Walnut Value Chain Analysis in Ajara Region of Georgia

The European Union for Georgia

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The research content does not necessarily reflect the view of European Union, GRDD of GIPA or CENN.

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1. Introduction

Agriculture plays important role in the economy of Georgia. It is especially important for the population of the country's regions as it is their main source of income.

The major goal of this research is to analyze walnut value chain in Ajara region. This implies description of walnut production and sales processes, determination of advantages and disadvantages of the chain, and drafting of recommendations.

Georgian soil and climate is favorable for walnut cultivation. The plant is cultivated in every region of the country. Ajara is a leader in terms of production, followed by Shida Kartli, Kakheti, and Imereti.

In terms of production, walnut is not a leading plant for Ajara currently, however, the prices and demand on walnut are high, which indicates that the plant has interesting potential.

2. Brief Description of the Sector

Walnut is one of the most precious and widespread plants. It has big social and commercial importance. The homeland of walnut are Iran and neighboring Middle and Near East Countries. It is cultivated in many countries of the world: Greece, Italy, Spain, US, Iran, Afghanistan, and etc. It is also widespread in Caucasus, including Georgia.

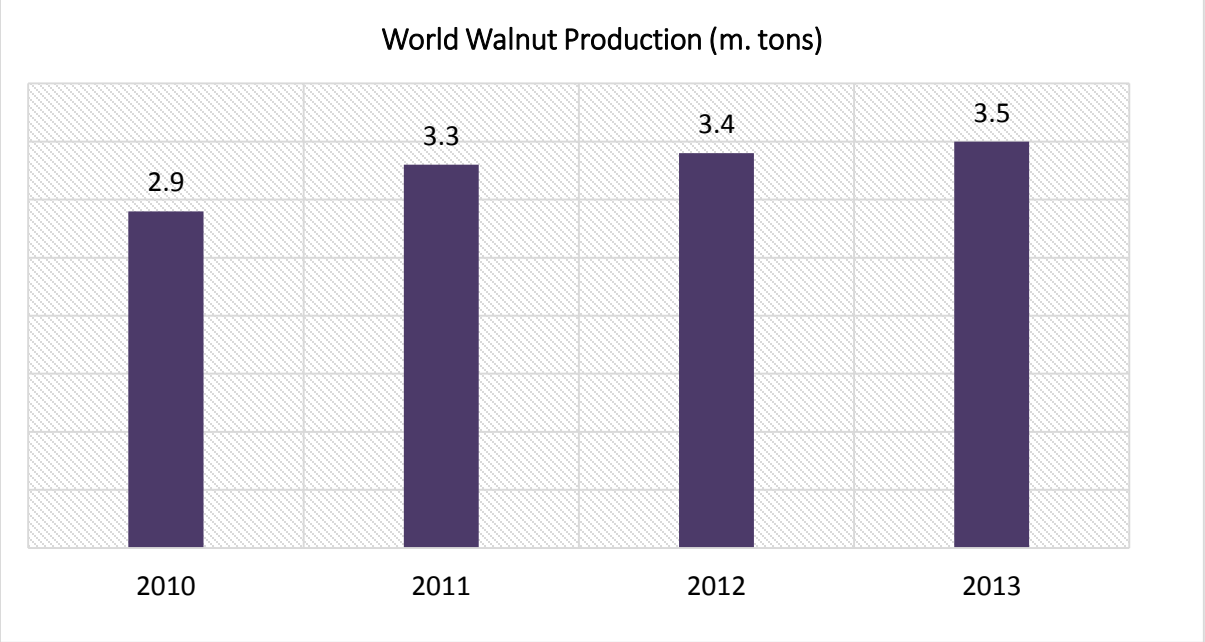
Walnut was used in traditional medicine long time ago. It contains many vitamins and useful micro elements. It positively affects digestive system and is rich in vitamin E, magnesium, potassium, iron, copper, and etc. Due to its composition, it is especially useful for pregnant women and children, also for people, who perform intellectual work. Walnut is recommended for those diagnosed with anemia, tuberculosis and cancer.[1]

Walnut is a plant that loves light. It should be planted on deep, fertile, clay-lime and clay soils. Walnut has strong root system which enables it to grow and develop on stony and rocky soils.[2]

2.1 Walnut Sector in the World

According to Food and Agriculture Organization (FAO), in 2013 world's total volume of walnut production reached 3.5 tons and exceeded the levels of the previous years.

Diagram 1. Total walnut production in the world, 2010-2013



Source: Food and Agriculture Organization, 2016

[1] http://www.mshoblebi.ge/gamocdileba/praqtikuli-rchevebi/1988-rith-aris-sasargeblo-kakali-ramdeni-da-romel-asakshi-unda-gaasinjoth-bavshvs.html).

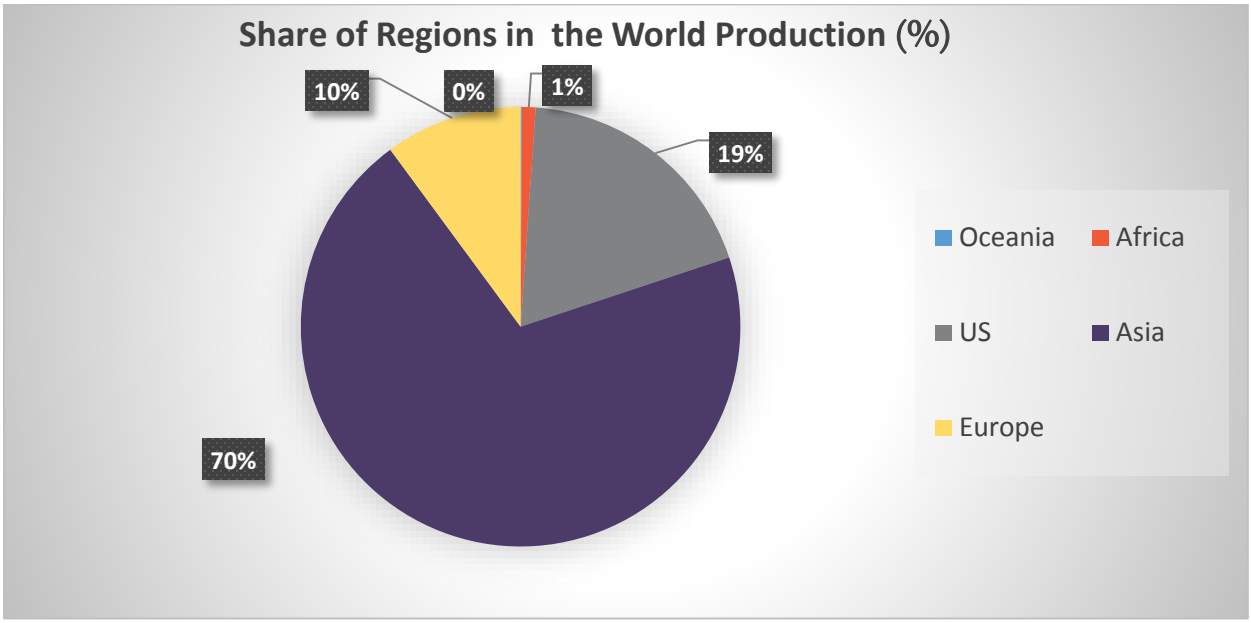
[2] http://agrokavkaz.ge/dargebi/mebageoba/kakali-mosheneba-movla-moqhvanis-teqnologia-gaskhvla-phormirebis-thaviseburebani.html

According to the average data of 2010 – 2014 yrs., the major walnut producer countries are:

- China – 1.6 m. tons
- Iran – 0.4 m. tons
- US – 0.4 m. tons
- Turkey – 0.2 m. tons
- Ukraine – 0.1 m. tons

Walnut production according to the regions is given below:

Diagram 2. Walnut production in the world by regions, average of 2010-2014 yrs.



Source: Food and Agriculture Organization, 2016

World's largest producers are:

Table 1. Average harvest of 2010-2014 yrs. (m. tons)

#	Country	Million tons
1	China	1,6
2	US	0,5
3	Iran	0,4
4	Turkey	0,2
5	Mexico	0,1
6	Ukraine	0,1
7	Chile	0,04
8	India	0,04
9	France	0,03
10	Romania	0,03

Source: Food and Agriculture Organization, 2016

Table 2. Major walnut importer and exporter countries in 2015 (by volume)

