



2013

Apple / Fresh Fruits Value Chain Baseline Screening

- *Apple*
- *Peach*
- *Sour Cherry*



USAID
FROM THE AMERICAN PEOPLE

AgBiz Program

USAID AgBiz Program's (www.agbiz.com.mk) overall objective is to increase incomes for all participants in selected Macedonian agricultural value chains by increasing sales (domestic and exports), improving productivity, enhancing the agricultural business environment, and increasing access to finance. AgBiz builds off of the existing capacity and expertise of Macedonian professionals and lead firms and farms to create a new understanding in the market for imbedded business development services and fee-based service delivery.

EPI Centar International (www.epicentar.mk) is a consulting company, providing consultancy and expertise to strengthen the capacities of private, public sector and the donor community and contributes to the economic growth

The company provides consulting services for:

1. Research studies and analyses in the area of rural development for the public, private and civil sector
2. Strategic & business planning in the area of business development
3. External project monitoring and evaluation in the area of economic development for donor funded projects
4. Public-private partnership process facilitation
5. Legal service support for domestic and foreign investors in the area of economic development
6. Project implementation in the area of economic development, specialized in agriculture, agribusiness and rural tourism
7. New project development for the support of economic growth activities and identification of potential donor support projects

EPI CENTAR's vision is to be a recognized partner of choice that offers innovative solutions for economic development to the most prominent private and public stakeholders in the SEE region.

Disclaimer

This publication was produced for review by the United States Agency for International Development.

The authors views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

Skopje, April 2013

Authors:

Ljubomir Dimovski, Director, EPI CENTAR International, Skopje

Vesna Garvanlieva, Business Development and Financial Specialist, Skopje

Stevan Orozovic, Evaluation and Monitoring Expert, EPI CENTAR International, Skopje

Marjan Kiprijanovski, Prof. PhD, Faculty of Agricultural Science and food, Skopje

Federation of Farmers of the Republic of Macedonia, Skopje

List of Acronyms

| | |
|-------|---------------------------------------|
| FF&V | Fresh Fruits and Vegetables |
| VC | Value-Chain |
| VCLA | Value Chain Lead Actors |
| Ex-YU | Ex Yugoslavian |
| MFN | Most Favored Nations |
| LA | Lead Actor |
| LF | Lead Facilitator |
| FGD | Focus Group Discussion |
| FFRM | Federation of Farmers of Macedonia |
| PDO | Protected Designation of Origin |
| PGI | Protected Geographical Indication |
| CEFTA | Central European Free Trade Agreement |
| WTO | World Trade Organization |
| LPIS | Land Parcel Identification System |
| EUR | Euro currency |

CONTENTS

| | |
|--|-----------|
| 1. BACKGROUND & OBJECTIVE..... | 7 |
| 2. INTRODUCTION TO THE FRESH FRUITS VC..... | 9 |
| 2.1. PRODUCERS AND PRODUCTION TRENDS..... | 10 |
| 2.2..... | 30 |
| 2.3. POST-HARVESTING AND PROCESSING | 31 |
| 3. MARKETS..... | 34 |
| 3.1. THE DOMESTIC FRESH MARKET | 34 |
| 3.2. THE EXPORT MARKET | 39 |
| 4. SUPPORTING ORGANIZATIONS AND REGULATORY FRAMEWORK..... | 47 |
| 4.1. REGULATORY FRAMEWORK AND ACCESS TO FINANCE | 49 |
| 5. SUBSECTOR BOTTLENECKS..... | 52 |
| 6. VISION FOR GROWTH..... | 53 |
| 7. MONITORING VC IMPACT MATRIX..... | 54 |
| Appendices | 57 |

TABLES AND FIGURES

| | |
|--|-------------------------------------|
| TABLE 1 DOMESTIC PRODUCTION OF PLANTING MATERIAL | 11 |
| TABLE 2 APPLE PRODUCTION | 13 |
| TABLE 3 NEW ORCHARDS IN HA BY VARIETY IN HA 2010/2011 | 16 |
| TABLE 4 APPLE YIELD PER HA 2011-2012 | 17 |
| TABLE 5 NEW ORCHARDS IN HA BY VARIETY IN HA 2010/2011 | 24 |
| TABLE 6 APPLE STORAGE CAPACITIES..... | 31 |
| TABLE 7 ANNUAL PRODUCTION COST | 55 |
| TABLE 8 APPLE FARM GATE PRICES..... | 55 |
| TABLE 9 APPLE WHOLESALE PRICES | 55 |
| TABLE 10 APPLE GREEN MARKET PRICES | 56 |
| | |
| FIGURE 1 PRODUCTION BY OWNERSHIP STRUCTURE Y2011 | 9 |
| FIGURE 2 APPLE PRODUCTION | 14 |
| FIGURE 3 PEACH PRODUCTION..... | 15 |
| FIGURE 4 SOUR CHERRY PRODUCTION | 15 |
| FIGURE 5 FRUIT PRODUCTION STRUCTURE..... | 16 |
| FIGURE 6 APPLE YIELD | 17 |
| FIGURE 7 PEACH HARVESTED AREA | 18 |
| FIGURE 8 PEACH YIELD..... | 19 |
| FIGURE 9 SOUR CHERRY HARVESTED AREA | 19 |
| FIGURE 10 SOUR CHERRY YIELD | 20 |
| FIGURE 11 APPLE ORCHARDS BY SIZE | 21 |
| FIGURE 12 APPLE VARIETY STRUCTURE | 25 |
| FIGURE 13 APPLE WHOLESALE PRICES | 37 |
| FIGURE 14 RETAIL VS. WHOLESALE PRICES APPLE | 37 |
| FIGURE 15 RETAIL VS. WHOLESALE PRICES PEACH..... | 38 |
| FIGURE 16 APPLE EXPORT/IMPORT QUANTITIES | 39 |
| FIGURE 17 APPLE EXPORT/IMPORT VALUE | 40 |
| FIGURE 18 APPLE MONTHLY EXPORT QUANTITY | 40 |
| FIGURE 19 APPLE MONTHLY EXPORT VALUE..... | 41 |
| FIGURE 20 APPLE EXPORT VALUE BY REGION | 41 |
| FIGURE 21 EXPORT STRUCTURE BY MARKETS..... | 42 |
| FIGURE 22 EXPORT/IMPORT QUANTITY PEACH | 42 |
| FIGURE 23 EXPORT/IMPORT VALUE PEACH | 43 |
| FIGURE 24 AVERAGE MONTHLY EXPORT PRICE – PEACH | 43 |
| FIGURE 25 AVERAGE COMPETITION MONTHLY EXPORT PRICE – PEACH..... | ERROR! BOOKMARK NOT DEFINED. |
| FIGURE 26 EXPORT DESTINATIONS – PEACH | 44 |
| FIGURE 27 EXPORT/IMPORT QUANTITY OF SOUR CHERRY | 45 |
| FIGURE 28 EXPORT STRUCTURE OF SOUR CHERRY | 45 |
| FIGURE 29 EXPORT QUANTITY OF SOUR CHERRY BY COUNTRY | 46 |
| | |
| MAP 1 ESTIMATED FREQUENCY OF PRODUCTION OF APPLE, PEACH AND SOUR CHERRY BY REGIONS IN MACEDONIA | 21 |

1. BACKGROUND & OBJECTIVE

USAID supports economic growth in Macedonia through programs that strengthen and improve competitiveness of Macedonian agribusinesses, improve the business environment, and encourage local economic development. The objective of AgBiz extension is to build up the existing capacity and expertise of Macedonian professionals, lead firms, and farms to create a new understanding in the market for embedded services and fee-based service delivery. The provision of the services will be delivered sustainably by local partners well beyond the anticipated graduation of the USAID Macedonia program.

AgBiz value chain upgrading work will focus on supporting FF&V value chain participants to more effectively and efficiently link themselves to viable markets, identify possible new market entry opportunities and expand their export sales. EPI CENTAR was selected as the Lead Facilitator that will implement an activity package that will lead to better coordination between suppliers of raw material and inputs and traders/exporters to implement activities to encourage development of highly productive and competitive Integrated Supply Chains, overcome key constraints at both the pre-harvest and post-harvest levels and enhance the value chain's productivity and competitiveness. One of the initial activities is preparation of FF&V VC Baseline Screening and setting up a mechanism for regular discussion and information exchange between LAs and their farmers on the VC performance progress at the primary production level through established Focus Groups. This VC Baseline Screening is a product of the detailed analysis based on relevant desk and field research data received and discussed with all the relevant VC players.

The traditional export markets for apple are the Ex Yugoslavia¹ (Ex Yu) countries, but recently this is changing. These markets are opening for products from other countries and in the last few years, there is also a trend of change in the consumers' habits. The current investments in the primary production of Fresh Fruits & Vegetables Value Chain (FF&V VC) in Kosovo and Serbia will present a serious threat to the Macedonian producers. Considering that Kosovo and Serbia are the two most valuable export markets for the majority of the FF&V products, the increased domestic production on these markets and increased number of competitors will have serious negative impact on the Macedonian domestic primary production. This will be a challenge, since at the moment; the Macedonian production is not yet fully ready for the EU markets especially regarding the post-harvest handling and packaging practices. The Russian market is also an option that is becoming relevant for consideration especially in the last few years. Poorly developed links with the local traders and the large risks related to working with these markets, will have to be considered as well.

Under these circumstances, the key constraints, that impede FF&V producers and exporters to make optimal export decisions, is weak vertical integration and coordination and lack of market information flow between the traders/exporters and farmers, but also not having relevant VC data, and overview that will provide a clear, updated picture about the VC players, performance analyses, constraints and potentials, VC dynamics that can be utilize in developing specific interventions for Improving Competitiveness and Productivity and Increasing Domestic and Export Sales of FF&V products. Therefore, EPI CENTAR as FF&V Lead

¹ Referring to the countries formerly being part of the Yugoslavian Federation in the period 1945-1992 consisted of six republics: Bosnia and Herzegovina, Croatia, Montenegro, Slovenia, Serbia and Macedonia which are all independent states today as well as Kosovo which used to be autonomous province.

Facilitator together with FFRM as a subcontractor implement an activity that includes the development of a Baseline Screening of the FF&V VC with the emphasis on three product groups: (apple/fruits, table grapes, and pepper/vegetables). It provides ready to use data and overview of the overall performance of the FF&V VC and serves as a tool for VCLAs, their suppliers and all other VC stakeholders but also for EPI CENTAR, FFRM and AgBiz Program to understand the latest specifics of the domestic production, and the most current issues related to the FF&V VC export competitiveness.

The overall objective of this activity is the preparation of FF&V VC Baseline Screening and setting up a mechanism for regular discussion and information exchange between LAs and their farmers on the performance progress on the primary production level through established Focus Groups.

The methodology used is based on the research from both primary and secondary data sources. The secondary data sources used in the research were collected initially through desk research. The desk research was based on data available from State Statistical Office, State Customs Office, FAOSTAT, EUSTAT, reviewed reports and documents from various institutions and organizations.

For further improvement of the study and focused in-depth analysis, in order to increase the quality and credibility of the study EPI CENTAR used primary data collected through interviews with relevant VC players and Focus Group Discussions (FGD).

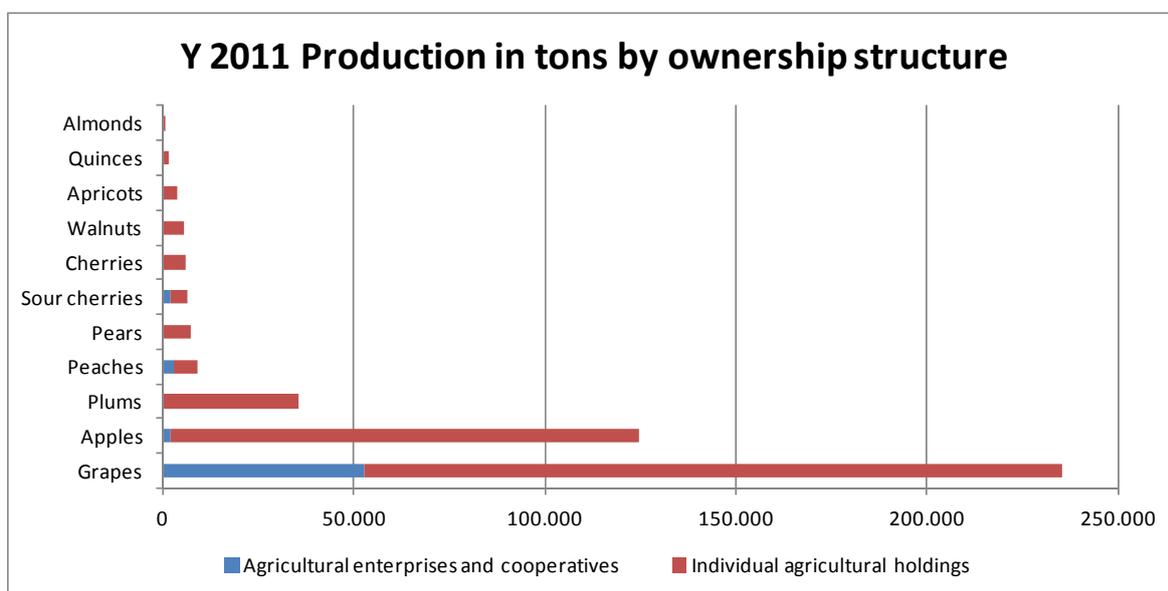
The data collected has been thoroughly analyzed and reviewed by the EPI CENTAR Team, respective Academic and Market experts in the area and Federation of Farmers of Macedonia (FFRM) especially at the policy level. All the data received and analyzed has been cross-checked in order to provide relevance and consistency.

2. INTRODUCTION TO THE FRESH FRUITS VC

The favorable ecological conditions in Macedonia provide opportunities for fruit production as well as further possibilities for the development of a value chain. The fruit production is an important sector of agriculture, GDP, external trade and for providing jobs and development of the rural areas and population.

The total agricultural land in Macedonia is over 1,12 million hectares (ha), out of which 46% or 511 thousand ha is cultivated area. The orchards are planted on 14,47 thousand ha or around 3% of the total cultivated land. The orchard production area is mainly owned by individual agricultural holdings-farmers (92% or 13.243ha) and only 8% of the production area is in ownership of is done by legal entities – enterprises and cooperatives (~1.226ha).

Figure 1 Production by Ownership Structure Y2011



Source: SSO Publications

From the Y2011 total fruit production (not considering the grapes), 62% is apple production, which demonstrates the importance of apple production as a leading fruit subsector/VC. Two thirds of the national production is produced in the regions of Ohrid and Prespa. In 2011 out of the total national production of 124.552t, 89.609t (or 72%) are produced in the Prespa - Ohrid Region.

2.1. PRODUCERS AND PRODUCTION TRENDS

Input Suppliers

Main inputs – When growing apples on apple plantations, different input materials are used as part of the production process. Prior to the planting of trees, the soil needs to be prepared adequately, by using methods appropriate for the soil type, rootstock, climate conditions in the region, etc.

The inputs for ameliorative fertilization include providing the soil with sufficient amounts of humus, macro and micro elements, and regulation of soil pH. For this purpose, the use of various types of organic and mineral fertilizers is necessary and the quantities and type of fertilizers used depend on the agrichemical analysis of the soil and the intensity/density of the apple plantation. The dense intensive plantations are fertilized with larger amounts compared to the semi-intensive and extensive plantations.

During the apple production process, various types of organic and mineral fertilizers and pesticides for plant protection (disease and pests) are used. In order to maintain the optimum soil moisture conditions and provide plant development, irrigation is also mandatory.

The cultivation of apple crop requires the most important input, propagation material with desired varieties and adequate rootstocks. The quantity/density of trees planted per unit area depends on the rootstock and the intensity of the orchard. The list of main inputs used in apple production as well as other tree fruit production inputs can be seen in the Appendix.

Main input suppliers (domestic and import) – There is a significant number of companies registered as suppliers of agriculture inputs. The supplies of planting material are either produced in the country or imported. The imported seedlings are of different species, varieties and rootstock. There are few domestic companies engaged in the production of fertilizers, pesticides and phytohormones used in agriculture, and most of the registered companies are representatives of foreign manufacturers. Thus, agriculture is highly dependent on imports of production inputs (such as fertilizers, pesticides, seedlings etc.) including agriculture equipment (such as mechanization, irrigation, anti-hail, anti-frost systems etc.), and other input supplies.

Planting material and varieties – The apple planting material with its genetic potential and health status, has a crucial effect on the success of the planting, the development and yield of the tree. Concerning the health status and the guarantee of authenticity of planting material, it can be classified as (1) standard and (2) certified. Currently, the production in Macedonia is solely of standard planting material while the developed fruit producing countries produce almost exclusively certified planting material. The procedures for production of certified planting material (especially basic material) are lengthy and complex; therefore the certified material always has a higher price. The new varieties planting material usually have to be imported, since there are no contemporary nurseries in Macedonia; however, there are still cases of “grey” import of non certified planting material especially from the neighboring countries. The customs duty on most agricultural inputs is from 2%-10%² which makes the trade quite open. The value-added tax (VAT) on basic agricultural inputs is 5 percent.

² <http://www.sobranie.mk/WBStorage/Files/6predlog-03-b.pdf>

Input material suppliers – Planting material suppliers (see Appendix) are registered in the MAFWE. The domestic planting material suppliers produce standard planting material. The imported material is generally standard as well and very rarely the imported planting material from EU is certified.

Apple - In terms of age, the suppliers of fruit seedlings provide one-year and two-year seedlings which are produced with different technologies and different physical characteristics. Generally, the one-year plant seedlings are with weaker development, low plant acceptance, growth and thus yield. The two-year plant seedlings are characterized with improved physical parameters and yield in the first year after planting, and later provide high yields quality produce making the purchasing price of these seedlings higher. The nurseries in Macedonia produce one-year seedlings almost exclusively; however, due to the significant positive effects of the two year seedlings they follow the recommendations to start intensive orchards with two-year seedlings. Currently, there are several apple varieties planting materials grafted on different rootstocks. (See List of varieties and rootstocks used in Appendix)

Table 1 Domestic production of planting material

| #2 | Domestic production of planting material | 2010 | | 2011 | | 2012 | |
|----|--|---------------|---------------|---------------|---------------|----------------|---------------|
| | | quantity | % | quantity | % | quantity | % |
| 1 | Idared | 17.147 | 27,6% | 10.930 | 30,1% | 27.500 | 12,8% |
| 2 | Golden Delicious | 8.517 | 13,7% | 5.840 | 16,1% | 54.680 | 25,4% |
| 3 | Mutsu | 5.180 | 8,3% | 2.280 | 6,3% | 6.150 | 2,9% |
| 4 | Granny Smith | 6.425 | 10,4% | 4.300 | 11,8% | 40.350 | 18,8% |
| 5 | Chadel | 1.800 | 2,9% | | 0,0% | 5.000 | 2,3% |
| 6 | Red Delicious | 11.050 | 17,8% | 5.910 | 16,2% | 3.370 | 1,6% |
| 7 | Jonagold | 2.750 | 4,4% | 2.410 | 6,6% | 21.730 | 10,1% |
| 8 | Fuji | 2.450 | 3,9% | 1.400 | 3,8% | 4.800 | 2,2% |
| 9 | Gala | 4.750 | 7,7% | 2.800 | 7,7% | 26.860 | 12,5% |
| 10 | Braeburn | | 0,0% | | 0,0% | 24100 | 11,2% |
| 11 | Other | 1.990 | 3,2% | 500 | 1,4% | 450 | 0,2% |
| | TOTAL | 62.059 | 100,0% | 36.370 | 100,0% | 214.990 | 100,0% |

Although there are an increasing number of registered planting material producers the total production is still low and does not satisfy the domestic consumption of planting material. In addition the annual production is variable and has not constant trend throughout the years. Comparing the last three years the planting material production in 2012 is much higher however due to the imported repro material in larger quantities used for production of planting material in the country which are initially intended for export and are in large part exported.

Concerning the varieties of the planting material produced the standards varieties of Idared, Red and Golden Delicious are still prevailing over the others. The other varieties available which are new are generally exported.

