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National programme for the production of certified citrus plants in Tunisia

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SUMMARY - A brief outline on the existing programme for the production of certified citrus in Tunisia is given. A project was worked out to clean citrus material from tristeza, psorosis, stubborn and viroid diseases by the use of shoot-tip grafting. Citrus tristeza virus (CTV) was never found during a monitoring survey in citrus commercial orchards.

Key words: citrus, viruses, virus-like, certification, project, Tunisia

RESUME *- Un bref aperçu est donné du programme actuellement en cours pour la production d'agrumes certifiés en Tunisie. Un projet a été élaboré pour débarasser le matériel agrumicole de la tisteza, de la psorose, du stubborn et des maladies à viroïdes en utilisant le micro-greffage. Le virus de la tristeza des agrumes (CTV) n'a jamais été détecté pendant les prospections réalisées dans des vergers d'agrumes.*

Mots-clés: *agrumes, virus, virus similaires, certification, projet, Tunisie*

Introduction

Citrus plantations in Tunisia are concentrated in areas near the Mediterranean coast which enjoy a temperate climate and where rainfall is higher. But as rainfall range only from 300 to 500 mm per year, artificial irrigation is used in most orchards.

The total surface area given over to citrus is about 13,200 Ha, the major part of which is located in the Cap Bon area.

The average annual production has improved during the last decade (1982-1991), increasing from 188,000 to 240,000 tons with average yield increase per Ha from 14 to 19 tons. This production improvement is mainly due to the supply of irrigation water from the North to citrus areas.

The following citrus are grown:

-	Sweet orange: Maltaise (46.9%), Navel (5.8%), Valencia late (2.6%) etc.	18,1%
-	Clementine	16,6%
-	Mandarin	6,2%
-	Lemon	5,6%
-	Sour orange	3,6%
-	Others	3%

Exportation starts normally in the month of January and covers about 20% of the production. Exports are mainly represented by Maltaise orange and are directed to France.

Compared to those of developed countries, yields still remain low. The 8th Agricultural Development Plan (1992-1996) quotes as main objective an average production of 270,000 tons. In order to attain this production level, it is necessary to improve the management of orchards and mainly to rejuvenate the old plantations as well as to extend the citrus acreage by establishing high quality plants. It is important to point out that not all the planting material produced by nurserymen in Tunisia comes from virus-free budwood and sometimes it is not true-to-type.

In addition, the National Mother Block, planted during 1974-1976 from varieties selected by INRAT, was not phytosanitarily controlled. Therefore, the propagation of such a material has caused the spread of many virus, virus-like and fungal diseases.

Production of certified propagating material

Until 1993, there was no strategy for the production of certified citrus plants free of virus and virus-like diseases. Nevertheless, Tunisia has not only research institutions and extension services working in the citrus sector but also disposes of true-to-type planting material. The main actions undertaken during the 80's, for the sanitation of Tunisian commercial varieties, have not shown positive results, given the lack of human and material resources. In 1993, a National Programme of Citrus Sanitation was worked out in collaboration between INRAT, GIAF (Groupement Interprofessionel des Agrumes et des Fruits), the PNUD/FAO Project RAB/88/025 and the General Direction of Agricultural Production (DGPA). This project aims at cleaning the main Tunisian citrus varieties from virus and virus-like diseases and to provide nurserymen and growers with clean propagating material.

The main objectives are summarised as follows:

1) Sanitation of the main commercial varieties by heat therapy and shoot-tip grafting through the:
   - selection of mother trees in the collections of INRAT and the National Foundation Block. This selection includes the following varieties: Maltaise sanguine, Washington Navel and Clementine.
   - indexing of selected mother plants for the main virus and virus-like diseases (tristeza, psorosis, stubborn and viroids) by the use of (i) serological tests (ELISA) for CTV detection; (ii) PAGE techniques for exocortis (CEVd) and cachexia (CCaVd) viroids; (iii) biological indexing in greenhouse for the detection of psorosis, stubborn and tristeza diseases.
   - sanitation of selected varieties by thermotherapy and shoot-tip grafting;
   - sanitary evaluation of the shoot-tip grafted plants.
2) Production of planting material true-to-type and free of virus and virus-like diseases by the establishment of:
   - two repositories at INRAT for the production of pre-basic (3 to 5 plants per variety) and basic plants (10 -12 plants per variety).
   - a foundation block for multiplication in G.I.A.F. under the control of D.G.P.A. that will provide budwoods to nurserymen for the production of certified plants virus – tested.
3) Introduction of new varieties and rootstocks to increase the range of varieties in Tunisia in order to cover a larger period of production and to develop exportation. To reach this objective, a repository of new varieties adapted to Tunisian conditions was established at INRAT.

Virus and virus-like diseases of citrus

The work began in 1993 by the symptomatological control and is now confirmed by ELISA tests and biological indexing.

- **Psorosis complex.** Psorosis A bark scaling was observed on Maltaise and Valencia late orange; concave gum and blind pocket are frequent on the Common mandarin and clementine.
- **Stubborn.** This disease, caused by *Spiroplasma citri*, was observed on Valencia late, Meski and Washington Navel oranges.
- **Cachexia xyloporosis.** This disease, caused by a viroid, is frequent in Tunisia. It is mechanically transmissible and induces stem pitting in the trunk of infected trees, above or below the bud-union, according to the position of the susceptible variety. It was observed on Arbi mandarin and clementine.

- **Exocortis.** Since no exocortis-untolerant rootstocks are used in Tunisia, this disease does not show symptoms. By means of biological indexing on Ethrog citron 861-S1, its presence in citrus orchards was demonstrated.
- **Infectious variegation and leaf rugose.** Symptoms of these two diseases were observed in Eureka lemon and sometimes in Washington Navel orange.
- **Tristeza.** One of the most important objectives of the Project RAB/88/025 is to control the presence of CTV in the Region. Since 1993 the Virology laboratory of INRAT is conducting a large survey at the Bank of Germoplasm and in the commercial orchards. Until now, no positive samples have been found.