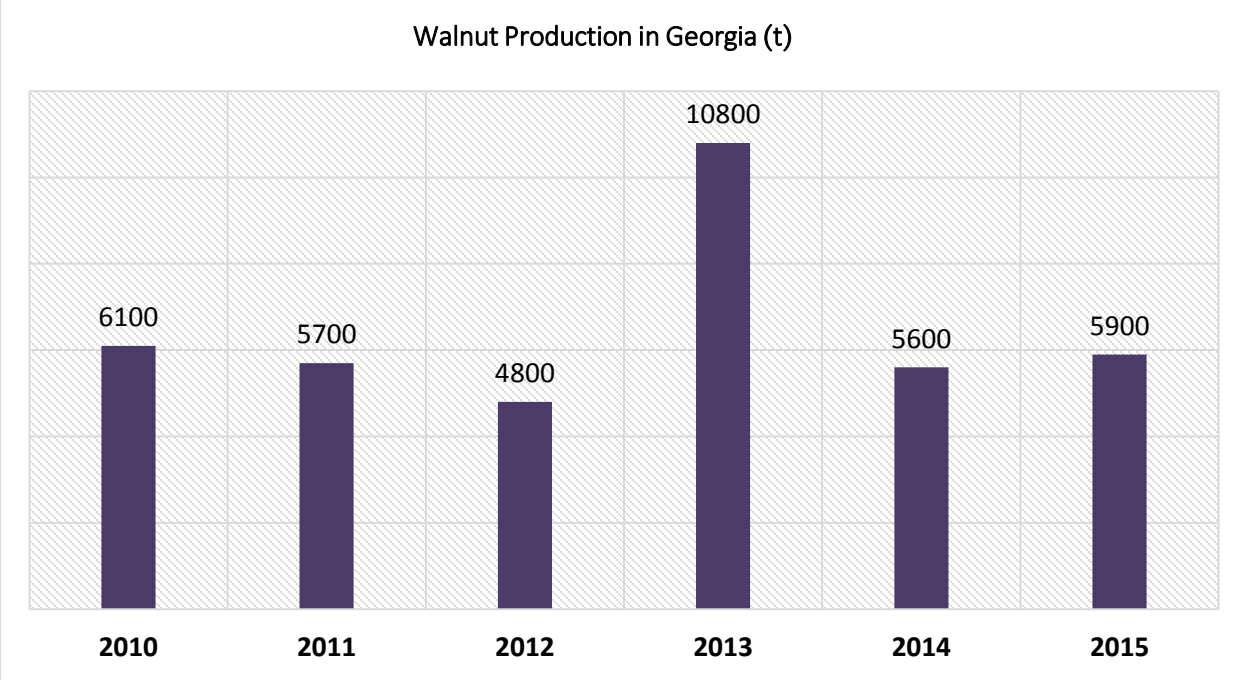
Importer countries	Exporter countries
Turkey	US
Italy	Chile
China	Mexico
Mexico	France
Spain	China

Source: ITC – Trade Map

2.2 Walnut Sector in Georgia

For years walnut produced in Georgia had been approximately 6000 tons, however, in 2013 the production volume exceeded 10 000 tons.

Diagram 3. Walnut Production in Georgia (tons)



Source: Geostat 2016

Walnut production by the regions of Georgia is given below:

Table 3. Walnut production by regions (thousand tons)

Walnut Production by Regions (000 tons)						
	2010	**2011**	**2012**	**2013**	**2014**	**2015**
Georgia	6,1	5,7	4,8	10,8	5,6	5,9
Including:						
AR of Ajara	**0,5**	**0,7**	**0,6**	**1,4**	**1,9**	**1,3**
Imereti	1,6	1,3	0,9	2,2	0,3	0,7
Samegrelo and Zemo Svaneti	0,5	0,2	0,4	0,4	0,4	0,5

Racha-Lechkhumi and Kvemo Svaneti	1,2	0,5	0,3	1,0	0,1	0,5
Shida Kartli	0,7	1,0	0,7	1,5	0,4	0,8
Mtskheta-Mtianeti	0,3	0,3	0,3	0,9	0,2	0,3
Kakheti	0,7	0,5	0,8	1,5	1,2	0,7
Kvemo Kartli	0,3	0,5	0,2	0,5	0,3	0,3
The rest	0,3	0,7	0,6	1,4	0,7	0,8

Source: Geostat, 2016

As the table shows, the biggest volume of walnut is produced in Ajara.

In 2013-2014 the Ministry of Agriculture of AR of Ajara brought 11 750 seedlings of American walnut Chandler in the region. The plants were bought by the farmers of all municipalities with co-financing principle (30% paid by the farmer, 70% - by the state). This purchase was implemented in the framework of a state program "Support supply of farmers and agricultural enterprises with perennial plant seedlings".[3]

The cultivar Chandler was bred on the expensive Paradox seedling. The grafted sapling is very delicate and sensitive to any stress. Hence, in order to receive desired result, a special attention needs to be paid to planting and usage of agricultural machinery.

[3] www.adjara.gov.ge/branches/description

3. Goal of the Research

Major goal of the research is to analyze walnut value chain in Ajara region by involving local students and professors in the research. The study focuses on Chandler cultivar, which has been cultivated in Georgia for 2-3 years already.

The goal of the analysis is to:

- Study walnut production process
- Identify participants of walnut value chain
- Reveal relations between the participants
- Analyze costs and mark-ups
- Reveal employment opportunities
- Estimate revenues of value chain participants

The major goal of the analysis is to reveal opportunities in walnut production in order to maximize added value in the value chain.

4. Methodology

Major methods used in the research are the following:

- Desk research: analysis of articles, reports, statistical data and etc.
- Field work: individual interviews and focus groups with input material suppliers, walnut producers (individual farmers and cooperative representatives), mediators/wholesalers, consumers, public and nongovernmental sector representatives, and independent experts.

20 interviews and 4 focus groups were carried out in total.

The following qualitative tools were used in the research:

- Determination of priorities for selection of the value chain
- Value chain grid map
- Analysis of management, coordination and control mechanisms, which implies analysis of those formal and informal institutions, regulations and standards that are related to the walnut sector
- Analysis of relations and trust, which implies analysis of the formal and informal agreements between the chain participants.

Also, following quantitative tools were used:

- Cost and markup analysis – determination of added value for each participant created at each stage of the value chain.
- Allocation of revenues in the chain, which implies determination of total revenues received by the chain participants from various activities.
- Revealing employment potential in the chain.

Students and Professors of Batumi Shota Rustaveli State University actively participated in the research. The professors carried out desk research, as for the students, they did interviews and focus groups.

Desk research

Desk research mainly involved analysis of the existing literature (reports, articles, statistical data) and was carried out at the initial state of the research.

Field work

In February 2016 at the meeting held in Batumi Shota Rustaveli State University, it was decided to carry out the value chain analysis for walnut. 35 people, including university representatives, farmers, cooperative representatives, members of local authorities and representatives of private sector, attended the meeting.

Participants of the meeting used following criteria for selecting the plant for further value chain analysis:

- Export potential of the plant
- Import substitution potential
- Innovative approaches
- Need for diversification
- Relevancy of the plant for Ajara region
- Climate conditions of the region
- Agricultural traditions of the region
- Storage conditions and etc.

After selecting the subject of the research, 20 interviews were held with walnut producers, chandler seedling producers, representatives of Ministry of Agriculture and Agricultural center. In addition, in June 2016, focus groups were carried out with participation of the farmers. In total 4 focus groups were held.

5. Research Constraints

Major constraint of the research is a limited number of the interviews and focus groups carried out. The number of the interviews and focus groups was limited as the Chandler walnut was introduced in the region in 2013-2014 years under state program and the harvest is not yet fully received. Hence, it is difficult to determine the revenues farmers will receive from this particular cultivar. The farmers did not receive harvest from the prior walnut types, hence these data are also difficult to collect and analyze.

6. Scope of the Research

6.1 Brief Description of Georgia's Walnut Producing Regions

Georgian soil and climate are favorable for walnut production. In Georgia walnut is mainly produced in Ajara (22%), Shida Kartli (14%), Kakheti (12%), and Imereti (12%).

Shida Kartli

Shida Kartli is an especially distinguished region in terms of fruit production. It is the number 1 producer of most of fruit varieties in the country. For years Shida Kartli has been maintaining the leading positions in production of such fruits as apple, plum, sweet cherry and cherry (Development Strategy of Shida Kartli Region for 2014-2021).

In addition to fruit, the region produces vegetables. Shida Kartli is number three by vegetable production after Kvemo Kartli and Kakheti. Following vegetables are notable from the varieties produced in the region: potato, beetroot, cabbage, carrot, onion, eggplant and etc.

Region's climate and fertile soil create high agricultural potential. In addition, Kvemo Kartli has large areas of irrigated land, which also contributes to the development of agriculture in this region (Development Strategy of Shida Kartli Region for 2014-2021).

Kakheti

Kakheti is the oldest vine-growing and wine producing region, where 70% of the country's vineyards are concentrated. In addition, grain production has an important role in the agriculture of Kakheti region. Kakheti is number one wheat producer.

Kakheti is also a leader in orchard fruit production (strawberry, water-melon, melon and pumpkin). These are highly profitable fruits, which also indicates on the potential of the region. In general, Kakheti holds second place in vegetable production, following Kvemo Kartli (Development Strategy of Kakheti Region for 2014-2021).

Imereti

Imereti is a large producer of vegetables. In some of the municipalities greenhouse infrastructure is well-developed. The region holds first place in beans and corn production and second place in orchard plant production.

In terms of fruit production, subtropical fruit and grape production are notable. Wine making is one of the oldest fields of the region.

As for the animal husbandry, Imereti holds second place by the number of cattle and is a leader in milk production (Development Strategy for 2014-2021 of Imereti Region).

It is notable that at this stage walnut is not a major plant for any of the above discussed regions.

