

THE MAIN TRENDS IN THE ACTIVITY OF AGRI-FOOD COOPERATIVES IN ALMERÍA, SPAIN

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Abstract

Located in the South-East of Spain, the province of Almería was considered in the first part of the twentieth century, a poor region. Despite the infertile soil, the limited resources of water and the land not exactly suitable for agriculture, today over 70% of the vegetables exported from Spain are produced here. In the largest greenhouse in the world, as Almería is also called nowadays, are grown tomatoes, peppers, cucumbers, eggplants, with a high yield and a low level of pesticides. The practice of intensive agriculture has led to the growth of the economy of the area, which is mainly based on agriculture and tourism. This paper focuses, especially, on the analysis of relevant indicators for the specific activity of the agri-food cooperatives in Almería. In order to highlight the impact of the economic activity of Almería's cooperatives on the economy, the paper presents a series of indicators of horticultural production in Spain. The statistical data presented and analysed that formed the basis of this paper were provided by Eurostat, Cooperativas Agro-alimentarias de España Grupo Cooperativo Cajamar.

Key words: Agri-Food Cooperatives, Almería, exports, Spain, vegetable production

INTRODUCTION

Almería is one of the 8 provinces of the Andalusian region, located in the southern Spain and the eastern Andalusia. Benefiting from a hot and dry climate, the province is known as one of the driest areas in Europe, with rainfall that in some places does not reach 200 ml per year (Figure 1).



Fig. 1. Map of Spain, Andalusia region
Source: [5].

If in the western part of the coastal area there are vast crops, the interior of the province is made up of mountainous landscapes and dry lands. This selenar aspect of the Tabernas Desert was the setting for western films in the 1960s. The population, characterized by a small number of inhabitants per km², lives on the coast of the Mediterranean Sea, which stretches for almost 250 km [6].

The first Moorish settlement in the area was built in 955, on the site of an important Roman port (Portus Magnus) and was named after the bay with wide beaches, "Al-Mariyya - mirror of the sea". It was under Arab rule until 1489, when it was conquered by Catholic Christians. It would later become the city of Almería and, today, the capital of the province of the same name [4].

In the 1950s, Spanish GDP was 40% lower than Italy's, and Almería's 50% lower than the national average. Almería was an arid expanse that survived from tourism and the exploitation of marble in the mountains. The Franco regime initiated the development plan for this area. Thus, in 1963 the Cooperative "Caja Rural Provincial de Almería" (now Cajamar Caja

Rural, the largest cooperative bank in Spain) started to operate and in 1977 COEXPHAL (Association of cooperatives and producer organizations) was set up, with the support of Cajamar, to give farmers access to foreign markets [13].

The development of horticultural greenhouses has led to very important social and economic benefits for the province of Almería, but it has created social challenges and had a negative impact on local biodiversity and natural resources. There are currently 15,000 farming families employed in production, and an additional 40,000 jobs are being offered. Workers of different nationalities (over 110 nationalities) work in the greenhouses of Almería. According to official published data, 95% of all farms are owned by families of farmers and their products are marketed mainly by cooperatives [7].

The economic contribution of horticultural greenhouses is about 1,800 million Euros, and the sector related to the auxiliary activity generates another 1,600 million Euros. In the province of Almería, greenhouse production represents 13% of gross domestic product (GDP), while the average agricultural GDP in Spain is 2.5%. The total economic activity around the agricultural system represents 40% of the GDP of the province of Almería [7].

Today Almería is in the top of fruit and vegetable producers and among the top 3 richest provinces in Spain, in terms of GDP per capita, and the agricultural area is now the largest cooperative area of vegetables in Europe, in which most cooperatives use biological pest control [18].

The development of agriculture has even led to the development of an education system that trains specialists in the field, such as the Universidad de Almería, founded in 1993.

In addition to agriculture, Almería is also famous for tourism, thanks to its vast beaches and natural reservations.

