

Master Plan Azerbaijan: Vegetable Sector Assessment

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1. Introduction

The sector protected vegetables consists of vegetable products cultivated in different types of protected environment, such as structures with plastic film (low and high, single and multi-tunnel) or glass cover. In some cases also nets are being used to protect the crop against insects and/or extreme climatic situations (such as cold temperatures, high irradiation and hail). Protected cultivation offers the possibilities to control the cultivation better than in open field cultivation with consequently higher production, better quality and better input efficiencies.

In this report the key features of vegetable production in Azerbaijan and in particular vegetable production under cover will be described. Next, the products' use, markets, government policies and the sector's business environment will be analysed. This note concludes by suggesting investment opportunities and providing recommendations how sector development could be promoted.

2. Structural features of the sector

The total area of vegetable crops was 73,700 ha in 2016, of which 97% open field crops and 3% with protected crops (see table 2.1). The total area with vegetable crops showed an increase till 2007 (85,000 ha) and is decreasing slowly since.

	1000 ha						%
Types of vegetables	2011	2012	2013	2014	2015	2016	2016
Total	81.1	78.3	77.6	76.0	77.1	73.7	100.0
vegetables sown in open lands-total	79.7	76.8	76.0	74.4	75.7	71.5	97.0
including:							
cabbage	6.4	6.4	6.4	5.6	5.6	5.2	7.0
Cucumber	13.9	13.6	13.6	13.2	13.6	12.3	16.7
Tomato	26.6	24.6	25.0	24.6	24.6	22.4	30.4
Beetroot	0.4	0.5	0.4	0.5	0.6	0.5	0.7
Carrot	0.8	0.8	0.8	0.9	1.1	1.0	1.4
Onion	13.1	11.6	11.1	11.8	12.1	12.0	16.3
Garlic	2.2	2.5	2.5	2.4	2.4	2.3	3.1
peas, green	1.1	1.1	0.4	0.4	0.4	0.4	0.5
other vegetables	15.2	15.7	15.8	15.0	15.3	15.4	21.3
vegetable under canopy lands-total	1.4	1.5	1.6	1.6	1.4	2.2	3.0
including:							
Cucumber	0.6	0.6	0.6	0.7	0.3	0.7	0.9
Tomato	0.8	0.9	1.0	0.9	1.1	1.4	1.9
other vegetables	0.0	0.0	0.0	0.0	0.0	0.1	0.1

Table 2.1: Sown area of vegetables by types, of categories of farms (1000 ha, %)

Source: stat.gov.az ; SSC, 2017

Tomato, cucumber and onion are the main open field vegetable crops. The area used for these three vegetable crops has declined since 2011, most prominently for tomatoes of which the area dropped by 4,200 ha over the last five registered years (see table 2.1).

The most important protected vegetable crops are tomato (about two-third of the area under canopy lands) and cucumber (the remaining one-third). The total area of protected vegetables has more or less stabilized since 2009 at 1,400-1,600 ha but 2016 data shows an increase to 2,200 ha. The protected area with tomato has increased steadily since 2011, while cucumber showed a strong decrease in 2015 in comparison to the years before.

According to large greenhouse companies the area of modern and high-tech greenhouses in Azerbaijan amounted to roughly 350 ha in 2016 but will expand to 500 ha in 2017 as several construction activities will be completed.

By far the largest area of vegetable crops (about 75,100 ha in 2015; 97.5%) is being produced at family farms, households and private owners and a limited area (ca. 2,000 ha; 2.5%) is produced at agricultural enterprises and other organisations (stat.gov.az).

Farm size

Almost 80% of the agricultural farms is smaller than 2 ha (utilized agricultural area). The other 20% of the farms has 76% of the (utilized agricultural) area. In practice vegetable production will occur at all type of agricultural farms.

Regional development

The area with protected cultivation of vegetables is concentrated in the region of Shamkir (798 ha in 2016, 36.9%). Other important production regions are Balaken (352 ha), Absheron (336 ha) and Geychay (263 ha). See figure 2.1 and also appendix 1. These four regions together contribute to almost 80% of the total area with protected vegetables. In Shamkir protected vegetable area is increasing steadily. A strong increase is observed in the Absheron and Balakan region, followed by Geychay. Striking is the strong increase in area in the region of Absheron from between 2014 and 2016 (from 52 ha to 336). One of the reasons maybe the establishment of large high-tech greenhouses by different investors (e.g. Azersun Holding MMC, Bina Agro LLC and Habako MMC).

On the other hand the greenhouse area in Masally region dropped from 384 (2014) to 14 ha (2016). The production dropped from 11,137 tons (2014) to 600 tons (2016), a decrease of almost 95% (see appendix 2). This is similar to the protected area decrease. Only the question arises which factor(s) has (have) contributed to this.

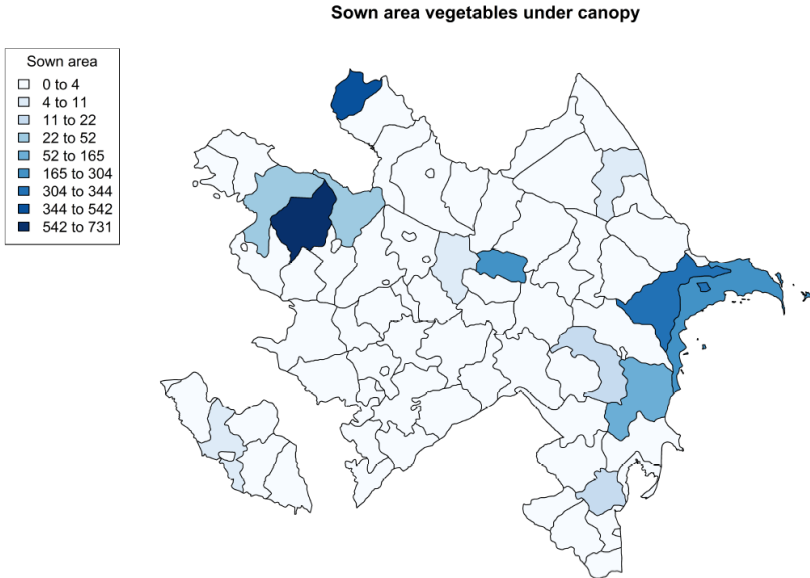


Figure 2.1: Sown area of protected vegetables (under canopy) per region in Azerbaijan in 2016 (ha)
Source: stat.gov.az

The most important production regions are spread over the country. From the east (Absheron) via the middle (Geychay) to the west (Shamkir) and to the north (Balaken). The climatic situation in these regions differs because of the geographical location with respect to temperature, irradiation and precipitation. The climatic conditions influence in principle the production potential of vegetables, especially for open field crops. With more means of protection and control systems being used (e.g. greenhouses), higher production and better quality can be obtained. Local climate conditions are as follows (<http://www.fao.org/ag/agp/agpc/doc/counprof/azerbaijan/azerbaijan.htm>):

Absheron region is in the east of Azerbaijan. Hot dry summers and mild winters characterize the climate of the Absheron peninsula. Annual temperature ranges between 10 - 14.5°C. Average January temperature is between -10°C and +5°C, but that of July between 21-27°C. The Absheron region has a dry climate type. Average annual precipitation is 150-220 mm. As the peninsula is bounded by the Caspian sea, average annual humidity is 70-80 percent.

Gazakh-Ganja region (Shamkir) in the west of the country, has a dry, warm climate in the plains, temperate-warm and steppe-dry winter climate type in the lowland. In the mountain area the climate is cold and humid. Average annual temperature is 11.8-13.0°C. Average annual precipitation ranges between 250-300 mm. Chestnut, light and dark chestnut soil types prevail in the zone. More than 2,700 hectares of land are severely salinized.

Shaki-Zagatala region (Balaken) is to the north of the country on the southern slopes of Major Caucasus. The climate is temperate and belongs to the wet "subtropical" climate type. Rainfed agriculture prevails. Average annual precipitation is 600-700 mm. In high mountains it reaches to 900 mm. Average annual temperature ranges between 10.5-12.6°C. Forest-meadow, alluvial-meadow and meadow-garden soils are widespread here. Strongly salinized soils make up 300 hectare.

Geychay: Climate comparable to Gazakh-Ganja region.

For Baku (Absheron region) the differences in solar radiation and air temperature during the year is illustrated in figure 2.3. Baku shows a larger variation in solar radiation and air temperature than in Almeria and Amsterdam. In the winter the climatic situation around Baku is similar to Amsterdam and during summer almost comparable to Almeria (Spain). With respect to designing greenhouses for vegetable production it is a challenge to realise optimal greenhouse climate conditions in all seasons. During the hot summer most greenhouses are empty due to the high inside temperatures. The production season can be expanded by using shadow screens and/or cooling techniques (e.g. fogging systems), but this equipment is mainly installed in high-tech greenhouse structures.

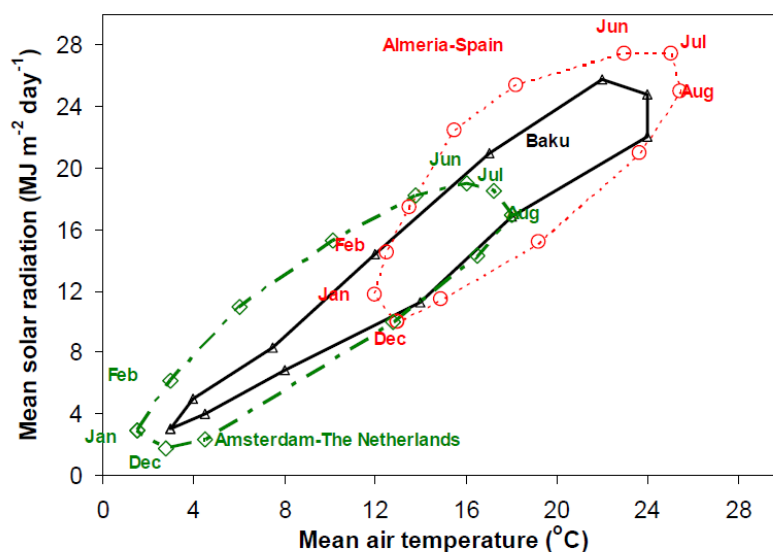


Figure 2.3: The mean solar radiation and mean air temperature for three greenhouse production regions (Katzoulos and Hadzilas, 2012)

Soil

The soil type is important to outdoor vegetables, but also for soil-grown vegetables in greenhouses. In more low-tech greenhouses (single tunnels with passive ventilation) soil culture is still common. In current areas with greenhouses the soil is (reasonable) suitable for vegetable production.

More and more greenhouse vegetables are cultivated in other growing media, like peat, cocopeat and an-organic material. This is because of the negative effect of soil-bounded diseases and pests on yield and quality. In that case the local soil types are less of importance and other production factors are more determining.