6.2 Ajara

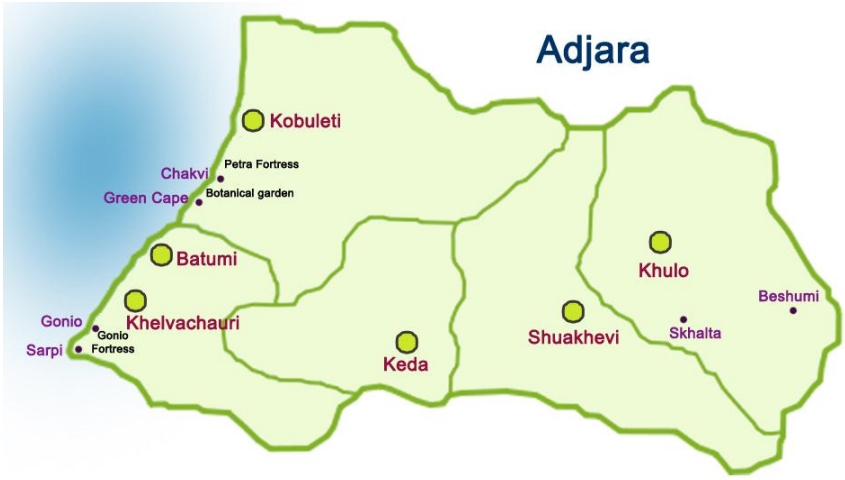
Ajara region, which is the major focus of this research, is located on the Black Sea coast. It consists of five municipalities and borders Turkey. The geographical location of the region is especially favorable for tourism and trade development.

Picture 1. Map of Georgia

Source: Wikipedia

According to 2014 census, the region is mainly populated by Georgians and they are 96% of the population. The rest of the population are Armenians (1.6%), Russians (1.1%), and other ethnic groups (1.3%).

Picture 2. Map of Ajara Region



Source: Wikipedia

Compared to the other regions of Georgia, Ajara is less dependent on Agriculture (approximately 10% of total 2014 output was from Agriculture), the region more relies on service, construction and trade sectors.

It is notable that the farmers have very small areas of land, with average of 0.4 ha. Despite this, the region is a leader in citrus and walnut production, it holds second place in apiculture.

The table below shows major statistical data for the agriculture of Ajara region:

Table 4. Share of Ajara in Georgia's total production of perennials.

	Walnut	***Pear***	***Plum***	***Citrus***	***Tea***
Production volume (thousand tons)	*1,9*	*1,3*	*0,6*	*51,4*	*0,2*
Share in country's total production (%)	*34*	*8*	*5*	*67*	*11*
Position in the country	*1*	*5*	*4*	*1*	*3*

Source: National Statistics Office of Georgia, 2014

Table 5. Share of Ajara in Georgia's total production of annual plants.

	Beans	***Potato***
Production volume (thousand tons)	*0,4*	*18,1*
Share in country's total production (%)	*4,6*	*8,4*
Position in the country	*7-8*	*3*

Source: National Statistics Office of Georgia, 2014

Table 6. Animal Husbandry in Ajara

	Cattle	***Bee***
Head count (thousand heads)	*95,0*	*56,1*
Share in country's total production (%)	*7*	*14*
Position in the country	*6*	*2*

Source: National Statistics Office of Georgia, 2014

The major barrier to the development of agriculture are outdated infrastructure and production technologies. Agriculture is mainly extensive and there is a lack of qualified work-force. Access to the finance is also limited (Development Strategy of Ajara Region for 2014-2021).

In addition, the region has advantages which, if properly utilized, could transform the agriculture into one of the perspective fields. These advantages are: geographical location of the region (the border with Turkey and Black Sea coast), long tradition in agriculture and existence of educational institutions in the region. One of such institutions is Batumi Shota Rustaveli State University founded in 1923, which offers bachelor, master and doctoral programs to students (Development Strategy of Samtskhe-Javakheti Region for 2014-2021).

As in other regions, modern research methods are not sufficiently used in Ajara. The teaching programs are outdated and do not meet requirements of modern job market. Involvement of professors and students from local university will support introduction of modern research methods in the teaching process.

7. Analysis of Geogian Walnut Sector

7.1 Walnut Production in Georgia

Walnut is one of the oldest plants and its homeland is Iran and neighboring Middle and Near East countries.

According to the Greek sources, in VI-IV centuries BC walnut is mentioned in Georgia together with other plants. Walnut is one-chamber, sex-divided, cross-pollinating plant. Cultivars that were common before in Georgia reach 10-30 meters in height and are productive for more than 100 years. One tree yields 40-150 kg of walnut on average. The plant is frost resistant, it can survive frost of -30-35°C. It starts to blossom in March April, hence the spring frosts can damage buds, despite the plant's high resistance to frost.

It should be noted that until recently, the there was no commercial walnut production in Georgia and the walnut harvested comes from roadsides and various areas. No professional care, pruning, treatment with pesticides and application of fertilizers are provided to these trees. For this reason, the discussion on the development of this field provided in the report refers to cultivating Chandler walnuts. The report does not cover existing walnut trees and plantations.

Today the situation is very different. Walnut orchards are cultivated in the farms and in several years there will be fully fruiting walnut orchards in many regions of Georgia, including Ajara. Cultivation of Chandler walnut started in 2016 in Ajara and it still continues.

Today the Chandler walnut is massively cultivated in Ajara and whole Georgia. The standard number of this cultivar's seedlings is 280 per hectare (distance 6X6). Cultivation of one ha walnut orchard approximately costs 8-9 thousand Laris. The walnut enters fruiting in the third year after planting, it enters full fruiting in 7th and 8th year. The yield is 2-2.5 tons/ha. However, it should be noted that currently in Georgia there are no Chandler walnut trees that are in full fruiting. Accordingly, all calculations made in this report are based on expectations and expert opinions.

Walnut can be propagated with seed or by vegetative method. Previously, seed propagation was more common. As for now, vegetative method is more popular. There are various vegetative methods available and grafting is the most popular one in practice. The optimal period for grafting is June-July.

Walnut diseases and methods to fight them

In general walnut is quite resistant to diseases. However, there are diseases that can spread on walnut in certain cases. These are walnut blight, crown gall, deep bark canker, shallow bark canker, branch wilt and blackline.

The method to fight the diseases is to spray the phosphorus organic treatments and combination of mineral oils to the saplings.[4]

7.2 Walnut Varieties and Cultivars

The table below presents the varieties and cultivars of walnut currently common in Georgia.

[4] http://agrosc.ge/uploads/kakali%20axali.pdf

Table 7. Walnut varieties and cultivars

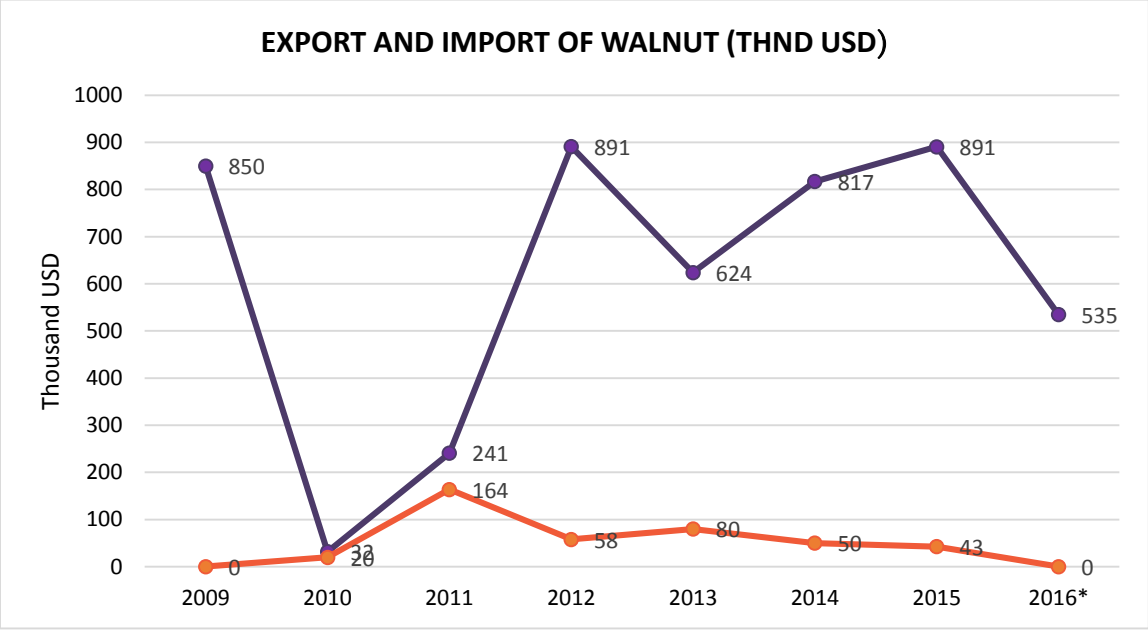
Variety	Cultivar
• Black • Grey • Manjurian • Heart shaped (Japanese) • Regular • Wild	• Regular • Shamira • Black • Grey • Heartshpaed • Manjurian • Chandler

7.3 Export and Import of Walnuts

Georgia is an import-dependent country which is reflected in the low coefficient of self-provision and high level of import. Alike other food products, the import of walnuts highly exceeds its export.