Peach – In Macedonia, the production of planting material for peaches used for new plantations is solely standard. Regarding the age of the planting material, plant material suppliers offer fall budded rootstocks, June budded one year old plants with two year old rootstock produced with different technologies and with different physical features. Generally, the one year old plants are with best quality and have a higher price. The nurseries in Macedonia mainly produce one year old trees with two year old stock and fall budded rootstocks from several peach varieties grafted on different rootstocks.

Sour Cherry – The planting material produced in Macedonia is solely of standard type which is used for new sour cherry orchards. In terms of age, the suppliers of fruit planting material provide one year old trees produced with various technologies and with different physical characteristics. So far, the new sour cherry orchards are with the Oblachinska variety which can be propagated with root suckers and grafting. The rootstock used for grafting is Mahaleb seedlings.

Quality and certification – In general, there is a shortage of apple planting material from domestic production. Therefore, starting new orchards/plantations requires import of large quantities of planting material which is of standard category. The planting material is imported mostly from neighboring Serbia, Bulgaria and Greece. This planting material is always one year old and with poor quality (in terms of physical characteristics, varieties and health safety authentication). Plantations with these trees give yield in later years which makes the yield lower and the quality of the fruits worse, and due to frequent virus contamination, various diseases give weaker and substandard fruits. The only advantage to this type of planting material is the low cost i.e. price.

The two year and one year planting materials with features that are categorized as certified seedlings have many advantages later on during the cultivation of crops as they bear fruit in the first year after planting, are abundantly fruitful, and the quality of the fruit is always high. However, due to the more complex procedures, these planting materials have a higher price so that our producers rarely decide to purchase seedlings from the developed EU countries.

The production of certified planting material in Macedonia is not a legal obligation. However, the new Rulebook prepared by the MAFWE gives directions for the production of certified planting material in Macedonia.

This will provide an incentive for production of domestically produced certified planting material which is expected to have lower process making it more acceptable for the buyers. However it should be mentioned that currently only small number of producers can respond to the rules and guidelines necessary for production of certified planting material.

Peach - In Macedonia, there is a shortage of peach planting material produced domestically. Therefore, large quantities of standard planting material for new orchards are imported mainly from Greece, and rarely from Serbia. The one year planting material with early branches that are categorized as certified has many advantages in the process of planting/initiating and later on during fruit cultivation. The situation is quite similar with **sour cherry** planting material for which there is also a shortage of planting material. The planting material is of standard category, mainly imported from Serbia, produced on own roots or grafted on *mahaleb* seedlings.

According to the legal regulations, the suppliers of planting material must be recorded in the Register of Suppliers of the Office for Seeds and Planting Material within the MAFWE. There are few registered suppliers of planting material in Macedonia who are producing planting material for fruit plants and a large number of registered suppliers that import planting material. Under these legal regulations, a planting material from any fruit can be marketed only if it is registered in the national list of varieties which represent the varieties included in the EU list. (See Appendix)

Producers and production

Apple

The total production of apple accounts for about 60% of the total fruit production in Macedonia. The apple production is concentrated mainly in the Prespa region. The annual production of apples varies but in the recent years, their average is around 120 thousand tons. A decade ago, the regional markets faced a significant deficit of apples, which resulted with a considerable consumption of our production without any major problems. However, in recent years the regional apple production has increased significantly, and the traditional main markets of the Macedonian apple – the neighboring markets, are more and more self-sufficient with their own production. The new orchards within the regional countries are more intensive with modern varieties, applying cutting edge technology, and are achieving high yields. As a result, the regional producers are increasingly taking over not only their domestic markets - our traditional markets - but are becoming major competitors on third markets as well.

The number of apple trees shows a continuously increasing trend (from 2,715 in 1989 to 4,313 in 2010), while the volume of annual production, although increasing, varies significantly annually (between 60.000 -170.000 t) as a result of changes in the climate conditions. Besides the climate, general low productivity (kg/tree) is being permanently affected by the unfavorable age structure of apple orchards in Macedonia.

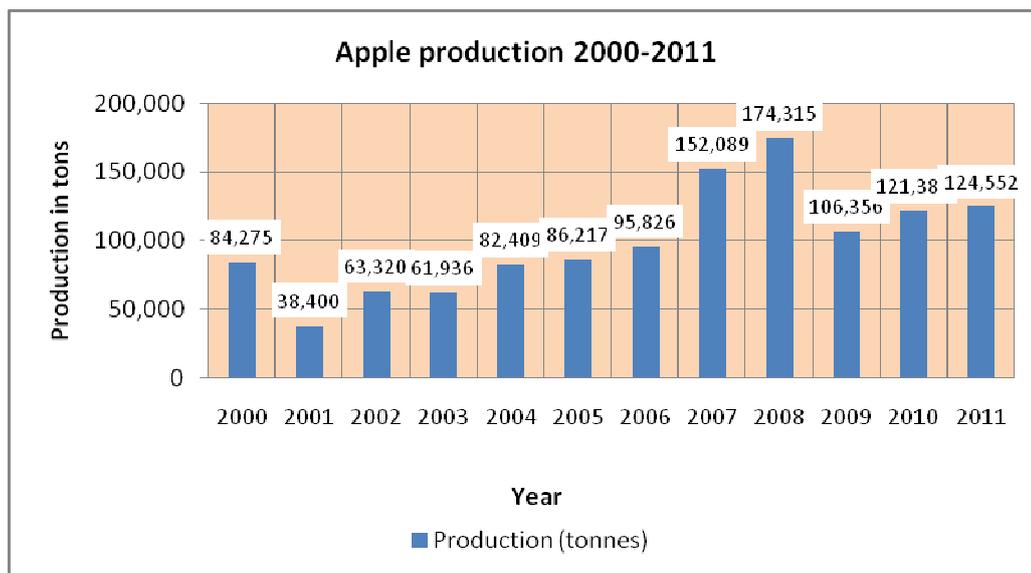
Table 2 Apple Production

| Production capacities for apple | | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---------------------------------|---------------|--------|---------|---------|---------|---------|---------|
| Numbers of trees, 000' | Total | 4.310 | 4.412 | 4.512 | 4.397 | 4.491 | 4.357 |
| | Fruit Bearing | 3.803 | 3.942 | 4.154 | 4.049 | 4.313 | 4.281 |
| Production | Total, tons | 95.826 | 152.089 | 174.315 | 106.356 | 121.383 | 124.552 |
| | Kg/tree | 25 | 39 | 42 | 26 | 28 | 29 |

Source: Statistical Yearbook 2011, State Statistical Office of the Republic of Macedonia

Most of the fruit production is used for fresh consumption both on the domestic and foreign markets, mainly in the neighboring countries, and lately on other non-traditional markets such as the markets in the Middle East, Russia, Ukraine, Romania, Moldova and others.

Figure 2 Apple Production



Source: <http://faostat.fao.org/>

The official statistics shows production variation which is quite large considering the fact that the fruit trees are perennial trees and there is no large yield variation. This indicates that the production quantities method for data collection is not as reliable as it can be expected.

Most of the apple producers are part-time farmers who own the orchards and its yield provides a significant supplementary income. The previous analysis shows that the average gross margin calculated by considering man/day for apple is higher than that of vegetable production.

The challenges for the apple sub-sector remain to be: domination of the Idared variety which, compared with Golden and Red Delicious Fuji, Beaburn, Pinova, Pink Lady, Granny Smith and other is not demanded on the EU and Near East Markets; lack of modern facilities for storage of apple during winter and spring periods when the price is drastically higher in comparison with the price during harvest; and needs for introduction of advanced production technologies, standards and water-efficient drip irrigation system

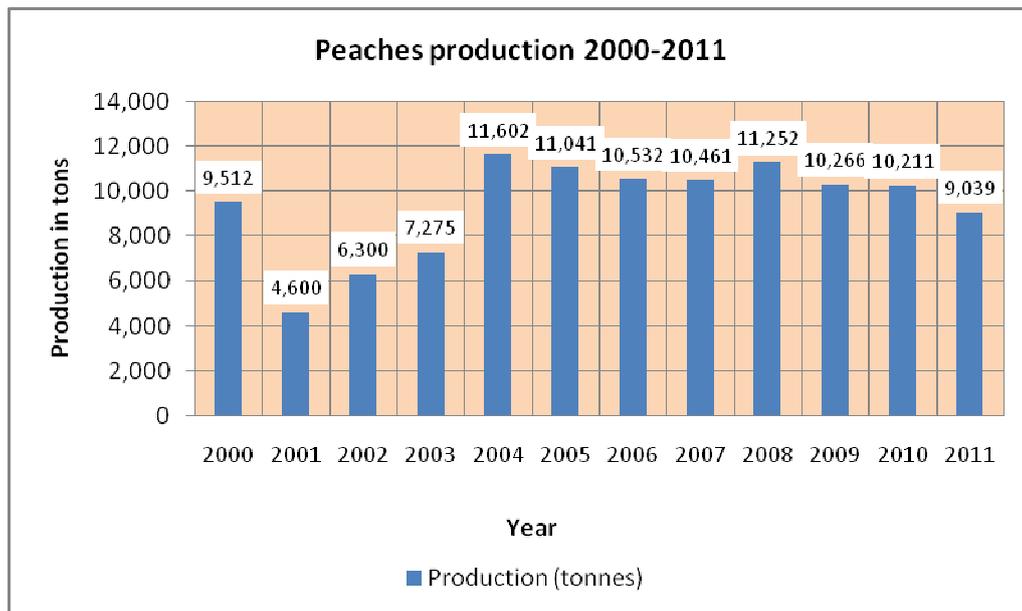
In the spring of 2013, a modern apple intensive technology model plantation has been established in Resen, in ownership of the High School Car Samuil in Resen. The orchard is expected to serve as a demonstration plot of the newest technologies for establishment and growing intensive apple orchards. AT the same time it will serve as a training site bothers for the students and the interested apple producers of the Prespa region and wider.

Peach

The total fruit production in Macedonia varies and the overall peach production accounts for about 5-6%. The peach production is mainly concentrated in the Vardar region. The average annual production in recent years is above 10 thousand tons.

Most of the peach production is used for fresh consumption, on both the domestic and foreign markets. The main export markets are ex-Yu, Russia, Belarus, Moldova, Ukraine and others.

Figure 3 Peach Production



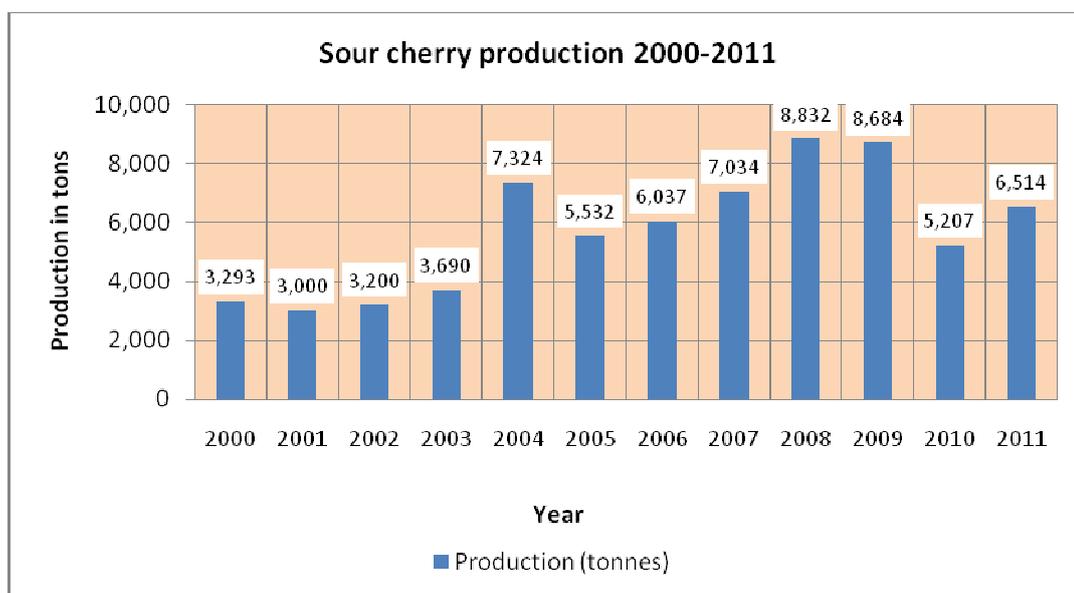
Source: <http://faostat.fao.org/>

Sour Cherry

Out of the total fruit production, the sour cherry represents 3-4%. Sour cherry plantations are dispersed throughout the country. The production in the last ten years steadily increased reaching more than 8 thousand tons in Y2009, and then again in the next few years the production started to decrease and dropped down at 5,000-6,000 tons per year.

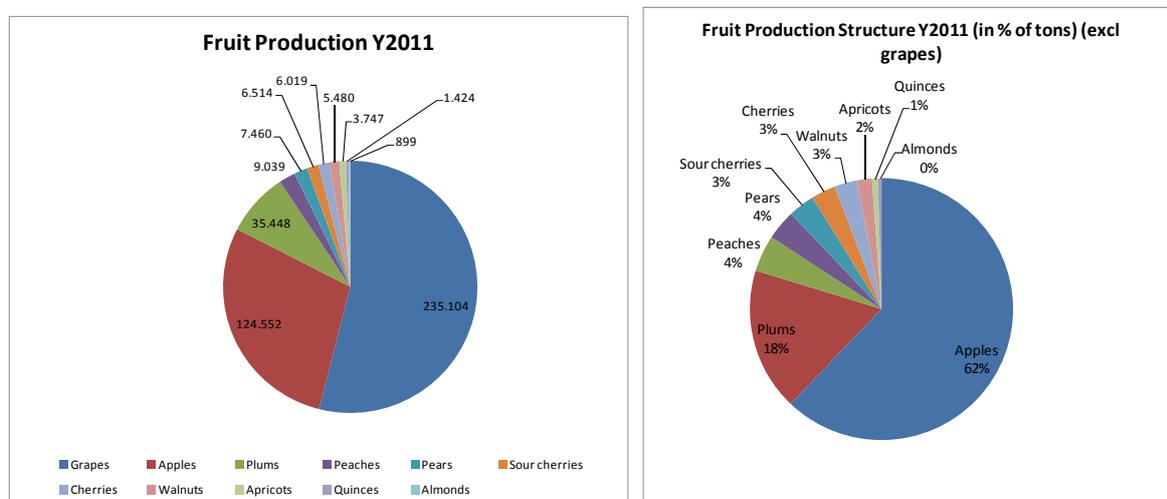
Almost the entire production is processed into various products and semi-processed products mainly for export markets. Only a very small portion of the fruit production is used for fresh consumption and on the domestic market.

Figure 4 Sour Cherry Production



Source: <http://faostat.fao.org/>

Figure 5 Fruit Production Structure



Source: SSO Publications, Filed Crops, Orchards and Vineyards 2011

Production Area & Average yield

The **apple** orchards area in Macedonia is constantly increasing, especially the area cultivated by individual growers. This is due to the fact that there are (1) excellent conditions for growing this crop; (2) the production of apples was very cost effective a few years ago, (3) high-rate of unemployment. There is an estimated annual area under apples increase of about 250ha. The new plantations are mainly in the ownership of individual holdings/farmers. There are some rare examples of enterprises planting new plantations with intensive technology, such as Agripro, Valandovo, with new apple plantations on 30ha.

Unfortunately, there are no exact statistical data for the area under different apple varieties. The State Statistical Office of Republic of Macedonia keeps record of number of apple stems. It is estimated that the production of apples takes place on 5-6 thousand³ ha.

According to the data collected as a result of the focus group discussions and the data from other sources during the last planting season it is estimated that there are new 234ha of apple orchards mainly planted with Idared while around 30% are Red Delicious, Golden Delicious, Mutsu, etc.

Table 3 New orchards in ha by variety in ha 2010/2011

| New orchards in ha by variety in ha 2010/2011 | | 234 ha |
|---|------------------------|--------|
| 1 | Idared | 70% |
| 2 | Red Delicious Redchief | 15% |
| 3 | Golden Delicious | 5% |
| 4 | Mutsu | 5% |

³ The 2007 Census production area under apple is 4.012ha, if we estimate that the last years trend of increase of about 250ha (Uprava za seme i semenski material) is constant and 50 ha of existing orchard area is dug up, the estimated increase is above 1.000ha

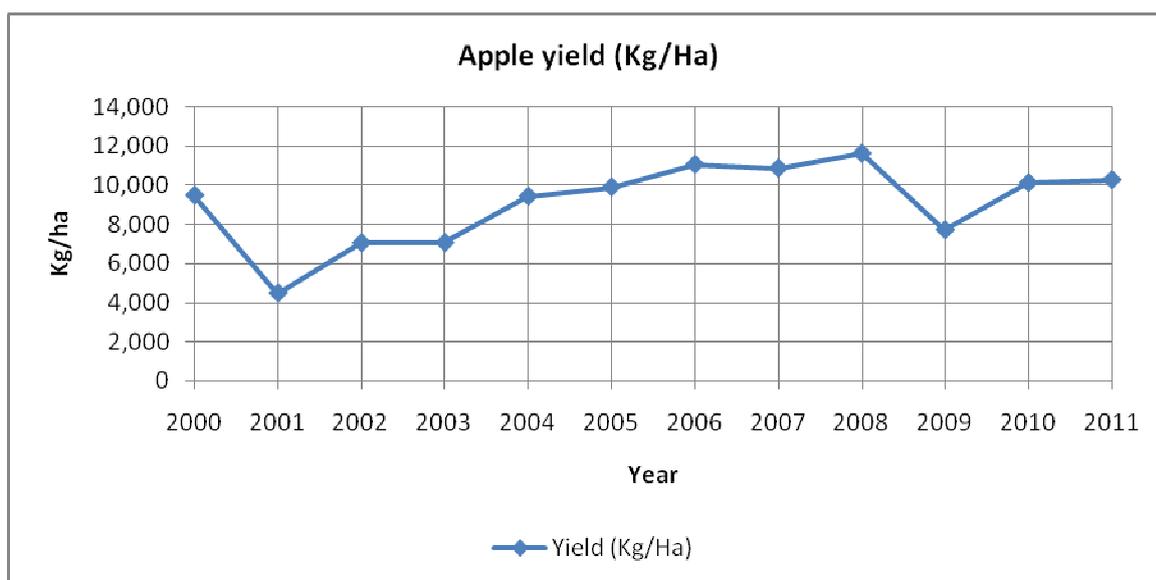
| | | |
|---|--------------|----|
| 5 | Granny Smith | |
| 6 | Chadel | 5% |
| 7 | Jonagold | |
| 8 | Fuji | 0% |
| 9 | Other | |

Source: Focus Group Discussions with Apple Producers, Monitoring matrix data

The average yield per ha varies in relation to the climate conditions throughout the year, grower/producer abilities/knowledge, variety, applied technology, etc. In the last years, the yields range from 25 to 30 t/ha, although there are plantations that provide yields over 60t/ha. In general, the less dense plantations using more vigorous rootstocks provide lower yields due to the poor light on the canopy resulting in poorly colored fruit and reduced quality.

Due to increased investments in apple orchards in the last years, the average yields per unit are increasing. Statistically reported yield data do not correspond to the real situation on the ground, according to which the yield per ha is up to 12 t/ha. The average yield of about 25t/ha has been confirmed on the focus group discussions with the most relevant producers of apples as well as the FFRM members of the model farms.

Figure 6 Apple Yield



Source: <http://faostat.fao.org/>

The data collected directly from the primary producers as a result from the quarterly meetings indicated that the average yield ranges from 30-35t/ha for Idared as the most common variety and is higher for Red Delicious, Jonagold and Mutsu variety. The yield is identical in the last two harvesting season and there is not significant change.

