Sustainable Water Use Securing Food Production in Dry Areas of the Mediterranean Region (SWUP-MED)

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Report on social and market acceptance of new management practices and new crops

Content

SUMMARY
This report summaries the findings from 4 studies conducted to assesses the market acceptance and management practices of new crops in the Mediterranian region, in particular Turkey and Morroco. These four parts have partly and in moderated forms been presented at the International Conference on : Sustainable Water Use for Securing Food Production in the Mediterranean region under Changing Climate, Agadir, Morocco, march 10-15, 2013.

The first two parts of deliverable 5.3 are focusing on farmers perception of new crops in Turkey, Adana and in Bouchane community in Morocco. Both areas are located in semi-arid regions and close to the European market. The studies differs in the sense that farmers have already been introduced to quinoa in the Bouchane region whereas farmers in Adana had little prior knowledge to the this new crop.

Part 1 aims at assessing the potential perception of quinoa as a new crop among farmers in Turkey. A combination of interviews and a survey of 92 farmers have been conducted in the Adana-region, Turkey, which addresses questions as farmers interest in new crops, factors that are important for adopting new crops, expected prices, yield and production potential compared to other crops.

Descriptive statistical analyses are used to describe and categorize farmers according to structural and socio-economic characteristics and perceptions. Specifically, analysis is undertaken with the aim of identifying attributes of different farm groups according to their perceptions of new crops on their fields. Special focus will be put on quinoa as a salt and drought tolerant crop. In addition a cluster analysis is made to find specific segments or clusters with particular characteristics according to perception of new crops.

Findings from these studies and interviews with farmers show that farmers in Adana had little, if any knowledge about quinoa. Many farmers indicate that when they consider the introduction of a new crop in their production system, they make some sort of comparison analysis between the crops that they already produce and the new crop. They look at the market availability, product prices, yield, production cost and ease of production. A number of farmers perceive quinoa as a likely crop to be included in their crop rotation if the current prices can be obtained on the market. A segment of mainly young and educated farmers have an interest to introduce the new crops in their crop rotation. Farm size seems also to be a significant characteristic in determining a farmer's attitude towards new crops. The smaller the farm, the less likely the farmer is to undertake new crops. Age, on the other hand, cannot conclusively be linked to willingness to accept new crops.

The objective of **part 2** is to assess the potential perception of quinoa as a new crop among farmers in Morocco. A combination of interviews and a survey of farmers have been conducted in, which addresses questions as farmers interest in new crops, factors that are important for adopting new crops, expected prices, yield and production potential compared to other crops. Firstly, 24 farmers have been interviewed in the region followed by interviews of 42 farmers in Bouchane community, which covers 730 hectares. In this region several farmers already have experience with quinoa, which have been introduced to them in 2009 from the EU-SWUPMED project.

Descriptive statistical analyses are used to describe and categorize farmers according to structural and socio-economic characteristics and perceptions. Specifically, cluster analysis is undertaken with the

aim of identifying attributes of different farm groups according to their perceptions of new crops on their fields.
Findings from this study indicate that most farmers know about the crop in Morocco. Market availability, product prices, yield, production cost and ease of production are taken into account.
A number of farmers perceive quinoa as a likely crop to be included in their crop rotation if the current prices can be obtained on the market. In summary, the main conclusion is that without a market farmers are not likely to start or continue producing any kind of crop even with good field conditions.

Part 3 describes the Moroccan supply-chain and potential barriers for introducing a new crop into the marketing chain.

Moroccan agriculture is relatively advanced with a supply chain capable of meeting the requirements and standards needed to export to the EU-market for a number of agricultural products, which Morocco has cultivated for a long time. This institutional set-up provides a basis for introducing a new crop that has some benefits related to problems faced by Moroccan farmers and potentially could contribute with a higher-value product for Moroccan exports as well as a protein-rich commodity for domestic consumers.

The development of the Moroccan domestic market towards a larger share for large supermarket chains puts some requirements on farmers both in terms of quality, quantity and timeliness of supplies. Local markets, SOUKs, are not expected to present similar obstacles although knowledge of the crop and acceptability of the same by domestic consumers need to be considered.
Export markets, particularly the EU, enforces quite rigid standards and requirements that have been met by Moroccan exporters on a number of products, particularly fruit and vegetables but also traditional cereals. Thus, the basic institutions in the supply-chain are in place. Introducing a new crop into the export supply-chain comes with a number of challenges in addition to the need to create a market for quinoa among European costumers and retailers. Experiences from other African countries that have been successful in creating a market in the EU for specialised products are related to the situation in Morocco.

Results reveal that the market for a specialised product like quinoa are able to provide profitable opportunities for the Moroccan agricultural sector and supply-chain.

The final **part 4** focuses on farmers management and power relation between farmers and intermediares. This paper investigates the determinants of intermediaries' power over farmers' margin related activities, in Turkey. In doing so, it proposes a holistic model of intermediaries' power over farmers margin related activities. The methodology used to understand the phenomenon of power in this research is a combination of quantitative and qualitative methods. The results of the quantitative analysis indicates that the power of the intermediaries' over farmers' activities can be explained from five sets of main factors: 1-product characteristics, 2-industry characteristics, 3-relationship characteristics, 4-farmers' characteristics and 5-farmers' access to resources. Furthermore, the analysis of the qualitative data showed that intermediaries due to their power employ a number of supply chain practices that transfer to farmers' excessive risks and unexpected costs. These risks and costs

compromise farmers' business position, who struggle to keep up a profitable business. Therefore, it is argued in this paper that a balance of power needs to be established between farmers-intermediaries, which should lead not only to improved farmers business position but also to increased efficiency of the supply chain.

Farmers perception of new drought and salt tolerant crops - experience from Adana in Turkey

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Summary

This part aims at assessing the potential perception of quinoa as a new crop among farmers in Turkey. A combination of interviews and a survey of 92 farmers have been conducted in the Adana-region, Turkey, which addresses questions as; Farmers interest in new crops, factors that are important for adopting new crops, expected prices, yield and production potential compared to other crops.

Descriptive statistical analyses are used to describe and categorize farmers according to structural and socio-economic characteristics and perceptions. Specifically, analysis is undertaken with the aim of identifying attributes of different farm groups according to their perceptions of new crops on their fields. Special focus will be put on quinoa as a salt and drought tolerant crop. In addition, a cluster analysis is made to find specific segments or clusters with particular characteristics according to perception of new crops.

A clustering procedure is used to group farmers according to specific characteristics with the aim of identifying features shaping farmers' attitude and perception of new crops.

Findings from these studies and interviews with farmers show that farmers in Adana had little, if any knowledge about quinoa. Many farmers indicate that when they consider the introduction of a new crop in their production system, they make some sort of comparison analysis between the crops that they already produce and the new crop. They look at the market availability, product prices, yield, production cost and ease of production. A number of farmers perceive quinoa as a likely crop to be included in their crop rotation if the current prices can be obtained on the market. In summary, the main point out of this is that without a market farmers are not likely to start or continue producing any kind of crop even with good field and yield conditions.

1. Background

In recent years the cultivation of quinoa has shifted from being a local crop for local consumption in the Andean countries of Bolivia and Peru to become a cash crop for export to North America and Europe. Currently the average yield of quinoa in these countries is less than 1 tons pr. hectare.

World	mio hectare
Chick peas	11,1
Linseed	2,3
Maize	159,5
Quinoa	0,1
Wheat	225,4

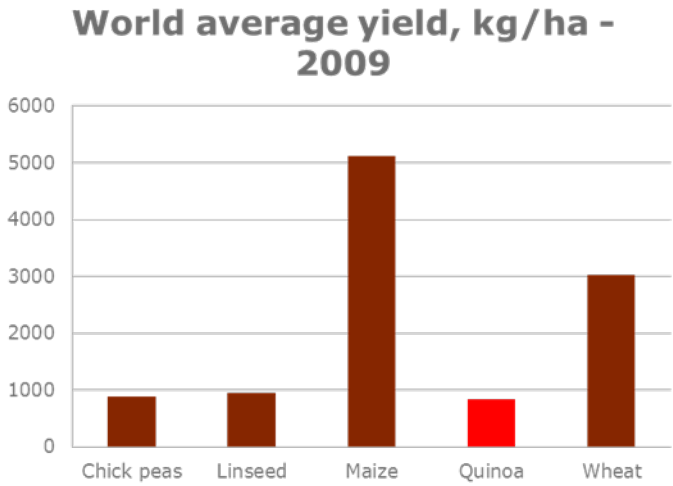

Table 1 World production and yield of selected crops in 2009, mio. hectare,

Source: FAO, 2011

Quinoa is produced and marketed as an organic crop and sold at relative high end-user prices compared with cereals. Bolivia and Peru are the main quinoa producing countries with a total production of nearly 30.000 tons and 40.000 tons respectively in 2009 (FAO 2012). The average producer price is about 1 USD per kg. In 2009 Europe imported 6.525 tons of quinoa from Bolivia and Peru of which the majority originates from Bolivia (CBI, 2009). The 3 most important European markets for quinoa are France, the Netherlands and Germany.

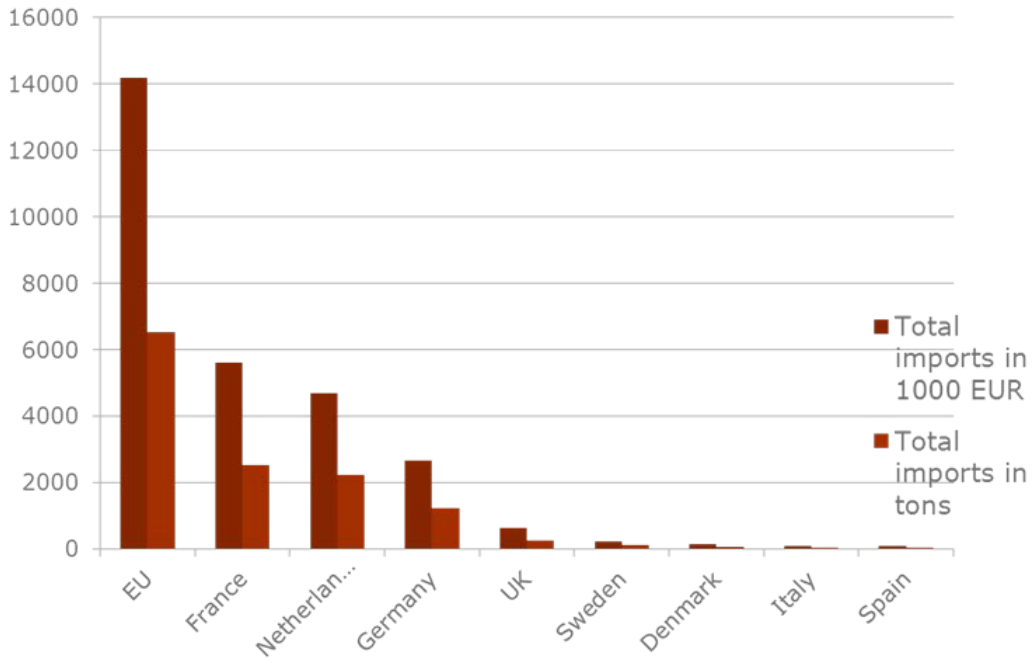

Figure 1 EU imports of Quinoa, 2009
Source: Ine and adex

But quinoa is also imported in UK, Scandinavia, Italy and Spain. So far, there is only a minor domestic production of quinoa in Europe. Quinoa has some characteristics that make a high value crop compared with cereals. From a cultivation point of view, it is relatively drought resistant and salt resistant compared with wheat and barley. A disadvantage is that the quinoa seed has to be cleaned for saponine and yields are currently low compared with other crops. From a market point of view, quinoa is gluten free (some consumers are allergic or intolerant to gluten) and as a result there is huge market potential for this kind of commodity in Europe and other high income regions. There are several drivers that suggest that food companies are going to produce more types of "free-from -products" in the next ten years. The celiac disease is regarded as one of the most under diagnosed diseases in the world (Bogue, 2011). The global market in 2010 was worth USD 1.7 billion with a growth rate of 25 percent per year. By 2015 is expected that the global market will be USD 4.3 billion (Bogue, 2011).

So far the quinoa has been produced in commercial scale in South America, but recent attempts have been made to introduce quinoa in Europe and North Africa in regions where cereals may be difficult to cultivate. Jacobsen (2003) argue that quinoa might be a crop to be introduced under dry conditions in Africa and Asia. Quinoa is regarded as a drought resistant and salt toilerant crop compared with cereals. Quinoa, however the crop is unlike wheat and barley low yielding and requires additional cleaning of saponine prior to consumption.

Amaranth may also be a potential crop to be introduced outside the Andes region. Amaranth do not require treatment of sabonine prior to consumption like Quinoa but the quality is often reduced due to

impurities from soil and mouse excrements, which have to be handled during harvest (Jacobsen et al 2003).

A study by Lavini et al (2013a) suggest from field experiments in the southern part of Italy that both quinoa cultivars "Titicaca" and "Puno" could be cultivated successfully in Italy and possibly in the medeterranian area. A
similar Italian study on Amaranth which is closely related to quinoa indicate that a reduction of irrigation water of 50 pct did not cause a yield reduction compared to full irrigation (Lavini et. al 2013b).

A study by Yazar et al. (2013) with field experiments from Adana in Turkey support the perception that quinoa is tolerant to saline water and water stress.

The objective of this study is to assess farmers perception of a new crop like quinoa in Adana region,Turkey and to provide a list of potential barriers and options to adopt quinoa among farmers.

2. Method

This study is based on interviews and surveys in the case region Adana in Turkey. Turkey are represented in the EU-project SWUP-MED that focuses on sustainable use of water and new crops in the Mediterranean region – Adana is located in the Mediterranean area close to the European market. Moreover, Adana regions is an semi-arid areas with the possibility to irrigate.

A broad review study from 1993 by Feder, Just and Zilberman on farmers adoption on new technology identify common parameters for adoption like that farm size, risk exposure, human capital, credit constraints and market access. Zeller et al 1997.

Several studies have also indicated that education has an impact on farm adoption of new crops. A study from 2003 in Ethiopia shows that educated farmers are less risk averse and more likely to adopt new crops that farmers without education (Knight et. al 2003).

From previous experience with farmers adoption and barriers to adopt new crops we specifically addressed questions about farmers' current crop production, farm size and their knowledge of quinoa. We also addressed questions about salinity and drought resistance – which is a specific crop characteristic of quinoa. In addition we asked farmers to priorities among different factors when introducing a new crop in relation to:

- Market access
- Crop price
- Ease of production
- Crop yield
- And production costs

This paper encompasses a summary of the information generated from interviews conducted in the region of Adana-Turkey in spring 2012. From the 13 interviews, 8 were recorded and used as a background study for a broader farm survey. These interviews were conducted with farmers who produced: Corn, wheat, sunflower, citrus (oranges, mandarins, grape fruits and lemons) and watermelon. Most of these farmers produced more than one crop and some of them practiced some kind of irrigation. Followed by these initial interviews, a survey of 92 farmers have been conducted in the Adana-region, Turkey which address questions such as; Farmers interest in new crops, factors that are important for adopting new crops, inclusion prices, yield and production costs.

The report concludes with a list of advantages and barriers to adopt a new crop like quinoa in the Mediterranean region and specifically in these two regions.

3. Results from the case areas

3.1 **Adana region in Turkey**

This study was carried out around Adana a city in southern Turkey, which is a major agricultural and commercial center with a population of around 2 million (Turkstat, 2010). It is the fifth most populous province in Turkey. The province surface is 15,485 km^2 equal to about 2 % of Turkey's overall surface; its coast line is 160 km which is about 1.9% of Turkeys overall coast line (Çukurova Development Agency, 2007).
The study was conducted in four districts, three of Adana (1.Seyhan 2.Yüreğir and 3.Ceyhan) and one district of Mersin (Tarsus). These four districts were selected because they cover most of the Çukurova region, one of the most productive regions in Turkey. Furthermore, the agricultural land areas are substantially located in these districts in the southern part of the region. Agriculture is an important sector in Adana. Notably field crops and fruit orchards have played important roles in socio-economic terms. Adana produces 4% of Turkey's agricultural product (Çukurova Development Agency, 2007). The crop structure in Adana compared to overall Turkey constitutes around 50% of the overall production of the region.

The farm survey conducted by Kusadokoro and Maru (2006) has identified a more detailed cropping pattern in the region of Adana (table 2). They found that the irrigated area of Adana utilizes intensively the agricultural land by the practice of double cropping, where the first crop is wheat, and the typical second crop is maize. It is argued that the main reason for intensive land use is due to relatively small field plots of the managed land. The most prevailed crop in rain-fed area of Adana is wheat, cotton and barley. In irrigated area of Adana, the most prevailed crop is maize, and the other main crops are wheat, tree crops (citrus), cotton, vegetables and watermelon.