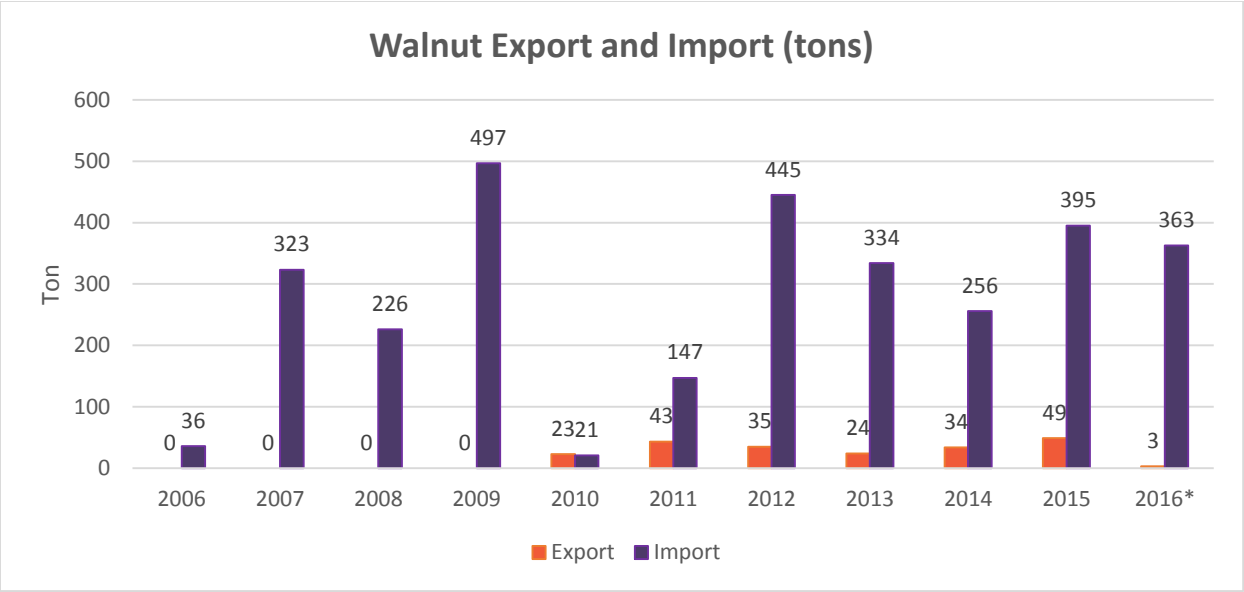
The diagram below shows export and import data in US dollars. Import data are more volatile than export data, which can be partially explained by the volatility of GEL-USD exchange rate.

Diagram 4. Export and Import of Walnut, thousand USD, 2009-2016



Source: Geostat, * Including July 2016

Diagram 5. Export and Import of Walnut, tons, 2006-2016



Source: Geostat, * Including July 2016

Import volume has increased since 2015, the import value has also increased.

Diagram 6. Walnut Export Markets, 2015

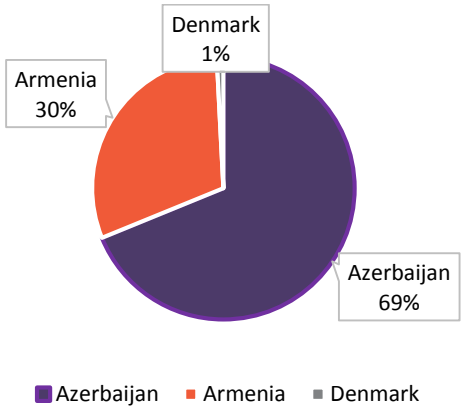
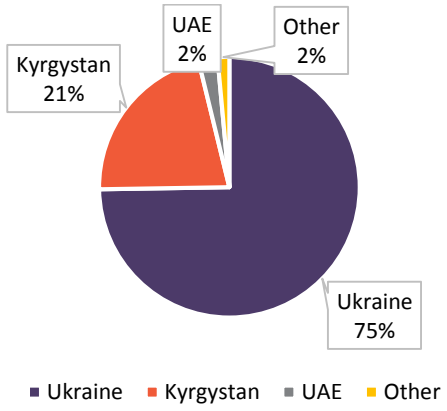


Diagram 7. Walnut Importing Countries, 2015



Source: ITC – Trade Map

Georgian export market is not well diversified and is limited to the neighboring countries. The same cannot be said about the import, as import is more diverse. Despite this diversity, the majority of walnut is imported from Ukraine.

8. Research Results

8.1 Participants of Walnut Value Chain in Ajara

Participants of walnut value chain can be divided into the following groups:

- **Suppliers of seedlings, plant protection products, fertilizers and etc.**

Agricultural shops that are available in each municipality fall in this category. These shops, in addition to the necessary products, provide farmers with free consultations on walnut cultivation. Agricultural shops are mainly small in size and local. In addition, there are several small nurseries in the region, which develop the seedlings and sell each for 17 Gel.

- **Farmers cultivating walnut plantations**

Ajara's Agricultural Program and the program Plant the Future of Agriculture Project Management Agency supported the appearance of small and medium sized farmers in the region. As for planting the walnuts on large areas, such case does not exist in Ajara today.

As for the farmers who collect walnut, they shake and collect walnuts in different areas, some have walnut trees in their own lands. Currently walnut is collected, sorted out and supplied to the market in such a way.

- **Mediators/wholesalers**

Mediators/wholesalers are the major sales channel. The majority of the producers and collectors sell walnut through them. However, there are some farmers who sell their walnut (with or without husk) in the market without any mediator.

- **Retailers in the market and supermarkets**

Mediators/wholesalers sell their produce in the markets of various cities, especially in Batumi and Kobuleti. Supermarkets are additional sale channel, where consumers can buy imported as well local walnut.

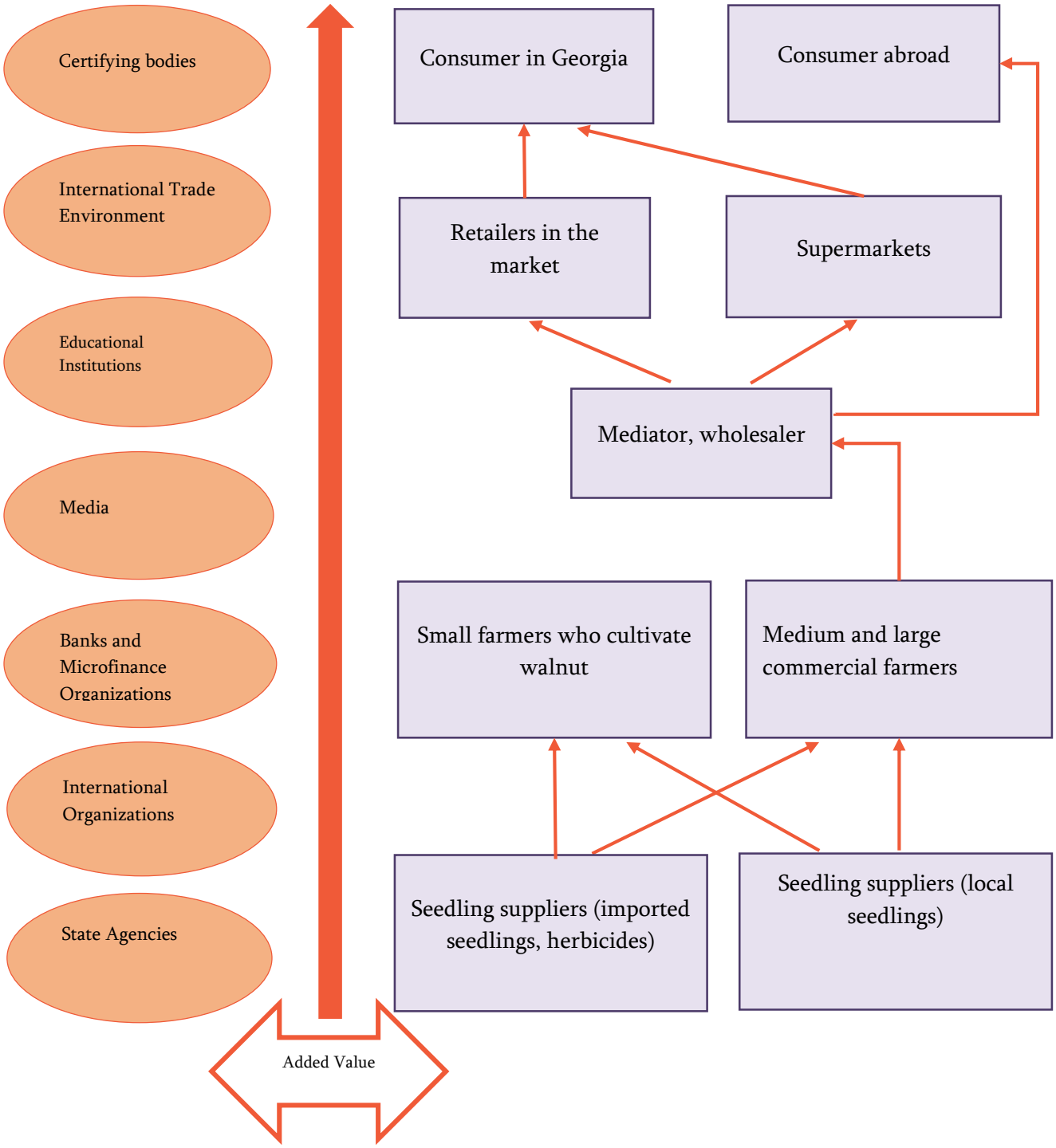
- **Local and foreign consumer**

As mentioned above, Georgian walnut is exported in small quantities. Export walnut is produced in Ajara as this region is a leading walnut producer in Georgia. It is also notable that the walnut produced in the region cannot fully satisfy the demand, deficit is especially notable in the winter and is filled with imported walnut. The demand on walnut is especially high during the New Year period and the price significantly increases at that time.
The demand on walnut is also determined by Georgian cuisine, especially during New Year days, as Satsivi and Gozinaki are the must attributes of Georgian Supra. Both of these pearls of Georgian Supra need high amount of walnut. Georgian cuisine uses walnut in other dishes as well on everyday basis, such dishes are eggplant with walnut, tomato and cucumber salad with walnut, and etc. A separate attention should be given to such product as Churchkhela, which is also made from walnuts and is even called Georgia Snikers. It is very popular in foreign tourists.
Hence the major participants of the walnut value chain are suppliers of seedlings, pesticides and fertilizers, farmers (commercial and noncommercial), mediators/wholesalers, retailers, supermarkets and end consumers (local and foreigner).

