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Analysis of the production structure and crop costs of pomegranates in Spain

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Abstract. The importance of the pomegranate is growing with increasing worldwide consumer demand, which is stimulated due to this fruits are considered a functional food, its technological improvements in processing and conservation and a wide range of new industrial uses of the fruit (packed arils, juices and extracts). The increased significance of this fruit in world trade is stimulating improvements in farming techniques and commercialization. This paper reviews the production structure of pomegranates in Spain, highlighting both the more favorable and limiting aspects. An analysis of the costs of pomegranate production at representative farms in Alicante province has been performed in order to identify more direct inputs into the economy of the farms which can contribute to their viability and continuity in the medium term. The first finding to be emphasized is that variable costs alone account for over 80% of total costs. Labor is the largest cost (over 32% of total costs), mainly due to the operations of pruning, thinning and harvesting. The irrigation water cost is over 17% due to the high average price of this natural resource in the area. The current average prices in the two main Spanish pomegranate varieties ('Mollar de Elche' and 'Valenciana') exceed the minimum threshold to offset the costs.

I – Introduction

Pomegranates (*Punica granatum* L.) are one of the traditional fruits cultivated in Spain, where Alicante province stands out over the rest with 84% of the surface and 90% of national production. Spain is the largest European Union exporter of pomegranates. The importance of the crop is growing with increasing worldwide consumer demand, which is stimulated by several factors: (i) pomegranates are considered a functional food; (ii) technological improvements in processing and conservation; and (iii) a wide range of new industrial uses of the fruit (packed arils, juices and extracts). The increased significance of this fruit in world trade is stimulating improvements in farming techniques and commercialization. This paper reviews the production structure of pomegranates in Spain, highlighting both the more favorable and limiting aspects. The paper concludes with an analysis of the costs of pomegranate production at representative farms in Alicante province, in order to identify more direct inputs into the economy of the farms which can contribute to their viability and continuity in the medium term.

II – Commercial production structure and status of the Spanish pomegranates

Spain cultivated 2,387 ha of pomegranate groves in 2008, of which 84.4% were concentrated in Alicante province, especially in the Bajo Segura and Bajo Vinalopó areas (MARM, 2011). Commercial pomegranate orchards in Alicante province increased in the first half of the 20th century. For example, only 1,207 ha (69.4% of national total) of pomegranate orchards were

cultivated in Alicante province in 1940. The 20,890 tons produced in Alicante in 2008 represented just over 90% of the total (Fig. 1). Spain is currently Europe's largest producer, highlighting its good export potential (more than 50% of its total production). Germany, England, Holland, France and Italy are the most significant destinations of Spanish pomegranate exports.

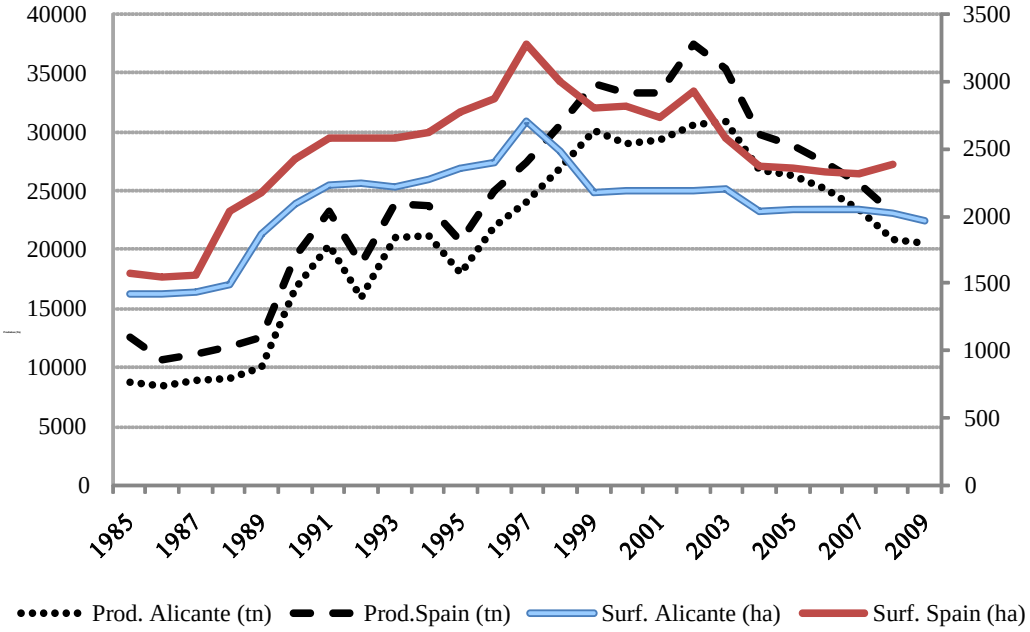

Fig. 1. Pomegranate surface and production in Spain and in Alicante province. *Source: MARM, 2011.*

An important factor in renewing the Pomegranate production system is the implementation of efficient irrigation systems, since fresh water is a scarce natural resource. During the last decade, drip irrigation was implemented in many farms to replace flood irrigation, although in 2004, 83% of the pomegranate groves were still irrigated by flooding techniques.

