CHALLENGES FOR THE VEGETABLE SUBSECTOR DEVELOPMENT IN THE REPUBLIC OF MACEDONIA

Gordana Popsimonova, Rukije Agic, Zvezda Bogevska, Margarita Davitkovska

Faculty of Agricultural Sciences and Food - Skopje, University Ss. "Cyril and Methodius" in Skopje, Republic of Macedonia

Corresponding author: gpopsimonova@yahoo.com

Abstract

The Republic of Macedonia has approximately 260 ha of agricultural cultivable area under glasshouses, but the exploitation of the facilities ranges between 75-80%, of their total capacity, leaving around 20-25 % of the facilities not being used. The area cultivated under plastic tunnels is not precisely known, but it is estimated between 4000 and 6000 ha dedicated for cultivation of tomatoes, cucumbers, peppers and cabbage. The open field production is gradually decreasing especially for production of tomatoes, cucumber and peppers due to lower productivity and increased problems with diseases. For other vegetables (melons, potatoes and onions) open production and strong seasonal aspects are dominating. The ex-Yugoslavia, considered as one market, traditionally has been and is still the largest consumer of the Macedonian fresh product. The position of Macedonian vegetable exporters in these markets is under threat for several reasons: market requirements shifting towards EU standards, related to the arrival of modern retail operations. The large producers are using local or international help which is very costly. There are no available financial instruments that stimulate the farmers to invest in new technologies and production, and the limited profits, mainly that the primary producers are making. High cost of input (energy) for production (energy is app.70% of the cost of the product) and the weak organization and cooperation of the stakeholders (vertical cooperation, horizontal cooperation and small sized production) are also significant challenges that should be dealt with in future. However, the biggest problem that causes weakness in this subsector is the limited Governmental and local investment in research. Due to that, there are no local producers of quality seeding material that causes higher cost of inputs and uncertainness of the quality of materials.

Keywords: vegetable production, markets, research and development.

Introduction

The vegetable production used to take considerable portion of the overall agricultural production in the time of Ex-Yugoslavia. After the breakup of closed markets, vegetable producers in Macedonia, as well as the researchers and policy makers, could not identify appropriate development policies. It resulted in even worse fragmentation of agricultural parcels, decrease in quantity and quality of vegetable products, deterioration of greenhouse establishments and losing of regional markets. During the last 25 years several World Bank, EU, USAID and other donor-funded projects have been carried out to support the vegetable sector, but lacking sustainable development strategy the funds were inefficiently consumed. This also applies to the government direct payments that are approaching the amount of 100.000.000 EUR annually and still do not yield the expected results. In this report we have tried to identify the key issues that limit the vegetable sector development that would further be challenges for all stakeholders in the subsector. From perspective of research and development several issues that merit appropriate attention have been underlined.

Material and methods

To prepare this analyses of the vegetable sector constrains a comprehensive desk research was carried-out on existing data and information obtained from the Office of Statistics, the Ministry of

Agriculture Forestry and Water Economy, reports of consulting companies from that have participated in different assessment regarding vegetable production, processing and trading. The findings from previous research at the Faculty of Agricultural Sciences and Food, as well as the Institute of Agriculture at UKIM University have also been taken into consideration.

Results and discussion

The Republic of Macedonia is recognized in the region by a specific fresh taste of vegetables. Large scale vegetable production took over industrial crops (cotton, poppy, tobacco) in early 70s with the brake-trough of the first greenhouses. As presented in Table 1, the participation of vegetable outcome is constantly between 30% and 37% of the overall agricultural output. The agricultural production, on other hand, participates with 10% in the GDP. (Statistical Yearbook, 2017)

Table 1. Participation of vegetable production in overall agricultural output [000 EUR]

	2011	2012	2013	2014	2015
Agricultural output	1 137 853	1 088 975	1 223 040	1 281 853	1 348 138
Crop output	871 804	818 195	928 455	982 975	1 048 167
Vegetables (-potatoes)	425 170	370 504	415 040	451 837	504 239
% in agricultural output	37.37	34.02	33.94	35.25	37.40
% in of crop output	48.77	45.28	44.70	45.97	48.11

Source: Statistical State Office, 2017

Open field production

Open field production is at largest absorbed by the processing industry. The acreage is relatively steady (Table 2) with slight tendency of increase over the last 10 years. Exemptions are melons and water melons that are planted on 1000ha smaller area from the one in 2006 and cabbages that take 50% larger acreage and have tendency to expand.

