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Results of an exploration to expand the diversity of *Daucus* and Apiaceae germplasm collections¹

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INTRODUCTION

In volume 8 of this newsletter, Reitsma and Widrechner (1998) reported on the status of *Daucus* and Apiaceae germplasm at the USDA-ARS North Central Regional Plant Introduction Station (NCRPIS), in Ames, Iowa. The NCRPIS is one of the primary active sites in the U.S. National Plant Germplasm System (NPGS), conserving diverse collections of crop plants and their wild and weedy relatives and making them available for research and educational purposes at no cost to the user. Information about all NPGS collections can be obtained through the Germplasm Resources Information Network (GRIN) database, which can be searched via the Internet at <http://www.ars-grin.gov/npgs>.

In 1999, Philipp Simon (USDA-ARS, Madison, WI), along with colleagues in Poland, Greece, Syria, and Turkey, organized and conducted an exploration through financial support provided by the USDA-ARS Plant Exchange Office (Williams, 2005). That exploration was designed to collect landrace and wild germplasm of *Daucus* and other Apiaceae from the eastern Mediterranean, a region with considerable umbel diversity. The incorporation of collections made by Simon and his colleagues during the summer of 1999 into the NPGS has made much of the information presented by Reitsma and Widrechner (1998) obsolete. In this report, we wish to inform umbel researchers about our success in confirming the identity of these new collections, regenerating them, and making them available for research and education.

MATERIALS AND METHODS

During July and August of 1999, Simon and Teresa Kotlinska, Research Institute of Vegetable Crops, Skierniewice, Poland, collected seed samples of umbel germplasm in Greece with the collaboration of Stelios Samaras, Greek Gene Bank, Thessaloniki, in Syria with Bassam Al-Safadi, Syrian Atomic Energy Commission, Damascus, and in Turkey with S. Ali Kucuk of the Aegean Agricultural Research Institute, Izmir. The exploration resulted in the collection of 290 umbel accessions, which were accessioned at the NCRPIS in October and November of 1999, making it one of the largest single acquisitions of umbel germplasm by the NPGS. Germplasm samples collected in Greece were assigned accession numbers between Ames 25460 and 25640; those from Syria were assigned accession numbers between Ames 25694 and 25787; and those from Turkey were assigned accession numbers between Ames 25794 and 25916. Once the samples were accessioned and inventoried, regeneration plans began, following general procedures noted by Reitsma and Widrechner (1998).

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As an integral part of the regeneration process, we used taxonomic keys and descriptions from Davis (1972), Mouterde (1966-1984), Sáenz Laín (1981), and Tutin (1968) to identify these accessions as they flowered and fruited. Curation for all umbel collections was coordinated by Reitsma until 2000, when curatorial responsibility for umbel genera other than *Daucus* and *Pastinaca* was transferred to Brenner.

RESULTS

Since 1999, we have been able to make 230 of these seed collections available for distribution, typically by producing sufficient quantities of fresh seeds under isolation in screened cages with the addition of insect pollinators. Only seven collections have been inactivated due to initial inviability or our inability to regenerate seeds from the initial samples. The remaining 53 samples await additional regeneration attempts, and we hope to make more of them available within the next two to three years.

During the course of regeneration, we were able to verify many of the initial taxonomic identifications made in the field by the collectors. However, based on the references noted above, 152 of the accessions have been re-identified or received name changes due to nomenclature issues. The largest group of changes made to date involved 84 accessions received as *Daucus* sp. This process is ongoing, with 47 accessions of *Daucus*, 5 *Torilis*, and 1 *Bifora* still only identified to genus and 12 accessions representing unknown umbel genera.

Tables 1 and 2 summarize the current status of accessions collected in 1999, organized by taxon and country of origin, with *Daucus* accessions presented in Table 1 and all other umbels in Table 2. Many of these collections are the only representatives of a taxon from a particular country that are held in the NPGS, and some are the only representatives of certain taxa from any source. Both situations are footnoted in the Tables. For example, the only current NPGS collections of *Daucus involucratus*, *Orlaya daucooides*, *O. daucorlaya*, *Torilis tenella*, and *Turgenia latifolia* result from this 1999 exploration.

As knowledge of the availability of these diverse accessions becomes more widely shared within the research community, we expect that these collections will be found useful for improving our understanding of umbel genetics, breeding, stress tolerance, and systematics. Recently, Baranski et al. (2006) published a report on the use of NIR-FT-Raman spectroscopy to distinguish among umbel taxa in a non-destructive fashion that employed samples of *Caucalis*, *Daucus*, *Orlaya*, *Pimpinella*, and *Torilis* collected on this exploration. We are very open to exploring similar research possibilities and supplying researchers with appropriate umbel germplasm and information to meet their needs.

REFERENCES

Baranski, R., M. Baranska, H. Schulz, P.W. Simon, and T. Nothnagel. 2006. Single seed Raman measurements allow taxonomical discrimination of Apiaceae accessions collected in gene banks. *Biopolymers* 81: 497-505.

Davis, P.H. (ed.) 1972. Flora of Turkey and the East Aegean Islands, Volume 4. Edinburgh University Press, Edinburgh.