MATERIALS AND METHODS

The paper analysed, mainly, a series of indicators related to the activity of agri-food cooperatives in Almería. Also, here, the presentation of specific indicators for the

horticultural sector in Spain was required. This was necessary to emphasize the positive contribution of the cooperatives in Almería to the good progress of the Spanish economy. The main indicators analysed: the number of cooperatives in the regions of Spain; areas cultivated with the main vegetable categories in Spain; areas with greenhouses in Almería; horticultural production in Almería; the areas in Almería, where biological control is applied for the main vegetable species; quantitative and value exports for the main vegetable categories. The statistical data used in this paper were provided by Eurostat, Cooperativas Agro-alimentarias de España, Grupo Cooperativo Cajamar. In order to accomplish this work, numerous specialized materials were consulted, especially from Spain. The results of the paper were presented in graphic and tabular form.

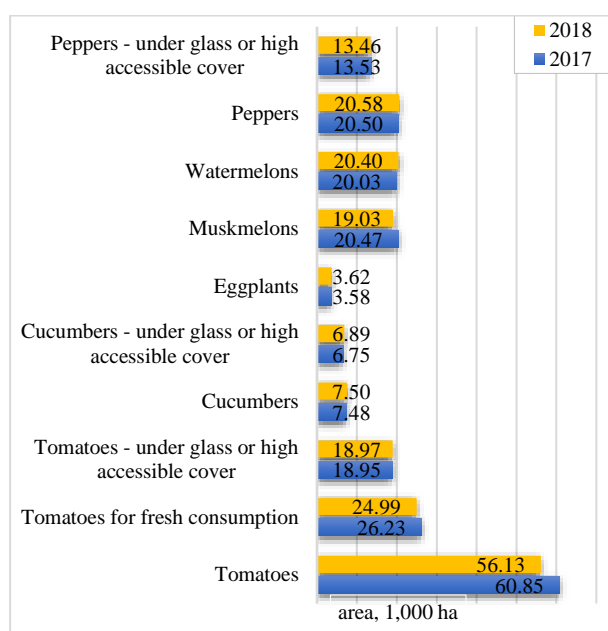
Part of the data and analysis presented in this paper are the result of the training mobility carried out within the Erasmus+ project CooPerformance - Digital, state-of-the-art agribusiness education for farmer led enterprises in the agri-food value chain, AG 2019-1-RO01-KA203-063752

RESULTS AND DISCUSSIONS

According to Eurostat, Spain is a major grower of vegetables and melons. In 2018, 56.13 thousand ha of tomatoes were cultivated in this country. It was the second largest tomato grower in the E.U., after Italy. The area registered in 2018 was decreasing compared to 2017, when it was of 60.85 thousand ha (Figure 2). In the tomato category, were analysed the subcategories Tomatoes for fresh consumption and Tomatoes under glass or high accessible cover, where Spain has been the European leader in the recent years. 24.99 thousand ha of tomatoes were grown for fresh consumption and 18.97 thousand ha of tomatoes under glass in 2018. The area cultivated with Cucumbers was of 7.50 thousand ha in 2018 (second place in the E.U.), and the areas with cucumbers under glass or high accessible cover represented 6.89 thousand ha (first place in the E.U.). For other important categories of vegetables, the following areas cultivated in

2018 were noted: 3.62 thousand ha with eggplants (third place in the E.U.), 19.03 thousand ha muskmelons (second place in the E.U.), 20.40 thousand ha watermelons (first place in the E.U.), 20.58 thousand ha peppers (first place in the E.U.), 13.46 thousand ha peppers under glass or high accessible cover (first place in the E.U.).

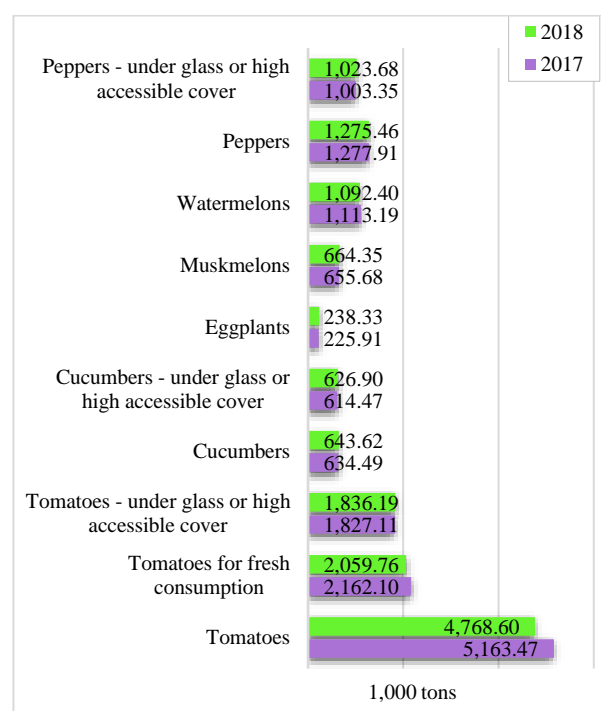
In 2018 there were increases in the areas for tomatoes under glass or high accessible cover, cucumbers, cucumbers under glass or high accessible cover, eggplants, watermelons and peppers, compared to 2017.