Table 4 Apple yield per ha 2011-2012

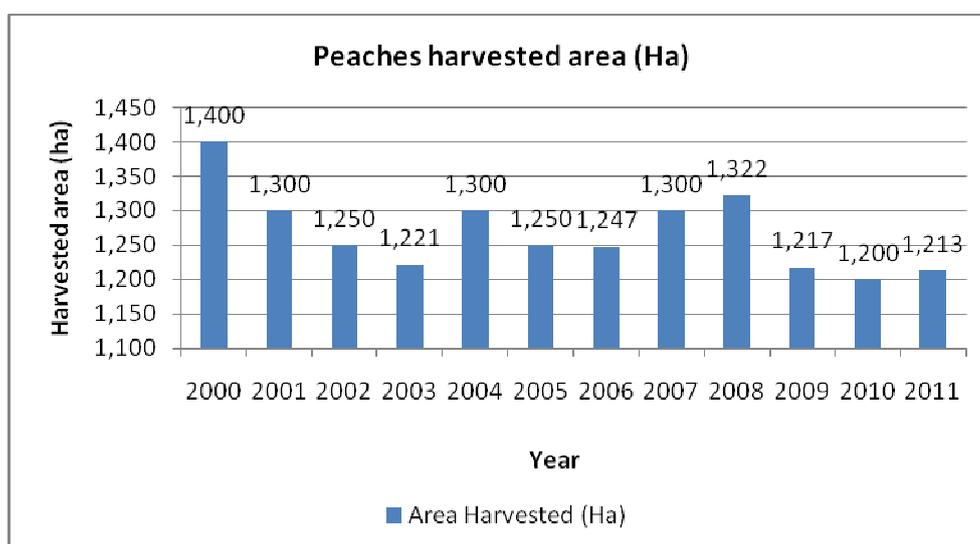
| #5 | Yield per ha | 2011 | | 2012 | |
|----|------------------|------|----|------|----|
| | | t/ha | | t/ha | |
| | | from | to | from | to |
| 1 | Idared | 30 | 35 | 30 | 35 |
| 2 | Golden Delicious | 30 | 35 | 30 | 35 |

| | | | | | |
|----|---------------|----|----|----|----|
| 3 | Mutsu | 45 | 50 | 45 | 50 |
| 4 | Granny Smith | 30 | 35 | 30 | 35 |
| 5 | Chadel | | | | |
| 6 | Red Delicious | 35 | 40 | 35 | 40 |
| 7 | Jonagold | 35 | 40 | 35 | 40 |
| 8 | Fuji | | | | |
| 9 | Gala | | | | |
| 10 | Braeburn | | | | |
| 11 | Other | | | | |

Source: Focus Group Discussions with Apple Producers, Monitoring matrix data

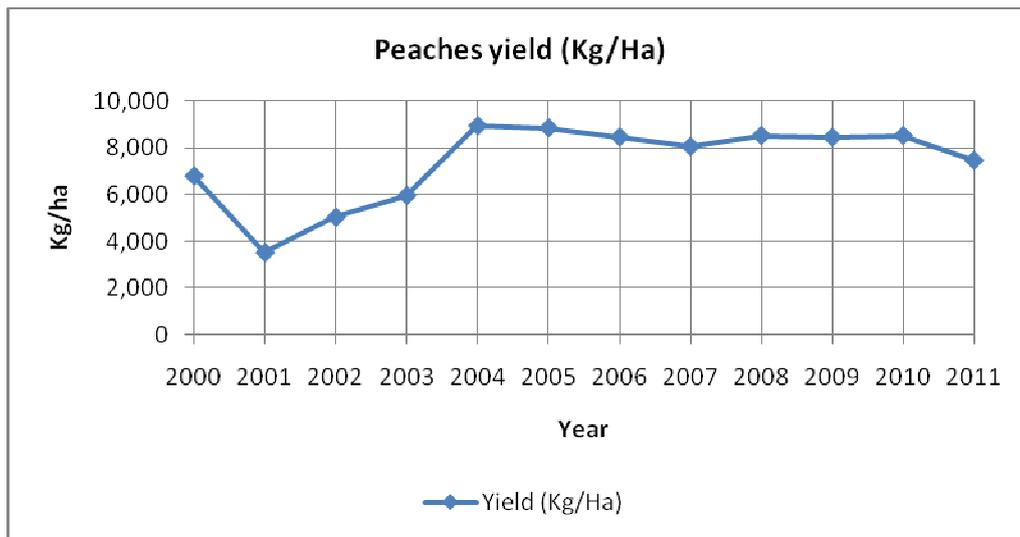
Peach – The areas under peach orchards are between 1.200ha-1.400ha while the average annual area increase is about 100 ha. The average yield varies (depending on variety, technology, etc.) and according to the recent statistics, the yields range from 8 to 10 t/ha; however, the field research indicates that the yields are greater than 15 t/ha, although there are plants that provide yields over 30 t/ha.

Figure 7 Peach Harvested Area



Source: <http://faostat.fao.org/>

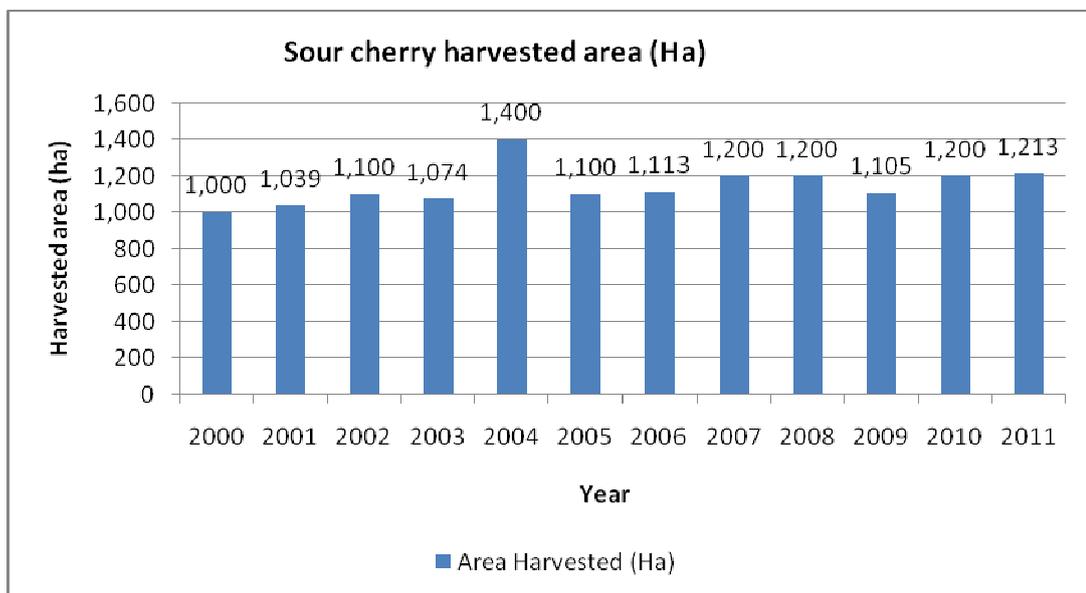
Figure 8 Peach Yield



Source: <http://faostat.fao.org/>

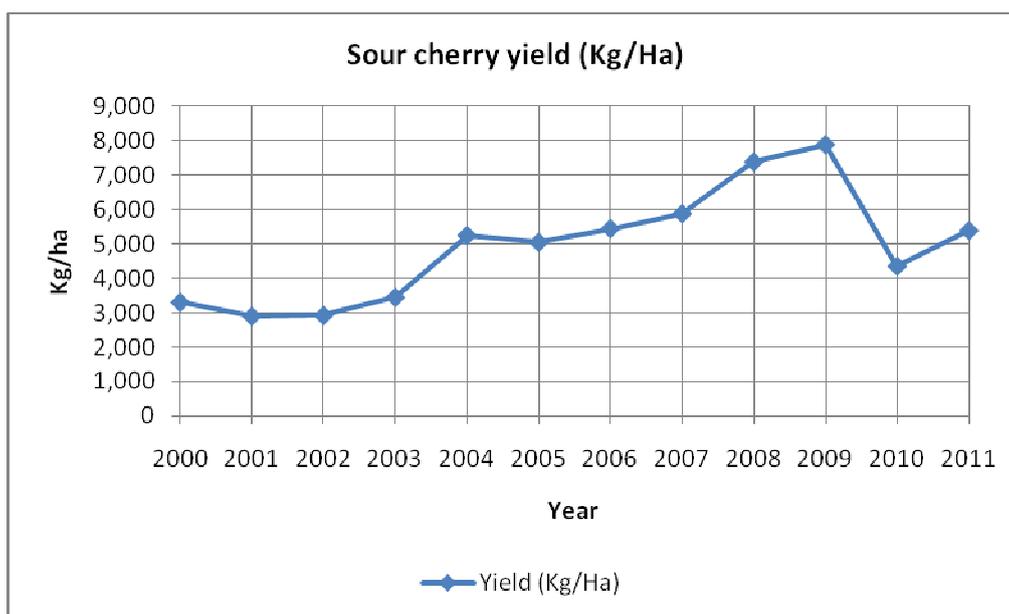
Sour cherry – The area under sour cherry orchards is between 1.000ha-1.400ha and in the last three years there are 500ha of new plantations with no fruit-bearing trees yet. According to SSO, the average yield per ha is 8 t/ha and constantly increasing. However, the yield quantity depends on the technology and the producer/grower knowledge as there are plantations that regularly provide yields up to 15t/ha.

Figure 9 Sour Cherry Harvested Area



Source: <http://faostat.fao.org/>

Figure 10 Sour Cherry Yield



Source: <http://faostat.fao.org/>

The same remarks given for the reliability and credibility of the production and yield per hectare for all perennial fruit trees, including apple trees are applicable for sour cherries as well. The yields are generally underestimated providing “inadequate” conclusion for the overall production with significant deviation.

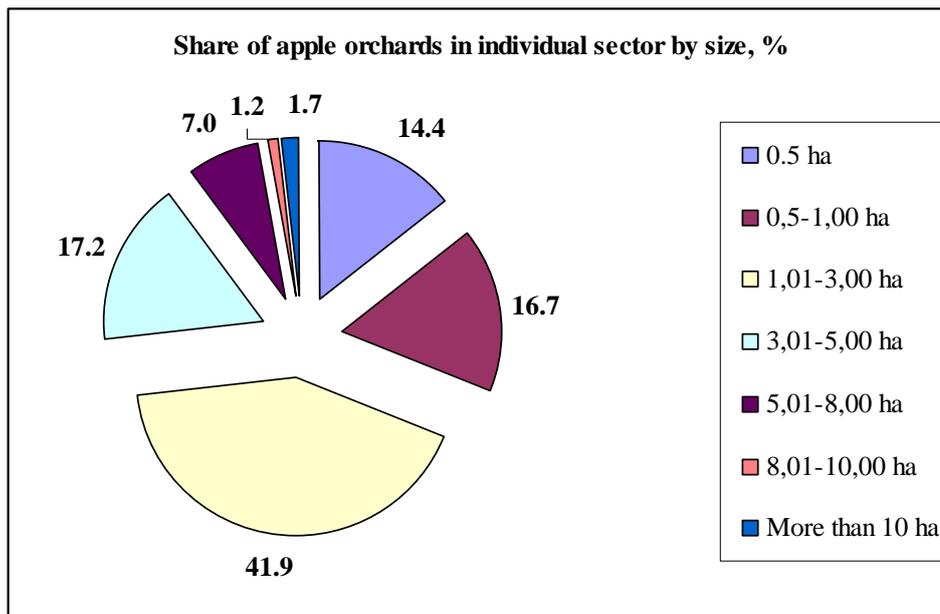
Number and size of producers

Apple -The apple production in Macedonia is located mainly in the Prespa region which covers over 80% of the total apple production. There has been an increased production in the Ohrid, Bitola and Polog regions in recent years; the apple production has started to spread in non-traditional areas.

Over 90% of the apple area orchards are in the ownership of individual farmers. It is estimated that the number of individual apple producers is around 5.000 households. The enterprises - companies producing apple are Agropod-Resen, with area of 70 ha, AD Vardar Brvenica, Tetovo, with 90 ha, AD Gradinar Ohrid with 20 ha, Agripro DOO, Valandovo, with 30 ha, Rudine DOO Delcevo with 10 ha. Out of these, only 30ha within Agripro are intensive and new plantations while the others are old plantations with old technology.

Large portion of this area is cultivated with a traditional, obsolete technology. Only a small number of growers have the knowledge and implements modern apple production technologies. There are only a dozen businesses that have organized production of apples on larger areas. There are no accurate records of the number neither of apple producers nor of areas planted with varieties. The orchards are located on small size plots of 0, 1 to 1 ha, and rarely larger plots are planted. The largest percentages of producers (70%) have apple plantation areas up to 3 ha.

Figure 11 Apple Orchards by Size

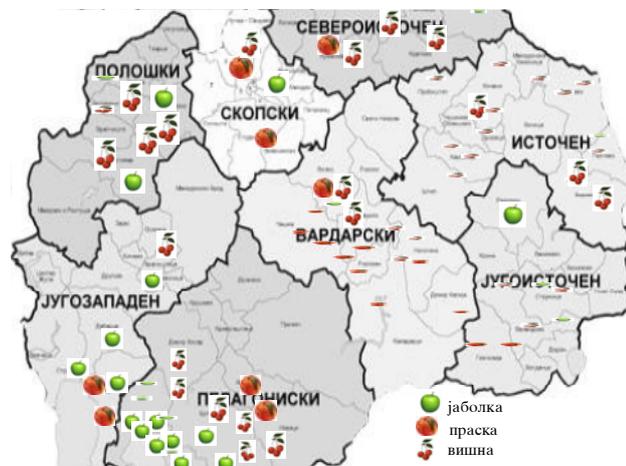


Source: State Statistical Office, Agricultural Census, 2007

A lot of producers are integrated into professional associations and cooperatives; most of them exist only formally, without sufficient commitment and a clear vision of their existence. Even weaker is the horizontal relationship and cooperation between associations founded in different regions within the country. But although there are a significant number of producer associations, most of the producers/growers are acting individually on the market, without any or very minimal negotiating power.

Although there are constantly new initiatives for vertical integration among all stakeholders in the supply chain, due to insufficient mutual trust and respect of the contracts, the vertical integration does not work and the whole chain acts spontaneously and in an unorganized manner.

There is one group named *Group for development of the apple subsector* which integrates a large portion of the stakeholders of the supply chain. Unfortunately, it does not operate as affectivity as it should.



Map 1 Estimated frequency of production of apple, peach and sour cherry by regions in Macedonia

| <i>Apple Subsector</i> | | |
|------------------------|---|--|
| | <i>Main Opportunities</i> | <i>Major Weaknesses</i> |
| 1 | Adequate climatic and ecological conditions for production of high quality apple fruit from various variety | Lack of high quality certified planting material |
| 2 | FTA with different countries which are traditional importers of apple | The production is with inadequate variety assortment and low knowledge/skills of the producers for new production technology |
| 3 | The existing interest and tradition for production of apple as well as experience | Lack of storage capacities |
| 4 | Existence of skilled labor | The producers are integrated in associations which are not functioning as PO organizing marketing and sales. In addition, there is no horizontal integration among the associations from different regions |
| 5 | Highly profitable business | Limited access to funds for financing investments and mechanization |
| 6 | Possibility for mechanization of the production processes | No market information system for timely information distribution to the producers and the traders |
| 7 | | Inexistence of additional stimulation (by the state subsidy system) for establishment of new intensive apple orchards |

Peach - The production of peach in Macedonia is located mainly in the municipalities of Rosoman Gradsko, Veles and Kavadarci. The total production of peaches in these regions covers more than 90%. Some smaller amounts of peach are also produced in the vicinity of Skopje, Valandovo, Gevgelija, Strumica, Bitola and Ohrid.

Larger producer companies are Zito Veles with 20ha, Vardar 03 Gradsko with 50ha, Dushan Kirikj Rosoman with 200ha, GD Tikvesh Kavadarci 40 ha.

About 70% of the area under peach orchards is individually owned and the rest is owned by business entities. The individual producers act individually on the market and the vertical integration is almost non-existent.

| <i>Peach Subsector</i> | | |
|------------------------|--|--|
| | <i>Main Opportunities</i> | <i>Major Weaknesses</i> |
| 1 | Adequate ecological conditions for the production of high quality fruit with ripening period from the beginning June to the end of September | Lack of high quality certified planting material |
| 2 | The existing interest and tradition for the production of peach as well as experience | The production is with inadequate variety assortment and low knowledge/skills of the producers for new production technology |
| 3 | Existent sales links within the supply chain and the traditional export markets | Lack of storage capacities for preservation of the fruit |

| | | |
|---|--|--|
| 4 | <i>It is potential profitable fruit for production</i> | <i>The producers are integrated in associations which are not functioning as PO organizing marketing and sales. In addition there is no horizontal integration among the associations from different regions</i> |
| 5 | | <i>No constant markets and market links causing market oscillations</i> |

Sour Cherry – The sour cherry production in the Republic Macedonia is mainly carried out on large plantations owned by business entities. Rarely, there are smaller plots in individual ownership. About 70% of the area under plantations is owned by business entities and the rest is owned by individual producers. Most of the plantations are grown without irrigation resulting with low yields per unit.

The larger producers are Rudine Delcehvo with 200ha, ZZ Ovoshtar Argulica, with 150ha, Hemomak pesticide Kocani, 40ha, Crveni Bregovi Negotino 60ha, Vardar Brvenica, Tetovo with 70ha.

| <i>Sour Cherry Subsector</i> | | |
|------------------------------|--|--|
| | <i>Main Opportunities</i> | <i>Major Weaknesses</i> |
| 1 | <i>Increasing and large demand of the Oblacinska variety on the world market</i> | <i>The producers and the processors are not vertically integrated on a satisfactory level</i> |
| 2 | <i>Existent sales links within the supply chain and the traditional export markets</i> | <i>Lack of irrigation causing priceless losses and damages on the plantations and the yields</i> |
| 3 | <i>Still available low-cost manual harvesting labor</i> | <i>No constant markets and market links causing irregular market oscillations</i> |
| 4 | <i>Processing capacities and freezing lines</i> | <i>There is lack of finalized value added processed products as most of the quantities are exported as semi-processings.</i> |

There is a lack of integration between individual sour cherry producers on small plots making their produce less price competitive, while the cost-effective production is on larger plantations. Most of the plantations are cultivated with a traditional old technology while only few producers have the knowledge and implement modern trends and new production technologies.

As in the case of the other perennial tree fruit producers, there is almost no horizontal integration among producers from different regions within the country. Most of the producers are focused on their contacts with the processing facilities as these are the buyers of most of their production.

For some producers and processing facilities that are direct exporters of fruits, there is a vertical integration. A particular group of processors simultaneously provide the smaller growers with raw materials such as planting material, pesticides, packaging and others as is the case with Fructana, Argulica. The owners of the largest plantations are simultaneously processors and exporters of fruits. Some major manufacturer groups organize their production independently, marketing the fruit spontaneously depending on the situation and on the market demand.

Varieties and production technology

Apple

The current apple orchards in Macedonia are planted with limited number of apple varieties which are generally unfavorable. Due to various analyses, the varieties present on the apple orchards are: Ida Red (65%), Golden Delicious (10%), Red Delicious (5%), Mutsu (5%), Granny Smith (5%), Chadel (3%), Jonagold (3%), and other varieties (4%).

Recently, however, new plantations are started with low dynamics and with new assortments such as Gala, Fuji, Braeburn, etc.

According to the last data available in the last planting season there has been an increase of the apple orchard area by 234 ha. In average is it estimated that in the last few years there are annual increases of the production area of apple is 200ha

Table 5 New orchards in ha by variety in ha 2010/2011

| New orchards in ha by variety in ha 2010/2011 | | 234 |
|--|------------------------|------------|
| 1 | Idared | 70% |
| 2 | Red Delicious Redchief | 15% |
| 3 | Golden Delicious | 5% |
| 4 | Mutsu | 5% |
| 5 | Granny Smith | |
| 6 | Chadel | 5% |
| 7 | Jonagold | |
| 8 | Fuji | 0% |
| 9 | Other | |

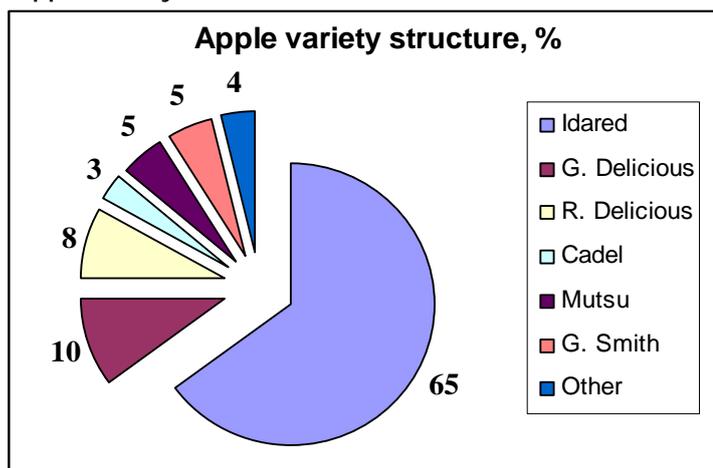
Source: Focus Group Discussions with Apple Producers, Monitoring matrix data

The plantations are mainly semi-intensive i.e. semi dense (up to 1000 trees per ha). The most common rootstock used is MM106, while the rootstock M9 is rarely used.