Water

An important production factor is the availability of water of good quality. Vegetable production is taken place on irrigated lands. Beside rainfall water is extracted from additional sources, being: surface water sources (canals, rivers and reservoirs) and/or groundwater sources like for example wells. Mostly on larger greenhouse farms rainfall is collected and stored in basins. Although water canals and rivers are available in most greenhouse regions, small greenhouse farmers use ground water, because connection to the water canal is too expensive. Large greenhouse farms are capable to organize connections to open water sources (via pipelines) by negotiating with the local government (with financial support).

The quality of water from the mountains is reasonable good (low salt and mineral content), but the quality of groundwater is varying and sometimes contain too much minerals. On some – but few - greenhouse farms reversed osmosis is available to produce good quality of water.

In the region of Samukh, water will become available for small farmers by establishment of a Water Users Union (WUU), which play an intermediate role between the government and the farmers. The Water Users Union is coordinating the water supply from yet to be build water storages. For members of the WUU the price of 1000 m³ water supply is varying between 0.5 (Fizuli region) and 4.63 manats (Khachmaz region), see appendix 6. Farmers who are no member of the WUU pay a 15% higher price for water supply.

Access to water (of good quality) is a serious point of attention, especially for small farmers.

Infrastructure

This aspect of the structure refers to (the quality of) transport infrastructure (road, rail, water and air) and to communication and information systems. See figure 2.4 for road, rail and river map of Azerbaijan. From a logistic point of view the Shamkir and Balakan region seems to be well situated for export to Russia, when vegetables are transported by trucks (main transport mode). Absheron and Geychay are situated more closely to the capital Baku. Despite the long(er) transport distances – especially in time - several companies have established large greenhouse areas around Baku (Bina Agro, Azersun/GreenTech, Habako and recently AS Agro), which export quality products to Russia.



Figure 2.4: Road, rail and river map of Azerbaijan (source: funny-quotes.picphotos.net)

ICT: Mobile phones are widely used as phone connections and internet is also widely used (see also Master Plan report 'Market and competitiveness analysis of the Azerbaijan agricultural sector: an overview').

3. Input supplying industries

3.1 Seed and other plant material

Seed can be obtained locally, but is also imported from foreign seed companies. The latter is to buy improved seed adapted to the local climatic situations in order to improve production and quality of the products. Some of the known national and international seed companies active in Azerbaijan are: Esi Group, Gilan Holding, Oguz, Organik LLC (Azerbaijan), Rijk Zwaan, Enza Zaden, Bejo, Monsanto, Syngenta, and other seed companies in neighbouring countries of Azerbaijan.

Local seed is also being improved, because a part of the domestic consumers prefer the typical taste of local varieties. The greenhouse vegetable sector is depending of good quality of seed or planting material, in particular when producing for the high-end market (domestic and export). Besides seed companies also plant propagators and nurseries play a role to provide the producers/growers with the appropriate planting material. These companies are in general small and medium sized. On some greenhouse farms they produce their own young plants on a small area.

3.2 Energy

Azerbaijan is rich on natural gas and fossil oil. In Azerbaijan a grid structure is present, but coarse. This means that not all greenhouse farms are connected to the gas infrastructure. Alternatives are oil or coal. Gas is provided by the only state-owned company Azerigaz OJSC. Gas tariffs are presented in table 3.1.

Table 3.1: Azerbaijan natural gas, wholesale, production and transmission tariffs

Nº	Name of service	Tariffs (including VAT, manat/1000 m ³)
1.	Production of natural gas	5,5
2.	Transportation of natural gas (for each 100 km distance)	2,0
3.	Wholesale price for distribution companies	75,0
4.	Retail prices of natural gas	
4.1.	Residential (population)	
4.1.1.	Part of the annual consumption up to 1700 m ³ (1700 m ³ including)	100,0
4.1.2.	The part of annual consumption of over 1700 m ³	200,0
4.2.	Non-residential	200,0
5.	The consumers who get gas directly from the main gas pipelines and use natural gas for production puposes (with a monthly consumption of no less than 10 million m3)	120,0

Source: Tariff Council of Azerbaijan (<http://www.tariffcouncil.gov.az/?/az/content/66/>)

In open field vegetables some electricity is used for pumps (irrigation), sorting and storage (cooling). Machines for sowing, ploughing, etc. will use diesel. Hardly no other energy carriers are used.

In protected cultivation of vegetables heating is occurring. Depending on the location of the farms, gas, oil or coal will be used for heating. Heating with gas will only occur on locations where infrastructure is available. Oil and coal is transported by trucks. In some cases large greenhouse companies have arranged gas supply by gas companies.

According to the different stakeholders gas infrastructure is not a big issue. However most farmers are complaining about the low pressure of the supplied gas, that causes difficulties in the heating system (Info from interviews with 37 greenhouse, poultry and livestock farmers).

Electricity comes from two power stations, Azerenergi OJSC and Azerishiq OJSC. On more large greenhouse farms a generator is installed as back-up facility. A serious problem is the number of power cuts. In general 10-20 times per month a power cut is happening. At greenhouse farms less problems

are being faced, because installations of generators can take over the electricity supply from the public grid (Info for interviews with farmers). Electricity tariffs are presented in table 3.2.

Table 3.2: Electricity tariffs

Number	The name of service	Tariffs, for 1 kWh (including VAT), kopecks
1.	Purchase tariffs from producers	
1.1.	Generation by the private small scale hydraulic stations	5.0
1.2.	Generation by the Wind Power Stations	5.5
1.3.	Generation by other alternative and renewable sources	5.7
2.	Wholesale tariffs	5.7
2.1.	For the companies operating in the chemical and aluminium industries and in the steel smelting facilities of which average monthly consumption of the electricity (for production purposes) is not less than 5 million kWh	
2.1.1.	Day time (08.00- 22.00)	5.8
2.1.2.	Night time (22.00- 08.00)	2.8
3.	Transit transmission of the electricity	0.2
4.	Retail tariffs	
4.1.	Residential	
4.1.1.	The part of monthly consumption volumes up to 300 kWh (300 kW included)	7.0
4.1.2.	The part of monthly electricity consumption of over 300 kilowatt hour.	11.0
4.2.	Non-residential	9.0

Source: Tariff Council of Azerbaijan (<http://www.tariffcouncil.gov.az/documents/N17-EE.pdf>)

3.3 Equipment and mechanisation (regarding protected cultivation)

The greenhouse area is about 2,200 ha (2016). A small part (ca. 20%) of the greenhouse area is of (updated and repaired) Russian style. New structures are mostly built by Turkish suppliers. Other greenhouses and greenhouse equipment is purchased from Israeli, Dutch, Italian or French suppliers (Info from interviews with greenhouse growers). The majority of the greenhouse structures have basic climate control components (Katsoulas and Hadzilias, 2012). Common type greenhouse are single plastic structures (gable roof) with mixed wooden and steel frame materials. New greenhouse have a multi-span structure with both plastic (arched roof) as well as glass cover (gable roof); see figure 3.1.



Figure 3.1: Traditional greenhouses with plastic cover and wooden structures (left); modern greenhouses with glass cover and steel structure and shadow/energy screen (right)

Cultivation is done in the soil with drip-irrigation. In more modern greenhouses soilless cultivation is being used with organic (peat, coco-peat) or an-organic substrates. Recirculation or reuse of drain water is not common (see figure 3.2). Fertilization is computer controlled. In most traditional greenhouses this is done with an A- and B-container (solid fertilizers). In mid and high-tech greenhouses fertilization is mostly applied with liquid fertilizers.

Water irrigation systems are in most cases supplied by Italian, Turkish and Israeli companies.



Figure 3.2: Cultivation in soil (left); in coco-peat slabs (middle); in coco-peat slabs in gutter, incl. recirculation (right)

Heating is done with steel pipes with hot water from gas or oil boilers. Energy saving techniques are usually not found in Azerbaijan. Climate is computer controlled (low to high-tech systems). Besides heating also cooling is very important in summer situations. This can be reached with a good ventilation systems (at the ridge) and/or evaporative cooling (depending on the specific climatic conditions, like the dry environments in Absheron and Astara region). CO₂ application is not common and is only present at modern greenhouses.

Other mechanisation is taken place for sorting and packaging of the harvested products. Depending on the market (from local to export market) the products are packed in large volume boxes or in small consumer packages. Temporary storage of products is mostly not cooled.

3.4 Labour (input, skills, competences, availability of labour qualifications)

Azerbaijan has a history in agriculture, although the oil industry is the main economic sector. Agriculture is performed on a large number of small farms (households and family farms). The applied cultivation techniques and methods in protected horticulture are traditional and transferred from generation to generation. Experiences with improved and/or new technologies are not familiar. The level of agricultural education is insufficient and there is a lack of qualified employees (Info greenhouse companies). In Shamkir region for example, an agricultural vocational school (Technicum) will start in 2018 (Info local MoA of Shamkir) as one of the few of these schools in the country. In view of the application of new technologies in protected cultivation the appropriate skills and competences are therefore not present. On some new and high-tech greenhouses foreign employees or managers have been contracted, because of the required skills and competences. Recently (July 2017) a job was published in HortiDaily in which the function of crop manager was offered for a very new modern greenhouse farm near Baku.

3.5 Services

Formerly, extension services were not a task of the Ministry of Agriculture (MoA). Since several years the Procurement (Institute of the MoA) is conducting extension service activities, but in practice these activities are limited and teachers/trainers are not well qualified. Most extension services is done by input suppliers, like seed companies, substrate companies, crop protection companies and fertilizers suppliers. This service has a commercial interest.

In some cases large modern greenhouse farms are operating as dealer for international suppliers of seed, crop protection and/or biological control agents. For example GreenTech (subsidiary of Azersun Ltd) is an official representative for Monsanto and Koppert Biological Systems.

There is a lack of qualified or certified laboratories to conduct analysis on product quality, on residues (MRL's), on soil and water (Info greenhouse companies). This hinders realising optimal cultivation conditions and to meet the requirements when selling products to high-end and/or export markets.

3.6 Capital

Availability and costs of capital are important and Azerbaijan's score on the WorldBanks 'getting credit' list is rather low, which means that access to credit is problematic and lending interests are high (ca. 16-17% in 2015/2016). Recent figures show that small farmers can lend money from commercial against interest rate of 18-36% (info MoA Samux), which makes access to finance more difficult. On the other hand agricultural production and processing sectors may benefit from discounted credits through the following channels:

- Credits by Azerbaijan National Fund for Entrepreneurship Support (ANFES)
- State Agency on Agricultural Credits (SAAC).

The biggest provider of discounted credits to agricultural sector is ANFES with the aim to support the development of entrepreneurship, to increase the business activity of the population and the implementation of the financial support (Agricistrade, 2015).

For some agricultural projects of the government the farmers can get a reduced interest for the a loan from a commercial bank (e.g. 6% instead of 18-36%). The difference in interest is subsidized by the government.

