RESEARCH ARTICLE

The competitive advantage of the Tunisian palm date sector in the Mediterranean region

Rihab Ben-Amor[1,2], Encarnación Aguayo[2] and M. Dolores de Miguel-Gómez[1]*

[1] Universidad Politécnica de Cartagena, ETSIA, Departamento de Economía de la Empresa. Paseo Alfonso XIII 48. 32003 Cartagena (Murcia). Spain.
[2] Universidad Politécnica de Cartagena, ETSIA, Departamento de Ingeniería de Alimentos y del Equipamiento Agrícola. Paseo Alfonso XIII 48. 32003 Cartagena (Murcia). Spain.

Abstract

In Tunisia, date-palm cultivation and production are of clear strategic importance in terms of economic, social and environmental development. However, the globalization of markets has had a huge impact on the traditional concept of the comparative advantage enjoyed by Tunisia in date exports, highlighting the necessary determinants for competitiveness in the international scenario. In fact, an analysis of the competitive advantage of the Tunisian date industry in the Mediterranean area and Iran over the last 20 years shows that Tunisia is still the main supplier of dates to the EU. The Deglet-Nour variety, in particular, puts Tunisia ahead of traditional competitors such as Algeria and Iran, with average of competitiveness indices as BIS 6405.99, DI 17.38, CMS 41.04 and TBI 99.50 are more stable than those countries during the studied period. But it is currently facing new competitors like Israel and re-exporting countries like France. New business strategies (conditioning, new non-chemical treatments, packing, opening new markets, new distribution channels) would be positive responses to tackle current market limitations, the emergence of new producers and restrictive EU policies.

Introduction

The foreign trade policy in Tunisia has been marked by two events: accession to membership of the World Trade Organization (WTO); and the Free Trade Agreement with the European Union (EU) in 1995. Within this context, the food industry has been facing new challenges arising from free trade and greater access of the Tunisian economy to the rest of the world. This has led companies in this sector to improve both their performance and competitiveness.

The agricultural and food policy in Tunisia has focused, on the one hand, on intensifying agriculture, improving irrigation, water infrastructure and water supplies and, on the other, on intensive use of inputs (equipment, chemical supplies, seeds and improved varieties, etc.). These efforts have focused on the maximization of production, thus agricultural activities were first carried out according to national guidelines and objectives of self-sufficiency in terms of food, and subsequently food safety, by supporting production prices and subsidizing most agricultural inputs (AfDB, 2012).

In their work Laajimi *et al*. (2012) explained that the approach to liberalization of the economy has not achieved the desired impact in either terms of institutions or behavior of the key characteristics of the Tunisian economy. Also, a simple analysis of export distribution shows that the main target is the Euro-Mediterranean area, especially the EU. In fact, more

than 3/4 of total Tunisian agricultural exports are destined to Italy, Spain, France and Germany. This situation has been achieved due to the multitude of trade agreements signed by Tunisia (EU in 1995; WTO in 1994; Great Arab Free Trade Area (GAFTA) in 1995; European Free Trade Association (EFTA) in 2005; Agadir in 2007). Clear examples are the case of olive oil, seafood and dates, which are considered strategic sectors of the national economy.

Globalization has made companies worldwide more competitive. Omoregie & Thomson (2001) informed that competitiveness is a relative concept; therefore there is a need for a measurement framework that will help to systematically evaluate all comparable factors thought to be relevant in the pertinent economic activities. This concept can be analyzed through competitive advantage, in this line; this work proposes to study the competitive position of a strategic sector in the Tunisian economy as palm date sector.

In 2011, seven million tons of dates were produced worldwide (compared to 5 million in 1999) of which 2.5% correspond to Tunisia, where production reached 180,000 tons. This makes Tunisia the ninth largest producer in the world, and the third in the Mediterranean after Egypt (the largest producer in the world with 25%), and Algeria.

The economic importance of date-growing in Tunisia is reflected in the date-growing area, which covered over 51,000 hectares in 2011 (Siddiq *et al.,* 2013). This extension has been steadily increasing over the past 20 years, doubling between 1990 and 2010, and is the sixth most widespread area in the world, after Saudi Arabia, Algeria, Iran, Iraq and Morocco (Fig. 1a).

Date palm sector in Tunisia is of clear socio-economic importance, as the sector forms an important part of the food trade balance. It is also a source of income for farmers in southern Tunisia and plays a strategic social role in balancing production systems in the oasis. In Tunisia, the date-growing sector accounts for 4% of total agricultural production, 7% of plant production and 12% of agricultural exports. There are about 5.4 million date palm-trees and approximately 50,000 farmers are employed, spreading over four production areas: Tozeur, Kebili, Gafsa and Gabès (GI Fruit, 2008).