The MM106 rootstocks are planted at a distance of 4 planting trees x 2-3m (830-1.250 trees / ha), while the M9 rootstocks are planted at a planting distance of 3,5-4 x 1,3-1,5m from 1.666 to 2.200 trees per ha respectively.

The grafted fruit trees on a MM106 rootstock are formed on spindle bush and those on M9 rootstocks are cultivated as slender spindle. Most of the plantations are irrigated with drip irrigation, and many of the producers apply fertigation.

Figure 12 Apple Variety Structure



Source: Publication, Kiprijanovski M. 2005. Transfer na tehnologii vo ovoshtarskoto proizvodstvo so cel zgolemuvanje na konkurentnost na ovoshjeto od R. Makedonija na pazarite na EU⁴

Apple varieties currently grown

Ida Red - less widely grown in many European countries, while a leading variety in Macedonia picked in late September and early October, and relatively well kept in ordinary storage facilities up until March, and in coolers and CA up until June.

The fruit is very large (250-300 g), with excellent texture and attractiveness while the taste does not satisfy the market demands and needs which ranks the fruit with lower price. This variety does not require any special technology of cultivation; it bears fruit early, abundantly and regularly. The flowers are quite susceptible to late spring icing, sensitive to the Fire Blight, powder, and scab.

Although this variety provides a satisfactory quality, it is not profitable and does not have future as the markets do not demand this variety any more.

Golden Delicious - is grown in many countries in the Americas, Europe, Australia, and Asia. In the EU it is the leading variety representing around 40% of the overall production. It is picked in the second half of September or 135-150 days after full bloom. In ordinary storage facilities the fruit loses its quality fast, while in coolers with CA (controlled atmosphere) it can be stored by May. The fruit is of medium to large size (120-200 g). Because of this lack of standard variety, and Golden Delicious rusty coating, the mutants, such as Smoothie, Reindeers, clone B and others, are more widely used.

Red Delicious - This is one of the most common varieties in the world which matures from the second decade of September to the first decade of October. The fruit is large to very large with bell conical shape. The fruit cannot be stored in ordinary storage facilities as it becomes floury and loses the juiciness. In refrigerators with CA it can be stored 9-11 months. The Red Delicious variety is very labile genotype, which causes the emergence of many mutants, some of which are much better than the standard variety, such as Red Chief and Spoor which are grafted on lush rootstocks.

Mutsu - is picked in late September and kept in refrigerators up until May. This is a lush variety and gives better results on less abundant lush rootstocks. The fruit is large to very large and weighs more than 300g. It is very sensitive to the occurrence of bitter stains, which requires

⁴ Zbornik na trudovi, Sredba "Fakultet-Stopanstvo 2005. 29.44

specific pruning and nourishment of the plants. It can be successfully kept in ordinary storage facilities for 2-3 months and 6-9 months in CA.

Chadel - is picked at the end of September. It is a medium lush variety, with good fertility. The fruit is a medium large ball. The flesh is light yellow, sourly and winy it is kept 3-4 months in ordinary facilities, and 7-8 months in CA.

Granny Smith - is picked in the second half of October, or 180 days after full bloom and it is best grown in warmer regions. The fruit is kept until June. The fruit is close to 200 gr, it has green color. However on the sunny side, the fruit can be colored red which is considered as a disadvantage. The flesh is whitish, firm, juicy, and sour. The Granny Smith variety is with moderate quality but with increased demand and therefore should be grown in our warmer regions.

Jonagold - matures in the first half of September. In ordinary storage facilities it can be kept until March and in CA 6-8 months, but it is better sold in the earlier season. The fruit is very susceptible to impacts/hits. The fruit is large to very large (150-300gr) elongated bally and with appealing look. By storing, the fruit develops a waxy coating. Most of its mutants are characterized by intensive red colored fruit thus the mutants are more frequently grown than the standard variety. Such mutants are Jonagored, Jonica, New Jonagold, Rubinstar, Jonaprince, Decoster and others.

Suggested varieties for new apple plantations - The world renowned centers for selection are constantly creating new apple varieties with improved quality of the fruit and better features evoking interest among the consumers and producers. Unfortunately, some of these varieties are not available to our producers because there is no local production of planting material and because they are protected by breeder rights. Currently, there are some smaller plots with some of these varieties butt with an insignificant plot area. The varieties suggested are Gala, Braeburn, and Fuji. (For description see Appendix)

Peach

The peach orchards/plantations in Macedonia use more varieties with different ripening time, starting from the second decade of June until the first decade of September. (The list of varieties is given in Table 5). Recently, however, there are some new plantations with more recent varieties with planting material bought from nurseries in Greece. The existent orchards are mostly of semi-intensive type and the most commonly used seedlings of vineyard peach that is not most appropriate for the high pH soils. The rootstock GF 677 is rarely used by some growers, and in other regions rootstocks of almonds and plums are also used. The plants are planted at a 4 x 2, 5-4 m (625-1000 trees/ha) distance. Many of the orchards are irrigated with drip system with fertirrigation, while many of the growers practice furrow irrigation and sprinkling (artificial rain).

The currently grown peach varieties are Springkrest, Early Redhaven, Redhaven, Glohaven, Kresthaven, Fajet, Rioosogem, Independens, Stark Red Gold, and Fantasy. (See appendix 5)

Sour Cherry

There are many sour cherry varieties grown in different regions of the world. The commercial plantations/orchards of sour cherry in Macedonia grow the variety *Oblachinska* exclusively. In the past, the trees were grafted on their own roots while 4-5 years ago, new plantations with planting material grafted on the *mahaleb* seedlings were established. The plants grown of their own roots are less vigorous, lower in height and picked easily from the ground.

The planting distance of the trees is 4 x 2-2,5m or 1.000 to 1.250 plants per hectare. Because of the shallow and poorly developed root system, the fruits grown on their own roots are very susceptible to drought, making the irrigation mandatory. Suckers appear on plants grown on their own rootstocks, and their removal is an additional operating cost. The plants grafted on *Mahaleb* are vigorous, higher and with a stronger root system so that they can be picked with mechanization - trunk shaking equipment.

Due to the deeper root system, this fruit is more drought resistant. Suckers do not appear on these plants. The plants grafted on *Mahaleb* are planted at a distance 4 x 2, 5-3 cm, or 830-1.000 trees per hectare. The other technology of cultivation is the same for both types. Most of the existent orchards in Macedonia are irrigated with drip or sprinkling system but there are large plantation areas without irrigation. When irrigated, the yield of sour cherries amounts up 15-20 t/ha, while without irrigation the yield is 5-7 t/ha.

Oblachinska Variety

This is economically the most important variety of sour cherry in Macedonia and in the neighboring Balkan countries. The fruit is medium small to medium large (2,5 – 3,5gr). It has a fairly uniformed size, healthy strong skin, intensely dark red color; the flesh is solid, compact, with colored juice, pleasant aroma and sour taste. The quality of the fruit is very high. There is 17%-20% a soluble dry matter, the stone is small (0,2gr – 0,4gr) and easily separated from the flesh.

The percentage of fruit flesh in the total fruit weight is high, ranging from 88%-93%. At full maturity, the fruit is suitable for mechanized harvesting, as it is easily separated from the stalk. It is great for fresh consumption and all types of processing, including freezing. It is a much sought and valued raw material for processing. We export sour cherry as fresh, frozen, canned, in alcohol or concentrated juice.

Depending on the location and climate conditions in the relevant year, sour cherries are picked from the second half of June to early July. One bud produces 1-4 fruits. Therefore, these are easily picked manually in a bunch of 4-10 (and even 15-20). The fruit is easily transportable and relatively well kept in refrigerator up to 7 days. The fruit trees are low and well branched, and grow freely to a height of about 4m. The variety is adequate for dense planting; the crown is compact with a round shape. There is an opportunity for regeneration.

The tree bears fruits early, in 2-3 years of planting, and full maturity is reached in 4-5 years. It is resistant to late winter and spring frosts. There is a high potential for genetic differentiation of buds and a high coefficient of fruit setting. It is not prone to alternative fruit bearing thus it bears fruits regularly and abundantly each year and provides high and stable yields. In full maturity, the yield is 8-20 kg per tree or depending on the conditions of cultivation and application of modern technology; it is from 6-20 t/ha. Modern and well-cultivated plantations can regularly yield 12-15 t/ha. The cost-effective period for cultivation of the tree is about 20 years.

Investment & Cost structure – Apple

The following examples are an illustration of the necessary investment and annual costs expressed in EUR for (1) Standard Technology with low density of 1.000 plants/ha of the most frequent variety currently grown - *Ida Red*, with *MM106* Rootstock; (2) Intensive Technology with high density of 2.500 plants/ha of the varieties: *Golden Delicious*, *Fuji*, *Breaburn*, or *Pinova* with *M9* Rootstock

(1) Standard Technology with low density of 1.000 plants/ha of the most frequent variety currently grown - Ida Red, with MM106 Rootstock

I) Assumed yield and production classification quality (extra, I-III category) by quantity and price based on experience and the FGD

| | Extra class kg/ha | I class kg/ha | II class kg/ha | III class (processing) kg/ha | Total Yield kg/ha |
|----------------------|----------------------|------------------|-------------------|------------------------------------|----------------------|
| Yield kg/ha | 12.000 | 12.000 | 4.000 | 2.000 | 30.000 |
| Yield % | 40% | 40% | 13% | 7% | 100% |
| Price EUR/kg | 0,30 | 0,25 | 0,18 | 0,08 | |
| Revenue EUR/kg | 3.600 | 3.000 | 720 | 160 | 7.480 |
| Average Price EUR/kg | 0,25 | | | | |

II) Investment size and annual expenses and revenues

| Annual Production Expenses for MM106 Rootstock - Standard Technology, density 1.000 trees/ha (to farm gate) | | | | | | | |
|--|-------------------|-----------------|-------------|-----------------|---------|---------------|----------------------------|
| Year | Investment EUR | Expenses EUR | Revenues | | | Profit EUR | Payback period & ROI |
| | | | Yield kg | Price EUR/kg | EUR | | |
| 0 | 5.830 € | | | | 0 € | 0 € | -5.830 |
| 1 | 1.920 € | | | | 0 € | 0 € | -7.750 |
| 2 | 2.840 € | | 2.000 | 0,25 € | 495 € | 495 € | -10.095 |
| 3 | 3.290 € | | 10.000 | 0,25 € | 2.475 € | 2.475 € | -10.910 |
| 4 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | -8.949 |
| 5 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | -6.988 |
| 6 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | -5.027 |
| 7 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | -3.066 |
| 8 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | -1.105 |
| 9 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | 856 |
| 10 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | 2.817 |
| 11 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | 4.778 |
| 12 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | 6.739 |
| 13 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | 8.700 |
| 14 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | 10.661 |
| 15 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | 12.622 |
| 16 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | 14.583 |
| 17 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | 16.544 |
| 18 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | 18.505 |
| 19 | | 5.464 € | 30.000 | 0,25 € | 7.425 € | 1.961 € | 20.466 |
| 20 | | 5.464 € | 25.000 | 0,25 € | 6.188 € | 724 € | 21.190 |
| TOTAL | 13.880 € | 87.424 € | 517.000 | | | 35.070 € | |

III) Investment Size, Payback period, ROI, Average Cost & Price per kilogram

| | |
|--|----------|
| <i>Investment (total)</i> | 13.880 € |
| <i>Payback Period</i> | Y 9 |
| <i>ROI (simple incremental gain = (gains-investment)/investment)</i> | 153% |
| <i>Average Cost per kg (w/o investment)</i> | 0,17 € |
| <i>Average Price per kg</i> | 0,25 € |
| <i>Average Profit per kg</i> | 0,07 € |
| <i>NPV</i> | 38.621 € |

| | |
|--------------------|------------|
| <i>unit cost</i> | 10, 4 mkd. |
| <i>unit price</i> | 15, 2 mkd. |
| <i>unit profit</i> | 4, 2 mkd. |

(2) Intensive Technology with high density of 2.500 plants/ha of variety Golden Delicious, with M9 Rootstock

- l) Assumed yield and production classification quality (I-III category) by quantity and price based on experience and the FGD

| | Extra class kg/ha | I class kg/ha | II class kg/ha | III class (processing) kg/ha | Total Yield kg/ha |
|-------------------------|----------------------|------------------|-------------------|------------------------------------|----------------------|
| Yield kg/ha | 25.000 | 15.000 | 8.000 | 2.000 | 50.000 |
| Yield % | 50% | 30% | 16% | 4% | 100% |
| Price EUR/kg | 0,30 | 0,25 | 0,18 | 0,07 | |
| Revenue EUR/kg | 7.500 | 3.750 | 1.440 | 140 | 12.830 |
| Average Price EUR/kg | 0,257 | | | | |

- l) Investment size and annual expenses and revenues

| Annual Production Expenses for M9 Rootstock - Intensive Technology, density 2.500 trees/ha (variety such as Golden Delicious) (to farm gate) | | | | | | | |
|---|-------------------|-----------------|-------------|-----------------|----------|---------------|----------------------------|
| Year | Investment EUR | Expenses EUR | Revenues | | | Profit EUR | Payback period & ROI |
| | | | Yield kg | Price EUR/kg | EUR | | |
| 0 | 21.725 € | | | | 0 € | 0 € | -21.725 |
| 1 | 2.800 € | | 5000 | 0,25 € | 1.250 € | 1.250 € | -23.275 |
| 2 | 2.700 € | | 12.000 | 0,25 € | 3.000 € | 3.000 € | -22.975 |
| 3 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | -18.417 |
| 4 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | -13.858 |
| 5 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | -9.300 |
| 6 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | -4.741 |
| 7 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | -183 |
| 8 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | 4.376 |
| 9 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | 8.934 |
| 10 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | 13.493 |
| 11 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | 18.051 |
| 12 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | 22.609 |
| 13 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | 27.168 |
| 14 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | 31.726 |

| | | | | | | | |
|----|--|---------|--------|--------|----------|---------|--------|
| 15 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | 36.285 |
| 16 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | 40.843 |
| 17 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | 45.402 |
| 18 | | 7.942 € | 50.000 | 0,25 € | 12.500 € | 4.558 € | 49.960 |

l) Investment Size, Payback period, ROI, Average Cost & Price per kilogram

| | |
|--|----------|
| Investment (total) | 27.225 € |
| Payback Period | Y8 |
| ROI (simple incremental gain = (gains-investment)/investment)) | 184% |
| Average Cost per kg (w/o investment) | 0,16 € |
| Average Price per kg | 0,25 € |
| Average profit per kg | 0,09 € |
| NPV | 68.939 € |

| | |
|--------------------|------------|
| unit cost | 9,6 mkd. |
| unit price | 15, 4 mkd. |
| unit profit | 5,8 mkd. |

2.2. POST-HARVESTING AND PROCESSING

Post harvesting operations & facilities

In the fresh fruit supply chain, post harvesting activities play a significant role in the quality of the produce and cover activities such as packaging, transportation, warehousing, storage and calibration/classification prior to sales, which are aimed at preserving the quality and better marketable fruits.

1) Apples - The maintenance of quality depends first of all on the appropriate packaging material that is separate for harvesting; transport and storage of the fruit as well as for sales procedures.

The producers/growers of apples use wooden crates packaging for harvesting which collect about 25 kg. Then these crates are loaded onto transport vehicles and transported to the place of storage. Various types of trailers (industrial or tailor-made in home workshops with adapted dimensions) are used for transferring the fruits to the storage facilities. The trailers are hooked and transported by tractors.

Storage - The apples are stored in different types of storage facilities. Some growers have developed special storage capacities that differ in size and capacity. Some growers use various kinds of facilities as storage facilities formerly used for other purposes and now customized as storage facilities. Apples can be successfully stored up to a certain period (3-5 months depending on the variety) in these facilities. Due to the lack of means to regulate the preservation conditions in these post-harvesting storage facilities, the loss of fruit durability in some varieties and years amounts up to 30%.

There are a small number of growers that have **storage** facilities with installed equipment regulating the temperature and humidity. According to data from the field, there are storage facilities with a total cooling capacity of 5.000 tons in all production regions.

Table 6 Apple Storage Capacities

| | | 2011 | 2012 |
|---|--|-------|-------|
| 1 | <i>Storage capacities with controlled temperature(tons)</i> | | |
| | Resen | 2.500 | 2.500 |
| | Skopje | 1.000 | 1.000 |
| | Bitola | | 1.000 |
| | Tetovo | 500 | 500 |
| 2 | <i>Storage capacities with controlled atmosphere (ULO) (tons)</i> | | |
| | | 0 | 0 |

Source: Focus Group Discussions with Apple Producers, Monitoring matrix data

The apples can be successfully stored in this storage - coolers for 5-8 months depending on the variety. These types of facilities store mainly apple varieties that cannot be kept in ordinary warehouses without loss of quality (mainly the varieties Golden Delicious, Mutsu, and rarely other varieties). Some growers even practice placing the fruits in plastic bags and then in cardboard boxes prior to their storing in a refrigerator. This method provides better retaining of the moisture, reduced transpiration, and therefore reduced losses.

Not many individual producers possess cooling storage facilities in the Prespa region. In Bistrica, Bitola, there are a larger number of individual producers with cooling facilities but with small capacities from 20t to 50t per individual.

The storage facilities with installed cooling equipment are mainly owned by individual growers/farmers. They are characterized with low storage capacities which partially satisfy their own needs. A small number of coolers with larger capacities are owned by business entities (producers or traders), such as. Rumko - Resen which has storage facilities with the capacity of 1.000t in which it stores produce bought from individual producers for their own purposes; Swisslion Agrar, with a storage capacity of 1.500t (former Agropod) for their own production, Agripro has a storage capacity of around 200 t and Rudine around 500t. None of the facilities is rented to individual producers since they are used for the companies' own production processes.

Prior to sales, the fruits are classified. The classification is mainly done manually in accordance with the buyers' demands and needs. Modern machines for calibration are not used. After classification, the fruits are packed in inners of different size, made of wood, cardboard or plastic according to the traders' needs. These packaging containers are usually purchased by the traders. After packaging, the packages are loaded directly on to the transporting vehicles; in rare circumstances the containers are placed on pallets before loading.

Modern chambers for apple storage (chambers with controlled atmosphere) where the condition can be controlled to provide successful storage of fruit for a longer period are not used yet. The rough estimated cost for building and equipping ULO storage facilities is around 400-500EUR/m³ (depends on the overall capacity, type of equipment etc.). According to the information from the field, there is a production of other varieties (30-40 thousand tons) besides the Ida Red variety. Out of the total national production of varieties, other than Ida Red, around half or 20.000 tons, could be stored in controlled storage environment i.e. it is necessary to disburse around 50.000m³ all over the country. There are still no controlled atmosphere storage facilities

2) Peach – The peaches are mainly harvested in plastic crates of different dimensions, which are loaded onto transport vehicles and transported to a destination for classification and packaging. The transportation of the peach fruits is carried out by various types of tractor trailers. However, some producers classify and package the fruits on the harvesting site and immediately load the produce onto the purchasers' ' vehicles.

In certain production centers (region Rosoman) there are collection centers where peaches are first cooled, then classified, packaged, palletized and stored until they are sold. In most cases, fruits are stored only for a few days and rarely, in the later ripening varieties (harvested at the end of August and September) are stored for up to a month. The classification of the fruits is done manually and as ordered by the buyers while modern calibration equipment is not used.

The packaging of fruits is done in containers of different size made of: wood, cardboard or plastic. The fruits are usually put into plastic pads placed inside the container. After completing the packaging, the containers which are rarely palletized are loaded directly onto transport vehicles.

3) Sour cherry - In practice, sour cherry packaging is performed in plastic crates of different size; the most commonly used are the 13-14kg crates which are loaded onto transport vehicles and transported to the site for marketing or to the processing capacities. The picking

is done manually, not mechanically. The processing facilities, depending on the type of fruit, perform a variety of processings. As *Oblachinska* is the only variety of sour cherry produced mainly for processing and is rarely used for fresh consumption, specific post-harvest activities are required.

