Greene, Geneticist/Curator, USDA/ARS, National Temperate Forage Legume Genetic Resources Unit, Prosser, Washington on 7 November 2012)

Crop taxa:

1. ***Medicago sativa* L. subsp. *sativa*** – **alfalfa**
2. ***Medicago sativa* L. nothosubsp. *varia* (Martyn) Arcang.** – **variegated alfalfa**
3. ***Medicago sativa* L. subsp. *falcata* (L.) Arcang.** – **sickle alfalfa**

Crop wild relatives:

Primary

1. *Medicago sativa* L. subsp. *falcata* (L.) Arcang. var. *falcata* (L.) Döll [tetraploids] — [References]
2. *Medicago sativa* L. subsp. *glomerata* (Balb.) Rouy [tetraploids] — [References]
3. *Medicago sativa* L. subsp. *sativa* [wild types] — [References]
4. *Medicago sativa* L. nothosubsp. *tunetana* Murb. [tetraploids] — [References]
5. *Medicago sativa* L. nothosubsp. *varia* (Martyn) Arcang. [tetraploids] — [References]
6. *Medicago sativa* L. subsp. *falcata* (L.) Arcang. var. *viscosa* (Rchb.) Posp. [tetraploids] — [References]

Secondary

1. *Medicago prostrata* Jacq. — [References]
2. *Medicago sativa* L. subsp. *caerulea* (Less. ex Ledeb.) Schmalh. — [References]
3. *Medicago sativa* L. subsp. *falcata* (L.) Arcang. var. *falcata* (L.) Döll [diploids] — [References]
4. *Medicago sativa* L. subsp. *glomerata* (Balb.) Rouy [diploids] — [References]
5. *Medicago sativa* L. nothosubsp. *tunetana* Murb. [diploids] — [References]
6. *Medicago sativa* L. nothosubsp. *varia* (Martyn) Arcang. [diploids] — [References]
7. *Medicago sativa* L. subsp. *falcata* (L.) Arcang. var. *viscosa* (Rchb.) Posp. [diploids] — [References]

Tertiary

1. *Medicago arborea* L. — [References]
2. *Medicago cancellata* M. Bieb. — [References]
3. *Medicago daghestanica* Rupr. ex Boiss. — [References]
4. *Medicago hybrida* (Pourr.) Trautv. — [References]
5. *Medicago marina* L. — [References]
6. *Medicago papillosa* Boiss. — [References]
7. *Medicago papillosa* Boiss. subsp. *macrocarpa* (Boiss.) Urb. — [References]
8. *Medicago papillosa* Boiss. subsp. *papillosa* — [References]
9. *Medicago pironae* Vis. — [References]
10. *Medicago rhodopea* Velen. — [References]
11. *Medicago rupestris* M. Bieb. — [References]
12. *Medicago ruthenica* (L.) Trautv. — [References]
13. *Medicago saxatilis* M. Bieb. — [References]

Crop Relatives in GRIN Taxonomy

(for the query: **family** = 'all families' & **native country** = 'all countries' & **crops** = 'chickpea' & **genetic relative status** = 'GR1, GR2, GR3, & GS' & **repositories** = 'all')

Follow links for a) **GRIN taxon reports** or b) **to view literature supporting thi**
items for explanation.)

Crop: CHICKPEA

(compiled by Dr. Blanca León; reviewed by Dr. Michael A. Grusak, USDA/ARS
Dr. Clarice Coyne, USDA/ARS, Western Regional Plant Introduction Station, Pu

Crop taxon:

1. *Cicer arietinum* L. – **chickpea**

Crop wild relatives:

