



*Plant genetic resources — our crop plants and their related wild species, and the genetic diversity they contain — are essential for our food, nutrition and economic security.*



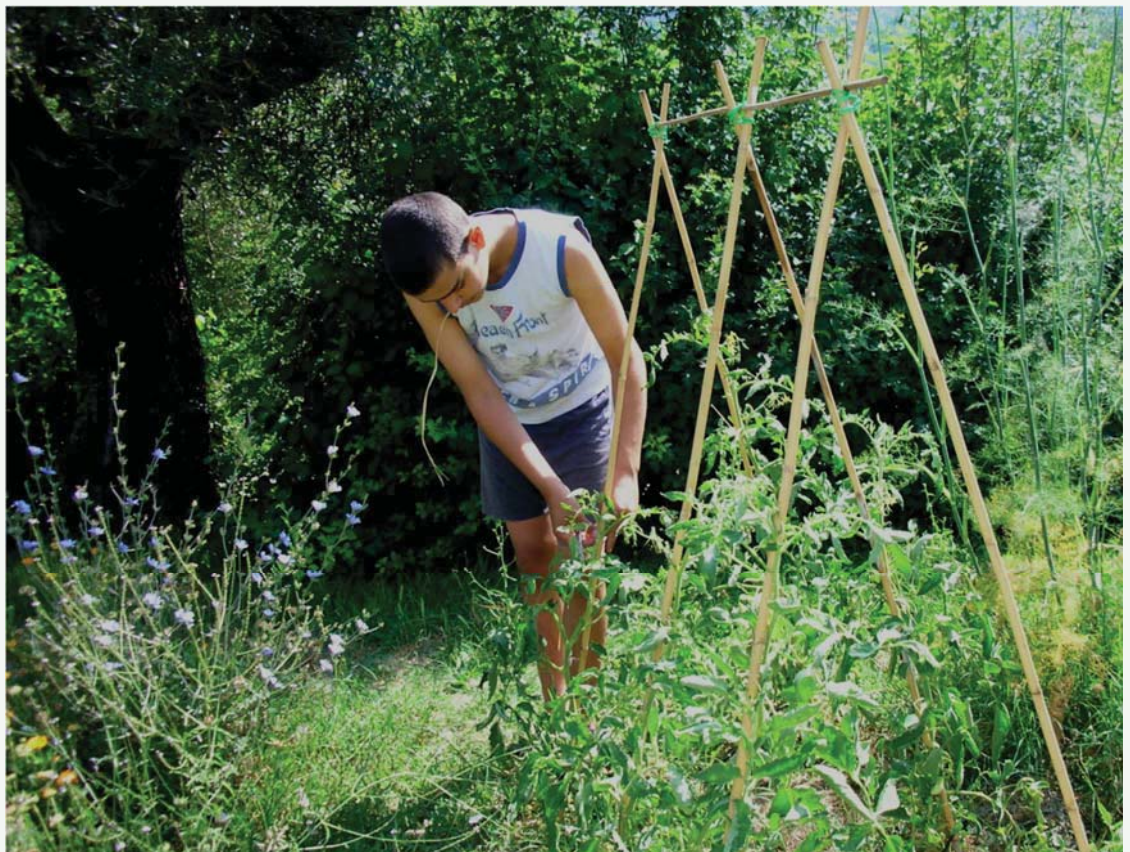
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# Landraces

Issue 4 January 2019

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**Establishing the European Network for *In Situ* Conservation and Sustainable Use of Plant Genetic Resources**



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**Front cover:** Nurturing a tomato landrace in an Italian organic garden

**Photo:** V. Negri



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# Recovering and enhancing the local tomatoes of the Vall d'Albaida, an inland district in the region of València (Spain)

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## Introduction

The region of València, situated in the Mediterranean coast of Spain, has a long horticultural tradition, with a plethora of local varieties of vegetables having been selected by traditional farmers. Tomatoes (*Solanum lycopersicum* L.) are no exception and a wide diversity of morphologically distinct local varieties can be found in this region (Cebolla-Cornejo *et al.*, 2013; García-Martínez *et al.*, 2013; Figàs *et al.*, 2015).