Tunisia is considered leader in the production and export of cv. Deglet-Nour (APIA, 2008), which has specific organoleptic characteristics (flavor, color, texture...), with over 73% of its production, and over 85% of exports. This cultivar is *par excellence* the most marketed in Europe, since about 90% of dates imported to the EU are 'Deglet-Nour', and 90% of these are imported from Tunisia and Algeria. The latter is Tunisia's main competitor, with the remaining 10% being supplied by Israel and the USA, emerging producers of this variety.

APIA (2008) divides the competing countries of Tunisia into three categories: (i) non-traditional producers that have developed an integrated agro-industry, such as Israel, Palestine and the USA; (ii) re-exporters, which add value to the low-cost imported product, basically France, Italy, Spain, Netherlands, Germany, United Kingdom and Switzerland; and (iii) traditional producers of 'Deglet-Nour', like Algeria.

Tunisia is in the best position in terms of quantity of exports and related income. But this is not so in product valuation, as it is positioned after the re-exporting countries, such as USA and Israel or Palestine (APIA, 2008).

FAO (2000) reports that countries wishing to develop their 'Deglet-Nour' exports to Europe come into competition with well-established and strong suppliers. As already mentioned Tunisia has the highest market share and is the undisputed leader. Despite this strong appearance, there are structural weaknesses, including the disruption of its trading system and the inconsistent quality of the packaged product, as well as a high rate of product infestation (APIA, 2008; Jemni *et al.,* 2014).

This is noteworthy, given the importance of this sector in the Tunisian economy in terms of export incomes as dates represent the second flagship product after the olive oil (FAO, 2000). However, it should be noted that there are currently various technical problems including pests and diseases, which are a major threat to the sector. The carob moth, *Ectomyelois ceratoniae*, is by far the most important problem faced by Tunisian 'Deglet-Nour' production and export. For decades, methyl bromide has been the only fumigant for quarantine pests. Because of its harmful effect on human health and the environment –identified as harmful to the ozone layer by the Montreal Protocol (PNUMA, 1992)– its use is restricted, thus there is an urgent need for new treatments and alternative techniques (Ahmed, 2001; Likhayo *et al.,* 2014).