9. Description of Walnut Value Chain

9.1 Walnut Value Chain Grid Map

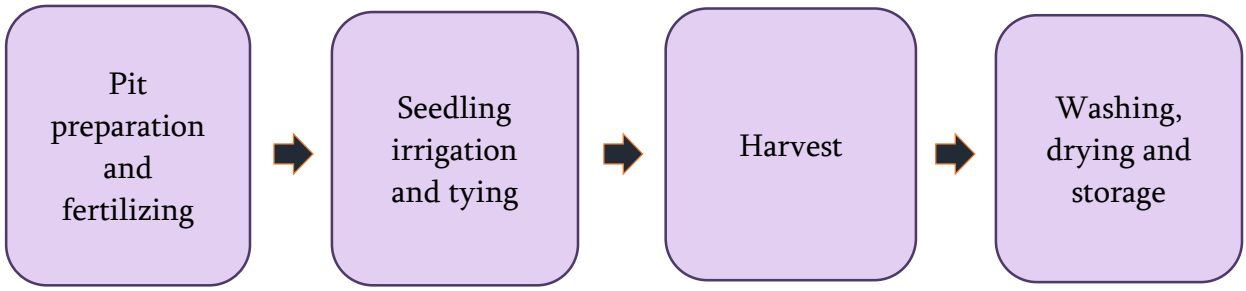
Diagram 8. Walnut value chain



9.2 Description of Main Steps

The processes in the walnut value chain can be divided in the following steps:

Diagram 9. Major steps in walnut value chain



Pit Preparation and Fertilizing

In order to make walnut orchards the soil needs to be processed in advance. The preparation works include plantage, cross ploughing, hoeing and harrowing. The location of the tree depends on its variety, cultivar and the soil. In general walnut should be planted in the following distance 10×10 m, 8×10 m, 8×8 m, Chandler walnut is planted at 6×6m and 6×5 m.

Before planting the tree, a pit of 0.7m depth and 1 m diameter should be prepared and it should be filled with 15-20 organic fertilizer (manure or other organic matter). The fertilizers containing phosphorus and potassium should also be applied.

The optimal period for walnut cultivation is late autumn (November) and early spring (March).

Irrigation and tying of the seedlings

After planting the walnuts, it is necessary to irrigate and tie them. It is also recommended to plant soy, beans or other legumes between the rows during the first three years after planting the walnut.

The care of walnut mainly includes such works as digging around the plants, powdering the soil and applying the fertilizers. During draught or hot weather irrigation is also necessary.[5]

The amount of fertilizers to be applied is different when the plant has not entered the fruiting stage and when it is in the fruiting stage.

Harvest

The yield of walnut varies from 3 to 7 tons per ha. The harvest is taken when the walnut is fully ripen. In case the harvest is taken early, the kernel reduces in size when drying and loses storage ability.

The walnut is fully ripen when the green husk becomes brittle and the walnuts fall from the tree. However, it should be noted that not all the walnuts fall from the tree at the same time, for this reason the tree is shaken to get the harvest.

[5] http://agrosc.ge/uploads/kakali%20axali.pdf

Washing, drying and storage

After the taking the harvest, the walnuts are fully cleaned from the green husk, they are washed in clean water and then dried on sun or in a special drier. The optimal temperature for storing the walnut is 3-10°C. In such conditions the walnut can be stored for more than one year.

Sale of walnut and walnut products

As for the sale of the walnut, the major sales channels are:

- Markets
- Mediators/wholesalers

In addition, as we have mentioned above, various products are made from walnut (e.g. Churchkhela) and after supplied to the consumers locally and abroad (export).

9.3 External Factors Affecting Walnut Value Chain

The processes in the walnut value chain largely depend on external factors. Below are those factors that influence walnut production or will influence it in the future.

- **State agencies**

Ministry of Agriculture played a significant role in the development of walnut sector in Ajara. With its support, Chandler plantations are cultivated in the region. The table below shows already cultivated areas, number of plants and the plan of Ministry of Agriculture with regards to cultivation of Chandler cultivar. The conditions are acceptable for the farmers, as 80% of the project cost is covered by the Ministry, the farmers only have to contribute 20%.

Table 8. Chandler cultivation in Ajara

Year	Number of plants	Hectare
2013-2015 (Planted)	21 750	67 Including: (Batumi - 7 ha) (Kobuleti - 11 ha) (Khelvachauri - 12 ha) (Keda - 12 ha) (Shuakhevi - 12 ha) (Khulo - 13 ha)
2016 (Planned)	25 350	77
2017 (Planned)	42 900	130
Total	**90 000**	**273**

Ministry of Agriculture of Ajara AR (July, 2016)

The program of Agriculture Projects' Management Agency "Plant the Future" is also notable. According to the data of August 2016, 234 beneficiaries have participated in the program in total. With the support of this program, 245 orchards were cultivated on total area of 1500 ha. The co-

financed amount was more than 7 m Gel. The conditions of this program is also very favorable for the farmers, as the major cost of the project is covered by the state. In addition, this project requires to install drop irrigation system in the plantations, and biggest part of its cost is covered by the state.

Various plants have following shares in the orchards cultivated:

- Walnut - 458 ha (30%)
- Apple - 445 ha (30%)
- Nuts - 264 ha (18%)
- Other - 331 ha (22%)

As we see, the walnut is a major culture cultivated in this program.

- **International organizations**

The demonstration farms of Chandler walnut were set up in all the municipalities of Ajara in 2014-2015 years with the help of EU program ENPARD.

- **Banks and microfinance organizations**

Access to finance is often considered one of the major barriers for the farmers, however, the preferential credit program launched by the Agricultural Projects' Management Agency is considered one of the most successful projects of the agency. This program is especially beneficial for the large farmers. Small farmers have difficulties to get the loan as they are required to present property as a collateral for the loan. For this reason, access to finance remains a significant problem for them.

- **Media**

Media plays important role in providing the farmers with the information about Chandler cultivar. They cover this topic in many directions. Several videos were made, which explain to the farmers how to cultivate and take care of this cultivar.

- **Educational institutions**

There is Batumi Shota Rustaveli State University in the region. The professors and the students of this university were involved in the monitoring of Chandler cultivation; they studied the characteristics and the potential of this cultivar. Their involvement in this research is also important as they have gained knowledge about walnut sector, which will help them to further continue the research of this topic.

- **International trade environment**

Georgia is a member of the World Trade Organization. It has preferential trade regime with Europe, CIS countries, Turkey, US, Norway, Switzerland, Canada and Japan. This year Georgia strengthened its trade relations with China as well.

If Georgia produces high quality walnut and meets the sanitary and phytosanitary requirement, Georgia can export walnut to these countries. However, there is also a possibility of increased competition on the local market as the trade agreements imply bilateral preferences.

- **Certifying bodies**

The custom clearance of the goods to be exported outside of Georgia is done by the customs agencies. To export the produce, the enterprise should present at the customs a list of documents determined by the law. Among these documents is a certificate of origin, which is given by the Georgian Chamber of Commerce and Industry. Another document is a phytosanitary document which is given by the plant protection unit of the Ministry of Agriculture of Georgia.