Some districts ("comarques"; made up of several municipalities) of the region of València, such as L'Horta (in the vicinity of the city of València), Plana Alta (in the northern part of the region of València), Baix Vinalopó, and Baix Segura (both in the southern part of the region of València), are well known for the cultivation of local tomato varieties (Cebolla-Cornejo *et al.*, 2007; Soler *et al.*, 2017). Many of these varieties have been characterized, and are increasingly being used by farmers targeting local markets (Cebolla-Cornejo *et al.*, 2007, 2013; García-Martínez *et al.*, 2013; Figàs *et al.*, 2015; Soler *et al.*, 2017). However, cultivation of tomato, mostly in small plots for local and self-consumption, has also been relevant in other districts where their cultivation is generally performed by farmers of advanced age. Consequently, there is a very high risk of loss of these local tomato varieties, something that was already recognized almost 40 years ago (Ferrer Ripollès and Saragossa Rovira, 1980).

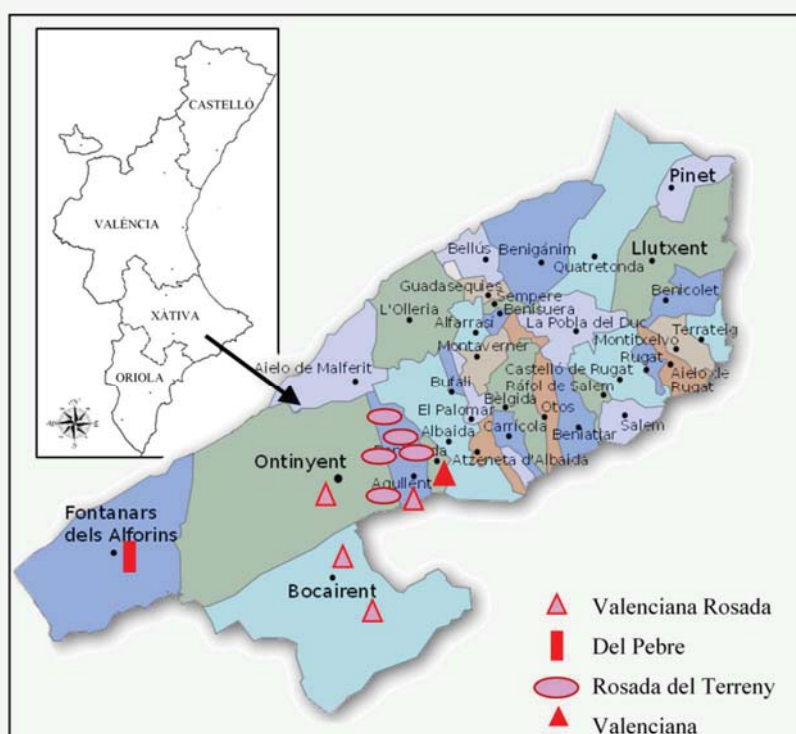
## The recovery and enhancement of Valencian local tomatoe landraces

One of the most efficient ways for the conservation of tomato local varieties is to recover their cultivation in their areas of origin (i.e. *in situ* conservation). This type of conservation may be efficient if these local varieties can be recovered for their commercial exploitation, so that they represent a profitable alternative for farmers (Soler *et al.*, 2010; Casañas *et al.*, 2017). In the current agricultural context, Valencian markets are flooded with a massive offer of cheap tomato fruits from modern varieties produced under highly intensive conditions in other Spanish regions (mostly from Almería in the southeast of Spain). However, Valencian consumers are increasingly demanding locally produced tomatoes from traditional varieties, which are associated to a better taste, to the local culture, and to a traditional agricultural system (Cebolla-Cornejo *et al.*, 2007; Soler *et al.*, 2017).

These varieties reach much higher prices in the local markets, and have become profitable for farmers who specialize in their cultivation. In this way, currently there are associations of tomato farmers involved in the production of certain local tomato varieties, such as the "Valenciana" local tomato variety (Soler *et al.*, 2017), which are having high demand.