Given the importance of palm date sector in the Tunisian economy and the different technical problems that limit its trading system, we analyzed Tunisian competitive position of this sector in relation to its main competitors in the Euro-Mediterranean area and Iran, insomuch as more than 88% of production and 70% of world trade take place there. This analysis examines competitiveness in terms of price and competitiveness not price, determined by the degree of specialization and dependence, trade balance, analysis of market share, quality, national efforts and product differentiation.
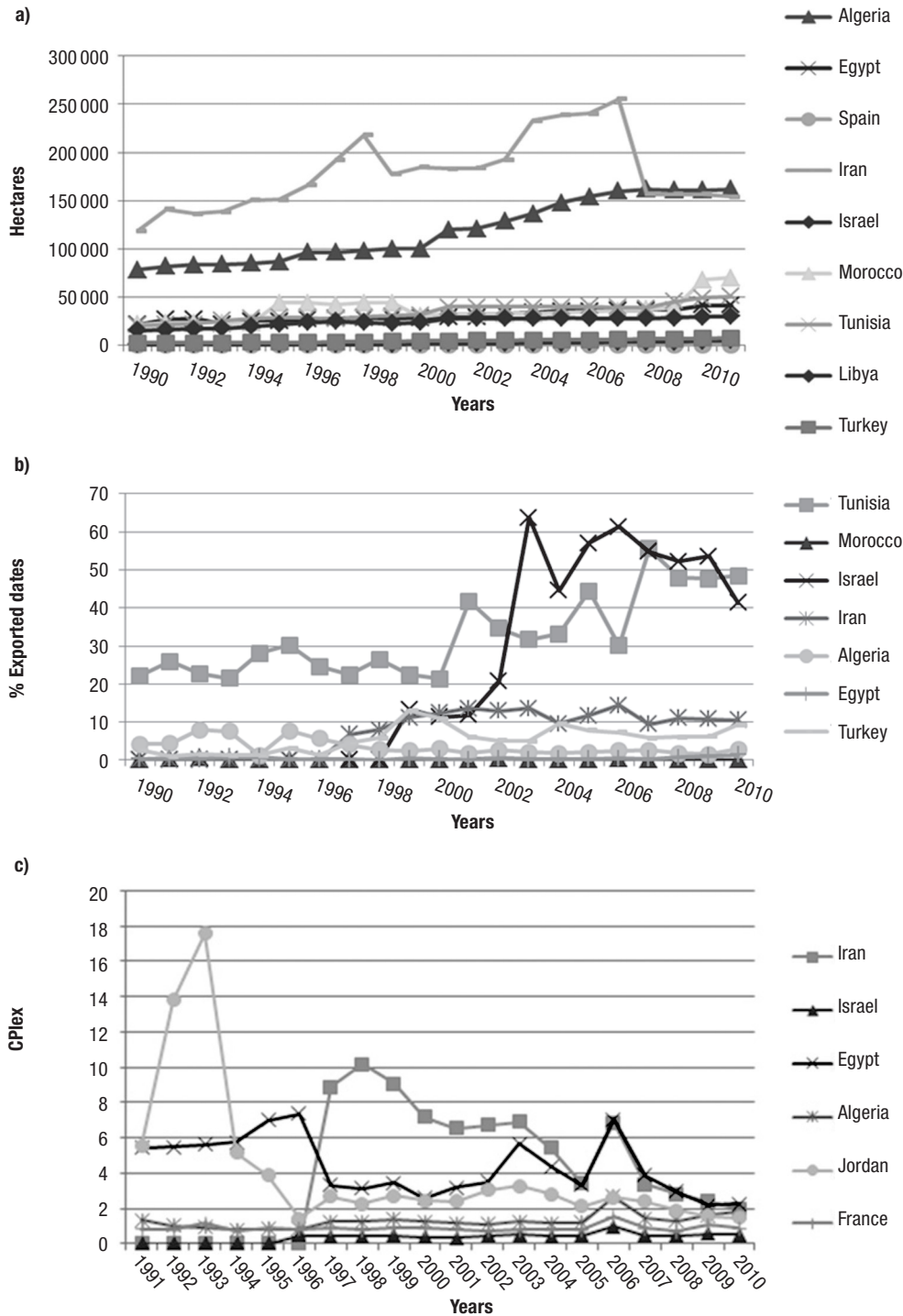
Figure 1. a) Evolution of dates harvested area; b) export performance of major countries; c) export competitive price index of dates in Mediterranean countries. Source: FAOSTAT (2014) (www.faostat.org).

Methodology

Asche *et al*. (2005) reported that on microeconomic theory one assumes that there exists a market constituted by a group of commodities. The commodities compete in the same market when the goods are substitutable for the consumer or the producer, which is the case of palm date fruit, in the Mediterranean area.

Economic competitiveness indices:

— *Balassa's revealed comparative advantage index (RCA)*. Liesner (1958) was the first to use RCA, but it was Balassa (1965) who improved it, and its subsequent dissemination in 1989 made it the most commonly used and, thus, it became known as the "Balassa index". This index basically measures normalized export shares of

a country *i*, compared to exports of the same industry in a group of reference countries. The concept of "revealed comparative advantage" is widely used to determine the weak and strong sectors of a country. Porter (1990) used a Balassa index >1 (100), in some cases reinforced with a Balassa index >2 (200), to identify the strongest sectors of a country's economy. Meanwhile, Vollrath (1991) suggested three alternative ways of measuring the RCA of a country: (i) the relative trade advantage, which considers both imports and exports, (ii) the simple logarithm of the relative export advantage (lnRXA); and (iii) the revealed competitiveness (RC), defined as the difference between the lnRXA and the logarithm of the relative import advantage (Fertö & Hubbard, 2003).

Balassa (1965) defined the RCA or specialization index as the ratio between exports of certain product *j* of a country and total exports of this country to the rest of the world (or the geographical area taken as a reference), and world exports (or geographical reference area) of the same product *j* of the total world exports (or of the geographical reference area) (Vollrath, 1991; Bojnec, 2001). Among other studies, the RCA of Blázquez-Lidoy *et al*. (2006), is named the Balassa Index of Specialization (BIS), measuring the degree of specialization of country *i* for product *j*.

In this research we used the classic model of Balassa, to analyze the commercial development of dates from the viewpoint of specialization through the comparative advantage in exporting. This decision is in accordance with Chudnovsky & Porta (1990), who recommend using it, simply as an indicator of an economy's, specialization in international trade at any given time.

The Balassa RCA is defined as:

$$RCA_{ij} \ or \ BIS_{ij} = \frac{\left(x_{ij} \middle/ \sum x_j \right)}{\left(x_j \middle/ \sum x_j \right)} \qquad [1]$$

where x_{ij} represents exports from country *i* for product *j*; $\sum x_j$, represents exports of all products of country *i*; X_j represents exports of product *j* in a reference area; and $\sum X_j$, represents exports of all products of the reference area.