* Eurostat official classification of vegetables
 Fig. 2 Areas cultivated with the main vegetables in Spain
 Source: [12].

In 2018, 4,768.60 thousand tons of tomatoes were harvested in Spain. It was the second largest tomato producer in the E.U., after Italy. The production achieved in 2018 was decreasing compared to 2017, when 5,163.47 thousand tons were obtained (Figure 3). 2,059.76 thousand tons of tomatoes for fresh consumption (first place in the E.U.) and 1,836.19 thousand tons of tomatoes under glass (first place in the E.U.) were harvested in 2018. Cucumbers production was of 643.62 thousand tons in 2018 (second place in the E.U.), and in the category of cucumbers under glass or high accessible cover were obtained 626.90 thousand tons (first place in the E.U.). For other important categories of vegetables, the following quantities were obtained in 2018:

238.33 thousand tons of eggplants (second place in the E.U.), 664.35 thousand tons of muskmelons (first place in the E.U.), 1,092.40 thousand tons of watermelons (first place in the E.U.), 1,275.46 thousand tons of peppers (first place in the E.U.) and 1,023.68 thousand tons of peppers under glass or high accessible cover (first place in the E.U.). Compared to 2017, in 2018 there were increases in production for tomatoes under glass or high accessible cover, cucumbers, cucumbers under glass or high accessible cover, eggplants, muskmelons and peppers under glass or high accessible cover.



* Eurostat official classification of vegetables
 Fig. 3 Production for the main vegetables in Spain
 Source: [12].

But where do these vegetables come from? What is the basic cell in Spanish agriculture? The answer is simple - family farms, united in agri-food cooperatives.

In Spain, in 2017, a number of 3,225 agri-food cooperatives operated. Of these, the most, 710, were in the south, in Andalusia and accounted for 22.02% of the total (Figure 4). It was followed, with a considerable difference, by Castilla-La Mancha, where there were 430 Cooperatives, is 13.33%. In the north, in Cantabria, the smallest number was registered, 5 cooperatives [9].

Autonomous communities	Nr.	%
Andalusia	710	22.02
Castilla-La Mancha	430	13.33
Castile and León	345	10.7
Valencian Community	335	10.39
Catalonia	298	9.24
Extremadura	281	8.71
Aragon	193	5.98
Galicia	169	5.24
Region of Murcia	127	3.94
Chartered Community of Navarre	92	2.85
Basque Autonomous Community	66	2.05
Canary Islands	61	1.89
La Rioja	46	1.43
Balearic Islands	31	0.96
Community of Madrid	20	0.62
Principality of Asturias	16	0.5
Cantabria	5	0.16

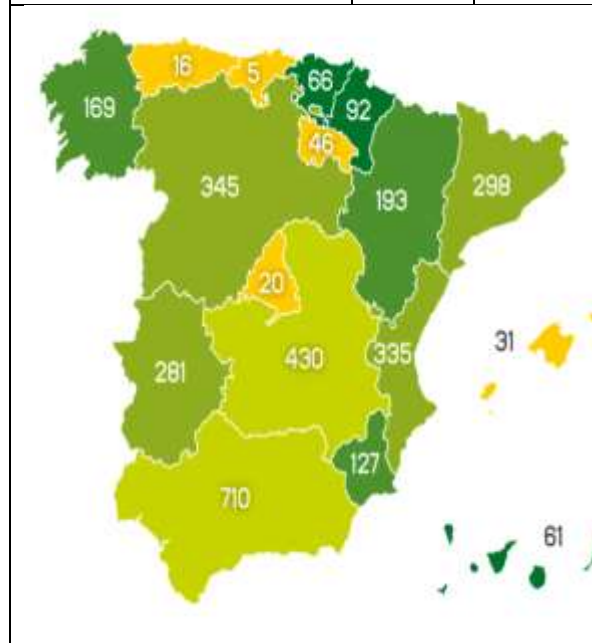


Fig. 4. Number of cooperatives in the regions of Spain, 2017
 Source: [9].