Processors

There were 26 F&V processors in Macedonia identified in Y2009, all of them were processing vegetable only, 5 processed only fruits and 15 processed both fruits and vegetables. According to the available data from the analyses performed in the period 2007-2009, in average 6,1 thousand tons of F&V were purchased by the processing capacities i.e. only 2,82% of the total fruit production.

The apple is usually processed in concentrate used for fruit juices. Only small amounts of apples are processed into other products, such as marmalades. Large portion is exported to processors in the neighboring countries Bulgaria and Serbia.

In the period 2007-2010, the average annual quantity purchased by the domestic processing capacities was 1, 2 thousand tons of apples. Most of the quantities are processed in the processing capacities of the companies Proimpex IPOZ Prespa AD Resen, Kevil Komerc Resen, Gudalat Gostivar etc. The main processing products are concentrate and paste. There are other small-sized processors as well with various processing technologies.

The varieties of peaches grown in Macedonia are mainly for fresh consumption, with a small quantity of low quality fruits which are processed. Most of the peach fruits purchased for processing are bought by Fructal Skopje. In other processing capacities, smaller quantities are used for marmalades, compotes and other fruit products.

The *Oblachinska* variety is produced almost exclusively for processing. The sour cherry processing is either for semi-processed or final products, such as fruit juices, marmalades, compotes, frozen fruits, fruits in alcohol etc. There are a large number of sour cherry processors, such as: Rudine from Delcevo, Fruktana from Argulica, Ladilnik from Tetovo, Industriski Ladilnik from Kumanovo, etc.

3. MARKETS

3.1. THE DOMESTIC FRESH MARKET

The total apple production in Macedonia exceeds the domestic consumption quantities and thus a large part is intended for export. If we make a general estimation of the fresh apple consumption for the last few years, we can see that 65% of the production is exported.

| <i>Fresh Apple</i> | 2009 | 2010 | 2011 |
|--------------------|---------------|---------------|---------------|
| <i>Production</i> | 106.356 | 121.383 | 124.552 |
| <i>Import</i> | 377 | 575 | 778 |
| <i>Export</i> | 44.945 | 90.105 | 73.640 |
| <i>Consumption</i> | <u>61.788</u> | <u>31.854</u> | <u>51.690</u> |

There is no official record of the quantity of apples consumed domestically, thus there are no accurate data. According to some former trials (Economic Chamber, period 1990-2000) the quantities of apples consumed on the domestic market amounted to 25-30% of the total production or on the average - 30-40 thousand tons. According to the Y2010 Agricultural and Rural Development report, 25% of the fruits are marketed on the domestic market and the remainder is exported.

The Macedonian (domestic) market consumes all varieties produced in Macedonia. However, the exact consumption structure by variety cannot be determined exactly. According to data from the FGD (including producers, traders, exporters, FFRM, academia) and the experience of the FGD participants, the largest consumption quantity is the Ida Red variety, followed by Golden and Red Delicious, Mutsu, Chadel, Jonagold and other varieties with smaller quantities. The domestic market consumes smaller quantities of imported apples. According to the import data, the average annual import quantity in the last 4 years is around 500 tons, mainly Golden Delicious, Red Delicious and Granny Smith varieties.

According to the field estimates for peach consumption, 60% of the production is exported and the rest is marketed on the domestic markets. These estimates are confirmed with the available export statistics data for Y2009-Y2011.

| <i>Fresh Peach</i> | 2009 | 2010 | 2011 |
|--------------------|--------------|--------------|--------------|
| <i>Production</i> | 10.266 | 10.211 | 9039 |
| <i>Import</i> | 8,92 | 52 | 98,78 |
| <i>Export</i> | 3.535 | 5.824 | 9.476 |
| <i>Consumption</i> | <u>6.739</u> | <u>4.440</u> | <u>-338*</u> |

**The data is extracted from SSO database and showed negative value for peach consumption in Y2011*

The sour cherry fruits are mainly intended for the processing industry while negligible quantities are sold on the domestic market for fresh consumption. Thus, the product is mainly purchased by the processing facilities in Macedonia and further exported in other product forms. The exported quantities of fresh sour cherries are insignificant because the largest part of the production in Macedonia is intended for the processing industry, and the goods are exported either as semi processes or processed final products.

| <i>Fresh Sour Cherry</i> | 2009 | 2010 | 2011 |
|--------------------------|-------|-------|-------|
| <i>Production</i> | 8.684 | 5.207 | 6.514 |

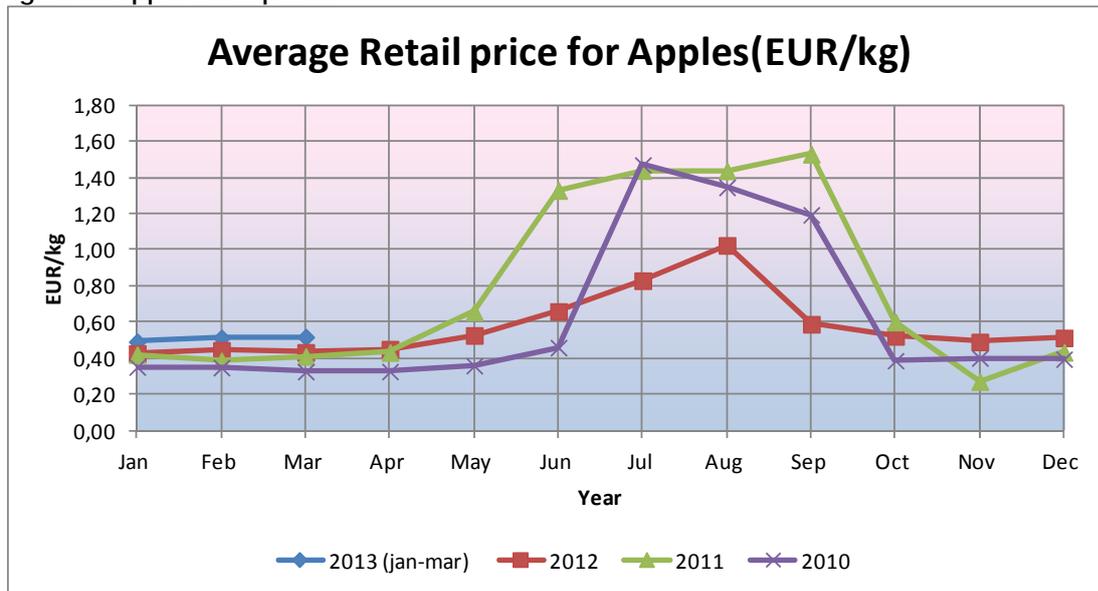
| | | | |
|-------------|--------------|--------------|--------------|
| Import | 0 | 0 | 0 |
| Export | 196 | 89 | 141 |
| Consumption | <u>8.488</u> | <u>5.118</u> | <u>6.373</u> |

Retail prices and retail markets

In Macedonia, the tradition of green markets still persists and each town has regular and functioning open green markets offering fresh produce. Most of the fruits are still purchased on the green markets. The final domestic consumer mainly supplies and buys apples on the green markets where the producers of fruits rarely sell directly themselves; most of the apples are sold by traders who buy the produce from wholesale markets and rarely from the producers' storage warehouses.

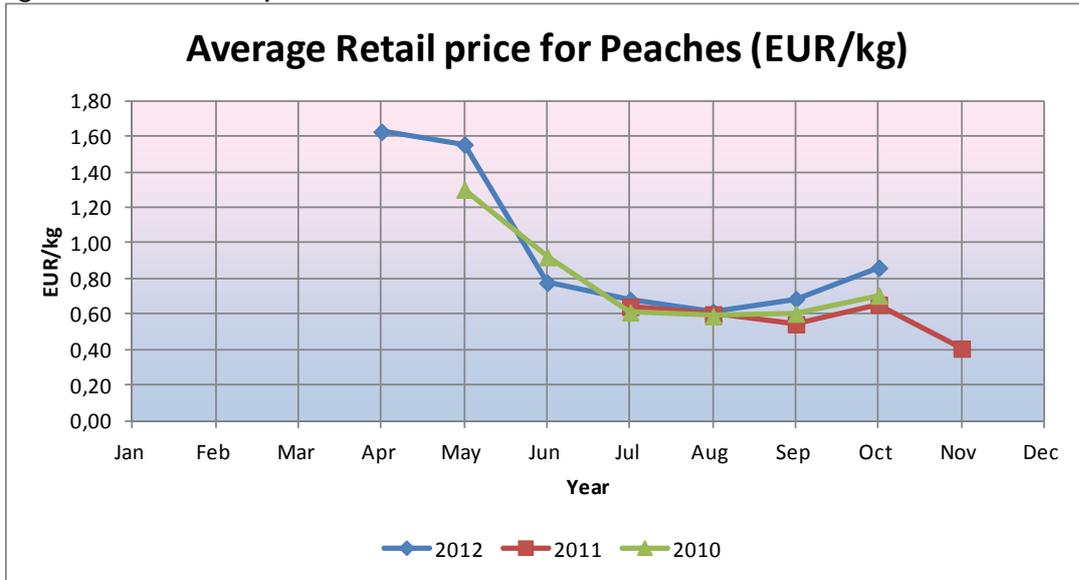
According to the statistics, the retail prices of apple fruits are volatile throughout the years and within the same year depending on the availability of domestic production. The highest prices per kilo are during the summer months and the beginning of autumn (June-September) when only imported apples are present. The prices of different apple varieties vary according to the season: in autumn, Golden Delicious, Red Delicious and Mutsu have higher price while in winter and spring Ida Red and Granny Smith have higher prices. These price differences arise from the different qualities offered. There is no official record of the distribution channel structure, but it is assumed that 60-80% is marketed through the green markets.

Figure 13 Apple Retail prices



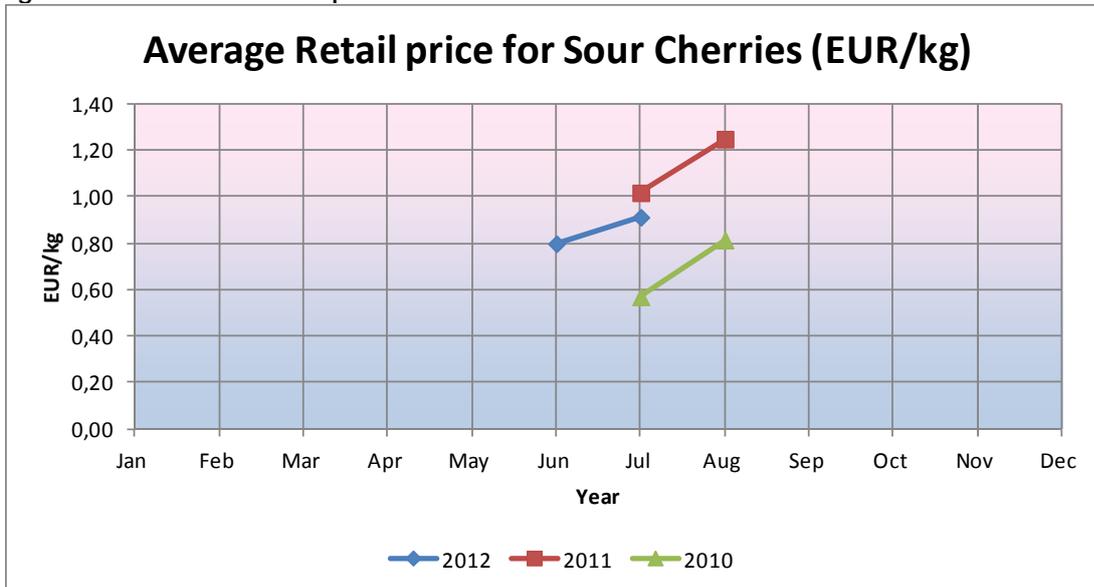
The peach retail prices on the domestic market are volatile, depending on the year, region, season, quality and other factors. The peach fruits on the domestic market are marketed during the period of June through September. The average price in the main season ranges from 25 to 40 MKD, with higher prices at the beginning and the end of the season or the beginning of June and the end of September. The peach distribution channels are through the retail markets, the neighboring retailers and super market chains; however, the main sales channel is still the green market.

Figure 14 Peach Retail prices



As mentioned before, the sour cherry fresh consumption is limited, thus not available through the retail channels. The common variety is intended primarily for processing. Very small quantities of the Mareli variety (which is similar to sour cherry) can be found and it is used for fresh consumption and marketed mainly through the retail markets. The official statistics of retail prices are displayed below; however, they are generally perceived to be much higher.

Figure 15 Sour Cherrie Retail prices

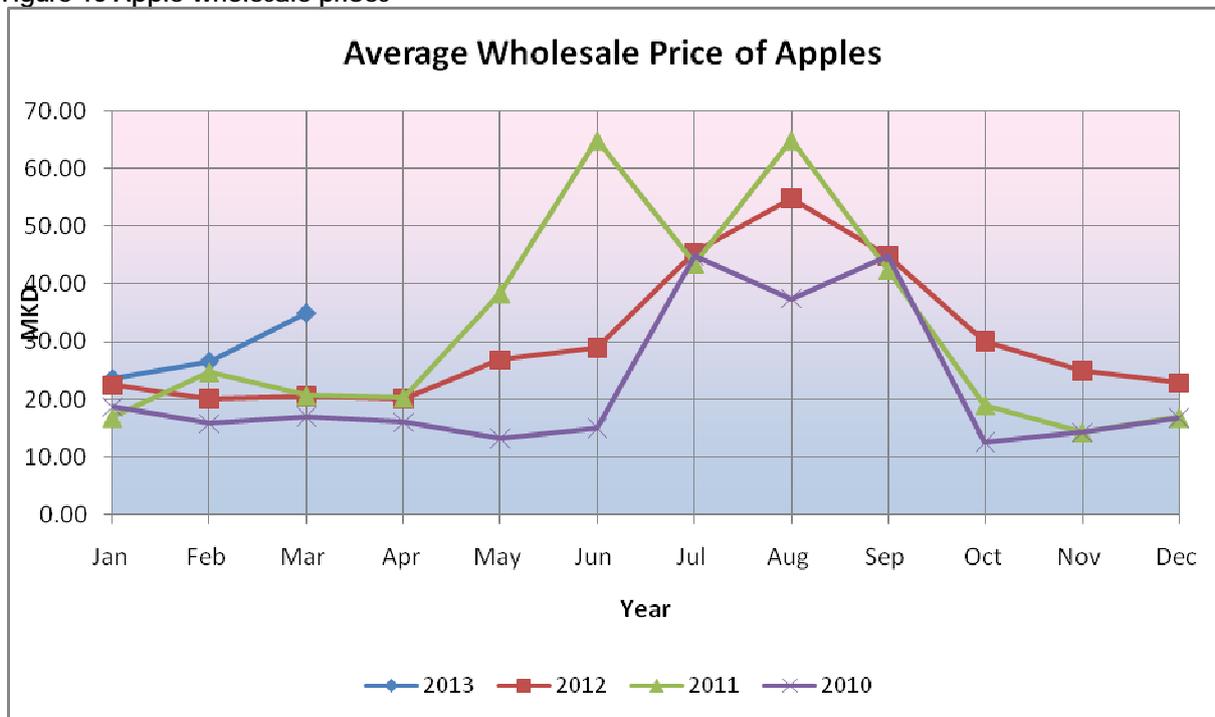


Wholesale prices and wholesale markets

The wholesale prices of *apple* vary according to variety, season and year. The wholesale markets are dominated by traders - wholesalers although some producers who supply the retailers are present as well. The products on the wholesale markets are mainly of domestic production, while during spring and summer months, when there is not enough quality apples produced domestically, there are imported apples as well.

The highest prices per kilo are during May through August when the imported fruits are marketed. The overall wholesale market prices of apples are lower by 20-30% compared to the retail prices. The official data (SSO) presented below, on the apple wholesale prices should be double-checked especially if we consider that at certain points the wholesale prices are higher than the retail prices, which is illogical. This has been confirmed during the FGDs by the stakeholders.

Figure 16 Apple Wholesale prices



Source: State Statistical Office

Figure 147 Retail vs. Wholesale Prices Apple



Source: State Statistical Office

The wholesale price of peaches varies in regard to year, variety and season. In the last few years, the average price is between 20-30MKD with significantly higher prices when only

imported peaches can be found on the market (April-May) and the lowest prices in the main season (July-August). Generally, the wholesale market prices are 20-30% lower than the retail prices.

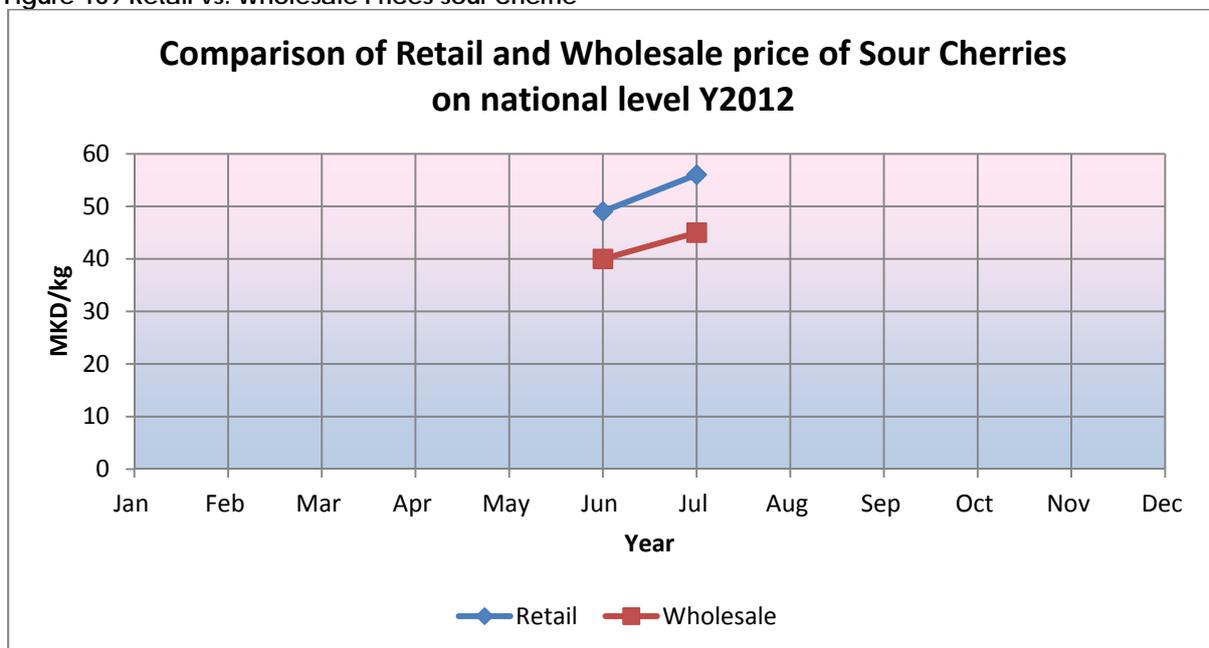
Figure 158 Retail vs. Wholesale Prices peach



Source: State Statistical Office

The production period of sour cherries is very short. In addition they can't be preserved in a fresh condition for a long time, thus they are present on the market only in June and July and the difference between the retail and the wholesale price is near 10 MKD.

Figure 169 Retail vs. Wholesale Prices sour cherrie



Supply Characteristics (size, type of packaging, quality, color etc.)

There are different categories and classes of *apples* supplied on the domestic market, and usually prior to sale, the producers perform manual classification according to size, and rarely

by coloration. The classification is done subjectively, usually under the orders of the trader or by convictions of the producers. There are often apples which are not classified at all.

The apples are sold in packaging of different size, type and quality. The wholesalers mainly buy apples in cardboard box packaging of different dimensions, usually 25 kg, which are then sold to the retail outlets as such in bulk. The fruits which are sold are usually with minimal standards, so that apples with unsatisfactory quality can often be found as well.

The best quality apple fruits are available at the beginning of the season, and over time, due to the usually poor storage conditions, the quality of fruit deteriorates (juiciness and crunchiness). Due to the lack of modern calibrators that can classify the apples according to color, there are fruits with different degree of coloration in the same package.

