# The Greenhouse Sector in Ukraine

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Agriculture and Innovation

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# Management Summary

According to the data provided by market operators, 3-4 ha of glass greenhouses were built in Ukraine in 2010. In 2011, this figure was about 6-8 ha. However, only three enterprises increase areas under glass greenhouses – Uman Greenhouse Complex (Cherkassy Oblast), Krymteplytsya (Crimea) and Teplychnyy Complex (Kyiv Oblast). Among glass greenhouses, about 400 hectares are old greenhouses, whereas 60 hectares are new.

Further trends in construction of greenhouses in Ukraine will be driven mainly by the prices for gas and other energy sources. Construction of new glass greenhouses is likely primarily due to expansion of the areas by existing greenhouse complexes. Additionally, they can be expanded in the regions where greenhouse production is traditional, e.g. south of Ternopil Oblast. Also, large agricultural companies consider investments in greenhouse production as a means of diversification. Particular interest is in construction of greenhouses next to large livestock complexes where conventional energy resources can be substituted by biogas. The demand for greenhouse equipment, construction materials and auxiliary components will grow accordingly. However, import figures demonstrate that buyers of these materials prefer short-term relationships rather than strategic partnerships with suppliers. This tendency signifies cost minimization strategies of main market players.

Over the last three years, areas under plastic greenhouses in Ukraine have been growing by 2-3% annually. Starting from 2009, the annual growth in Zakarpatska Oblast amounted to 10-12%. Areas under plastic greenhouses in Lviv, Zhytomyr, Vinnytsia, Odesa, Kiev Oblasts and Crimea grew at a lower rate (3-5% annually). Old-style plastic greenhouses were modernized in Zaporizhzhya, Dnipropetrovsk, Luhansk and Ternopil Oblasts. However, the majority of plastic greenhouses still have to be modernized. Consequently, increase of demand for construction materials and interior equipment for plastic tunnels will be further observed in these regions.

Further development of the plastic segment of greenhouse sector can be delineated as follows. On the one hand, the expansion rates will slow down in the next two or three years because of lack of available areas and limited access to finance (the majority of producers are rural households). On the other hand, expansion of plastic greenhouses will probably take place at agricultural enterprises which are able to diversify their energy sources, e.g. via burning of pellets, use of biogas, etc. Also, agricultural enterprises will tend to improve the existing technologies. One of the respondents mentioned there will be a demand for irrigation equipment in Zaporizhzhya and Kherson Oblasts.

In 2008-2010, an upward trend in the use of mineral fertilizers by greenhouse enterprises was observed. However, as the producers of greenhouse products already use intensive technologies, it is expected that the tendency towards enhancement of use of mineral fertilizers will remain but the growth rate will considerably slow down. At the same time, organic-based growth regulators become popular today.

According to the estimates of market operators, Ukrainian market of plant protection agents grew by 40-45% in 2011 compared to 2010. However, according to one of the experts interviewed in terms of this study, the sector of plant protection products "is in anxiety at the moment, anticipating a new wave of economic crisis" that can substantially affect the market. Additionally, managers of big agrochemical companies avoid forecasting the market development in the next years maintaining that they are unable to talk even about exact market size. They name the greenhouse market "grey" as there are a lot of uncontrolled supplies of generic products going on, especially in the regions that are situated close to the state borders. Based on UCAB's survey of agricultural producers, the growth rate of the market for plant protection agents is estimated at the level of 7% in 2012.

In the nearest future, stable demand for seeds of greenhouse tomatoes can be forecasted although the second wave of financial crisis can cause wide use of low quality seeds. According to the experts from seed companies, the demand for the seeds of greenhouse cucumbers will be higher than that for tomatoes. The reason is higher profitability of cucumbers as they are less light-demanding, i.e. energy-consuming crop. However, similarly to the situation with tomato seeds, the demand for cucumber seeds can be affected by the second wave of financial crisis. In the medium- and long-term perspectives, production of greenhouse dill and onion will

grow as the domestic demand for these products has been already established. Although it is currently covered by imports, market operators argue that there is a potential of import substitution by domestic production. Accordingly, this may increase the demand for the seeds of dill and green onion. Greenhouse production of cabbage and salads is currently underdeveloped in Ukraine. Production volumes of these crops are low due to underdeveloped habits of all-year consumption. However, moderate (but stable) import of greenhouse cabbage and especially salads shows that the consumption patterns are changing. Therefore, it is expected that production of cabbages and salads will increase and the demand for cabbage and salad seeds will grow in the medium term.

Future demand for planting material for greenhouse flowers will depend on the development of greenhouse flower production. This, in turn, depends on the prices for gas and other energy sources. Given double increase of gas prices in 2011 (from USD 285/1.000$m^3$ to USD 575/1.000$m^3$), expansion of greenhouse flower production is unlikely. Also, the development of the flower market depends on changes of consumption patterns based primarily on population incomes. In this context, high gas prices are also an important indirect factor as they lead to higher utility payments of population. Some additional opportunities for local producers can originate from market protection through further complication of the import procedure by the customs.

Currently, the biggest market players that are located in Kyiv and Cherkasy oblasts and Republic of Crimea are expanding their areas. This process can be stimulated by the state. Recently, the Minister of Agricultural Policy and Food pronounced that "450 hectares of greenhouses are definitely not enough" and the Ministry is currently preparing the plan of provision with greenhouse vegetables for 2012. This plan will involve measures that aim to increase production and storage capacities as well as to improve the functioning of wholesale markets.

State budget-2011 provided for allocation of UAH 50 mln (about EUR 4.5 mln) for partial compensation of expenses incurred by agricultural producers when building new greenhouse complexes. According to the Order, up to 50% (excluding VAT) of construction cost of new greenhouses could be compensated from the state budget. An important precondition to receive this support was the use of modern energy saving technologies while constructing new greenhouses. However, the law "On State Budget 2012" does not provide for support of this measure, although theoretically it could be financed in the framework of programs focused on general state support in agriculture.

# Introduction

Ukrainian agriculture has been the most stable sector of the national economy during the economic crisis of 2008 and 2009. Partly due to inelastic demand for food, the sector has survived the peak of the crisis and, moreover, demonstrated profitable growth in different subsectors. Not surprisingly, this has awakened the interest of investors towards agriculture.

The Ukrainian greenhouse sector made no exception in this respect. In 2009, the sector demonstrated a record harvest of 374 thousand tons of vegetables which is 35% more than in pre-crisis 2005. The area under greenhouse vegetable production has also increased in 2009 as compared to 2005 – by 8.5%. This disproportional growth of volume and acreage indicates steady growth of productivity, whereas the latter is achieved particularly through investments of agricultural enterprises in modern technologies. Today Ukrainian greenhouse producers are willing to purchase high quality planting material and fertilizers, use hydroponic systems and even invest in grading and packaging facilities as well as irrigation systems. As a result, the most efficient producers claim they operate with 100 per cent profitability while central and local authorities express their willingness to support horticultural sector in general and greenhouse production in particular.

However, despite the growing role of modern agricultural enterprises in production of tomatoes, cucumbers, green onion, cabbages and salad, the greenhouse sector is still dominated by private households. For example, their share in greenhouse production of vegetables accounted for 60 per cent in 2009. Having difficulties in accessing finance and diversifying distribution channels, households demonstrate low quality of production as well as poor productivity. In 2009, the productivity of greenhouse vegetable production was 66% lower in households than in agricultural enterprises. Thus, structural changes that would be comparable with those of the other subsectors, e.g. production of grains, oilseeds, milk and pork, are still expected in the greenhouse sector.

In this regard, the investors' interest is primarily in understanding of how the greenhouse sector will further develop, what the unsatisfied needs of producers are and how to satisfy them in the best suitable way. Upon request of the Agricultural Department of the Embassy of the Kingdom of the Netherlands in Ukraine, Association "Ukrainian Agribusiness Club" has conducted this market study to analyze: a) the development of the structure of greenhouse production including the actual areas under greenhouses; b) pricing, profitability and external trade figures of the main greenhouse crops (tomatoes, cucumbers, cabbages, green onion, salads and flowers); c) markets of the main inputs (construction materials for glass greenhouses and plastic tunnels, interior equipment, fertilizers, plant protection agents and planting material); and d) institutional framework for the greenhouse sector including quality regulation and standardization. Analysis is based on available secondary data on the above indicators.

Particular focus of the study was on inputs of greenhouse production. In order to evaluate the demand for inputs and the competition among input suppliers, the study involved field research and in-depth interviews with representatives of the largest greenhouse companies, producers and importers of carcasses, glass and plastic materials, lighting, heating and ventilation equipment, fertilizers and plant protection products. In total, 19 expert interviews were made.

This report is structured as follows. First, the study provides an overview of the Ukrainain greenhouse sector whereby UCAB addresses the production structure by crops and type of ownership, describes main distribution channels for greenhouse products and analyzes the inflows of foreign direct investments in the greenhouse sector.

Second, markets of the most spread greenhouse products in Ukraine (tomatoes, cucumbers, cabbages and salads, dill and green onion as well as flowers) are analyzed. The information disclosed in this part includes production figures, price dynamics and external trade. Here, the prospects for the development of greenhouse production in Ukraine are also addressed.

Third, the markets of inputs of greenhouse production such as construction materials and interior equipment for glass greenhouses and plastic tunnels, fertilizers, plant protection agents, planting materials and seeds are analyzed. Because official statistics do not contain

records that are specifically dedicated to greenhouse inputs, UCAB inquired experts of the greenhouse sector about production and external trade figures and asked them to delineate prospects for the development of specific input markets.

Fourth, the study addresses the issue of logistics in the greenhouse sector. Based on some secondary data and expert interviews, UCAB provides information on availability and construction of storage facilities, sorting and grading equipment, packaging and quality assurance in the greenhouse supply chain.

Fifth, current legal framework for doing business in the greenhouse sector is described. Apart from key legislative requirements that are in force at the moment, the aspects such as taxation, budget support programs, land market regulation, quality standardization, import regulation and creation of possible free trade areas with the EU and CIS countries are reviewed. Impact of these aspects on the greenhouse sector is addressed in detail.

Subsequently, SWOT-analysis of the Ukrainian greenhouse sector is conducted. Legislative, production and logistics aspects that have to be considered by investors when entering the market are scrutinized. Regional opportunities for doing greenhouse business in Ukraine are also addressed.

The report ends up with the list of useful contacts, including greenhouse producers, governmental bodies, exhibitions and conferences relevant for the sector.

# 1. Overview of the Ukrainian greenhouse sector

## 1.1. Production structure by type of crops

According to official statistics[1], total area of greenhouses in Ukraine occupied 2342 hectares including 754 ha of winter (glass) greenhouses in 2010. The area of greenhouses of large-scale commercial manufacturers (agricultural enterprises and farms) amounted to 586 hectares, including 504 ha of winter (glass) greenhouses. The rest was occupied by greenhouses of rural households.

Vegetable growing dominates greenhouse production at agricultural enterprises. About 83% of the total greenhouse area is assigned for vegetables. Flowers and ornamental plants occupy 16% of the area. Greenhouse cultivation of mushrooms, fruits and berries is not developed; they occupy less than 1% of the greenhouse area in Ukraine.

At the end of 2010, gross production of greenhouse vegetables by all types of producers accounted for 375.9 ths tons (4.6% of total production of all vegetables) excluding lettuce and herbs in pots. The more commercial agricultural enterprises collected 140.8 ths tons of greenhouse vegetables (37.4% of total production). According to official adata, nearly 90% of products were grown in winter greenhouses. Growing of salads and herbs in pots is a new direction in greenhouse production and this market is currently estimated at the level of 2.0-2.1 million units or about 300 tons.

**Table 1. Production of greenhouse products in 2008-2010 (official data)**

| | 2010 | | 2009 | | 2008 | |
|---|---|---|---|---|---|---|
| | Total | Agricultural enterprises | Total | Agricultural enterprises | Total | Agricultural enterprises |
| Vegetables total, ths ton | 8122 | 965 | 8341 | 1120 | 7965 | 1109 |
| Vegetables grown in the open ground | 7747 | 824 | 7967 | 970 | 7670 | 961 |
| Tomatoes | 1651 | 362 | 1864 | 524 | 1357 | 263 |
| Cucumbers | 678 | 11 | 703 | 19 | 606 | 12 |
| Cabbage | 1523 | 111 | 1527 | 108 | 1696 | 169 |
| Zucchini | 478 | 34 | 459 | 30 | 407 | 27 |
| Onion | 909 | 138 | 876 | 112 | 1049 | 255 |
| Carrots | 715 | 64 | 686 | 55 | 740 | 88 |
| Aubergines | 79 | 8 | 73 | 6 | 62 | 6 |
| Greenhouse vegetables | 375,94 | 140,76 | 374,04[2] | 150,33 | 295,33 | 147,17 |
| Tomatoes | 173,37 | 73,95 | 177,27 | 76,63 | 140,81 | 79,91 |
| Cucumbers | 181,72 | 66,03 | 179,79 | 72,11 | 145,68 | 65,61 |
| Other vegetables | 20,85 | 0,78 | 16,98 | 1,58 | 8,83 | 1,64 |
| Cut flowers, ths psc. | - | 80135 | - | 71654 | - | 74536 |
| Rose | - | 78548 | - | 70611 | - | 70668 |

*Source: State Statistics Agency of Ukraine (2011)*

Among greenhouse vegetables, production of tomatoes and cucumbers prevails. Annually these two vegetables account for 95% of the total volume in the production structure of greenhouse vegetables. In the production structure of agricultural enterprises, the share of tomatoes and cucumbers is even higher – about 99%. Despite strong demand, greenhouse production of other vegetables is underdeveloped. Currently, there are only a few greenhouses

[1] As will be mentioned throughout this report, official statistics may differ from actual figures due to data collection methods and difficulties in obtaining data from rural households. Expert interviews conducted in terms of this study provide a more realistic picture of the Ukrainian greenhouse sector.

[2] Remarkable growth of domestic production in 2009 can be explained by significant devaluation of Ukrainian hryvnya.

that specialize in cultivation of other vegetables. In total, agricultural enterprises collected 780 tonnes of sweet peppers, aubergines, radish, and lettuce and other vegetables and herbs (excluding herbs in pots) in 2010.

It should be mentioned that such small volumes of production shown by official statistics are significantly underestimated according to the market experts. The main reasons for discrepancies of production estimates include incomplete coverage of statistical records as well as underreporting or absence of production figures for a large number of small greenhouses. Official statistics often lacks data on production of vegetables in greenhouses that specialize in cultivation of flowers. Additionally, small-scale producers often underreport on production of vegetables in greenhouses because of complexity of reporting or small production volumes. These volumes are then reported as part of gross vegetable production of a farm. Large share of glass greenhouses in the production structure of greenhouse vegetables (more than 90%) is an indirect sign of significant underreporting since market experts argue that production volumes in film greenhouses are much higher than reported. Another significant weakness of official statistics is the fact that greenhouse production of vegetables is not recorded by type of crops. The only exception is tomatoes and cucumbers. The abovementioned factors led to the absence of single and objective assessment of domestic greenhouse production. Given the revaluation surplus in 2010, the actual production of greenhouse vegetables by agricultural enterprises (including small farmers) amounted to not less than 550-600 thousand tons, more than four times bigger than the official estimate of production.

In 2010, the area of greenhouses that specialize in flowers is estimated at the level of 90 hectares. It should be mentioned that this figure is higher than in 2009. In 2009, around 20 ha of greenhouse areas under flowers were reorientated towards vegetable growing because of decrease in consumer purchasing power while demand for vegetables was high enough. Also, many enterprises that specialize in flowers do not officially register themselves until they reach certain production volumes. Therefore, trustworthy official figures on flower growing may appear with some lag.

In the production structure of cultivated flowers, roses have the leading place. In 2010, according to the official statistics, production of roses accounted for 78 million flowers or 97.5% of total 80 million of flowers produced. The popularity of roses among manufacturers is caused by strong domestic demand and high profitability. By the estimates of industry experts, profitability of produciton of roses reaches 30% on average.

## 1.2. Production structure by type of ownership

Climate conditions in Ukraine allow growing vegetables and flowers at the open ground not longer than five or six months a year – from May to October. Nevertheless, there is relatively stable demand for these products throughout the year and this has been the main reason for active development of the greenhouse sector in the last five years.