This index varies between 0 and + ∞, values <200 indicate that country *i* is relatively less specialized in the sector *j* than the reference area, or is at a disadvantage compared to the reference area. For values >200, we can say that participation of the sector *j* in the structure of exports from country *i* is higher than that observed in the reference area, whereby one can state that the said country is strongly specialized in this sector.

— *Dependency ratio (DR)*. Parallel to the BIS, the DR for the imports of sector *i* from country *j* is the ratio between the imports of this sector with respect to total imports, considering this relationship with the ratio between the imports of that sector and total imports of the reference area, also called the relative advantage of imports by Vollrath (1991).

Thus, one can compare the structure of imports of a country within the reference area. If it is >100 for sector *i*, one can say that participation in the said sector in the structure of imports of country *j* is higher than that observed in the reference area.

$$DR_{ij} = \frac{\left(m_{ij} \middle/ \sum m_j \right)}{\left(M_j \middle/ \sum M_j \right)} \times 100 \qquad [2]$$

where m_{ij}, represents imports from country *i* for product *j*; $\sum m_j$, represents imports of all products from country *i*; M_j, represents imports of product *j* in the reference area; and $\sum M_j$, represents imports of all products from the reference area.

This index does not have to be correlated with the specialization index of RCA, since there is no relationship between the two indices (Martínez-Sánchez, 1994).

— *Constant market share (CMS)*. Is an approach that analyzes trade patterns and trends in order to formulate policies, the technique identifies the factors underlying the results of comparative export of a country (Ahmadi-Esfahani, 2006). This method disaggregates trade data of the countries surveyed and compares trade flows around the world.

The traditional CMS model was first applied to studying international trade by Tyszynski (1951). Other studies continued using this model despite the well-documented problems (*e.g.,* Richardson, 1971a,b; Jepma, 1986; Oldersma & Van Bergeijk, 1993).

$$CMS_{ij} \ or \ PM_{ij} = \left(\frac{x_{ij}}{x_m} \right) \times 100 \qquad [3]$$

where X_{ij}, represents exports from country *j* of product *i*; X_m, represents exports of the geographical area taken as a reference of a product *i*.

— *Competitive price index (CPI)*. This index of price competitiveness and export performance, also known as the trade-weighted currency index, attempts to measure trends or competitiveness of product price from a particular country worldwide. These indices incorporate information on developments in domestic currency, price of the products exported by the country, as well as trends in the exchange rate.

Since these indices compare prices from one country to others, one must select the area for which they are

calculated. In general, it is advisable to select an area that is representative of the true competitors of the country.

The same index is applied to the prices paid to the farmer and is called the producer's CPI, so the competitive price index of country i over a competitor j is defined as price, but in this study we only analyze the producer's CPI:

$$CPI_{ij} = \left(\frac{e_j}{e_i}\right) \times \left(\frac{PX_i}{PX_j}\right) \qquad [4]$$

where CPI_{ij}, is the competitive price index of country i over competitor j; e_j, the exchange rate of country j to the US dollar; e_i, the exchange rate of country i to the dollar; PX_i, the price of reference country i of a product; and PX_i, the price of the competing country j of the same product.

In this study, we work with data of updated FAO prices in a single currency (US$), from which the CPI are calculated from the producer and exporter price given by FAO, without applying the exchange rate. Thus is defined the:

— *Export competitive price index (CPIex)*. Relating export price of the reference country to export prices of its competitors converted to a common currency and converted to 100 as the reference year.

Whereby, in this case, the above equation is reduced to the following equation:

$$CPIex_{ij} = \left(\frac{PX_i}{PX_j}\right) \qquad [5]$$

According to the formula used to construct the indices, an increase (or decrease) of the same indicates a real appreciation (or depreciation) of the currency of the country under study and, therefore, a deterioration (or improvement) of the said country's external competitiveness with respect to the geographical area of reference.

This index of price competitiveness and export performance relates the export price of country i for a given product, with the export price of its competitors for the same product, but first converts these prices into a common currency and on the basis of 100 in a given year. To calculate this CPIex, more countries must be included in the analysis, such as the re-exporting countries and non-producers.

— *Trade balance index (TBI)*. It is employed to analyze whether a country has specialization in export (as net-exporter) or in import (as net-importer) for a specific group of products. Lafay (1992) used TBI to measure RCA. More recently, in 2010, TBI was used by Widodo (2009) as one of the crucial variables for analyzing the catching-up economies comparative advantage.

