# Fruit tree rootstock breeding and selection program

This program was begun in 1996 for the purpose of obtaining new rootstocks that would meet and satisfy the demands of the fruit production sector. The first few years saw the implementation of the directed breeding technique and a germplasm bank so different parental lines would be available. This has been expanded over the years with great genetic diversity.

Below is a summary table showing the number of breedings completed, the materials obtained, the number of field tests performed and finally, the number of commercial rootstocks registered.

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|---|---|
| Germplasm | 268 clons y cultivars |
| Parental lines used | 98 |
| Número of breedings | 427 (directed) |
| Number of pollinations | 85,700 |
| Offspring | 343 |
| Selections studied | 68 |

| | |
|---|---|
| Commercial breeds | 5 |
| Pre-commercial (advanced) | 6 |
| Field test | 98 (38 currently underway) |
| Locations in Spain | 27 |
| Locations outside Spain | 12 |
| Co-breeding programs | 2 |
| EU Registers and US Patents | 5 in the EU and 6 in the US |

## Primary criteria used for the selection

The different selections were assessed under field and/or laboratory conditions for the following parameters:

### AGRONOMICAL:

High or dwarfing vigor
Productivity and fruit quality
Varietal compatibility
Cold or heat tolerance
Efficient water use

## PHYSIOLOGICAL ALTERATIONS:

Iron chlorosis
Salinity
Radicular asphyxia

## PLAGUES AND DISEASES:

Soil fungi: Armillaria spp., Phytophthora spp., Rosellinia necatrix

Root-knot (Meloidogyne spp) and lesion (Pratylenchus spp.) nematodes

Crown gall tumors: Agrobacterium tumefaciens

These tasks were completed in collaboration with various public centers and private firms.

# The primary objectives of the program

**1. To obtain peach tree hybrid rootstocks that are better adapted to the Mediterranean production conditions than those that currently exist (GF-677).**

- Improved productivity and fruit quality.

- Improved tolerance to radicular asphyxia and soil fungi.
- Resistance to root-knot nematodes (Meloidogyne spp.).
- Tolerance to iron chlorosis.
- Erect with little ramification (for easier nursery handling)

**ROOTPAC-90, ROOTPAC-70**

**2. Prunus rootstocks adapted to low winter rest needs.**

- Low cold needs (300 to 400 uf) to get ahead of the precociousness of the existing commercial varieties.
- Moderate tolerance to iron chlorosis (active Ca between 8-10%, pH 7 to 7.8).
- Tolerance to high temperatures (North Africa).
- High resistance to root-knot nematodes of the genus Meloidogyne.
- Medium - high vigor, erect growth and little ramification.

**TEMPROPAC, ROOTPAC-40**

**3. Low-vigor rootstock.**

- To reduce tree size.
- To establish an efficient and more competitive production system than the current ones based on cost reduction.
- Good adaptation to Mediterranean conditions.
- To maintain or exceed the current production and quality levels.
- To establish the effects of low-vigor grafting in relation to tree size, flowering, fruition, yield and fruit quality.

**ROOTPAC-20, ROOTPAC-40**

**4. Rootstocks for replanting in fatigued soils.**

- Multi-resistance to various biotic stress factors (soil pathogens).
- Multi-tolerance to abiotic stress factors.
- Versatility: potential for use in different stone fruit species.
- Medium to medium-high tree size and better adaptation to fatigued soils.

**ROOTPAC-R**