Although in 2006-2017 the number of cooperatives in Spain decreased by 8%, their turnover increased by 56%. At the same time, large cooperatives have increased their export dynamism [9].

From the analysis of the distribution of direct payments on the territory of Spain, it resulted that in the region of Andalusia the largest amounts were granted, and the largest number of farmers benefited from these direct payments. The regions of Castilla y León and Castilla-La Mancha followed [8].

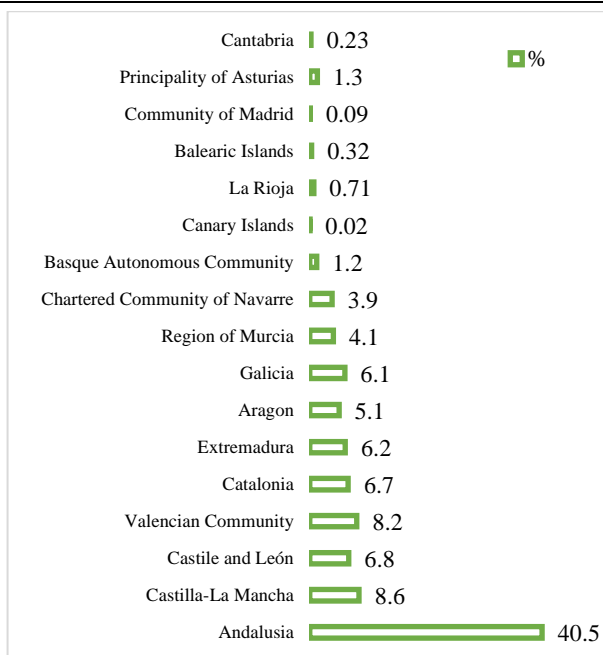


Fig. 5. Turnover of cooperatives in the regions of Spain, 2017
 Source: [9].

The turnover recorded by the Spanish Cooperatives is shown in Figure 5. As it can be seen, in the first place were the cooperatives in the region of Andalusia, which accounted for 40.5% of the total turnover. Castilla-La Mancha ranked second with 8.6%.

The importance of Andalusian agri-food cooperativism for Spain can be seen in Figures 4 and 5, it represents 22% of the Spanish cooperatives and accounts for 40.5% of the group's turnover.

Vegetables obtained in the province of Almería, the largest greenhouse in the world, have gained fame due to the quantities produced, to the yield per hectare (200 tons / ha for tomatoes) and to the quality (99.3% of the production has the level of pesticide residues close to zero). The technology used involves the application of natural fertilizers and drip irrigation, which means high taxes, water representing 10-15% of the cost of production for vegetables in Almería. It is used a model of solarium with almost flat roof (Photo 1), because there is not much rainfall and a super-intensive agriculture is practiced, without excessive chemicalization, with the help of beneficial insects [3].



Photo 1. The model of greenhouses in Almería
 Source: [2].

In the summer months, when the countries where it is exported usually get their own harvest, maintenance and preparation work is carried out for the following season.

Farmers are united in cooperatives, through which they procure the necessary inputs, have set up their own collection, sorting and packaging Center and they analyse the vegetables.

In Almería, the financing is made through loans from the banking institution dedicated to the agricultural sector since the early '60s, Cajamar Caja Rural. The foundation supported by this bank finances a research Center, where new varieties of vegetables and fruits are produced and new cultivation technologies are tested, adapted to the particularities of the area [2].

Returning to modern cultivation technologies applied in Almería, it was concluded that this is the province that has the largest horticultural area under biological control. This favoured the fact that only 0.8% of the horticultural products harvested in Almería registered values above the maximum residue limit allowed, compared to 2.6% as the average in the E.U. [1].