## The local tomatoes of the Vall d'Albaida district

In the Valencian inland central districts there are many areas of traditional cultivation of vegetables, including tomato. One of these cases is the Vall d'Albaida (Figure 1), which is an inland district made up of 34 municipalities covering an area of 722 km<sup>2</sup>. Geographically, this district is a wide valley surrounded by mountains. Cultivation of local traditional tomatoes has taken place not only in the periurban area of the most important city (Ontinyent; aprox. 38,000 inhabitants), but also in most of the other villages, many of which have a very ancient tradition of vegetable crops cultivation thanks to the availability of water from natural water courses or fountains. This is the case of small villages in the Vall d'Albaida region such as Agullent, Bocairent, or Fontanars dels Alforins. In the proximity of these villages there are farmland areas characterized by high levels of smallholdings with an increasing rate of abandonment, putting in risk the *in situ* conservation of these local varieties, many of which have not been collected, as well as their associated ethnobotanical knowledge and culture.



**Figure 1.** Map of Vall d'Albaida district within the historical demarcations of the region of València, and location of the 11 traditional varieties of tomato considered.

One of the local tomato varieties from the Vall d'Albaida is the 'Rosada del Terreny', which is heart shaped and has a colour which is intermediate between off-white red and purple rose (Figures 2 and 3). This variety is especially valued for its fleshy fruits and its exceptional flavour. Another type of local variety in the area is the "Del Pebre" (meaning *Capsicum* pepper) tomato. This type has an elongated shape, and its flesh has an intense red colour. Another traditional type from the Vall d'Albaida district is the "Valenciana Rosada", which is characterized by the typical pointed shape of "Valenciana" tomato (Soler et al., 2017), and is very fleshy and tasty and pink coloured.

**Table 1.** Varietal types of the 11 traditional varieties of tomato from the Vall d'Albaida used in the present work.

Local variety	Municipality of origin	Varietal type
AG1	Agullent	"Valenciana Rosada"
AG2	Agullent	"Rosada del Terreny"
AG3	Agullent	"Rosada del Terreny"
AG4	Agullent	"Rosada del Terreny"
AG5	Agullent	"Rosada del Terreny"
AG6	Agullent	"Rosada del Terreny"
AG7	Agullent	"Valenciana"
BOC1	Bocairent	"Valenciana Rosada"
BOC2	Bocairent	"Valenciana Rosada"
FONT1	Fontanars dels Alforins	"Del Pebre"
ONT1	Ontinyent	"Valenciana Rosada"

### Characterization and enhancement of local tomatoes from the Vall d'Albaida

Enhancement of local varieties benefits from their characterization, which allows typification and differentiation from other similar materials. In this way, we have performed a morpho-agronomic characterization of a set of 11 accessions of local traditional tomato from the Vall d'Albaida district: five of "Rosada del Terreny", one of "Del Pebre", four of "Valenciana

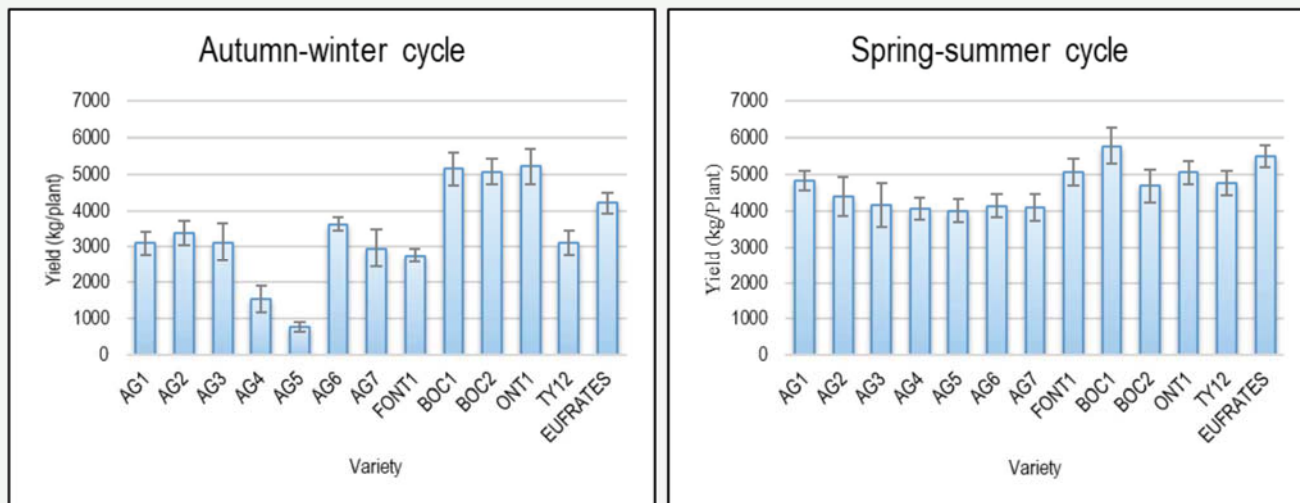
Rosada", and one of "Valenciana" (Table 1; Figure 1). The modern commercial varieties "Euphrates" and "TY12" have been included as controls. The local varieties were cultivated in a mesh greenhouse in two growing cycles (spring-summer and autumn-winter).