Primary

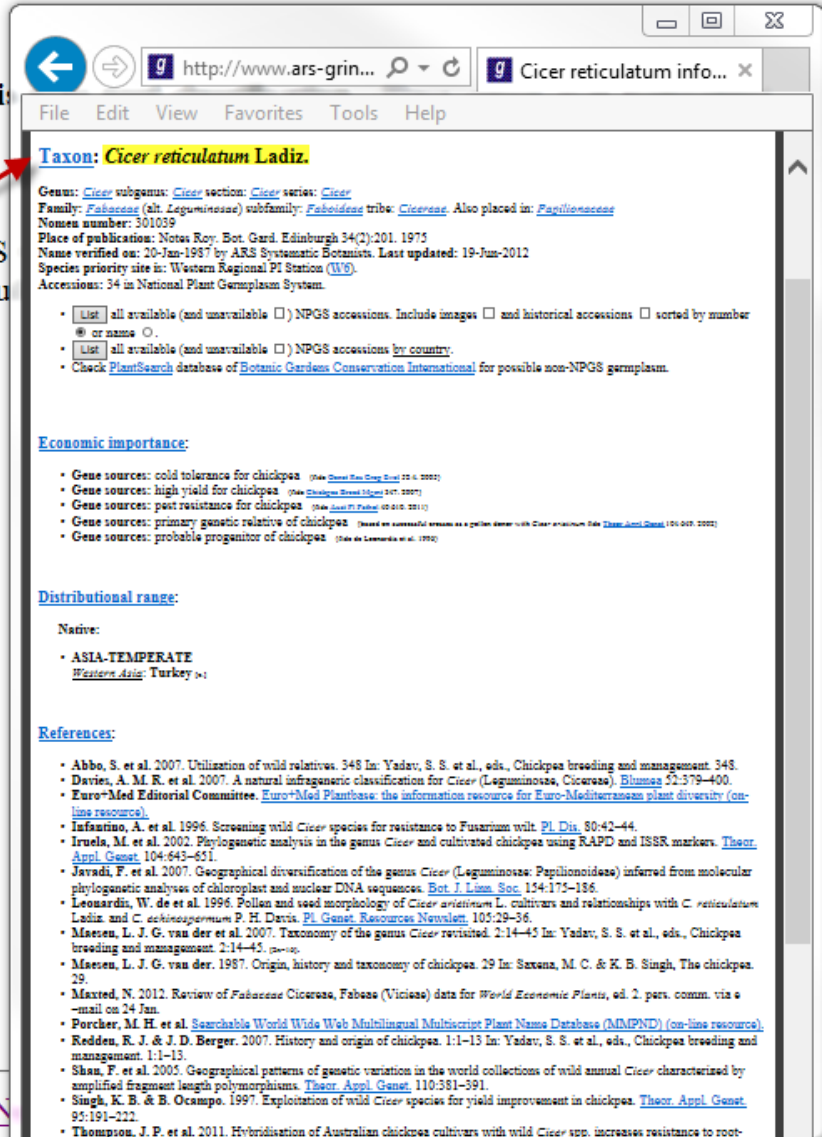
1. *Cicer reticulatum* Ladiz. — [References]

Secondary

1. *Cicer echinospermum* P. H. Davis — [References]

Tertiary

1. *Cicer atlanticum* Coss. ex Maire — [References]
2. *Cicer bijugum* Rech. f. — [References]
3. *Cicer incisum* (Willd.) K. Malý — [References]
4. *Cicer judaicum* Boiss. — [References]
5. *Cicer pinnatifidum* Jaub. & Spach — [References]



Crop Relatives in GRIN T

(for the query: **family** = 'all families' & **native country** = 'all countries' & **crops** = 'chic
& GS' & **repositories** = 'all')

Follow links for a) **GRIN taxon reports** or b) **to view literature supporting this gene**
items for explanation.)

Crop: CHICKPEA

(compiled by Dr. Blanca León; reviewed by Dr. Michael A. Grusak, USDA/ARS Childr
Dr. Clarice Coyne, USDA/ARS, Western Regional Plant Introduction Station, Pullman,

Crop taxon:

1. *Cicer arietinum* L. – **chickpea**

Crop wild relatives:

Primary

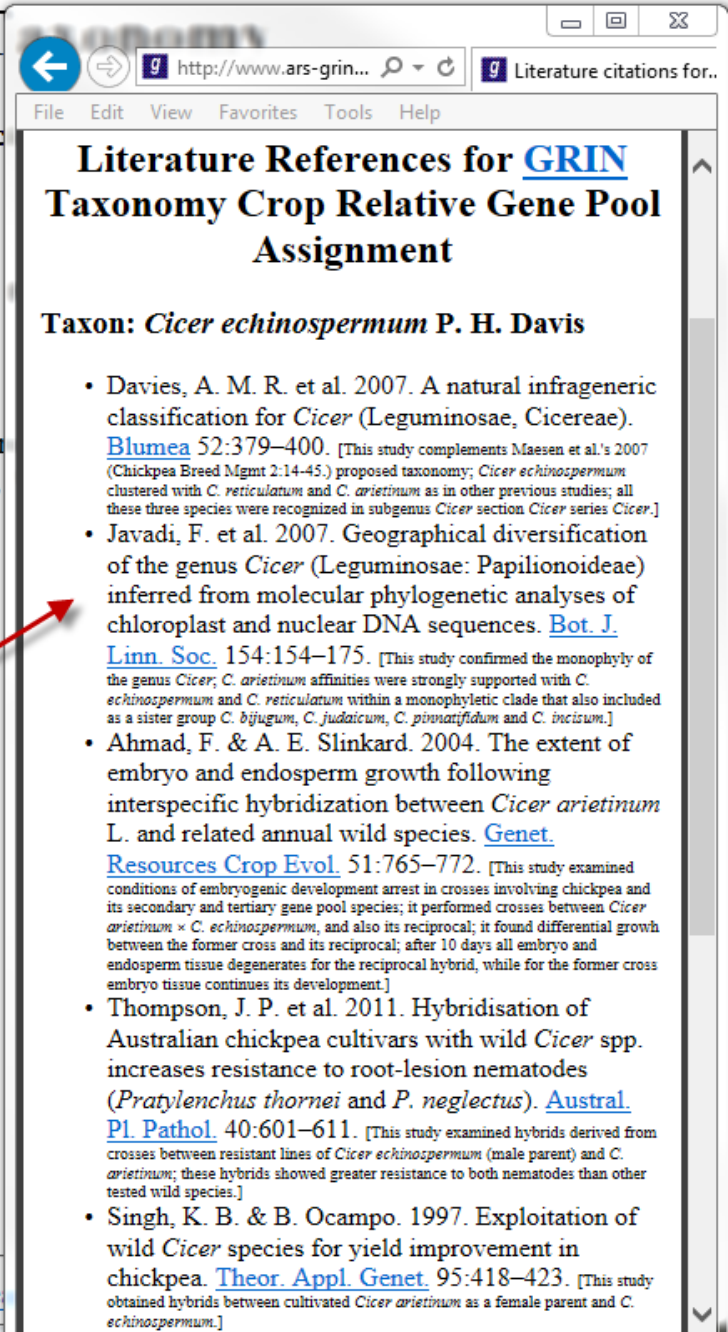
1. *Cicer reticulatum* Ladiz. — [References]

