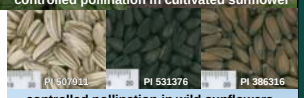
NCRPIS Oilseeds Curation Project

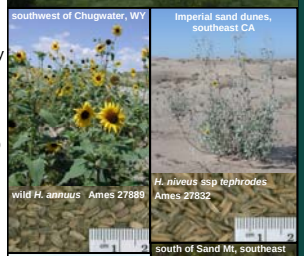
Laura Fredrick Marek*, Barbara Bingaman*, and Irvin Larsen**

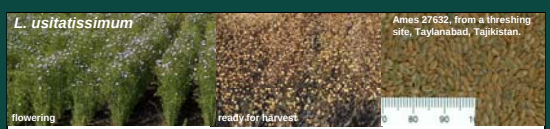
* Agronomy Department, North Central Regional Plant Introduction Station, Iowa State University, Ames, IA 50011
**USDA/ARS, North Central Regional Plant Introduction Station, Iowa State University, Ames, IA 50011

Helianthus

The NCRPIS Helianthus collection contains 3834 accessions representing 62 of the 66 taxa in this genus. Cultivated sunflower has been curated at NCRPIS since the station opened in 1948. Oil seed and confectionary sunflower are produced from *H. annuus*; ornamental sunflowers include species in addition to *H. annuus*. Wild populations of *H. annuus* and its wild relatives have provided sources of cytoplasmic male sterility required for the development of hybrids. In addition, wild germplasm provides an important source of genetic variation for disease resistance and tolerance to biotic stresses such as drought and salinity. The USDA sponsored wild sunflower collection began in Bushland, TX in 1976. That collection along with a collection from Davis, CA was transferred to NCRPIS in 1986. Sunflower is one of very few crops native to North America and multiple collections of wild sunflowers have been made over the years. To ensure that the collection contains maximum genetic diversity, there is an active effort to collect from populations representing the full geographic range for all Helianthus taxa.







Linum

The cultivated flax (*Linum usitatissimum*) collection was received in 1998 from the USDA NCRL, Fargo where it was developed by Dr. Jim Hammond and Dr. Jerry Miller. Wild flax accessions have been held at NCRPIS (currently 34 taxa) since the 1980's and provide genetic diversity. Flax oil is high in omega 3 fatty acids and a renewed interest in this crop has been driven by the nutraceutical industry. Nine new *L. usitatissimum* accessions, collected in 2004 in Tajikistan, are now available for distribution along with five accessions received from China in 1991.

Table 1: Overview of North Central Regional Plant Introduction Station (NCRPIS) Oilseed Project Collections

Site Crop	Genera (taxa)	accessions
Sunflower	1 (62)	3834
other oil seed Asteraceae	17 (95)	324
Brassicaceae	22 (261)	3177
Cuphea	1 (71)	648
Euphorbia	1 (57)	210
Flax	1 (35)	2986

Table 2: Selected Oilseed Project genera and taxa

Taxon	# accessions	# available
Helianthus annuus , cultivated*	1690	1514
Helianthus annuus , wild	922	849
Helianthus argophyllus	48	12
Helianthus cusickii **	21	12
Helianthus deserticola **	25	13
Helianthus eggertii	15	6
Helianthus exilis	29	19
Helianthus niveus ssp. *tephrodes* **	13	6
Helianthus petiolaris	146	137
Helianthus pumilus **	53	44
Helianthus verticillatus	2	2
Helianthus other	846	433
Vernonia galamensis	58	19
Vernonia other	182	52
other oilseed *Asteraceae*	84	20
Brassica carinata	72	52
Brassica juncea	442	393
Brassica napus	637	554
Brassica rapa	667	585
Brassica other	184	124
Alyssum murale	3	1
Alyssum other	38	28
Camelina sativa	41	33
Camelina other	20	11
Crambe abyssinica	91	83
Crambe other	133	79
Eruca sativa	238	225
Eruca other	40	25
other oilseed *Brassicaceae*	593	361
Euphorbia lagasce	90	34
Euphorbia other	120	10
Linum usitatissimum	2826	2812
Linum flavum	13	4
Linum lewisii	10	5
Linum other	134	46
Cuphea calophylla	40	25
Cuphea carthagenensis	51	47
Cuphea lanceolata	72	68
Cuphea lutea	17	17
Cuphea tolucana	41	41
Cuphea viscosissima	87	86
Cuphea wrightii	50	46
Cuphea other	263	142
Totals	11145	9061

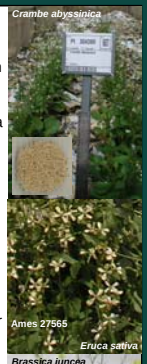
*83 accessions are not available due to CSR restrictions.
**Targeted species during four 2005 collection trips.

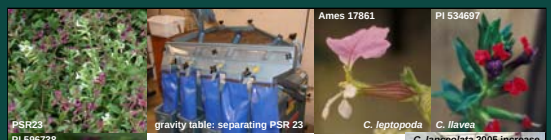
Acknowledgements: Thank you to Dr. Alice Pilgeram, Montana State University, for *Camelina sativa* field images, to Dr. Jim Hammond, North Dakota State University, for *Linum usitatissimum* images and to Dr. Thomas Gulya for the *Helianthus deserticola* field image. All other images were taken by NCRPIS personnel.

Questions: Contact Laura Marek, lmarek@iastate.edu

Brassicaceae

Brassicaceae accessions have been part of the NCRPIS collection since the station opened in 1948. *Brassica napus* and *B. rapa* are the most common source of canola (low erucic acid in the oil). Specialty industrial applications that require high erucic acid oil are supplied by non-canola brassicas (rapeseed oil), *Crambe abyssinica* and *Eruca sativa*. The NCRPIS has 60 newly available *E. sativa* accessions collected in the Mediterranean in 2004. *Camelina sativa* and *Matthiola* produce oil high in omega 3 fatty acids popular with the nutraceutical industry. *C. sativa* is currently under intensive development in eastern Montana where NCRPIS accessions have provided material with above average oil content. Brassicaceae species, including *B. napus* and *C. sativa* are under development by the biodiesel industry. Accessions of other Brassicaceae species including *B. juncea*, *Alyssum murale* and *Biscutella* are used in phytoremediation research.





Cuphea

Cuphea, a genus of 260 species in the family *Lythraceae,* is the only plant source of mid-chain fatty acids (C8, C10, C12, C14) that can be grown in farmers fields in the midwest. Mid-chain fatty acids are important industrial feedstocks currently derived from petroleum and coconut and palm oils. PSR23, a hybrid selected from crosses between NCRPIS populations of *C. lanceolata* and *C. viscosissima* (Dr. Steve Knapp) is being domesticated and is under production in Minnesota and Illinois. In addition, many cuphea taxa and hybrids are in demand for ornamental horticultural uses especially in the southern United States.