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# Five years of observations of the GREMPA almond collection in CEBAS-CSIC, Murcia, Spain

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**SUMMARY** – The GREMPA (Groupe de Recherches et d'Etudes Méditerranéennes pour l'Amandier et le Pistachier) agreed to establish an almond collection, including 35 new European selections, in the different GREMPA countries in order to study their behaviour in each of these countries. This collection consisted of 13 cultivars from France, 10 from Spain, 7 from Italy and 5 from Greece. The collection was established in CEBAS-CSIC, Murcia, Spain, in 1992. From 1994 to 1998, different traits were studied (flowering, production, fruit characteristics, etc). In 1999, most of the trees were removed from the orchard and 12 selections were kept because of their good behaviour.

**Key words:** Almond, *Prunus dulcis* Miller, new cultivars, GREMPA.

**RESUME** – "Cinq années d'observations de la collection d'amandiers du GREMPA au CEBAS-CSIC, Murcie, Espagne". Le GREMPA (Groupe de Recherches et d'Etudes Méditerranéennes pour l'Amandier et le Pistachier) avait convenu d'établir une collection d'amandiers, incluant 35 nouvelles sélections européennes, dans les différents pays rattachés au GREMPA afin d'étudier leur comportement dans chacun de ces pays. Cette collection était formée par 13 cultivars provenant de France, 10 d'Espagne, 7 d'Italie et 5 de Grèce. La collection a été mise en place au CEBAS-CSIC, Murcie, Espagne en 1992. De 1994 à 1998, différents caractères ont été étudiés (floraison, production, caractéristiques du fruit, etc.). En 1999, la plupart des arbres ont été éliminés des vergers et 12 sélections ont été gardées en raison de leur bon comportement.

**Most-clés :** Amandier, *Prunus dulcis* Miller, nouveaux cultivars, GREMPA.

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## Introduction

The breeding of almond species has experienced spectacular advances in recent years. The result of the different breeding programs developed in numerous almond producing countries has been the release of new improved varieties, that frequently include among their characteristics late flowering and self-compatibility.

The GREMPA (Groupe de Recherches et d'Etudes Méditerranéen pour le Pistachier et l'Amandier) agreed in 1985 to establish an almond collection including the best selections obtained until then by the researchers in several countries, with the purpose of studying the behaviour of these new varieties in environments where they might potentially be cultivated.

In this work we present the results of the study of this collection of varieties in CEBAS-CSIC, Murcia, Spain.

## Material and methods

The GREMPA collection includes 35 European selections (13 French, 10 Spanish, 7 Italian and 5 Greek). At CEBAS-CSIC, Murcia, Spain, the collection was established in February of 1992 in the experimental farm "Tres caminos" in Murcia. The orchard, which is 150 m a.s.l., enjoys warm winters without risk of frost and dry, hot summers. The plantation was established with a 4 × 5 metre spacing and drip irrigation. Two trees of each selection were planted. Between 1994 and 1998 numerous characteristics were studied (Table 1).

Table 1. Characteristics studied in the GREMPA collection

Flowering time (initial, full and final)	Percentage of double seeds
Flower density	Percentage and type of defects
Production density	Kernel shape
Maturation time	Kernel thickness
Yield	Kernel shrivelling
Percentage hull/shell/kernel	Kernel colour
Weight of one shell	Kernel flavour
Weight of one kernel	Overall score of the almond
Shell hardness	

Analysis of the five years results was carried out in 1999. The best selections were kept and the rest eliminated.

## Results and discussion

Some of the selected genotypes are varieties which have been described previously. This is the case with Guara (Felipe and Socías i Company, 1986) or Masbovera, Glorieta and Francolí (Vargas and Romero, 1985). The rest are in different selection phases, and were described by Romero and Vargas (1992).

Table 1 shows the main characteristics of the 12 best selections. The other selections were discarded for different reasons. Among the selected genotypes, 5 were French, 3 Greek and 4 Spanish. The most important selection criteria were flowering time, yield and fruit quality.

Table 1. Main characteristics of the best selections of the GREMPA collection in CEBAS-CSIC, Murcia (Spain)

	Country	Full flowering <sup>†</sup>	Yield <sup>††</sup>	Percentage of kernel	Hardness of shell <sup>†††</sup>	Weight of 1 kernel (g)	Double kernels (%)	Overall score <sup>††††</sup>	Self-compatible
Lauranne	France	0	4.4	29	4.0	1.0	0	3.0	Yes
Ferragnès Tuono-36	France	-6	4.8	30	4.0	1.3	0	3.3	Yes
Ferragnès Tuono-283	France	+2	7.0	51	1.6	1.2	2	2.7	Yes
Ferragnès Tuono-279	France	-6	5.7	39	4.0	1.3	8	3.0	Yes
Tuono Ai-6	France	-7	5.5	29	4.0	1.3	0	3.3	Yes
Ferragnès Troito-13	Greece	-6	6.6	27	4.0	1.1	6	3.0	Yes
Ferragnès Troito-30	Greece	-2	6.4	31	3.7	1.1	0	3.0	Yes
Ferragnès Troito-35	Greece	-4	4.6	30	3.7	1.3	0	3.0	Yes
Guara	Spain	-6	3.4	31	4.0	1.3	7	3.0	Yes
Masbovera	Spain	-3	4.2	27	4.0	1.4	0	3.3	No
Glorieta	Spain	-7	5.3	27	3.7	1.3	0	2.6	No
Francolí	Spain	-7	5.0	28	4.0	1.1	0	2.3	No

<sup>†</sup>Flowering time with reference to Lauranne. Full flowering of Lauranne = February 26.

<sup>††</sup>Yield accumulated from 1994 to 1998 (kg of kernel/tree).

<sup>†††</sup>Hardness of shell: 1 = very soft, 2 = soft, 3 = intermediate, 4 hard, 5 = very hard.

<sup>††††</sup>Overall score of fruit: From 1 (very bad) to 5 (very good).

If we take Lauranne as the reference, most of the varieties flowered earlier, except Ferragnès Tuono-283 that flowered 2 days later. Some selections, although flowering very late (Ayles, Moncayo, Garbi, Tardy Nonpareil Tuono-19), were among the less productive.

As for yield, it was Ferragnès Tuono-283 once again that behaved best, closely followed by Ferragnès Troito-13 and Ferragnès Troito-30. Among our selections, Guara had the smallest production.

With the exception of Ferragnès Tuono-283, which is soft shelled (51% of kernel), all the selections were hard shelled with kernel percentages ranging from 27 to 39%, which is an acceptable value for industrial processing in Spain.

Kernel weight did not vary much among those selected, although the average weight of Lauranne might be considered low (1.0 g), while that of Masbovera (1.4 g) was excellent. Double kernelled fruits were only important in Guara, Ferragnès Troito-13 and Ferragnès Tuono-279. The overall evaluation of the fruit was average in most of the cases, although Masbovera, Ferragnès Tuono-36 and Tuono Ai-6 were noticeable for their more attractive seeds.

In conclusion, among the self-compatible selections, Ferragnès Tuono-283 must be considered one of the best although soft shelled. Among the hard shelled selections, Lauranne, Tuono Ai-6 and Ferragnès Troito-30 were the best due to their late flowering time, high productivity and the quality of their fruits.

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