

A GERmplasm COLLECTION OF CONFECTIONERY SUNFLOWER LANDRACES FROM SPAIN

Leonardo Velasco, José M. Fernández-Martínez,
Begoña Pérez-Vich

*Institute for Sustainable Agriculture (CSIC)
Córdoba, Spain*

20th International Sunflower Conference
June 20-23, 2022. Novi Sad, Serbia

Confectionery sunflower landraces in Spain



Confectionery sunflower has been grown in Spain in small vegetable gardens since its introduction from the New World in the 16th century.

The sunflower has been traditionally used for providing shadow to small vegetable gardens.

Confectionery sunflower landraces in Spain



These uses created a vast genetic diversity in the form of local landraces. However, a strong genetic erosion has occurred in recent decades.

The main reasons, apart from the decay of the rural population, are the replacement by maize plants for shadowing purposes. Self-compatible sunflower forms are replacing landraces.

Confectionery sunflower landraces in Spain



We have conducted collection expeditions in Central and Southern Spain to collect such invaluable genetic resources.

The Spanish National Collection of Confectionery Sunflower Landraces is composed of 196 accessions, collected from 1986 onwards.

Confectionery sunflower landraces in Spain



Objectives

To evaluate genetic diversity in the Spanish germplasm collection both at the phenotypic and genotypic level.

Phenotypic:

- Plant and seed traits
- Seed quality traits

Genotypic:

- 52 polymorphic SSR markers

Materials and Methods

The plants of 187 accessions were cultivated in the field for three years.

The plants were sib-mated to produce seed for multiplication and analyses, since most of the accessions have a high degree of self-incompatibility.