Secondary

1. *Cicer echinospermum* P. H. Davis — [References]

Tertiary

1. *Cicer atlanticum* Coss. ex Maire — [References]
2. *Cicer bijugum* Rech. f. — [References]
3. *Cicer incisum* (Willd.) K. Malý — [References]
4. *Cicer judaicum* Boiss. — [References]
5. *Cicer pinnatifidum* Jaub. & Spach — [References]



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Genus name: (e.g. *Oryza* [without author])
Note: Only returns CWR in that genus. Select by crop to return all CWR of its crops.

Genetic relative status: primary ☑ secondary ☑ tertiary ☐ graftstock ☐

Family(ies):
Aspidistraceae
Aspleniaceae
Asteliaceae
Asteraceae/Compositae
Asteranthaceae
Asteropeiaceae
Astragalaceae

(Use shift or control key to make multiple selections.)

Selections

Native distribution:

Continent: ALL CONTINENTS

Region:

Country(ies):
ALL COUNTRIES
Afghanistan
Albania
Algeria
American Samoa
Andorra
Angola

(Use shift or control key to make multiple selections.)

State/Province: (e.g. Alabama)

Include non-native distribution ☐

Crop Relatives in GRIN Taxonomy

(for the query: **family/altfamily =** '*Asteraceae*' & **native country =** 'Albania' & **crops =** 'all' & **genetic relative status =** 'GR1 & GR2' & **repositories =** 'all')

Follow links for a) **GRIN taxon reports** or b) **to view literature supporting this gene pool classification** (Place cursor over highlighted items for explanation.)

Crop: ARTICHOKE

(compiled by Dr. Blanca León)

Crop taxon:

1. *Cynara cardunculus* Cardoon and Scolymus Groups – **artichoke/cardoon**

Crop wild relatives:

Primary

1. *Cynara cardunculus* L. subsp. *cardunculus* — [References]

Crop: CHICORY

(compiled by Dr. Blanca León)

Crop taxon:

1. *Cichorium intybus* L. – **chicory**

Crop wild relatives:

Secondary

1. *Cichorium pumilum* Jacq. — [References]

Crop: ENDIVE

(compiled by Dr. Blanca León)

Crop taxon:

1. *Cichorium endivia* L. subsp. *endivia* – **endive**

Crop wild relatives:

Primary

1. *Cichorium pumilum* Jacq. — [References]

Secondary

1. *Cichorium intybus* L. — [References]

Crop: LETTUCE

(compiled by Dr. John H. Wiersema; reviewed by Dr. Beiquan Mou, USDA/ARS, Salinas, California on 7 June 2013)

Crop taxa:

1. *Lactuca sativa* L. – **lettuce**
2. *Lactuca sativa* Cos or Romaine Lettuce Group (*Lactuca sativa* L. var. *longifolia* Lam.) – **romaine lettuce**
3. *Lactuca sativa* Crisphead (Iceberg or Cabbage) and Butterhead Lettuce Groups (*Lactuca sativa* L. var. *capitata* L.) – **head lettuce**
4. *Lactuca sativa* Cutting or Curled Lettuce Group (*Lactuca sativa* L. var. *crispa* L.) – **leaf lettuce**
5. *Lactuca sativa* Stalk (or Asparagus) Lettuce Group (*Lactuca sativa* L. var. *angustana* L. H. Bailey) – **stalk lettuce**

Crop wild relatives:

Primary

1. *Lactuca serriola* L. — [References]

Secondary

1. *Lactuca saligna* L. — [References]

1. **Contributions to GRIN CWR data are welcome**

2. **Specialist reviews of GRIN CWR data are also welcome**

http://www.ars-grin.gov/~sbmljw/cgi-bin/taxcwr.pl

Thank you for your attention!