Table 2 Cropping pattern in Adana, %

		Wheat	Barley	Maize	Cotton	Sugar beet	Other field crops	Water melon	Vege-tables	Tree crops	Total
Adana	RF	75.26	5.67	0.00	6.82	0.00	7.22	2.84	0.92	0.97	99.71
	IR	35.07	0.04	56.67	6.02	0.00	8.29	2.51	4.85	10.97	124.41

Source: Farm survey 2003, 2004, 2005 (Kusadokoro and Maru, 2006)
Note: RF – Rain-fed area; IR – Irrigated area

Findings from the initial interviews with 8 farmers in Adana, show that farmers had little if any knowledge about quinoa. All the farmers said that when they consider the introduction of a new crop in their production system, they make some sort of comparison between the crops that they already produce and the new crop. They look at the market availability, product prices, yield, production cost and ease of production. Below are presented (in figure , 3 and 4) a preliminary description of demographic statistics from the Adana region farm survey. As indicated, most farms covers an area of less than 15 hectares with focus on cereals (maize and wheat) and water melon, The market channels mainly consist of local byers and to a less extent exporters and processors.

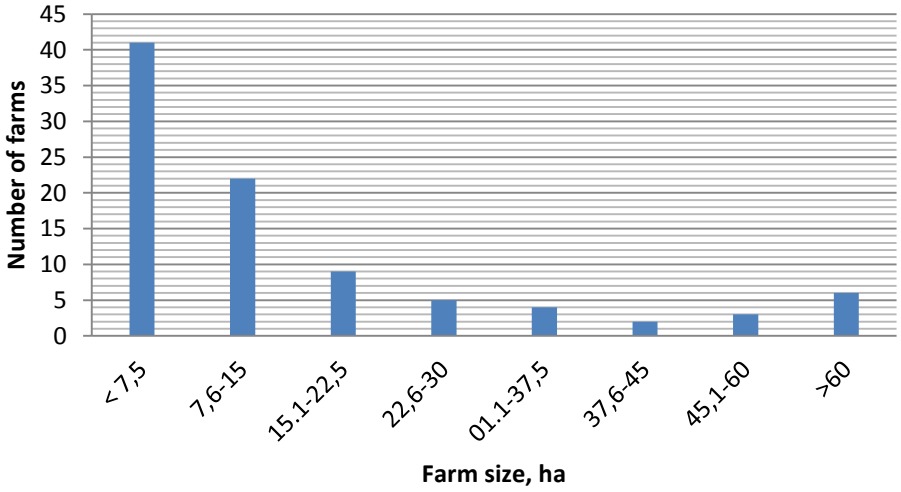

Figure 2 Farm size distribution, Adana region, farm sample. N = 92

The main crops in this region are corn/maize citrus and wheat as indicated in figure 3. This cropping pattern is similar to the general cropping pattern for the irrigated land in Adana.

Farmers have three possibilities to sell their cereal production, TMO (Toprak Mahsűlleri Ofisi – Soil Products Office) which is a government agency for traders and processors. However, most of the farmers sell only to traders. Usually, the price offered by TMO is the highest in the market. Though, in

the last 10 years TMO has reduced the amount bought from farmers and has made the selling process for the farmers more difficult.

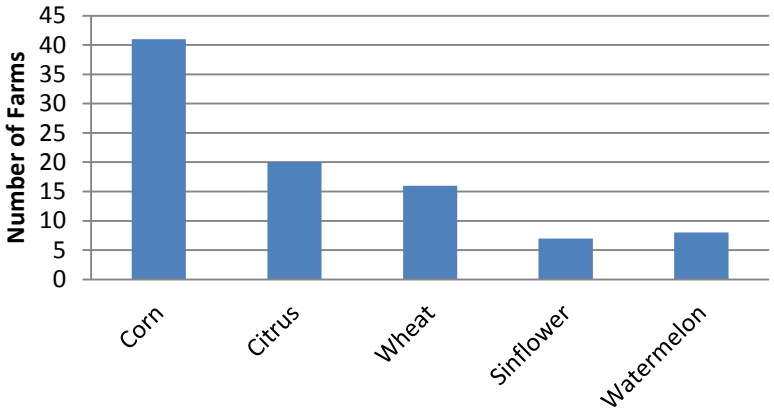

Figure 3 Type of cultivated crops, N = 92,

Selling to processors is very difficult (especially for small farmers) since they do not want to deal with farmers directly due to their small level of supply. They prefer to deal with traders who supply them with large quantities and a continuous supply. In conclusion, the only market channel available to most of the farmers is local traders/buyers as indicated in figure 4.

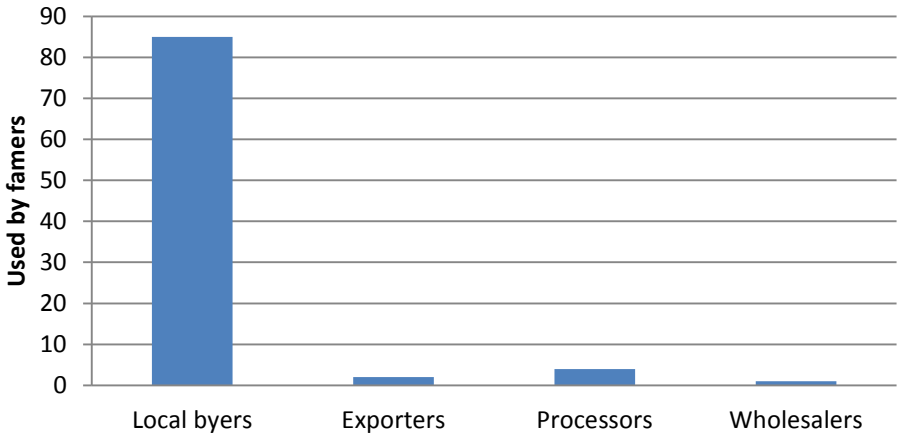

Figure 4 Market channels used by farmers to sell their products in Adana, N= 92

We addressed the question to the 92 farmers if they have heard about a crop named quinoa? 9 (about 10 percent) farmers responded “yes” and 83 (about 90 percent) responded “no” to this question. However, a majority of the farmers were still open for introducing a new crop that is resistant to drought and salinity on their farms. More than 58 percent of the 92 farmers reply that they would like to include a crop that is resistant to drought and can deal with salinity problems.

About 28 percent of the farmers in Adana said that they have problems with salinity on their land. This problem may be due to a large frequency of irrigation in this region and common problems with

salinity in regions with heavy irrigation. Only 19 percent of the farmers reply that they have problems with drought on their land (see figure 5).

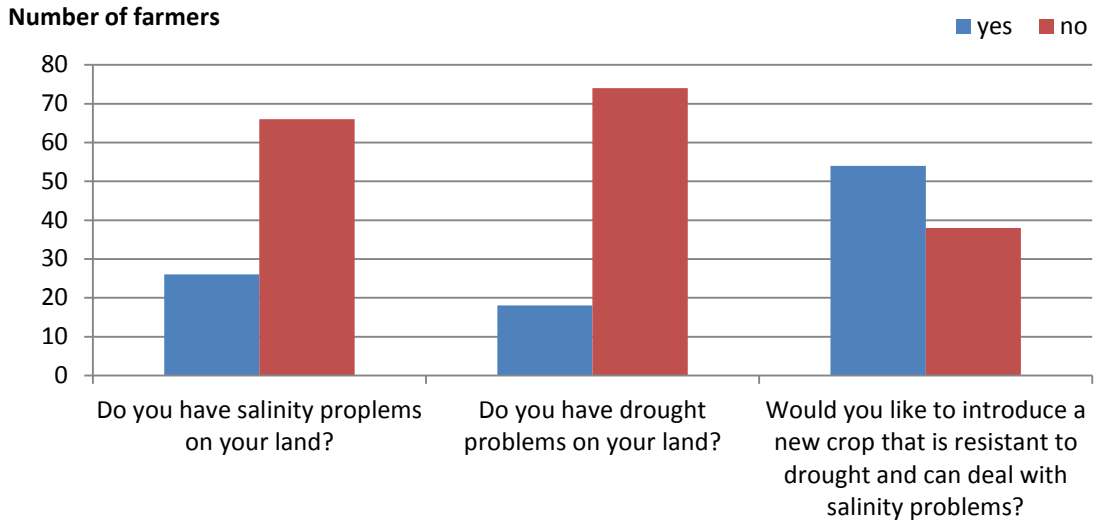

Figure 5 Farmers experience with salinity and drought and perception in the Adana region.

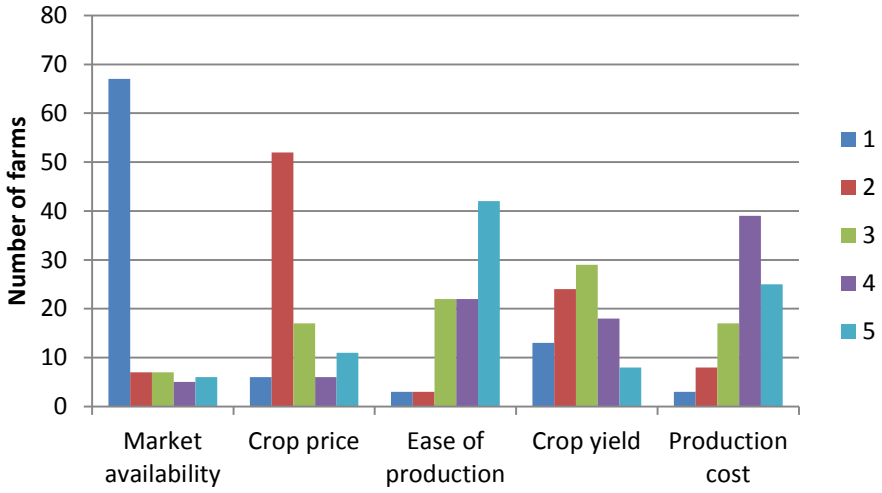

Figure 6 Factors that determine the inclusion of a new crop among farmers, N= 92

Note: 1 is highest priority and 5 is lowest priority.

To introduce a new crop it is important that the crop can provide a benefit to the farmers. The majority of farmers in Adana indicated that they would be interested to grow a new crop if it can deal with salinity and is resistant to drought. It may be the salt tolerance factor that is most important in this regard given the fact that most farmers apply some sort of irrigation in the region. Moreover, farmers' perception of a new crop is highly related to the market conditions. More than 60 percent of the farmers reply that market availability has the highest priority to them compared with, yield, crop price ease of

production and production costs. Ease of production and production costs are not major issues in regard to perception. The second most important factor is crop yield followed by crop price (see figure 6).

Cluster analysis

In order to analyse farmer' attitude towards undertaking new crops and their possible interest in quinoa a cluster analysis employing some basic characteristics of farms and farmers' perceptions is carried out.

Cluster analysis is a method that uses a minimum of prior assumptions or theories but instead attempts to let data reveal structures and patterns in the data. The analysis begins with a hierarchical cluster analysis with the aim of determining the number of distinct groups or clusters in the dataset. In the hierarchical analysis, Ward's method is employed. Ward's method is the most commonly used algorithm for hierarchical cluster analyses and has the property that the number of objects, in this case farmers, in each cluster do not differ too much. Subsequently, in order to refine the grouping of farmers an hierarchical cluster analysis is undertaken, which use the number of clusters obtained from the non-hierarchical cluster analysis as given.

The analysis attempts to identify determining characteristics of farmers that shape their attitudes towards quinoa and new crops. Naturally, farmers have to be grouped according to variables of interest. Hence, the analysis is restricted by available data on farmers. Furthermore, some variables have only limited variation between farmers making them unsuitable as determining characteristics. Based on available data in the survey described above, the variables chosen for the cluster analysis are:

- Farmer's age
- Farm size,hectares
- Use of irrigation, yes = 1, no = 2
- Education level, Illiterate = 1, Literate, no school = 2, Primary = 3, Lower secondary = 4 Higher secondary = 5, University = 6
- Have you heard about a crop named quinoa? yes = 1, no = 2
- Would you like to introduce a new crop that is resistant to drought and can deal with salinity problems? yes = 1, no = 2

Using these variables, the non-hierarchical clustering procedure produce the results shown in table 3.

Table 3. Part of clustering history of a hierarchical cluster analysis applying Ward's clustering method.

Cluster no.	Number of farmers	R^2	PsF	PsT^2
5	53	0.85	120	43.1
4	7	0.81	125	12.5
3	32	0.73	120	39.9
2	85	0.59	127	54.8
1	92	0.00	.	127.0

Cluster analysis does not come with a solid statistical foundation in terms of probability distributions due to the number of possibly quite disparate variables used. Therefore, the selection of the number of clusters requires an element of evaluation by the researcher. However, some indicative measures provide some guidance. In table 3, pseudo-F (PsF) and pseudo-t^2(PsT^2) values are displayed. A large pseudo-F value relative to the preceding value indicates a stopping point. For the pseudo-t2 statistics, the procedure is to move down the column to stop a value markedly higher than the preceding one and then move one cluster up. To further aid the selection of the number of clusters, a measure of the proportion of variance in the data accounted for is provided using the squared multiple correlation, R^2.

Both the Pseudo F- statistic and the Pseudo t^2-statistic suggest four clusters with 81 % of the variation accounted for by the choice of four clusters. The hierarchical clustering method is an irreversible procedure, which means that once an object has been assigned to a cluster, the object cannot change to another cluster even though cluster characteristics might change significantly as more and more objects are clustered. Therefore, applying the choice of the number of clusters from the hierarchical procedure, a non-hierarchical procedure is performed with the objective of refining the clustering of farmers.

Table 4. Taxonomy of farmers using a non-hierarchical k-means clustering procedure.

		<----------	----------	Cluster	means	----------	---------->
Cluster no.	Number of farmers	Farmer's age	Farm size, ha	Irrigation, yes/no	Education level, 1-6	Heard about quinoa, yes/no	Want to grow a drought and saltresistant crop, yes/no
1	53	39.5	6.3	1.26	4.00	1.92	1.38
2	5	51.0	95.0	1.00	4.40	1.80	1.40
3	8	39.9	47.0	1.00	5.25	1.75	1.13
4	26	57.9	16.3	1.08	4.00	1.92	1.58

In table 4 is shown the results of the non-hierarchical clustering procedure with four clusters. Cluster one is the largest with 53 of the 92 farmers. It is characterised as consisting of the smallest farms and operated by a young farmer. They have less irrigation than farmers in the other clusters and have the shortest education. Farmers in cluster one have generally not heard about quinoa but are not as such opposed to undertaking a new crop.

Cluster two is the smallest cluster and consists of the largest farms operated by a farmer in the higher age span. They use irrigation and have a fairly long education. Some, but not many, have heard about quinoa and they are not overly opposed to introducing a new crop.

Cluster three contains 8 farmers in the younger age group. They have medium sized farms and use irrigation. Cluster three consists of the highest educated farmers. Cluster three farmers are the most willing to introduce a new crop.

Cluster four consists of 26 farmers that are the oldest in the sample. They have relatively small farms and generally use irrigation. Cluster four farmers are among the lowest educated and they have generally not heard about quinoa. Furthermore, cluster four farmers are the most opposed to introduce a new crop.

The cluster analysis reveals that education has an effect on willingness to undertake a new crop. The more educated the farmer is the more open to new farming techniques he appears to be. Farm size seems also to be a significant characteristic in determining a farmer's attitude towards new crops. The smaller the farm, the less likely the farmer is to undertake new crops. Age, on the other hand, cannot conclusively be linked to willingness to accept new crops.

Introducing a new crop in AdanaExperience from other crops

Framers have different experiences with the introduction of new crops in the Adana region. One example is a farmer who started to produce blueberry. He saw in another region of turkey that farmers that were producing blueberries were getting good prices and market was available. He then started to produce blueberries; but in his region, there was no market for that product. Since the product was highly perishable it was not feasible to transport it to the other region. In the end, he gave up. The main point out of this is that without a market farmers are not likely to start or continue producing any kind of crop even with good field conditions.

On the other hand, farmers pointed out the case of sunflower, which has been a successful introduced crop through government subsidies. The land area of sunflower cultivation has increased rapidly in the last 10 years in Adana. One reason behind this success is market availability – Turkey has deficiencies in vegetable oil production and the government started the campaign to introduce oil crops. Moreover, prices in the market are good. It is an easy crop to produce – in the region of Adana it can be produced with good yields under rain fed conditions and the cost of production of sunflower is low – partly due to governmental support.

Another example of a new crop introduction that has been successful in the region of Adana is apricot. This crop was introduced by farmers' initiatives. As in the case of the farmer who tried to produce blueberries but was unsuccessful; the farmers who introduced apricot in their production system, firstly, saw it being produced by an Italian company that started the production of apricot in their region hereafter, they researched the market and found that it was profitable to produce it - and they set up a production system. Both examples indicate that a strategy of quinoa introduction should involve the market actors including the demand from consumers and end-users.

4. Discussions

Quinoa is already imported in large quantities from Bolivia and Peru to the European market. In this respect there is already an established market for Quinoa in Europe.

Findings from these studies and interviews with farmers show that farmers in Adana had little, if any knowledge about quinoa. Many farmers indicate that when they consider the introduction of a new crop in their production system, they make some sort of comparison between the crops that they already produce and the new crop. They look at the market availability, product prices, yield,

production cost and ease of production. A number of farmers perceive quinoa as a likely crop to be included in their crop rotation if price is competitive and the market is available . Findings also indicate that a segment/cluster of mainly young and educated farmers have an interest to introduce the new crops in their crop rotation.

On the consumers' side, quinoa is especially good for people who are intolerant to gluten which could be an important market segment for national markets and for exports to Europe.

Table 5 gives an overview of advantages and barriers for implementing quinoa as a new crop among farmers in Adana.