There is a decrease from 25,000 ha (2012/2013) to 23,345 ha where biological control is applied in 2018/2019.

The evolution of these areas during the agricultural campaigns 2012/2013 - 2018/2019 is presented in Figure 6.

Studies carried out by Grupo Cooperativo Cajamar have shown that 48.3% of the cultivated area is subject to biological control.

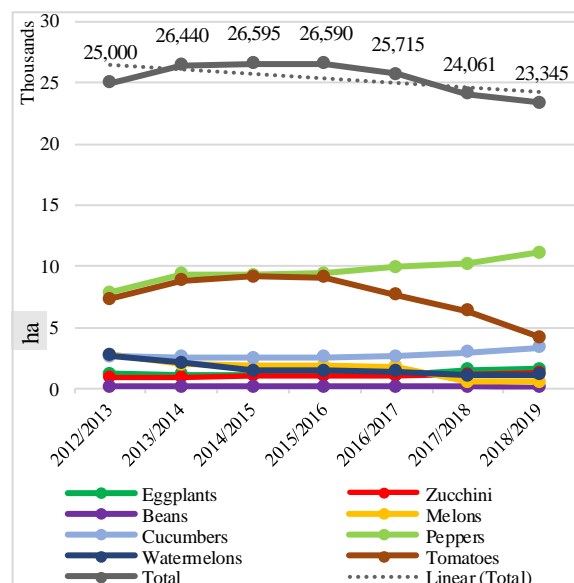


Fig. 6. Evolution of areas in the province of Almería, where biological control is applied, to the main vegetable species
 Source: [14].

Compared to the 2017/2018 campaign, the area in the last analysed campaign was 3% smaller. There were also decreases in the areas cultivated with beans, melons, watermelons and tomatoes.

In the 2018/2019 campaign, the culture where biological pest control was used on the entire cultivated area, was that of peppers (Figure 7). This was followed by the cultivation of eggplants - 74.4% of the total areas occupied with this vegetable and cucumbers - 71.6%. The crop with the lowest percentage in terms of the area to which biological control is applied is watermelon, 10.9%.

The Junta de Andalucía (The Regional Government of Andalusia) calculated that there are currently 35,839 ha of greenhouses in the provinces of Granada - 8.4% of the total, Malaga - 2.2% and Almería - 89.4%.

The largest increase took place in the coastal area of Granada, where the covered area increased by 8% in 2019. In Almería, the area increased by 1.4% in 2019 compared to 2018, thus reaching 32,048 ha [14].

Greenhouses in the province of Almería are the largest structure made by humans, which can be seen with the naked eye from Earth's orbit [10].

The large area they cover, over 30,000 ha, made them appear as a white dot, thanks to the foil that covers them (Photo 2)

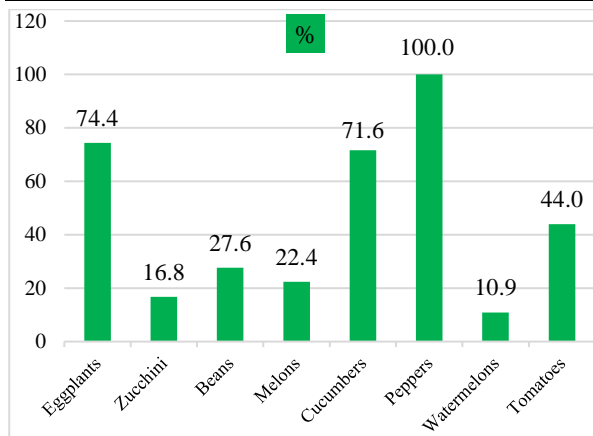


Fig. 7. Areas (%) where biological control is applied, for the main vegetable species (Almería province)
 Source: [14].



Photo 2. Greenhouses in Almería seen from space
 Source: [11].

The areas occupied by greenhouses in the province of Almería increased in the period 2012-2019 from 28.639 ha to 32.048 ha (Figure 8). The average annual growth in the last 10 years has been 1.5% and was due, as mentioned by Grupo Cooperativo Cajamar, to the expansion to the Levante area, because in the west there is not much room to develop greenhouses.

