

## A Germplasm Collection of Confectionery Sunflower Landraces from Spain

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### Abstract

Confectionery sunflower has been traditionally cultivated in Spain in small vegetable gardens since its introduction from the New World in the 16<sup>th</sup> century. This created great genetic diversity in the form of local landraces, which have been collected for conservation and characterization. The germplasm collection consists of 195 accessions, which are maintained at the National Plant Genetic Resource Center (CRF; <http://wwwx.inia.es/inventarionacional/Introduccioneng.asp>). Evaluation of the collection, conducted in Córdoba (Spain) in 2011, 2012, and 2013, revealed large variation for morphological, phenological, and biochemical traits. Great variability was particularly observed for hundred-seed weight (4.2 to 19.7 g), plant height (65.0 to 361.7 cm), head diameter (9.0 to 31.0 cm), seed length (0.9 to 1.8 cm), days to flowering (64.3 to 163.0), oil content (16.0 to 29.8%), fatty acid profile (e.g. oleic acid from 22.9 to 63.9%), kernel tocopherol content (114.0 to 423.2 mg kg<sup>-1</sup>), kernel squalene content (12.0 to 128.1 mg kg<sup>-1</sup>), kernel phytosterol content (1344.0 to 2942.5 mg kg<sup>-1</sup>), and phytosterol profile (e.g.  $\beta$ -sitosterol from 32.3 to 66.1%;  $\Delta^7$ -stigmastenol from 7.1 to 35.2%). The analysis of the genetic structure of the germplasm collection with a set of 52 SSR markers revealed the existence of two genetic groups, one of them widely distributed geographically and another one linked to a reduced area in the north of Córdoba Province. Genetic diversity of this germplasm collection can be of great utility for widening the genetic base of cultivated sunflower in breeding programs.

**Key words:** Fatty acids, genetic structure, germplasm evaluation, oil content, seed quality traits

## 西班牙食用向日葵地方品种种质资源的收集

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### 摘要

食用向日葵自十六世纪引入西班牙以来，主要用传统的栽培方法种植在小菜园中。这种形式使地方品种具有遗传多样性，并被收集和保存下来。入库编号的种质资源有 195 个，主要保存在国家植物遗传资源中心（CRF；[http://www\\*.iia.sEs/StutoRea-Nosial/PixCioNo.asp](http://www*.iia.sEs/StutoRea-Nosial/PixCioNo.asp)）。2011、2012 和 2013 年在科尔多瓦（西班牙）对收集的种质进行评价，并得出从形态学、物候学和生化特性方面表现出很大的变异性。变异性最大的是籽仁百粒重（4.2~19.7 克）、株高（65~361.7 厘米）、花盘直径（9~31 cm）、种子长度（0.9~1.8 cm）、开花期（64.3~163）、含油量（16~29.8%）、饱和脂肪酸组成（如油酸含量在 22.9 到 63.9% 之间）、籽仁生育酚含量（在 114-423.2 mg kg<sup>-1</sup> 之间）、籽仁植物甾醇含量（12-128.1 mg kg<sup>-1</sup>）、核仁甾醇含量（1344-2942.5 mg kg<sup>-1</sup>）、植物甾醇谱（如  $\beta$ -谷甾醇在 32.3-66.1% 之间； $\delta$ 7-雌甾醇在 7.1-35.2% 之间）。利用 52 个 SSR 标记对收集的种质资源的遗传结构进行分析，发现两个遗传类群，一个在地理上分布广泛，另一个与科尔多瓦省北部不断减少的种植面积紧密相关。种质资源的遗传多样性对栽培向日葵育种中拓宽向日葵的遗传基础具有重要意义。

**关键词：**脂肪酸、遗传结构、种质评价、含油量、种子品质性状