**Figure 2.** Group picture of the traditional tomato varietal types from the Vall d'Albaida district used in this work: "Rosada del Terreny" (left), "Del Pebre" (center) and "Valenciana Rosada" (right).



**Figure 3.** Immature fruits of the traditional tomato varietal types from the Vall d'Albaida district used in this work: "Rosada del Terreny" (left), "Del Pebre" (center) and "Valenciana Rosada" (right).

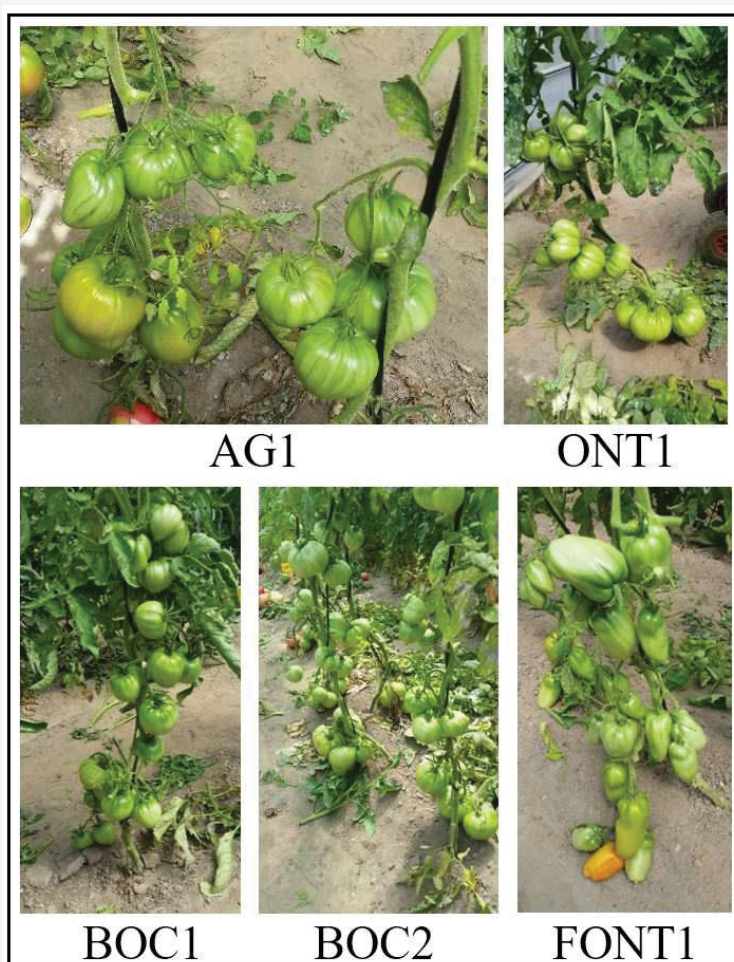


**Figure 4.** Yield ( $\pm$ SE) of the 11 local tomato varieties of the Vall d'Albaida district and the two commercial controls in the autumn-winter and spring-summer growing cycles.