The *peach* supply is comparable with the apples, the peach fruits on the domestic market are classified manually, and the packages are of different size and material.

The fruits are mainly packaged in cardboard boxes in which around 10kg of fruit can be placed. The peaches are often collected in wooden crates as well and each fruit is placed in plastic pad within the wooden crates. The appearance and quality of marketed fruits are mostly satisfactory; however, due to a longer storage in inadequate conditions, the fruits lose firmness and are marketed as such.

The *sour cherry* fruits are generally packaged in plastic containers in which they are harvested, and the quality meets the minimum requirements.

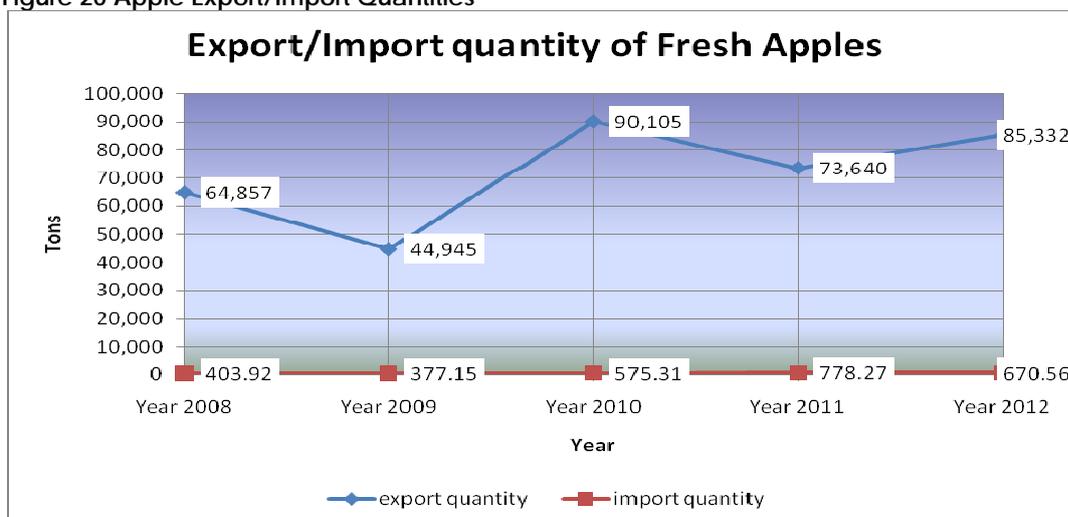
THE EXPORT MARKET

Apple production is mainly exported and in the last five years, the average annual exported quantity has been 71 thousand tons (45 to 90 thousand tons) per year.

The total export of apples varies mainly due to the fact that Macedonia as a small-sized producer, it rather fills in gaps on the markets rather than being a stable constant supplier.

The current main competitors of Macedonia in apple production (given the current characteristics) on the international market are Poland, Moldova and Serbia. That is the reason why there are higher exports and a higher demand whenever the competitors are not able to deliver, due to frosts, floods etc., which was the case last years (e.g. Y2010).

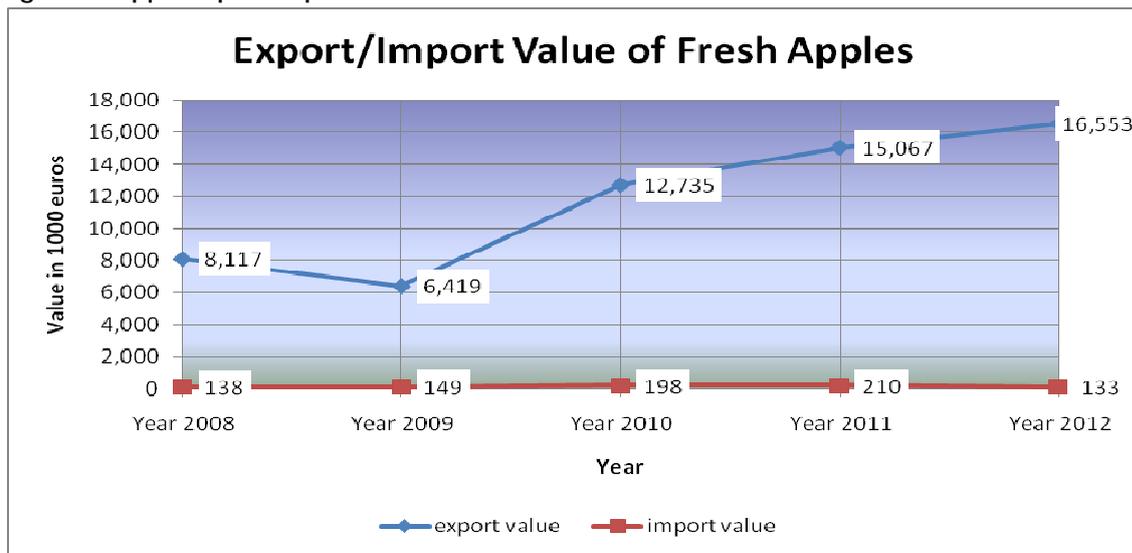
Figure 20 Apple Export/Import Quantities



Source: Based in EURO STAT data

The total export value is also variable and ranges between 6,4 and 16,5 million EUR or on the average of about 11,8 million while the value of the imported quantities of apple ranges from 140 to nearly 200 thousand Euros. According to official data, the average annual export prices range from 0,13 to 0,22 EUR; however, there are evidence from the experience of the private sector exporters that the officially recorded average export price per kilogram does not correspond with the real prices hence decreasing the total export value of apples and decreasing the overall value of the subsector posing unrealistic picture of the sector since the real prices are much higher. Thus, it should be noted that there is a need for a mechanism that will attempt to record the correct export prices and value of apples as the most significant representative of the fruit sector in Macedonia. On the other hand, the average price of imported apples is much higher due to their higher quality.

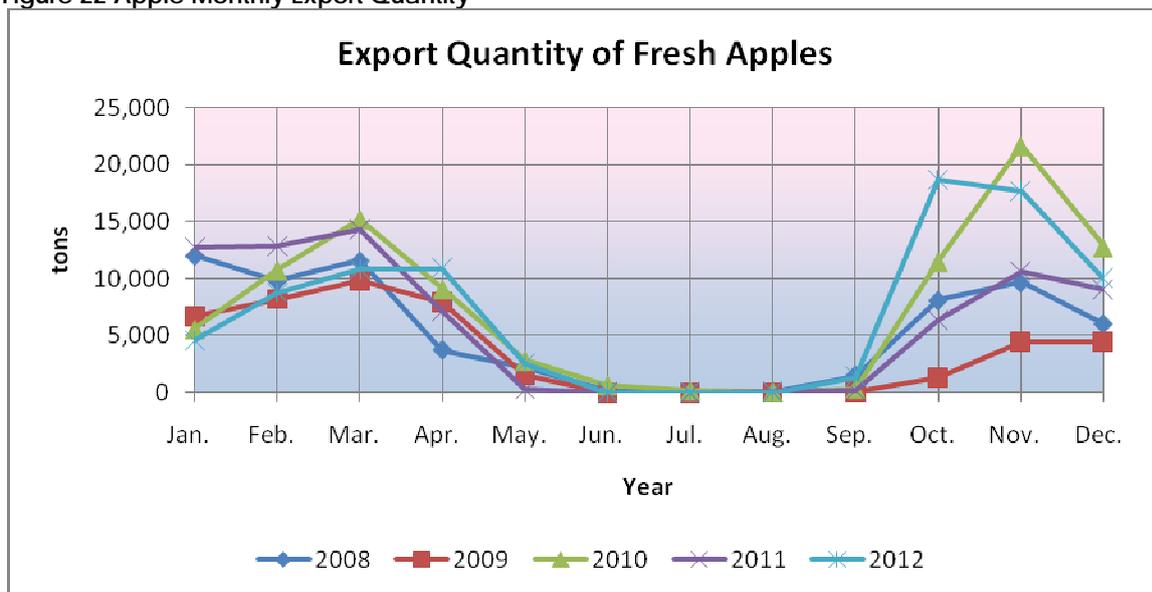
Figure 21 Apple Export/Import Value



Source: Based in EURO STAT data

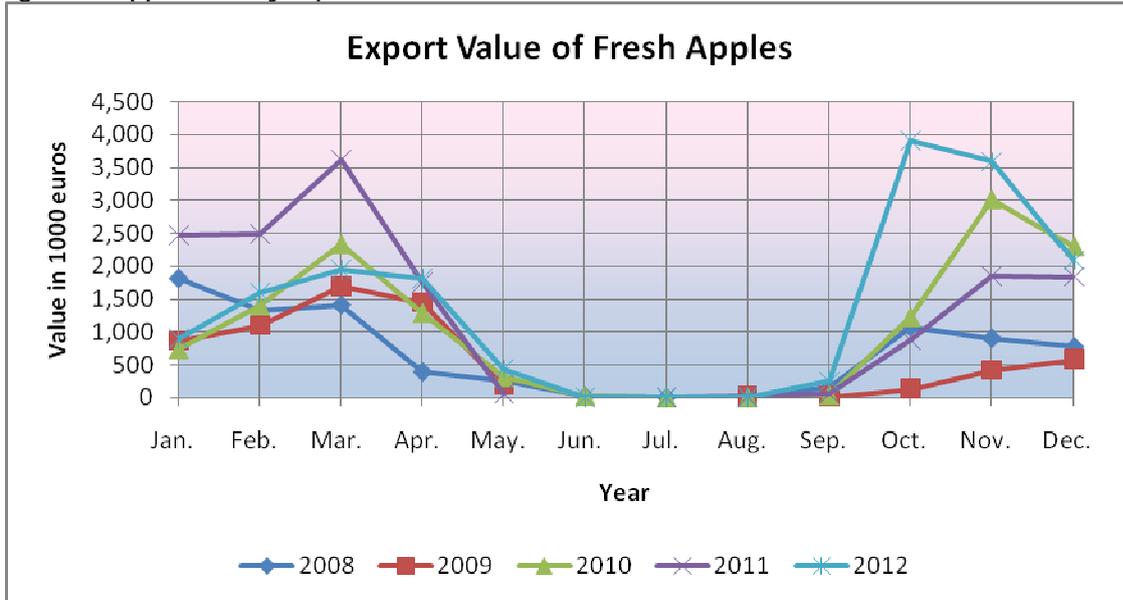
Most of the quantity of apple is exported in the period from November to March. In the summer period, there is no export of domestically produced apples, and the data recorded most likely refer to re-export.

Figure 22 Apple Monthly Export Quantity



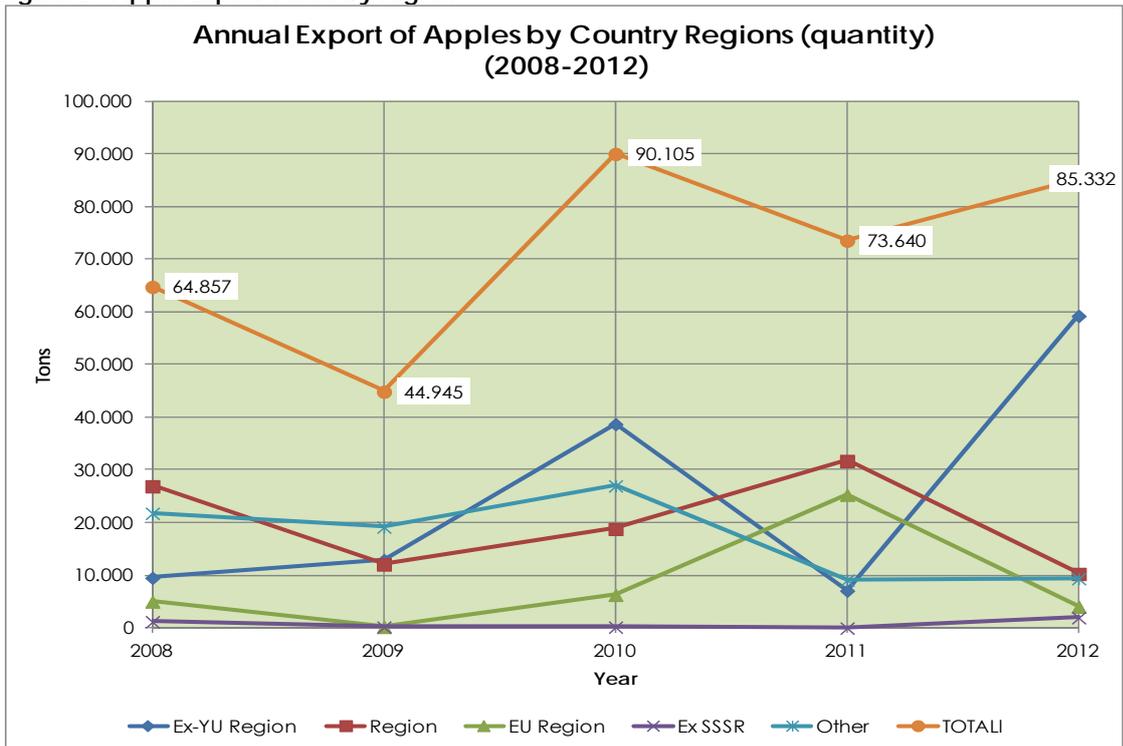
Source: Based in EURO STAT data

Figure 23 Apple Monthly Export Value



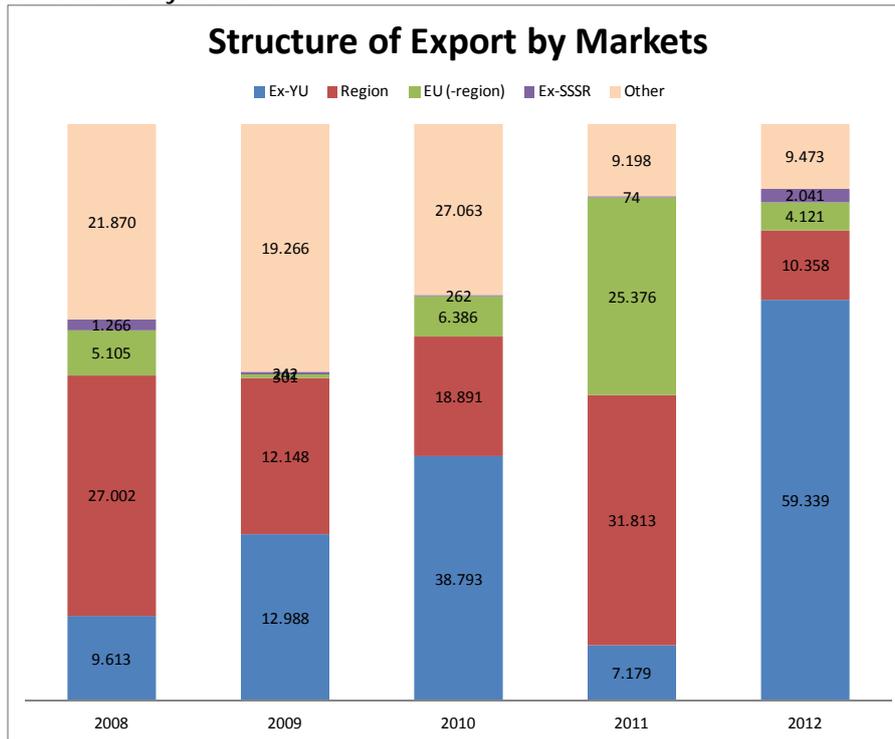
Source: Based in EURO STAT data

Figure 24 Apple Export Value by region



The export markets are many European countries and in recent years, some countries in Asia and Africa. However, the largest quantities are still exported to the traditional neighboring markets primarily in Serbia, Bulgaria, Kosovo and Albania. In recent years, considerable quantities of apples are exported to markets in Iraq and Russia.

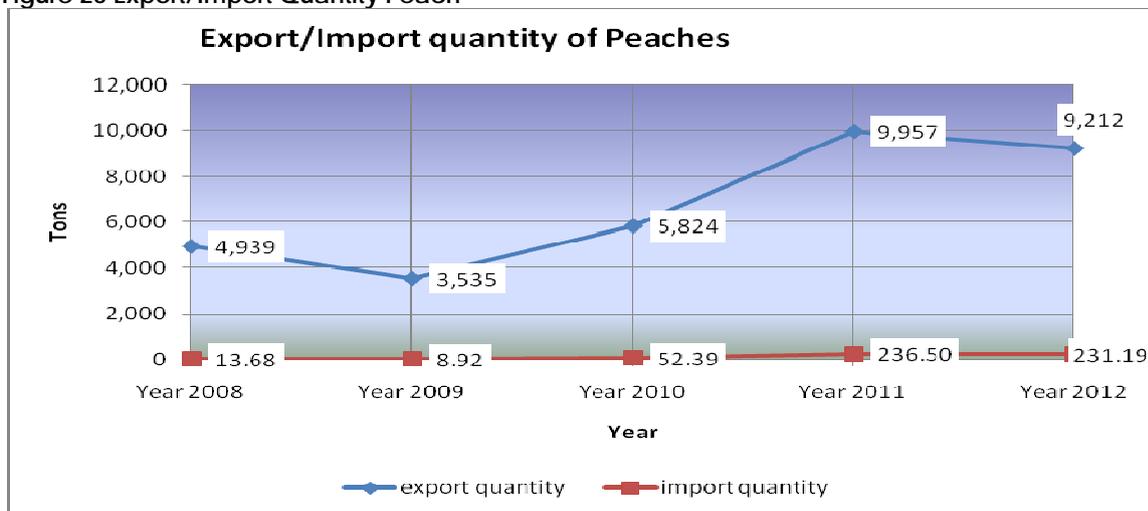
Figure 25 Export structure by markets



In 2010, significant quantities (55% of the total exported quantity) were exported in Saudi Arabia, Libya and Jordan. This event occurred only in 2010 and has not been repeated. This was confirmed during the discussions with the FG when it was pointed out that these sales were accomplished by under pricing of products, producers experienced significant delays of payment or no payments from the buyers so it is likely that these markets will be avoided in future. The 2011 export of 45% is to Serbia and total of 70% to ex-Yu and additional 12% to other regional markets.

Out of the total quantity of *peaches* produced in the last years, 30-60% has been exported or, on the average around five thousand tons (from 3,5 to 9,9 thousand tons) in the last five years with a trend of significant growth with the 2011-2012 official statistical data. The import quantities are much lower and fluctuate dramatically from around 9 tons in 2009 to 231 tons in 2012.