All variety of protected ground production can be divided into three categories, they are as follows:

- *greenhouses* that can be subdivided by period of use into winter and spring greenhouses. Winter greenhouses operate all year round whereas spring greenhouses are used from March to November. This typology is equivalent to classification type of material whereby greenhouses are grouped into glass and film greenhouses;
- *hotbeds*;
- *insulated ground*.

By type of ownership, private households dominate in all the above categories, except for winter greenhouses. This can be explained by relative technological simplicity of film greenhouses and hotbeds while winter greenhouses are expensive and resource-consuming constructions that require large stationary facilities for heating. Only large specialized enterprises can afford themselves glass greenhouse business (see Table 2).

Thus, private households are major producers in most product segments of the greenhouse sector. In 2010, their share in production of greenhouse vegetables was 62.6% (see Figure 1).

Given that this category of producers does not report on production volumes officially, analysis of their performance in terms of size, quantity and property relations requires a large-scale

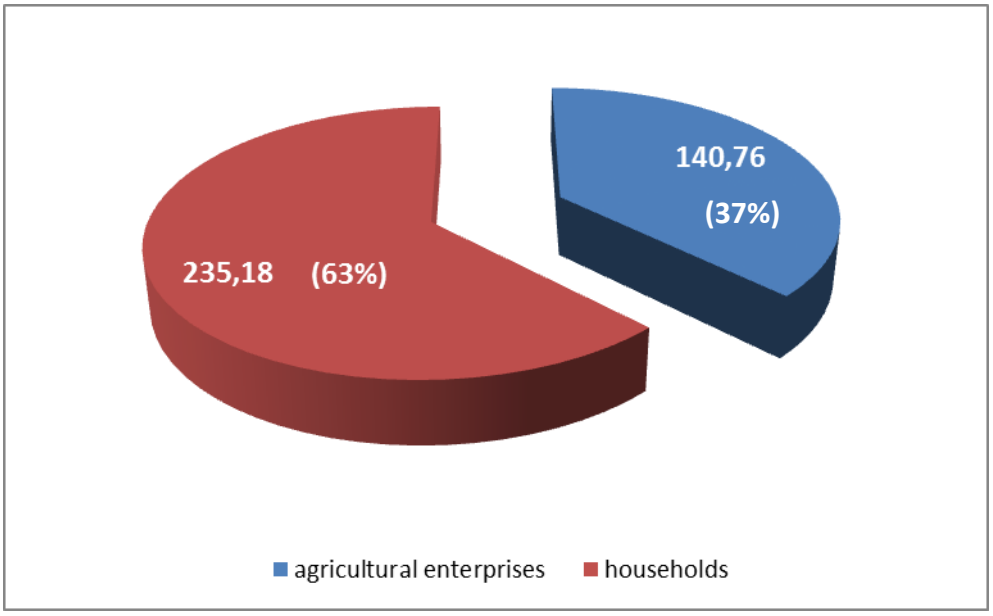
survey that complicates the analysis. In further research, UCAB will work with figures of agricultural enterprises, given that in terms of market saturation their contribution is more significant. It should be also taken into account that a large share of the household products (according to our estimates, at least 50%) is produced for own consumption.

**Table 2. Areas of protected ground by the categories and type of ownership, ha (official data)**

| | | Greenhouses | | Hotbeds | Insulated ground |
|---|---|---|---|---|---|
| | | winter | spring | | |
| 2010 | All types of ownership | 663,9 | 1 588,0 | 79,8 | 254,4 |
| 2010 | Agricultural enterprises | 414,1 | 81,6 | 4,5 | 1,0 |
| 2010 | Number of greenhouses at agricultural enterprises | 84 | 78 | 9 | 4 |
| 2009 | All types of ownership | 603,6 | 1 668,6 | 81,0 | 255,0 |
| 2009 | Agricultural enterprises | 441,9 | 73,7 | 5,6 | 1,7 |
| 2009 | Number of greenhouses at agricultural enterprises | 89 | 76 | 10 | 7 |
| 2005 | All types of ownership | 587,7 | 1 477,9 | 82,5 | 253,2 |
| 2005 | Agricultural enterprises | 428,7 | 112,5 | 1,9 | 3,6 |
| 2005 | Number of greenhouses at agricultural enterprises | 101 | 98 | 23 | 9 |

*Source: State Statistics Agency of Ukraine (2011)*

**Fig. 1a. Production structure of greenhouse vegetables in 2010, thousand tons**




*Source: State Statistics Agency of Ukraine (2011)*

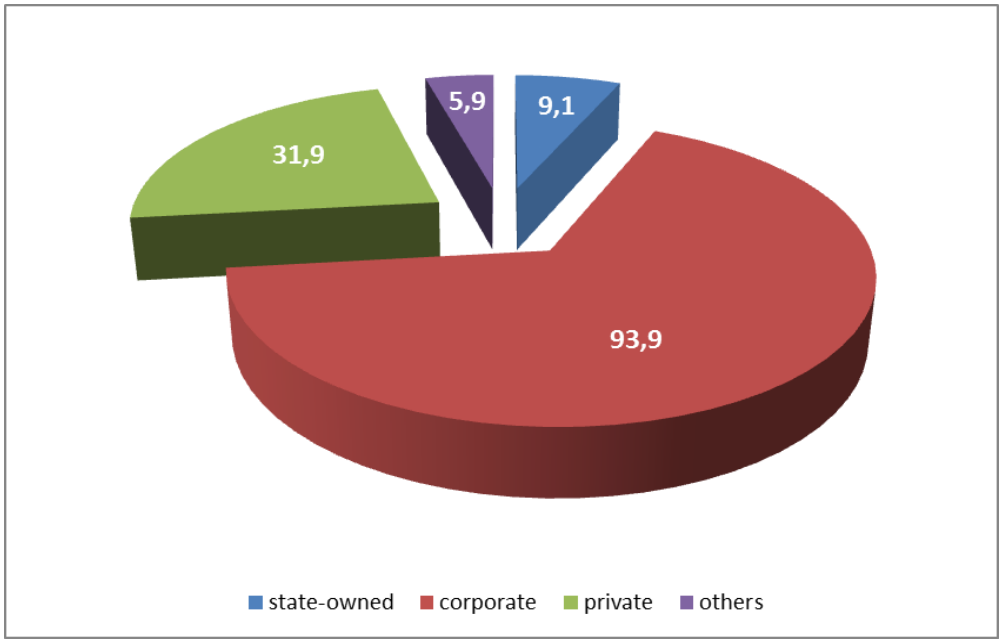
In most cases, agricultural enterprises involved in vegetable production are privately owned and represent local business (Fig. 1b). Among state-owned enterprises, the largest one is "Agrocomplex Pushcha-Vodytsa".

The leading producers of vegetables are "Teplychnyi Complex", "Uman greenhouse complex", "Krymteplytsia", "Agrocomplex Pushcha Vodytsia", and "Zmievskaya vegetable factory". In total, they produce almost half of all greenhouse vegetables produced by agricultural enterprises.

In the market of flowers produced in greenhouses, there are only large producers traditionally. At the beginning of 2011, not more than 20 enterprises in Ukraine cultivated flowers in greenhouses officially. Similarly to greenhouse vegetable production, most of them are private companies. The share of the only state-owned producer "Agrocomplex Pushcha Vodytsia" at the market of cut flowers is very small, less than 0.1%. Among the major

independent producers of cut flowers, "Askania Flora", "Tandem", "Ukraflora Vinnytsya" and "Cameliya" should be mentioned. According to estimates of market players, the share of seven leading companies in greenhouse cultivation of flowers is 80-85%.

**Fig. 1b. Production structure of greenhouse vegetables in agricultural enterprises in 2010, thousand tons**




*Source: State Statistics Agency of Ukraine (2011)*

## 1.3. Main distribution channels for greenhouse crops

Greenhouse production in Ukraine is targeted towards the domestic market. However, in the last two years, there has been a tendency towards export increase. In 2008, exports were estimated at 9-10% of the production volume. In 2009 and 2010, this figure was already 22% and 18%, respectively. One reason for such increase is financial attractiveness and capacity of the Russian market which is the main consumer of Ukrainian greenhouse tomatoes and cucumbers. In addition, a positive factor of the development of trade relations between Ukraine and the Russian Federation is a duty-free regime for supplies of vegetables from Ukraine to the Russian market.

The fact that a major part of greenhouse products is sold in the domestic market, most greenhouses are located around cities as they are the major consumer markets. The largest and most successful commercial greenhouses are located in Kyiv, Kharkiv, Cherkasy and Dnipropetrovsk oblasts (Fig. 2).

Considering distribution channels, one of the main channels for both large and small farms is trading in open markets because it brings quick money. However, most large greenhouse complexes prefer to work with wholesalers. This reduces overhead expenses for greenhouses.

Large greenhouses sell also through their own shops, stands, kiosks, and fairs. This distribution channel provides producers with substantial price benefits. Sometimes, incomes from own stores are 30% higher than from other distribution channels due to higher marketing margins. However, these margins are often established at high levels in order to cover overheads that originate from maintenance cost of a store. A good example in this regard is "Krymteplytsia" that has its own sales network in Simferopol. In the last three years, however, there has been a decline in sales of greenhouse vegetables through this channel. In 2008, it accounted for 31% of all sales. In 2009 and 2010, its share was 27% and 22%, respectively. This decrease can be explained by the growing share of products distributed via retail chains and exports.

Major retail chains prefer to work directly with producers. This way of distribution is typical of the largest producers that are able to supply stable volumes and quality products. Among these producers, there is "Uman greenhouse complex" which is not only actively working with

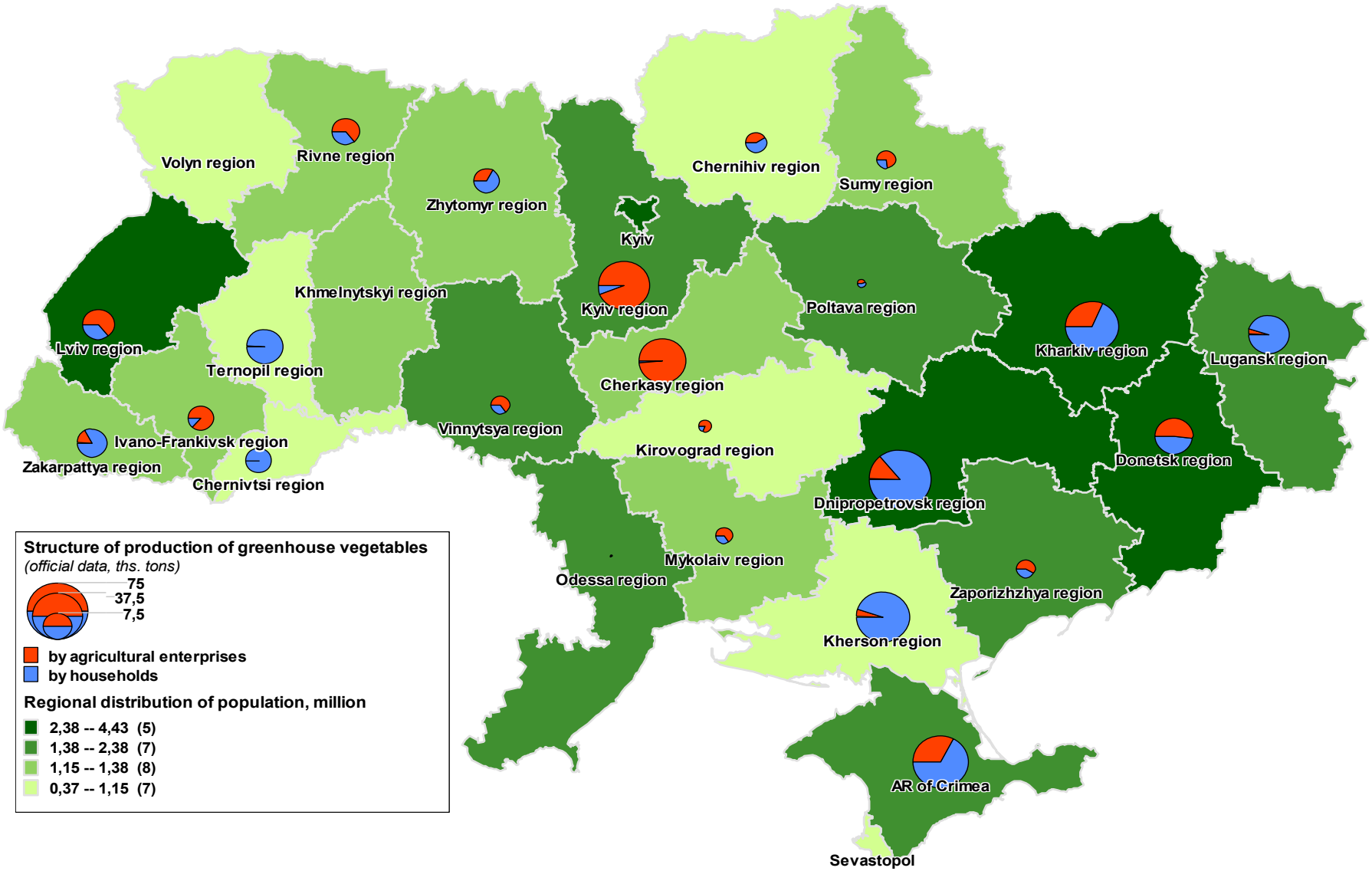
retail chains but also has its own brand "S gryadki" ("From the garden") as well as recognizable packages.

Large greenhouse complexes such as "Uman greenhouse complex", "Askania Flora", "Ukraflora" and "Pushcha Vodytsya" put much effort on the development of their own distribution networks and logistic centers. For this purpose, they have a fleet of cars with guaranteed stable temperature and refrigerators for delivery of vegetables, herbs or flowers to domestic customers as well as for export.

Considering the market of floral products grown in greenhouses, the major distribution channels in the segment of cut flowers are open markets, street trading and small flower shops which sell around 85% of total production volumes. Both large and small producers sell through these distribution channels.

We should point that large enterprises have more freedom to choose distribution channels for their products. Some of them, for example, the Camelia Company, have their own wholesale markets, sales centers and shops. Camelia established a network of flower shops in Kyiv. Based on our expert interviews, the volume of floral products distributed via supermarkets and large construction stores will grow.

**Fig. 2. Regional distribution of production of greenhouse vegetables**



## 1.4. Foreign direct investments in the sector

In Ukraine, there is no available statistics or any other information about investments in agricultural companies that specialize in cultivation of greenhouse crops. Thus, to estimate the amount of foreign investments in the industry, UCAB used data obtained either through direct contacts with producers or from other public sources of information (companies' press releases, mass media, Internet, etc.). Certainly, the findings may not be completely comparable with the official data on the volume of investments into the economy; however, they can provide some reference.

Before proceeding to the analysis of investment activity in the greenhouse sector, the study will provide the official key indicators of foreign direct investments (FDI). At the beginning of 2011, cumulative FDI in agriculture amounted to USD 831.1 mln[3] or less than 2% of the total investments in the Ukrainian economy. Crop production dominates in the sectoral distribution of FDI; it has 62.6% of the total investment. Despite the fact that Ukraine is a country with strong traditions in agricultural production, agriculture did not attract investors until certain point. During the period from 1991 to 2004, agriculture has attracted USD200 mln in total. Since 2005, the food crisis problem arose and started disturbing the international community. In terms of market conditions, it became evident in soaring food prices for almost all major groups of food products. From 2005 to 2008, FAO price index growth accounted for 64.5%. In this situation, the investment attractiveness of Ukrainian agriculture has increased dramatically. As a result, from 2005 to 2008, over USD 150 mln were invested in agriculture annually.

Greenhouse sector had the status of one of the most promising investment directions for a long time. In the pre-crisis period, annually growing consumer demands for greenhouse products were a great incentive to finance modernization and development of production capacities in greenhouses. In terms of investment flows, we can identify a number of key features. Active reconstruction and development of greenhouse vegetable production was carried out mainly at the expense of domestic investment, almost without foreign capital. At the same time, the sector of greenhouse flower production attracted significant amounts of FDI.

Despite the growing potential of greenhouse vegetables market, foreign investors reacted rather cautiously to this segment of greenhouse business. Along with the traditional problems that harm the investment climate such as instability of the legislative framework, lack of government strategies for the development of and support to the sector, there were also infrastructural problems throughout the supply chain. Therefore, foreign companies preferred to work in the area of input supplies for greenhouse vegetable production. Additionally, profitability of the greenhouse business depends strongly on availability of cheap energy resources. In this regard, it is worth to mention that the price of natural gas imported from Russian Federation is very high. Starting from November 2011, marginal price of natural gas for industrial consumption has been established by the National Electricity Regulatory Commision at the level of UAH 4600/1.000m$^3$ (USD 575/1.000m$^3$). At the beginning of 2011, this indicator was more than twice lower – USD 285/1.000m$^3$.