A large morpho-agronomic variation was found among the 11 accessions (Table 1). The highest variability was observed for fruit shape. Varieties AG2, AG3, AG4, AG5, and AG6, are slightly flattened; varieties AG1, AG7, BOC1, BOC2 and ONT1 have a cordiform fruit; and, FONT1 has an elongated fruit. As observed in previous works (Figàs *et al.*, 2015), some morphological features such as the fruit shape, presence of green shoulders, different degrees of fasciation or the presence of green stripes are the most useful when describing and differentiating the local tomato varieties from the Vall d'Albaida district.

Amazingly, most of the varieties evaluated had high yields. Thus, under greenhouse cultivation in the autumn-winter cycle varieties BOC1, BOC2 and ONT1 had yields of around 5 kg/plant, higher than the two commercial controls (Figure 4). Other six varieties (AG1, AG2, AG3, AG6, AG7 and FONT1) had intermediate yields, while the two other (AG4 and AG5) had a comparatively lower yield. In the spring-summer cycle there was less variation among varieties in yield, with all of them (including the controls) being in the range comprised between 4 and 6 kg per plant. These results indicate that local varieties of the Vall d'Albaida have a good performance in the spring-summer season, and even some of them have promising agronomic behaviour in the autumn-winter season. This fact might make it possible to market these varieties throughout the year.

Based on the characterization and yield results, we have selected five local varieties of the Vall d'Albaida (AG1, BOC1, BOC2, FONT1 and ONT1; Figure 5) which might allow a recovery of the local tomato cultivation in this district of the region of València. The results of this work suggest that there are local tomato varieties from the Vall d'Albaida that could be a profitable alternative for the farmers of this inland district of the region of València. The morphological characteristics regarding shape, colour and quality allow a differentiation of these traditional with respect to other varieties. This may contribute to placing a differentiated high quality product in the market, for which the consumer may be willing to pay a price higher than



**Figure 5.** Plants of the varieties from the Vall d'Albaida district AG1 ("Valenciana Rosada"), ONT1 ("Valenciana Rosada"), BOC1 ("Valenciana Rosada"), BOC2 ("Valenciana Rosada"), and FONT1 ("Del Pebre") selected for their morpho-agronomic characteristics and yield.

for standard commercial varieties. This higher price can make an important impact in the economy of farmers from the Vall d'Albaida, especially if associations of farmers, such as those already existing in the village of El Perelló with the "Valenciana" tomato (Soler *et al.*, 2017) or in Alcalà de Xivert with the tomato "De Penjar", are created.

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### References

- Casañas, F., Simó, J., Casals, J., Prohens, J. (2017) Toward an evolved concept of landrace. *Frontiers in Plant Science* 8:145.
- Cebolla-Cornejo, J., Soler, S., Nuez, F. (2007) Genetic erosion of traditional varieties of vegetable crops in Europe: Tomato cultivation in Valencia (Spain) as a case study. *International Journal of Plant Production* 1:113-128.
- Cebolla-Cornejo, J., Roselló, S., Nuez, F. (2013) Phenotypic and genetic diversity of Spanish tomato landraces. *Scientia Horticulturae* 162:150-164.
- Ferrer Ripollés, M.A., Zaragoza Rovira, G. (1980) *El País Valencià*. Ed. Anaya, Madrid, Spain.
- Figàs, M.R., Prohens, J., Raigón, M.D., Fernández De Córdova, P.J., Fita, A.M., Soler, S. (2015) Characterization of a collection of local varieties of tomato (*Solanum lycopersicum* L.) using conventional descriptors and the high-throughput phenomics tool Tomato Analyzer. *Genetic Resources and Crop Evolution* 62:189-204.
- García-Martínez, S., Corrado, G., Ruiz, J.J., Rao, R. (2013) Diversity and structure of a sample of traditional Italian and Spanish tomato accessions. *Genetic Resources and Crop Evolution* 60:789-798.
- Soler, S., Prohens, J., López, C., Aramburu, J., Galipienso, L., Nuez, F. (2010) Viruses infecting tomato in Valencia, Spain: occurrence, distribution and effect of seed origin. *Journal of Phytopathology* 158: 797-805.
- Soler, S., Figàs, M.R., Prohens, J. (2017) I Congrés de la Tomaca Valenciana d'El Perelló. Ed. Universitat Politècnica de València, València, Spain.