Table 2. Area of open field production of main vegetable crops 2007-2016 [ha]

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Potato	13799	13554	13527	13037	13454	13204	13477	13178	13360	13279
Onion	3131	3182	3361	3554	3488	3527	3499	3588	3606	3584
Beans	4864	4789	4925	4612	4557	4726	4608	4834	4783	4887
Cabbage	3236	3362	3638	3706	3766	3734	4491	4367	4815	4597
Tomato	5368	5319	5731	5665	5632	5614	5478	5746	5657	5609
Pepper	8331	8199	8438	8474	8465	8626	8511	8528	8622	8766
Lences	1013	1003	1060	936	947	936	82	80	84	84
Garlic	87	85	69	90	68	74	928	956	980	978
Mellons	6152	6211	5977	5732	5800	5691	5598	5740	5562	5506

Source: MAFWE – period of 2007-2016

Processors usually complain about the raw-material quality and quantity as very often vegetable varieties that are grown in open-field are intended for fresh-consumption aiming for higher prices. Therefore they luck satisfactory dry matter content and other necessary parameters for processing. A solution to this problem might be establishment of functional co-operatives that can apply single chosen variety on larger parcels. This integration of the parcel lots can also enable mechanization of different agricultural practices, including harvesting that would consequently reduce the costs of production.

Organic cultivation is another interesting development direction for enrichment of the open field production. For the time being mostly pumpkins are organically grown vegetables, although there is

space and facilities for cultivation of more sensitive cash-crops if proper services and training would be provided to the growers (Agic at al., 2012).

Reproductive material and plant breeding

The production of vegetable seeds in the Republic of Macedonia (up until 30 years ago) had its own tradition. Taking the favorable conditions in certain agro-climate regions in consideration, seed was produced from more garden sorts with high quality attributes (purity, germination, viability etc.), while speaking in terms of quantity it was sufficient to cover the country's own needs, and to be able to export to several Ex-Yugoslavia countries, and some European countries as well. For example, for the Netherlands, onion, carrot, tomato and watermelon seeds have been produced. From nearly 200 tons seed material from various vegetable crops in the 70's (Figure 1), today Macedonia has virtually no seed production. It is completely dependent from import of several vegetable crops, mainly from the Netherlands and Israel.

Taking into consideration the climate conditions in Macedonia, it can certainly be organized in the first two agro-climatic regions: the Sub-Mediterranean with the following locations: Gevgelija, Dojran, Valandovo and Strumica and the Continental mixed with Sub-Mediterranean region with locations: Tikvesh, Veles, Shtip, Kochani, Skopje and Kumanovo.

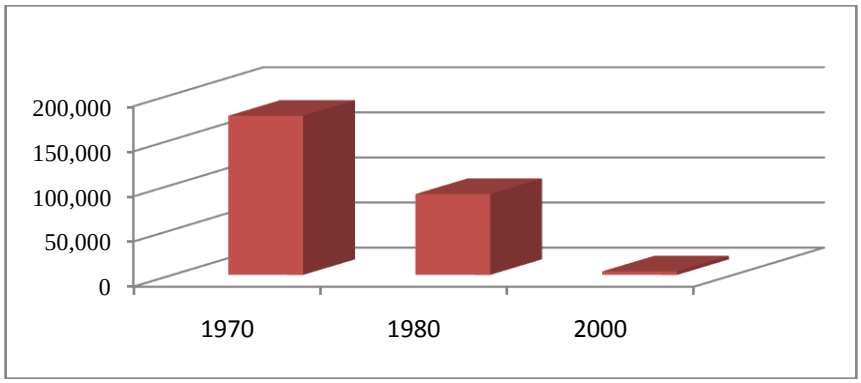


Figure 1. Historical trend of vegetables seed production quantities in the Republic of Macedonia [kg]