Small farmers can obtain money to buy seed, fertilizers and chemicals from a government related Institute (Procurement). This institute purchases inputs and about 25% of the expected revenue value the farmers will get earlier in order to buy the inputs from this institute. After selling the harvest the loan will be settled (Info MoA Samux).

From the interviews with 12 farmers of greenhouse products it can be concluded that half of the farmers doesn't apply for loans from financial institutes. The other half has made use of loans from the national Fund for Entrepreneurship Support. General complain of all farmers is the high rate of interest and that they can hardly pay the interest payments and repay the loans.

4. Trends in production, yields, revenues and costs

Production volume

The total production of vegetables was almost 1.3 million tons in 2016. About 97% was from open field production (ca. 1.2 million tons) and more than 3% from protected cultivation (ca. 93,6 tons) (see table 4.1).

Table 4.1: Production of vegetables by types, all categories of farms, 1000 tons

	2011	2012	2013	2014	2015	2016
Total	1214.8	1216.2	1236.3	1187.7	1275.3	1270.3
Vegetables sown in open lands-total	1167.8	1162.9	1179.5	1136.3	1233.4	1177.0
including:						
Cabbage	100.1	110.6	101.4	88.8	94.5	93.3
Cucumber	190.7	191.5	198.8	192.9	223.1	201.7
Tomato	439.1	440.8	466.4	450.7	481.0	426.6
Beetroot	5.3	7.6	6.0	6.7	9.7	12.9
Carrot	10.6	11.7	12.1	11.8	16.5	20.9
Onion	182.5	166.2	157.7	169.1	179.0	178.2
Garlic	19.5	20.7	20.7	20.2	20.8	21.1
Peas, green	4.1	4.5	2.1	1.2	1.9	2.8
Other vegetables	215.9	209.3	214.3	194.9	206.9	219.5
Vegetable under canopy lands-total	47.0	53.3	56.8	51.4	41.9	93.6
including:						
Cucumber	21.4	18.6	19.5	20.5	7.6	16.2
Tomato	24.1	30.8	34.3	30.7	34.2	76.1
Other vegetables	1.5	3.9	3.0	0.2	0.1	1.3

Source: stat.gov.az

Total production of protected vegetables in 2016 was substantially higher than in 2014 and 2015 due to the larger area. Compared to 2011 levels the production volume of protected vegetables has almost doubled. As expected, about 96% of the vegetable production in 2016 is produced at family farms, households and private owners and almost 4% at agricultural enterprises and other organisations.

As well as for the production area, the production volume of protected vegetable crops is concentrated in the region of Absheron (40,908 tons in 2016), 43.7% of total production of protected vegetables) (see appendix 2). The following production regions in size are Shamkir (20,9%), Geychay (12.5%) and Balaken (5.7%). The production volume of protected vegetable crops in Absheron has increased very strongly and is caused by the strong increase of the production area between 2014 and 2016 (646%). The production volume of protected vegetables in Shamkir has increasing steadily.

Yields

The trend in yields in the open field vegetable production is increasing, with the average yield of vegetable products (open field and protected) increased by 8% in 2016 compared to 2011 levels. Strong risers are green peas (20.5%), beetroot (15.2%), tomato (14.5%) and cucumber (14.8%).

Table 4.2: Yield of vegetables by types, all categories of farms, open field production 100kg/ha

Types of vegetables	2011	2012	2013	2014	2015	2016
Total	146	150	154	152	158	159
Cabbage	154	172	158	159	163	172
Cucumber	135	138	144	143	155	155
Tomato	165	178	186	182	189	188
Beetroot	124	142	132	135	143	138
Carrot	127	125	127	126	127	158
Onion	140	143	142	144	148	148
Garlic	88	84	83	85	87	89
Peas, green	39	43	61	33	47	72
Other vegetables	140	133	135	129	132	139

Source: stat.gov.az

The average yield of open field vegetables from table 4.2 (16.5 ton/ha in 2016, SSC data) is close to the FDMS figure for 2015 which is 15.6 ton/ha. Unfortunately no separate SSC data are available of yields of vegetable crops in greenhouses. According to FDMS data the average yield of vegetables in greenhouses is 121.1 ton/ha (2015). Most likely, the FDMS figures only register that yields from modern glasshouses, not providing information on yields achieved by production under plastic film. Indeed, combining the information from table 4.1 (production) and table 2.1 (on areas) indicates that the overall yield of vegetable production under canopy is 42.5 ton/ha (tomatoes: 54.4 ton/ha; cucumbers: 23.1 ton/ha). If all protected production of vegetables is taken into account and yields are compared with open field production, yields under canopy are more than 2.5 times higher than that of open field production (42.5 ton/ha versus 16.5 ton/ha).

Yields of tomato and cucumber which together contribute substantially to both the open field cultivation as well as the protected cultivation are listed per region in appendix 3 and 4. For tomato the average national yield (open field and protected cultivation) has increased with 14.5% since 2011. In some regions the yield has (almost) doubled, like in Gubadly (104%) and Tovuz (91.4%). In Shamkir, the region with the largest area of protected cultivation the yield increased with around 25%. The highest yield of tomato was obtained in Tovuz (33.3 ton/ha), Bilasuvar (31.8 ton/ha) and Sheki city (31.0 ton/ha). With respect to cucumber most significant yield increases were achieved in the region Gubadly (120%), Gabala (89%) and Shabran (74.5%), with highest yields in Absheron (42.4 ton/ha and in Masally (28.8 ton/ha). It can be assumed that the regions with the highest figures of yield will have a large part of protected cultivation.

For three regions 2015 FDMS data of average yield of greenhouse vegetables are available: 231.2 ton/ha in Absheron; 75.3 ton/ha in Geychay and 97.9 ton/ha in Shamkir. For some other regions an average yield is mentioned of 96 ton/ha, but it is doubtful whether this is correct, because no detailed figures are given and it is very unlikely that these regions would have exactly the same production.

Selling prices

The selling prices of vegetable products are known for agricultural enterprises and for private owners (hence, not for family farms and households, the small and medium sized producers that grow more than 95% of the vegetables). In table 4.3 an overview is shown for vegetables (open land) and of market-garden crops. Selling prices of greenhouse crops are not available. In general, products from greenhouses are of better quality and presentation and most likely will receive a higher selling price.

Table 4.3: Annual selling price of per 100kg agriculture harvest by agricultural enterprises and by private owner farms, manat

The name of the indicators	2011	2012	2013	2014	2015	2016
<i>Agricultural enterprises</i>						
Vegetable (open land)	24.23	15.69	23.66	30.27	25.93	11.21
Market-garden crops	15.21	13.79	14.29	13.07	14.12	13.13
<i>Private owner farms</i>						
Vegetable (open land)	28.50	26.50	24.1	32.25	32.17	30.88
Market-garden crops	20.10	16.80	13.6	12.24	12.94	12.15

Source: stat.gov.az.

The selling prices show annual fluctuations as a result of demand and supply. All the time, selling prices of vegetable products from private owner farms are higher than for those from agricultural enterprises. For market-garden crops it seems selling prices for agricultural enterprises have become higher than for private owner farms in recent years. The selling prices of vegetables and market-garden crops are also available on regional level, but these data are incomplete (see stat.gov.az). There are also seasonal fluctuations of prices, especially in the period from May till September when horticultural products from both open field as well as protected cultivation are on the market.

According to FDMS data the average producer price of protected vegetables in 2015 was 841.2 manats/ton (0.84 manats/kg). This is 3.3 times higher than the average product price of open field vegetables (=253.9 manats/ton).

Prices registered at 22 May 2017 at wholesale markets in Meyvali (Baku), market Shamkir Sabati (Ganja), a local market in Baku (Yasli - Greenmarket), in supermarket Bravo (Pasha Group) and a local supermarket (Bol Market) are given in appendix 5.

On some greenhouse farms vegetable products are packed in Azerbaijan newspapers to show that the products are of Azerbaijan origin (see picture below).



Costs

The costs of vegetable production (open land) at both agricultural enterprises as well as private owner farms show a small increase, but also fluctuates to some extent (see table 4.4). The costs figures do not include interest costs on capital and rent on land.

Table 4.4: Cost price of per 100kg agriculture harvest by agricultural enterprises and by private owner farms, manat

The name of the indicators	2011	2012	2013	2014	2015
<i>Agricultural enterprises</i>					
Vegetable (open land)	12.5	9.21	11.2	14.22	12.82
Market-garden crops	7.91	8.41	8.81	9.21	7.89
<i>Private owner farms</i>					
Vegetable (open land)	11.30	12.48	10.12	15.30	15.29
Market-garden crops	7.28	10.02	8.12	8.04	8.07

Source: stat.gov.az

According to table 4.4 the cost prices of vegetables at private owner farms are higher than at agricultural enterprises during the last two years. The reason for this is unknown. The cost prices of market-garden crops for agricultural enterprises and private farms are more similar. Based on FDMS data the average cost price of greenhouse vegetables is 124.8 manats/ton (2015). This is about 1.6 times higher than that of open field vegetables (= 78.3 manats/ton).

In table 4.7 an overview is given of the revenues, costs and profit of protected vegetable production for Azerbaijan as a whole and for the main production regions according to FDMS data.

Labour

The labour input in vegetable production is more or less stable since 2011 and amounts to an average of 23 person hours per 100 harvested products (see table 4.5). There is no difference in labour input between agricultural enterprises and private owner farms.

Table 4.5: Labour expenditure for per 100kg agriculture harvest by agricultural enterprises and by private owner farms, person-hour

The name of the indicators	2011	2012	2013	2014	2015
<i>Agricultural enterprises</i>					
Vegetable (open land)	22.9	23	23	23	23
Market-garden crops	12.1	12.1	12.3	12,3	12.2
<i>Private owner farms</i>					
Vegetable (open land)	23	23	23.1	22.9	23
Market-garden crops	11.9	12.1	12	11.5	11.7

Source: stat.gov.az

The labour figures of vegetables (open land) are also available on regional level, but the data are incomplete (see stat.gov.az). FDMS data show that labour input per surface area on greenhouse farms is higher than on open field vegetable farms, due to a higher productivity and a longer production season. General figures are not available, but as an example, an expert guess is that a 10 ha greenhouse farm with vegetables would need 100 permanent employees and 50 persons extra during peak season, resulting into about 10-15 persons per ha.

Tariffs of labour vary, but in general wages for greenhouse employees are higher than in other agricultural sectors, like poultry and livestock. About 500-1000 manats per month is being paid to local staff and 300 manats/month to workers (Info from interviews and of trip in May 2017).

Profitability

According to table 4.6 the production of vegetables (open land) is (very) profitable, although with large fluctuations. The average profitability is higher at private owner farms than at agricultural enterprises. This is mainly caused by higher selling prices of the vegetables for private owner farms.