According to UCAB data, of 65 greenhouse enterprises that use over 1 hectare of greenhouse areas, only nine have attracted foreign investments, including a company that has the status of an enterprise with 100% foreign investments ("Dniprovika", Israel). The total volume of FDI amounted to USD 1.7 mln officially. However, according to the estimates of our experts during interviews, the volume of FDI in greenhouse production could reach at least USD 15-18 mln. Major investor countries are Cyprus (see footnote 4), Lebanon, the Netherlands, UK, and Azerbaijan. It should be mentioned that none of the top-10 greenhouse enterprises of Ukraine which, according to official statistics, formed more than 60% of the total production of greenhouse vegetables in 2010, attracted foreign direct investments.

As an exception, we should consider an investment project of Dutch Olviya Group BV in Ukraine, the "Olvita" company. The company was founded in 2003 and was planned to get the leading position in the market of fresh salads. Subsequently, the range of products was

[3] This calculated figure is based on a conservative methodology which does not consider investments coming from IPO at international fund markets.

extended to fresh and frozen vegetables (using shock freezing method). Unfortunately, the consumer market was not ready for the expansion of salads and lettuce and this direction has been temporarily suspended. Other acivities of "Olvita" such as creation of a multifunctional complex for full-cycle storage, processing and logistics of vegetables, berries and fruit were more popular and profitable. In 2010, despite bad experience, "Olvita" started again producing greenhouse fresh salads, and lettuce in a separate structural division "DC Kyiv". At the moment, the total area of "DC Kyiv" is 15 hectares, of which 1.5 ha are modernized. Thereof, 1.0 ha is used for production of herbs and flowers and 0.5 ha is occupied by salads and lettuce.

The volume of FDI in floriculture was larger and more regular than in the vegetable sector. Almost all largest flower companies started their business exclusively from imports. The market grew with the imports while the distribution system has been established and developed. Subsequently, some large companies began to invest in reconstruction and building of their own greenhouses in Ukraine because of the growth of world energy prices and increasing transport costs as well as because of the desire to set up own businesses. The market situation at that time (from 2003 to 2005) was more than favorable because market capacity grew by 25-30% annually. At the same time, cheap energy resources allowed growing plants below wholesale price of imported products (price including shipping, taxes and profits). Most producers worldwide chose warmer climates to grow flowers. Whereas in Ukraine it would be logically to choose the southern regions and the Crimea, the large companies chose proximity to main markets (Kyiv at first hand).

According to UCAB estimates, the volume of FDI into companies that specialize in greenhouse floriculture was USD 34.9 mln (that accounts for 4.2% of total FDI in agriculture). Seven of the ten largest flower producers attracted FDI. In total, more than USD 25 mln were invested in such known companies as "Askania Flora", "Camelia-PR", and "Victoria" that are the largest producers of cut flowers in Ukraine. Major investor countries are the Netherlands, Cyprus[4], Virgin Islands[5], Slovakia and Russian Federation. Out of major producers of cut flowers, only Lviv-based company "Tandem" operates exclusively with private domestic investments. In 2010, it had the second position in the market.

In general, according to UCAB estimates, about USD 55 mln were invested in the whole greenhouse sector of Ukraine in the last 20 years (6.6% of the total investment in agriculture).

[4] Cyprus is one of the main investors in the whole Ukrainian economy, not only in the greenhouse sector. However, the investment inflows from this country should only be formally perceived as those of foreign origin. The investments from Cyprus are usually those from Ukrainian companies registered in the island due to favorable taxation conditions.

[5] See the above footnote.

# 2. Markets of greenhouse products in Ukraine, 2008-2010

## 2.1. Tomato market

### 2.1.1. Production figures

Tomato is traditionally considered as one of the most popular vegetables in Ukraine. In 2008-2010, the share of tomatoes in production structure of all vegetables was 20% or 1624 ths tons on average. Less than a quarter of the total tomato produciton (23.1% or 383 ths tons in 2008-2010 on average) was concentrated at large agricultural enterprises and farms. Production growth at large enterprises is associated primarily with the development of the processing sector, mainly production of tomato paste. Production volumes of concentrated tomato paste doubled from 35.7 ths tons in 2007 to 70.6 ths tons in 2009.

In the production structure of greenhouse vegetables, tomato is one of the key crops. According to official statistics, tomato accounts for 46-48% of the total greenhouse production, only slightly inferior to cucumbers. On average, production of tomato in greenhouses was 164 ths tons or 10.1% of total production in 2008-2010. The share of production of greenhouse tomatoes at large enterprises was 46.9% (77 ths tons).

In the last three years, there has been a diverse trend in production of greenhouse tomatoes, by category of producers. Production volumes at large enterprises declined (Table 3). One of the main reasons is competition from imported products. At the same time, at the expense of private households, total production of greenhouse tomatoes has increased during the same period. Such disbalance may be also related to changes in methodology for reporting of agricultural activities of private households.

**Table 3. Production of tomatoes in 2008-2010**

| | Tomatoes, ths tons | | Greenhouse tomatoes, ths tons | | Share of greenhouse tomatoes in production, % | |
|---|---|---|---|---|---|---|
| | Total | Agricultural enterprises | Total | Agricultural enterprises | Total | Agricultural enterprises |
| 2008 | 1357,3 | 263,1 | 140,8 | 79,9 | 10,4 | 30,4 |
| 2009 | 1863,5 | 523,8 | 177,3 | 76,6 | 9,5 | 14,6 |
| 2010 | 1651,3 | 361,8 | 173,4 | 74,0 | 10,5 | 20,5 |

*Source: State Statistics Agency of Ukraine (2011)*

**Table 4.TOP-5 largest producers of greenhouse tomatoes in 2010**

| | Area of greenhouse, ths $m^2$ | Share of tomatoes in production structure, %* | Production of tomatoes, ths tons | Yield, kg/sq.m | Share in production, %** |
|---|---|---|---|---|---|
| Uman greenhouse complex | 439,6 | 82,3 | 18,1 | 59,5 | 24,4 |
| Complex „Teplychnyi" | 484,2 | 78,6 | 18,0 | 51,2 | 24,4 |
| „Krymteplytsya" | 233,0 | 80,9 | 7,4 | 45,5 | 10,0 |
| Agrocomplex „Pushcha Vodytsya" | 228,1 | 52,7 | 4,0 | 35,0 | 5,4 |
| „Soteko" | 68,0 | 57,5 | 2,5 | 68,7 | 3,3 |

** - share of greenhouse tomatoes in production structure of greenhouse vegetables at the enterprise*
*** - share of the enterprise in total volume of production of tomatoes by large enterprises*
*Source: UCAB data based on estimates of market operators (2011)*

As mentioned above, official data on greenhouse production does not represent the real situation in the market. Based on the survey of producers, enterprises of all types of ownership collected about 235 ths tons extra of greenhouse tomatoes in 2010. Revaluation surplus of production was made because of small and medium-size enterprises that use primarily film greenhouses and cultivation in plastic tunnels. In 2010, tomatoes were cultivated on 3.2 ths

hectares of covered ground (1125 ha and 2075 ha in the spring-summer and summer-autumn rotation, respectively), excluding the area under greenhouses of winter type. Depending on production conditions and technologies, yields varied from 6.8 to 10.1 kg/sq.m.

In 2010, more than 30 large and medium-size greenhouses (more than 20 ths sq. m), as well as more than fifty small greenhouses (mainly hotbeds) with a total share of less than 1% in production were involved in production of greenhouse tomatoes. The share of three largest greenhouse complexes in production of tomatoes amounted to 58.9% in 2010. The largest enterprises are characterized by high intensity of production. Their yields were at the level comparable to those of modern enterprises in Europe – 50-60 kg/sq.m.

### 2.1.2. Price dynamics

Greenhouse tomatoes prevail in the market from November to May with price peaks during the winter-spring period. Maximum price level is usually reached before holidays (New Year, Christmas, Easter, International Women's Day, etc.). Prices go down when open ground tomatoes come to the market (June-August). The ratio of average annual prices betwenn open ground tomatoes and greenhouse tomatoes is 1 to 4.

The price level for greenhouse tomatoes reflects the import price. For example, in January-March 2009, domestic prices for greenhouse tomatoes were 10-20% higher compared to the same period in 2008. Despite the fact that the actual priceof imports (inUSdollars) was almost identical, the Ukrainian currency devaluation led to a sharp increase of prices of imported tomatoes.

**Fig. 3. Dynamics of retail prices for greenhouse tomatoes**

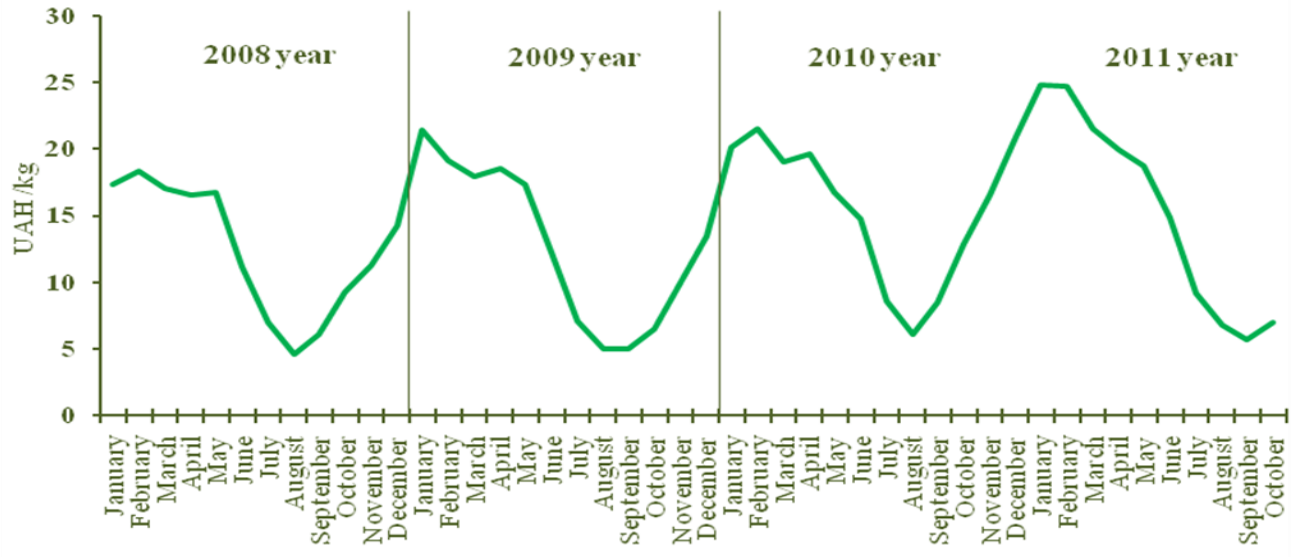
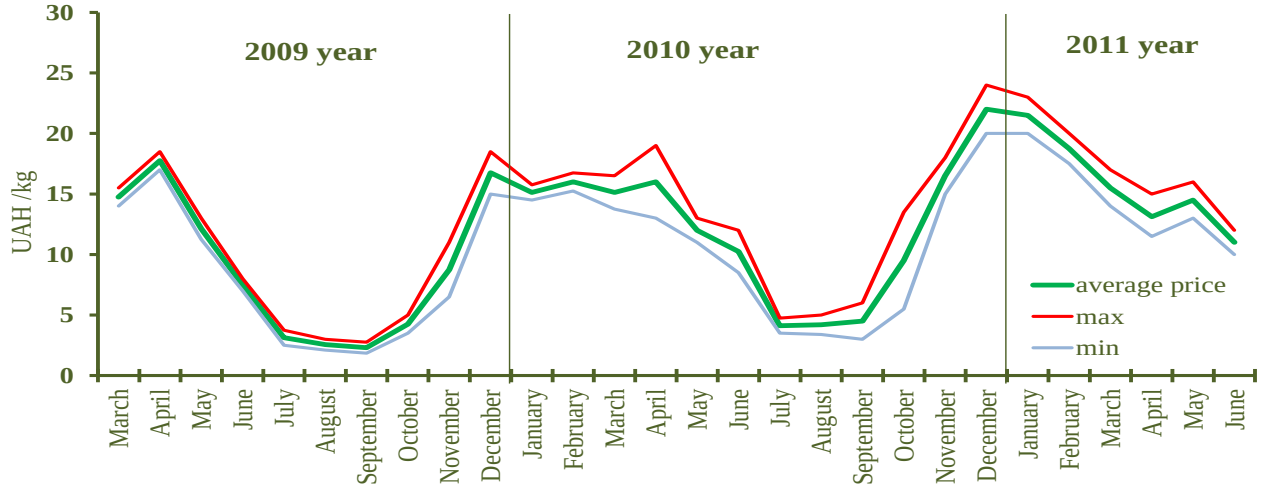



**Fig. 4. Dynamics of wholesale prices for tomatoes**




*Source: Shuvar market (2011), http://shuvar.com/index.php?mod=page&id=analytic_report*

## 2.1.3. External trade

**Import**

According to the rules of WTO, Ukraine was obliged to reduce import duty on horticultural production starting from 2008. As a result, import duty on tomatoes changed from 0,3 €/kg to 10% of the customs value. Taking into account the fact that the average tomato import price for the last five years (from 2006 till 2010) was in the range 0,36-0,82$/t, simple calculations lead to a conclusion that tariff load decreased by 5-11 times. It resulted in sharp increase of tomato imports. This way, import supplies of tomatoes increased on average by 15 times in 2008-2010 as compared to 2006-2007. In 2008-2010, annual import of tomatoes was on the level of 43-60 ths ton. Mainly, it is greenhouse production which is imported to the Ukrainian market from November till June, when imported tomatoes are competitive at the market.

These volumes represent only legal supplies. Significant volumes of greenhouse vegetables, including tomatoes, are imported under shadow schemes. For example, greenhouse production from Turkey is imported to Moldova where there are no duties on vegetable imports. Then, by small parties, vegetables are transferred to Ukraine by cars and trucks. Assessments of market experts on evaluation of shadow imports differ but, definitely, the amount of illegally imported tomatoes is at least the same as official volumes.

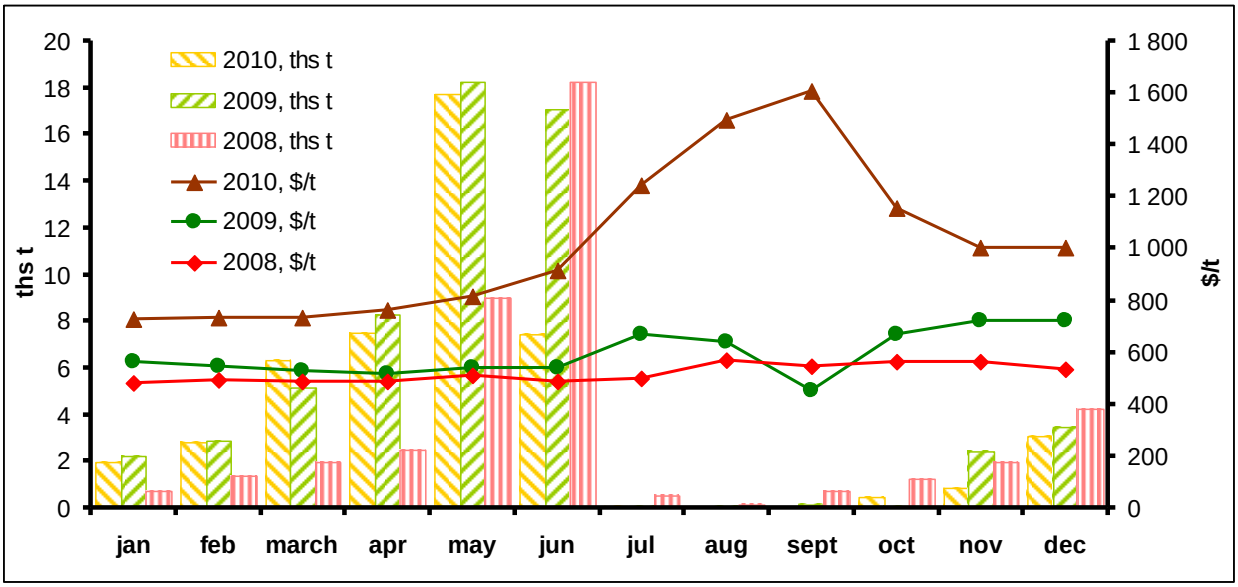
The main supplier of tomatoes to Ukraine is Turkey. It has 73% in the structure of supplies in 2008-2010. In 2010, supplies from Turkey decreased. The reason of such decline was prohibition of tomato imports from Turkey due to the massive invasion of tomato moth (tuta absoluta) in January 2010. The prohibition was temporal. After the visit of Ukrainian delegation to Turkey, both parties have signed an agreement. According to the agreement, Ukraine agreed to renew the import of Turkish tomatoes under the condition that supplies are from the regions that are not affected by tomato moth. For Turkey, tomatoes are one of the main export products.