Seed production of vegetable crops can be easily organized in agro-climatic areas characterized with a lengthy vegetation period of 200 days registering above 10^0C and a yearly sum of temperatures 4500^0C. That is the most important and an irreplaceable factor for producing high quality seeds.

Table 3. Projection of seed production for domestic market

Crop	Seed yield [kg-ha]	Open field cultivation [ha]	Seed rate for one ha [kg]	Total seed requiremets [kg]	Wholesale price per kg seed [EUR]	Income [EUR]
Tomato	100	5600	0.2	1120	50	56 000
Pepper	200	8800	1.2	10560	50	528 000
Cabbage	1000	4600	0.5	2300	100	230 000
Onion	1000	3600	4.5	16200	150	2 430 000
Leek	900	1200	3	3600	12.5	45 000
Water melon	100	3000	1.2	3600	20	72 000
Melon	150	2000	2	4000	20	80 000
Carrot	900	800	7	5600	25	140 000
Snap beans	1100	1000	120	120000	12.5	1 500 000
Peas	2200	1300	200	260000	12.5	325 0000
Total predicted income [EUR]						8 331 000

As presented in the Table 3, Macedonian economy can save around 10 million EUR with domestic production of vegetable seeds. The idea is not compete with the greenhouse hybrids, but to work on breeding programs and further propagation of local vegetable landraces that are well adopted and accepted in the region (Popsimonova et al., 2017).
The Republic of Macedonia does not have specialized center for production of seedlings. Currently, most of the individual farmers produce the seedlings by themselves, often in outdated way for example in warm beds, while the greenhouse producers use modern methods of container production. Very small percent of greenhouse producers obtain the transplants from specialized centers for transplant production from the neighboring countries. Based on the production area under plastic houses and greenhouses the need for vegetable transplants on annual bases in Republic of Macedonia can be estimated on 130 million units (Ristevska, 2012). The number would significantly increase if the production on open field is taken into account. The data shows the necessity of organized transplant production which will also include production of grafted seedlings.

Greenhouses

There are approximately 260 ha of agricultural cultivable area under glasshouses, but the exploitation of the capacities ranges between 70-75%. Most of the greenhouse complexes are blocks of 6-24 ha units in extent. As presented in the Figure 2, the production area of vegetables, especially tomato, in glasshouses is drastically reduced in the last ten years. The area under plastic-houses and tunnels vary between 4000-6000ha.
The start of cultivation depends on the possibility of heating the greenhouses. The few glasshouse operations that have the financial means to purchase sufficient crude oil and start nurseries (first tomato, later the more cold-sensitive cucumber) already in November, transplant the seedlings in December and harvest the crop in February and March when very high prices can be obtained. Most glasshouse operators, who cannot afford the heating expenses (up to 0,39 Euro/kg.), start later to save on fuel consumption but fetch lower prices for the crop (Epicenter, 2012).