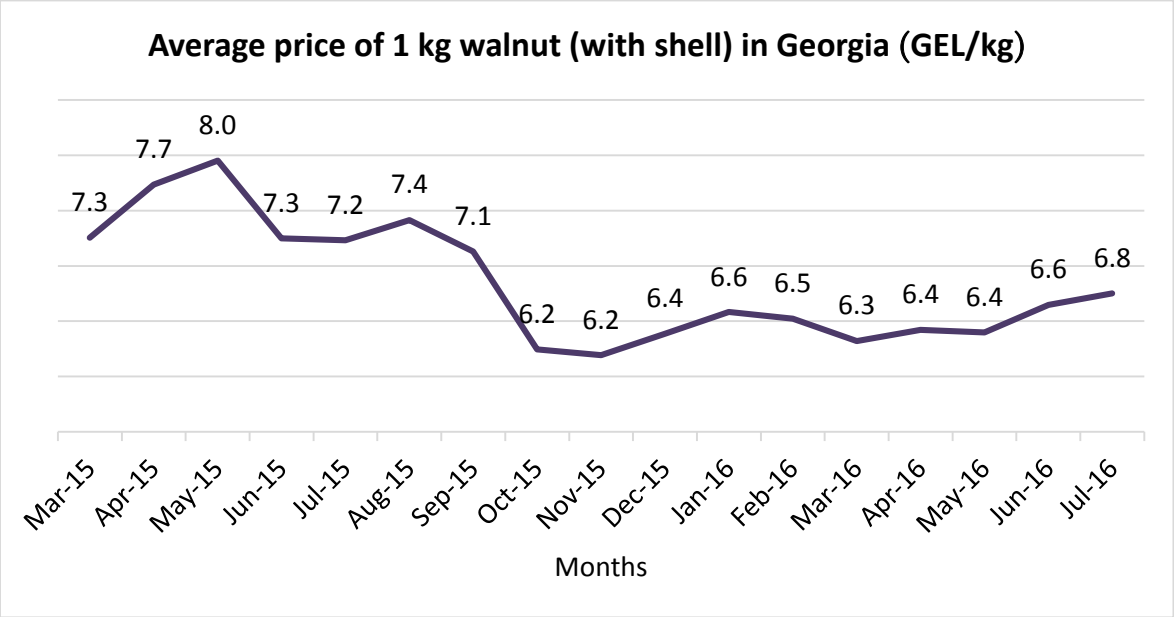
9.4 Cost and Mark-up Analysis

9.4.1 Costs and Revenues of Producers

Cultivation of modern orchard of walnut costs approximately 8-9 thousand Gel per hectare at the initial stage. The walnut gives small harvest in the third year, it requires 7-8 years for the full fruiting. In full harvest period, in Georgia the chandler cultivar is expected to yield 2.-2.5 tons on average in 7th -8th year after planting (realistic forecast). Based on this judgement, the table below gives detailed calculations resulted from sensitive analysis.

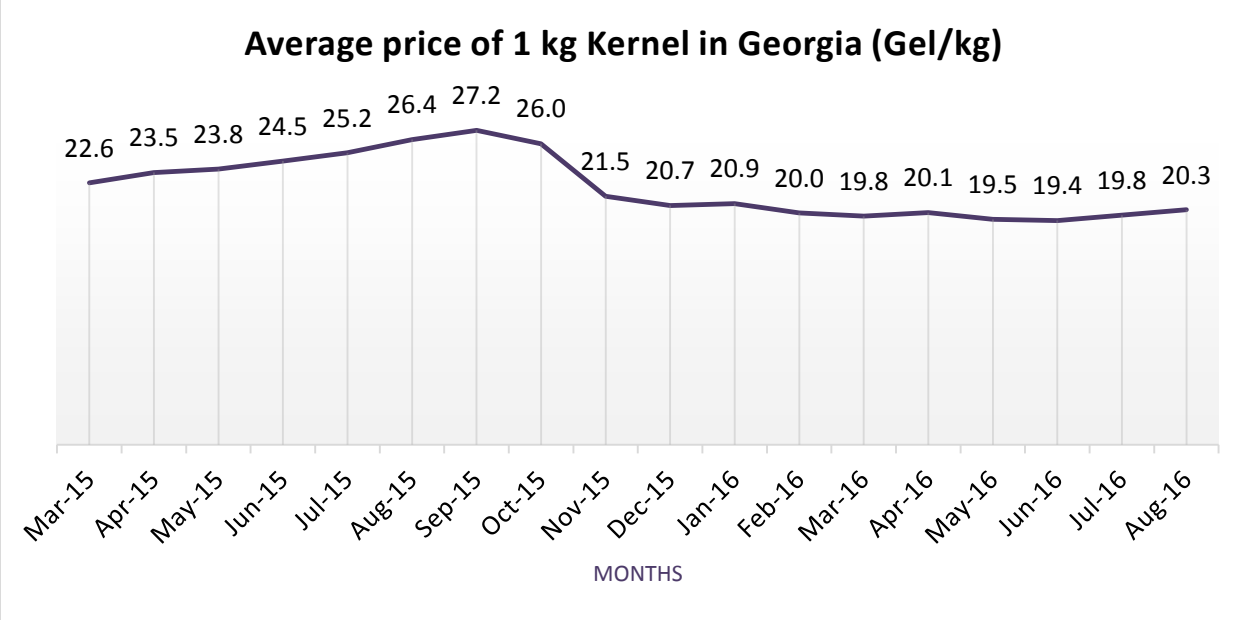
As for the price of walnut and its kernel, they are given in a diagram below:

Diagram 10. Walnut Prices in Georgia



Source: Regional office of Ministry of Agriculture

Diagram 11. Average price of kernel in Georgia



Source: Regional office of Ministry of Agriculture

As in the case of walnut with shell, the kernel prices differ by region. See diagrams in annex (diagram A1 and A2 for detailed information).

As for the profitability of walnut production, the financial calculations are given in the table below:

Table 9: Comparison of economic performance (to full harvest, Chandler cultivar)

#	Indicator	Third year from planting	Fifth year from planting	Seventh year from planting
1	Walnut harvest (with shell)	140 kg	700 kg	1700 kg
2	Average wholesale price (with shell)	4 Gel/kg	4 Gel/kg	4 Gel/kg
3	Revenues (Gel)	560	2'800	6'800
4	Total operational Cost (Gel)	1'100	1'200	1'400
5	Profit (Gel)	**- 540**	**0**	**5'400**

Source: author's calculation based on the interview results. S. Gongladze calculations were also used.
Note: detailed economic calculations of S. Gongladze is given in table A1 in annex.
From the table above it is clear that, alike all perennial plants, the Chandler cultivar also requires time to bring profit to the farmer at the in the initial stage. In the full harvest, the profit is high in case of high revenues (Table 11).

Table 10. Comparison of economic performance (to full harvest, Chandler cultivar)

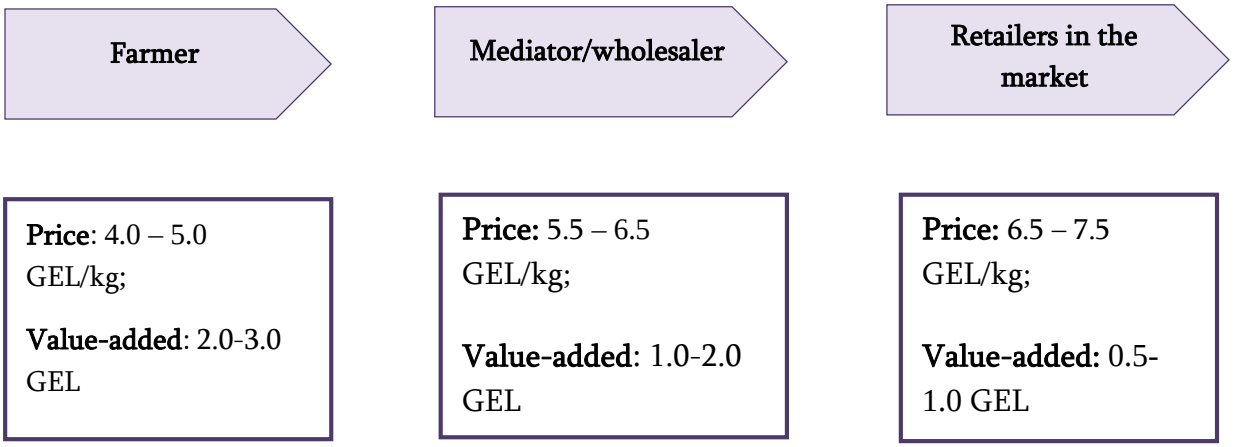
#	Indicators	Low yield (1,5 t/ha)	Average yield (2,3 t/ha)	High yield (3,0 t/ha)
1	Average wholesale price (with shell)	4 Gel/kg	4 Gel/kg	4 Gel/kg
2	Total operational cost (Gel)	2'000	2'200	2'400
3	Revenues (Gel)	6'000	9'200	12'000
4	Profit (Gel)	**4'000**	**7'000**	**9'600**
5	COGS per 1kg	**1,33**	**1,05**	**0,80**
6	Profit margin per unit (Gel)	2,67	2,95	3,20
7	Profit Margin (%)	67%	76%	80%

Source: author's calculation based on the interview results. S. Gongladze calculations were also used.
Note: detailed economic calculations of S. Gongladze is given in table A1 in annex წყარო: ავტორის

9.4.2 Analysis of Value-added

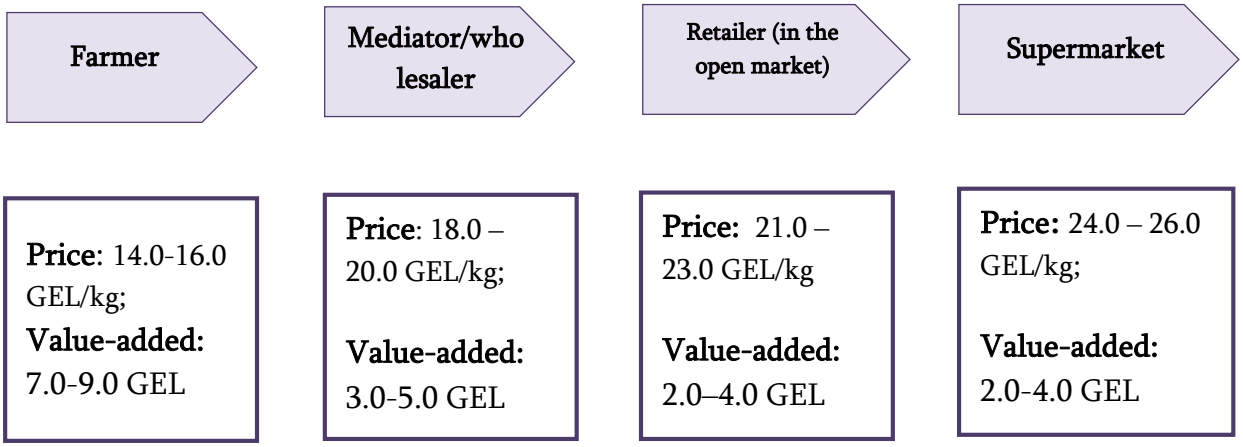
Value-added is a price difference between various steps of the value chain.