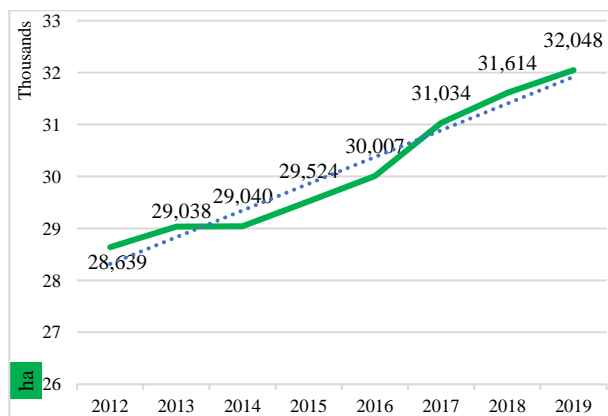


Fig. 8. Evolution of greenhouse areas in the province of Almería
 Source: [14].

The area occupied by horticultural crops in general has also increased. The vegetable area was of 58,654 ha in the 2018/2019 campaign, 5.4% higher than in the previous campaign. Horticultural production in Almería fluctuated during the analysed period (Figure 9). Favourable weather conditions and the effectiveness of treatments for pests have increased production yields for most cultivated species, especially in the spring.

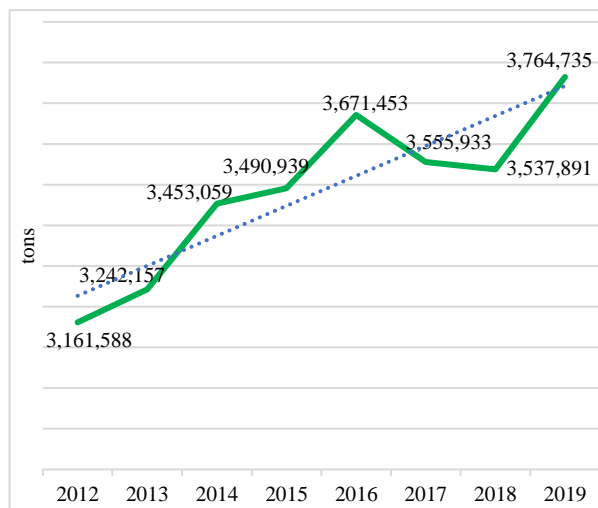


Fig. 9 The evolution of horticultural production in Almería
 Source: [14].

Thereby, the total horticultural production of the province of Almería for 2019 was of 3,764,735 tons (6.4% more than in 2018), of which 3,525,187 tons (4.4% more than in 2018) belong to protected crops. Compared to 2012, the increase for total horticultural production is of 19.08%.

Table 1 presents the production from Almería for the main vegetable crops, for the agricultural campaigns 2017/2018 and 2018/2019. From the analysis of the presented data, we conclude that in the categories of green beans and tomatoes the productions decreased, by 45%, respectively 10.8% for tomatoes. In the other horticultural crops there were increases, the most significant being in lettuce (49.4%) and melons (32%).

Spain is one of the most important players in the world trade with agricultural products. Thereby, in 2017 it ranked 9th, in the export category, climbing a position in the ranking, compared to 2006 [17].

Table 1. Production from Almería for the main crops, compared on two campaigns

Specification	2017/2018 tons	2018/2019 tons	2018/2019 / 2017/2018 %
Eggplants	181,130	190,614	5.2
Green beans	7,897	4,347	- 45
Peppers	707,693	785,043	10.9
Tomatoes	996,254	888,389	- 10.8
Cucumbers	459,777	527,352	14.7
Zucchini	456,045	459,420	0.7
Melons	91,927	121,344	32.0
Watermelons	477,152	548,677	15.0
Total greenhouses	3,377,875	3,525,187	4.4
Lettuce	130,271	194,675	49.4
Other horticultural crops	29,745	44,873	50.9
General Total	3,537,891	3,764,735	6.4

Source: [14].

In the category of fresh or chilled tomatoes, Spain ranked third in the world, with exports of 1,098,005 thousand US Dollars (2018), respectively 1,140,930 thousand US Dollars (2017). From the presented data, there was an increase in value exports in 2018, compared to 2017. The exported quantity was of 809,612 tons in 2017, respectively 813,875 tons in 2018 [15].