**Table 5. Import of tomatoes (Code 0702) to Ukraine in 2008-2010**

| | ths t | % (t) | mln $ | $/t |
|---|---|---|---|---|
| **2010** | | | | |
| **Total** | **48,2** | **100** | **39,6** | **822** |
| Turkey | 33,3 | 69 | 25,9 | 777 |
| Spain | 3,5 | 7 | 3,3 | 940 |
| Netherlands | 3,3 | 7 | 3,2 | 969 |
| Poland | 3,0 | 6 | 3,0 | 978 |
| Syria | 3,0 | 6 | 2,4 | 793 |
| **2009** | | | | |
| **Total** | **60,0** | **100** | **33,3** | **555** |
| Turkey | 47,9 | 80 | 25,7 | 536 |
| Syria | 4,9 | 8 | 2,5 | 518 |
| Spain | 3,3 | 5 | 2,3 | 716 |
| Poland | 2,1 | 3 | 1,5 | 715 |
| Netherlands | 1,1 | 2 | 0,8 | 736 |
| **2008** | | | | |
| **Total** | **42,5** | **100** | **21,3** | **502** |
| Turkey | 28,9 | 68 | 14,0 | 483 |
| Spain | 7,5 | 18 | 4,0 | 533 |
| Netherlands | 2,9 | 7 | 1,6 | 563 |
| Poland | 1,8 | 4 | 1,0 | 571 |
| Macedonia | 0,3 | 1 | 0,1 | 519 |

*Source: State Statistics Service of Ukraine (2011)*

**Fig. 5. Dynamics of import of tomatoes (Code 0702) to Ukraine in 2008-2010**




*Source: State Statistics Service of Ukraine (2011)*

**Export**

Export supplies of tomatoes from Ukraine significantly increased – twice on average – in 2009-2010 as compared to 2008. This tendency is stipulated by substantially lower prices for greenhouse tomatoes in Ukraine than in Russian Federation, the main importer of this production. The price difference reaches almost 100%. Growing exports can be also explained by the fact that Ukraine supplies vegetables to the Russian Federation in a duty-free mode.

**Table 6. Export of tomatoes (Code 0702) from Ukraine by month in 2008-2010**

| | jan | feb | March | apr | may | jun | nov | dec |
|---|---|---|---|---|---|---|---|---|
| 2010, ths t | 0,1 | 0,0 | 0,2 | 2,9 | 2,5 | 4,6 | 1,7 | 0,0 |
| 2009, ths t | 0,0 | 0,0 | 0,3 | 1,7 | 2,7 | 6,9 | 1,4 | 0,1 |
| 2008, ths t | 0,0 | 0,0 | 0,2 | 0,8 | 0,6 | 4,4 | 0,4 | 0,0 |

*Source: State Statistics Service of Ukraine (2011)*

In Ukrainian commodities classification of foreign economic activities, greenhouse tomatoes are not distinguished as a separate category. Nevertheless, the average share of greenhouse production can be evaluated on the level of 20-25% of total tomato exports in the last three years. Greenhouse tomatoes are predominantly exported from November till June. The dynamics of export of tomatoes from Ukraine is presented in the table below.

Ukrainian export of tomatoes is mainly directed to two countries: Russian Federation and Belarus. Supplies to Russia account for more than 90%.

One of the leading exporters of greenhouse tomatoes is "Uman Greenhouse Complex".

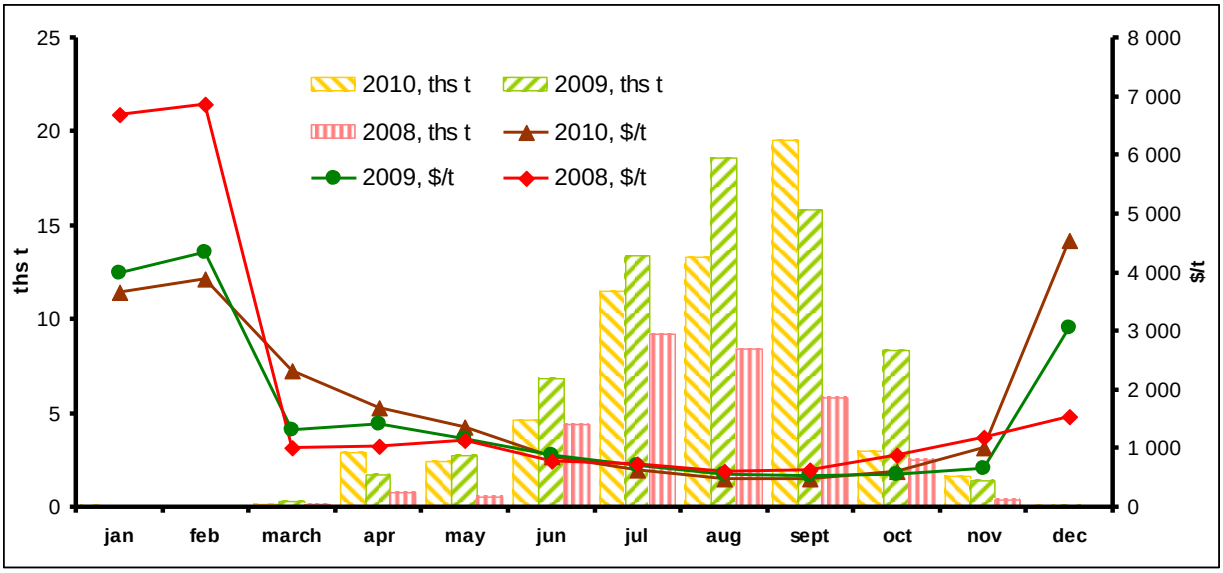
**Table 7. Export of tomatoes (Code 0702) from Ukraine in 2008-2010**

| | **ths t** | **% (t)** | **mln $** | **$/t** |
|---|---|---|---|---|
| **2010** | | | | |
| **Total** | **59,3** | **100** | **39,7** | **669** |
| Russian Federation | 54,7 | 92 | 37,6 | 687 |
| Belarus | 4,6 | 8 | 2,1 | 460 |
| **2009** | | | | |
| **Total** | **69,4** | **100** | **45,8** | **660** |
| Russian Federation | 58,1 | 84 | 40,5 | 697 |
| Belarus | 11,3 | 16 | 5,3 | 470 |
| **2008** | | | | |
| **Total** | **32,4** | **100** | **23,6** | **727** |

| | ths t | % (t) | mln $ | $/t |
|---|---|---|---|---|
| Russian Federation | 30,3 | 94 | 22,3 | 734 |
| Belarus | 2,0 | 6 | 1,3 | 626 |

*Source: State Statistics Service of Ukraine (2011)*

**Fig. 6. Dynamics of export of tomatoes (Code 0702) from Ukraine in 2008-2010**




*Source: State Statistics Service of Ukraine (2011)*

## 2.2. Cucumber market

### 2.2.1. Production figures

According to official data, the share of cucumber in production of all kinds of vegetables was 10% (830 ths tons) in 2008-2010. The share of agricultural enterprises in the production structure is less than 10% (82 ths tons).The major share (more than 85%) is produced in greenhouses. The market of cucumbers was stable in the last years. The volume of consumption of cucumbers in Ukraine is estimated at the level of 14.9 kg/per capita/year. This is significantly above the world average of 6.1 kg/per capita/year.

Cucumber is the second greenhouse vegetable by production volumes and cultivation area (40-60% of the greenhouse area every year, depending on rotation). In 2008-2010, the average annual production of greenhouse cucumbers was 169 ths tons (20% of total cucumber production). The share of large-scale commercial producers in total output was 40% or 68 ths tons on average in 2008-2010. The yields in the largest glass greenhouses account for 40 kg/sq.m and 28 kg/sq.m in film greenhouses. Profitability of cucumber production in film greenhouses is much higher than in glass greenhouses Profitability of glass greenhouses was 7.8% on average in 2008-2010. Profitability in modern greenhouses with drip irrigation systems was above 15% in the same period. Average profitability of cucumber in film greenhouses accounted for 29.4% in 2008-2010; in film greenhouses with drip irrigation systems, profitability was 47.6%. The reason is that products grown in film greenhouses are popular among consumers.

**Table 8. Production of cucumbers in 2008-2010 (official data)**

| | Cucumbers, ths t | | Greenhouse cucumbers, ths t | | Share of greenhouse cucumbers in production, % | |
|---|---|---|---|---|---|---|
| | Total | Agricultural enterprises | Total | Agricultural enterprises | Total | Agricultural enterprises |
| 2008 | 751,5 | 77,4 | 145,7 | 65,6 | 19,4 | 84,8 |
| 2009 | 883,0 | 90,6 | 179,8 | 72,1 | 20,4 | 79,6 |
| 2010 | 860,1 | 77,4 | 181,7 | 66,0 | 21,1 | 85,3 |

*Source: State Statistics Service of Ukraine (2011)*

**Table 9. TOP-5 largest producers of greenhouses cucumbers in 2010**

| | Area of the greenhouse ths $m^2$ | Share of cucumbers in production structure, %* | Production of cucumbers, ths tons | Yield, kg/sq.m | Share in production, %** |
|---|---|---|---|---|---|
| „Zmiyevskaya vegetable factory" | 216,5 | 90,9 | 6,20 | 32,0 | 9,4 |
| Complex „Teplychnyy" | 484,2 | 21,4 | 4,91 | 37,7 | 7,4 |
| „Perspektyva" | 180,0 | 78,3 | 4,54 | 21,1 | 6,9 |
| Uman Greenhouse Complex | 439,6 | 17,7 | 3,89 | 28,6 | 5,9 |
| „Greenhouse complex Dneprovskyy" | 172,2 | 60,5 | 3,52 | 52,6 | 5,3 |

** - share of greenhouse cucumbers in production structure of greenhouse vegetables at the enterprise*
*** - share of the enterprise in total volume of production of cucumbers by large enterprises*
*Source: UCAB data based on estimates of market operators (2011)*

Expert estimates of production of greenhouse cucumbers are higher than the official data of State Statistics Service, which is also confirmed by our survey of producers. According to our respondents, in 2010, enterprises of all types of ownership collected at least 190 ths tons of cucumbers in greenhouses which is almost three times more than official figures. Revaluation surplus of production is due to small and medium-size enterprises as well as households producing marketable volumes of cucumbers and using primarily film greenhouses. The total area of protected ground was 830-900 ha with average yields of 13-15 kg/sq.m. Major production volumes, more than 70%, were achieved in spring-summer rotation (March-June). Noteworthy, our findings are similar to the data on greenhouse cucumber marketability collected on the basis of a survey of household living conditions that is conducted annually by the State Statistics Service of Ukraine. Based on official statistics, the volume of greenhouse cucumber trade amounted to 156 ths tons in 2010.

In 2010, greenhouse cucumbers were cultivated in 120 greenhouses of agricultural enterprises with 300 hectares under cucumbers. Of them, 36 hectares are film greenhouses. In 2010, the share of the five largest greenhouses in cucumber production was 35%.

## 2.2.2. Price dynamics

Pricing trends for greenhouse cucumbers are characterized by a strong degree of seasonality: maximum values are observed from November to April. Mass inflows of Ukrainian cucumbers in the market occur at the end of February – early March. Before that, imported cucumbers dominate the market. The limitation factor of earlier market entry is the need for heating and lighting in winter, while the cost of these resources is growing significantly in this period. When greenhouse cucumbers of Ukrainian origin come to market, this usually leads to higher prices, given their higher production cost compared to the imported products, especially of Turkish origin. However, in terms of consumer preferences, Ukrainian cucumbers are competitive enough due to their freshness and the prevailing opinion that domestic production is safer. By the end of March, the prices are falling but remain high as long as cucumbers from film greenhouses come to the market in late May – early June. In 2011, the delay of 2-3 weeks occurred with supplies of the products from film greenhouses due to the cold spring.

In Ukraine, both short-fruited and long-fruited cucumbers are cultivated in greenhouses. Short-fruited cucumber is more expensive than long-fruited by 20-35% on average. This is due to the fact that cultivation of short-fruited cucmber requires higher temperatures, by 2 °C on average.