Some unfavorable aspects of the production structure include the advanced age of farmers, the lack of generational change and the structure of small farms, with an average plot size of about 1.4 ha.

Strengths that characterize pomegranate cultivation in Spain include: (i) recent crop research and technological developments; (ii) drip irrigation expansion; (iii) provision of cold storage; (iv) post-harvest improvements to extend the traditional campaign; and (v) good network logistics and commercial-producing regions.

III – Analysis of production costs

Production cultural operating costs for pomegranate trees has been taken from data collected by a survey of farms in the main pomegranate producing municipalities in Alicante province

(Elche, Albatera and Crevillente). After reviewing the usual workplan of crop farms, each of the inputs used have been economically quantified. Calculation methodology has followed the pattern of budget enterprise (Caballero *et al.*, 2004). Table 1 specifies the cost of producing a hectare of pomegranates ('Mollar of Elche' cultivar) in mature orchards at a spacing of 5x4 m. This variety is harvested beginning in October. The farm of reference has a production area of five hectares with irrigation infrastructure and vehicles compatible with this size. The cultural practices represent products and materials considered typical of a well-managed orchard in the region. Drip irrigation is applied, with an average amount of 4,800 cubic meters of water. The growers distribute the fertilizer through the irrigation system. Although it is a family farm, crop management is professional; this is the reason why all labor has been computed at market price. The share of national insurance cost is included in Insurances (section 2.4).

Table 1. Spanish pomegranate production costs in 2011[†]

	Cost (€/ha)	**% of total costs**
1. Variable costs (VC)	**5875.46**	**80.9**
1.1. Irrigation water	1201.75	16.6
1.2. Fertilizers	1110.00	15.3
1.3. Insecticides, fungicides, herbicides and traps	544.90	7.5
1.4. Variable costs of owned machinery	602.61	8.3
1.5. Total manual labor cost	2288.20	31.5
1.6. Rental of machinery and labor to blend the trimings	128.00	1.8
2. Fixed costs (FC)	**1110.29**	**15.3**
2.1. Fixed costs of owned machinery	275.85	3.8
2.2. Amortization of the planning cost	144.00	2.0
2.3. Amortization of installations (irrigation systems and permanent installations)	216.00	3.0
2.4. Taxes and insurance	474.44	6.5
TOTAL COSTS WITHOUT OC (1+2)	**6985.75**	**96.2**
3. Opportunity costs (OC)	**275.51**	**3.8**
3.1. Capital interest of the planting cost	72.00	1.0
3.2. Capital interest of current assets	117.51	1.6
3.3. Capital interest on installations (irrigation systems and fixed installations)	86.00	1.2
TOTAL COSTS WITH OC (1+2+3)	**7261.26**	**100.0**
Cost per Kg without opportunity costs (Profitability threshold for net margin)	0.35	
Cost per kg with opportunity costs (profitability threshold for profit)	0.36	

[†]Farm of reference: 'Mollar de Elche' variety, 5 ha, drip irrigation. Average production of reference: 20,000 kg/ha.

The first finding to be emphasized is that variable costs alone account for over 80% of total costs. Labor is the largest cost (over 32% of total costs), mainly due to the operations of pruning, thinning and harvesting in particular, as well as work performed by the employer. The irrigation water cost is remarkable due to the high average price of this natural resource in the area. In addition, there are outstanding costs charged to the machinery itself and the burden of social security contributions on the labor required.

The final figures also include minimum thresholds of profitability, based on an average production of 20,000 kg/ha. The average price per kilogram must exceed 0.35 Euros in order to offset the variable and fixed costs (the threshold for profit), and a price of 0.36 Euros per kilo is required to compensate for all costs, including the opportunity costs.

IV – Conclusions

The current average prices in the two main Spanish pomegranate varieties ('Mollar de Elche' and 'Valenciana') exceed the minimum threshold to offset the costs, which allows an optimistic vision of the pomegranate future over the short term. The optimization of water, fertilizers, and the degree of increased mechanization of this crop will remain essential elements to keep costs at acceptable levels, especially if they have to compete with pomegranates from the southern Mediterranean countries which operate with lower costs. We will face new business challenges that Spanish pomegranate production must meet. Farmers must continue efforts to improve production, optimize all cultural practices and control all aspects which could increase production costs.

References

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