Table 4.6: Profitability of 100 kg sold products by agricultural enterprises and by private owner farms, %

The name of the indicators	2011	2012	2013	2014	2015
<i>Agricultural enterprises</i>					
Vegetable (open land)	6,8	41.3	84.8	94,3	71.4
market-garden crops	48,3	44.0	41.7	38.1	43.1
<i>Private owner farms</i>					
Vegetable (open land)	84.0	53.1	73.9	85.7	109.1
market-garden crops	71.5	37.5	42.5	50.5	56.5

Source: stat.gov.az

Compared to performance data of EU growers, the profitability of Azeri agricultural enterprises and private owner farms are rather high. Looking at the rather low modernity of the greenhouses (old to very old greenhouse structures), it is doubtful whether these reported profitability figures are reliable.

Table 4.7 shows revenues, costs and profits for protected vegetables crops, provided by the FDMS.

Table 4.7: Revenues, costs and profits for a 1 ha protected vegetables in 2015 (manats)

Regions	Vegetable (protected fields)		
	Gross revenues from 1 ha, AZN	Costs for 1 ha, AZN	Profits from 1 ha, AZN
Country	214871	22500	192371
Absheron region	229186	23500	205686
Geychay region	39405	21369	18037
Shamkir region	39779	10129	29649
Zardab region	618	459	159
Regions	Greenhouses		
	Total revenues from 1 ha, AZN	Actual costs for 1 ha, AZN	Profits from 1 ha, AZN
Country	101412	15111	86300

Source: FDMS data.

Table 4.7 points out that in general protected vegetable crops have achieved positive financial results (in 2015). Remarkable is the big difference in financial results between the profits based on gross revenues and on total revenues.

When we look at the economic figures there is also a big difference between regions, in particular the low figures in the Zardab region compared to those in the Absheron region. It will partly have to do with a different composition of crops and plant schemes, but doesn't explain completely the big difference.

5. Distribution channels of vegetables

The supply chain of vegetables can be illustrated by the following scheme (see figure 5.1).

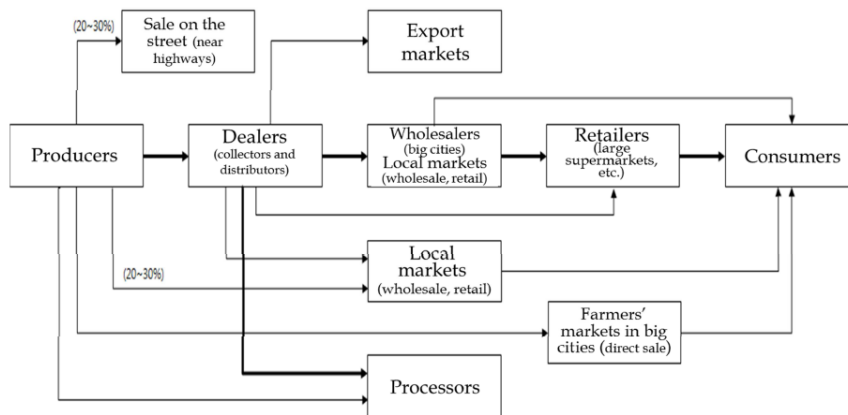


Figure 5.1: Major distribution channels of fruits and vegetables in Azerbaijan (Source: Khalilov et al., 2015)

As mentioned in chapter 2 there are three categories of producers: family farms and households, agricultural enterprises and private owners. Up to 98% of the producers are family farms and households and they are small and medium sized. Their trade relations are mainly based on verbal agreements. The number of wholesale and retail outlets is not clearly known, but is estimated at about 1,365 wholesale markets and more than 30,000 retail shops.

Producers sell their products to dealers and to intermediary. These actors play an important, but also a various role, such as gathering small quantities of products from family farms into large volumes by truck and distribute it to wholesale markets in big cities, regional markets and to overseas markets. In that context dealers are also providing services on logistics, grading, standardization, packaging and activities related to shipment and cargo handling. These activities show that the dealers and intermediary are key players in the distribution channels and supply chain (Khalilov et al., 2015).

Three types of distribution channels can be distinguished:

- Producer > dealer (collector and distributor) > wholesale market > retail market > consumers
- Producer > local markets of wholesale market in big cities > consumers
- Producer > processing companies.

In some cases several dealers are involved in the same channel. For fresh vegetable products from greenhouses the distribution channel from producers to processing companies is of minor importance.

In figure 5.2 an impression is shown of the Meyvali wholesale market in Baku. Trade is done on the spot and mostly without any contracts. Producers and traders are waiting for buyers. This is also the case for imported products (e.g. from Iran) by traders selling their products on the Meyvali market. The wholesale market cannot be considered as an auction. Payment of purchased products is in cash.

The wholesale market showed a strong difference in quality levels of products. This could also be seen how products were packaged and presented. On some locations the products are stored in cooled cells. The organisation of the wholesale market seems to be working adequate, but there is no control on quality levels and food safety. Guards are present and active (when we were taking pictures and were registering price data).

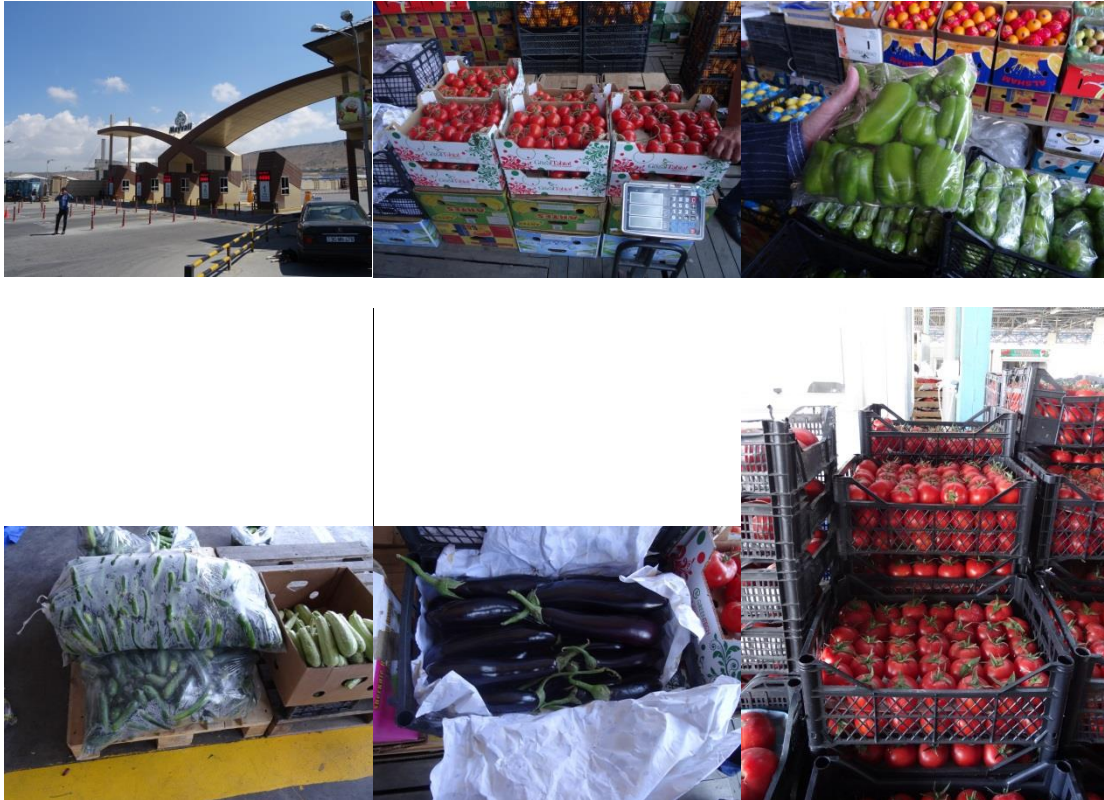


Figure 5.2: Entrance Meyvali wholesale market (upper left), tomato in carton box (upper middle), green bell pepper in plastic bags (upper right), cucumbers in plastic bags (under left), eggplant in carton box (under middle) and pink tomatoes in crates (under right)

Producers can sell their products directly to consumers on the street near the highways and at local markets in the weekends (farmers markets). Rough estimates show that 20-30% of vegetable products are sold on the street/highway and 20-30% on weekend markets.

Khalilov et al. (2015) suggest to turn the current agricultural distribution systems with concealed and closed dealers into a competitive system with an open and fair distribution system. The role of the dealers should in that transition be reduced.

Some various ways of transport is illustrated in figure 5.3.



Figure 5.3: Transport of products from producer to wholesale market Meyvali

As figure 5.1 shows the *retail* (medium-sized and large supermarkets) is being supplied by wholesalers and dealers. Next to that, local markets and farmers markets are supplying consumers with different (local) food products.

The quality of vegetable products on the local market and farmers market differs very much, but in most will not meet the requirements for export to Russia or to Europe (Global Gap). The vegetable products in supermarkets like Bravo (see appendix 5) have a better presentation and are of higher quality. In some

cases, though, presented products with the label premium quality in supermarkets do not have that quality level that is required (for export), see figure 5.4.



Figure 5.4: Strawberry in baskets with soft spots (Mini-market Samkir Sabati)

A new development in the country's logistic infrastructure supporting the collection and distribution of fresh vegetables and fruits is the establishment of the Shamkir Agropark on the Ganja-Gazakh highway (see figure 5.5), opened in August 2017. According to its website (<http://shamkiragropark.az>) "financial support for enterprises to be established under "Shamkir Agropark" will be carried out at the expenses of the state's preferential loans through the National Fund of Assistance for Entrepreneurship of the Ministry of Economy and Industry. The Agropark should work as a service enterprise, strengthening the ownership activity of farmers in the region and would enable them to be provided with consulting, technical, agrarian and logistic services". The Shamkir Agropark is considered as an international hub for fruit and vegetable products, where modern production, logistics and sales technologies come together. The Agropark website indicates the Park will offer services on cold storage, laboratory activities, calibration and packaging lines and 'single window' system (e.g. custom clearance and agro consulting). Shamkir Agropark is not only facilitating the supply chain, but will also start projects to set up production facilities for seedlings & saplings, greenhouse crops and processing activities (dried fruits, jam factory, etc.). In total 64 unit of cold storage (ULO) and 7 units of temporary storages are soon available for fruits and vegetables. Aim is to focus on fruit and vegetable products for the high-end market (domestic and export market). The Agropark will also organize consulting to growers/farmers on different fields to raise the knowledge level of the producers. On the short term priority is given to the following products: tomato, persimmon, cucumber, potato, cherry and apricots.