Diagram 12. Value-added for walnut



Source: author's calculations.

Diagram 13. Value-added for walnut kernel



Source: author's calculations.

In case of walnut kernel, the value-added is higher.

9.5 Major Participants and Their Relations

9.5.1 Horizontal Relations in the Value Chain

The following horizontal relations were revealed in the walnut value chain as a result of the interviews.

Table 11. Horizontal relations

Relation	Description
Suppliers of agricultural products and services (including nurseries)	Lately the number of agricultural shops increased in the region, hence the competition became stronger. In the region increase of the nurseries, small as well as relatively large size, is also notable. There is competition between them, however, they also cooperate in certain cases.
Between the farmers	As Chandler is a new cultivar for the country, the farmers closely cooperate with each other in order to exchange information.
Between the mediators/wholesalers	There are many mediators/wholesalers in the region and sale of walnut is not difficult in the region. The competition between the mediators/wholesalers is not very strong as the prices offered by them to the farmers do not differ much.
Between the retailers in the market	There are many retailers in the market and hence, the environment is competitive. However, as in the latter case, the prices are almost similar in retailers. Frequently the farmers themselves act as retailers, when they take their produce to the market.

Between the supermarkets	The number of supermarkets has increased lately and the competition among them is very strong in big cities. As for the regions, there are only several supermarket chains there and the competition is weak.
Between the consumers	Walnut (kernel) is a very popular consumption product and we have listed the causes of this trend above. The consumers purchase local, as well as imported walnut especially during the New Year period, in order to prepare tradition dishes.

9.5.2 Vertical Relations in the Value Chain

Table 12. Vertical relations

Relation	Description
Between agricultural shops, nurseries and farmers	As respondents say in the interviews, agricultural products and services and seedlings are easily available. However, they frequently note that the price and the quality of purchased product or service do not match.
Between the farmers and the mediators/wholesalers	Majority of the relations between the farmers and the mediators/wholesalers is informal and is not based on any kind of agreement (contract), written or verbal. Majority of the farmers do not have stable relations with the mediators/wholesalers and sell their product to various mediators/wholesalers.
Between the mediators/wholesalers and the retailers in the market	This relation is also informal is not based on any kind of agreement. However, it is stable. The majority of the retailers purchase produce from the same wholesaler based on the verbal agreement.
Between the mediators/wholesalers and the supermarkets	This relation is formal and backed with the agreement between the mediator and the supermarket.
Between the retailers in the market and the consumer	Markets have many customers, in the cities as well as in the villages. Compared to the other retail sales points, the prices in the markets are usually lower, which is crucial for certain segment of the consumers. In addition, there is certain group of consumers who believe that the product purchased in the market is healthier and more natural.
Between supermarkets and the consumers	The supermarkets offer customers a comfortable environment during the shopping for the products and respectively, they charge higher prices than the retailers in the market. Usually, the supermarkets have different target audience, who is ready to pay a higher price for the comfort.

10. SWOT Analysis of Walnut Sector in Ajara

Table 13. Walnut sector SWOT analysis in Ajara

Strengths (S)	**Weaknesses (W)**
• Chandler is frost and disease resistant; has smaller vegetation period than other cultivars; • The walnut seedlings stop erosion; • Program "Plant the Future"; • Chandler Cultivation Program of Ajara AR; • Demonstration farms.	• Aging of the walnut trees and reduction of yield; • Frequent frosts; • No fruiting plantations; • Migration of population; • Affordable seedlings and the expensive price; • No crackers and processors; • Lack of experience in Chandler production.
Opportunities (O)	**Threats (T)**
• Proximity with turkey that has experience in Chandler production; • The opportunity to register the land, which will help the farmer to make plantations; • Employment, increase of revenues; • Possible to plant up to 1500 meters above the sea level.	• Climate change and natural events in mountainous Ajara (e.g. landslide); • Low productivity of Chandler cultivar; • Spread of diseases; • Reduction of price as the supply increases.

11. Walnut Sector Potential.

11.1 Employment Potential

As there are no fruiting walnut orchards in Georgia yet, the employment is not regular in this field either, except in several new orchards and nurseries, which employ more and more people. In the future, the increase of Chandler plantations will require more labor force for the care of plantation, harvesting, and as processing (cracking and sorting).

As for the current situation, the population is employed seasonally during walnut harvest and processing, the work mainly involves shaking of the trees, cleaning walnut from husk, cracking and sorting and supplying the market with the walnut kernet (sometimes kernel is cut into certain pieces, which is also very labor-intensive). Churchkhela is one of the most popular walnut products and many people are involved in making them. Churchkhela is prepared in households as well as by small enterprises (including cooperatives).

As walnut processing is a very labor intensive process, the development of this field will employ more people not only seasonally, but in many cases, constantly. Hence, the field has the capacity to create jobs.

11.2 Revenue Generation

Majority of Georgian farmers receive income from various sources. As the studies reveal, the activities of small and medium sized farmers are quite diversified and they receive revenues from planting as well as from animal husbandry.

Currently walnut production is not a major source of income in Ajara. However, as the plantations grow, the revenues will increase in parallel after some time and this field will become an important source of income for more and more families.

As the above calculations show, the field has a potential to become an important source of income, also, the walnut can be exported in addition to selling it locally. This will increase the revenues of the participants of the value chain.

11.3 Impact on Environment

In terms ოგ environmental impact, the walnut is especially useful for stopping the landslides, which is very common in Ajara region. Walnut can be cultivated up to 1500 meters above the sea level, and this makes it possible to cultivate the walnut in certain places of Ajara's all municipalities (and this is being implemented currently).

12. Discussions and Recommendations

12.1 Major Constraints of Walnut Sector

Walnut value chain analysis revealed several significant barriers that can be divided in three groups: production constraints, processing constraints, and sales constraints.

Production constraints

Factors impeding production are lack of nurseries, high prices on seedlings and lack of knowledge in Chandler and in general, walnut cultivation. In fact, cultivation of commercial orchards just took start in the country and the walnut cultivation practice is just being introduced, which raises a founded doubt in the field specialist. Their major concern is whether the cultivar will be successful and bring as much yield as in other countries (e.g. in California, where this cultivar was developed). The seedlings planted in Georgia grew quite well in many places. Now the major concern is to receive desired volume and quality of harvest from the trees.

Walnut cultivation entails certain of the agricultural issues that need to be studied and tested by the farmers and field specialists. This is a big challenge from one hand, and a very profitable activity, if successful, on the other hand. In addition to planting walnut orchards, it is necessary to study the diseases of Chandler cultivar and carry out preventive measures, or be prepared for fighting with the disease in case necessary.

In addition to the above mentioned difficulties, there are such barriers as lack of insurance practice. Despite state support, agricultural insurance is still not widely used by the farmers in Georgia.

Processing constraints

In the value chain of the sector post-harvest care – storage and processing – is one of the most important steps. This is the step where the largest part of the value added is created as we saw above. There are no nut cracking and sorting machines in the country. In parallel to the growth of walnut's commercial production, these machinery should exist in the country.

In addition, walnut can be processed to receive walnut oil, walnut butter and etc. At this stage these directions do not exist in the country.

Sales and marketing constraints

As we saw today, Georgian walnut cannot satisfy local demand and certain amount is imported to respond to market demand. However, when a supply of a product significantly increases, the price on the product sharply decreases too. This is the basic supply-demand rule in the economic science. This can easily happen in Georgia when the plantations planted now enter full harvest period and hopefully yield high harvest (this has already been discussed above).

Hence, it is necessary to search for export markets and diversify export for walnut kernel and for products made from walnut (Churchkhela, etc.).

12.2 Recommendations

Improvement of each step in the value chain requires holistic approach in order for the field to overcome the challenges mentioned above and further develop.

Observation on Chandler cultivars in the demonstration farms should be continued, the proper conclusions should be drawn and farmers should be provided with the adequate information, which will enable them to learn new approaches.

Development of infrastructure necessary for agricultural tourism, creation of touristic offer is also important. This will add to the diversity of the services offered to increased number of tourists.

The walnut products produced in the country should be diversified and supplied to the consumer. This will promote locally produced walnut and walnut products on local as well as foreign markets. It is notable that Georgian nut is already very well known on world market and along the growth of its reputation, the sales opportunities also grow. This situation should be well utilized for walnut and nut exporters should also be offered to export the walnut.

It is recommended that farmer unite in the cooperatives focused on walnut storage as this will support development of storage and processing direction. The cooperative can also establish a processing factory, which will be a guaranteed source of value added for the farmers. This can be done through public private partnership.

In order for the walnut sector and the components of its value chain to be effective, it is necessary to enhance knowledge with modern methods and approaches. In the universities and colleges of the region the courses teaching walnut cultivation and processing should be improved and they should be based on theoretical, as well as practical teaching.

