Citrus biodiversity in Turkey

Tuzcu O.

in

D'Onghia A.M. (ed.), Djelouah K. (ed.), Roistacher C.N. (ed.).
Proceedings of the Mediterranean research network on certification of citrus (MNCC): 1998-2001

Bari : CIHEAM
Options Méditerranéennes : Série B. Etudes et Recherches; n. 43

2002
pages 37-38

CITRUS BIODIVERSITY IN TURKEY

Ö. Tuzcu
Çukurova University Faculty of Agriculture
Department of Horticulture,
Adana - Turkey

SUMMARY - General figures on citrus production, cultivated land and main growing species in Turkey are given. Citrus biodiversity evaluation in Turkey started with the establishment of 2 collection plots: "Antalya Citrus Research Station" (ATAE) and "Tuzcu Citrus Collection" (TCC). In the latter, composed of 865 genotypes (varieties and rootstocks) of different origin, a molecular characterization was also carried out as well as the assessment of the main diseases.

Key words: *Citrus* and related genera, biodiversity, molecular characterization, Turkey

RESUME - *Des données générales sur la production des agrumes sur les surfaces cultivées et les espèces les plus utilisées en Turquie sont citées. L'évaluation de la biodiversité des agrumes en Turquie a commencé avec l'établissement de 2 parcelles, la collection auprès de la station de recherche sur les agrumes à Antalya (ATAE) et la collection des agrumes Tuzcu (TCC) ; la dernière se compose de 865 génotypes (variétés et porte-greffes) de différentes origines. L'évaluation des principales maladies ainsi qu'une caractérisation moléculaire ont été effectuées sur ce matériel végétal.*

Mots clés*: agrumes et genres associés, biodiversité, caractérisation moléculaire, Turquie.*

Turkey is one of the most important citrus-producing countries in the Mediterranean region. Although Turkey does not represent a natural genetic centre of citrus, there is historical evidence showing that citrus fruits have been known in Turkey for many centuries as citrus growing has been an ancient and traditional agricultural activity especially in the Southern parts of the Taurus Mountains, along the Mediterranean coast.

Turkey has a great potential for citrus growing. Indeed, at present, the citrus plantings cover 80,000 hectares, while the total citrus production equals 1,597,000 tons, including 780,000 tons of orange, 360,000 tons of lemon, 372,000 tons of mandarin and 85,000 tons of grapefruit. In Turkey, 1,035,900 tons are intended for fresh consumption, 105,500 tons for processing and 455,600 tons for export. In total, the Turkish citrus exports come to 102,000 tons of orange, 137,100 tons of mandarin, 153,500 tons of lemon and 63,000 tons of grapefruit.

The main citrus growing regions of Turkey are the Eastern Mediterranean region, the Western Mediterranean region, the Aegean region and the Eastern Black Sea region. The ratio share in the production is as follows: the Mediterranean 85%, the Aegean 14% and the Black Sea 1%. The Mediterranean region is divided into the Western and the Eastern sub-regions. The second one covers 85% of orange, 60% of mandarins, 99% of lemon, 97% of grapefruit and 86% of the total citrus fruit production of Turkey.

Along the Mediterranean and Aegean regions, the climate is typically mild or cool subtropical. In these regions, the special agro-ecological conditions favour the production of high-quality citrus fruits, whereas the best of Washington navel and Shamouti oranges and Kütdiken lemons are produced in Mersin and around Finike, Satsuma mandarins in Gümüldür and İzmir surroundings, particularly suited for fresh fruit markets.

Modern citrus growing in Turkey started in the 1930's. Before 1920, all citrus varieties were called generally by local names. Therefore, the same cultivars were known under different names.

Due to the introduction from different countries and the presence of native selections, citrus displays a wide genetic variability in Turkey. There are two main citrus germplasm collection plots that have an important role in maintaining citrus genetic variability. One of these collections, which represents the first collection plot in Turkey, "*Antalya at Citrus Research Station*" (ATAE), was established in 1933. The first modern citrus varieties were introduced into the country during that period.

The most important citrus germplasm collection, *"Tuzcu Citrus Collection"* (TCC), includes a total of 865 genotypes. These were introduced from different countries and from native selections, obtained via breeding programs and survey works. This collection was established at Çukurova University, Faculty of Agriculture, Department of Horticulture in Adana - Turkey. This is an *ex- situ* collection of 865 accessions of *Citrus* and related genera including *Aegle*, *Aeglopsis, Afraegle, Atalantia, Citropsis, Clausena, Eremocitrus, Glycosmis, Hesperethusa, Microcitrus, Murraya, Pamburus, Pleiospermium* and *Severinia* species. The *"Tuzcu Citrus Collection"* has a great potential in terms of citrus germplasm and indeed, it represents one of the main centres for Citrus research in Turkey.

This collection covers more than 30 hectares and the 865 genotypes include *Aurantioidea* subfamily species as living plants. These genotypes are made of high-quality commercial and non-commercial cultivars and rootstocks and citrus relatives. Among these materials, 436 genotypes were provided by national institutions and 87 genotypes were introduced into the collection by Dr. Tuzcu. The citrus selection and breeding programs were carried out from the Eastern part of the Mediterranean to the Aegean region, and many sour oranges that are more than 400 years old were found. Following the results of morphological and pomological evaluations and of some specific studies, 29 clones within these genotypes, with a diverse genetic structure, were selected.

During the selection and breeding program, surveys were carried out from the Mediterranean region to the Aegean region, showing that, in different provinces of citrus growing areas, the orange selections were introduced from the Western and Eastern Mediterranean regions. The results of selection and breeding for determining high-quality orange cultivars and clones demonstrated that the best orange clones, especially Washington navel and Shamouti oranges, were present in several provinces of the Mediterranean region as for example in Antalya, Mersin and Adana. High-quality lemon clones were found around Mersin in the Eastern Mediterranean region. Moreover, through the Eastern Mediterranean region up to the Aegean region, especially around İzmir, mandarin clones with fruits of high quality and a diverse genetic structure were reported.

Beside selection and breeding programs, new cultivars and rootstocks were obtained by carrying out an hybridisation breeding program. For example, triploid Tuzcu M1 and M2 citranges were found by the hybridization of Alanya Dilimli orange which is the one of the most resistant oranges trees to calcareous soil conditions and *Poncirus trifoliata* Raf. var. 'Yerli'.

In this way, the collection was established with local selections and new hybrids derived from the breeding program, along with materials introduced from different citrus producing areas of the world. This allowed a gathering of high genetic diversity which provides a great opportunity for citrus research works.

Most of the genotypes existing in the collection are free from known diseases and may be used to obtain healthy genetic materials, in view of the free exchange of healthy citrus biodiversity.

At present, the "Tuzcu Citrus Collection" has first of all a conservation role and it also provides an opportunity for citrus research projects. For example, to detect differences and relationships among these genotypes and also genetic structures and to identify true-to-type citrus varieties among the existing cultivars, an isoenzymes and RFLP analysis program has been undertaken in the framework of a collaborative study between Çukurova University and CIRAD (France). Molecular marker techniques will be applied to assess the characteristic structures of Citrus germplasm at a molecular level and to obtain data which can be used for taxonomic and breeding studies. Furthermore, a number of Master thesis and experiments on the adaptation of several cultivars and rootstocks, investigations into different growing techniques and the effects of different rootstocks on fruit quality, yield, size, juice content were conducted to provide detailed information on this collection materials.

Efficient co-ordination of the works on the best conservation and utilization of citrus genetic resources throughout the Mediterranean can be obtained in the framework of MECINET under the aegis of the FAO.