Table 5 Advantages and barriers for implementing quinoa as a new crop among farmers in Adana

Advantages	**Barriers**
• Drought resistant • Salt resistant • High price • Gluten free (added value) • High durability	• Low yields compared with cereals • Difficult to get seed • Competition with other high yielding crops • High content of saponine – quinoa must be processed before consumption
Specific to Adana • Farmers, mainly young and educated, are interested in crops that are drought resistant	*Specific to Adana* • Irrigation is common and quinoa has to compete with other irrigated crops • Farmers have little if any knowledge about quinoa

In the discussions with farmers in Adana examples were given about successfully introduced new crops (i.e. sunflower by the government and apricot by farmers private initiatives). In both of these examples the market for these products was available. However, there have been other cases of new crops introduction which have not been successful (e.g. canola, soybean). The main reason provided by farmers for quitting producing these new crops was lack of market availability.

Farmers' incentive to grow quinoa will also depend on the marginal benefit of growing quinoa compared to existing crops. On rain fed areas quinoa may have advantages due to drought resistance – but on irrigated lands it may have to compete with other high value crops like water melon, carrots etc.

Nowadays the introduction or production of a new crop should start by first considering the market. Several food companies (e.g Unilever, Nestle, DANONE etc.) base their new product development process in the market research with the aim to identify new food trends or new market needs. One of the biggest food trends is currently the health and wellness trend (Vaidya and Mogelonsky, 2007;

Bogue and Yu, 2009; Kearney, 2010). Schaafsma and Kok (2005) indicate that most of the top managers of the food companies and retail sector expect a strong and further growth of the health food trend. Part of this trend is also the "free-from trend", which has to do with products that are free from certain ingredients. . As is the case of celiac consumers who are intolerant to product that contain gluten. There are several drivers that suggest that food companies are going to produce more types of free-from (including gluten free) products in the next ten years:

- The celiac disease is the most under diagnosed diseases in the world (Bogue, 2011)
- Health as a motive to buy free-from products, these products are perceived to be healthier.
- Higher profits for food companies because these products have high added value.
- The global market of "free-from" products in 2010 was worth USD 1.7 billion with a growth rate of 25% per year; by 2015 is expected that the global market will be USD 4.3 billion (Bogue, 2011)
- Free-from as a means for food companies to differentiate their products in the saturated markets.

From the discussion so far, there appears to be a significant market potential for quinoa since it is a gluten free product. Strategies that aim to introduce this crop in the Mediterranean region should attempt to establish links between food companies or farmers' cooperative that operate in these regions (e.g. ULKER, ETI, etc.) and the farmers.
For example, a strategy should aim to increase the awareness of quinoa to these companies. Moreoverthe potential benefits of gluten-free food in the industrialized countries and also cities in Turkey and Morocco (e.g. Istanbul, Ankara, Marrakesh) should be addressed. By doing so it is more likely that the introduction of quinoa in the farmers production system will be a success.
The creation of a market for quinoa in Turkey and Morocco has several beneficial effects for the two regions. One of these benefits is in regard to production of lands that have elevated levels of salinity and are not used for other crop production. A drawback of quinoa is its low yields and high labor consumption compared to corn and wheat – especially in regard to local consumption where yield are regarded important. Furthermore, quinoa has a higher price in the international market compared to corn and wheat. Therefore, the low-yield levels and high labor costs can be covered from the high price.

5. Conclusions

Findings from this study indicate that most interviewed farmers had little if any knowledge about quinoa in Adana. All the farmers said that when they consider the introduction of a new crop in their production system, they make a comparison between crops that they already produce and the new crop. First of all they look at the market availability, but also product prices, yield, production cost and ease of production are taken into account.

A number of farmers perceive quinoa as a likely crop to be included in their crop rotation if the current prices can be obtained on the market. In summary, the main point conclusion is that without a market farmers are not likely to start or continue producing any kind of crop even with good field conditions.

6. Acknowledgement

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Farmers' perception of quinoa - experience from Bouchane region in Morocco

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Abstract

This paper aims at assessing the potential perception of quinoa as a new crop among farmers in Morocco. A combination of interviews and a survey of farmers have been conducted, which addresses questions such as; farmers' interest in new crops, factors that are important for adopting new crops, expected prices, yield and production potential compared to other crops. Firstly, 24 farmers have been interviewed in the case region followed by interviews of 48? In the Bouchane community in Morocco which covers 730 hectares. In this region, 9 farmers have experience with quinoa, which have been introduced to them in 2009 from the EU-SWUPMED project.
Descriptive statistical analyses are used to describe and categorize farmers according to structural and socio-economic characteristics and perceptions. Specifically, analysis is undertaken with the aim of identifying attributes of different farm groups according to their perceptions of new crops on their fields.
Findings from these studies and interviews with farmers show that several farmers in Bouchane, Morocco, have previous knowledge about quinoa from their neighbors. Many farmers indicate that when they consider the introduction of a new crop in their production system, they make some sort of comparison analysis between the crops that they already produce and the new crop. They look at the market availability, product prices, yield, production cost and ease of production.
A number of farmers perceive quinoa as a likely crop to be included in their crop rotation if the current prices can be obtained on the market. In summary, the main point out of this is that without a market farmers are not likely to start or continue producing any kind of crop even with good field and yield conditions.

Keywords, quinoa, farmers' perception

7. Background

In recent years the cultivation of quinoa has shifted from being a local crop for local consumption in the Andean countries of Bolivia and Peru to become a cash crop for export to North America and Europe. Currently the average yield of quinoa in these countries is less than 1 tons pr. hectare. Quinoa is produced and marketed as an organic crop and sold at relative high end-user prices compared with cereals. Bolivia and Peru are the main quinoa producing countries with a total production of nearly 30.000 tons and 40.000 tons respectively in 2009 (FAO 2012). The average producer price is about 1 USD per kg. In 2009 Europe imported 6.525 tons of quinoa from Bolivia and Peru of which the majority originates from Bolivia (CBI, 2009). The 3 most important European markets for quinoa are France, the Netherlands and Germany. But quinoa is also imported in UK, Scandinavia, Italy and

Spain. So far, there is only a minor domestic production of quinoa in Europe. Quinoa has some characteristics that make a high value crop compared with cereals. From a cultivation point of view, it is relatively drought resistant and salt resistant compared with wheat and barley. A disadvantage is that the quinoa seed has to be cleaned for saponine and yields are currently low compared with other crops. From a market point of view, quinoa is gluten free (some consumers are allergic or intolerant to gluten) and as a result there is huge market potential for this kind of commodity in Europe and other high income regions. There are several drivers that suggest that food companies are going to produce more types of "free-from -products" in the next ten years. The celiac disease is regarded as one of the most under diagnosed diseases in the world (Bogue, 2011). The global market in 2010 was worth USD 1.7 billion with a growth rate of 25 percent per year. By 2015 is expected that the global market will be USD 4.3 billion (Bogue, 2011).

So far the quinoa has been produced in commercial scale in South America, but recent attempts have been made to introduce quinoa in Europe and North Africa in regions where cereals may be difficult to cultivate.

Studies from field experiments in semi arid regions of Morocco indicate shows that well managed deficit irrigation (50 pct of full irrigation) with manure fertilization allows for high yields of quinoa and a high level of water efficiency (Fghire et al 2013). A study by Benlhabib et al 2013 from Bouchane region in Morocco, shows a significant variation in grain yield. The best growth was obtained with a combined application of water and nitrogen with highest yields at 1.67 t per ha).

This study is based on trials in Morocco in the EU- SWUP-MED project with quinoa. The objective of this study is to assess farmers perception of a new crop like quinoa in these two regions and to provide a list of potential barriers and options to adopt quinoa among farmers.

8. Method

This study is based on interviews and two surveys in Morocco, Bouchane region. Bouchane is semi-arid areas with the possibility to irrigate.

From previous experience with farmers adoption and barriers to adopt new crops we specifically addressed questions about farmers' current crop production, farm size and their knowledge of quinoa. We also addressed questions about salinity and drought resistance – which is a specific crop characteristic of quinoa. In addition we asked farmers to priorities among different factors when introducing new crop in relation to:

- Market access
- Crop price
- Ease of production
- Crop yield
- And production costs

This paper encompasses a summary of the information generated from interviews conducted in the region

In Morocco – Bouchane region, a first survey was conducted in 2011. The survey was held with 32 farmers, it concerns 598 ha surface land, with an average area of 18,69 ha per farm. A significant number of these farms have irrigation on part of their farm (1- 5 ha) with a total of 43 wells and 32 pumps connected to these 32 farms. Soil drainage capacity was evaluated by farmers, as good drained, medium and weak. Most of the land has good drainage capacity because most soils are classified loamy type. Only about 20% of the farms do not have pump for irrigation needs, 6% have not even a well and are dependent on neighbours of their domestic needs.

In 2012 in Morocco, an exploratory focus group interview has been conducted in May 2012 followed by a survey of 24 farmers in late 2012. In this paper, the survey data from 2012 are applied because this survey addresses issues on farmers perception of new crops on their farm. Finally, a follow up survey have been conducted. in spring 2013 with 41 farmers. Farmers were selected from the same region and from the same cooperative and they all have some experience and knowledge with quinoa either own field "trials" or from knowledge sharing with neighbor frams.

Based on the latter survey a cluster analysis was undertaken with the aim of identifying attributes of different farm groups according to their perceptions of new crops on their fields.

The report concludes with a list of advantages and barriers to adopt a new crop like quinoa in the Mediterranean region and specifically in these this region.

9. Results from the case areas

3.2 Bouchane community in Morocco

Morocco has 16 regions of which Marrakesh Haouz is one region. This region is where Bouchane community is located in the Province, Kelâat Sraghna. The main business in this area is mining (phosphate) and agriculture.

Bouchane community is an arid area. The average precipitation in the province Kelâat Sraghna, is 250 mm per year. Currently 280.000 ha of agricultural land is cultivated in the province (2012) of which cereals cover 230.000 ha. Caktus covers about 29.000 ha. The province authorities plan to establish a new supporting scheme for cactus with another 30.000 ha within the next 5 years. This plan also includes initiatives to produce marmalade from caktus in a new development project.
There are about 18-19.000 farms in the region/province. The average farm size is about 14-15 hectares in this province. The biggest farms are about 4000 hectares. But there are also a number of farms with 200-500 hectares. The cereal yield is about 500 kg/ha on average.
In addition to crop production there is a significant production of meat from 600.000 sheeps and goats in the province.

The ownership of land is mainly based on informal contracts. Only about 25% (July 2011) of Morocco land areas are formally registered.

In this region about 90% of the agricultural cultivation and harvest activities are mechanized. Farmers often rent the machinery from neighbor farms.
The farmers union in Bouchane community, which is the group that has been surveyed, include 320 members of which 56 are woman and with 2 women that are head of a farm. The women are also organized in a cooperative with cleaning of quinoa seeds. In the union, the farmers buy seed and fertilizer and organize meetings together.

The following table provides the results from the farm survey in Morocco 2013. In total the land areas covers 730 hectares among the 41 farmers. These farms irrigate 113 hectare of land of which 53 hectare is drip irrigation. As part of the EU-SWUP project 15 hectare of land is cultivated with quinoa among 15 farmers with an average quinoa area of 1 hectare.

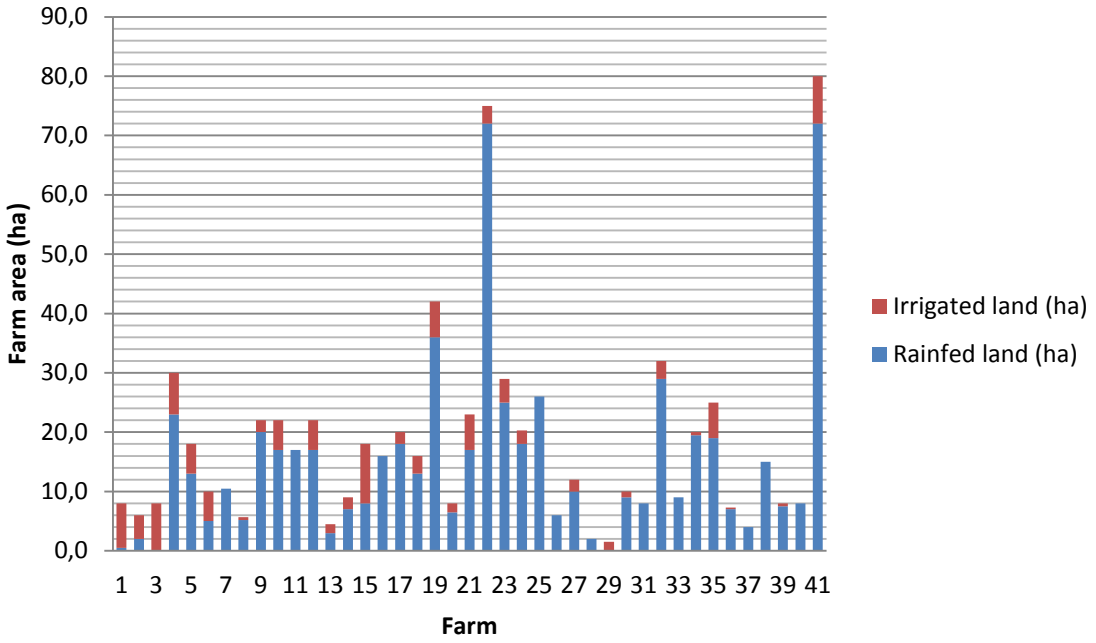

Figure 1 Farm size distribution, Buchane, farm sample. N = 41

Most of the farmers in Bouchane grow barley, bread wheat and durum wheat. Other crops are, vegetables (carrots) pea and faba bean. Local produce of Quinoa from Bouchane has only been introduced on the market in Morocco in modest amounts. The price of local produced quinoa is currently 60-80 MAD (6-8 Euro pr. kg) per kg (2012) on the market in the larger cities in Morocco like Marrakesh. Quinoa is harvested by hand and packed and cleaned in small 500 gram bags. Currently the yield is about 300 kg/ha in the Bouchane region based on farm survey and interviews.

So far 35 kg in total have been sold in small bags from the farm community. Recently, there have been problems with the cleaning of quinoa and concerns about obtaining the right quality – but these problems are expected to be temporary. The cleaning process is time-consuming; it takes about 6 hours for one person to clean 20 kg.

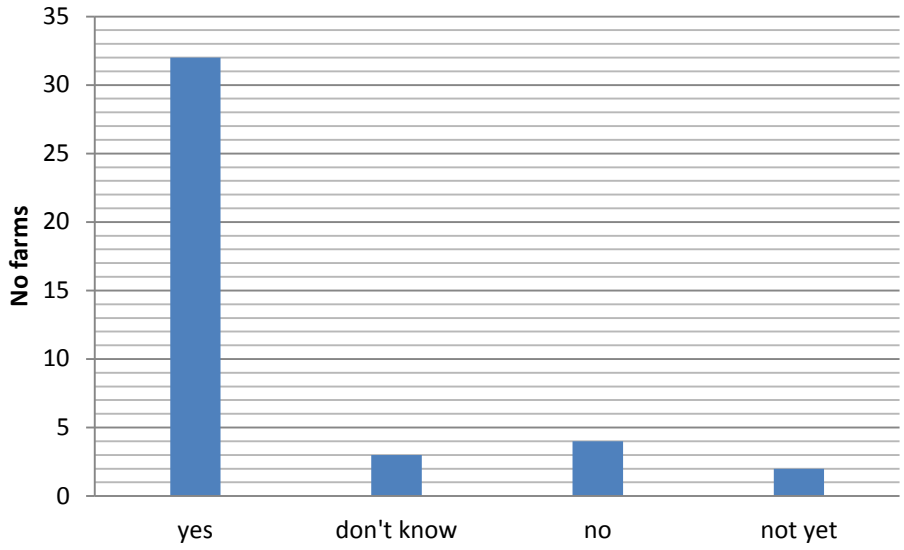

Figure 2 Farmers perception of quinoa, Would you like to grow quinoa on your land, N= 41.

5 out of 8 farmers that have tried to grow quinoa and they find quinoa more yield stable relative to other crops. However this experience is only based on 2-3 years.

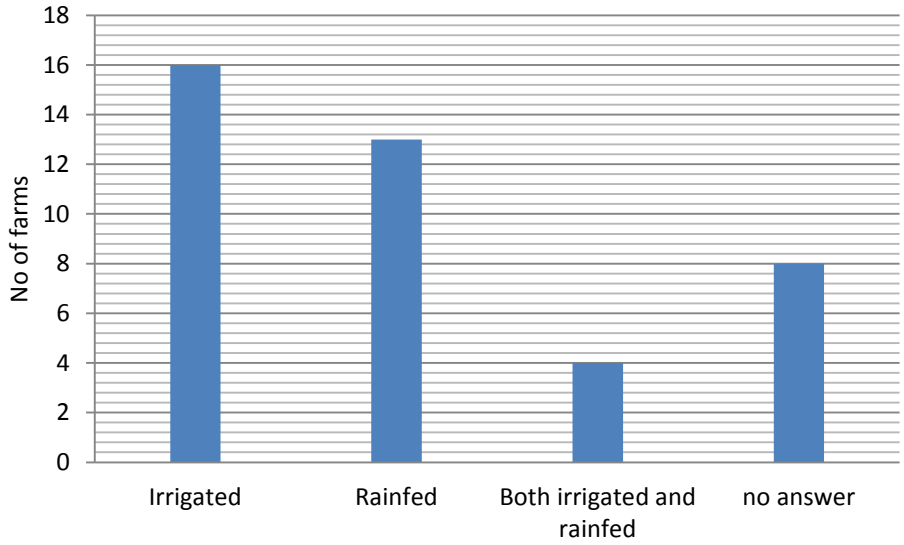

Figure 3 Would you like to grow quinoa on rainfed or irrigated areas?, N = 41

16 farmers would like to grow quinoa on irrigated land and 13 farmers would like to grow on rainfed. Iin addition, 4 farmers would like to grow on both irrigated and rainfed land.

