GERMPLASM COLLECTION OF WILD SPECIES OF *HELIANTHUS* IN MEXICO

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SUMMARY

In order to develop new sunflower cultivars adapted to the great diversity of agroecological conditions in Mexico and in the main sunflower producer countries, it is necessary to get genetic variability, which is founded in wild populations of genus *Helianthus*. The objectives of this study were to locate and to collect germplasm and herbarium specimens of the *Helianthus* species reported as native from Mexico, for breeding purposes and preservation. This is the first systematic attempt to collect germplasm of the wild sunflowers in Mexico, during which observations were also made on its ecology. The collections were carried out in the Mexican states of Baja California, Sonora, Chihuahua, Durango and Coahuila. Germplasm of 15 populations, and herbarium specimens of 19 populations were sampled and deposited at the INIFAP Durango germplasm bank and at CIIDIR Herbarium, respectively. From 12 names for *Helianthus* in mexican Herbaria, 8 are recognized here: *H. annuus, H. petiolaris, H. niveus, H. californicus, H. ciliaris, H. laciniatus, H. hirsutus and H. gracilentus* . Two more species are registered for the first time from Mexico: *H. maximiliani, and H. praecox. H. similis* is excluded for belong to *Viguiera*. Great phenotypic variability was observed in the sampled populations, which can be interpreted as indication of genetic variability.

INTRODUCTION

Germplasm of wild species of *Helianthus* has a very important role in genetic improvement of modern sunflower cultivars and have also an ecological importance (Skoric and Vannozzi, 1984). *Helianthus* is a Northamerican genus with around 49 species largely centred in the U.S.A. (Rogers, et.al., 1982). The related South American species have been segregated in the genus *Helianthopsis* (Robinson, 1979). In Mexico, the localization and collection of *Helianthus* species began in 1988 and continue at present (Gómez and González, 1991b)..

The objectives of this study were to locate and to collect germplasm and plant specimens of *Helianthus* species reported as native from Mexico, for breeding purposes and preservation.

In this report its revised the knowledge of *Helianthus* in México and analyzed the results of the germplasm collecting expeditions carried out during 1991.

MATERIALS AND METHODS

The exploration and collecting trips were planned in data basis of the herbarium labels of *Helianthus* in the mexican national herbaria ENCB of the Instituto Politecnico Nacional and MEXU of the Universidad Nacional Autónoma de México. The collects were carried out in Baja California, Sonora, Chihuahua, Durango and Coahuila states, which occupied a total surface of 773,500 km². The sampled area is located between 22°00' and 32°30' Lat. N and 99°30' and 117°00' Long. W, and the altitude of the locations of collects is between 0 and 2270 m.a.s.l.

Germplasm available was collected and seed samples deposited at the INIFAP (Instituto Nacional de Investigaciones Forestales y Agropecuarias) Durango Germplasm Bank. Herbarium specimens were collected as Vouchers, and identified mainly with basis in the keys of Heiser (1955), Heiser et al. (1969) and González and

Gómez (1992). The Vouchers were deposited at CIIDIR (Instituto Politécnico Nacional) Herbarium, and duplicates distributed to ENCB, IEB (Centro Regional del Bajío), MEXU and TEX (University of Texas at Austin) Herbaria.

RESULTS

From 12 specific names for *Helianthus* in mexican herbaria, only 8 were right, since *H. tuberosus* and *H. strumosus* were excluded to be names on misidentified herbarium specimens and *H. canus* due to be a synonym of *H. petiolaris* var. *canescens*. *H. similis* was also excluded, following to Brandegee (1908) and Schilling and Heiser (1981), for belong to *Viguiera*,

Two more species: *H. maximiliani* and *H. praecox* are registered for the first time from the country, giving about 10 species and 5 infraspecific taxa known to occur in Mexico. Using the infrageneric classification proposed by Schilling and Heiser (1981), the Mexican species are grouped as follows:

Sect. *Helianthus*: *H. annuus, H. niveus, H. petiolaris and H. praecox.*

Sect. *Ciliares*:

Series *Ciliares*: *H. ciliaris* and *H. laciniatus.*

Series *Pumili*: *H. gracilentus.*

Sect. *Divaricati*:

Series *Corona-Solis*: *H. californicus, H. hirsutus* and *H. maximiliani.*

Table 1 summarizes information of the sampled populations and amount (g) of collected seeds during 1991. From 31 sampled populations, 19 were of *Helianthus* species: *H. annuus, H. petiolaris, H. niveus, H. gracilentus, H. laciniatus and H. maximiliani* . Germplasm was available from 15 of these populations.

The remainder twelve populations were of species of other genera: *Viguiera, Heterotheca, Heliopsis, Helianthella, Encelia and Verbesina*, some of the which are closely related to *Helianthus*,

specially the abundant and well distributed *Viguiera* (Heiser et al. 1969; Gómez and González, 1991a).

From the reported species, *H. californicus, H. ciliaris, H. hirsutus* and *H. praecox* have not being collected, the last two because they are distributed in Northeastern México, in an area not still explored in this project. *H. californicus* and *H. ciliaris* were not located at the areas were they are reported, and it is possible that later explorations allow to locate these and also other species still not known from the country.

The greater phenotypic variability in the collected *H. annuus* was found in **BC6891** population. Populations **S5391** and **S5491** of *H. petiolaris* have plants with characters of both var. *petiolaris* and var. *falax*. Population **S5491** was formed by few individuals, some of them with androesterility. For this reason, only a little amount of seed was available here.

Some individuals in the populations **S54b91** and **CH6491** are also androsterils and liked to be hybrids between *H. petiolaris* and *H. annuus*. On the other hand, some mutant plants with lemon-yellow tips of ligules were observed in the population **CH64b91** of ***H. petiolaris***. The population **D6391** of *H. laciniatus* have also lemon-yellow ligules, different of the yellow ligulated common populations.

DISCUSSION AND CONCLUSIONS

This is the first systematic attempt to collect germplasm of the wild sunflowers in Mexico, during which observations were also made on its ecology. Ten species of wild *Helianthus* are registered from Mexico. Germplasm and plant specimens with high phenotypic variability, have been collected from 15 populations of six of the known species, and plant specimens have been collected from four more populations. The available genetic resources are used in the INIFAP-Pisa breeding project.

It is necessary to continue looking for the species not yet located, and to collect their seed and plants. Also, it is necessary explore to locate more populations of the species collected before, and maybe to locate other species not still known for Mexico.

Table 1. Populations of species of *Helianthus* sampled during 1991. INIFAP-CIFAP Durango.

Species	Population	Seed (g.)
H. laciniatus A. Gray	D5091	4
H. petiolaris Nutt.	CH5191	2
H. petiolaris Nutt. var. *petiolaris* > var. *falax*	S5391	1
H. petiolaris Nutt. var. *petiolaris* > var. *fallax*	S5491	1
H. petiolaris Nutt. <> *H. annuus*	S54b91	-
H. laciniatus A. Gray	CH6091	-
H. laciniatus A. Gray	CH6191	8
H. laciniatus A. Gray	D6391	1
H. petiolaris Nutt. var. *petiolaris*	CH6491	17
H.petiolaris Nutt. var. *petiolaris*	CH64b91	1
H.petiolaris Nutt. var. *petiolaris*	CH6591	37
H. gracilentus A. Gray	BC6691	19
H. annuus L.	BC6891	120
H. niveus (Benth.) Brandegee var. *niveus*	BC6991	3
H. niveus var. *tephrodes* (A. Gray) B. Turner	S7091	2
H. niveus var. *tephrodes* (A. Gray) B. Turner	S7191	4
H. niveus var. *tephrodes* (A. Gray) B. Turner	S7291	2
H. maximiliani Schrader	CH7991	-
H. maximiliani Schrader	C8391	-

> means equal to *fallax*

<> means equal to both parents

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