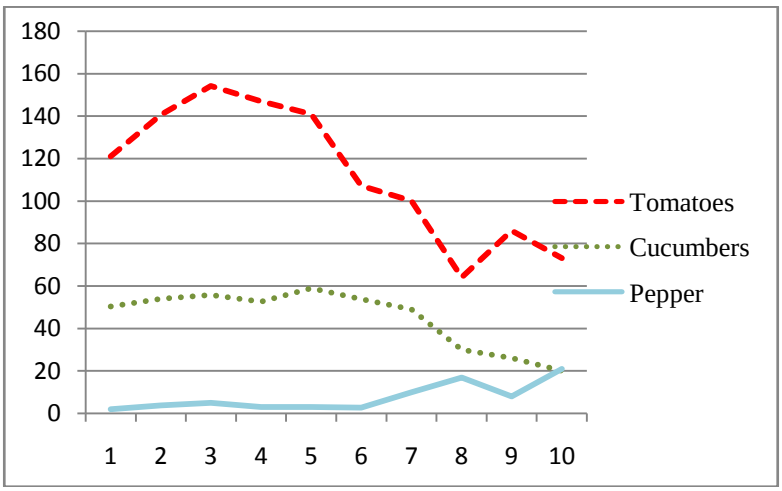


Figure 2 Decreasing trend of greenhouse area in the period 2007-2017 [ha]

Next, production in the plastic tunnels starts in February/March with harvest in May/June, depending on whether or not, the tunnels are heated. In case of heating this is done subsoil by passing hot water through plastic tubes that are laid below the ground. Most foil tunnels, however, are not heated and thus come later into production. Then the open field season starts in April, often using seedlings grown in protected nurseries and continues until September. In the hot summer months, protected cultivation cannot compete with open field cultivation. The protected cultivation starts again in September for a second crop (only tomato and cucumber-often gherkins) as practiced by an increasing number of growers, where heating is available.

Due to the climatic diversity, the production of fresh vegetables is pretty regional and almost 80% is an output of the Southeastern Macedonian region (Diagram 1). Changed Mediterranean climate that dominates in the encircled region meets the temperature requirements of most vegetables. Therefore it would be viable solution updated technologies to be introduced (such as soil-less cultivation) along with reconstruction of the heating and ventilation equipment in order year-round production to be obtained.

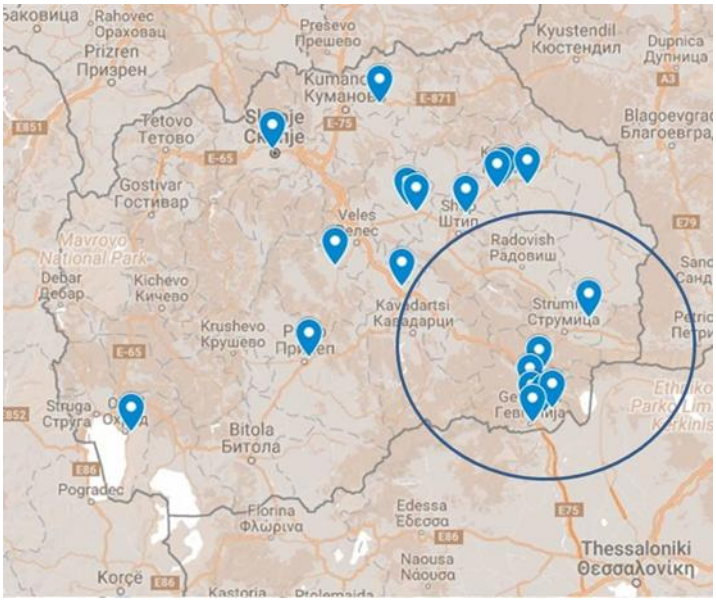


Diagram 1. Distribution of glass-houses in the Republic of Macedonia

In the rest of the country advanced technologies can be only applied in mid or long term perspective, whereas successive planting of different cold resistant crops (possibly flowers) or varieties in adequate climatic regions can be readily adopted followed by minor interventions in production technology and greenhouse structures in order to conserve and maintain energy throughout the season. In that way, the cropping season can be prolonged for few weeks.

Conclusions

Macedonian vegetable production faces a big challenge – to move forward from the position that has been established few decades ago in completely different economic, social, and technological environment. The solutions proposed in this paper refer to open field production, protected crops and plant breeding programs. These are only few steps that need to be taken towards more productive vegetable sub-sector and they have to be supported by sound research and extension services. Due to unfortunate policy decisions and luck of research projects in the past the agricultural institutes that used to be engaged in seed production, plant breeding and technology application are now focused on teaching only. So, the very first step to improvement should be made in the research field.

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