**Fig. 7. Dynamics of retail prices for greenhouse cucumbers**

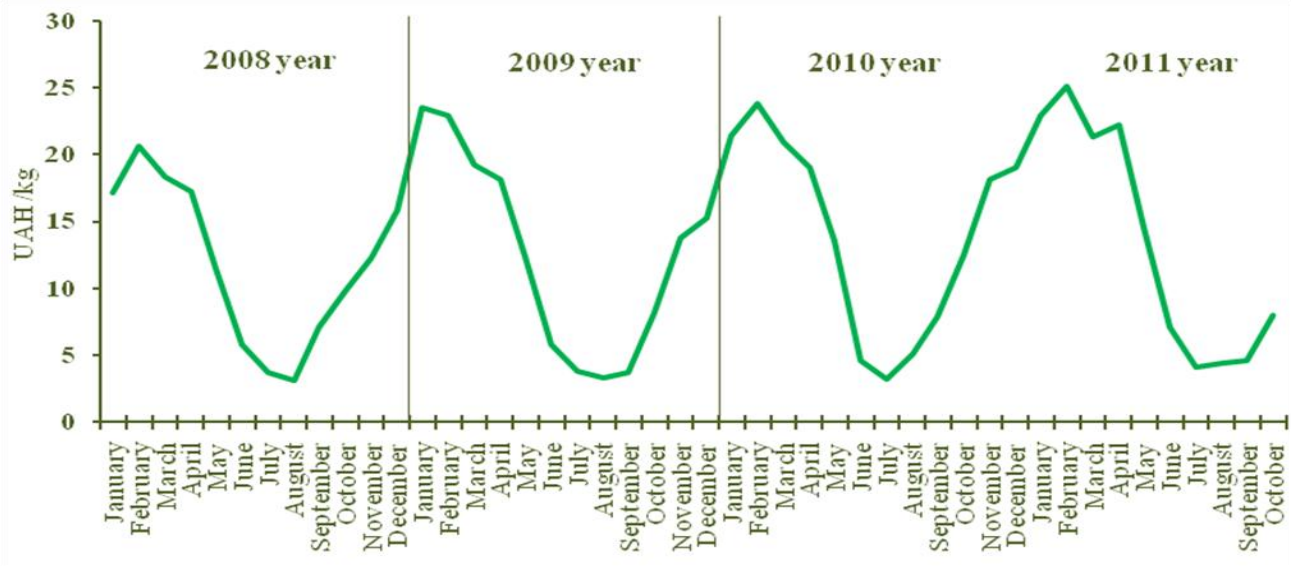
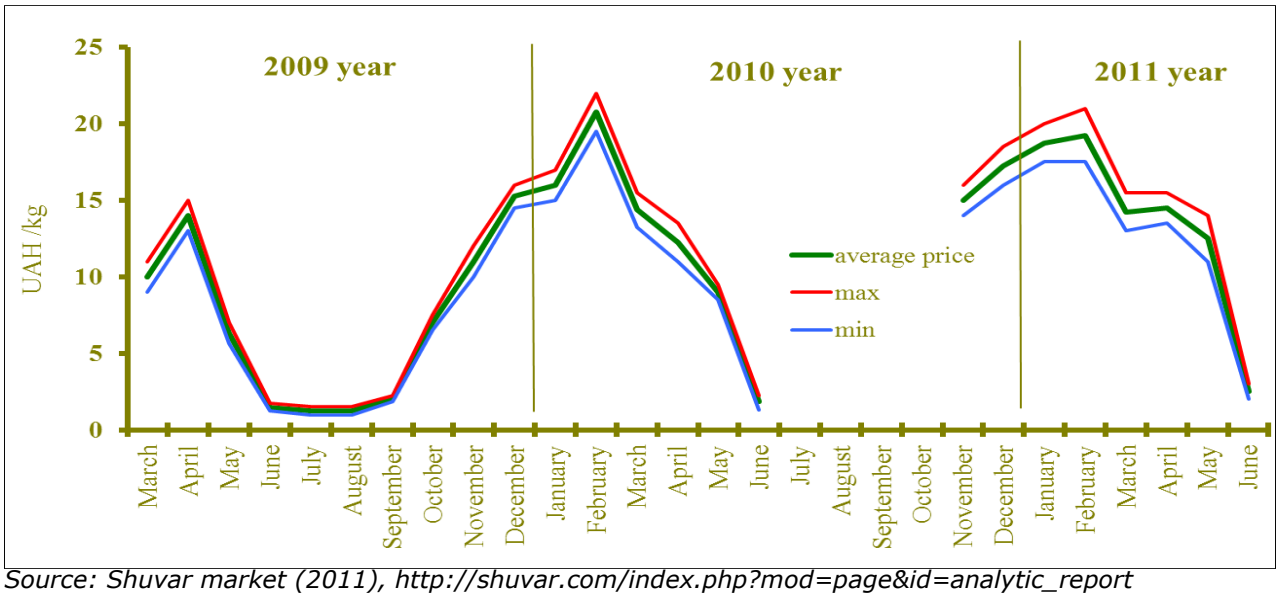
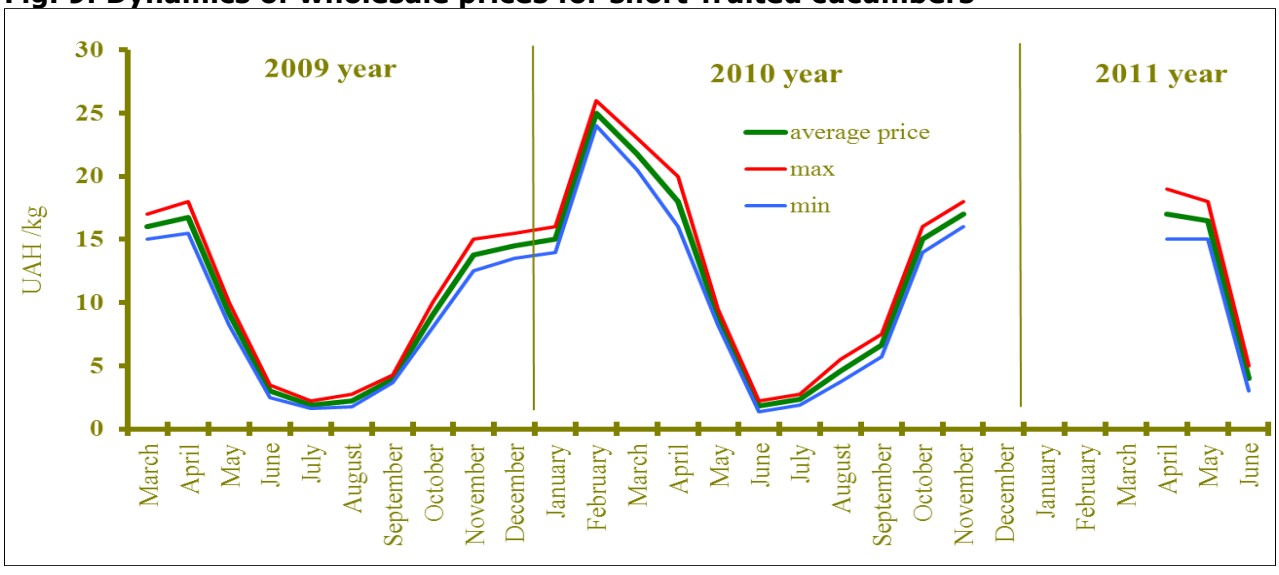



**Fig. 8. Dynamics of wholesale prices for long-fruited cucumbers**




*Source: Shuvar market (2011), http://shuvar.com/index.php?mod=page&id=analytic_report*

**Fig. 9. Dynamics of wholesale prices for short-fruited cucumbers**




*Source: Shuvar market (2011), http://shuvar.com/index.php?mod=page&id=analytic_report*

## 2.2.3. External trade

### Import

Import supplies of cucumbers to Ukraine are characterized by almost the same tendencies that were observed in the case of tomato import. The only difference is that the period of supplies of cucumbers to Ukrainian market is shorter than that of tomatoes by 2 months. Large batches of cucumbers are imported from November to April. The largest volumes come in November-December. Then, gradual reduction of supplies is observed. Most of the imports are greenhouse cucumbers.

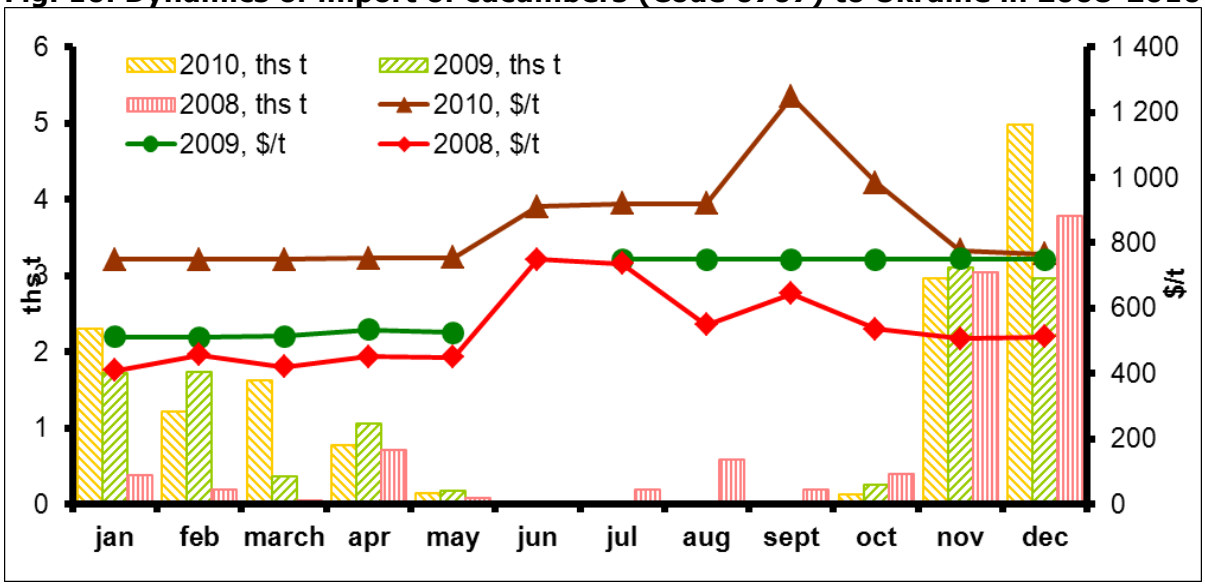
Import of cucumbers is not diversified by suppliers and almost all cucumbers come to Ukraine from Turkey. This country accounted for 92% of cucumber import in 2010.

**Table 10. Import of cucumbers (Code 0707) to Ukraine in 2008-2010**

| | ths t | % (t) | mln $ | $/t |
|---|---|---|---|---|
| **2010** | | | | |
| **Total** | **14,1** | **100** | **10,8** | **763** |
| Turkey | 13,0 | 92 | 9,9 | 763 |
| Syria | 0,5 | 4 | 0,4 | 750 |
| Jordan | 0,4 | 3 | 0,3 | 750 |
| **2009** | | | | |
| **Total** | **11,3** | **100** | **7,3** | **646** |
| Turkey | 10,3 | 91 | 6,7 | 652 |
| Jordan | 0,4 | 4 | 0,2 | 522 |
| Syria | 0,3 | 3 | 0,2 | 579 |
| **2008** | | | | |
| **Total** | **9,5** | **100** | **4,9** | **510** |
| Turkey | 7,4 | 78 | 3,7 | 497 |
| Belarus | 0,5 | 5 | 0,2 | 460 |
| Spain | 0,4 | 4 | 0,2 | 561 |

*Source: State Statistics Service of Ukraine (2011)*

**Fig. 10. Dynamics of import of cucumbers (Code 0707) to Ukraine in 2008-2010**




*Source: State Statistics Service of Ukraine (2011)*

### Export

Greenhouse cucumbers are exported from Ukraine mainly in the period from November to May. The table below presents dynamics of export of cucumbers from Ukraine during these months (Table 11). The share of greenhouse cucumbers in total export of cucumbers in 2008-2010 accounted for 40-45% on average.

**Table 11. Export of cucumbers (Code 0707) from Ukraine by month in 2008-2010**

| | Jan | Feb | march | apr | may | nov | dec |
|---|---|---|---|---|---|---|---|
| 2010, ths t | 0,1 | 0,4 | 2,5 | 1,0 | 2,5 | 0,1 | 0,0 |
| 2009, ths t | 0,0 | 0,3 | 1,5 | 1,2 | 3,0 | 0,0 | 0,1 |
| 2008, ths t | 0,0 | 0,5 | 1,0 | 0,1 | 0,7 | 0,1 | 0,0 |

*Source: State Statistics Service of Ukraine (2011)*

The main consumers of Ukrainian cucumbers are the Russian Federation and Belarus. Ukrainian greenhouse complexes significantly increased their exports of greenhouse cucumbers to Russian market in the last two years. In 2010, Ukraine ranked fourth among the largest exporters of greenhouse cucumbers to Russia after Turkey, Iran and China.

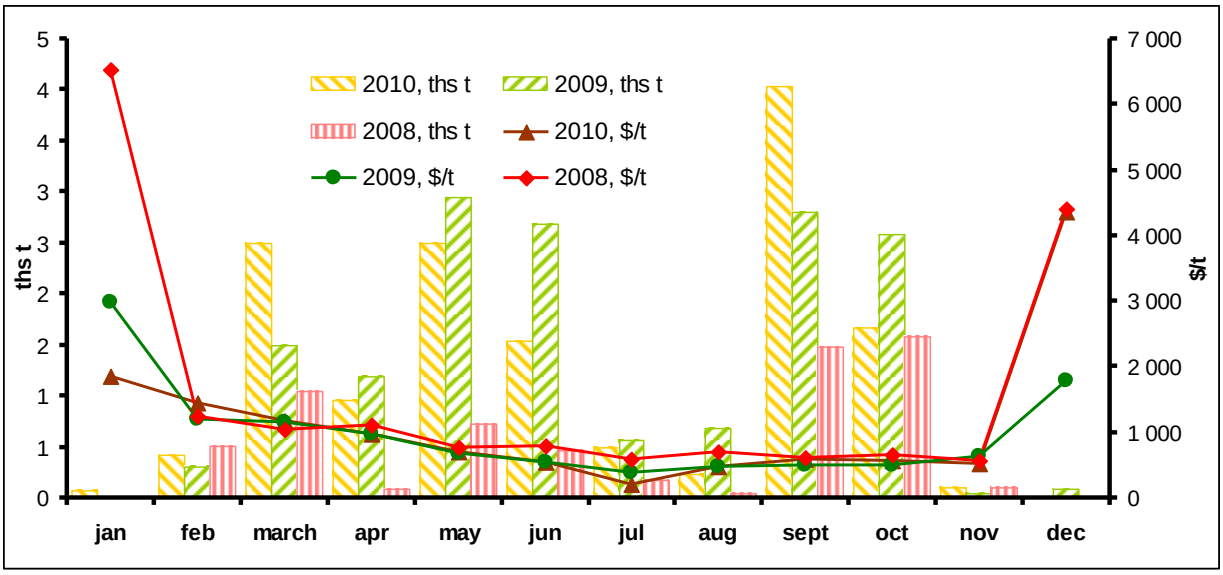
One of the leading exporters of greenhouse cucumbers is "Uman Greenhouse Complex".

**Table 12. Export of cucumbers (Code 0707) from Ukraine in 2008-2010**

| | ths t | % (t) | mln $ | $/t |
|---|---|---|---|---|
| **2010** | | | | |
| **Total** | **59,3** | **100** | **39,7** | **669** |
| Russian Federation | 54,7 | 92 | 37,6 | 687 |
| Belarus | 4,6 | 8 | 2,1 | 460 |
| **2009** | | | | |
| **Total** | **69,4** | **100** | **45,8** | **660** |
| Russian Federation | 58,1 | 84 | 40,5 | 697 |
| Belarus | 11,3 | 16 | 5,3 | 470 |
| **2008** | | | | |
| **Total** | **32,4** | **100** | **23,6** | **727** |
| Russian Federation | 30,3 | 94 | 22,3 | 734 |
| Belarus | 2,0 | 6 | 1,3 | 626 |

*Source: State Statistics Service of Ukraine (2011)*

**Fig. 11. Dynamics of export of cucumbers (Code 0707) from Ukraine in 2008-2010**




*Source: State Statistics Service of Ukraine (2011)*

## 2.3. Dill and green onion markets

### 2.3.1. Production figures

Cultivation of dill and green onion (or so-called "greens") helps greenhouse enterprises to diversify their range of goods on offer and reduces the impact of seasonality of vegetable consumption. Most greens are characterized by cold resistance; they do not require a lot of light and have a short period of yield formation. This allows them to grow with little

expenditure of energy in 2-3 rotations. This advantage is particularly important during the sharp rise in prices for energy in Ukraine. Despite this, large-scale commercial production of greens has been unpopular until recently and the major risk was associated with the absence of sustainable market. This risk was slightly smoothed in the last 5-8 years with the development of large retail chains. However, the necessity of specific manual production operations (sorting, packaging, etc.) and low demand caused low profitability of these crops.

Key challenge for cultivation of greens in large industrial greenhouses was consolidation of crops in order to maximize utility of the area. Most often, greens account for less than 1% of the total usable area of the greenhouse. The major part of products is grown in early spring in film greenhouses with ground heating or solar heating. They are usually small greenhouses with the area of up to 500 square meters. At the same time, several large industrial greenhouses became specialized in cultivation of greens in the last years.

The figures that characterize this market rely only on our survey data and expert opinions of market operators. Official statistics do not make production records for dill and green onion, except for production of green onion from the open ground.

The annual large-scale commercial production of green onions (excluding private households) is estimated at the level of 7-9 ths tons, including the share of greenhouse production of not less than 60% (4,2-5,4 ths tons). Of these, more than 80% is grown in film greenhouses today. In glass greenhouses, green onions are grown in December-January. The majority of greenhouses grow onions on the areas of 0.1-0.5 ha with several rotations. In the fall rotation, yields account for 8-10 kg/sq.m whereas in February and March yields are usually 15-20% higher. At current prices such figures secured profitability at the level of 4-8% in 2008-2010. Profitability of onion production in film greenhouses varies from 12 to 20%. Noteworthy, higher yields are not the key factor of profitability. Companies with better logistics and distribution systems obtain greater economic benefits. It should be mentioned also that further development of the market of greens, including onions, requires not only expansion of production capacities but also gradual change of consumer preferences. Ukrainian consumers are quite reluctant to off-season offers of fresh greens. This is due to the factors such as underdeveloped consumption habits, low purchasing power and prejudice to the quality of greenhouse products.

Dill, along with parsley, is considered as one of the most popular aromatic greens in Ukraine. Despite consistently high consumer demand, production of dill is insufficient, especially in autumn and winter.

The annual large-scale commercial production of dill (excluding private households) is estimated at the level of 2,8-3,1 tons, including the share of greenhouse production of 55% (1,54-1,70 tons). The main volume of greenhouse dill is produced in film greenhouses or on the ground with the simplest film shelters. Production of dill in film greenhouses in early spring is considered to be the most popular and profitable way. The share of film greenhouses in the total production of greenhouse dill is at least 80%.

Areas which are occupied by dill in glass greenhouses are small, up to 0.5 ha; average yields are 1-1.5 kg/sq.m. Dill is not particularly popular for growing in glass greenhouses and the main reason is low profitability. In autumn-winter period, the price of greenhouse dill is higher than that of imported dill.97% of the imported dill is supplied from Georgia. In this respect, it should be mentioned that a number of Ukrainian companies are co-tenants of Georgian greenhouses and their share was not less than 15-20% of 1.7 ths tons of dill supplied from Gerogia.

Agrocomplex “Pushcha Vodytsya”, “Kremenchug vegetable factory”, “Symphony” farm, “Agrocompany” private enterprise are the largest producers of green onion and dill. The “DC Kiev” company must be mentioned separately as a leader in this area of greenhouse production. “DC Kiev” is a subsidiary of the Dutch Olviya Group BV which was founded in 2010. “DC Kiev” is specialized in growing of greens, salads and herbs in a greenhouse complex with the total area of 15 hectares. The assortment includes more than twenty titles of green crops including onions, parsley, dill, salad and basil.