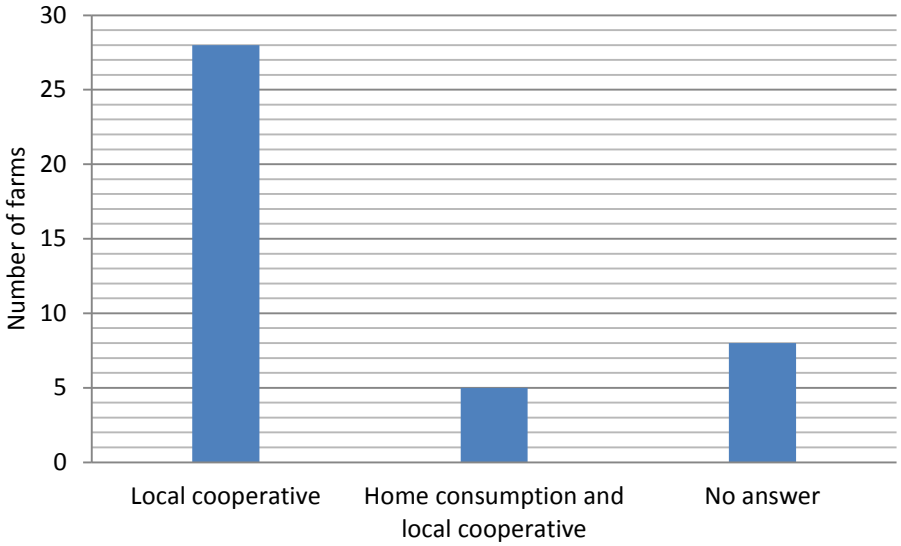

Figure 4 Market channels used by farmers to sell their products, N= 41

In the cleaning process, up to 5 steps is involved including grilling, de-hulling and packaging.

The Moroccan market is divided into a formal and informal market. The local market consists of the souk, local restaurants and other farms and families in the community. The rural souk can be regarded as a rural supermarket but often open once a week at different places. The first day it may be in one village/town and the next day it may be in another neighbor town/village. Usually, farmers sell their commodities on these local markets.

The market price paid to the farmer from the women's' cooperative is currently 40 MAD pr. Kg (Dirham) before cleaning and packaging (2012). The women's cooperative are then paid 60-80 MAD per kg at the market in Marrakesh for a cleaned product. This price is paid to the farmers from the women cooperative is well above the price paid on other markets.

The formal market is aimed for the industry, bakeries and for exporting. For exports, it is important that the producer or exporting company fulfills the standards that are set by the importing company/country. In the formal market, ONICL is the main coordinating body of the cereal and legume market in Morocco. The role of this institution is to make sure that there is enough cereals on the market and that the Moroccan society have a certain level of food security. About 200 companies/actors buy cereals from the farmers in Morocco and sell the commodities to the processing and milling industry. Main actors are located in Casablanca, Meknes, Fes and Agadir. Only bread wheat is regulated. The subsidies and regulation may differ from year to year depending on the market situation. At a national scale the yield for bread wheat is about 1200-1400 kg pr. hectare - in very good years it can be 1800 kg pr. hectare.

A crop like quinoa may have to compete with cereals at the farm level but also with other crops on the market in the larger cities and for exports.

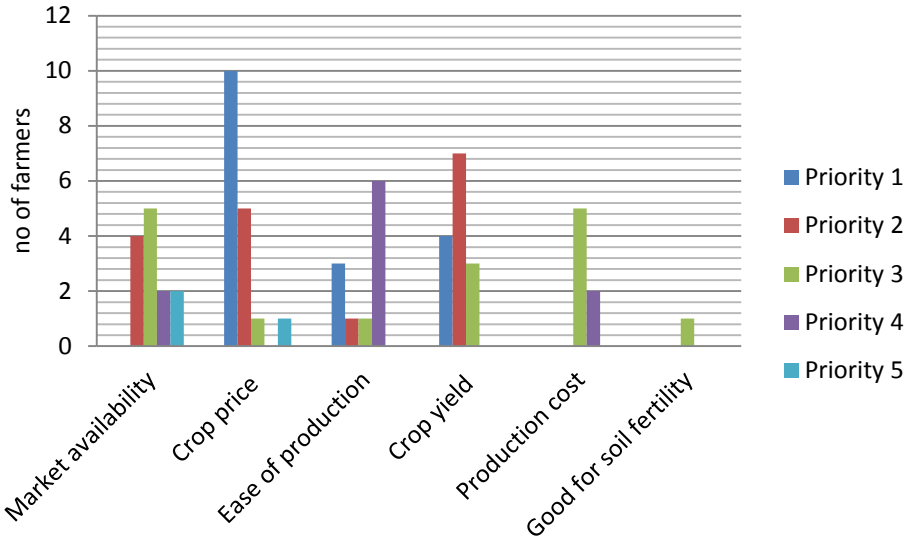

Figure 5 factors that determine the inclusion of a new crop among farmers, N = 17
Note: 1 is the highest priority and 5 is the lowest priority

To introduce a new crop it is important that the crop can provide a benefit to the farmers. The majority of farmers in Bouchane indicate that they would be interested to grow a new crop if it can deal with drought. It may be the salt tolerance factor that is most important in this regard given the fact that most farmers apply some sort of irrigation in the region. Moreover, farmers' perception of a new crop is highly related to the crop price. About 58 percent of the farmers reply that crop price has the highest priority to them compared with yield (second most important), ease of production, market availability and production costs. Production costs and good soil fertility are not major issues in regard to perception. It is surprisingly that market availability is a minor factor in regard to farmers perception. But the reason for this may be that farmers already have some experience with the crop and sold the crop on the market in Marrakesh and other cities in Morocco.

Cluster analysis

Farmers in the Bouchane region have been introduced to the crop quinoa and 19 of the 41 farmers in the survey have begun introducing the crop into their rotation. In order to get an understanding of which types of farmers are likely to undertake new crop varieties, cluster analyses are used to group farmers according to characteristics.

Cluster analysis is a method that uses a minimum of prior assumptions or theories but instead attempts to let data reveal structures and patterns in the data. The analysis begins with a hierarchical cluster analysis with the aim of determining the number of distinct groups or clusters in the dataset. In the hierarchical analysis, Ward's method is employed. Ward's method is the most commonly used algorithm for hierarchical cluster analyses and has the property that the number of objects, in this case farmers, in each cluster do not differ too much. Subsequently, in order to refine the grouping of farmers a non-hierarchical cluster analysis is undertaken, which use the number of clusters obtained from the hierarchical cluster analysis as given. The non-hierarchical clustering procedure minimise within-cluster variation and maximise between-cluster variation using Euclidean distances.

The analysis attempts to identify determining characteristics of farmers that shape their attitudes towards quinoa and new crops. Naturally, farmers have to be grouped according to variables of interest. Hence, the analysis is restricted by available data on farmers. Furthermore, some variables have only limited variation between farmers making them unsuitable as determining characteristics.

Some of the variables in the survey have very little variation between farmers making them unsuitable for statistical analysis. Furthermore, some variables correlate highly, whereby the inclusion of one of these variables by extension also implicitly includes the other correlating variables. In the cluster analysis the chosen variables are:

- Family size
- Area of rainfed agricultural land
- Are used for quinoa production

Quinoa is more drought tolerant than traditional crops and may thus be considered a choice for rainfed areas. Moreover, the amount of rainfed area correlates strongly with farm size in terms of hectares of land per farm. Hence, farm size is implicitly included in the variable area of rainfed agricultural land. The family size could have an effect upon the choice of introducing quinoa into the crop rotation. On the production side, quinoa may require a different mix of labour input and the fact that quinoa is a new crop might provide for additional labour. From a marketing perspective, quinoa can be a cash crop to be sold through available market channels or as a crop for home consumption with beneficial nutritious properties.

Table 1 shows part of the clustering history of a hierarchical cluster analysis applying Ward's clustering method.

Table 1. Clustering history of a hierarchical cluster analysis applying Ward's clustering method ().

Cluster no.	Number of farmers	R^2	PsF	PsT^2
4	23	0.89	101.0	12.4
3	16	0.86	113.0	13.6
2	39	0.66	76.2	57.2
1	41	0.0	.	76.2

Cluster analysis does not come with a solid statistical foundation in terms of probability distributions due to the number of possibly quite disparate variables used. Therefore, the selection of the number of clusters requires an element of evaluation by the researcher. However, some indicative measures provide some guidance. In table 3, pseudo-F (PsF) and pseudo-t^2(PsT^2) values are displayed. A large pseudo-F value relative to the preceding value indicates a stopping point. For the pseudo-t2 statistics, the procedure is to move down the column to stop a value markedly higher than the preceding one and then move one cluster up. To further aid the selection of the number of clusters, a measure of the proportion of variance in the data accounted for is provided using the squared multiple correlation, R^2.

Both the Pseudo F- statistic and the Pseudo t^2-statistic suggest three clusters with 86 % of the variation accounted for by the choice of three clusters. The hierarchical clustering method is an irreversible procedure, which means that once an object has been assigned to a cluster, the object cannot change to another cluster even though cluster characteristics might change significantly as more and more objects are clustered. Therefore, applying the choice of the number of clusters from the hierarchical procedure, a non-hierarchical procedure is performed with the objective of refining the clustering of farmers.

Table 2. Taxonomy of farmers using a non-hierarchical clustering procedure.

		<----------	Cluster means	---------->
Cluster no.	Number of farmers	Family size No. persons	Rainfed area, ha	Quinoa area, ha
1	23	6.57	6.27	0.31
2	16	8.75	20.78	0.49
3	2	14.50	72.00	0.00

In table 2 results of the non-hierarchical clustering procedure with three clusters is shown. Cluster one is the largest with 23 of the 41 farmers. It is characterised as consisting of the smallest farmers and having the smallest average household. Nevertheless, farmers in cluster one has undertaken to grow the new crop quinoa on around one third of a hectare. Cluster two contains 16 farmers that have on average assigned around one half of a hectare to grow quinoa. The size of farms in this cluster is almost three times as large, as farms in cluster one, and they have a larger household. The third cluster consists of only two farms that do not grow quinoa. It is the largest farms both in terms of area and family size.

Based on the cluster analysis, it appears that larger farms are less likely to undertake growing quinoa. Furthermore, a relatively small household does not prevent farmers from introducing a new crop like quinoa. However, the sample is collected among farmers that almost all already grow quinoa thereby making conclusions about determining characteristics for potentially choosing to grow quinoa for currently non-growing quinoa farmers uncertain. Nevertheless, the few farmers in the sample not growing quinoa have uncharacteristically large farms and households.

Among the reasons for introducing quinoa to farmers in Morocco is the better resilience of the crop towards drought and salinity, which should in turn provide for more stable yields. Farmers in the Bouchane region were asked if they consider the yield of quinoa to be more stable relative to other crops. The average response for the groups, where 2 = yes, quinoa provides for a more stable yield, 1 = don’t know, 0 = no, results in 0.26 for cluster 1, 0.25 for cluster 2 and 0 for cluster 3. Thus, the farmers in the Bouchane region do not appear to consider quinoa as a safer crop than alternatives.

This result is further underlined by the fact that only 8 out of 23 farmers in cluster 1 would like to grow quinoa solely on rainfed areas, in cluster 2 it is 4 out of 16 and 1 out of 2 in cluster 3. This corresponds somewhat to the number of farmers who experience problems with drought on their land. For cluster 1, 10 farmers answer yes to having drought problems, 5 farmers in cluster 2 and 1 in cluster 3. Salinity is

much less of a problem in the Bouchane area, only 2 farmers answer yes to having problems with salinity, both in cluster 1.

A subset of farmers were asked to rank their reasons for choosing a crop. The results are presented in figure 6.

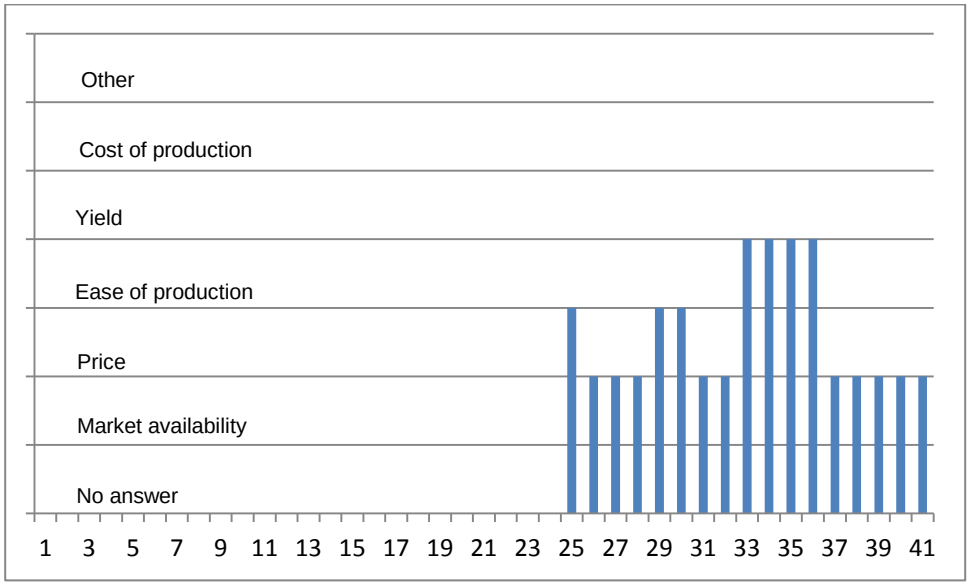

Figure 6. Farmers priorities for choosing a crop

The figure shows that of the farmers that have answered most prioritise price over other considerations for choosing to grow a crop. For four farmers, yield is the first issue and for only three, ease of production appears to be the most important characteristic. Yield and price both have a direct on the farm income, but yield may be more important of some of the crop is used for home consumption.

Summing up, it appears that the properties of quinoa that makes it a more stable crop in terms of greater tolerance towards drought and salinity is less of an argument for farmers in the Bouchane region. Although they can be said to experience drought problems to a moderate degree, salinity problems are only affecting a few farmers. Price is the most determining characteristic of a crop that provides for farmers introducing it into the crop rotation. This is mirrored in the farmers' response to the question of whether they expect to sell the crop or use it for domestic consumption. Only five of the 41 farmers plan to use quinoa for domestic consumption while the vast majority expects to sell the crop on the market.

10. Discussions

Quinoa is already imported in large quantities from Bolivia and Peru to the European market. In this respect there is already an established market for quinoa in Europe.
Morocco's export revenue is dependent upon being able to sell food products at the EU-market.

Findings from this study and interviews with farmers show that several farmers in Bouchane, Morocco have previous knowledge about quinoa from their neighbors. Many farmers indicate that when they consider the introduction of a new crop they see price and yield as important parameters.

A number of farmers perceive quinoa as a likely crop to be included in their crop rotation if the current prices can be obtained on the market.

However, in reality the current price of quinoa among farmers is well above the expected long term price. The market is still inmature in the sense that only a few growers have tried the crop and a formal processing and distribution system is still in its infancy.

On the consumers' side, quinoa is especially good for people who are intolerant to gluten which could be an important market segment for the domestic market and for exports to Europe.

Table 3 gives an overview of advantages and barriers for implementing quinoa as a new crop among farmers in Bouchane.

Table 3: Advantages and barriers for implementing quinoa as a new crop among farmers in Bouchane.

Advantages	**Barriers**
• Drought resistant • Salt resistant • High price • Gluten free (added value) • High durability	• Low yields compared with cereals • Difficult to get seed • Competition with other high yielding crops • High content of saponine – quinoa must be cleaned before consumption
Specific to Bouchane • A significant share of rain fed areas. • Initiatives made by women's cooperate to clean quinoa • A high value on restaurants in Marrakech • Can be used for couscous (Morocco)	*Specific to Bouchane* • Irrigation scheme is about to be implemented which may cause competition from other crops

Farmers' incentive to grow quinoa will also depend on the marginal benefit of growing quinoa compared to existing crops. On rain fed areas quinoa may have advantages due to drought resistance – but on irrigated lands it may have to compete with other high value crops like water melon, carrots etc.