Mouterde, P. 1966-1984. Nouvelle Flore du Liban et de la Syrie. Éditions de l'Imprimerie Catholique, Beirut.

Reitsma, K.R., and M.P. Widrechner 1998. *Daucus* and Apiaceae in the USDA germplasm collection. Umbelliferae Improvement Newsletter 8: 1-4.

Sáenz Laín, C. 1981. Research on *Daucus* L. (Umbelliferae). Anales Inst. Bot. A.J. Cavanilles 37: 481-534.

Tutin, T.G. (ed.) 1968. CXXIX. Umbelliferae. Pp. 315-375. In: Flora Europaea, Volume 2. Cambridge University Press, Cambridge.

Williams, K.A. 2005. An overview of the U.S. National Plant Germplasm System's exploration program. HortScience 40: 297-301.

Table 1. Status of *Daucus* collections from the 1999 exploration

TAXON ^a	COUNTRY ^b	# COLLECTED ^c	# AVAILABLE
<i>Daucus aureus</i>	Syria	1(0)	0
<i>Daucus broteri</i>	Greece	3	2
<i>Daucus broteri</i>	Syria	4	3
<i>Daucus broteri</i>	Turkey	4	3
<i>Daucus carota</i>	Greece	31	31
<i>Daucus carota</i>	Syria	12	10
<i>Daucus carota</i>	Turkey	51	50
<i>Daucus carota</i> subsp. <i>commutatus</i>	Turkey	1	1
<i>Daucus guttatus</i>	Greece	12(10)	7
<i>Daucus guttatus</i>	Syria	1	1
<i>Daucus guttatus</i>	Turkey	6	6
<i>Daucus involucratus</i>	Greece	1	1
<i>Daucus involucratus</i>	Turkey	3	2
<i>Daucus muricatus</i>	Greece	5(2)	0
<i>Daucus muricatus</i>	Syria	1(0)	0
<i>Daucus muricatus</i>	Turkey	1	0
<i>Daucus</i> sp.	Greece	11	11
<i>Daucus</i> sp.	Syria	14	13
<i>Daucus</i> sp.	Turkey	22	20
Total		184(177)	161

^a. Taxa highlighted in bold represent unique taxa, which are only represented at the NCRPIS through these collections.

^b. Countries highlighted in bold represent unique geographic representation; these collections are the only ones held at the NCRPIS from the displayed countries for those specific taxa.

^c. Numbers in parentheses represent the number of currently active accessions for cases where some accessions have been inactivated.

Table 2. Status of Apiaceae collections (other than *Daucus*) from the 1999 exploration

TAXON ^a	COUNTRY ^b	# COLLECTED	# AVAILABLE
<i>Ammi majus</i>	Syria	2	2
<i>Ammi visnaga</i>	Turkey	1	1
<i>Anethum graveolens</i>	Greece	1	1
<i>Anethum graveolens</i>	Turkey	1	1
<i>Bifora</i> sp.	Syria	1	0
<i>Caucalis platycarpus</i>	Greece	6	6
<i>Caucalis platycarpus</i>	Turkey	11	6
<i>Caucalis</i> sp.	Syria	1	0
<i>Coriandrum sativum</i>	Syria	1	1
<i>Foeniculum vulgare</i>	Greece	1	1
<i>Foeniculum vulgare</i>	Syria	1	1
<i>Orlaya daucoides</i>	Greece	1	1
<i>Orlaya daucoides</i>	Syria	1	0
<i>Orlaya daucoides</i>	Turkey	2	1
<i>Orlaya daucorlaya</i>	Greece	5	1
<i>Petroselinum crispum</i>	Greece	2	1
<i>Petroselinum crispum</i>	Syria	2	2
<i>Petroselinum crispum</i>	Turkey	1	1
<i>Pimpinella peregrina</i>	Syria	4	4
<i>Torilis arvensis</i>	Greece	1	1
<i>Torilis arvensis</i>	Syria	3	3
<i>Torilis arvensis</i>	Turkey	5	3
<i>Torilis arvensis</i> subsp. <i>neglecta</i>	Syria	8	5
<i>Torilis arvensis</i> subsp. <i>neglecta</i>	Turkey	3	2
<i>Torilis leptophylla</i>	Greece	2	2
<i>Torilis leptophylla</i>	Syria	11	10
<i>Torilis leptophylla</i>	Turkey	2	2
<i>Torilis nodosa</i>	Turkey	5	5
<i>Torilis</i> sp.	Syria	4	1
<i>Torilis</i> sp.	Turkey	1	0
<i>Torilis tenella</i>	Syria	3	3
<i>Turgenia latifolia</i>	Syria	1	1
Unident-Apiaceae sp.	Greece	2	0
Unident-Apiaceae sp.	Syria	9	0
Unident-Apiaceae sp.	Turkey	1	0
Total		106	69

^a. Taxa highlighted in bold represent unique taxa, which are only represented at the NCRPIS through these collections.

^b. Countries highlighted in bold represent unique geographic representation; these collections are the only ones held at the NCRPIS from the displayed countries for those specific taxa.