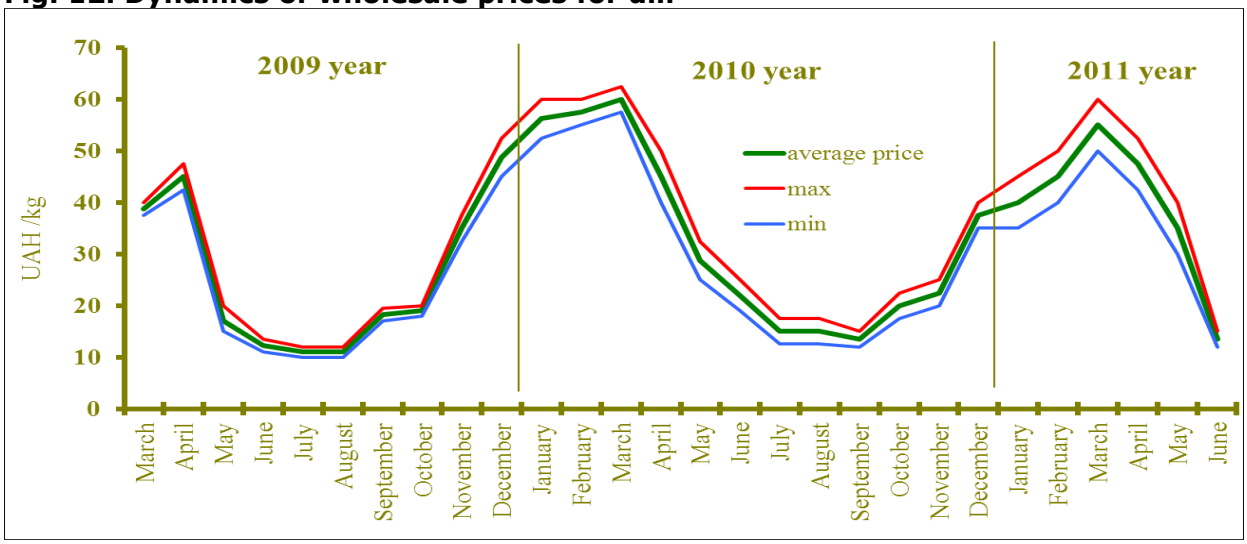
## 2.3.2. Price dynamics

In general, price dependences in the market of greens are similar to those in the markets of greenhouse tomatoes and cucumbers.

At the same time, there are some specifics. In the period from November to April, price pikes are observed in the dill market which is almost entirely dependent on imports, primarily of Georgian origin. Imports contribute to price stability in the market that is characterized by small differences between the maximum and minimum price levels. Over the last two seasons, this figure was at the level of 16% from November to April.

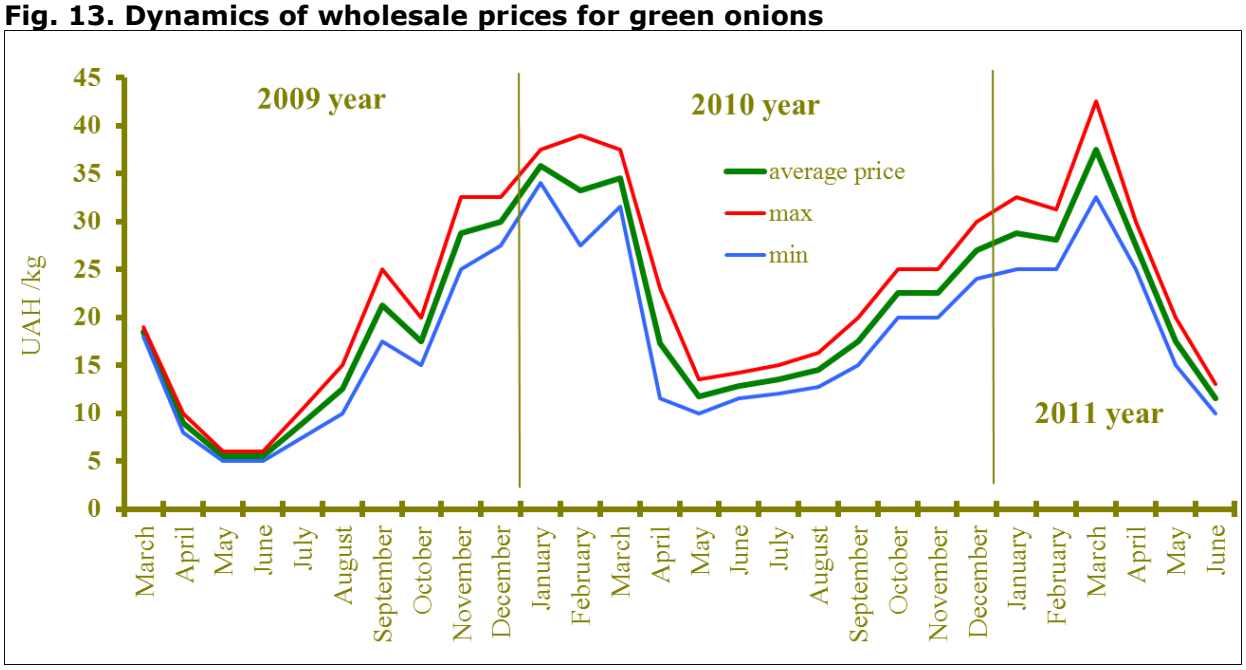
At the same time, green onions are mainly of domestic origin and a large number of small producers are working in this market. This leads to a significant discrepancy between the maximum and minimum price values. This figure almost never dropped below 20% in the last three years.

**Fig. 12. Dynamics of wholesale prices for dill**




*Source: Shuvar market (2011), http://shuvar.com/index.php?mod=page&id=analytic_report*

**Fig. 13. Dynamics of wholesale prices for green onions**




*Source: Shuvar market (2011), http://shuvar.com/index.php?mod=page&id=analytic_report*

## 2.3.3. External trade

### Import

In Ukrainian commodities classification of foreign economic activities, dill is not assigned as a separate product category. It is included to the heading 0709909000 of the Ukrainian commodities classification together with parsley, coriander, basil, arugula and other aromatic herbs. The same is for green onions. It is included to the heading 0703900000 "Leek and other bulbous vegetables".

**Table 13. Import of greens and aromatic herbs (Code 0709909000), leeks and other bulbeous vegetables (Code 0703900000) to Ukraine in 2008-2010**

| | 2010 | | | 2009 | | | 2008 | | |
|---|---|---|---|---|---|---|---|---|---|
| | T | % (t) | $/t | t | % (t) | $/t | t | % (t) | $/t |
| Greens and aromatic herbs, total | 2 642 | 100 | 647 | 2 277 | 100 | 598 | 1 765 | 100 | 556 |
| including | | | | | | | | | |
| dill | 1 743 | 66 | 782 | 1 520 | 67 | 363 | 1 036 | 59 | 532 |
| others | 899 | 34 | 387 | 758 | 33 | 1 071 | 729 | 41 | 591 |
| Leek and other bulbous vegetables | 133 | 100 | 1 772 | 119 | 100 | 684 | 119 | 100 | 684 |
| including | | | | | | | | | |
| green onion | 0,56 | 0 | 3 001 | 1,07 | 1 | 446 | 0,74 | 1 | 647 |
| others | 133 | 100 | 1 767 | 118 | 99 | 686 | 118 | 99 | 684 |

*Source: State Statistics Service of Ukraine, estimates of market players (2011)*

Dill is the most demanded type of aromatic herbs that is imported to Ukraine. It accounted for 64% of the imported greens in 2008-2010. Dill is normally imported in November-April; in some years, large volumes were also recorded in May. In November-April, imported dill prevails because of underdeveloped dill production in Ukrainian greenhouses. It is hard to compete by price and quality characteristics with dill from Georgia. In a mild climate of Georgia, farmers grow dill in relatively cheap plastic tunnels and this significantly reduces the cost of production.

Neverthelessprices of imported dill rose considerably in the last three years. In 2010, the price of imported dill was 70% higher than in 2008. It can be explained by the need of Georgian suppliers to invest in new technology for growing, handling, cooling and transportation of greens. Another explanation is the increase of transaction costs at Ukrainian customs where the process of customs registration becomes complicated if the price falls below the established level.

**Table 14. Import of dill to Ukraine in 2008-2010**

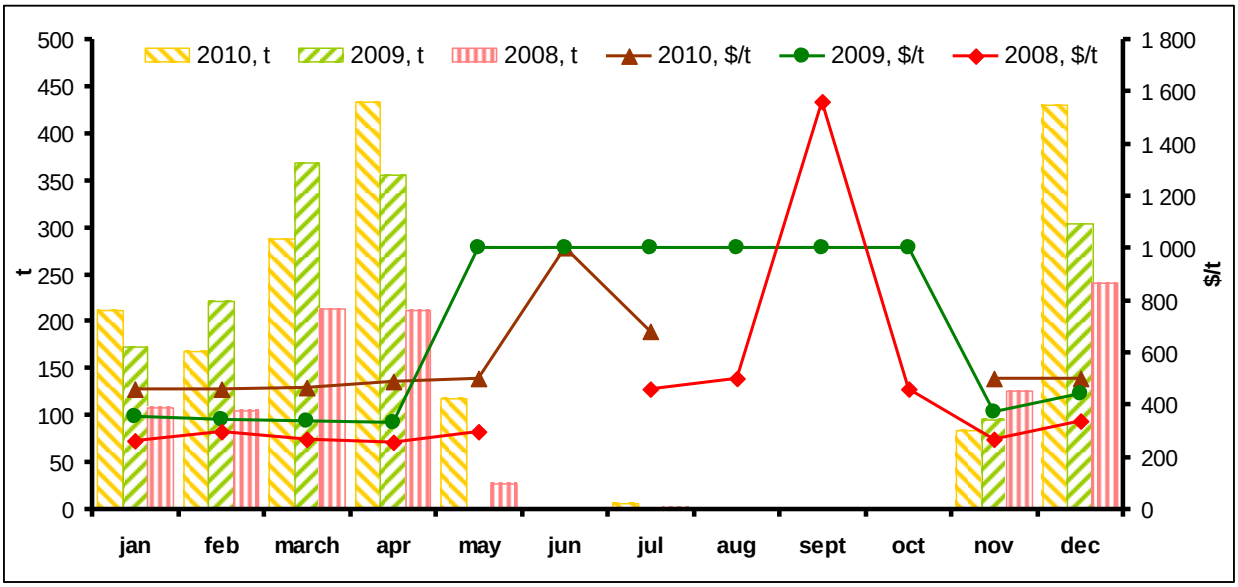
| | t | % (t) | ths $ | $/t |
|---|---|---|---|---|
| **2010** | | | | |
| **Total** | **1 743** | **100** | **844** | **485** |
| Georgia | 1 694 | 97 | 812 | 479 |
| Uzbekistan | 30 | 2 | 20 | 681 |
| Iran | 11 | 1 | 6 | 500 |
| **2009** | | | | |
| **Total** | **1 520** | **100** | **551** | **363** |
| Georgia | 1 471 | 97 | 533 | 362 |
| Iran | 29 | 2 | 9 | 300 |
| Turkey | 18 | 1 | 8 | 469 |
| **2008** | | | | |
| **Total** | **1 036** | **100** | **296** | **285** |
| Georgia | 1 010 | 97 | 283 | 281 |
| Turkey | 10 | 1 | 2 | 181 |

| | t | % (t) | ths $ | $/t |
|---|---|---|---|---|
| Egypt | 7 | 1 | 7 | 921 |

*Source: Estimates of market players (2011)*

When Ukrainian dill from the open ground comes to the market, then imports are almost fully substituted.

**Fig.14. Dynamics of dill import to Ukraine in 2008-2010**




*Source: Based on the estimates of market players (2011)*

In contrast to dill, imports of green onions are very low due to seasonality of consumption of this product. The peak of imports occurs in the period of mass harvesting at the open ground – from the second half of April to the first half of June. In other periods, green onions are consumed by households occasionally. From November to April, the demand for green onion is mainly covered by small greenhouse production.

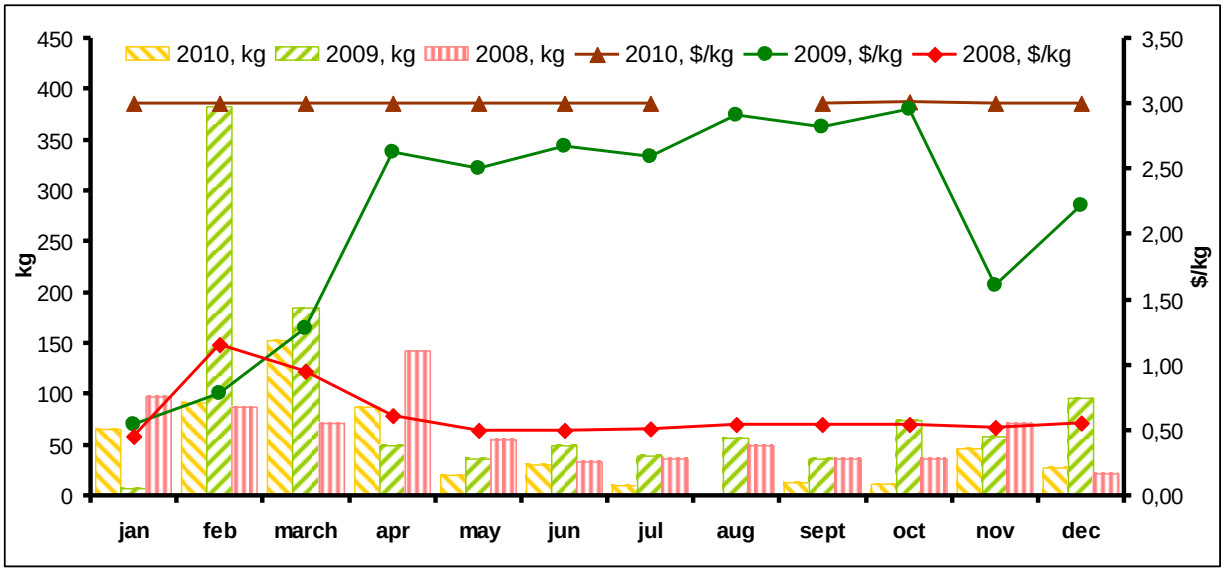
The basis of green onions import to Ukraine is green chives or schnitt that are mainly imported from Israel.

**Table 15. Import of green onions to Ukraine in 2008-2010**

| | kg | % (kg) | ths $ | $/kg |
|---|---|---|---|---|
| **2010** | | | | |
| **Total** | **556,6** | **100** | **1,67** | **3,00** |
| Israel | 552,6 | 99 | 1,66 | 3,00 |
| Netherlands | 4,0 | 1 | 0,01 | 3,01 |
| **2009** | | | | |
| **Total** | **1 071,5** | **100** | **1,79** | **1,67** |
| Israel | 921,0 | 86 | 1,68 | 1,82 |
| France | 110,0 | 10 | 0,09 | 0,80 |
| **2008** | | | | |
| **Total** | **738,0** | **100** | **0,48** | **0,65** |
| Israel | 668,0 | 91 | 0,45 | 0,68 |
| Netherlands | 70,0 | 9 | 0,02 | 0,35 |

*Source: From the estimates of market players (2011)*

**Fig. 15. Dynamics of import of green onions to Ukraine in 2008-2010**




*Source: Estimates of market players (2011)*

**Export**

Because of underdeveloped cultivation of dill in greenhouses, the main periods of exports coincide with harvesting of field dill. Two export peaks can be observed in May-June and September-October. Ukrainian dill is fully supplied to the Russian Federation.