The TBI value indicates a qualitative structure of product export and import and trade flows. It is formulated as follows:

$$TBI_{ij} = \left[\left(\frac{X_{ij} - M_{ij}}{X_{ij} + M_{ij}}\right)\right] \times 100 \qquad [6]$$

where X_{ij} and M_{ij} represent exports and imports, respectively, of country i for product j.

The TBI value varies between –100 (if a country only imports) and 100 (if a country only exports). Any value within –100 and +100 implies that the country exports and imports a commodity simultaneously. A country is referred to as "net importer" in a specific group of product where the value of TBI is negative and as "net exporter where the value of TBI is positive.

Data collection

Data on trade patterns, information on agricultural policies and trade regulations are necessary to analyze the competitiveness of the Tunisian date trade within the Mediterranean and Iran. The study was conducted for a group of 11 countries, 10 of which belong to the Mediterranean basin (Algeria, Egypt, Spain, France, Italy, Israel, Jordan, Morocco, Tunisia and Turkey), selected based on date palm export values over the past 20 years. We also included Iran in the study, even though it is not part of the Mediterranean, due to the weight of the date-trade sector, geographical proximity to the Mediterranean, and similarity of climatic and agronomic parameters.

The agricultural trade statistics in general and of dates, in particular, were taken from the FAO. They have been complemented and contrasted with data from the United Nations Commodity Trade Statistic Database (UN CONTRADE), from official records of national statistics for each country, such as the National Institute of Statistics of Tunisia, Israel Export Institute, and finally date export-import data missing in the sources consulted were estimated by linear interpolation using data from previous and subsequent years. The period analyzed was 20 years (1991-2010), divided in four sections, of five years each.

Results and discussion

— *Balassa's revealed comparative advantage index (RCA or BIS)*. Table 1 show that Tunisia is the second most specialized country in date exports after Algeria. It presented specialization indices much higher than 200 throughout the study period, remaining more or less stable with a slight decline in the latter part of the study (BIS = 5390.84 in 2006-2010), exceeding the BIS of Egypt by 41 times on average during the study

Table 1. Analysis of no-price competitiveness of dates in the Mediterranean and Iran

	Tunisia	Iran	Israel	France	Egypt	Algeria	Italy	Jordan	Turkey	Morocco	Spain	Mediterra-nean
Specialization index (RCA or BIS)												
1991-95	6193.70	2741.62	632.83	29.51	206.91	30213.42	1.54	138.75	1.61	44.57	3.09	100
1996-00	7345.41	2188.16	305.01	36.65	170.38	35330.78	2.79	60.37	6.57	4.55	2.81	100
2001-05	6693.99	1428.91	1127.40	26.43	77.58	13713.10	2.30	137.45	7.81	6.51	2.06	100
2006-10	5390.84	1260.25	1052.64	18.22	173.30	6720.16	5.12	149.14	8.52	1.17	2.20	100
Averages	6405.99	1904.74	779.47	27.70	157.04	21494.37	2.94	121.43	6.13	14.20	2.54	100
Dependency index (DI)												
1991-95	10.69	0.00	0.00	201.13	28.66	2.24	76.25	506.68	26.67	158.22	79.68	100
1996-00	17.51	0.00	0.02	189.01	7.49	0.15	71.98	379.33	38.53	373.25	99.39	100
2001-05	26.17	0.25	0.04	125.06	5.53	0.35	46.65	343.69	54.86	1877.56	66.50	100
2006-10	15.16	0.00	0.43	105.47	14.52	0.03	42.87	304.99	77.38	1921.16	58.00	100
Averages	17.38	0.06	0.12	155.17	14.05	0.69	59.44	383.67	49.36	1082.55	75.89	100
Constant market share (CMS)												
1991-95	36.63	32.60	10.25	14.45	1.27	30.67	0.28	0.36	0.08	0.38	0.44	100
1996-00	40.12	26.95	4.27	16.33	1.07	22.77	0.53	0.23	0.35	0.04	0.49	100
2001-05	43.44	21.24	13.40	10.66	0.75	8.26	0.48	0.66	0.41	0.06	0.42	100
2006-10	43.95	25.57	13.11	6.72	2.56	4.76	1.06	0.87	0.48	0.01	0.44	100
Averages	41.04	26.59	10.26	12.04	1.41	16.62	0.59	0.53	0.33	0.12	0.45	100
Trade balance index (TBI)												
1991-95	99.76	100	100	−35.05	46.58	99.76	−94.95	−72.78	−61.24	−50.90	−83.86	32.33
1996-00	99.47	100	99.98	−36.45	68.90	99.97	−91.67	−82.40	−47.13	−97.92	−89.25	19.19
2001-05	99.18	99.96	99.99	−39.58	71.84	99.81	−89.10	−58.45	−54.76	−99.47	−88.99	15.93
2006-10	99.58	100	99.92	−40.11	74.34	99.97	−68.09	−42.98	−61.02	−99.90	−83.83	25.30
Averages	99.50	99.99	99.97	−37.80	65.42	99.88	−85.95	−64.15	−56.04	−87.05	−86.48	23.19