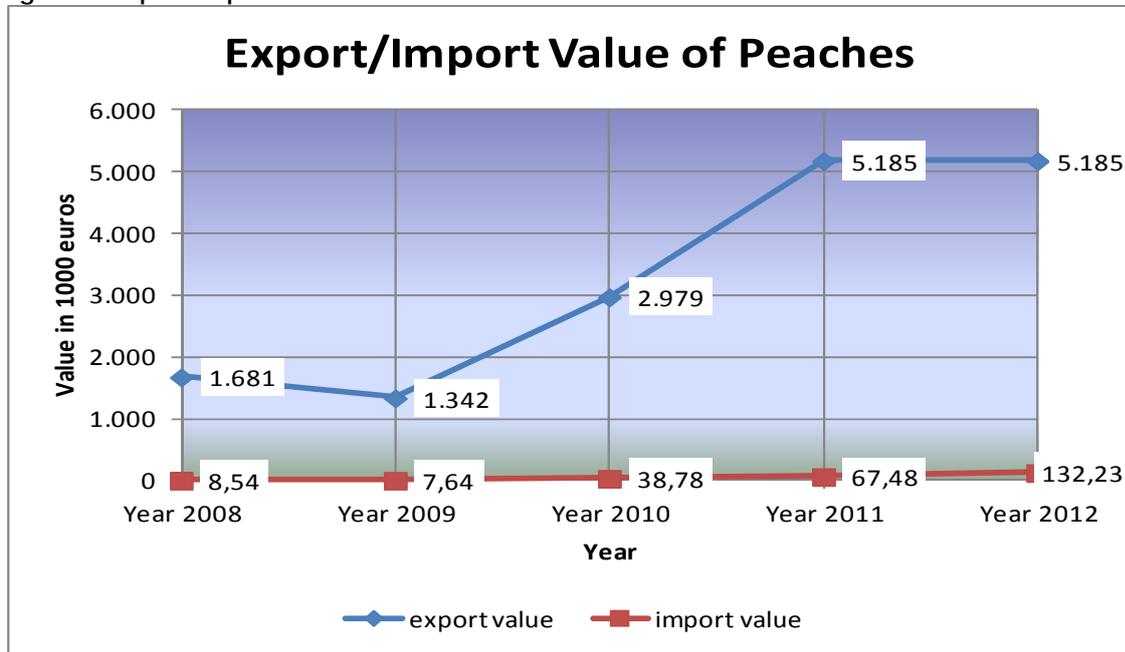
Figure 26 Export/Import Quantity Peach



Source: EURO STAT

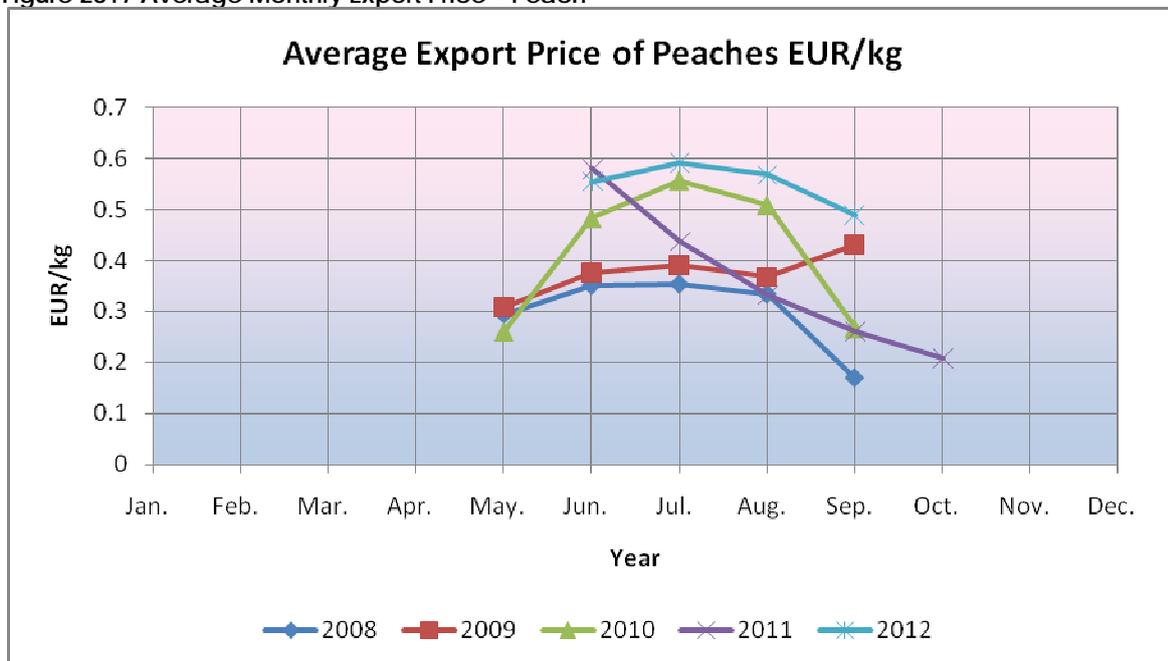
The export value of the exported quantity of fresh peach is from around 1,6 to 5,2 million EUR with an export price per kilo of around 40 cents. The exports occur in the period between May and September with the most intensive export in August. The prices range from 0, 20 to 0, 60 EUR

Figure 27 Export/Import Value Peach



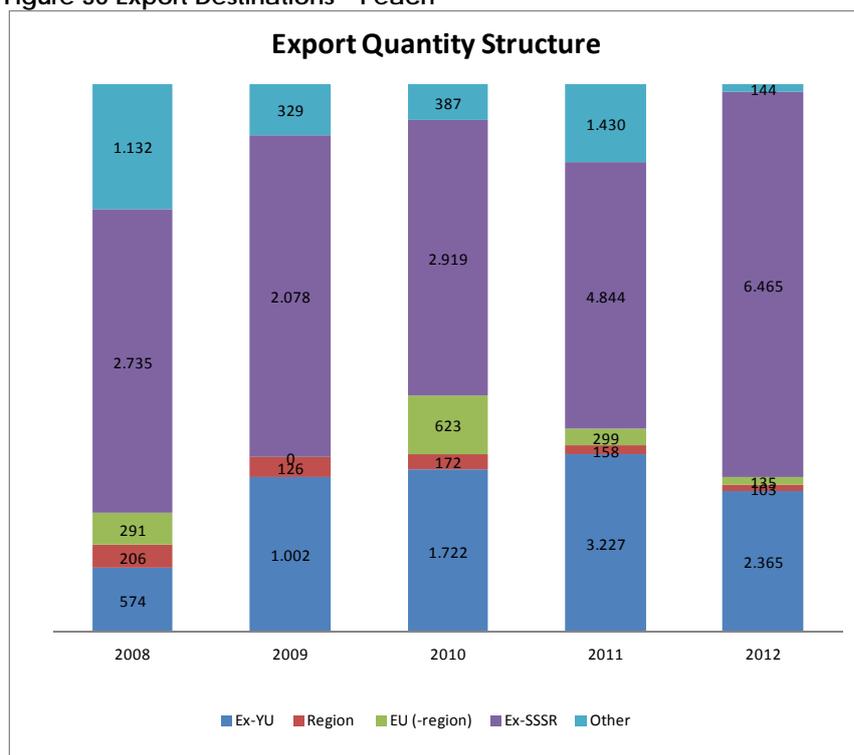
Source: EURO STAT

Figure 2817 Average Monthly Export Price – Peach



Source: EURO STAT

Figure 30 Export Destinations – Peach



Source: EURO STAT

The top export destinations vary significantly by year indicating the random sales of fresh peaches and unsteady relations with the markets. The major prevailing markets are the ex-SSSR markets including Russia, Belarus and Ukraine. These are followed by the ex-Yu markets interchanging among Croatia, Bosnia and Kosovo.

In the period 2008-2012 the top export destination by highest exported quantity was Russia, and Russia, Serbia and Kosovo, seem to be steady markets in the past years with a relatively stable exports although there are new markets emerged, or occurring incidentally such as Turkey, Greece, US, Slovakia, Czech, Bulgaria, etc.

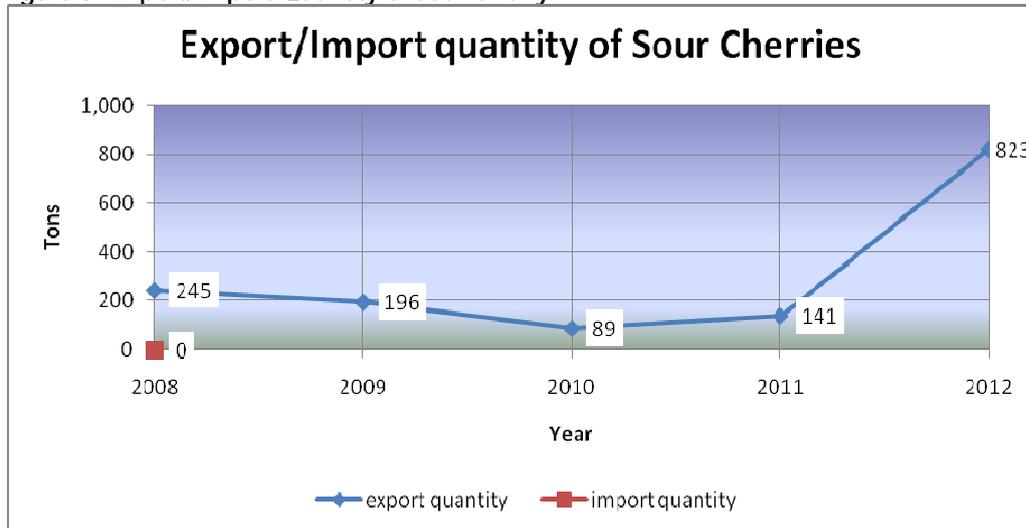
The import on the other hand although not highly significant it is increasing in the last two years with the import from Serbia in 2011 (mainly in August) and from Russia (Aug-Sept), Greece (June-Oct), and Albania (May-July) in 2012.

Compared with the EU competition it can be seen that the Macedonia fresh peach is a seasonal product (June – September) without being present on the foreign market throughout the year as are the top EU producers and thus can only compete with a lower price in the peak season when there is a surplus of production. The main competitors of the Macedonian peach are Spain and Greece. With the first sales on the markets, these two countries guide the overall market price due to the quantities and the quality supplied. The Macedonian peach “fills in” the market gaps, especially during the period after 20th of August to 15th of September when the production of the competitor ends.

Sour Cherry exports are of very small quantities and in the last few years have been ranging from 245t in Y2008 to 823 tons in Y2012. However, the general trend of fresh sour cherry exports has plummeted. The value of exported quantities is also variable and depends primarily on the world market prices in the particular year. Major quantities of exported sour cherry have been noticed in the period June-July. There are no fresh sour cherry fruit imports in Macedonia. The importers of Macedonian sour cherry are few, such as: Bulgaria, Serbia,

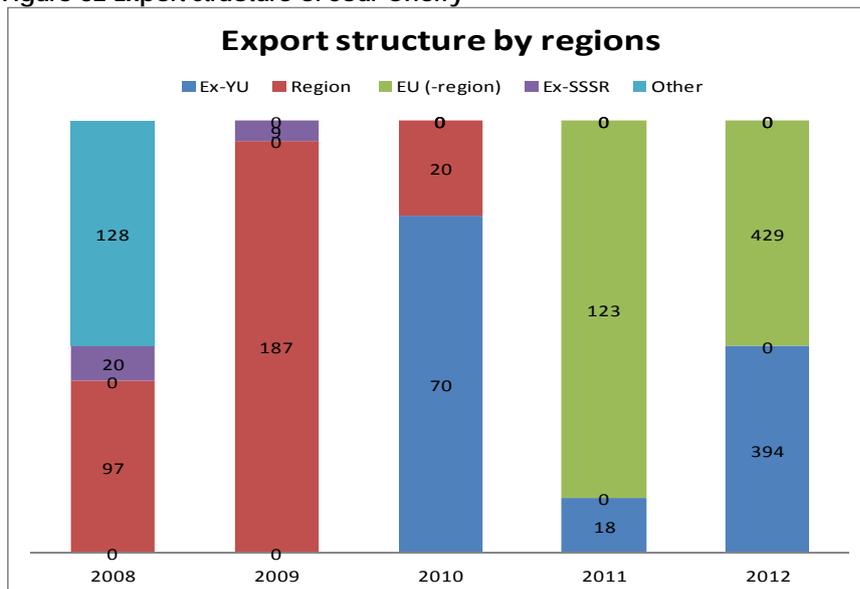
Russia and Germany. However the export of processed or semi processed products of sour cherries is exported which is the case why there is a high “domestic consumption” of the sour cherry. The exceptionally high export quantity of fresh sour cherry in 2012 is due to the decreased production in Serbia as a result of the low temperature damages. The exports of over 450t are exported by two producers of Macedonia.

Figure 31 Export/Import Quantity of Sour Cherry



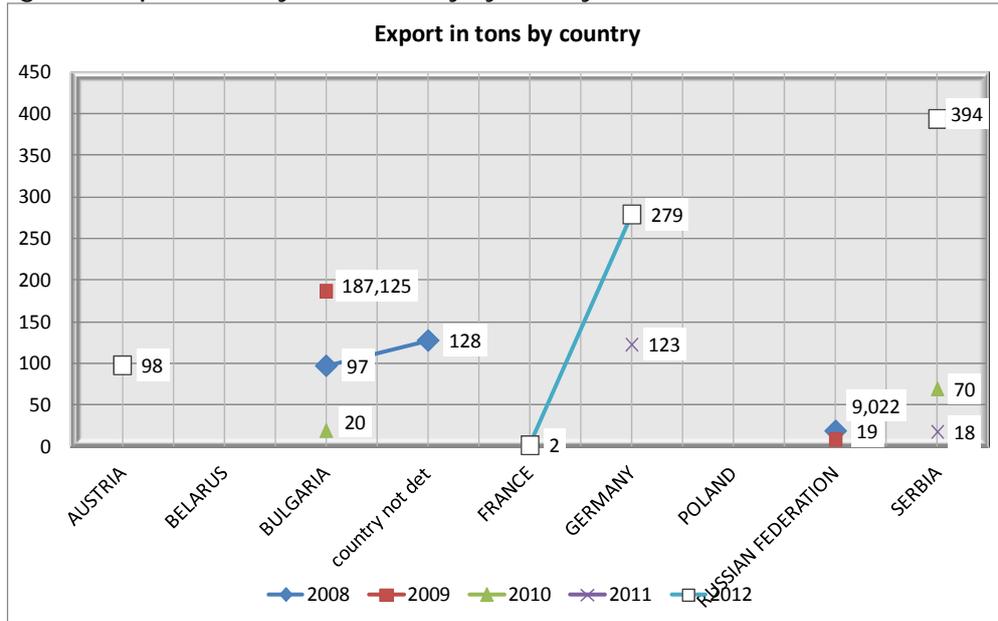
Source: EURO STAT

Figure 32 Export structure of Sour Cherry



Source: EURO STAT

Figure 33 Export Quantity of Sour Cherry by country



Source: EURO STAT

4. SUPPORTING ORGANIZATIONS AND REGULATORY FRAMEWORK

Direct support to the agriculture is implemented through the Annual Program for Financial Support in Agriculture. This program consolidates direct payment schemes and measures for technical assistance. The Annual Program for financial support of rural development along with the **IPARD program** is another set of support of agriculture and rural development schemes for capital grants and other measures for technical assistance in rural development problems.

In the last five years, direct payments schemes for support to producers of fruit production include payments based on: planted area, production (quantity based) and non-production criteria.

The largest amounts of payments are made per hectare of cultivated area to farmers who are directly engaged in agricultural activities and who have secured the right to cultivation of claimed land (through ownership or lease with or without financial compensation).

Agricultural holdings can apply if they satisfy the minimum land size criteria for eligibility for subsidies, while to some measures subsidy payment per unit might be subject to reduction by raising the percentage with increasing the land size in order to manage budget expenditure allocation priorities.

The amount and criteria for area payments depend on the type of crop and are classified on a larger sub-sectoral production level, such as permanent crops (vineyards and orchards), vegetables, and a group of other perennial crops.

In order to stimulate higher usage of **agro-chemical analysis**, 70% cost share for agro-chemical soil analyses not exceeding 9.000 MKD per beneficiary is offered as a support by the program. In addition to this measure, individual **farmers registered** in the scheme of social insurance are also granted with 5% increase in the overall amount of subsidies from all measures for support.

Following the support measures applied in the last five years, **direct payments** are crucial for the respective sub-sectors in 2012 as continuation of these activities:

Table 1 Apple Financial Support

| Apple Support | | |
|--|---|--|
| Direct payments per area for maintenance of permanent orchards | 28.000 den/ha | minimum claimed area of 0,3 ha for trees since the second year after the registered planting |
| | 100% up to 5 ha, 60% for area from 5,1-30 ha, 30% for area from 30,1-50 ha, 10% above 50 ha | |
| Direct payments for establishment of new orchards | For areas under apples: | - minimum claimed area of 0,3 ha - compulsory chemical soil analysis - minimal number of seedlings per ha required |
| | 100% for trees density above 999 trees/ha and 70% for areas from 400-999 trees | |

| Input subsidy | | |
|--|--------------------------------------|---|
| Direct payments for production of vine and orchard seedling material | 15 den/seedling | subsidized material should be produced by producers of certified seed and seedling material registered in the MAFWE |
| State aid for insurance of agricultural production | 60% of the value of insurance policy | - maximum allowed per beneficiary: |
| | | Up to 5 ha of vineyards and orchards |
| | | Up to 2 ha of vegetables |

Subsidies approved by meeting the above criteria may be taken as a basis for top-up payments granted to eligible beneficiaries with increased amount of:

- 30% for certified organic producers,
- 20% for certified producers applying GLOBALGAP standards.

Distribution of direct payments funds by measures of financial support for apples in the period 2008-2011 is presented bellow.

Table 2 Direct Payments Funds Distribution

| Apple Measure | 2008 | | | 2009 | | | 2010 | | | 2011 |
|--|----------|-----------------------|---------|----------|-----------------------|---------|----------|-----------------------|---------|----------|
| | per unit | total amount paid MKD | farmers | per unit | total amount paid MKD | farmers | per unit | total amount paid MKD | farmers | per unit |
| Direct payments per area for maintenance of permanent orchards | 10.000 | 2.357.805 | 110 | 10.000 | 7.439.927 | 515 | 18.000 | 61.935.083 | 4.023 | 25.000 |
| for apple production | 10.000 | | | 10.000 | | | 43.700 | 91.098.698 | 2.216 | 35.000 |
| Direct payments for establishment of new orchards | 75.000 | 32.886.714 | 501 | 90.000 | 110.783.263 | 927 | 90.000 | 96.869.992 | 708 | 100.000 |
| total | | 35.244.519 | | | 118.223.190 | 1.442 | | 249.903.773 | 6.947 | |

4.1. REGULATORY FRAMEWORK AND ACCESS TO FINANCE

As a result of WTO accession in 2003, most of the traditionally used price and trade policy instruments were either phased out or reformed based on the principles of restriction of market distortion practices and interventions, and in general, free formation of the prices for agricultural products. Tariff protection for Macedonian producers has been reduced significantly, which puts an increasingly competitive pressure on domestic producers and processors. The MFN tariffs for agricultural products almost halved, from 24, 87% to 13, 75%. Import tariffs have been reduced for the most of traded products, though moderate-to-high tariffs remain in place for highly sensitive commodities, such as vegetable and processed agricultural products⁵.

The Free Trade Agreement with CEFTA 2006 countries is an important step in the creation of a fully liberalized regional trade zone with Macedonian traditional most important trading partners. Under this agreement, the trade between the Republic of Macedonia and the Republic of Serbia, Bosnia and Herzegovina, Montenegro, and Kosovo is fully liberalized, while in the case of Croatia, only a few products are traded within the free-trade quotas and with 45% of MFN out of quota tariffs. Since November 2011, a full free-trade regime has started with Albania. And finally, with the ratification of changes in the agreement with Moldova, full liberalization of trade relations will also be established with this country, with the exception of wine that is regulated with the free-trade quota regime.

Free trade agreements with Turkey and Ukraine are more restrictive in regard to selected agricultural and food products on the free-trade quotas or quotas with reduced tariffs regime, and the MFN tariff-based trade for out-of-quota quantities.

Tariffs for the analyzed products on import in the Republic of Macedonia, as regulated by the provisions of the actual free-trade agreement, are presented in the table below:

| <i>Tariff number</i> | <i>Description</i> | <i>Custom's rate for import in RM</i> | <i>EU</i> | <i>EFTA</i> | <i>Turkey</i> | <i>Ukraine</i> | <i>Moldova</i> |
|----------------------|-------------------------------|---------------------------------------|-----------|-------------|---------------|----------------|----------------|
| 0808 10 | Apple | | | | | | |
| 0808 10 10 00 | Sour Apple 16.09-15.12 | 50% | 50% | 50% | 50% | 50% | 50% |
| 0808 10 80 00 | Other | 50% | 50% | 50% | 50% | 50% | 50% |

The table above shows that the apple imports are protected with a high customs rate during the import with 50%.

In support of agricultural producers to obtain financial assets, the opportunity was presented in the form of loans at favorable terms offered by the Agricultural Loan and Discount Fund (ACDF). The fund is responsible for payment of loans and is based on the Agreement / Memorandum of Understanding between GoM and the financial institutions with joint financing of 80% (mainly IFAD 1 & 2 PSDL EIB loan arrangements) and 20% respectively.

The following loan categories are financed through ACDF:

- Loan for purchase of capital investment and operating costs for primary agricultural production up to 100,000 Euros per user, with an interest rate of 4% per year if the loan is

⁵ Document number WT/ACC/10/Rev.1, note by the Secretariat: The number of tariff lines bound at the peak rate of 60% dropped from 142 tariff lines upon accession to only 6 tariff lines at the end of the implementation period. One third of the tariff lines are higher than 15%.