**Table 16. Export of greens and aromatic herbs (Code 0709909000) from Ukraine in 2009-2010**

| | 2010 | | | 2009 | | | 2008 | | |
|---|---|---|---|---|---|---|---|---|---|
| | t | % (t) | $/t | T | % (t) | $/t | t | % (t) | $/t |
| Greens and aromatic herbs, total | 3 716 | 100 | 636 | 4 668 | 100 | 703 | 2 347 | 100 | 979 |
| Including | | | | | | | | | |
| Dill | 1 994 | 54 | 609 | 2 788 | 60 | 701 | n/a | | |
| others | 1 722 | 46 | 667 | 1 880 | 40 | 706 | | | |
| Leek and other bulbous vegetables | 22,07 | 100 | 912 | 6,10 | 100 | 480 | 0,66 | 100 | 2 876 |
| Including | | | | | | | | | |
| green onions | 21,75 | 99 | 840 | 6,04 | 99 | 421 | n/a | | |
| others | 0,32 | 1 | 5 871 | 0,06 | 1 | 6 425 | | | |

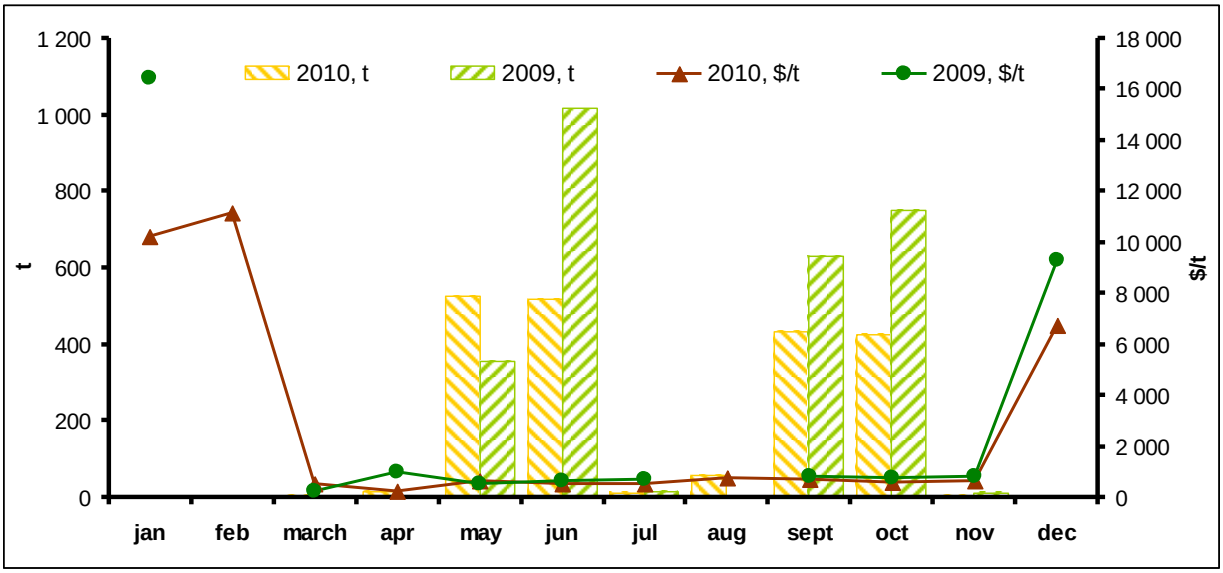
*Source: State Statistics Service of Ukraine, estimates of market players (2011)*

**Table 17. Export of dill from Ukraine in 2009-2010**

| | t | % (t) | ths $ | $/t |
|---|---|---|---|---|
| **2010** | | | | |
| **Total** | **1 994** | **100** | **1 214** | **609** |
| Russian Federation | 1 994 | 100 | 1 212 | 608 |
| **2009** | | | | |
| **Total** | **2 788** | **100** | **1 954** | **701** |
| Russian Federation | 2 788 | 100 | 1 953 | 701 |

*Source: Estimates of market players (2011)*

**Fig. 16. Dynamics of dill export from Ukraine in 2009-2010**




*Source: From the estimates of market players (2011)*

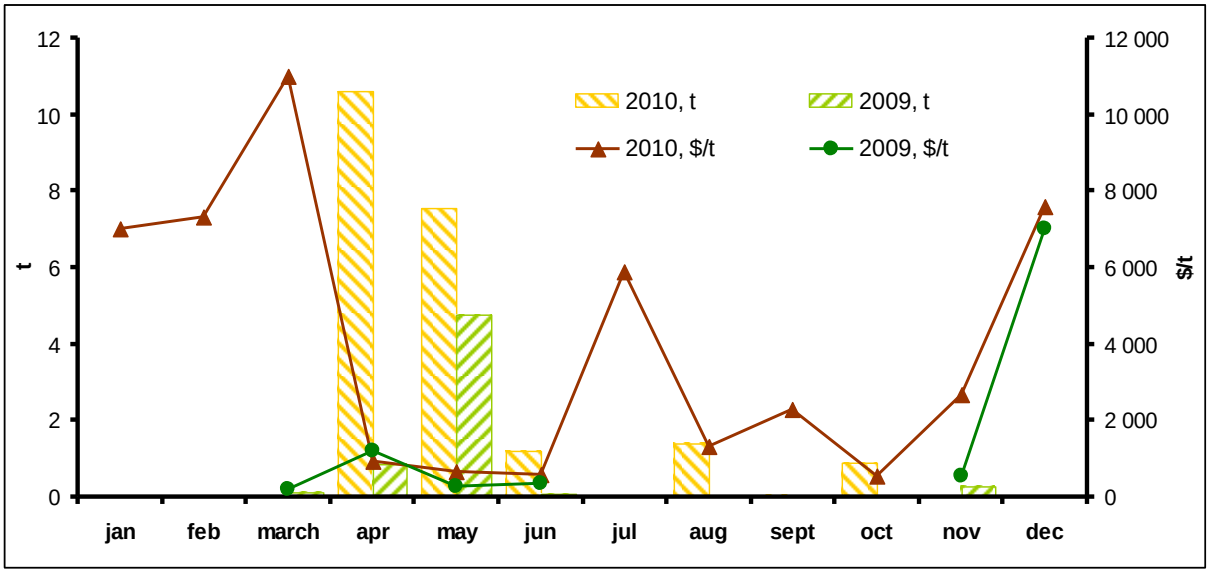
Export of green onions from Ukraine is not well developed; it is mainly exported in the season of mass harvesting at the open ground (from the second half of April to the first half of June). The main consumer is the Russian Federation.

**Table 18. Export of green onions from Ukraine in 2009-2010**

| | T | % (t) | ths $ | $/t |
|---|---|---|---|---|
| **2010** | | | | |
| **Total** | **21,8** | **100** | **18,3** | **840** |
| Russian Federation | 21,7 | 100 | 17,6 | 812 |
| **2009** | | | | |
| **Total** | **6,0** | **100** | **2,5** | **421** |
| Russian Federation | 6,0 | 100 | 2,5 | 419 |

*Source: Based on the estimates of market players (2011)*

**Fig. 17. Dynamics of export of green onions from Ukraine in 2009-2010**




*Source: Estimates of market players (2011)*

## 2.4. Cabbage and salad markets

### 2.4.1. Production figures

Cabbage is one of the most popular vegetable crops in Ukraine. According to official data, in 2008-2010, the average share of cabbage (open ground) in production of all vegetables was 19% or 1582 ths tons. The share of agricultural enterprises in the production structure is slightly over 8% (129 ths tons). The official record of production of different salads is not conducted. Official data on production volumes of cabbages and salads in greenhouses is also absent.

White cabbage is the most widespread and popular sort of cabbages in Ukraine. Cauliflower, Chinese cabbage and red cabbage are less popular. By the estimates of experts, the share of the latter in production structure does not exceed 2-3%.

*White cabbage.* Cabbage is traditionally harvested on the open ground. Complicated requirements towards growing conditions and a long period of growing (110-120 days on average) affect the popularity of cabbage growing in greenhouses. Besides, the main demand for early cabbage, the most profitable for the seller, is traditionally high in spring and lasts only about four months (April-July). In autumn-winter period, the demand for early cabbage is practically absent due to the availability of sufficient volumes of a cheaper winter cabbage. Because of many reasons, early cabbage is almost never grown in glass greenhouses. Only a few greenhouses (located mostly in the southern regions) are engaged in growing of early cabbage in winter period. In addition, production target is the performance of long-term contractual agreements with major retail chains that express a demi-season demand in order to diversify the assortment or for realization in the HoReCa sector. At the end of 2010, production of early cabbage in glass greenhouses was 300-400 tons. Besides, some glass greenhouses have their own area for growing of cabbage seedlings. The main volumes of early cabbage seedlings grown in greenhouses are produced in film greenhouses, polytunnels and temporary film shelters (arcs). Cabbage for early harvest is usually sown in early February. The crop is harvested in mid-May – early June with possible postponements that can be caused by climatic conditions. According to the estimates of our experts, production volumes of raripe cabbage accounted for 40-60 thousand tons with average yields of 6.8 kg/m$^2$ in 2008-2010. The total area used by all types of greenhouses and shelters was 650-700 hectares.

*Cauliflower.* Cauliflower is a special crop among other types of cabbage. At all stages of its development, it is very sensitive to the slightest changes in growing conditions. In comparison with white cabbage, cauliflower is less stable to low temperatures. At the same time, cauliflower is the second most popular crop after white cabbage. In 2008-2010, the average volume of large-scale commercial production of this crop (excluding private households) was estimated at the level of 1.3 ths tons by the official statistics data. Experts estimate that the real output is at least 7 times higher and can account for about 9-10 ths tons. However, there is no greenhouse production of cauliflower in Ukraine. The only use of greenhouse technology is a film cover for growing of seedlings by individual producers.

*Chinese cabbage.* In recent years, the demand for Chinese cabbage has been growing and the area of its production has grown considerably. Taking into account the growing consumer demand, we forecast that Chinese cabbage can be transformed from an obscure, occasionally grown vegetable to the important industrialized crop in Ukraine. Conditions for cultivation are good both in the open ground and in greenhouses, whereas Chinese cabbage preserves its marketability and freshness during a long term. Current market capacity of Chinese cabbage is estimated at the level of 2-2.5 thousand tons per year; in the last five years, the market demonstrates a stable positive growth trend. The main growth of the market was due to import of Chinese cabbage of Polish production. At the same time, Ukrainain producers become also interested in production of Chinese cabbage. According to our experts and survey of producers, Chinese cabbage production amounted to about 1.3-1.6 ths tons. By type of cultivation, Chinese cabbage is divided into two groups, spring and fall planting. In Ukraine, the second type is the most popular; it has great potential for long-term storage after harvest. Chinese cabbage is grown mainly by the seedling way, either in cassetes or pots. Similarlyc to cauliflower, film shelters are used only for seedlings growing. Currently, Chinese cabbage is grown quite rarely in glass greenhouses, most often as an experimental crop. Production volumes are estimated at the level of 200-250 tons in 2010. The crop yields equal to 6.8

kg/sq.m when cultivated separately, whereas consolidated cultivation brings about yields of 2.5-4.0 kg /sq.m.

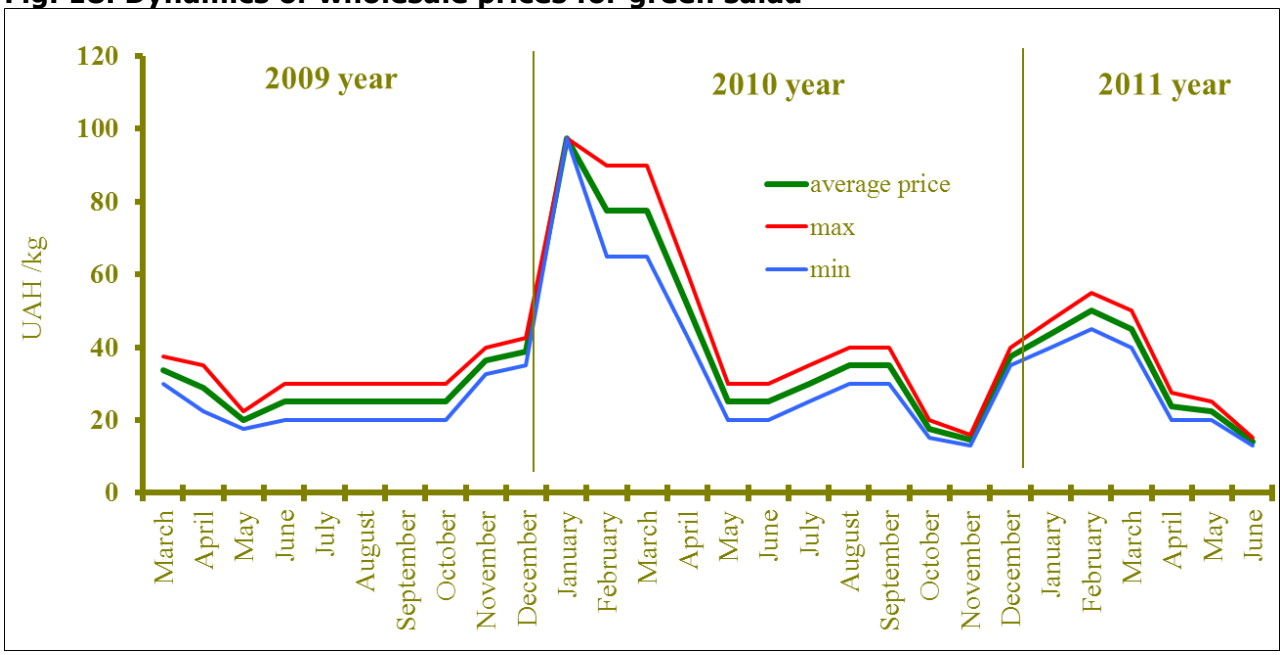
*Salad.* Consumption of salads in Ukraine is still at the low level in comparison with the world averages. According to FAO, consumption of salads in Ukraine is 0.23 kg/per capita/year, whereas the world average is 5.9 kg/per capita/year. Besides underdeveloped consumer habits, marketing of salads requires profound support. Plants of lettuce quickly lose marketability conditions. Substantial additional costs for special packaging and fridges are necessary for successful sales.

Currently, production of salads is estimated at the level of 11.0 ths tons. Large-scale producers have the share of 3.5 ths tons. Greenhouse areas under the crop are small and do not exceed 130-150 ha of film greenhouses mainly. Glass greenhouses do not specialize in growing salads. The most popular variety in the production of salads is Batavia. Salad is usually grown as a bundle, sometimes as a rosette. If the plant is cultivated as the bundle, then the yields are 1.6-2.4 kg/sq.m. If cultivated as the rosette, there are 20-50 plants per 1 sq.m and the yields are lower, 0.6-1.2 kg/sq.m. Given special requirements towards marketability, these yields certainly do not contribute to the interest of producers to grow the crop in greenhouses. In the greenhouses specialized in growing salads and other greens, yields are at the level of 6.5-8.5 kg/sq.m. However, except for "DC Kiev", there are only a few greenhouses that grow salads and other greens in Ukraine.

## 2.4.2. Price dynamics

Initially, Ukrainian consumers perceived salads as an opportunity to diversify their diet from time to time in the winter-spring period, especially when there was a shortage of fresh green vegetables while imported products dominated the market. With the development of HoReCa segment and large retail chains, these products became more common in the diet of Ukrainian people, especially in urban areas, leading to growing interest of Ukrainian greenhouse sector in these crops.

**Fig. 18. Dynamics of wholesale prices for green salad**



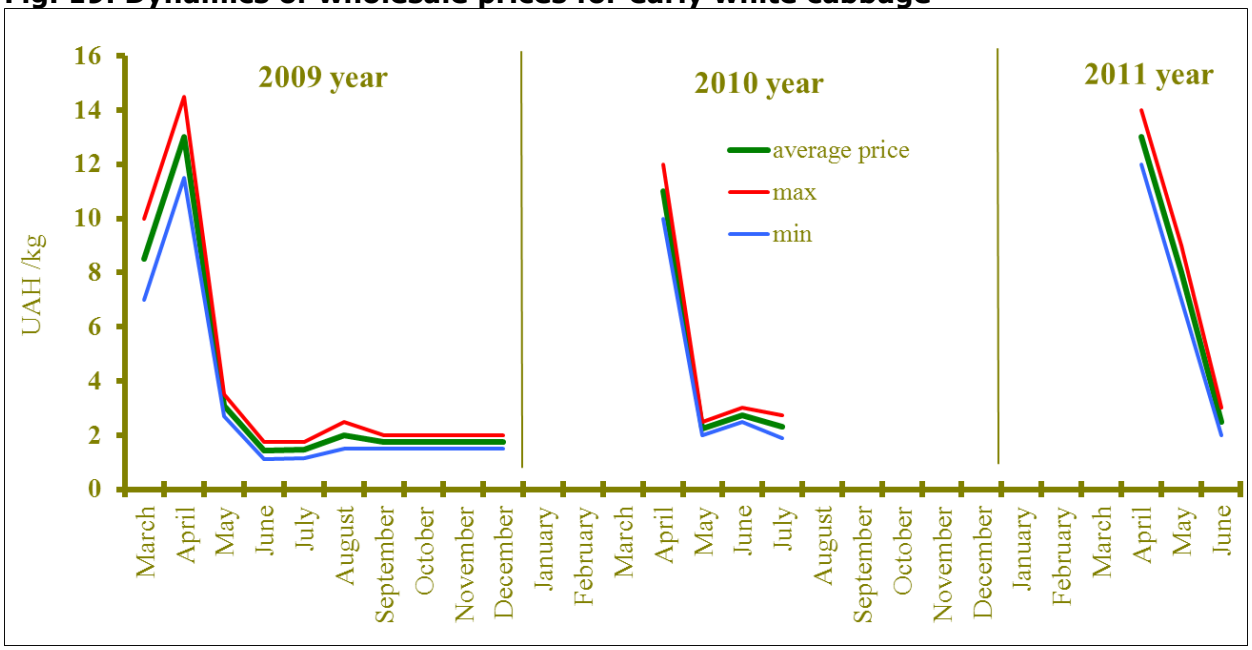

*Source: Shuvar market (2011), http://shuvar.com/index.php?mod=page&id=analytic_report*

Record high prices for white cabbage in winter-spring 2011 strengthened the position of salads in the market. This led to a sharp increase of consumption of salads. Consequently, imports and domestic production of salads increased and thisled to lower prices as well as to smoothing the effects of seasonality that were observed in 2010.