period (first producer of dates in the world), an average of 8 times that of Israel (whose improvement is ongoing) and an average of 3.3 times that of Iran (the second largest date producer in the world).

Fig. 1b shows that on analyzing the Tunisian date export (measured as the Exports/Production ratio), which gives an average of 33% over the 20 years studied and has been as high as 50% in recent years, we see that it greatly exceeds the export of Algeria, with an average of 3.5%, or Iran 7.4% and Israel 23% for the same study period. This means that Tunisia has made by far the greatest effort to export its dates to international markets, dominating with 26% of global date exports in the last decade (Rached *et al.*, 2012).

— *Dependency ratio (DR).* The DR or relative advantage of imports (Vollrath, 1991) for Tunisia in the date sector ranged from 10 to 26 during the study period (Table 1). This is considered relatively low compared to Morocco (ranging from 160-1900), Jordan (300-500), France (105-201), Spain (58-80), and Italy (45-76), all considered major importers of dates.

Therefore, the fact that BIS>>200 and DR ≈ 0, shows that Tunisia is strongly specialized in exporting dates, and has a high RCA compared to Mediterranean countries and Iran. Moreover, Algeria is its main competitor

in international markets with its BIS descending in the last period, almost equal to the BIS of Tunisia. This is probably due to phytosanitary problems that affect levels of production and marketing of Algerian dates. Given this situation, Tunisia should seek to improve or at least maintain its competitive position in the future, solving the problem of dates. Moth mentioned above and considered the main threat of the date palm industry in Tunisia, and seek alternatives to chemical treatments to meet international and European standards, maintaining a low infestation rate and optimum product quality.

— *Constant market share (CMS).* Table 1 shows that Tunisia ranks first in the Mediterranean, and is ahead of Iran for the time studied, with a CMS average of 41%. This score remained more or less stable throughout the observation time, with small progressive increases in one time period to another, reaching a market share of 44% in the 2006-2010 period.

Iran ranked second in market share, which is considered important; however, it was unstable given the variation between one period and another, and with significant losses after 1996, dropping from 33% in the 1991-1995 period to an average of 24%, from 1996-2010. This probably reflects economic losses due to the progression of the red palm weevil in Iran.

In the Mediterranean, Algeria began in second place in market share criterion, but has declined drastically, dropping from 30% in 1991-1995 to 4.76% in 2006-2010. It has lost more than 25% of its CMS probably due to the decline in French imports, its main destination.

The remaining countries have a negligible share, such as Egypt with an average CMS of 1.40%, over the observation period, or Italy, Jordan, Turkey, Morocco and Spain, with an average CMS <0.5%.

— *Trade balance index (TBI)*. Economic development is probably the most important policy objective in less developed countries and exports are often seen as an engine for growth (Dawson, 2005). Results of TBI given in Table 1 confirm this concept and show that Tunisia is a net exporter of dates, with values greater than 0, and is very close to 100 (TBI average 99.59). Tunisia exports but does not import dates, or if it does so, in negligible quantities.

Likewise Iran, Israel and Algeria have TBI values that are equal or very close to 100, indicating a similar export structure and competitive advantage.

Egypt has an average TBI value of 65% during the study period, indicating that it is a net exporter. However, it also imports a significant amount of dates due to the large domestic demand, added to the fact that most of the varieties grown there are lacking in quality and are used for animal feed (Soliman *et al.*, 2003).

— *Export competitive price index (CPIex)*. The FAO (Liu, 2003) reports that the EU is the most important market for date exporters, and import mainly high-quality dates. In 1998-2000 the average unit value of imported dates ranged from between $1.7/kg and $2/kg in the EU, while the unit value worldwide was only $0.6/kg, indicating that greater value is placed on this fruit by the EU than the rest of the world.