The Agropark is located in the Shamkir region with a large area of (greenhouse) vegetables, but these are mainly destined for daily trade and not stored. With regard to fruits, a substantial area persimmons is planted in Shamkir, but a limited area of apples and pears. Big question mark is whether the Agropark will be attractive to producers, traders and other stakeholders so that they will make use of its facilities. A footnote is the top-down approach and it is unknown whether the actors in the chain really will embrace this initiative. During the field trip (May 2017) no agreements were signed yet between the Agropark and (local) producers or other actors in the supply chain. In principle the Shamkir Agropark is promising, but practice will show if this will become reality.



Figure 5.5: Shamkir Agropark: main building (left), storage cells (middle) and sorting & packaging hall (right)

6. Domestic production, consumption, import and export

In table 6.1 an overview is given about the production and consumption quantities. Table 6.1 shows that besides domestic production (1.3 million tons in 2015) there is a small quantity of import (ca. 42,000 tons or 3.3% of domestic production), that has decreased since 2011. The largest part of the resources of vegetable products is consumed as unprocessed food (ca. 82%). The export of vegetable products is twice as large of the imported quantity, so Azerbaijan is a net exporter of vegetable products. Remarkable is the quantity of losses in the supply chain (almost equal to export quantity).

Table 6.1: Resources and utilizations of different vegetable products, 1000 tons

	2011	2012	2013	2014	2015
RESOURCES					
Stocks at the beginning of year	199	206	200	197	179
Production	1,215	1,216	1,236	1,188	1,275
Import	121	70	38	39	42
Total of resources	1,535	1,492	1,474	1,423	1,497
UTILIZATIONS					
Used for seed	1.4	1.4	1.3	1.3	1.3
Used fodder of cattle and poultries	33	32	32	31	32
Production of food products	48	48	52	43	58
for production of vegetable canned food	48	48	52	43	58
for production of other kinds of food products	-	-	-	-	-
Consumed as food products (without processing)	1,092	1,070	1,042	1,016	1,052
Export	67	56	66	78	84
Losses	88	85	84	75	79
Stocks at the end of year	206	200	197	179	189
Total of utilizations	1,535	1,492	1,474	1,423	1,497

Source: stat.gov.az

A large part of the harvested vegetable products (82%) is being consumed without processing (see table 5.1) and is decreasing. A small but growing part is processed (ca. 5% is canned).

With respect to greenhouse vegetables all fresh products will be consumed unprocessed. So the processing industry is not a major actor for fresh vegetables in the supply chain.

Azerbaijan has a self-sufficiency of vegetable products of 103.4% in 2015. Since 2007 the level of self-sufficiency is varying around 100% (stat.gov.az). This was the goal of Azerbaijan's agricultural strategy to be (come) food independent.

The main country for export of fresh vegetable products is Russia. Almost all vegetables are exported to Russia (2015: 99.5% in volume and 99.8% in value), see table 6.2.

Table 6.2: Export of fresh vegetable products to countries, tons and 1000 USD

Country	Quantity, tons	Value, thsd. US dollar	Quantity, tons	Value, thsd. US dollar	Quantity, tons	Value, thsd. US dollar
Year	2015	2015	2014	2014	2013	2013
Total	83,314.3	70,692.0	76,661.5	66,847.8	65,518.5	55,595.2
Russian Federation	82,928.3	70,593.3	76,341.7	66,729.5	64,514.3	55,502.1
Georgia	198.9	24.4	319.8	118.3	882.0	49.3
Kazakhstan	187.1	74.3	.	.	120.2	39.7
Ukraine	.	.	.	.	2.0	4.1

Source: stat.gov.az

The export of fresh vegetables has increased in quantity and in value and is mainly due to the increased export to Russia (27-28% between 2013 and 2015). The main export vegetables in volume and value are tomato and cucumber, broadly followed by pepper, eggplant and leafy vegetables. The import of fresh vegetables to Azerbaijan mainly comes from Iran and Turkey (Table 6.3).

Table 6.3: Import of fresh vegetable products from countries, tons and 1000 USD

Countries	Quantity, tons	Value, thsd. US dollar	Quantity, tons	Value, thsd. US dollar	Quantity, tons	Value, thsd. US dollar
	2015	2015	2014	2014	2013	2013
Total	25,490	6,149	22,750	2,391	21,461	4,051
Islamic Republic of Iran	22,044	5,062	5,985	1,215	18,017	3,640
Turkey	1,867	578	16,581	1,039	3,361	304
China	859	264	.	.	54	16
Other country	720	246	183	136	29	92

Source: stat.gov.az

Competitors on the export market

Russia is the largest export market of Azerbaijan's fresh vegetables. Because of the political disturbances with Turkey and Ukraine, these countries' exports to Russia fell. Also the ban of Russia for EU fruits and vegetables since 2014 has been beneficial to the export of vegetables and fruits from Azerbaijan to Russia. These developments led to an increase of Azerbaijan's export of fresh vegetables to Russia in recent years.

Other competitors on the Russian market for fresh vegetables are Iran, Kazakhstan, Ukraine and Turkey. All these countries are developing their agricultural production by introducing improved and new technologies and stimulating and supporting capacity building in all stages of the supply chain. The extent to which Azerbaijan succeeds in making the transition to a sustainable and competitive chain determines the competitiveness of the (greenhouse) vegetable sector.

Important producing countries of vegetables in the region are listed in table 6.4.

Table 6.4: Production of vegetable products, all category farms, in neighbouring (CIS) countries, tons and 1000 USD

2011	2012	2013	2014	2015	2016	
Cəmi, min ton Total, 1000 tons						
1 215	1 216	1 236	1 188	1 275	1 270	Azerbaijan
787	849	876	955	1 032	991	Armenia
1 816	1 581	1 628	1 734	1 686	1 891	Belarus
2 878	3 062	3 242	3 470	3 565	3 795	Kazakhstan
821	866	882	920	1 052	1 069	Kyrgyzstan
362	231	292	327	246	293	Moldova
14 696	14 626	14 689	15 458	16 111	16 250	Russia
1 242	1 342	1 491	1 549	1 667	1 748	Tajikistan
6 994	7 767	...	...	...	...	Uzbekistan
9 833	10 017	9 873	9 638	9 214	9 414	Ukraine

Source: stat.gov.az

Table 6.4 shows that Azerbaijan is sixth in production volume of vegetable products in the region. Especially Ukraine, Kazakhstan, Tajikistan and Belarus are competing export countries.

7. Policy and business environment

Agricultural and trade policies

Most important policy support measures relevant to the vegetable sector are:

- Free from paying income taxes
- Producers get 40 manats per planted hectare (direct subsidy)
- Discount on price of irrigation water
- Growers benefit from subsidy on fuel (oil products) and lubricants.

More details on agricultural and trade policies are reported in the Market analysis report, part of the Master Plan project.

Environmental policies (gas/oil, tariffs)

As mentioned the government support farmers with subsidies on fuel (oil products) and lubricants.

Recently the Ministry of Economy has issued that Azerbaijan increases and differentiates natural gas and electricity tariffs (<http://abc.az/eng/news/100425.html>). The differentiation is based upon the consumption level.

The prices of gas, oil and electricity for greenhouse production are equal for whole Azerbaijan.

Prices (info stakeholders; price level: 2017):

- Gas: 0.20 manat per m³ (above 1,500 m³ per year)
- Oil: gasoline: 0.66 USD/l, diesel: 0.35 USD/l; www.mytravelcost.com/Azerbaijan/gas-prices/)
- Electricity: 0.12 manat/kWh (above 250 kWh per month).

Azerbaijan pursues no specific environmental policy aiming at the reduction of emission of chemicals (crop protection products) and nitrate (fertilizers products) by growers to the environment.

Access to extension services

Producers mainly have access to extension services via input suppliers. Recently, a government extension service has started by establishing the Procurement (part of MoA), but this is still of minor importance and of low quality. Main reason is the lack of well-educated personnel from vocational school, agrarian colleges and university. Alternatives are input supplying companies who sell advices. In practice mostly medium and large scale greenhouse farms will make use of extension service, leaving the large category of small farmers unreached.

Access to finance

The possibilities for (greenhouse) vegetable growers to lend money for investments are limited. Interest rates of commercial banks are high (18-36%). For some agricultural projects the government will subsidize a reduced interest for (small) farmers (resulting in a net interest rate of 6-7%).

8. Investments opportunities of greenhouse vegetables - promising regions

Based on the regional biophysical conditions (climate, infrastructure, available resources, etc.), field visits, interviews with public and private stakeholders and expert judgement the tool Global Detector (Hennen, 2017) is applied to estimate the opportunities for greenhouse production of vegetables in all Azerbaijan regions. The ten highest ranked regions according to Global-Detector were completed with two regions which have already a substantial area of greenhouse production but were ranked lower according to Global Detector based evaluations. In figure 8.1 regions with highest potentials for vegetable and fruit production under canopy (protected cultivation) are illustrated by dark green colours.

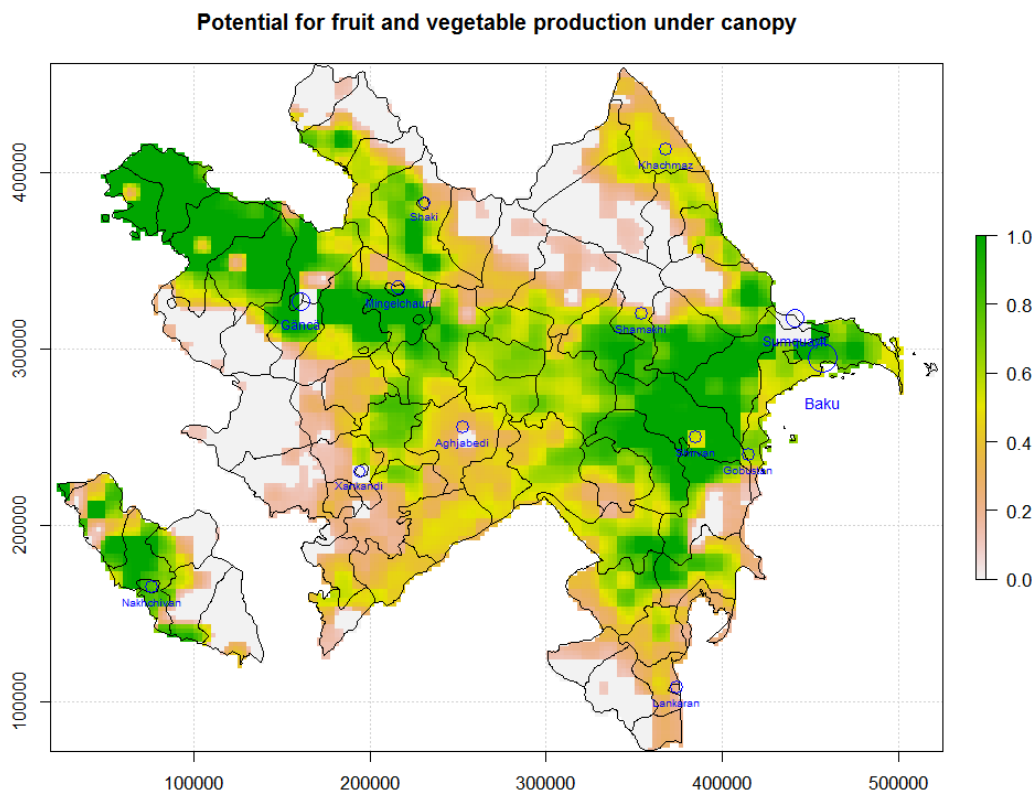


Figure 8.1: Potentials for vegetable and fruit production under canopy (greenhouse production); score 0-1, where 0.0 is low and 1.0 is high potential.