- disbursed through commercial banks or 6% if paid through savings banks
- Loan for purchase of capital investment and operating costs for small and medium businesses with primary activities in the agro-food processing, up to 200,000 Euros per user, with an interest rate of 5% on annual level if the loan is disbursed through commercial banks or 6, 5% if paid through savings banks.
 - Loan for purchase of capital investment and operating costs for small and medium enterprises, with export activity of the agro-food products up to 200,000 Euros per user, with an interest rate of 5% on annual level if the loan is disbursed through commercial banks or 6, 5% if paid through savings banks.

Repayment terms and the repayment period is the responsibility of financial institutions in accordance with their credit policy. The regular repayment period is 7 years for capital investments, including 3 years grace period and for operating expenses, the repayment period is 3 years with 1 year grace period.

According to the decision of the Government, as of 7/1/2010, the ACDF credit line has been administered within the Macedonian Bank for Development Promotion (MBDP), which is regulated by the Agreement of the administration concluded between the Ministry of Finance and MBDP.

The total number of financial institutions involved in the implementation of ACDF credits is usually around 11, of which 9 are commercial banks and 2 savings banks, which will allow easier access to potential beneficiaries to these resources through their networks of subsidiaries and branches throughout the Republic of Macedonia.

The implementation of credit activities within the Agricultural Credit Discount Fund has been conducted since October 2003, and in accordance with the Status of Refinanced Loans in 12/31/2011, total loans of 2.456 (i.e. 43 million Euros) have been approved..

The distribution of the loans according to purpose and (where data available) the respective sub-sector's level is given in the table below. Loans approved to apple producers are dominant with half of all fruit growing loans, while data for viticulture also include loans for wine growing grapes, which are supposed to be prevailing.

Table 3 Approved Fruit Loans

| Purpose of the Loan | Number of Approved Loans | Percentage of Total Number of Approved Loans | Total Amount of Approved Loans (EUR) | Percentage of Approved Loans Amount | Average Amount of Approved Loans (EUR) |
|---------------------|--------------------------|--|--------------------------------------|-------------------------------------|--|
| Apples | 206 | 8 | 1,651,087 | 4 | 8,014 |
| Fruit growing | 357 | 15 | 3,175,445 | 7 | 8,894 |
| Fruit processing | 13 | 1 | 1,479,530 | 3 | 113,810 |

Source: Macedonian Bank for Development Promotion, December 2011

5. SUBSECTOR BOTTLENECKS

Planting material – Lack of a certified planting material for either of the perennial fruits domestically produced. The sector depends on cheap imports of propagation material from the region which is of a very low quality

Varieties – the varieties assortment of apple and peach are obsolete and inadequate for the export markets which are demanding high value added fresh fruit products

Production technology – is outdated as there is a lack of knowledge among the producers for new technologies, such as production technologies (lack of high dense orchards, drip irrigation, anti-hail protection system) and harvesting and post-harvesting (lack of adequate box pallets, storage facilities)

Finance – There is a lack of interest among the banks to finance new orchards as the investment is long term so the predictability is low therefore the interest rates for loans are high

Organized sales and marketing – There is a lack of organized POs dealing with the organization of sales and marketing by individual producers, the sale is rather individual for each producer – fragmented sale and it is dictated by the local wholesalers.

Post harvesting facilities – There is a lack of modern post harvesting facilities reducing the quality of products and shelf life hence diminishing the sales window.

Subsidy program – The subsidy program for the tree fruits is social rather than developmental as it is not focused on new production technology development and productivity stimulation

Extension service – There is a lack of efficient and functional network of sector specific extension service

Standards and quality - Lack of implementation of GLOBALGAP standard and lack of interest among the farmers to implement the standards.

Production plots - highly fragmented and owned by individuals thus making significant investments to improve production or equipment economically inefficient

Post-harvesting CA storage – There is no CA storage in Macedonia that would preserve the produce and extend the sales window both for the domestic and export markets

Data availability – In order to analyze the sector, there is a need for accurate data. It has been confirmed that there is a lack of accurate data on an annual level for production, yield, as well as the external trade value which is a significant drawback for further strategic planning and sector improvements

Distribution centers – There are no organized distribution centers equipped for calibration, grading, packing, labeling of products, adding further value....

Export strategy – There is a lack of consolidated and integrated strategy for the export of fruits on specific markets thus the loss of traditional markets will result in accidental sales whenever and wherever there is a lack of produce, which can be seen from the trade balances

6. VISION FOR GROWTH

Education – Development of skills in new *technology* among producers and awareness for the benefits from the implementation of new technologies as well as education for *certification* and traceability

Certification – Support to the individual producers for implementing quality and safety standards in the production of fresh fruits i.e. GLOBALGAP standards

Planting material – Better control and protection mechanisms for the quality of the planting material. Provision of technical assistance to the nurseries for improvement of the planting material quality and the propagation material production striving for certification.

Processing – Support for the processing capacities of final products with a higher added value

Storage – Assistance to the industry participants in accessing funds for financing cold storage facilities with controlled atmosphere as well as in upgrading the knowledge for ULO storage capacity.

Marketing System – Development of a functional system for gathering and distribution of market data for the demand and supply on the domestic and export markets

Export Strategy – Development of export strategies for specific product target markets and defining the opportunities to approach those target markets and target groups.

7. MONITORING VC IMPACT MATRIX

Based on the findings of this study and the FG discussions concerning the lack of data necessary for all sectors and VC analyses, the following monitoring matrix was suggested as a method for more objectives monitoring of the sector performance and development.

| <i>MONITORING MATRIX FOR VC APPLE</i> | | | | | | |
|--|---|---------------------------------------|---|---|---------------------------------------|--|
| # | <u>Indicator</u> | <u>Source</u> | <u>Indicator Type (qualitative & quantitative)</u> | <u>Time for indicator collection</u> | <u>Frequency of collection</u> | <u>Responsible Organization</u> |
| 1 | <i>New plantations in ha and variety</i> | AFSARD | Qualitative and Quantitative | After subsidy applications | Annually | FFRM |
| 2 | <i># sold domestically produced plants (planting materials) by variety</i> | Seeds and Planting Material Office | Qualitative and Quantitative | December | Annually | FFRM |
| 3 | <i># sold imported plants (planting materials) by variety</i> | Seeds and Planting Material Office | Qualitative and Quantitative | December | Annually | FFRM |
| 4 | <i>Price of pesticides</i> | Statistics Office | Quantitative | December | Annually | FFRM |
| 5 | <i>Yield per ha and by variety</i> | FFRM - Model Farms | Quantitative | November | Annually | FFRM |
| 6 | <i>Sales by variety</i> | FFRM - Members | Quantitative | End of May | Annually | FFRM |
| 7 | <i>Purchase price on the domestic market by variety (wholesale market "kvantashki")</i> | Model Farms and Exporters | Quantitative | End of month | Monthly | FFRM |
| 8 | <i>Retail price on domestic market by variety</i> | Model Farms | Quantitative | End of month | Monthly | FFRM |
| 9 | <i>Wholesale price on export markets by variety</i> | 3 Traders Exporters different by size | Quantitative | End of month | Monthly | FFRM |
| 10 | <i>New storage facility with controlled atmosphere m³</i> | AFSARD | Quantitative | After completion of each IPARD call | Annually | FFRM |
| 11 | <i>New storage facility with normal atmosphere m³</i> | AFSARD | Quantitative | After completion of each IPARD call | Annually | FFRM |

The data collected from the monitoring matrix as proposed and approved has been collected through the focus group discussions and are part of the study depending on the issue.

The discussions with the producers indicate that there is 7-10% increase of the production expensed compared to the last year mainly due to the increased costs for fuel, treatment substances, electricity, etc.

Table 7 Annual production cost

| Annual production cost for apple production for fruit bearing orchard (based on current situation on the field) | | | |
|---|---|------------------------------------|------------------------------------|
| 2012 | | 2011 | |
| Average yield kg/ha | | 40.000 | |
| # | Type of expense | Cost per unit of production MKD/kg | Cost per unit of production MKD/kg |
| I. | Total material/operating expenses | 5,15 | 5,46 |
| II. | Total expenses related to machine works | 1,40 | 1,38 |
| III. | Total Labor costs | 2,83 | 3,23 |
| IV. | Depreciation costs | 1,07 | 1,07 |
| | TOTAL | 10,44 | 11,14 |

Table 8 Apple Farm gate prices

| Farm gate prices 2012, MKD/kg | | | | |
|-------------------------------|----------------|--------------|----------------|--------------|
| Variety | Season | | | |
| | Winter/spring | | autumn/Winter | |
| | Normal storage | Cold storage | Normal storage | Cold storage |
| 1 Idared | 15 | | 16 | |
| 2 G. Delicious | | 30-35 | 18 | |
| 3 R. Delicious | | | 20 | |
| 4 Mutsu | | 40 | 22 | |
| 5 Granny Smith | | 25 | 20 | |
| 6 Chadel | | | 19 | |
| 7 Jonagold | | | 18 | |

Table 9 Apple Wholesale prices

| Wholesale prices for the farmers 2012, MKD/kg | | | | |
|---|----------------|--------------|----------------|--------------|
| Variety | Season | | | |
| | Winter/spring | | autumn/Winter | |
| | Normal storage | Cold storage | Normal storage | Cold storage |
| 1 Idared | 17 | | 18 | |
| 2 G. Delicious | | 32-37 | 20 | |
| 3 R. Delicious | | | 22 | |
| 4 Mutsu | | 42 | 24 | |
| 5 Granny Smith | | 27 | 22 | |
| 6 Chadel | | | 21 | |
| 7 Jonagold | | | 20 | |

Table 10 Apple green market prices

| Green markets process for the framers 2012, MKD/kg | | | | |
|--|----------------|--------------|----------------|--------------|
| Variety | Season | | | |
| | Winter/spring | | autumn/Winter | |
| | Normal storage | Cold storage | Normal storage | Cold storage |
| 1 Idared | 25-30 | | | |
| 2 G. Delicious | 30-35 | | | 50-60 |
| 3 R. Delicious | 35-40 | | | |
| 4 Mutsu | 35-40 | | | 50-60 |
| 5 Granny Smith | 35-40 | | | 50-60 |
| 6 Chadel | 35-40 | | | 50-60 |
| 7 Jonagold | 35-40 | | | 50-60 |

Appendices

Appendix 1 – List of Key VC Players

There are numerous companies registered as input suppliers for agriculture. There are a significant number of registered planting material suppliers which are either producing or importing plants of different species, varieties and rootstocks. There are few domestic companies engaged in the production of fertilizers, pesticides and phyto-hormones used in agriculture, thus most of the registered companies are mainly representatives of foreign manufacturers.

(1) List of key players – Pesticides Suppliers

1. TD MAGAN MAK LLC – SKOPJE
2. HROMOS Pesticidi, LLC – SKOPJE
3. HEMOMAK pesticidi, LLC- VELES
4. TDPTDU AGROJUNIKOM, LTD SKOPJE
5. DPU AGRIMATKO, LTD SKOPJE
6. DPP Agrohemija KOMERC, LTD SKOPJE
7. DPPU RADOMAK, LLC – SKOPJE
8. DPTU HERBOS town, LLC – SKOPJE
9. DTPTU Algina, LTD SKOPJE
10. DPVNTAGROPIN, LLC SKOPJE
11. DPTU HERB –HEM, LLC SKOPJE
12. AD OHIS Biljana SKOPJE
13. MAKTRADE-92, LLC SKOPJE
14. DPPU-UNIVIGO, LTD SKOPJE
15. DPTU PRIMATEKS, LLC – SKOPJE
16. DPPAgrohemija, LLC- SKOPJE

(2) List of key players – Fertilizer Suppliers

1. TD MAGAN MAK DOO SKOPJE
2. HEMOMAK PESTICIDU, LLC-Veles
3. DPU AGRIMATKO, LTD SKOPJE
4. TDPTDU-AGROJUNIKOM, LLC SKOPJE
5. FITOHEMIJA-SVETI NIKOLE
6. ICE TALJO, LLC-Negorci GEVGELIJA
7. ZK-PELAGONIJA-Bitola
8. MV-FLORA GARDEN-SKOPJE
9. AD Alkaloid, Skopje
10. GEOTERMIKA-Strumica
11. DUBROVI-NEGOTINO
12. DPTU HERBA HEM, LLC, SKOPJE
13. Evora -KOMERC-Krivogastani, Prilep
14. HIT-73, Kamenjane, Tetovo
15. Holland-FARMING MACEDONIA, LLC- Strumica\
16. ZOI UNION, LLC – NEGOTINO
17. FER PROKOM – Kocani
18. Agro UNIJA – SKOPJE
19. SOKOL LLC – Veles
20. MEGA-PLAN 2001 – GEVGELIJA
21. PRONEX HEM – Strumica

22. Agro Produkt Ltd- Strumica
23. Agro-PELAGONIJA – Prilep
24. Agro-ZIMAK Trajce, Rosoman

Appendix 3

Assumed Peach Cost 25 t/ha

| <i>Expenses</i> | <i>1ha EUR</i> |
|----------------------------|----------------|
| 1. Total material expenses | 2.050 |
| 2. Equipment related costs | 730 |
| 3. Labor | 1.410 |
| 4. Depreciation (15 years) | 650 |
| Total | 4.840 |

Yield & Revenues per Annum – Full Maturity

| Yield kg/ha | Extra class | I class | II class | III class (processing) |
|--------------|-------------|---------|----------|---------------------------|
| 25.000 | 10.000 | 7.500 | 3.750 | 3.750 |
| Price EUR/kg | 0,45 | 0,30 | 0,20 | 0,12 |
| Revenue | 4.500 | 2.250 | 750 | 450 |

| | |
|--------------------------|--------------|
| Total Revenue EUR | 7.950 |
| Total Expense EUR | 4.840 |
| Earnings EUR | 3.110 |

Assumed Sour Cherry Cost 12t/ha

| <i>Expenses</i> | <i>1ha EUR</i> |
|----------------------------|----------------|
| 1. Total material expenses | 1.500 |
| 2. Equipment related costs | 780 |
| 3. Labor | 860 |
| 4. Depreciation (20 years) | 500 |
| Total | 3.640 |

Yield & Revenues per Annum – Full Maturity

| | |
|--------------|--------|
| Yield kg/ha | 12.000 |
| Price EUR/kg | 0,45 |
| Revenue EUR | 5.400 |

| | |
|--------------------------|--------------|
| Total Revenue EUR | 5.400 |
| Total Expense EUR | 3.640 |
| Earnings EUR | 1.760 |

Appendix 4

Table 4 Variety List and Rootstock used for apple planting material production

| Varieties | Rootstocks |
|--|---------------------|
| Ida Red | MM106 |
| Golden Delicious, (Standard, clone B) | M9 (several clones) |
| A group of Red Delicious: Standard, Red Chief, Super Chief, Hierly, Scarlett) | M26 |
| Mutsu | M7 |
| Chadel | Wild apple |
| Jonagold (several clones) | |
| Granny Smith | |
| Fuji (several clones) | |
| Gala (several clones) | |
| Braeburn | |
| Prima | |
| Other | |

Table 5 List of varieties and rootstock for peach planting material production

| <i>Varieties</i> | | <i>Rootstock</i> |
|-----------------------|----------------------|-------------------------------------|
| <i>Springtime</i> | <i>Glohaven</i> | <i>Vine peach</i> |
| <i>May Crest</i> | <i>Maya</i> | <i>Almond</i> |
| <i>Spring crest</i> | <i>Andromeda</i> | <i>Hybrid peach x almond GF 677</i> |
| <i>Nectared 4</i> | <i>Suncrest</i> | |
| <i>Collins</i> | <i>Fantasy</i> | |
| <i>Cardinal</i> | <i>Crest haven</i> | |
| <i>Spring belle</i> | <i>Stark Redgold</i> | |
| <i>Early Redhaven</i> | <i>Fajet</i> | |
| <i>Redhaven</i> | <i>Rioosogem</i> | |
| <i>Independence</i> | <i>Flame Kist</i> | |
| <i>Royal Glory</i> | <i>Other</i> | |

Appendix 5

Suggested varieties for new apple plantations

Gala - ripens 25 days before Golden Delicious. The fruit is of medium size, and requires adequate pruning to achieve larger fruit. The flesh is yellow to creamy, with a fine structure of solid, crunchy, juicy, sweet and excellent quality. In controlled conditions, the fruit can be stored 4-6 months at optimal conditions of storage although when stored longer, it loses the quality. This is a leading variety in all fruit producing developed countries. Due to the weak coloring of the standard variety, the red colored mutants are more widely used.

Braeburn – the fruit is of medium to large size, susceptible to calcium deficiency resulting in bitter stains especially if the harvesting is delayed. The flesh is creamy yellow, crunchy, firm and very juicy, with fine structure and sour sweet taste. The best flavor is obtained after several months of storage. It gives fruits early and has good fertility. Requires the use of appropriate pomotechnical measures, ripens 10-15 days after Golden Delicious, and has great storage characteristics if the fruit is from well-grown trees.

Fuji – the fruit is medium to large, with a round flat often irregular shape. The yellow-green basic color over the dust blurry pink-red is spotted with floury dusty color. Lower temperatures before harvesting produce better color. The mutants are characterized with much better coloring. The flesh is creamy yellow, firm, juicy and very crunchy, sweet with very little acidic flavor. One of the drawbacks of this variety is the propensity of alternative fruit bearing. It ripens 20-25 days after Golden Delicious, and the later harvested fruit has a more sweet taste, which does not affect its ability to be stored. It has positive storage characteristics of at least 6 months and in CA up to 9 months. This variety is well resistant to diseases.

Appendix 6

Description of the grown peach varieties

Springkrest – the fruit is relatively small and oval shaped. The skin is without emphasized hair. The fruit matures (in the Skopje region) in the third decade of June. The fruit is close to 120 g, with oval, medium mossy and quite attractive. The skin is orange-yellow, covered with red spots. The flesh is yellow, with medium consistency, and good quality and difficult to separate from the pit.

Early Redhaven - matures 12-14 days before the Redhaven variety in the first decade of July (conditions in Skopje). The fruit is medium to large, round to elongate with poorly pronounced peak. The skin is yellow, covered with red surface on the sun exposed side. The flesh is yellow, firm and strong. The characteristics of this fruit are not much different from those of the Redhaven except that it ripens earlier.

Redhaven - old variety originating from the USA, which is considered the “queen” of all peaches and still holds the leading place in all peach producing countries. It matures early, in the third decade of July. The fruit is large (120-150gr), with round to elongated-oval shape. The skin is yellow and covered with red colored lines. The flesh is yellow, and reddish around the pit. The fruit is transportable, lush, blooms early, with great fertility and fairly resistant to low temperatures.

Glohaven – ripens in late July and early August. The fruit is large, up to 200gr, and round shaped. The skin is dark yellow and the whole surface is covered with dark red spots. The flesh is orange-yellow, juicy, with excellent quality, and with redness around the pit. The flesh separates easily from the pit. The fruit is transportable.

Kresthaven – ripens in mid August, with round shape, and weight close to 250gr. The skin is yellow and 60-70% is covered with red spots. The flesh is distinctively yellow red around the pit, it is juicy and tasty and separates easily from the pit. The fruit is lush, productive.

Fajet - the ripening of the fruit is at the end of the second decade of August. The fruit is large, over 250gr, with a round shape. The skin is yellow, 60-70% covered with red spots. The flesh is yellow and red around the pit and separates easily from the pit. It is juicy and very sweet. It is used for fresh consumption and processing.

Rioosogem – the fruits ripens in the third decade of August. The fruit is large (weighs over 250gr), with an elongated round shape in the middle. The skin is yellow with some red color reflection. The flesh is yellow, with weak redness around the pit. It is used for fresh consumption and processing. This variety is very sensitive to low temperatures.

Independens – ripen in mid July; the fruit is close to 150gr, with elongated oval shape. The main color is yellow while the skin is covered with orange and red spots up to 90%. The flesh is yellow-orange, firm, tasty, and it can be separated from the pit.

Stark Red Gold – ripens in the first decade of August. The fruit is large (up to 160gr) and spherically elongated in shape. The main color is yellow-orange and covered with 80% redness. The flesh is yellow-orange, firm, and juicy, with good flavor and separates easily from the pit.

Fantasy – ripens in mid August. The fruit is close to 150gr, and oval shaped. The main color is yellow to orange covered 60 -70% with red spots. The flesh is yellow orange, red around the pit with sweet taste, firm, juicy, and separates from the pit.