The influence that prices have on a country's competitive position is measured by the CPIex, calculated on the basis of export prices. The trend of these indices (Fig. 1c) reveals that, compared to all the countries studied, Tunisia is gaining a competitive position in date export prices. From 2001 to 2010, the CPIex was significantly reduced compared to the other countries studied, with the exception of Iran and Egypt, which have a very unstable CPIex, decreasing significantly after 2007. This could be explained by a combination of factors, which may have contributed to the reduction of the Tunisian CPIex, such as:

— Regularity of production: a steady increase in Tunisian date production, reaching 199,000 tons in 2013, of which 141,000 tons were 'Deglet-Nour'.

— Export efforts: Tunisia is the first date exporter in the world in value but the seventh producer in quantity. Note that Tunisia currently exports about 60% of its total production, compared to 33% in 1999. This trend necessarily implies a special effort to avoid a decline in quality of the exported product, and a modification in export prices (APIA, 2008).

— Importance of variety, quality and presentation: Import prices can vary by up to ten times depending on the variety, origin, packaging and quality (Liu, 2003).

The recovery ratio calculated by APIA (2008) reveals that Tunisia sells its dates for 3.4 times more than the global average. The recovery ratio is very high for Israel, 6.3, due to the sale of 'Deglet-Nour' and cv. Medjool. France sells 4.2 times the average world price (they package and re-export 'Deglet-Nour'), whereas Algeria has a coefficient of 2.7 with 'Deglet-Nour' predominating.

In conclusion, date industry is important in Tunisia, in terms of production and export, playing a key socio-economic role. Given the analysis of this sector's competitiveness within the Mediterranean basin and Iran, we conclude that Tunisia has a highly important trade position compared to the Mediterranean area. Nonetheless, recent years have seen a decline in this comparative advantage due to declining competitiveness indices.

However, the market share indices (constant part of the market) are more stable, with a slight upward trend. This indicates that Tunisia is maintaining its market within the Mediterranean, and is well above the index of all competing countries throughout the period analyzed. This highlights the importance of the Tunisian date in the Mediterranean and Iran. Moreover, the Tunisian trade balance index remains stable, and close to 100 for the 20 years analyzed, reflecting it continues to be a net exporter of dates. Conversely, imports in this sector are negligible, as in Iran, Algeria and Israel (its main competitors). Regarding the analysis of the competitive price index (CPI), indices for Tunisia were very unstable from one country to another over the period analyzed. However, we can conclude that Tunisia is gaining a competitive position in terms of date export prices, since export CPI were significantly reduced compared to the other countries studied for the period 2001-2010, except for Iran and Egypt, which have had very variable export CPIs, with significant reductions since 2007.

References

AfDB, 2012. Distortions to agricultural policy incentives in Tunisia: A preliminary analysis. African Development Bank, Economic Brief. Available in: http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Brochure%20note%20politique%20agriculture%20Anglais.pdf. [February 2014].

Ahmadi-Esfahani FZ, 2006. Constant market shares analysis: uses, limitations and prospects. Aust J Agr Resour Econ 50: 510-526. http://dx.doi.org/10.1111/j.1467-8489.2006.00364.x

Ahmed M, 2001. Disinfestation of stored grains, pulses, dried fruit and nuts, and other dried foods. In: Food irradiation principles and applications (Molins R, ed.), Wiley Intersci, NY, pp: 77-112.

APIA, 2008. Étude de positionnement stratégique de la Deglet Nour tunisienne et de la promotion de ses exportations a long et moyen terme. Agence de Promotion des Investissements Agricoles de la Tunisie, 194 pp.

Asche F, Guttormsen AG, Sebulonsen T, Sissener EH, 2005. Competition between farmed and wild salmon: The Japanese salmon market. Agr Econ 33: 333-340. http://dx.doi.org/10.1111/j.1574-0864.2005.00072.x

Balassa B, 1965. Trade liberalisation and 'revealed' comparative advantage. The Manchester School of Economics and Social Studies 33: 99-123. http://dx.doi.org/10.1111/j.1467-9957.1965.tb00050.x

Blázquez-Lidoy J, Rodríguez J, Santiso J, 2006. ¿Ángel o demonio? Los efectos del comercio chino en los países de América Latina. Revista de la Cepal 90:17-43.

Bojnec S, 2001. Trade and revealed comparative advantage measures: Regional and Central and East European agricultural trade. Eastern Eur Econ 39(2): 72-98.

Chudnovsky D, Porta F, 1990. La competitividad internacional. Principales cuestiones conceptuales y metodológicas. CENIT, DT 3, Buenos Aires. 125 pp.