Nowadays the introduction or production of a new crop should start by first considering the market. Several food companies (e.g Unilever, Nestle, DANONE etc.) base their new product development process in the market research with the aim to identify new food trends or new market needs. One of the biggest food trends is currently the health and wellness trend (Vaidya and Mogelonsky, 2007; Bogue and Yu, 2009; Kearney, 2010). Schaafsma and Kok (2005) indicate that most of the top managers of the food companies and retail sector expect a strong and further growth of the health food trend. Part of this trend is also the "free-from trend", which has to do with products that are free from certain ingredients. . As is the case of celiac consumers who are intolerant to product that contain gluten. There are several drivers that suggest that food companies are going to produce more types of free-from (including gluten free) products in the next ten years:

- The celiac disease is the most under diagnosed diseases in the world (Bogue, 2011)
- Health as a motive to buy free-from products, these products are perceived to be healthier.
- Higher profits for food companies because these products have high added value.
- The global market of "free-from" products in 2010 was worth USD 1.7 billion with a growth rate of 25% per year; by 2015 is expected that the global market will be USD 4.3 billion (Bogue, 2011)
- Free-from as a means for food companies to differentiate their products in the saturated markets.

From the discussion so far, there appears to be a significant market potential for quinoa since it is a gluten free product. Strategies that aim to introduce this crop in the Mediterranean region should attempt to establish links between food companies or farmers' cooperative that operate in these regions (e.g. ULKER, ETI, etc.) and the farmers.
For example, a strategy should aim to increase the awareness of quinoa to these companies. Moreover, the potential benefits of gluten-free food in the industrialized countries and also cities like Marrakesh should be addressed. By doing so it is more likely that the introduction of quinoa in the farmers production system will be a success.
The creation of a market for quinoa in Morocco has several beneficial effects for the two regions. One of these benefits is in regard to production of lands that have elevated levels of salinity and are not used for other crop production. A drawback of quinoa is its low yields and relatively high labor consumption due to cleaning compared to corn and wheat – especially in regard to local consumption where yield are regarded important. On the other hand, quinoa has a higher price in the international market compared to corn and wheat. Therefore, the low yield levels and high labor costs can be covered from the high price.

11. Conclusions

Findings from this study indicate that most farmers know about the crop in Morocco. All the farmers said that when they consider the introduction of a new crop in their production system, they make a comparison between crops that they already produce and the new crop. First of all they look at the product prices and yield

A number of farmers perceive quinoa as a likely crop to be included in their crop rotation if the current prices can be obtained on the market.

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Institutional barriers for producing quinoa in Morocco – a description of supply chain and markets

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The objective of this paper is to provide a description of the Moroccan supply-chain and discusses potential barriers for introducing a new crop into the marketing chain. The development of the Moroccan domestic market towards a bigger share for large supermarket chains puts some requirements on farmers both in terms of quality, quantity and timeliness of supplies. Local markets, SOUKs, are not expected to present similar obstacles although knowledge of the crop and acceptability of the same by domestic consumers need to be considered. Quinoa is a relatively new crop to Maroccan agriculture and is, therefore, not generally incorporated into the supply chain. Consequently, this paper looks primarily at cereals substituting as a parallel for quinoa given that quinoa displays characteristics and uses similar to traditional cereals.

Moroccan agriculture is relatively advanced with a supply chain capable of meeting the requirements and standards needed to export to the EU-market for a number of agricultural products, which Morocco has cultivated for a long time. This institutional set-up provides a basis for introducing a new crop that has some benefits related to problems faced by Moroccan farmers and potentially could contribute with a higher-value product for Moroccan exports as well as a protein-rich commodity for domestic consumers.

Export markets, particularly the EU, enforces quite rigid standards and requirements that have been met by Moroccan exporters on a number of products, particularly fruit and vegetables but also traditional cereals. Thus, the basic institutions in the supply-chain are in place. Introducing a new crop into the export supply-chain comes with a number of challenges in addition to the need to create a market for quinoa among European costumers and retailers. Experiences from other African countries that have been successful in creating a market in the EU for specialised products are related to the situation in Morocco.

The EU is the world's largest consumer of quinoa, CBI (2012). For 2009, the EU market is estimated at a value of 14 mio. € corresponding to about 6,500 tonnes, which is almost 5 times the size of the EU

market in 2005. Thus, consumers and companies in the EU is increasingly acknowledging the benefits quinoa offers and in turn creating a promising destination for exporters.

Interviews undertaken in Morocco is analysed aiming at producing a taxonomy of potential customers in the Moroccan supply-chain. Different groups of potential customers are grouped according to their position along the supply-chain as well as according to structural characteristics.

The market for food and agricultural products is expanding globally and has provided opportunities for developing countries to reap increasing benefits of the international division of labour, which in turn have enabled these countries to capture a significant share of world trade, Diop and Jaffee (2005). An example from Madagascar, Minten et al (2009), shows that the new dynamics of the globalised food and agricultural markets has allowed small-holder farmers in a developing country to build up a niche for a specialised high-value product, in this case French beans sold to European supermarkets. Because these beans are hand-picked, quality is perceived superior and it fetches a price in European supermarkets that is twice or three times higher than the price for the more industrial produced French beans in Europe. Nevertheless, exporting food and agricultural products to markets in developed countries in particular requires that products and production processes conform to standards to ensure health and safety. The rapid expansion of large agricultural corporations and retailing companies that makes arrangements with local farmers and agents in turn provides these with knowledge and capacity in order to ensure that products comply with requirements. However, these corporations and retail companies often set their own standards in addition to international agreed specifications, Reardon et al (2003); Weatherspoon et al (2001).

Quinoa originates from South-America and is propagated as a seed that is resistant to drought and frost and frequently is cultivated on poor soil, Vilche et al (2003). Furthermore, quinoa is found to exhibit more tolerance towards soils with increased levels of salt than e.g. wheat, Wilson et al (2002). Quinoa is a pseudocereal, which has a high nutritional value including higher protein levels and lower on gluten relative to traditional cereals, Gallagher et al (2004). Schoenlechner and Berghofer (2002) completed trials with both quinoa and amaranth (as a 40% replacement for wheat flour in a yeast bread formulation). They found that the bread quality (loaf volume and crumb softness) and nutritional aspects, including dietary fibre content were improved when the dough moisture was increased to 65%. Quinoa has some characteristics that make it a high value crop compared with cereals even though it is not a grain but a seed and is in the same family (goosefoot) as sugar beet and spinach. As shown, quinoa is a high-protein, gluten free product and contains a good mix of essential amino acids, which makes quinoa an attractive alternative to traditional cereals in many uses. Quinoa is used in the same way as a grain such as flour for food use. Quinoa is relatively drought resistant and salt resistant compared with cereals. It is traditionally cultivated as an organic crop. However from a logistic point of view it has to be cleaned for saponine and yields are currently low compared with other crops. A

benefit of quinoa being gluten free is that a significant market potential among costumers that are allergic or intolerant to gluten exists. Furthermore, quinoa is priced at a level, at least currently, that makes it a profitable crop compared with traditional cereals and makes up for the decrease in yields.

Moroccan agriculture

Some basic indications for Morocco and the agricultural sector are presented in table 1. The same indicators for the EU are included in the table to make it possible to compare Morocco with its close neighbour and main trading partner. Morocco has a population of 32 million people and a total gross national product (GDP) of EUR 73 billion. In 2011, the GDP per capita was EUR 2218 which was about 10 % of EU GDP per capita. The agricultural sector contributed with 15% to the country's GDP while 41% of the population is employed in the sector. Comparing these figures with the EU, Morocco has some of the characteristics of being a developing country, which includes larger shares of employment and GDP coming from agriculture, Aksoy and Beghin (2005).

Table 1, Basic Indicators of Morocco Compared with the EU

	Morocco	EU
Population (million, 2011)	32	504
GDP (billion EUR, 2011)	73	12768
GDP per capita (EUR 2011)	2218	25350
Agriculture value added (% of GDP, 2010)	15,4	1,5
Employment share in agriculture (%)	40,9 (2008)	5,1 (2010)
Agricultural Area (ha, 2010)	8.988.300	174.974.000
Average farm size (ha)	6 (2000)	13 (2010)

Source: World DataBank, EUROSTAT

Moroccan agriculture is dominated by relatively small-scale farms, where each farm on average has around 6 hectares of agricultural land.

The sector faces different obstacles according to the International Fund for Agriculture Development (2008). These obstacles can be listed as

- Land tenure factors, where especially the Moroccan agriculture is dominated by small size farms that can be an issue towards future investments
- Frequent climatic fluctuation that raises risks of the production and increases the instability for the farmers and the sector as a whole
- Overgrazing, exploitation of soil, erosion which impacts the country's natural resources
- Lack of access to investment credit to develop the sector
- Poor professional organisation amongst farmers and thereby little bargaining power of the farmers
- Wide spread illiteracy and lack of education amongst farmers
- Low levels of technical training used in the agriculture and in the different production processes

Production

Cereals are the largest agricultural production in Morocco, where 68% of the land is used for growing cereals (International Fund for Agricultural Development 2008). From figure 1 the Moroccan total output value of crops and animals are presented. The figure shows that crop production including cereals in general is the largest but also more fluctuating than animal output.

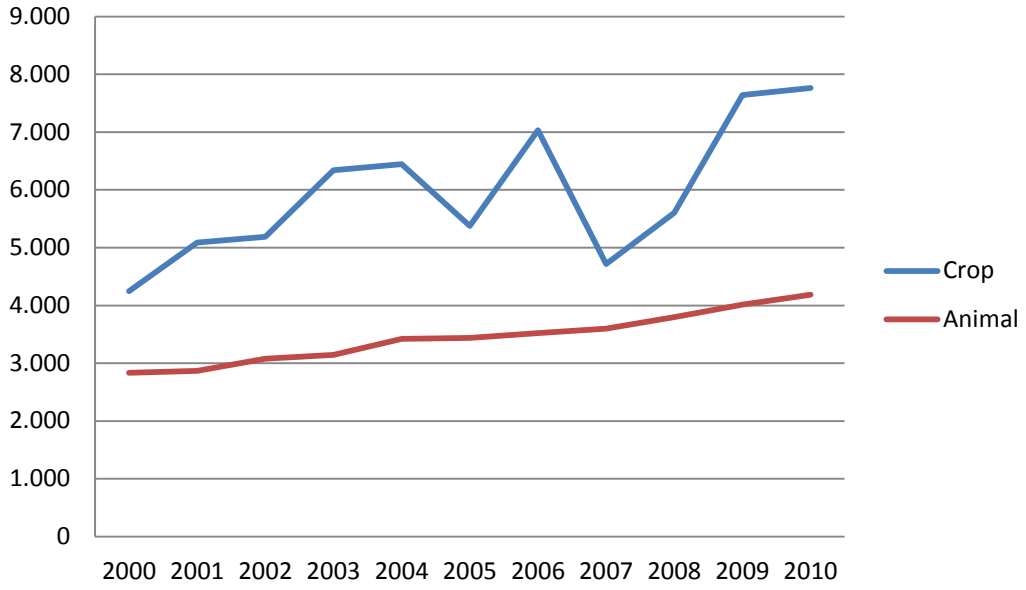

Figure 1. Development in the output values of crops and animals, 2000-2010 (millions of EUR, 2000-prices) in Morocco
Source: EUROSTAT

Irrigation is an important factor in Moroccan agriculture, particularly when growing cereals and other crops (FAO 1997). 13% of the arable land is irrigated necessitated mainly by the climatic conditions and droughts in the North-Western parts of Africa. The irrigated areas contributes around 45% of agricultural value added and 75% of agricultural exports (International Fund for Agricultural Development 2008).

In figure 2, the production quantities of fruit, vegetables and cereals are provided. From the figure it is seen that the production of fruit is more or less stable around 2.5 million tonnes annually, while the production of vegetables has increased from 4.3 million tonnes in 2000 up to 7.5 million tonnes in 2010. Moreover, figure 2 displays that the production of cereals are highly volatile with a minimum production of 2 million tonnes in 2000 and 2.5 million tonnes in 2007 and a maximum production in 2009 of 10.4 million tonnes.

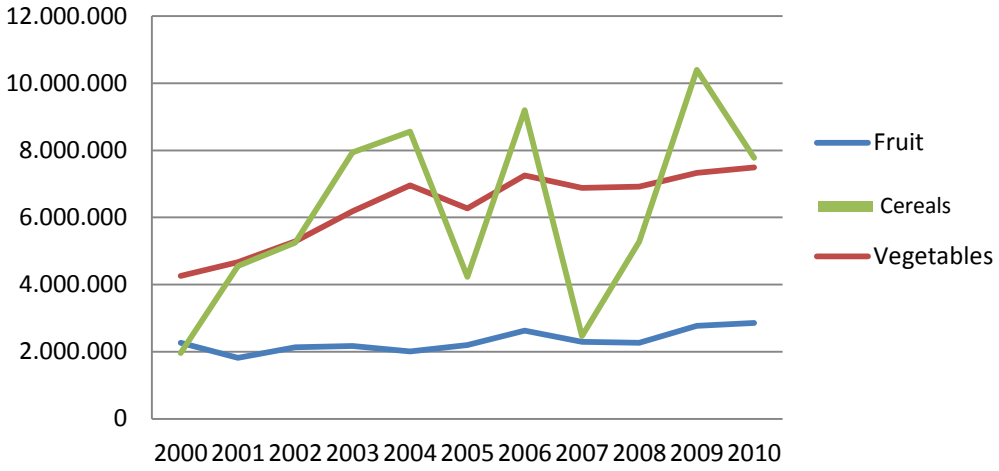

Figure 2, Production of fruit, vegetables and cereals in the years 2000-2010 (tonnes) in Morocco Source: EUROSTAT

Consumption

In Morocco, the consumption of wheat is estimated at 258 kg per person annually, which is a high level by world average standards. Barley is mostly consumed as animal feed in Morocco. In 2011-12, the total consumption of wheat was around 8.2 million tonnes, where around 40% were imported. Due to the Moroccan-EU free trade agreement most of the wheat is imported from EU mainly from France. One of the reasons why the import of wheat is quite high is that the quality of the wheat harvested some years has been of poor quality and are, therefore, instead used as animal feed. Especially 2011 was a poor harvesting year due to lack of rainfall, late sowing and unusual cold periods (USDA 2012).

One million tonnes of the wheat produced is procured by the government with the objective of keeping the price low for Moroccan consumers. The distribution of wheat is highly controlled and governed by the state and therefore commonly known as “national flour”. Moreover, the government subsidise the planting seeds purchased by the farmers with 40-60% of the actual costs. In addition, the government subsidise farm machinery and irrigation equipment (USDA 2012).

Trade

Morocco is a net-importing country with a total import value of EUR 13.3 billion and exports around EUR 7.4 billion in total, as documented in table 2. Amongst the main export commodities of Morocco

are the marketing of citrus fruits, vegetables and fish, while wheat is amongst the country's main import commodities (Central Intelligence Agency 2011). From table 2, it is seen that EU by far is the main trading partner of Morocco with 50% of the country's total imports and 59% of the country's exports.

Table 2. The Top Five Major Trading Partners with Morocco in 2010

Rank	Import	Value, EUR mio.	Share of total import, %	Rank	Export	Value, EUR mio.	Share of total export, %
1	EU27	13,284	50.2	1	EU27	7,365	59.1
2	China	2,125	8	2	India	742	6
3	United States	1,876	7.1	3	United States	453	3.6
4	Saudi Arabia	1,567	5.9	4	Brazil	414	3.3
5	Russia	940	3.6	5	Switzerland	234	1.9
	World (all countries)	26,440	100		World (all countries)	12,456	100

Source: European Commission and EUROSTAT (2013)

To foster more trade with countries and regions Morocco is engaged in different trade promoting forums and agreements such as; the Euro-Mediterranean Free Trade Area (EMFTA), World Trade Organisation (WTO), Agadir Agreement[1], the United States-Morocco Free Trade Agreement, Morocco-Turkey Free Trade Agreement, and the Arab Free Trade Zone (European Commission 2012, USTR, Moroccan Investment Development Agency).

Looking at agricultural commodities Morocco is also a net-importer. In figure 3 the relationship between the country's imports and exports values are provided. Mostly the increasing import and export follows each other, but in 2007-08 the import value takes a hike most likely because the domestic production of cereals and especially wheat was at a low level, as earlier presented in figure 2. This was also the year of the most recent international food crisis where food prices for cereals, oilseeds and dairy products rose dramatically on a global scale due to a decrease in supply of these food commodities (Jones and Kwiecinski 2010) which also was the case in Morocco.

