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Franck N.

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N. Franck

Centro de Estudios de Zonas Áridas, Facultad de Ciencias Agronómicas, Universidad de Chile (Chile)

Abastract. The pomegranate plantations in Chile have increased exponentially in the last decade taking fresh pomegranate exports from 200 t/year in 2007 to 2500 t/year in 2010. Practically 100% of the pomegranate production in Chile was based on the Wonderful variety which fulfils the requirements of intense red colour of the skin and the flesh inside demanded by the destination markets supplied by Chile: Europe and Russia. This flourishing industry in Chile has faced several challenges related to appropriate planting areas, growing and post-harvest techniques for fruit destined for export and industrialisation and to the large proportion of fruit unsuitable for export. The presentation will detail these challenges as well as the technical advances in cv. Wonderful growing that have been made thanks to the collaboration between producers, exporters and research centres in Chile.

Keywords. Chile – Growing – Wonderful.

I – Introduction

Chile started producing and exporting a limited amount of cv. Wonderful fresh pomegranates to the European market fifteen years ago. Ten years went by before the export, and companies involved in exporting pomegranates exponentially increased (Fig. 1), encouraged by the burst in the demand for red pomegranates by the European markets. Such increase in exports was sustained by a boom of pomegranate plantations in Chile, reaching a total of 724.6 ha in the country, according to the last data available (Table 1). This trend continues nowadays, especially with the recent opening of the United States market in 2010 (system approach), therefore the actual area planted with pomegranates in Chile is very likely well above this figure. Until now, virtually all of the plantations of pomegranates in Chile have continued to be of the cv. Wonderful which fits the market requirements, namely: deep red colour of skin and arils and large size. Although this late ripening cultivar reaches high yields in other countries, in Chile yields tend to be relatively low (15-25 t ha^{-1}). Such low yields are attributable to an inadequate initial knowledge about the edapho-climatic requirements of the crop and its technical management. Because of the high market prizes commanded by Chilean pomegranates until 2010, growing pomegranates under sub-optimal climatic conditions and applying inadequate orchard management still resulted in positive economic outcome. This scenario is slowly changing with the concurrence of Peruvian pomegranates and the exponential increment in the offer of Chilean fresh pomegranates (Fig. 1).

II – Growing Wonderful pomegranates in Chile: Achievements and challenges

In Chile the pomegranate industry has been developed both by the private sector and through research and development projects executed by the University of Chile (UCH) in collaboration with several growers and agro-industries and co-financed by governmental agencies such as INNOVA-Chile, FIA (Fundación para la Innovación Agraria) and FONDEF (Fondo de Fomento al Desarrollo Científico y Tecnológico).

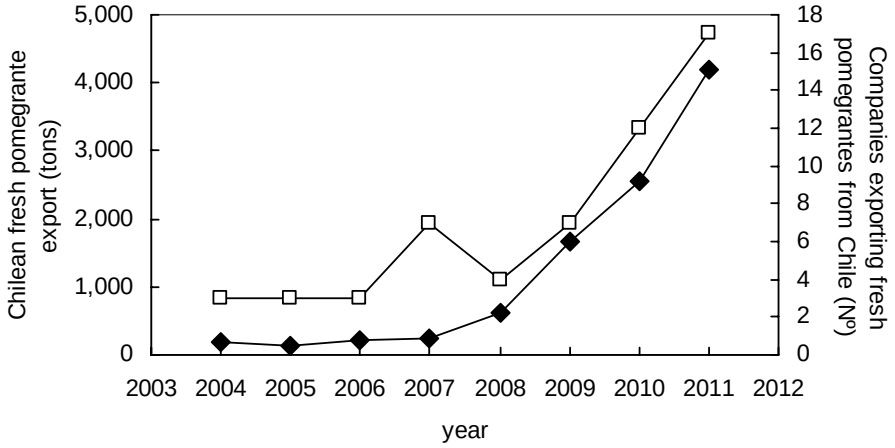

Fig. 1. Amount of fresh pomegranates exported from Chile between 2004 and 2011 and number of companies exporting them.