Figure 8.1 shows that the following regions has the best prospects for greenhouse production of vegetables and fruits in descending order: Babek, Kengerli, Absheron, Haijgabal, Sabirabad, Agstafa, Agsu, Gazakh, Shamkir and Tovuz. Balakan and Geychay complete this list as mentioned before.

For these regions a cost-benefit analysis has been conducted leading to three main economic indicators: net financial result, payback period and return on investment or internal rate of interest (IRR). Moreover an investment sheet has been composed, which gives an overview of the different economic figures. For two levels of greenhouse technologies the calculations are made: low/mid-tech and high-tech. A short description of the two types of greenhouses is presented in table 8.1.

Table 8.1: Short description of a low/mid-tech (plastic) and high-tech (glass) greenhouse

Greenhouse		Plastic	Glasshouse
Dimensions	surface	1.5 ha	5 ha
Equipment:	greenhouse type	multitunnel	Venlo type
	heating: gas	no	yes
	energy screen	no	yes
	CO2 application	no	yes
	dripirrigation and fertigation	yes	yes
	recirculation drainwater	no	yes
	rainwater bassin	yes	yes
Market	packaged products to ..	local market, wholesale	wholesale, retailer
	consumer market	national	international
Others	labour: staff	local	local/hired
	labour: workers	contracted	contracted

The Shamkir region – as most important greenhouse production area - has been used as basis to determine the costs and benefits of the other regions. The investments in the two greenhouse technology levels are in principle regional independent. The operational costs will also be more or less similar. Only the climate factor will have an substantial effect on production and the necessary related labour due to differences in global radiation. This climate effect will be stronger on the high-tech type than on the low/mid-tech type of greenhouses.

The cost and benefits for Shamkir have been determined for the vegetable crops cluster tomato and cucumber and are given in table 8.2 and 8.3.

Table 8.2: Cost-benefits and economic indicators of low/mid-tech and high-tech greenhouse production of cluster tomato in Shamkir (Euro/farm)

Item	Low/mid-tech Plastic multi-tunnel	High-tech Glasshouse
<i>Investment amount</i>	375,000	4,375,000
<i>Revenues</i>	105,000	630,000
<i>Costs</i>	86,250	500,000
Of which:		
Plant material	8,625	25,000
Fertilizers and crop protection	4,315	15,000
Energy	4,315	125,000
Labour	30,190	125,000
Equipment	25,880	150,000
Others	12,940	60,000
<i>Profit</i>	18,750	130,000
<i>Economic indicators</i>		
Payback period	5.0	5.6
IRR (%)	5.0	3.0

Table 8.3: Cost-benefits and economic indicators of low/mid-tech and high-tech greenhouse production of cucumber in Shamkir (Euro/farm)

Item	Low/mid-tech Plastic multi-tunnel	High-tech Glasshouse
	375,000	4,375,000
<i>Revenues</i>	93,720	557,810
<i>Costs</i>	86,250	500,000
Of which:		
Plant material	8,625	25,000
Fertilizers and crop protection	4,315	15,000
Energy	4,315	125,000
Labour	34,500	150,000
Equipment	25,880	150,000
Others	8,630	35,000
<i>Profit</i>	7,470	57,810
<i>Economic indicators</i>		
Payback period	5.9	6.1
IRR (%)	2.0	1.3

For the other 11 selected regions the revenues and labour costs have been adjusted according to the following the rules of thumb:

- 1% difference in global radiation = 0.5% in equal difference in production for the low/mid-tech and 0.75% for the high-tech greenhouse;
- 1% difference in production = 0.5% equal difference labour (for harvesting, sorting and packaging) for both type of greenhouses.

The differences in global radiation between the regions in Azerbaijan have been derived from public sources (Hennen, 2017). Based on these calculations the regions have been ranked, as indicated above.

9. Conclusions and suggestions for investment opportunities

Conclusions

- The greenhouse sector is characterised by a large group of small farmers (< 2 ha) and a limited number of medium (> 3 ha) and large scale companies (> 10 ha);
- Linked to the previous point is the big difference in technology and knowledge level of greenhouse production. On medium and large scale greenhouse more technology and knowledge is present reaching higher levels of production and product quality.
- Looking at the biophysical features, Azerbaijan has good potentials for greenhouse production. Basic conditions are to some extent present with regard to climate, water and energy supply and infrastructure. The more technology is applied the more greenhouse production will become climate independent and will realise higher input efficiencies.
- The main existing greenhouse regions (Shamkir, Geychay, Balaken and Absheron) offer good perspectives for further expansion, but also the regions Babek, Kengerli, Sabirabad, Hajigabul, Tovuz, Gazah, Agsu and Agstafa have good opportunities, based on the Global-Detector tool and the investment sheet (cost-benefit analysis and economic indicators payback period and internal rate of return/return on investment) conducted in a separated exercise. These latter regions have equal or even better biophysical conditions than the first four mentioned which can lead to better performances in market/chain, economic and/or sustainable point of view.
- Large greenhouse farms realise better business conditions, because of their negotiation power with suppliers of inputs and/or purchasers of their produce. Connection to the energy and water grid can be organized and financed more easily than medium and small greenhouse farmers can do. Large greenhouse farms are mostly modern and well equipped to meet the requirements and demands of export countries (CIS countries and the EU).
- Small greenhouse farmers are facing several obstacles:
 - Limited access to (good quality) water: good quality water is (too) expensive
 - Limited access to finance: no collateral and unsecure product prices
 - Limited access to high-end markets: small farmers do not meet the requirements of the market (cold chain, Global Gap, etc.) and their volumes are too small to be attractive to purchasers
 - Limited access to knowledge: growers are not well educated and consulting experts (too) expensive
- Azerbaijan is a net exporter of fresh vegetables, but the cold chain concept is not common practice in the value chain.
- The agricultural knowledge and information system (education, research and extension service) seems on paper adequate, but is in reality a weak point. There is a lack of educated specialists and linkages between education, research and extension service are poor. Knowledge transfer to practice is, therefore, hardly taking place.
- The Shamkir Agropark looks promising as hub for production, logistics and sales of fruits and vegetables. Question mark is whether the actors in the value chain (producers, traders and distributors) will use the facilities (storage, laboratories, packaging and services) as no contracts have been signed before the the establishment was built (top-down project).
- Although some shortcomings have been noticed in the vegetable value chain, still possibilities are present to lift the vegetable sector to a higher level of sustainability and competitiveness. Especially new and modern greenhouse farms have shown that their vegetable products can meet the quality requirements of the retail and can compete with other countries on the high-end domestic and export market (e.g. Russia).

Suggestion for investment opportunities

- The knowledge and information system deserves extra support in order to realise knowledge transfer to the greenhouse sector in the whole supply/value chain (production, post-harvest and logistics). More skills and competences are needed to apply modern technologies and to meet the requirements of high-end markets.
 - The local departments of the Ministry of Agriculture can host/facilitate education, training and demonstration, because accommodation in all regions is already available.

- Involve the greenhouse sector & industry when setting up demonstration projects (PPP)
- Focus efforts on reaching young entrepreneurs in the value chain and teach/train them on market and chain oriented production and trading.
- Support (small) producers in organizing producers groups in order to create collaboration and to develop market power towards wholesalers and retail. Train and educate young and middle-aged entrepreneurs to learn cooperating and sharing values and forces according the slogan 'alone you go faster, but together you will come on'.
- Stimulate and support actors in the value chain in developing a market strategy for 'brands' of (regional) vegetable products of high quality (e.g. taste, nutritional value, organic). In this way actors in the value chain are collaborating in creating closed chains with distinct products.
- Support actors in the value chain to invest in adapted technologies and (management) methods to improve quality of products and production processes (certified products).
- Adaptation of the subsidy system into a system in which sustainability, market development and competitiveness are stimulated instead of stimulating production. Look at the lessons learned from the Common Agricultural Policy (CAP) in the EU.
- Development - in collaboration with commercial banks - of adapted or new financial instruments in supporting greenhouse growers to invest in sustainable and competitive production systems and management methods.
- Realise a business environment of public-private initiatives and investments. In particular investments in infrastructure (land area, energy and water supply, road/railway) can pave the path towards sustainable and competitive greenhouse development in the main and most promising greenhouse regions.
- Support the Shamkir Agropark in order to achieve that the objectives and goals will be realised in practice. It is recommended to analyse how the Agropark facilities can be linked to the fruit and vegetable sectors in such a way that all actors in the value chain will benefit.

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Consulted organisations/companies

AgroInvest (Baku)

AS Agro (Baku)

Azersun – GreenTech Ltd. (Baku)

Azersun Agricultural Products Ltd. – D. Tugal (director) (Bilasuvur)

Azrus-Dostluq ASC - Ganja

Bol supermarket – Ganja

Bravo supermarket (Pasha Group) - Baku

Buta Group – Baku

Cooperative Quarabagh – Azer (chairman)

Ministry of Agriculture – Rayon Shamkir

Ministry of Agriculture – Rayon Samux – R. Hasanov (head Agricultural Department)

Ministry of Agriculture – Rayon Khachmaz – A. Hagverdiyev (head Agricultural Department)

Ministry of Agriculture – Rayon Lenkaran – T. Rzayev (head Agricultural Department)

Saheta Company – Salyan region

Samkir Sabati – wholesale market and mini market

Shamkir Agropark – Q. Seyfullaev (general director) and M. Majidli (deputy general director) (Ganja)

Meyvali wholesale market (2 times) (Baku)

Yasli – Green Bazar – (Baku City).