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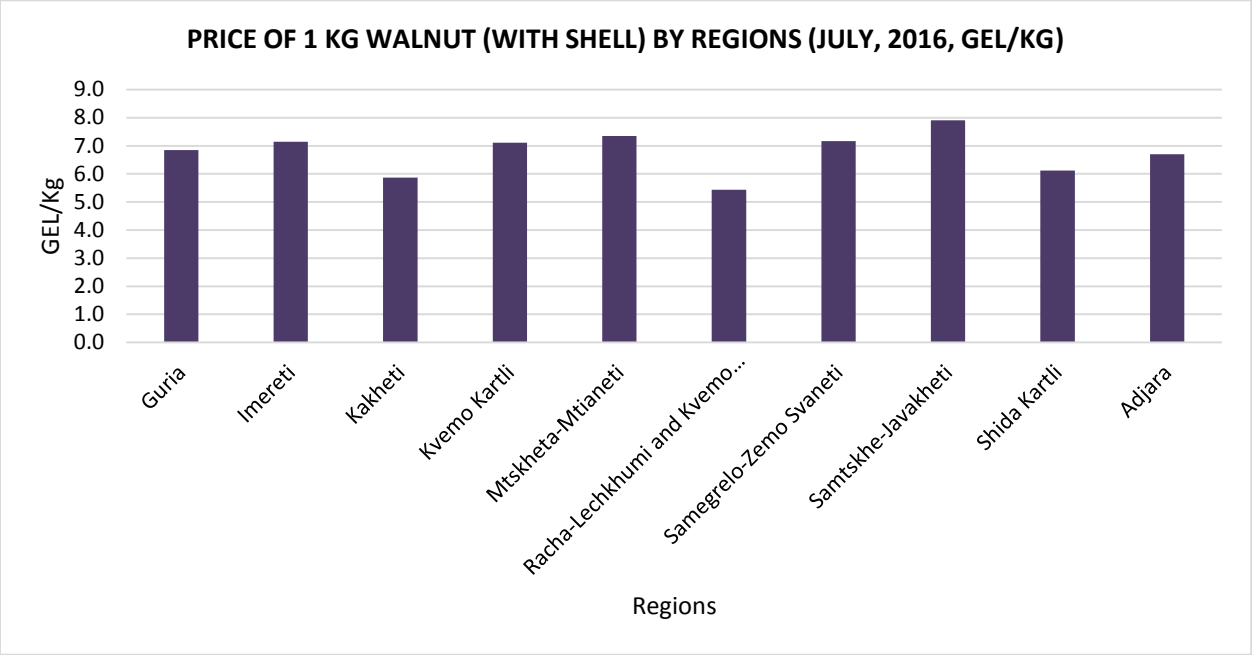
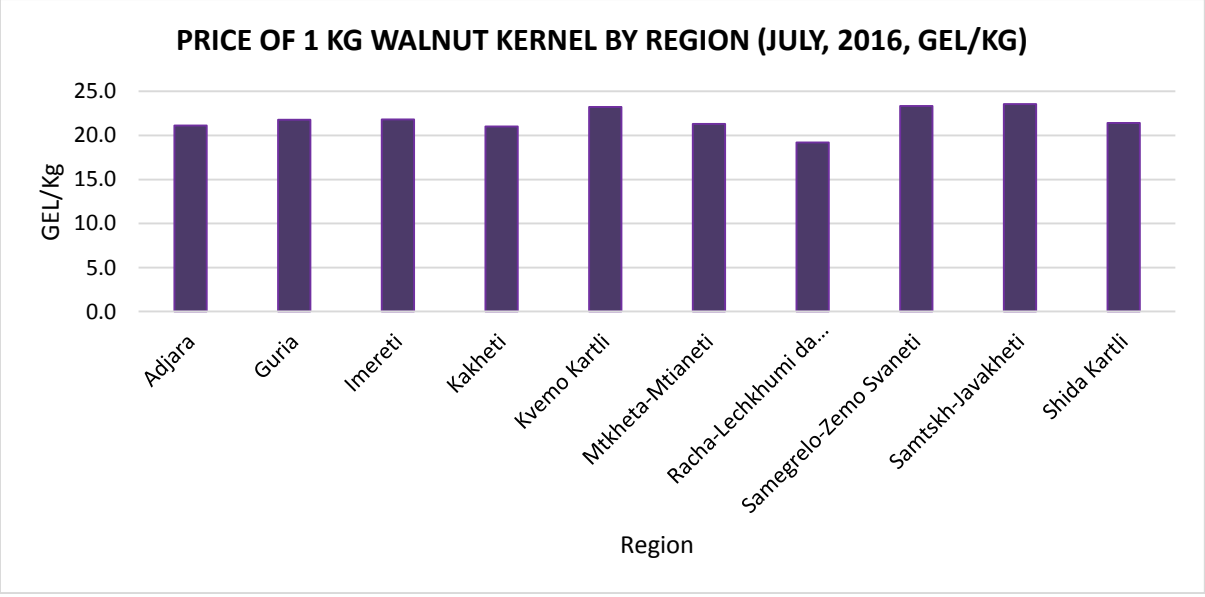
Appendix

Diagram A1: Prices of walnut with shell by regions, July, 2016 (GEL/kg)



Source: Ministry of Agriculture, Regional Offices

Diagram A2: Prices of walnut kernel by region, July, 2016 (GEL.kg)



Source: Ministry of Agriculture, Regional Offices.

Table A1: Investment calculation for cultivation of intensive orchard in Ajara[6]

Cultivation of Chandler cultivar started several years ago in Georgia. In the past 4 years only several dozen ha of orchards were cultivated. Hence, currently the plantations are observed for results and it is difficult to judge what amount of harvest can be received in any region. Spring frosts have major income on the harvest.

Assumptions made in table 3 are the following:

- Standard amount of walnut seedlings - 280 seedling/ha (distance 6X6).
- Fruiting period – 3rd year after planting
- Full fruiting – 7th, 8th year after planting
- Yield per ha in full harvest – 2 – 2.5 tons/ha

As for the sales price, for long-term projections, it is rational to use the lowest market price – 4 Gel/kg walnut (with shell).

Table: Chandler orchard cultivation costs and yield (by production years)

Revenues		Year II	Year IV	Year V	Year VI	Year VII	Year VIII
Number of walnut seedlings	seedling/ha	280	280	280	280	280	280
Walnut harvest (with shell)	kg/seedling	0.5	1.5	2.5	4.0	6.0	7.5
Walnut harvest (with shell)	kg/ha	140	420	700	1,120	1,680	2,100
Sales price (average)	GEL/kg	4.00	4.00	4.00	4.00	4.00	4.00
Total revenues	GEL/ha	560	1,680	2,800	4,480	6,720	8,400
Costs							
Costs	GEL/ha	1,100	1,100	1,200	1,300	1,400	1,500
Share of cost in revenues	%	196%	65%	43%	29%	21%	18%

Table 4 shows costs associated with the cultivation of walnut orchard and its care during one year.

[6] Source: S. Gongladze economic calculations, cultivation of bulb onion, peach and walnut, 2016

Table: Costs of Chandler orchard cultivation

Costs							ლარი/ჰა
Preparation of the soil							
Cleaning the land (with machine)	1.0	- time	x	100.00	GEL	=	100
Cleaning the land (by workers)	8.0	w orker/day	x	25.00	GEL	=	200
Ploughing the soil	1.0	- time	x	550.00	GEL	=	550
Processing the soil	1.0	- time	x	100.00	GEL	=	100
Purchase of the mineral fertilizers (NPK)	300.0	kg/ha	x	0.90	GEL/kg	=	270
Apply the fertilizers with a spray (NPK)	1.0	- time	x	13.00	GEL	=	13
Additional works	1.0	- time	x	140.00	GEL	=	140
Planting the seedling							
Planning	6.0	w orker/day	x	20.00	GEL	=	120
Purchase of the seedlings	280.0	units	x	18.00	GEL/u	=	5,040
Preparation of the pits	8.0	w orker/day	x	25.00	GEL	=	200
Planting the seedlings	6.0	w orker/day	x	25.00	GEL	=	150
Irrigation (with pump)	12.0	Liters	x	1.80	GEL/l	=	22
Irrigation (manually)	1.0	w orker/day	x	20.00	GEL	=	20
Taking care of the seedling							
Purchase of ammonia nitre	200.0	kg/ha	x	0.90	GEL/kg	=	180
Apply the ammonia nitre	2.0	w orker/day		20.00	GEL	=	40
Ploughing the seedlings	4.0	w orker/day		25.00	GEL	=	100
Processing the soil between the rows (plough)	2.0	- times		120.00	GEL	=	240
Apply the herbicides	1.0	w orker/day		20.00	GEL	=	20
Cost of herbicides	2.0	Liters		20.00	GEL/l	=	40
Apply the insecticides	2.0	- times		20.00	GEL	=	40
Cost of insecticides	2.0	Liters		35.00	GEL/l	=	70
Make irrigation rows	1.0	- time		100.00	GEL/ha		100
Irrigation (with pump)	36.0	Liters	x	1.80	GEL/l	=	65
Irrigation (manually)	3.0	w orker/day		25.00	GEL	=	75
Pruning the plants	1.0	w orker/day		25.00	GEL	=	25
Unforeseenable expenses							
of garden cultivation cost	3%						238
Other expenses							
Irrigation water fee							70
Land tax							87
Total costs							**8,314**