1. Optimal production zones

Many plantations of Wonderful pomegranate orchards in Chile have been placed in zones with sub-optimal climatic conditions, such as high autumn rain probability (Regions south of Valparaíso) which fall before the harvest of this late cultivar has been completed (or even initiated) resulting in a high incidence of fruit cracking. Also plantations near the coast, with milder summer and winter temperatures and frequent foggy days in spring, have shown to be inadequate for fresh pomegranate production. In this zones bloom, and consequently harvest, tend to spread in time, resulting in a significant proportion of fruit that does not fulfil its ripening process or develops very poor skin colour. Moreover, the incidence of fungal disease affecting the fruit, due to infections promoted by condensation during bloom, severely increases under costal climatic conditions of Chile. We now know that the best conditions for growing pomegranates in Chile are in the interior of the transversal valleys (Andes foothills) of the northern cultivation zones: especially the Atacama and Coquimbo Regions, which therefore concentrate 83% of the country's pomegranate production area (Table 1). These zones present long, dry and hot summers, high solar irradiance, slightly colder winters and nights than coastal regions; and dry spring and autumn, which all favour the production of high quality fresh pomegranates.

Table 1. Distribution of pomegranate plantations (ha) in different administrative Regions of Chile. Number between brackets indicates the year for which the data were obtained

Region (from north to south)						
Atacama (2011)	**Coquimbo (2011)**	**Valparaíso (2008)**	**Metropolitana (2010)**	**O'Higgins (2009)**	**Maule (2007)**	**Country (Total)**
215.5	387.7	22.8	72.7	10.5	15.4	724.6

2. Orchard management

Through a project co-financed by INNOVA-Chile several orchard management practices have been studied in commercial farms of growers associated to the project. The results have

allowed constructing the seasonal macro-nutrient extraction curves of new and producing pomegranate orchards under the local conditions. The irrigation requirements, along with periods in which controlled water deficit can be applied have also been quantified in this project. The adjustment of fruit load and its effect on fruit size, yield and the incidence of biennial bearing have also been established. Chemical thinning trials for reducing the presence of late fruits, which do not achieve adequate size and colour, have given interesting results indicating that ethephon sprays in late bloom efficiently thin out such fruits and may also contribute to a better red-colour development of the fruit skin. Trials for limiting sun scald damage to fruits have shown that the use of shading nets and paper bags most efficiently reduce this problem, as compared to different doses and frequencies of kaolin sprays.

3. Challenges

Planting frames and orchard design vary widely in Chile with frames ranging from low (4 x 6 m) to high (2 x 3.5 m) density plantations with trees formed to spindles, open vase and multi-trunk shapes. Trellising systems also vary from none to the use of sophisticated multi wire trellises. Although trials for assessing these different orchard designs have been initiated, they need to be evaluated in the long term. Control strategies for diseases, mainly fungi affecting the fruits in postharvest and quarantine plagues such as mealy bugs remains to be developed. The loss of exportable fruits to fruit cracking and sun scald as well as mechanical damages can account for more than 40% of the whole production in many orchards in Chile. Methods for controlling and preventing such damages are urgently needed and are currently being studied. A project involving the Chilean fruit growers association (Fedefruta), the agriculture and animal husbandry service (SAG) and UCH; and financed by INNOVA-Chile will attempt to tackle these challenges. The development of alternatives for adding value to pomegranates, mainly arils and juices, is also currently being developed by the industry and the UCH and should be able to absorb the fruit not achieving fresh fruit market requirements. The use of new varieties has also been undertaken and should enlarge the production area and harvest season in Chile.

III – Conclusions

The best areas and basic techniques for growing pomegranates in Chile have been developed in a collaborative effort of growers, the UCH and government funding agencies. Some aspects such as orchard design, pest, disease, sun scald and fruit cracking control remain to be developed. The technology transfer of the results generated in the abovementioned research and development projects is an important challenge for the future success of Chilean pomegranate industry.

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