[1] An agreement with Egypt, Jordan and Tunisia about reducing tariffs and harmonization of legislation

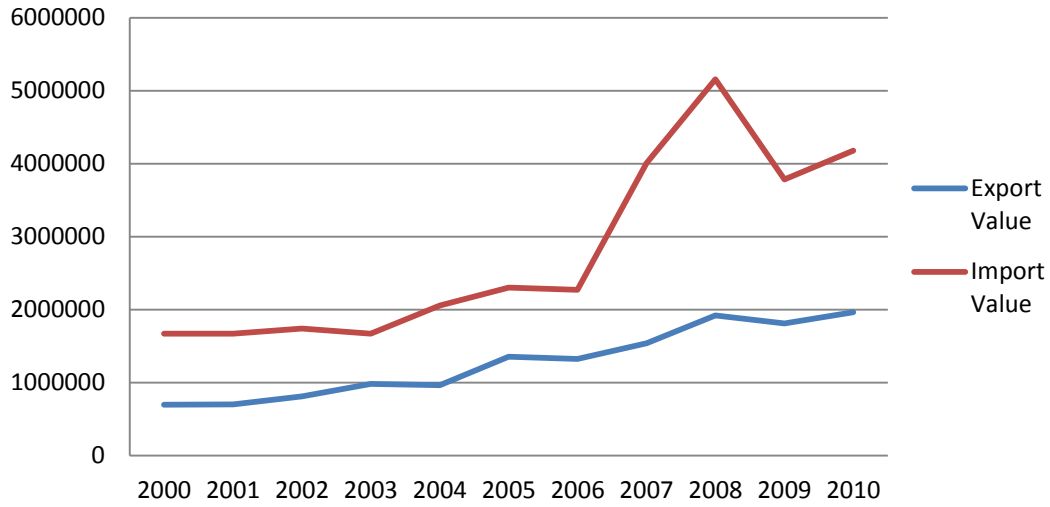

Figure 3, Morocco's trade with agricultural products in 2000-2010 (USD 1000)
Source: FAOSTAT

Climate changes are causing changes in Moroccan agriculture as in other of the Northern Africa countries. Several episodes of drought have already been experienced and future negative warnings of climate changes include rising temperatures and reduced rainfalls as well as higher variability of climate and water resources (FAO 2011). This could be a contributing factor behind the fluctuations of imports of cereals for the last ten years illustrated in figure 4.

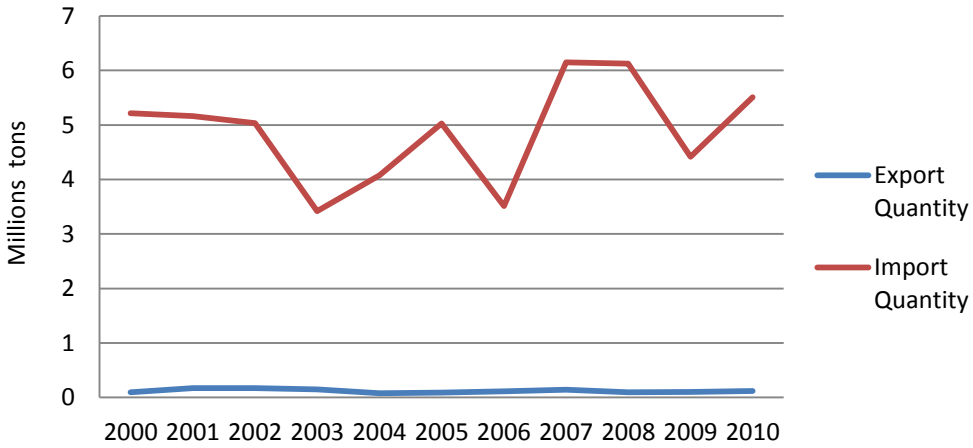

Figure 4, Export and import quantities of cereals in 2000-2010 (tons)
Source: FAOSTAT

Supply chain

Figure 5 shows elements of the Moroccan supply chain related to quinoa. The first column describes activities on the farm from where the product is passed on to local processing activities shown in the second column. Subsequently, the product proceeds to reach consumers through either the informal market or the formal market. The informal market consists of other farms, local markets (Souks) or local restaurants. The formal market entails a more rigid procedure aiming at ensuring the product conforms to standards set by international bodies, national authorities or businesses. Specifically, if the product is to be exported to the EU a number of specific standards have to be met, particularly the standards of the SPS-agreement of the WTO.

Local produce of Quinoa has only been introduced on the market in Morocco in modest amounts from farmers in the Bouchane region, which is located in the Province, Kelâat Sraghna. The farm gate price paid to the farmers from a local womens' cooperative that clean and pack the seeds is currently 40 MAD pr. kg before cleaning and packaging (2012). The womens' cooperative are then paid 60-80 MAD (6-8 Euro pr. kg) at the market in Marrakesh for a cleaned and packed product.

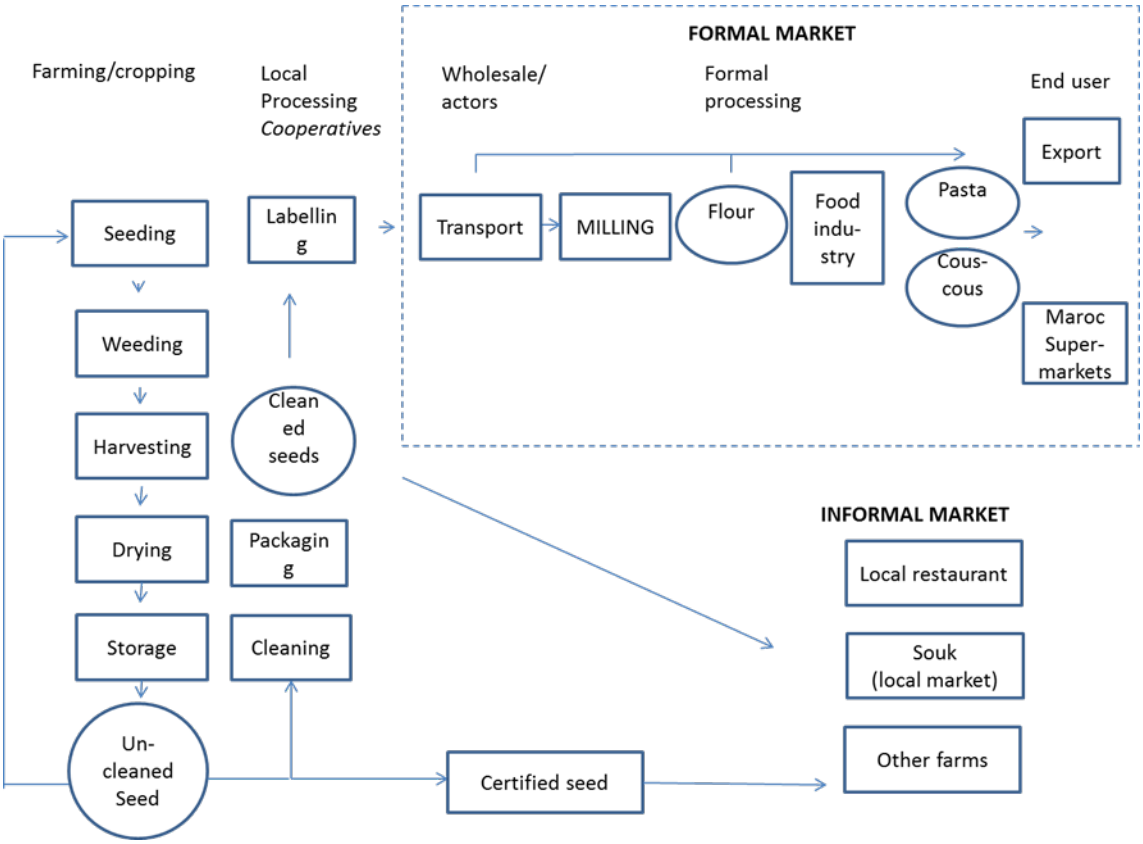

Figure 5, Moroccan supply chain

The Moroccan farmers have the option to either sell their products on the free (and mostly local) market or through official channels at a minimum government guaranteed price. Most of the grain that goes through the official channels is wheat. Grains delivered through official channels are sold to either grain merchants, flour mills or cooperatives. The distribution shares of these three official channels are 69, 26 and 5%, respectively, according to USDA (2012). The quantities of wheat and other grains procured by the state grain agency ONICL is presented in table 3 which in average is around 50% of the total domestic production of wheat.

Table 3, Grain Channelled to Licensed Agents in 2002-2011 (1000 tonnes)

Marketing year	Common wheat	Other grains *	Total
2002	1,092	42	1,134
2003	1,013	33	1,046
2004	1,507	45	1,552
2005	1,860	30	1,890
2006	1,651	20	1,671
2007	2,479	20	2,499
2008	519	13	532
2009	1,388	25	1,413
2010	2,658	42	2,700
2011	1,841	31	1,872
Average	**1,601**	**30**	**1,631**

Source: Moroccan Cereal Office and USDA 2012

The guaranteed prices Moroccan farmers receive are considerably above world market prices, see table 4. The table shows the price of common wheat for three months, primo and ultimo. Evidently, the Moroccan wheat price is considerably higher than the world market price in all periods shown in the table. Furthermore, the change in the Moroccan wheat price does not appear to be linked closely to changes in the world market price. For instance, from primo to ultimo Dec. 2009 the world market price declined, whereas the Moroccan price increased.

Table 4, Wheat prices

	Dec 2009		**Nov 2009**		**Dec 2008**	
Morocco Euro/ton	219	240	201	228	208	260
World Euro/ton	147	134	130	139	133	148

Source: C. Lemerle (2011)

Even though farmers are paid a price of wheat significantly above world market prices, the price of quinoa is even higher. Farmers from the womens' cooperative is paid around 8 times higher than the Moroccan wheat price. Thus, at present at least quinoa presents a profitable alternative to farmers albeit substantial increases in production volume would have to be paralleled up the supply chain and would probably lead to some decreases in price.

Looking at the food retail sector three main categories supply channels for the consumer can be identified according to the USDA (2009):

- Large retail and wholesale supermarkets
- Small retail supermarkets, convenience stores, large grocery stores
- Small Independent grocery stores

Of the large supermarkets there are around 38 stores and most of them located in the larger cities such as Casablanca, Rabat, and Marrakech. Mainly the mid- to high income consumers use these to purchase both food and non-food commodities. A wide range of food products are found in the large supermarkets including imports and domestic products and accounts for around 40-50% of the total sales in these large supermarkets. Some of these supermarkets are Marjane, METRO, and Aswak Assalam (USDA 2009).

Around 400 small retail supermarkets exist in Morocco of which some are independent, some are part of a hyper chain and some have self-service. These supermarkets include butcher shops, frozen products and alcoholic beverages. ACIMA and the Label Vie are two of these supermarkets with 31

and 16 stores in Morocco with approximately 5,000 and 2,000 different items in each, respectively. Hanouty is another and smaller chain of convenience stores with 130 shops (USDA 2009).

The small independent grocery stores are the main source of food purchases for the Moroccan population. Mainly domestic produced food is sold in these shops and there are around 45,000 of small grocery stores in Morocco. Many of these shops are family owned and mainly occupy one full time employee. Local products are by far the largest share of food sold in Morocco mainly from small family owned shops or retail outlets. Only around 10-15% of the population frequently buys imported products (USDA 2009).

The structure of the Moroccan domestic retail sector provide quinoa producers and processing companies such as the womens' cooperative mentioned above with several options for selling their products. The local markets (SOUKs) and the small independent grocery stores rely on locally produced food products of which quinoa could be introduced. In the long-term, however, introducing quinoa or quinoa-products to the large supermarket chains could lead to more stable and standardised products, which in turn could be exported to the European market. The relatively advanced level of the Moroccan retail sector offers producers and processors with a variety of opportunities.

Moroccan food export sector

As stated by Aloui and Kenny (2004), the Moroccan food export sector has been going through a reform process since the mid-1980s. State monopoly of food exports has been abandoned, and private export groups have emerged. The current organizational framework is one in which the level of integration in the supply chain plays a critical role.

The industry is heavily dominated by integrated export groups that control the overall chain from farm to market. The producers in these export groups have access to new imported technology and benefit from the well-trained local labour force, know-how and logistics. There are also a number of small non-integrated farms that are surviving more or less marginally. Newcomers in the industry are rare, especially in citrus, due to certain barriers in the land market.

The Moroccan export activities can be categorised according to one of three supply chains:

1. Integrated channel, in which exporters control their supply and packing facilities from the farm to the market

2. Traditional channel, in which farmers sell to exporters that manage packing houses

3. Semi-integrated channel, in which exporters control only a part of their supply

Regardless of the channel used for exporting farm products, exports are required to fulfil a number of standards. Standards are increasingly regulating international trade. Health and safety standards are regulated according to the SPS treaty under the WTO and the Codex Alimentarius under the UN. The Moroccan export sector has a long tradition of technical regulation. Since the early 1940s, a technical approval after inspection has been a precondition for exporters of fresh products.

Second, during the first 30 years after Independence (1956–86), export of food products was under a public monopoly (Office de Commercialisation des Exportations, or OCE). As a public institution, OCE trained farmers and exporters about quality issues and modern marketing (labeling). Its activities, while not always efficient, contributed to a general awareness of the importance of quality issues. Third, as a quota regime has been applied to major exports, exporters have progressively promoted "quality" as a way to increase the commercial value of the preferential access quotas. This has resulted in Morocco having a fairly advanced system in place in order to ensure health and safety requirements.

In theory, the decision to comply with SPS measures and implement a given certification standard may be taken at any of the three levels: farms, packing houses or exporter groups. However, in most cases, for financial, commercial, technical, and logistical reasons, the packing house is the main and the first level where the decision to implement any kind of standard is taken. This constitutes a driving force for the lower (farmers) and higher (exporter groups) levels of the organizational structure to adopt a similar strategy of quality and biosafety standards.

Quinoa is listed as a cereal in the EU market access system. EU has a trading arrangement with Mediterranean countries of which Morocco is a member, however in the agricultural area many exemptions from general tariff reductions exist. The Erga Omnes tariff for quinoa imported into the EU is 37 EURO / ton. However, Morocco enjoy the benefits under the GSP as a developing country, which lowers the tariff to 25.90 EURO / ton.

Concluding remarks

Agriculture in Morocco is mainly dominated by small scale farms and the production consists mostly of cereals and animals. Due to a variety of reasons the production of cereals has been fluctuating the last decade and the import of wheat has been following the same pattern. Morocco is a net-importer of agricultural products and is therefore dependent upon foreign food exporters mainly of wheat, which is consumed at high levels in the country. The distribution of farmers' products is done both through governmental channels and via the private markets. The food retail sector mainly consists of small independent grocery stores, however larger supermarkets are existing in Morocco and the developing trend of these stores are positively growing.

Morocco has a relatively advanced agricultural supply chain, which ensures capacity for taking advantage of new products such as quinoa. Furthermore, the domestic market is maturing with urban consumers willing to embrace new products. Consequently, a market for a crop like quinoa might exist both in the domestic market but also on potential export markets.

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Power between farmers and intermediaries'

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Abstract

This paper investigates the determinants of intermediaries' power over farmers' margin related activities in Turkey, and proposes a holistic model. The methodology used to understand the phenomenon of power in this research is a combination of quantitative and qualitative methods. The results of the quantitative analysis indicates that the power of the intermediaries' over farmers' activities can be explained from five sets of main factors: 1-product characteristics, 2-industry characteristics, 3-relationship characteristics, 4-farmers' characteristics and 5-farmers' access to resources. Furthermore, the analysis of the qualitative data showed that intermediaries due to their power employ a number of supply chain practices that transfer to farmers excessive risks and unexpected costs. These risks and costs compromise farmers' business position, struggling to keep up a profitable business. Therefore, it is argued that a balance of power needs to be established between farmers and intermediaries, which should lead not only to improved farmer business position but also to increased efficiency of the supply chain.

Keywords: market, supply chain, Turkey, quinoa

1 Introduction

In the literature, it is often pointed out that farmers get the lowest margin of the final product value. Several studies indicate that farmers are being "squeezed up" by the intermediaries' on the market for farm products, especially in developing countries (Thapa et al, 1995; Lantican, 1997; Murray, 1997; Banskota and Sharma, 1999; Shrestha and Shrestha 2000; Khushk, 2001; Pokhrel and Thapa 2007). As a result of their power, intermediaries transfer excessive risks and unexpected costs to the farmers. These risks and costs compromise the innovation, modernization and restructuring of the farming sector into more efficient forms. In developing countries, around 50% of the population is dependent upon farming for their livelihood. The intermediaries' power therefore impacts directly on their livelihood and indirectly on the development of the country.

Power in an inter-organizational business relationship often involves inducing change in the other organisations' behaviour. As Gaski (1996) notes, what could be more useful to an agent of the distribution channel than the ability to get customers or suppliers to comply with its preferences? Furthermore, understanding the power that exists in the business relationship among the channel members is of critical importance because power may determine channel performance, satisfaction of the channel members, rent distribution, relationship quality, channel member behavior, risk sharing, etc. However, most of the studies are focused on the downstream part of the supply chain (e.g.

manufacturer – retailers/dealer relationship), – much less attention have been put on studies that attempted to understand the power determinants for the upstream part of the supply chain (e.g. trading relationship between farmers and intermediaries).

According to Emerson (1962), power is a characteristic inherent in social relations. The idea of power is abstract and ambiguous, even though its consequences are real. In the literature, there are as many definition of power as there are authors who have written about it. Nevertheless, a general consensus exists (Gaski, 1984), to define power as the ability of a channel member to influence another channel member's behaviour or strategy decision variables in a direction that he/she would not have freely tended, which (the direction of influence) favours the one who exercised power (Wilemon, 1972; El-Ansary and Stem, 1972; Wilkinson, 1981; Dawson and Shaw, 1990).

On the other hand, as pointed out by Collins (2002 & 2007) there is not too much consensus in the literature regarding the independent variables used to explain power in marketing channels as there is on how to define it. The nature of power has been greatly illuminated by a number of authors, especially French and Raven (1959) who identified five sources of power:

- Reward power – B's perception that A has the ability to mediate rewards for B.
- Coercive power – B's perception that A has the ability to mediate punishments for B.
- Legitimate power – B's perception that A has a legitimate right to prescribe behaviour for B.
- Referent power – B's identification with A.
- Expert power – B's perception that A has some special knowledge or expertness.