Dawson PJ, 2005. Agricultural exports and economic growth in less developed countries. Agr Econ 33: 145-152. http://dx.doi.org/10.1111/j.1574-0862.2005.00358.x

FAO, 2000. Étude des principaux marchés européens de la datte et du potentiel commercial des variétés non traditionnelles. Groupe des Produits Horticoles, Service des Matières Premières et des Produits Tropicaux et Horticoles, Division des Produits et du Commerce International, Rome. 54 pp.

Fertö I, Hubbard L, 2003. Revealed comparative advantage and competitiveness in Hungarian agri-food sectors. World Econ 26(2): 247-259. http://dx.doi.org/10.1111/1467-9701.00520

GI Fruit, 2008. The sector of dates in Tunisia. Groupement Interporfessionel des Fruits, Tunisie. Available in http://www.gifruit.nat.tn/en/index.php?option=com_content&task=view&id=53&Itemid=114 [January 2014].

Jemni M, Otón M, Ramirez JG, Artés-Hernández F, Chaira N, Ferchichi A, Artés F, 2014. Conventional and emergent sanitizers decreased *Ectomyelois ceratoniae* infestation and maintained quality of date palm after shelf-life. Postharvest Biol Technol 87: 33-41. http://dx.doi.org/10.1016/j.postharvbio.2013.08.002.

Jepma CJ, 1986. Extensions and application possibilities of the constant market shares analysis. Rijkusiniversiteit, Groningen, The Netherlands.

Laajimi A, Thabet B, Ben Said M, 2012. Une lecture dans la politique agricole et alimentaire en Tunisie: Pour une nouvelle vision. New Medit 2: 24-28.

Lafay G, 1992. The measurement of revealed comparative advantages. In: International trade modeling (Dagenais MG & Muet PA, eds.), Chapman & Hill, London. http://dx.doi.org/10.1007/978-1-4757-2150-8_10.

Liesner HH, 1958. The European common market and British industry. Econ J 68: 302-316. http://dx.doi.org/10.2307/2227597.

Likhayo P, Olubayo F, Ngatia C, 2014. Methyl bromide alternatives for maize grain storage in Kenya. Int J Sci Res 7(3): 2348-2352.

Liu P, 2003. The marketing potential of date palm fruits in the European market. FAO, Rome. 18 pp.

Martínez-Sánchez A, 1994. Competitividad internacional en el sector de telecomunicaciones. Cuadernos de Ciencias Económicas y Empresariales 27:129-137.

Oldersma H, Van Bergeijk PAG, 1993. Not so constant! The constant market share analysis and the exchange rate. Economist 14: 380-401. http://dx.doi.org/10.1007/BF01717406.

Omoregie EM, Thomson KJ, 2001. Measuring regional competitiveness in oilseeds production and processing in Nigeria: a spatial equilibrium modelling approach. Agr Econ 26: 281-294. http://dx.doi.org/10.1111/j.1574-0862.2001.tb00070.x

Porter M E, 1990. The competitive advantage of nations. Macmillan, London. 896 pp.

PNUMA, 1992. The Montreal Protocol on Substances that Deplete the Ozone Layer. United Nations Environment Programme, 47 pp. Available in: http://ozone.unep.org/new_site/en/montreal_protocol.ph. [January 2014].

Rached Z, Ali-Salmi A, Khaldi R, 2012. Les performances techniques des dattes biologiques et conventionnelles en Tunisie: Cas de la région de Hezoua. New Medit 13: 50-58.

Richardson JD, 1971a. Constant market shares analysis of export growth. J Int Econ 1: 227-239. http://dx.doi.org/10.1016/0022-1996(71)90058-4.

Richardson JD, 1971b. Some sensitivity tests for a constant market shares analysis of export growth. Rev Econ Stat 53: 300-304. http://dx.doi.org/10.2307/1937978.

Siddiq M, Aleid SM, Kader AA, 2013. Dates: postharvest sciences, processing technology and health benefits. Wiley-Blackwell. 326 pp.

Soliman SS, Ahmed-Ali B, Mohamed-Ahmed MM, 2003. Genetic comparisons of Egyptian date palm cultivars *(Phoenix dactylifera* L.) by RAPD-PCR. Afr J Biotechnol 2(4): 86-87. http://dx.doi.org/10.5897/AJB2003.000-1017.

Tyszynski H, 1951. World trade in manufactured commodities, 1899-1950. Manch Sch Econ Soc 19: 222-304.

Vollrath TL, 1991. A theoretical evaluation of alternative trade intensity measures of revealed competitive advantage. Weltwirtsch Arch 130: 265-279. http://dx.doi.org/10.1007/BF02707986.

Widodo T, 2009. Comparative advantage: theory, empirical measures and case studies. Rev Econ Bus Stud 4: 57-82.