Materials and Methods



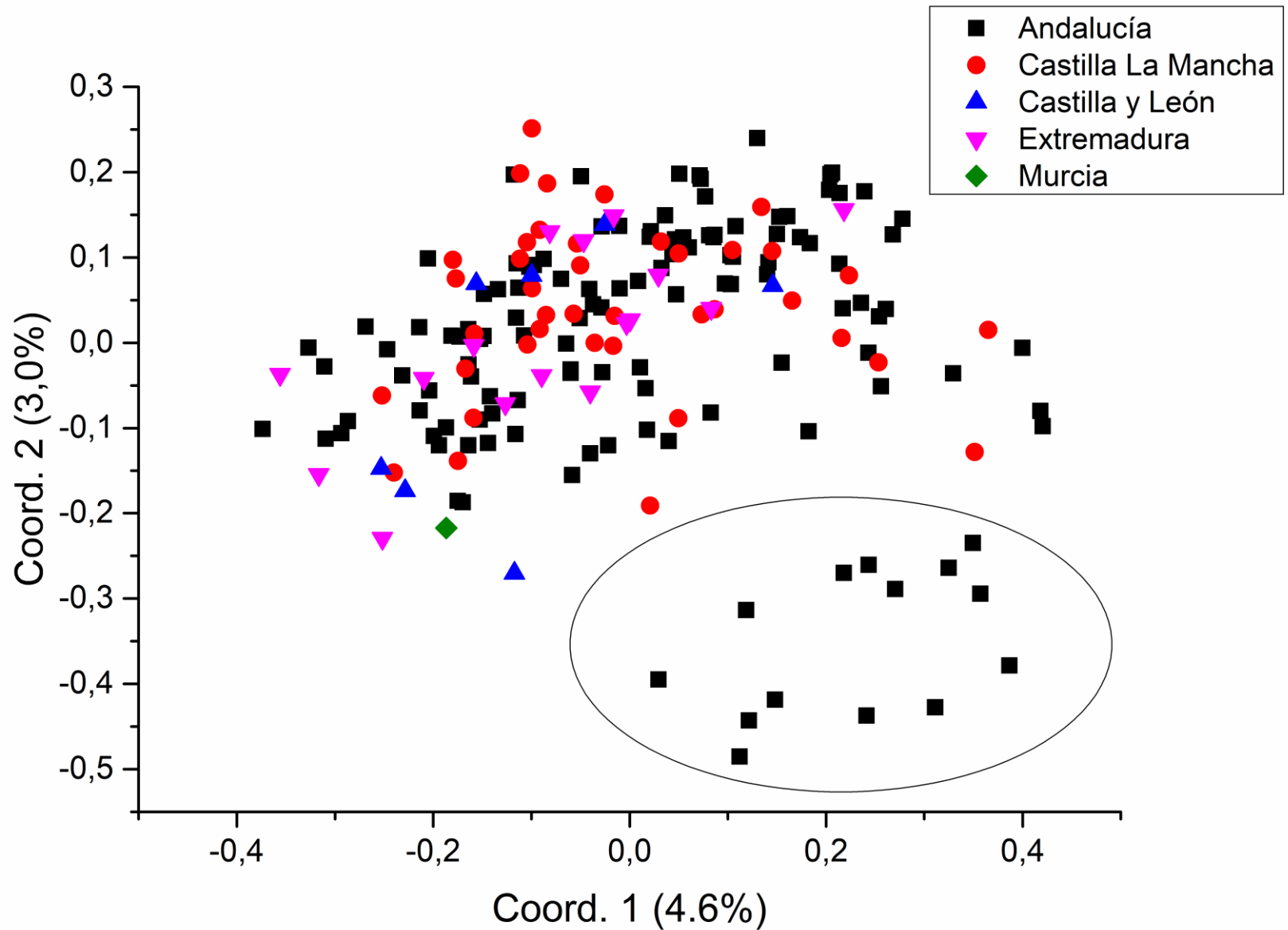
Seed and Plant Traits

Trait	Minimum	Maximum
Seed length (cm)	0.91	1.75
Seed width (cm)	0.50	1.15
Seed length/width	1.32	2.39
Hundred seed weight (g)	4.21	19.68
Kernel (%)	39.32	68.10
Seed oil content (%)	16.00	32.20
Plant height (cm)	65.00	361.67
Head diameter (cm)	9.00	31.00
Days to flowering	64.31	163.00