This classification of the power sources has been widely used in research of power in marketing channels (El-Ansary & Stern 1972, Hunt and Nevin 1974; Etgar, 1978; Lusch & Brown, 1982; Brown *et al*, 1983; Frazier & Summers, 1986; Kastikeas *et al*, 2000). However, in this study, the relationship between power sources and the intermediaries power over farmers' margin related activities was not investigated due to the nature of the relationship of farmers intermediaries. The predominant short term relation between farmers and intermediaries and the way they are framed may prevent the identification of a reliable relationship between power sources and power as the dependent variable.

Besides the body of research of power taking the perspective of power as a function of the sources of power available to a channel member, another branch of research of power in marketing channels views power as a function of parties' dependencies. Emerson (1962) is one of the first to hypothesise a relationship of power and dependency. He points out that "…*the power of A upon B is equal to, and based upon, the dependence of B upon A*…" (Emerson, 1962, p. 33). Dependencies emerge from the interaction of two factors: alternatives and commitments (Bacharach and Lawler, 1981). Furthermore, Gaski (1984) concludes in his paper that power and dependency are conceptually inseparable. Other research of power taking on the power-dependency perspective highlights the critical role that specific investment play in the determination of dependency (Heide & John, 1988). According to Williamson (1983) "credible commitments" and "hostages" as a form of specific investments increase one party dependency on the other. Furthermore, aaccording to Provan and Gassenheimer (1994) what most studies of power in marketing channels adopting the power-dependence perspective fail to consider is that not all channel member dependencies are related in the same way to actual influence. Enz (1989) argues that while all power originates from dependence, all potential power is certainly not exercised. By extending this logic, dependencies built on relationships exhibiting high levels of trust may result in

different levels of exercised power than dependencies embedded in relationships characterised by low levels of trust.

Much of the empirical research on power in marketing channels presented above has studied power from a behavioural theory perspective by viewing it as a social phenomenon (Butaney and Wortzel, 1988). Another branch of research on power has studied power from an industrial organisation perspective. Heflebower (1957), one of the earlier researchers of power employing an industrial organization perspective, argued that sellers operating in oligopolistic markets can gain control over buyers operating in more competitive markets and vice versa. From an industrial organisations point of view, power is explained by industry characteristics such as concentration ratios (e.g. CR4) at different levels of the market channel, size of the firms etc.

The purpose of this study is to investigate the determinants of intermediaries' power over farmers' margin related activities, in the context of developing countries. Where by power over margin is meant the intermediaries' influence over farmers' activities that contribute to their profit margin, such as influence over price or influence over credit terms to the intermediary, etc. (Collins, 2002). In taking this approach, we propose to highlight some of the ways that can reduce the farmers' exposure towards the intermediaries' power with the aim of improving their position in the value chain. The study is based on semi structured interviews and a farm survey conducted in the ADANA region, Turkey.

The paper is structured as follows. First, a brief description of the farmers' business environment in Adana and Mersin in Turkey is presented, followed by a presentation of the hypothesis of this study. Next, the methodology employed in this research is described. Lastly, the results of the study are discussed and the paper is concluded.

2 Farmers' Business Environment in Adana, Turkey

This section describes the current business environment that the farmers in Adana-Turkey face. The information of this section is mainly generated from 13 semi-structured interviews and several informal interviews conducted with farmers and other agents of the farmers' business environment in the region of Adana. The focus of these interviews was to get an in-depth understanding of farmers' business environment. A first outcome is that the business relationship between farmers and intermediaries are not formal; there is often no written contractual agreement and large farmers are no exception from this. Usually, the agreements are oral. In most of the cases, the relationships are short-term and are in the form of a spot market transaction. Both parties are focused on the short term outcomes. The negotiation is framed as a zero sum game (win or lose) and there is no goal convergence between the parties in the business relation. As pointed out by Williamson (1979) these kinds of relations are characterized by a high level of transaction cost, which arises due to bounded rationality and opportunistic behavior. Furthermore, farmers have limited market channel possibilities to commercialize their products. In most of the cases, the only market channel available to sell their produce is local traders. Selling to processors, wholesalers, supermarket chains etc. is considerably more difficult (especially for small farmers), since they do not want to deal with farmers directly due to their small level of supply. The lack of market channels available to farmers is one of the main factors that contribute to the intermediaries' power to influence farmers' margin related activities. There are

also other factors that impact intermediaries' power over farmers' margin related activities, which emerged from the analysis of the semi-structured interviews. These factors are:

- Farmers access to resources: Farmers' lack of access to credit, farmers' lack of access to market information, farmers' lack of access to storage facilities and farmers' lack of available capital
- Farmers characteristics, Farmers need for money, Farmers experience, Farmers educational level
- Product Characteristics: Difficulty of transporting the product to the market, product perishability, product resistance (before harvest).

3 Study Hypothesis

Based on the literature review and the information generated form the semi structured interviews, a number of hypotheses arises regarding the nature of the relationship of the intermediaries' power over farmers' margin and a number of determinants (variables) pointed out in the previous two sections.

Hypothesis 1(Farmers access to resources): *The intermediaries' power over farmers' margin related activities is negatively related to farmers' access to credit, market information, storage facilities and availability of capital or other income sources to them.*

Hypothesis 2(Farmers characteristics): *The intermediaries' power over farmers' margin related activities is positively related to farmers need for money but negatively related to farmers' educational level and experience.*

Hypothesis 3(Product characteristics): *The intermediaries' power over farmers' margin related activities is positively related to product perishability and transportation difficulty of the product but negatively related to product resistance.*

Hypothesis 4(Relationship characteristics): *The intermediaries' power over farmers' margin related activities is positively related to farmers' perception of their dependency upon the intermediaries but negatively related to the farmer's perception of the intermediaries' dependency upon them, the level of interdependency in the relationship, farmers' trust in the intermediaries and the size of the hostages posted by intermediaries (e.g. advance payment) in the trading relationship.*

Hypothesis 5[2](Industry characteristics): *The intermediaries' power over farmers' margin related activities is positively related to the concentration at the intermediary level but negatively related to farm size, farmers selling through collective actions (e.g. cooperatives) and concentration at farm level.*

Each of the hypothesised relationships presented above cumulatively establishes a more precise understanding of the determinants of intermediaries' power. In this manner the hypotheses are intended to build upon one another. Thus, each finding represents a potential building block for a more complete understanding of the intermediaries' power. One of the strengths of such a broadened perspective is that it facilitates separating out the determinants of the intermediaries' power (Collins, 2002). Based on

[2]Unfortunately, it was not possible to operationalize the variable "farmers participation in cooperatives", since there were no farmers' cooperative operating in the study area related to the selected products.

these hypotheses, a model of the intermediaries' power over farmers' margin related activities is presented in fig. 1. These hypotheses are tested in the following section.

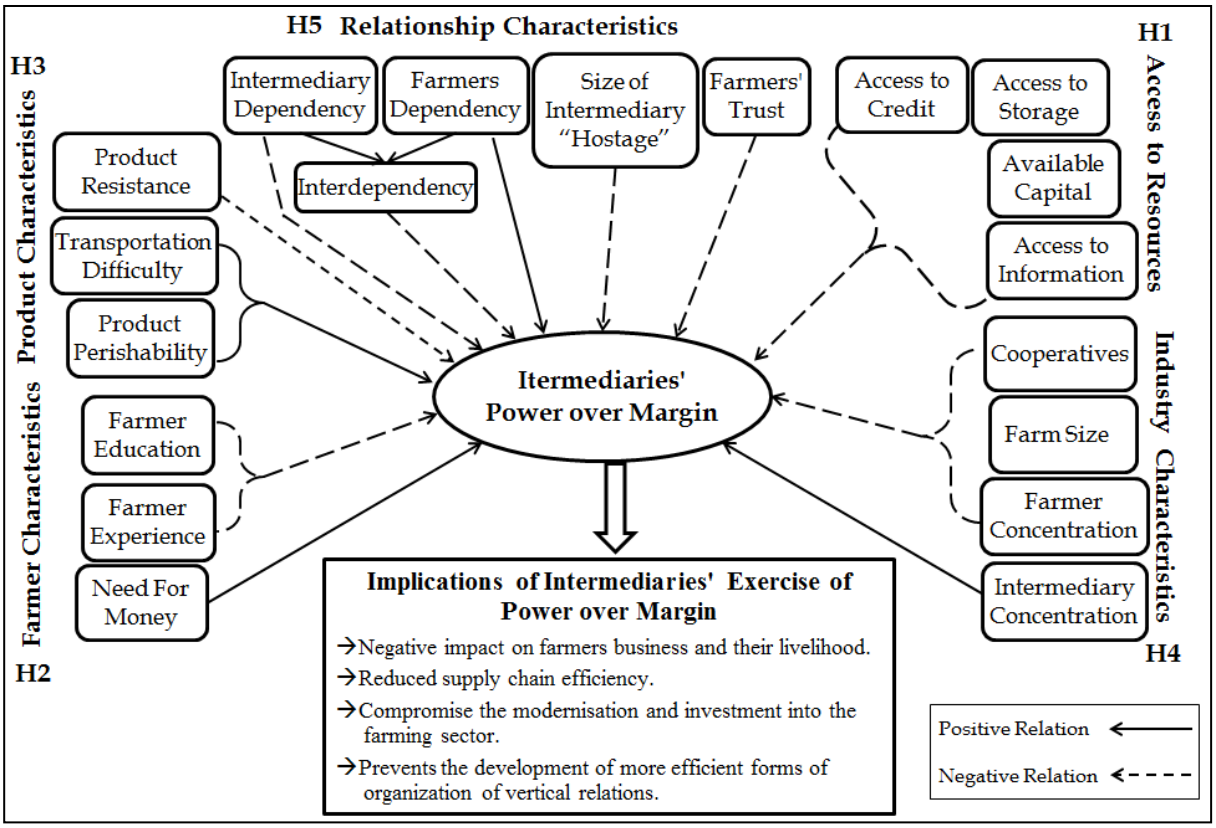

Fig. 1 A model of intermediaries' power over farmers' margin related activities

4 Methodology

This section addresses the methodology of this study. The main aim of this section is to establish construct validity for each of the hypothesized determinants and to test the hypothesized relationship presented in the previous section. The unit of analysis of this study is the dyadic relationship farmers-intermediaries. Intermediaries are here all those channel members, which in the distribution channel are placed between the farmer and the end consumer. To develop the measures of the variables of this study, the data have been collected from farmers themselves. This approach of surveying the channel member over whom power is exercised has been widely practiced in the study of power in marketing channels (El-Ansary, 1972; Hunt and Nevin 1974; Lusch and Brown 1982; Brown *et al*, 1995; Collins 2002 & 2007).

The data collection was conducted in Adana and Mersin (Turkey) with farmers that produced corn, citrus, wheat, sunflower and watermelon, between March and June 2012. As part of the initial stage of the study, a series of thirteen semi-structured interviews were carried out with key informants of distribution channels (e.g. farmers, local buyers, exporters, etc.) to investigate intermediaries' power over farmers' activities and the nature of their trading relationship. The information generated from the

analysis of these interviews was presented in section two. Moreover, the information of these interviews helped in the development of the research instrument that incorporated most of the issues important to the understanding of intermediaries' power over farmers.

The second stage of the data collection process had to do with the collection of quantitative data. A six-page questionnaire was used to measure the determinants of intermediaries' power over farmers. A cross-sectional self-administered and researcher-administered survey was utilized for data collection. The data was then analysed to ensure that no systematic error emerged from the use of these two methods of data collection. To achieve this, a series of t-test comparing the mean values of a number of constructs to identify any significant differences between the two methods were applied. The target sample frame of this study consisted of farmers operating in the region of Adana and Mersin. Three districts of Adana (Seyhan, Yüreğir and Ceyhan) and one Mersin (Tarsus) were selected purposefully because these districts cover most of the Çukurova region, one of the most productive agricultural regions in Turkey. After selecting the districts to conduct the survey, a list of farmers operating in these districts was obtained from the water use associations operating in these areas. A random sample was first applied to these lists to select the villages, followed by a second random sample to choose the farmers operating in these villages. The adoption of this approach (stratified random sampling) reduces the effect of random error and systematic error that are subject to bias in selecting the respondents. In total 92 questionnaires were completed and 137 farmers were contacted.

4.1 Measurement development

In order to carry out the analysis and test the hypothesis presented above, it is necessary to develop measures of the variables of this study. Central to any study of power is the development of a measure of the dependent variable itself. At this stage, it is necessary to point out the role of perception in the determination of a channel member's power. Bacharach and Lawler (1981) examine power between parties in a negotiation process and claim that negotiation power is perceived power. Furthermore, they point out that meaningful power in a business relationship does not exist beyond the parties' perceptions of power. March (1955) suggested that attributed influence be used to measure power directly. He also suggests capturing the opinion change due to the influence through the use of likert scale measures. There are several studies of power in marketing channels (El-Ansary and Stem 1972; Hunt and Nevin, 1974; Etgar, 1978; Lusch and Brown, 1982; Collins, 2002 & 2007) that have used perception of channel members to derive a measure of power. Therefore, the measure of power in this study is derived from farmers' perception of intermediaries' power over them.

It should be emphasized that most of the studies of power in marketing channels have seen power as a unidimensional variable (EI-Ansary and Stern 1972; Hunt and Nevin 1974; Etgar, 1976). However, as argued by Collins (2002 & 2007) power is a multidimensional variable and extends across a wide range of activities, such as margin related activities, product related activities, delivery related activities, etc. These activities represent dimensions over which power is exercised. By assuming that power is a unidimensional variable, bias may be introduced into the analysis in favor of one activity over the other. Therefore, this study follows Collins' (2002 & 2007) suggestion that the power variable is multidimensional and each dimension has its own determinants. As the subsequent analysis will show, the broad research on farmers-intermediaries' relationships that this study was nested identifies three dimensions of intermediaries' power over farmers, which are: power over margin related activities,

power over input selection activities and power over activities that contribute to losses at the intermediary stage.

To derive our measure of power, nine activities important to farmers business were chosen based on a series of 13 semi-structured interviews with farmers, literature review and discussions with key informants of distribution channels. These activities were: variety of product selection, pesticide selection, price to the intermediary, time of product delivery, the way the product is delivered, harvesting, credit terms to the intermediary, fertilizers selection and total payment of the intermediary. The extent of intermediary influence was captured for each activity by using a five point Likert scale, ranging from 1 (no influence) to 5 (major influence). To get our measure of power, the level of intermediary influence for each activity was multiplied by a weight of the perceived level of importance of each activity to the farmer. This level of importance of each activity to the farmer was also measured using a Likert scale (1 no importance to, 5 major importance). The main reason for multiplying the influence level by the importance of the activity to the farmer was to get the directional element of power. As it was stated in the definition of power in section one, power is not just influence, it is influence in a direction that favors the one who exercised it (intermediary), whereas in this direction, the one whom power was exercised over (farmer) would not have freely participated. In this context, one can exercise influence without exercising power. This method of deriving a measure of the power variable was used by El-Ansary and Stern (1972), Butaney and Wortzel (1988), Collins (2002 and 2007).

As it is shown in table 1, the exploratory factor analysis (EFA) using principal component applied to the nine activities important to the farmers business highlighted above, revealed three dimensions of intermediaries power over farmers activities, which explain the structure of the data set, accounting for 68% of the total variance. Barlett's test of sphericity (χ^2 = 236: df=36; P<.000) and the KMO test of sampling adequacy (.68) confirm the appropriateness of factor analysis (Field, 2009). While it is possible to extract as many factors as there are items, it was decided to extract only those factors that fulfilled the Kaiser's criterion for factor retention. Kaiser (1960) recommended retaining all factors with eigenvalues greater than one. All factor loadings are well in excess of Stevens (2002) recommended value of .40, providing evidence of constructs convergent validity. Factor 1 (F1) represents intermediaries' exercised power over activities that contribute to losses at their stage. Factor 2 (F2) represents intermediaries' exercised power over farmers' margin related activities and factor 3 (F3) represents the intermediaries exercised power over farmers' input selection activities. The Chronbach's α value for the power over margin dimension exceeds the cutoff value of .70, giving evidence of constructs reliability (Nunnally, 1981). Lastly, each score of the high loading items into the factor representing the power over margin were averaged to get a measure of the dependent variable of this study.

Having developed a measure of the dependent variable, the next step of the analysis is to develop measures of the independent variables that can explain power. The discussion in section two pointed out three sets of factors that may explain intermediaries' power over farmers, which were: farmers' access to resources, product characteristics and farmers' characteristics. For some of the variables of these three groups multi-item scales were used to get a measure since there was no objective measure available to the researcher. The farmers' agreement or disagreement with each of the questionnaire items was captured with a likert scale ranging from 1-strongly disagree to 5-strongly agree. The results

of the reliability analysis and exploratory factor analysis for these variables are presented in table 1 in the appendix. Five factors emerged from this analysis explaining 73% of the total variance: (F1) farmers need for money, (F2) available capital to the farmer, (F3) farmer access to credit, (F4) difficulty of transportation, and (F5) farmer's experience. Barlett's test of sphericity (χ^2 = 716: df=120; P<.000) and the KMO test of sampling adequacy (.73) support the appropriateness of factor analysis. All of the emerging factors show a good internal consistency (reliability) with Chronbach's α values bigger than the suggested value of .70 (Nunnally, 1981). Furthermore, the loadings of each item on a particular factor are bigger than Stevens (2002) recommended value of .40.