Table 2. Exports from Almería for the main vegetable crops, compared on two campaigns

Specification	2017/2018		2018/2019	
	tons	1,000 Euro	tons	1,000 Euro
Eggplants	120,189	108,067	123,328	129,435
Green beans	10,953	24,220	12,540	33,842
Peppers	513,894	624,901	553,417	738,643
Tomatoes	446,601	503,016	447,334	527,952
Cucumbers	451,779	358,041	485,865	395,627
Zucchini	286,689	238,705	308,201	268,836
Melons	54,787	43,135	66,574	47,706
Watermelons	274,443	167,678	330,988	156,086
Lettuce	148,882	116,705	165,503	129,522
Other horticultural crops	154,228	218,558	218,335	256,647

Source: [14].

In 2018, Spain was the world's largest exporter of eggplant, with a quantity of 155,000 tons, followed by Iran, with 140,000 tons and Mexico, 76,000 tons. Spain accounted for 25% of the global eggplant exports, in 2018 [1].

The province of Almería is the leader in Andalusia in terms of exports. Sales abroad increased between January - October 2019 by 11% for Almería, unlike the values recorded at the regional level, Andalusia - 5% and at the national level, 1.6% [16].

Table 2 presents the exports of vegetables of the province of Almería, quantitative and value, for the 2017/2018 and 2018/2019 campaigns. Peppers was the most exported category, 553,417 tons in 2018/2019, followed by cucumbers (485,865 tons) and tomatoes (447,334 tons).

For the green beans category, the lowest quantity exported was registered - 12,540 tons, respectively 33,842 thousand euros.

It is observed that in all categories of vegetables analysed, exports increased from one campaign to another. Watermelons exports had the highest increase, from 274,443 tons (2017/2018) to 330,988 tons (2018/2019) and then peppers, from 513,894 tons (2017/2018) to 553,417 tons (2018/2019). The lowest increase was noted for tomatoes and green beans.

Quantitative vegetable exports of the province of Almería are shown in Figure 10.

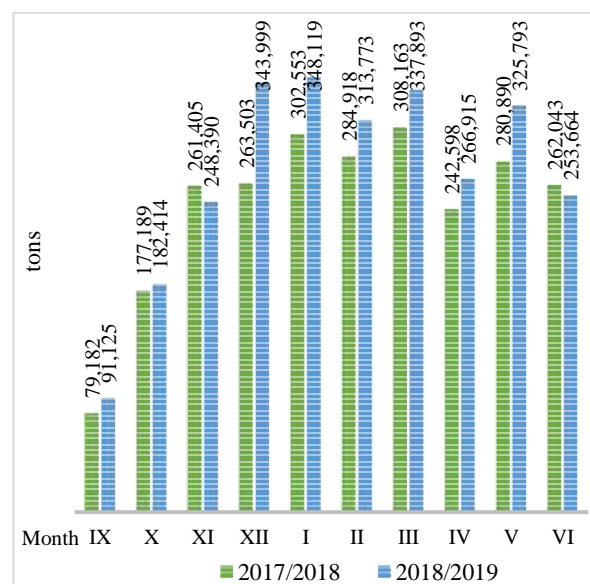


Fig. 10. Evolution of quantitative exports of the province of Almería by months, compared on 2 campaigns
 Source: [14].

Corresponding to the applied crop technologies, the peak of exports was recorded for the 2018/2019 campaign in January and December, and for the 2017/2018 campaign in

March and January. In September, the smallest quantities of vegetables were exported from both campaigns. In 2018/2019, the province of Almería exported the largest quantities of vegetables to Germany, France, the UK, the Netherlands, Poland and Italy.

Regarding the value exports, by months, of the province of Almería, presented in Figure 11, the highest values were observed in January and December of the 2018/2019 campaign, and for the 2017/2018 campaign - January and February. The lowest values were also obtained in September, for both campaigns.

Almería's partners, which recorded the highest values for value exports were, in 2018/2019 Germany, France, UK, Netherlands, Italy and Poland.

The emergence and development of agri-food cooperatives in Spain and in the province of Almería in particular has been a beneficial fact that has led to the development of agriculture and living standards in this poor area.