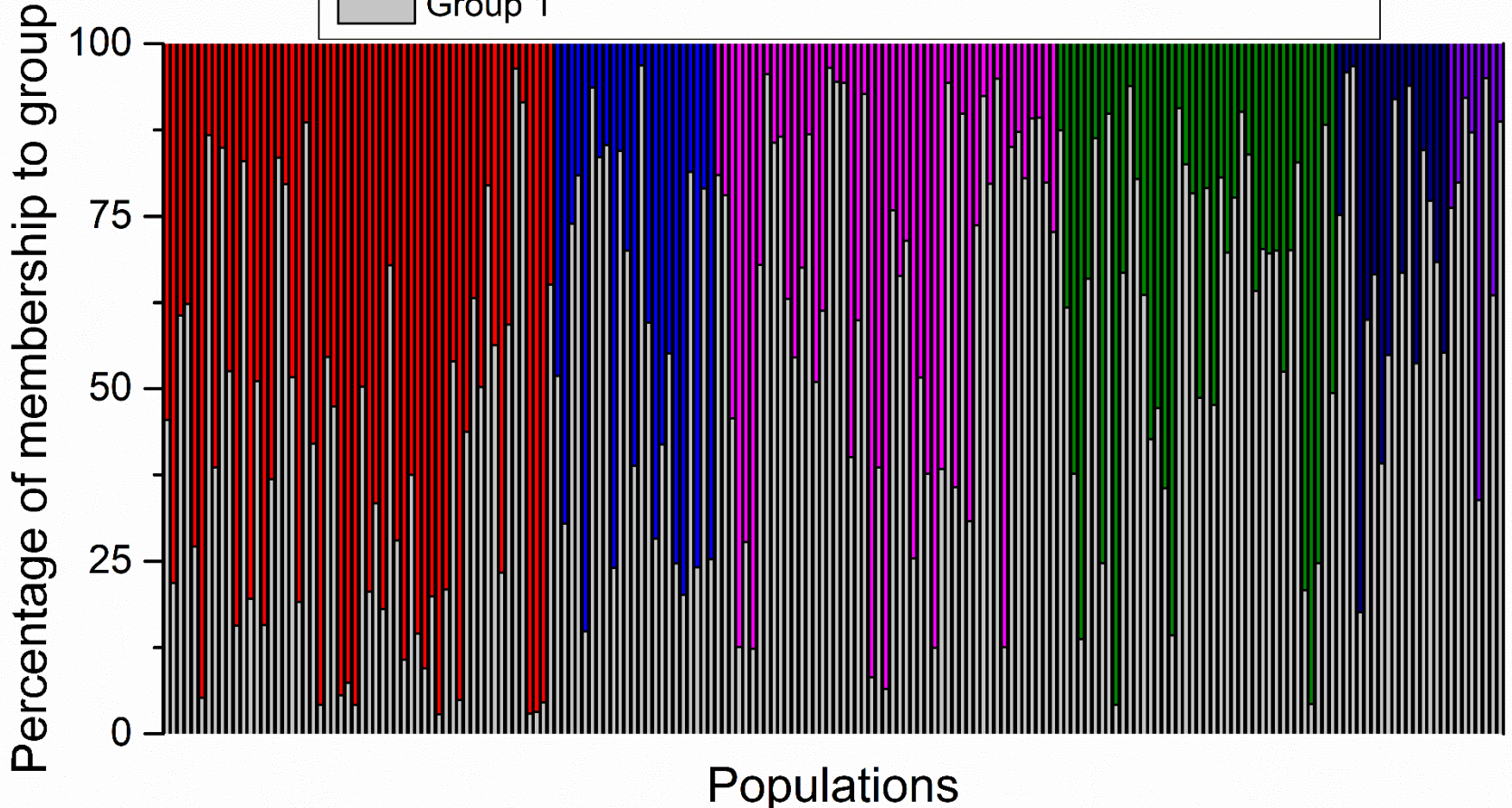
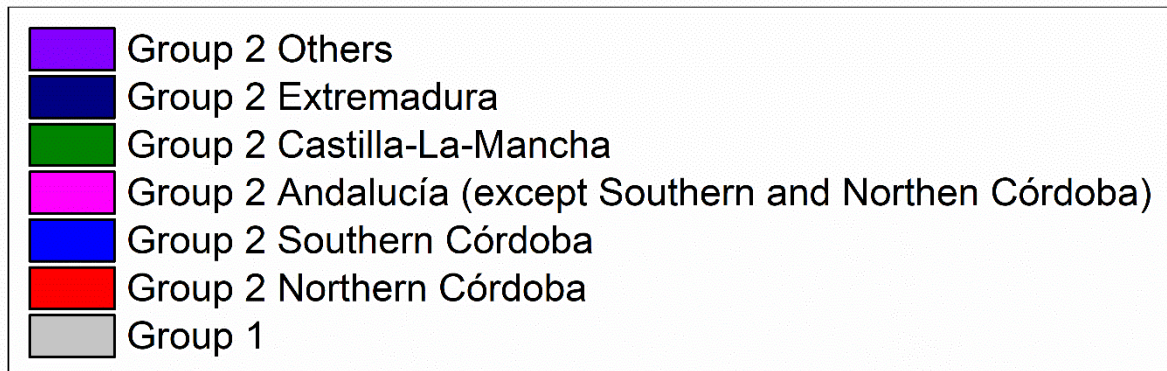
Seed Quality Traits

Trait	Minimum	Maximum
Palmitic acid (%)	5.6	10.4
Stearic acid (%)	1.6	5.8
Oleic acid (%)	22.9	63.9
Linoleic acid (%)	24.8	66.7
Tocopherols (mg kg⁻¹)	114.0	423.2
α-tocopherol (%)	96.1	99.8
β-tocopherol (%)	0.2	3.9
Squalene (mg kg⁻¹)	12.0	128.1
Phytosterols (mg kg⁻¹)	1344.0	2942.5
Campesterol (%)	4.4	17.1
Stigmasterol (%)	4.8	14.1
β-sitosterol (%)	32.3	66.1
Δ^5-avenasterol (%)	0.2	10.7
Δ^7-stigmastenol (%)	7.1	35.2
Δ^7-avenasterol (%)	1.7	7.5

Molecular Analysis (PCoA)



Molecular Analysis (Structure)



Conclusions

Two main genetic groups of confectionery sunflower in Spain

One of them contains a small number of accessions restricted to a reduced geographical area in the North of Córdoba province.

These accessions are very tall, and very late flowering. The plants were formerly very much used for shadowing small vegetable gardens and their dried stems were used as beams for drying sausage inside the houses.

Conclusions

Plants of this gene pool also have a distinctive seed composition, e.g. high Delta-7-Stigmastenol content



Conclusions



The Spanish germplasm collection of confectionery sunflower contains great genetic diversity that can be of great interest for widening the genetic bases of cultivated sunflower, and for discovering novel alleles in sunflower