Appendix 1: Sown area of protected vegetables (under canopy lands) per region, ha

Region	Code	2010	2011	2012	2013	2014	2015	2016
Total in republic		1390	1384	1531	1574	1633	1394	2165
Baku city	AZ.BA	83	83	210	141	26	31	273
Absheron region	AZ.AR	30	32	31	46	52	142	336
Sumgait city	AZ.SQ	1	1	-	1	1	-	-
Ganja city	AZ.GA	12	12	7	7	5	5	-
Tovuz region	AZ.TO	-	-	-	10	10	25	31
Shamkir region	AZ.SM	620	611	657	710	714	720	731
Samukh region	AZ.SX	-	-	2	7	4	18	36
Balaken region	AZ.BL	-	-	-	-	174	181	352
Zagatala region	AZ.ZQ	2	2	-	-	-	-	-
Lenkaran city	AZ.LN	2	2	2	2	2	2	2
Masally region	AZ.MA	410	419	402	410	384	10	14
Khachmaz region	AZ.XZ	9	-	-	-	-	3	-
Shabran region	AZ.DV	-	-	-	-	7	7	7
Geychay region	AZ.GY	212	213	207	201	195	197	263
Barda region	AZ.BR	-	-	3	3	3	3	3
Bilasuvar region	AZ.BS	-	-	-	2	2	2	2
Salyan region	AZ.SL	-	-	-	19	30	19	67
Yevlakh city	AZ.YV	-	-	-	2	2	2	2
Agdash region	AZ.AS	6	6	6	6	6	6	6
Ujar region	AZ.UC	-	-	-	-	-	3	-
Kurdamir region	AZ.KU	-	-	1	2	2	-	2
Sabirabad region	AZ.SB	-	-	-	-	7	6	14
Hajigabul region	AZ.HA	-	-	-	-	-	2	3
Shirvan city	AZ.AB	-	-	-	2	1	2	2
Nakhchivan city	AZ.NX	2	3	2	2	2	2	2
Sherur region	AZ.SR	0,3	-	1	1	1	1	2
Babek region	AZ.BB	0,2	-	-	-	0,5	0,6	2
Ordubad region	AZ.OR	0,2	-	-	-	0,3	0,3	0,2
Julfa region	AZ.CF	-	-	-	-	0,3	0,3	0,2
Kengerli region	AZ.BB	-	-	-	-	2	4	6

Source: stat.gov.az

Appendix 2: Production of protected vegetables (under canopy lands) per region, tons

Region	Code	2010	2011	2012	2013	2014	2015	2016
Total on Republic		48313	46981	53342	56801	51409	41889	93583
Baku city	AZ.BA	7912	7393	12803	10212	944	2242	9043
Khyzy region	AZ.XI							
Absheron region	AZ.AR	3806	3463	3585	3754	5475	5519	40908
Sumgait city	AZ.SQ	19	180	-	846	85	-	-
Ganja city	AZ.GA	623	721	900	896	418	572	-
Tovuz region	AZ.TO	-	-	-	2800	2773	1841	1535
Shamkir region	AZ.SM	17360	17059	17837	18222	18372	18656	19590
Samukh region	AZ.SX	-	-	130	1021	588	726	2250
Balaken region	AZ.BL	-	-	-	-	2639	2870	5376
Zagatala region	AZ.ZQ	37	36	-	-	-	-	-
Lenkaran city	AZ.LN	130	99	78	222	120	6	19
Masally region	AZ.MA	12297	11977	11880	11598	11137	591	600
Khachmaz region	AZ.XZ	225	-	-	-	-	315	-
Shabran region	AZ.DV	-	-	-	-	75	302	438
Geychay region	AZ.GY	5643	5688	5567	5282	5252	3747	5040
Barda region	AZ.BR	-	31	38	46	44	96	90
Bilasuvar region	AZ.BS	-	-	-	2	227	105	165
Salyan region	AZ.SL	-	-	-	1101	748	920	2390
Yevlakh city	AZ.YV	-	-	-	65	72	32	878
Agdash region	AZ.AS	138	192	282	346	566	363	239
Ujar region	AZ.UC	-	-	-	-	-	391	-
Kurdamir region	AZ.KU	-	-	50	62	138	-	44
Sabirabad region	AZ.SB	-	-	-	-	1116	1813	2541
Hajigabul region	AZ.HA	-	-	-	-	-	60	170
Shirvan city	AZ.AB	-	-	-	118	128	189	124
Nakhchivan city	AZ.NX	26	34	53	58	59	67	159
Sherur region	AZ.SR	30	36	45	50	132	145	179
Babek region	AZ.BB	25	27	27	28	28	40	215
Ordubad region	AZ.OR	17	17	17	18	17	18	18
Julfa region	AZ.CF	-	-	20	22	23	25	25
Kengerli region	AZ.BB	25	28	30	32	233	238	687

Appendix 3: Yield of tomato per region, 100 kg/ha

Region	Code	2010	2011	2012	2013	2014	2015	2016
Total on Republic		160	165	178	186	182	189	188
Baku city	AZ.BA	272	272	272	380	190	119	85
Khyzy region	AZ.XI	76	73	71	74	71	73	81
Absheron region	AZ.AR	115	107	116	101	101	103	115
Sumgait city	AZ.SQ	34	4	4	0.4	1	1	1
Ganja city	AZ.GA	55	55	60	58	60	60	70
Gazakh region	AZ.QZ	276	239	270	281	284	279	294
Agstafa region	AZ.AF	55	60	88	97	100	77	108
Tovuz region	AZ.TO	159	174	300	301	301	333	321
Shamkir region	AZ.SM	135	191	278	240	240	239	227
Gedabey region	AZ.GD	-	151	152	154	148	119	125
Dashkesen region	AZ.DS							
Samukh region	AZ.SX	104	103	106	106	106	111	85
Goygol region	AZ.XR	100	108	85	82	82	90	90
Goranboy region	AZ.GR	60	65	69	74	72	87	86
Naftalan city	AZ.NA	-	77	77	86	100	113	97
Balaken region	AZ.BL	83	86	100	112	113	113	113
Zagatala region	AZ.ZQ	123	127	126	132	132	132	133
Gakh region	AZ.QX	91	92	88	88	86	86	90
Sheki city	AZ.SK	301	303	310	311	310	310	301
Oghuz region	AZ.OG	82	82	81	81	78	97	95
Gabala region	AZ.QA	60	59	66	59	59	94	103
Astara region	AZ.AA	194	194	196	197	198	178	166
Lenkaran city	AZ.LN	320	286	320	307	300	288	249
Lerik region	AZ.LE	145	146	149	141	145	142	146
Yardymly region	AZ.YR	233	237	210	202	210	224	196
Masally region	AZ.MA	285	277	323	292	288	289	289
Jalilabad region	AZ.CL	99	106	103	94	90	94	95
Gusar region	AZ.QR	138	149	148	150	151	159	159
Khachmaz region	AZ.XZ	266	257	295	329	246	266	273
Guba region	AZ.QB	94	103	103	105	105	107	107
Shabran region	AZ.DV	84	110	102	120	91	98	100
Siyazan region	AZ.SY	259	93	125	114	91	86	72
Geychay region	AZ.GY	244	247	249	249	250	185	186
Beylagan region	AZ.BQ	91	97	111	103	118	118	118
Agjabedi region	AZ.AC	105	105	105	105	106	106	106
Barda region	AZ.BR	77	77	89	90	93	110	107
Neftchala region	AZ.NE	95	111	125	125	125	125	125
Bilasuvar region	AZ.BS	180	190	276	343	353	318	429

Salyan region	AZ.SL	59	63	79	100	109	111	101
Yevlakh city	AZ.YV	106	106	115	115	115	115	120
Mingechevir city	AZ.MI	55	69	70	67	68	66	58
Agdash region	AZ.AS	162	159	162	164	171	175	227
Ujar region	AZ.UC	84	88	89	89	90	91	92
Zardab region	AZ.ZR	118	248	249	250	252	254	255
Kurdamir region	AZ.KU	83	73	75	78	83	87	90
Imishly region	AZ.IM	117	117	112	113	112	113	113
Saatly region	AZ.ST	121	132	167	195	175	177	189
Sabirabad region	AZ.SB	78	112	112	116	116	121	146
Hajigabul region	AZ.HA	260	260	261	261	261	260	261
Shirvan city	AZ.AB	103	110	129	105	101	147	131
Jebrayil region	AZ.CB	145	147	148	150	150	151	151
Fizuli region	AZ.FU	85	90	80	86	86	87	100
Agdam region	AZ.AM	184	186	165	190	194	195	196
Tertter region	AZ.TA	114	116	124	121	127	127	127
Khojaly region	AZ.XC	65	67	49	58	54	65	64
Shusha region	AZ.SU	35	35	46	45	46	46	50
Khojavend region	AZ.XD	90	92	95	94	93	104	104
Lachin region	AZ.LC	40	60	-	20	60	-	-
Gubadly region	AZ.QD	22	25	33	33	46	51	43
Gobustan region	AZ.QO	28	33	33	34	30	31	37
Ismayilly region	AZ.IS	92	91	87	87	87	88	89
Agsu region	AZ.AU	77	70	72	87	99	108	95
Shamakhy region	AZ.SI	115	96	95	90	87	87	88
Nakhchivan city	AZ.NX	86	86	86	89	89	92	94
Sherur region	AZ.SR	118	119	118	119	116	181	180
Babek region	AZ.BB	80	80	80	80	80	107	107
Ordubad region	AZ.OR	66	66	66	66	66	69	81
Julfa region	AZ.CF	249	248	248	248	253	261	271
Kengerli region	AZ.BB	114	115	119	117	114	122	102
Shakhbuz region	AZ.SH	205	203	207	208	207	190	192
Sadarek region	AZ.SD	109	109	110	109	114	124	126

Appendix 4: Yield of cucumber per region, 100 kg/ha

Region	Code	2010	2011	2012	2013	2014	2015	2016
Total on Republic		129	135	138	144	143	155	155
Baku city	AZ.BA	106	111	138	253	159	124	99
Khyzy region	AZ.XI	76	73	76	74	76	72	83
Absheron region	AZ.AR	390	332	367	328	364	424	191
Sumgait city	AZ.SQ	20	17	17	2	2	2	2
Ganja city	AZ.GA	50	49	60	59	64	64	80
Gazakh region	AZ.QZ	244	240	223	210	200	220	208
Agstafa region	AZ.AF	196	193	149	150	152	89	83
Tovuz region	AZ.TO	159	175	170	171	172	229	219
Shamkir region	AZ.SM	178	424	247	217	217	217	210
Gedabey region	AZ.GD	-	151	152	154	148	119	125
Samukh region	AZ.SX	104	103	106	106	107	121	95
Goygol region	AZ.XR	60	75	81	86	84	89	89
Goranboy region	AZ.GR	70	78	78	82	75	85	85
Naftalan city	AZ.NA	-	100	100	100	84	113	113
Balaken region	AZ.BL	138	136	139	146	154	152	174
Zagatala region	AZ.ZQ	101	111	113	114	114	114	115
Gakh region	AZ.QX	88	88	91	91	89	89	94
Sheki city	AZ.SK	253	249	258	257	256	256	256
Oghuz region	AZ.OG	77	79	79	81	78	96	95
Gabala region	AZ.QA	44	46	56	52	52	87	100
Astara region	AZ.AA	179	180	181	180	182	166	168
Lenkaran city	AZ.LN	295	270	271	270	264	264	241
Lerik region	AZ.LE	158	163	173	154	140	155	157
Yardymly region	AZ.YR	145	138	133	135	133	135	139
Masally region	AZ.MA	281	296	291	274	284	288	291
Jalilabad region	AZ.CL	98	98	103	95	85	94	94
Gusar region	AZ.QR	142	155	153	158	159	159	159
Khachmaz region	AZ.XZ	249	254	265	274	242	278	261
Guba region	AZ.QB	87	92	88	92	92	93	93
Shabran region	AZ.DV	71	55	68	57	54	96	96
Siyazan region	AZ.SY	68	66	77	69	70	75	66
Geychay region	AZ.GY	237	239	241	243	242	144	146
Beylagan region	AZ.BQ	96	98	99	101	105	106	106
Agjabedi region	AZ.AC	65	65	65	65	64	64	64
Barda region	AZ.BR	80	80	88	93	95	102	100
Neftchala region	AZ.NE	103	104	124	128	129	129	129
Bilasovar region	AZ.BS	179	199	212	213	221	259	394
Salyan region	AZ.SL	62	62	74	103	100	106	107