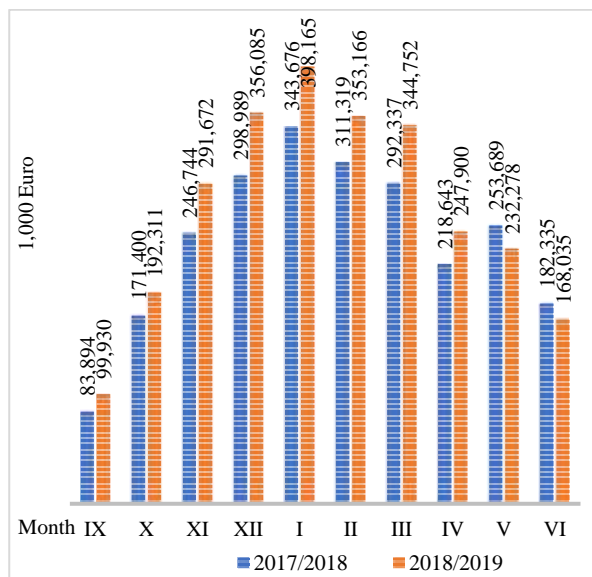


Fig. 11. Evolution of value exports of the province of Almería by months, compared on 2 campaigns
 Source: [14].

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CONCLUSIONS

Following the research, on the one hand, of the main aspects related to the activity of agri-food cooperatives in the province of Almería, and on the other hand, of the main indicators specific to the horticultural sector, the following resulted:

- 15,000 families work in the horticultural sector in the province of Almería, due to the development of greenhouses;
- 95% of the total farms are owned by farmers' families, and the products made are sold through cooperatives;
- greenhouse production in Almería has a share of 13% of GDP, compared to the average agricultural GDP in Spain (2.5%);
- the agricultural area of Almería, currently represents the largest cooperative area of vegetables in Europe;
- In 2018, 56.13 thousand ha of tomatoes were cultivated in Spain. This cultivated area placed Spain on the second place in the top of tomato growers, at the level of the European Union;
- Spain, in 2018, ranked second in the top of the tomato producers in the European Union, with a production of 4,768.60 thousand tons. Italy ranked first in this ranking;
- In Spain, horticultural products are made in family farms, which are united in agri-food cooperatives;
- In 2017, a number of 3,225 agri-food cooperatives were registered in Spain. A significant aspect is represented by the fact that a number 710 were in the south, in Andalusia (22.02% of the total);
- Cooperatives in the region of Andalusia, accounted for 40.5% of the total turnover of Spanish Cooperatives;
- In Almería there was a very good yield for tomatoes (200 tons / ha);
- The vegetables obtained in Almería are superior in terms of quality (99.3% of production has the level of pesticide residues close to zero);
- 48.3% of the cultivated area is subject to biological control, according to a study conducted by Grupo Cooperativo Cajamar. In the 2018/2019 season, biological control was applied on 23,345 ha. This surface has

undergone changes compared to the previous periods;

-Currently, there are 35,839 ha of greenhouses in the provinces of Granada (8.4% of the total), Malaga (2.2%) and Almería (89.4%);

-In 2019, the area occupied by greenhouses was of 32,048 ha, which represented an increase of 1.4%, compared to 2018. Also, in 2019, there was an increase of 11.90% in the area with greenhouses, compared to 2012;

-The horticultural production achieved at the level of the province of Almería in 2019, was of 3,764,735 tons. In 2019, there was an increase in production by 6.4%, compared to 2018;

-Almería ranks first in the top exporters of Andalusia;

-In 2019, for the period January-October, in Almería there was a 11% increase in sales abroad;

-The top of quantitative exports for Almería in the 2018/2019 season was made up of: Peppers (553,417 tons); cucumbers (485,865 tons) and tomatoes (447,334 tons);

-Value exports were dominated in the 2018/2019 season, also by Peppers (738.643 thousand Euro). They increased by 18.20% compared to the 2017/2018 season;

-The main sales markets for the vegetable products made in Almería in the 2018/2019 season were: Germany; France; UK; Netherlands; Poland and Italy.

The increase of the living standard and the development of agriculture in Spain, but also in the province of Almería was due to the development of cooperatives. This type of association represents a solid basis for the agricultural sector in Spain, which in the future will ensure the food security for the population.

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