Table 1 Reliability and EFA: *Dependent variables – Intermediaries' power*

	α	F1	F2	F3
F1) Power over activities that contribute to losses at intermediary stage (POLI)	**.856**			
how much influence the major buyer of the product has on the Decision how the product is delivered		.883		
how much influence the major buyer of the product has on the Decision when the product is delivered		.877		
how much influence the major buyer of the product has on the Decision how the product is harvested		.872		
F2) Power over margin (POM)	**.727**			
how much influence the major buyer of the product has on the Decision on the Price of the product			.851	
how much influence the major buyer of the product has on the determination of the credit terms to the buyer (payment delay)			.826	
how much influence the major buyer of the product has on the Decision on the amount to be paid for the product			.753	
F3) Power over input selection (POIS)	**.662**			
how much influence the major buyer of the product has on the Decision on what variety of product to produce				.819
how much influence the major buyer of the product has on the Decision on what fertilizers to use				.799
how much influence the major buyer of the product has on the Decision on what pesticides/herbicides to use				.701

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
[1]Factors are highlighted in bold

The review of the literature in section one revealed two sets of factors explaining the intermediaries' power over farmers. These were: industry characteristics and relationship characteristics. Also in the case of the variables of these two groups, farmers agreement or disagreement about each of the items representing the variables was measured through a likert scale ranging from 1-strongly disagree to 5-strongly agree. The resulting exploratory factor analysis applied to the items of two variables groups (table 2 in the appendix) generated five factors to explain the structure of the data, accounting for 66 % of the total variance. The factors that emerge from the analysis are: (F1) concentration at intermediary level, (F2) concentration at farmer level, (F3) farmer dependency on the intermediary, (F4) intermediary dependency on the farmer and (F5) farmers' trust upon the intermediary. Barlett's test of

sphericity (χ^2 = 727: df=171; P<.000) and the KMO test of sampling adequacy (.68) support the appropriateness of factor analysis. As can be seen from table 2, the Chronbach's α of each variable except the variable farmers' trust are above the minimum accepted level of .70. Also each of the items loads on a particular factor at values greater than the one suggested by Stevens (2002), giving evidence of convergent validity. It should be noted that to get a measure of each of these factors, the scores of high loading items on each of them were averaged.

A construct is considered valid when it fulfills not only the condition of convergent validity (items loading significantly on the factor they are measuring) but also the condition of discriminant validity (ensuring that these factors are distinct and do not covary highly) (Campbell and Fiske, 1959; Bagozzi *et al*, 1991). Exploratory factor analysis gives some evidence of discriminant validity. However, further evidence is required. Kumar *et al* (1995) and Molla and Sanchez (1997) suggest a method to prove construct discriminant validity by testing whether the correlation coefficients between measures are significantly different from unity. This method tests the null hypothesis that the correlation coefficient (r) between measures is equal to unity (H_0: r=1) and the alternative hypothesis (H_1: r<1). If this test is significant then the null hypothesis is rejected (H_0: r=1) and the measures are not perfectly correlated. Therefore, they are not measuring the same construct. Table 3 in the appendix gives evidence of constructs discriminant validity. Each of the t-test statistics are significant at p<.000 level enabling us to reject the null hypothesis "H_0: r=1" and claim discriminant validity. Each of the t test values are shown below each coefficient. Further evidence of construct discriminant validity is provided by comparing the correlation coefficients between measures against their Chronbach's α, if the correlation coefficients between measures is smaller than its Chronbach's α, it gives evidence of construct discriminant validity (Gaski 1986; Katsikeas *et al*, 2000; Collins, 2002).

4.2 Hypothesis testing and model estimation results

Each of the hypotheses presented in section three are tested through correlation analyses. The results of these analyses are presented in table 2. As can be seen from the table most of the hypotheses are supported. However, some variables do not display a significant relation.

The employed correlation analyses to test the stated hypotheses provide evidence on how the variables are related to each other. Regression analysis was used to get further evidence of the relationship between the variables (see table 3). A limited number of variables were selected to be regressed towards the dependent variable due to the small sample size. Therefore, it was decided to regress only those determinants that in the previous analyses showed a good relationship with the power over margin dimension and had a sound logical and theoretical link with it. The selected variables are: 1-Farmers dependency on the intermediary, 2-intermediary dependency on the farmer, 3-farmers' need for money, 4-intermediry concentration, 5-farm size, 6-farmers educational level, 7-farmers' access to market information and 8-the size of the intermediary's hostages. Based on this selection, the following proposition is made:

Hypothesis 6: *Intermediaries' power over farmers margin related activities is positively related to farmers' perception of their dependency on the intermediaries, farmers' need for money, and intermediaries concentration but negatively related to farmers' perception of intermediaries'*

dependency on them, farm size, farmers educational level, farmers' access to market information and size of intermediaries' hostage.

Table 2 Correlation Analyses Results

Group	Independent Variables	Dependent Variable: Power over margin	Hypothesised relationship	
Farmer Access to Resources	Access to Credit	-.343**	Negative	H1
	Farmers' Available Capital	-.126	Negative	
	Access to storage facility (categ)	-.255**	Negative	
	Access to information (categ)	-.364**	Negative	
Farmers' Characteristics	Farmer experience	-.115	Negative	H2
	Farmers' Need for Money	.309**	Positive	
	Farmer Education Level (categ)	-.264**	Negative	
Product Characteristics	Difficulty of Transportation	.167	Positive	H3
	Perishability[3] (categ)	-.071	Positive	
	Product Resistance	-.189*	Negative	
Industry Characteristics	Farm Size	-.448**	Negative	H4
	Intermediary Concentration	.192*	Positive	
	Farmer Concentration	-.167	Negative	
Relationship Characteristics	Farmers' Dependency	.237*	Positive	H5
	Intermediarys' Dependency	-.354**	Negative	
	Interdependency	-.129	Negative	
	Farmer Trust	-.156	Negative	
	"Hostages" – size of advance payment made by intermediaries	-.243**	Negative	

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

Note: The writing (categ) beside a variable means that the variable is measured at a categorical level. The correlation coefficient used in this case is not "Pearson correlation" but "Spearman's rho".

[3] The perishability variable is operationalized through the type of product by grouping wheat and corn as less perishable, sunflower as medium perishable and citrus and watermelon as high perishable products.

Table 3 Regression Analyses

Dependent Variable: Power over Margin Related Activities

	B	SE B	β	Sig.
Constant	17.55	1.52		
Farmer Dependency	.48	.33	.13	.152
Intermediary Dependency	-1.22	.38	-.30	.002*
Farmers' Need for Money	.87	.32	.23	.007*
Intermediary Concentration	.53	.24	.19	.033*
Farm Size	-.06	.01	-.36	.000*
Education (Low Secondary VS Primary)	-1.37	.68	-.17	.047*
Access to info (Institution VS Buyer)	-1.17	.72	-.14	.107
Size of Intermediary Hostages	-.03	.02	-.14	.106

Note: $R^2 = .48$; Adjusted $R^2 = .43$; $F(8,83)=9.54$ $p < .000$

Abbreviation: B – Unstandardized coefficients; SE B – Coefficients' standard error; β – Standardised coefficients; Sig. – Coefficients statistical significance.

All the determinants display the hypothesized relationship sign and the one marked with (*) are significant at $p < .05$. As can be seen from table 3, the most important variable to explain intermediaries' power over margin is farm size. Small scale farmers experience more intermediaries' exercised power than big scale farmers. Another important variable that emerges from the table to explain intermediaries' power is farmers need for money. On the other hand, the variables farmers' access to market information, farmers' dependency and size of intermediary hostages are not significant, even though they display the hypothesized sign.

5 Discussion and Conclusions

Intermediaries' exercise of the power over farmers' margin related activities (POM) is harmful to farmers business. The more the intermediaries employ this power dimension, the lower becomes the profit margin to the farmers. In some case the extensive use of POM results in negative margin to the farmers, who leave the products in the fields to perish because harvesting the product and commercializing it, "is not worth it". The way the negotiation is framed between farmers-intermediaries regarding the margin related activities is more of a zero-sum game. Intermediaries' focus is on extracting as better terms as possible from the farmers, leaving the latter one to struggle to keep up a profitable business. Furthermore, the exercise of this dimension makes farmers more likely to diminish their trust on the intermediaries, reduce investments in their farms, focus on short term outcomes, increased incentives to cheat by producing products of lower quality, etc. All of these, impacts negatively the performance of the supply chain. The exercise of POM seems to promote conflict, short-term relationship, no goal convergence, and disintegration between farmers-intermediaries. The implications of intermediaries exercise of power especially of the POM dimension makes the situation even worse in developing countries because the development of the countries is negatively impacted, since a large proportion of the population in these countries lives on farming business. A natural question arises "*what can be done to improve farmers' business position in these countries?*" The model of intermediaries' power over farmers' margin related activities may help in answering this question.

The model presented in fig. 1 suggests ways to reduce farmers' exposure towards the intermediaries' exercise of the POM dimension. Increased farmers' dependency on intermediaries seems to increase intermediaries' exercise of POM. On the other hand, increased intermediary dependency on farmers reduces the exercise of POM. As discussed in section one, dependency is a resultant of alternatives available to trading parties and the commitment of the party to the outcome controlled by the other party. Let focus first, on outcomes available to the farmers. As pointed out in section two, farmers have limited market channels to sell their products. Most of them sell only to local buyers (92 % of the sample of farmers of this study reported to sell only to local buyers). The main reason provided by the farmers for not being able to sell to processors, retail chains etc. was their small level of supply. These buyers demand high quantities and continuous supply, which individual farmers cannot achieve. Furthermore, the transaction costs of these buyers for dealing with many individual farmers are very high. In the author's opinion, a viable way for farmers to sell to these buyers and increase their possible market channels alternatives is to control a larger amount of supply.

The control by farmers of a larger amount of supply can be achieved through collective actions, which are a variable of the model of intermediaries' power. Unfortunately was not possible to be tested in this study. However, the variable, farm size gives some evidence that supports the argument because as farm size increases the exercise of POM diminishes. Farmers selling through collective actions (e.g. cooperatives) make them more likely to access the other market channels. This should give farmers more alternative market channels for selling their products. As a result, their dependency on intermediaries should decrease. Furthermore, their commitment to the outcome controlled by an intermediary is likely to decrease because they have more similar or better alternative outcomes by operating as a group. In addition, the transaction costs of the above mentioned buyers' decreases by dealing with the group of farmers rather than with the individual farmers. It is expected that the dependency of intermediaries on farmers should increase as farmers organize their self in collective actions because the number of alternatives to the intermediary decreases and the importance (commitment) of a group of farmers' or farmers' cooperative account (outcome) increases.

It appears that farmers' pressing needs for money makes them more likely to accept intermediaries terms, even when it comes at a cost of a lower margin. Farmers in Adana could fulfill their pressing needs for money by taking credit from financial institution. However, some farmers that did not have a land title could not get credit. These farmers were more vulnerable to the intermediaries' exercise of POM dimension because they did not have any other opportunity to get credit aside the intermediaries that they did business with. Therefore, it is necessary that policies aimed at the development of the farming sector ease farmers' access to credit.

In conclusion, it is important to create a balance of power between farmers-intermediaries especially for the POM dimension. This should lead to the rise of more efficient forms of organisation of vertical relations between the two. For example, the trading relationship farmers-intermediaries can move from the current spot-market transaction to long-term contacting. The first effect of this move is reduced transaction costs and improved chain coordination. This on the other hand, should increases not only the efficiency of farmers-intermediaries stage but the efficiency of the whole chain.

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8 Appendix

Table 1 Reliability and EFA: *Farmer access to resources, product and farmers' characteristics*

	α	1	2	3	4	5
1) Farmers' Need for Money	**.838**					
Since I need the money to pay (e.g. credit, fees, next year production, rent, etc.), I sell my production even when the price in the market is low		.849				
I have to sell the products even if the price in the market is low because I need the money		.814				
I need to get the money of the production as fast as possible to pay the expenses that I have made		.793				
I can't wait for the market price to increase to sell my production because I need the money		.775				
In case my buyers don't pay in time, I would need to take credit		.579				
2) Available Capital to the Farmer	**.856**					
Aside the income generated from the farm business, I have also other income sources to cover expenses			.907			
Beside the capital generated from the farming business, I have also other capital that helps my business			.879			
If I don't get the money from the production, I don't have capital to start next year production (Reversed)			.656			
3) Farmer Access to Credit	**.759**					
The commercial terms of the credit makes' it easy to access				.853		
It is easy to get credit				.831		
The interest rate of the credit is very high, this makes it unfavourable (or unprofitable) to get (Reversed)				.701		
4) Difficulty of Transportation	**.710**					
This product can be damaged very easily during transportation					.848	
The transportation of this product to the market (or buyer) is easy (Reversed)					.705	
It is cheap to transport this product to the market (Reversed)					.699	
5) Farmer Experience	**.754**					
I have very good knowledge on how to produce this product						.875
I have a long experience in the cultivation of this product						.770

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

[1]Factors are highlighted in bold.

Table 2 Reliability and EFA: *Industry and relationship characteristics*

	α	1	2	3	4	5
1) Intermediary Concentration[1]	**.838**					
The market of this product in my region is controlled by a small number of buyers.		.823				
There are few buyers to where to sell this product.		.815				
A few buyers dominate this product market		.773				
This product market is controlled by a small number of large buyers.		.759				
2) Intermediary Dependency	**.841**					
If I stopped supplying to my major buyer of this product, he will find it difficult to source products of similar qualities.			.857			
My major buyer of this product would have difficulties to find other source of supply if I were to stop supplying to him.			.841			
If I discontinued supplying to my major buyer of this product, he would have difficulties making up the sales volume about this product.			.829			
I make up a high proportion of the total purchases of my major buyer of this product.			.697			
3) Farmer Concentration	**.832**					
This product market is controlled by a small number of large farm enterprises.				.871		
There are a few big farmers that produce most output of this product in the region.				.806		
This product market is dominated by a few large farms.				.762		
4) Farmer Dependency	**.702**					
In case a buyer of this product withdraws from the agreement to buy, it would be very difficult to find another buyer.					.713	
It would be very difficult to replace a buyer of this product if I were to lose one.					.701	
I'm very dependent on the buyers of this product					.645	
I don't have many alternatives to where to sell this product.					.641	
The loss of a buyer of this product would be a serious blow to my profitability.					.510	
5) Farmer Trust	**.627**					
The major buyer of this product backs up his words with actions.						.787
The major buyer of this product keeps his promises.						.771
The major buyer of this product is competent at what he does.						.621

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

[1]Factors are highlighted in bold.

Table 3 Evidence of constructs discriminant validity

	IOM	CI	CF	DF	DI	FT	AC	CA	tr	Fexp	NM
Power Over Margin	.727										
Intermediary Concentration	**.228**	.838									
t value (H_0: r=1) (H_1: r<1)	7.52										
Farmer Concentration	**-.188**	**.290**	.832								
t value (H_0: r=1) (H_1: r<1)	7.84	7.04									
Farmer Dependency	**.274**	**.333**	**.134**	.702							
t value (H_0: r=1) (H_1: r<1)	7.16	6.71	8.29								
Intermediary Dependency	**-.393**	**.243**	**.325**	**.185**	.841						
t value (H_0: r=1) (H_1: r<1)	6.26	7.40	6.77	7.87							
Farmer Trust	**-.277**	**-.066**	**.065**	**.025**	**.105**	.627					
t value (H_0: r=1) (H_1: r<1)	7.14	8.88	8.89	9.25	8.54						
Farmers' Access to Credit	**-.383**	**-.127**	**.164**	**-.190**	**.219**	**.142**	.759				
t value (H_0: r=1) (H_1: r<1)	6.34	8.35	8.04	7.83	7.59	8.22					
Farmers' Available Capital	**-.156**	**-.164**	**-.134**	**-.267**	**-.076**	**-.057**	**.045**	.856			
t value (H_0: r=1) (H_1: r<1)	8.10	8.04	8.29	7.22	8.79	8.96	9.07				
Difficulty of Transportation	**.272**	**.211**	**-.056**	**.231**	**.027**	**-.197**	**-.213**	**-.295**	.710		
t value (H_0: r=1) (H_1: r<1)	7.18	7.66	8.97	7.50	9.23	7.77	7.64	7.00			
Farmer experience	**-.320**	**.045**	**.198**	**-.107**	**.061**	**.261**	**.282**	**.132**	**-.404**	.754	
t value (H_0: r=1) (H_1: r<1)	6.81	9.07	7.76	8.52	8.93	7.26	7.10	8.30	6.18		
Farmers' Need for Money	**.323**	**.172**	**.096**	**.203**	**.085**	**.047**	**-.149**	**-.494**	**.115**	**.019**	.838
t value (H_0: r=1) (H_1: r<1)	6.78	7.98	8.61	7.72	8.71	9.05	8.16	5.52	8.45	9.31	

Note: The diagonal entries are Cronbach's α of the constructs, the one in bold are Pearson Correlation Coefficients and the other values are t-test (Absolut value)