Yevlakh city	AZ.YV	104	104	110	110	110	110	107
Mingechevir city	AZ.MI	109	90	75	72	75	75	66
Agdash region	AZ.AS	128	142	136	155	157	154	209
Ujar region	AZ.UC	81	88	90	90	87	87	81
Zardab region	AZ.ZR	104	139	141	142	140	141	142
Kurdamir region	AZ.KU	70	70	76	79	85	90	92
Imishly region	AZ.IM	85	85	84	84	84	86	86
Saatly region	AZ.ST	96	128	140	197	178	178	189
Sabirabad region	AZ.SB	96	115	114	120	120	131	139
Hajigabul region	AZ.HA	254	254	254	254	254	255	260
Shirvan city	AZ.AB	175	232	186	144	154	188	141
Jebrayil region	AZ.CB	-	-	-	-	-	140	143
Fizuli region	AZ.FU	85	85	79	86	86	87	85
Agdam region	AZ.AM	184	186	207	185	184	185	185
Tertter region	AZ.TA	120	120	125	123	127	132	129
Khojaly region	AZ.XC	90	75	55	50	51	67	63
Shusha region	AZ.SU	35	35	46	45	46	45	45
Khojavend region	AZ.XD	90	90	95	95	93	92	92
Lachin region	AZ.LC	-	-	-	20	50	-	-
Gubadly region	AZ.QD	21	20	23	33	39	44	41
Gobustan region	AZ.QO	28	32	33	34	28	30	36
Ismayilly region	AZ.IS	89	89	91	92	92	93	97
Agsu region	AZ.AU	56	56	55	64	66	83	84
Shamakhy region	AZ.SI	90	93	93	88	85	86	87
Nakhchivan city	AZ.NX	79	78	78	91	92	93	104
Sherur region	AZ.SR	114	114	114	114	110	175	176
Babek region	AZ.BB	81	81	81	81	81	109	107
Ordubad region	AZ.OR	62	62	62	62	62	59	81
Julfa region	AZ.CF	193	190	188	186	190	200	223
Kengerli region	AZ.BB	87	88	92	92	91	120	111
Shakhbuz region	AZ.SH	138	137	138	141	141	172	193
Sadarek region	AZ.SD	121	120	129	129	130	140	151

Appendix 5: Wholesale prices and supermarket prices of vegetables (May, 2017)

Wholesale market Meyvali in Baku				
Date	22 May 2017			
Product name	Price (manat)	Unit	Origin	Explanation
Vegetables				
Tomato (loose)	1.30	kg	local	high quality
Beef tomato	1.00	kg	local	normal size
id	1.20	kg	local	big size
id	1.30	kg	local	Extreme size
Truss tomato	1.20	kg	local	
Cherry tomato	4.50	kg	local	Small plastic handbag (ca. 0.5 kg)
Sweet pepper (green)	2.10	kg	local	
Cucumber	0.50	kg	local	
Cucumber	0.70	kg	local	In bags of 10 kg (7 manat)
Eggplant	2.60	kg	Iran	small size and hard
	2.10	kg	Iran	big size and pointy
Zuchini	0.90	kg	local	
Lettuce curled	0.10	kg	local	

Date	25-sep-17			
Product name	Price (manat)	Unit	Origin	Explanation
Vegetables				
Sweet pepper	90.00	8 kg		red ype
	50.00	12 kg ?		green type
Sweet pepper	18.00	5 kg		Combination of red and yellow
Garlic	4.00	10 kg		pealed nuts;
Eggplant	0.50	kg	Khachmaz	
Strawberry	10.00	kg		
Apple	3.00	kg		
Pumpkin	20.00	piece		

Wholesale market and mini market Samkir Sabati				
Location:	Near greenhouse area Shamkir (coming from Ganja).			
Date	25 May 2017			
Product name	Price (manat)	Unit	Origin	Explanation
Vegetables				
Beef tomato	0.7	kg	local	
Tomato (pink)	1	kg	local (Qazax)	
Chives	15	kg	local	Bieslook
Radish	0.5	3 bunches	local	
Vegetables (divers)	0.5	bag	local	Different leafy vegetables

Supermarket prices (Bol Market)			
Date	25 May 2017		
Product name	Price (mana)	Unit	Origin
Tomato (loose)	1.40	kg	local
Pepper	3.00	kg	local
Cucumber	0.50	kg	local
Eggplant	2.50	kg	local

Bravo supermarket (part of the Pasha Group)				
Date	29-sep-17			
Product name	Price (manat)	Unit	Origin	Explanation
Vegetables				
Cucumber	0.83	kg		
Tomato loose	1.39	kg	Shamkir	
Tomato loose	2.05	kg	Secma	
Tomato beef	1.90	kg		
Eggplant	0.53	kg	Badimcan	
Sweet pepper	7.99	kg	Iran	green/red; Ranghi biber

Appendix 6: Price of water sold to the farmers through 'Water Users Union' (WUU) for irrigation purposes.

Regions	Price of 1000 m3 water for the members of WUUs, AZN
Absheron region	1-2.5
Agjabedi region	1
Agdam region	0.7
Agdash region	1.35-2.2
Agstafa region	1.4-1.55
Agsu region	2.5
Astara region	0.95
Balaken region	0.5
Barda region	0.95-1.54
Beylagan region	1.5-1.6
Bilasuvar region	1.45-1.48
Jalilabad region	1.3-1.35
Fizuli region	0.5
Goranboy region	1.5
Geychay region	1.14-1.94
Goygol region	1.5
Hajigabul region	1.4
Imishly region	1.5-3
Ismayilly region	1
Kurdamir region	1
Lenkaran city	1
Lerik region	-
Masally region	0.58-0.77
Neftchala region	1.17-1.72
Oghuz region	1
Gakh region	2-2.9
Gazakh region	1.96-2.05
Gabala region	3
Guba region	3.7-7
Gusar region	2.8-3.5
Saatly region	1.7-2.77
Sabirabad region	2.1-4.16
Shabran region	1.5-3
Salyan region	1.77-2.96
Shamakhy region	0.5
Samukh region	0.5-1.7
Sheki city	0.7
Shamkir region	0.75-3.46
Siyazan region	1.5
Tertter region	0.6-0.62
Tovuz region	1.17-1.97
Ujar region	1.1-1.5
Khachmaz region	2.5-4.63
Khyzy region	2
Khojavend region	0.5-0.8
Yevlakh city	1.1
Zagatala region	2.2-2.3
Zardab region	1.5-3.0

Source: FDMS (MoA)

Note: Water is sold with 15% higher price, for farmers who are not members of the WUU. The number of such farmers are only 0.5% of the total number of farmers.

Appendix 7: Development of area and production of protected vegetables between 2014 and 2015 per region.

		area ratio	production
		ratio	ratio
Region	Code	2015/2014	2015/2014
Total		0.85	0.815
Baku city	AZ.BA	1.19	2.375
Khyzy region	AZ.XI		
Absheron region	AZ.AR	2.73	1.008
Sumgait city	AZ.SQ		
Ganja city	AZ.GA	1.00	1.368
Gazakh region	AZ.QZ		
Agstafa region	AZ.AF		
Tovuz region	AZ.TO	2.50	0.664
Shamkir region	AZ.SM	1.01	1.015
Gedabey region	AZ.GD		
Dashkesen region	AZ.DS		
Samukh region	AZ.SX	4.50	1.235
Goygol region	AZ.XR		
Goranboy region	AZ.GR		
Naftalan city	AZ.NA		
Balaken region	AZ.BL	1.04	1.088
Zagatala region	AZ.ZQ		
Gakh region	AZ.QX		
Sheki city	AZ.SK		
Oghuz region	AZ.OG		
Gabala region	AZ.QA		
Astara region	AZ.AA		
Lenkaran city	AZ.LN	1.00	0.050
Lerik region	AZ.LE		
Yardymly region	AZ.YR		
Masally region	AZ.MA	0.03	0.053
Jalilabad region	AZ.CL		
Gusar region	AZ.QR		
Khachmaz region	AZ.XZ		
Guba region	AZ.QB		
Shabran region	AZ.DV	1.00	4.027
Siyazan region	AZ.SY		
Geychay region	AZ.GY	1.01	0.713
Beylagan region	AZ.BQ		
Agjabedi region	AZ.AC		
Barda region	AZ.BR	1.00	2.182
Neftchala region	AZ.NE		
Bilasuvar region	AZ.BS	1.00	0.463
Salyan region	AZ.SL	0.63	1.230
Yevlakh city	AZ.YV	1.00	0.444
Mingechevir city	AZ.MI		
Agdash region	AZ.AS	1.00	0.641
Ujar region	AZ.UC		
Zardab region	AZ.ZR		
Kurdamir region	AZ.KU		
Imishly region	AZ.IM		
Saatly region	AZ.ST		
Sabirabad region	AZ.SB	0.86	1.625
Hajigabul region	AZ.HA		
Shirvan city	AZ.AB	2.00	1.477
Jebrayil region	AZ.CB		
Fizuli region	AZ.FU		
Agdam region	AZ.AM		
Tertter region	AZ.TA		
Khojaly region	AZ.XC		
Shusha region	AZ.SU		
Khojavend region	AZ.XD		
Kelbajar region	AZ.KA		
Lachin region	AZ.LC		

Gubadly region	AZ.QD		
Zangilan region	AZ.ZG		
Gobustan region	AZ.QO		
Ismayilly region	AZ.IS		
Agsu region	AZ.AU		
Shamakhy region	AZ.SI		
Nakhchivan city	AZ.NX	1.00	1.136
Sherur region	AZ.SR	1.00	1.098
Babek region	AZ.BB	1.20	1.429
Ordubad region	AZ.OR	1.00	1.059
Julfa region	AZ.CF	1.00	1.087
Kengerli region	AZ.BB	2.00	1.021
Shakhbuz region	AZ.SH		
Sadarek region	AZ.SD		