Market of early cabbage is characterized by a pronounced seasonality of consumption that affects pricing. This crop the first salad-type fresh vegetable that appears in the market in early April and, therefore, enjoys high demand from consumers. Initial prices for early cabbage

are in the range of 10-12 UAH / kg (0,90-1,08 EUR / kg) but, a month later, prices decrease to 2-2.5 UAH / kg (0,18-,23 EUR / kg) with further downward tendency. The exception was 2011 when a poor harvest of cabbage in 2010 resulted in a sharp price increase. Consequently, prices for early cabbage were at the level of 7 UAH / kg (0,63 EUR / kg) in May 2011.

**Fig. 19. Dynamics of wholesale prices for early white cabbage**




*Source: Shuvar market (2011), http://shuvar.com/index.php?mod=page&id=analytic_report*

## 2.4.3. External trade

### Import

Import of cabbage to Ukraine is underdeveloped. The most stable supplies are cauliflower and broccoli: between one and two ths tons in 2008-2010. Other types of cabbage are imported in small batches, mostly to diversify the range of goods in large retail chains. The main reason of small import volumes is low domestic demand for these types of cabbage. The exception is white cabbage which has a high demand inside the country. For example, in 2010, large imports were caused by a cold winter. There is a lack of storage facilities in Ukraine and, thus, around 30% of the harvest got lost.

With regard to salads, import plays a prominent role in the Ukrainian market. Lettuce trade turnover is estimated at the level of 3,2 ths ton at the moment. In 2008-2010, import supplies of lettuce vegetables varied in the range 1-1,4 ths ton, in other words, one third of the market. The major part of import is lettuce salad which accounts for 90% in the structure of import.

Cabbage import is significant in January-May when there is not enough domestic produce. Greenhouse products are also imported. Starting from February, the first batches of spring white cabbage come to the market.

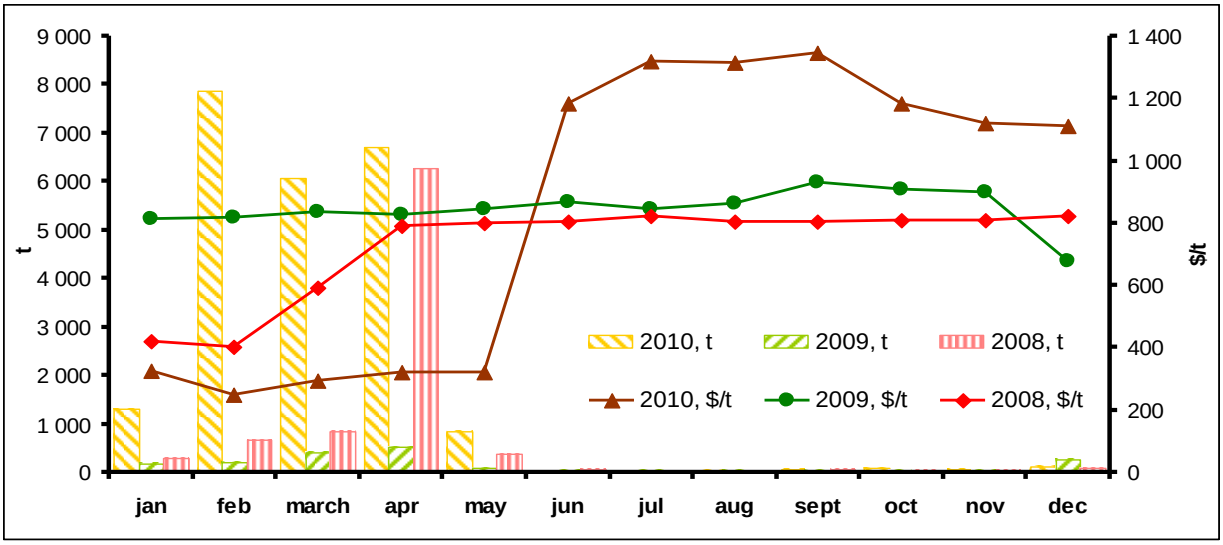
**Table 19. Import of cabbage (Code 0704) and salads (Code 0704, 07099010) to Ukraine in 2008-10**

| | 2010 | | | 2009 | | | 2008 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ths t | % (t) | $/t | ths t | % (t) | $/t | ths t | % (t) | $/t |
| Cabbage of all types | 23,17 | 100 | 303 | 1,85 | 100 | 811 | 8,76 | 100 | 730 |
| including | | | | | | | | | |
| Cauliflower and broccoli | 1,21 | 5 | 980 | 1,12 | 61 | 834 | 1,75 | 20 | 667 |
| Brussels sprouts | 0,08 | 0 | 1 037 | 0,07 | 4 | 880 | 0,03 | 0 | 671 |
| White cabbage and red cabbage | 21,63 | 93 | 255 | 0,42 | 23 | 727 | 6,13 | 70 | 740 |
| other (kohlrabi, savoy | 0,25 | 1 | 915 | 0,24 | 13 | 829 | 0,85 | 10 | 791 |

| | 2010 | | | 2009 | | | 2008 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ths t | % (t) | $/t | ths t | % (t) | $/t | ths t | % (t) | $/t |
| cabbage, Chinese cabbage etc.) | | | | | | | | | |
| Salad vegetables | 1,31 | 100 | 1 798 | 0,98 | 100 | 1 630 | 1,39 | 100 | 1 235 |
| including | | | | | | | | | |
| Lettuce salad and chicory | 1,18 | 90 | 1 754 | 0,93 | 95 | 1 617 | 1,30 | 94 | 1 231 |
| other salad vegetables | 0,14 | 10 | 2 169 | 0,05 | 5 | 1 863 | 0,08 | 6 | 1 286 |

*Source: State Statistics Service of Ukraine (2011)*

**Fig. 20. Dynamics of import of all types of cabbage to Ukraine in 2008-2010**




*Source: State Statistics Service of Ukraine (2011)*

The main suppliers of white cabbage to Ukraine in 2010 were Poland and Georgia. Early cabbages come from the Netherlands, France, and Spain.

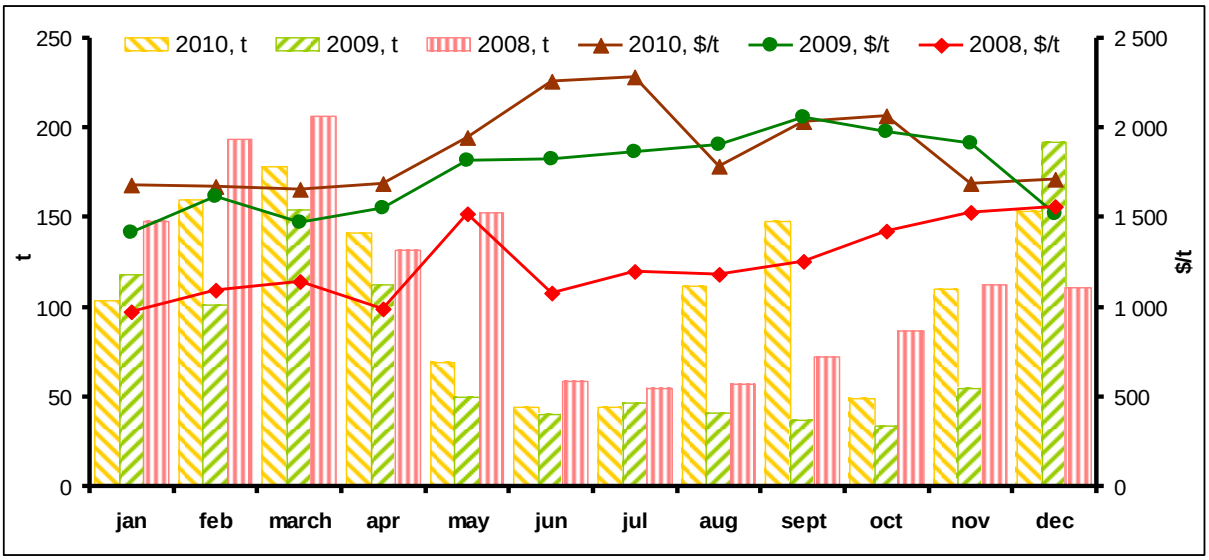
**Table 20. Import of all types of cabbage to Ukraine in 2008-2010**

| | T | % (t) | ths $ | $/t |
|---|---|---|---|---|
| **2010** | | | | |
| **Total** | **23 168** | **100** | **7 009** | **303** |
| Poland | 11 582 | 50 | 2 968 | 256 |
| Georgia | 7 915 | 34 | 1 683 | 213 |
| Belarus | 721 | 3 | 209 | 289 |
| France | 602 | 3 | 574 | 955 |
| Macedonia | 519 | 2 | 472 | 909 |
| **2009** | | | | |
| **Total** | **1 851** | **100** | **1 500** | **811** |
| France | 688 | 37 | 574 | 834 |
| Netherlands | 196 | 11 | 171 | 873 |
| Spain | 193 | 10 | 163 | 845 |
| Poland | 187 | 10 | 158 | 846 |
| Turkey | 182 | 10 | 150 | 821 |
| **2008** | | | | |
| **Total** | **8 757** | **100** | **6 396** | **730** |
| Poland | 2 601 | 30 | 2 079 | 799 |
| Georgia | 1 885 | 22 | 1 301 | 690 |
| France | 1 204 | 14 | 807 | 670 |
| Azerbaijan | 785 | 9 | 518 | 659 |
| Netherlands | 418 | 5 | 328 | 785 |

*Source: State Statistics Service of Ukraine (2011)*

On one hand, lettuce import is seasonal with major volumes coming to the market in November-April when Ukrainian products are not available. On the other hand, supplies in the period from May till October decrease but they remain considerable and stable. It is caused by the growing demand for these products. Thus, domestic production can not provide neither enough volumes nor assortment.

**Fig. 21. Dynamics of import of salads and lettuce vegetables in 2008-2010**




*Source: State Statistics Service of Ukraine (2011)*

The main suppliers of salad vegetables to Ukraine are Spain, the Netherlands and Italy. In total, they account for more than 90% of all supplies.

**Table 21. Import of salads and lettuce vegetables to Ukraine in 2008-2010**

| | T | % (t) | ths $ | $/t |
|---|---|---|---|---|
| **2010** | | | | |
| **Total** | **1 313** | **100** | **2 361** | **1 798** |
| Spain | 654 | 50 | 1 049 | 1 603 |
| Netherlands | 425 | 32 | 844 | 1 988 |
| Italy | 116 | 9 | 239 | 2 059 |
| **2009** | | | | |
| **Total** | **981** | **100** | **1 599** | **1 630** |
| Spain | 574 | 58 | 848 | 1 478 |
| Netherlands | 273 | 28 | 489 | 1 790 |
| Italy | 65 | 7 | 118 | 1 829 |
| **2008** | | | | |
| **Total** | **1 387** | **100** | **1 713** | **1 235** |
| Spain | 691 | 50 | 920 | 1 332 |
| Netherlands | 435 | 31 | 512 | 1 178 |
| Italy | 158 | 11 | 156 | 989 |

*Source: State Statistics Service of Ukraine (2011)*

**Export**

Cabbage export is characterized by small volumes of supplies. The highest result of 2010 did not exceed 10 ths ton. At that, the main export positon is early spring white cabbage. Mass exports take place in May-August. In the period from September till April, export supplies also occur but they are small. Basically, they could have been bigger, if Ukraine had had enough modern storage facilities.

Export supplies of salads demonstrated a stable upward trend in the last three years but still were characterized by low volumes. In 2010, they amounted to 147 ton.

**Table 22. Export of cabbage (Code 0704) and salads (Code 0704, 07099010) from Ukraine in 2008-2010**

| | 2010 | | | 2009 | | | 2008 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ths t | % (t) | $/t | ths t | % (t) | $/t | ths t | % (t) | $/t |
| Cabbage of all types | 9,94 | 100 | 253 | 2,63 | 100 | 302 | 2,07 | 100 | 327 |
| including | | | | | | | | | |
| White cabbage and red cabbage | 9,40 | 95 | 240 | 1,96 | 74 | 258 | 1,56 | 75 | 295 |
| other (kohlrabi, savoy cabbage, Chinese cabbage etc.) | 0,54 | 5 | 480 | 0,67 | 25 | 431 | 0,50 | 24 | 424 |
| Salad vegetables | 0,15 | 100 | 917 | 0,13 | 100 | 767 | 0,09 | 100 | 1 135 |
| including | | | | | | | | | |
| Lettuce salad and chicory | 0,15 | 98 | 907 | 0,05 | 35 | 912 | 0,03 | 37 | 1 276 |
| other salad vegetables | 0,00 | 2 | 1 353 | 0,09 | 65 | 688 | 0,06 | 63 | 1 053 |

*Source: State Statistics Service of Ukraine (2011)*

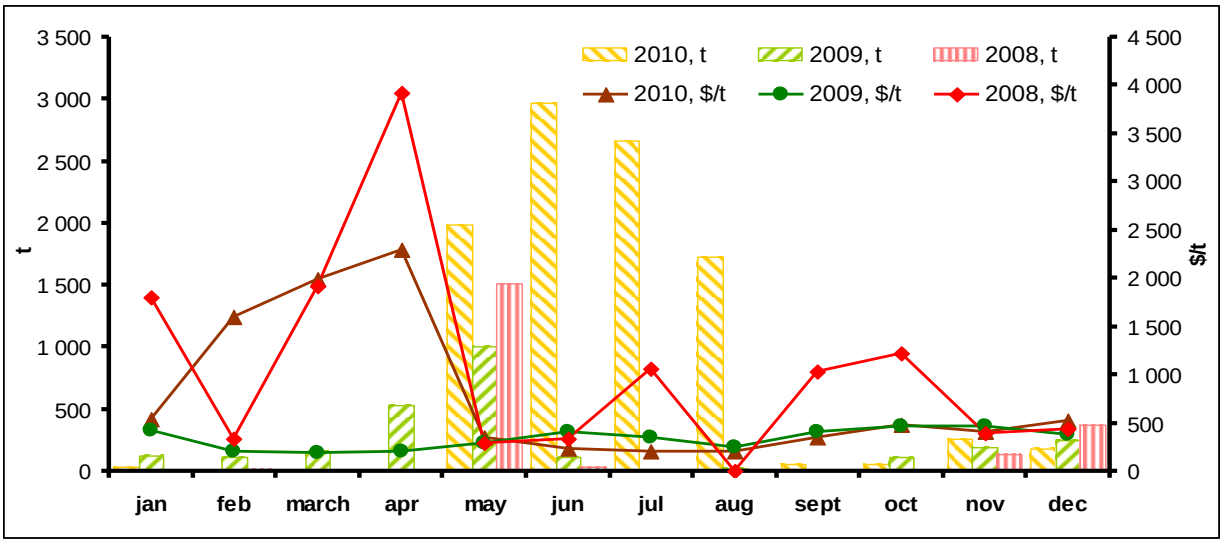
The main importers of cabbage from Ukraine are Russian Federation and Belarus.

**Table 23. Export of all types of cabbage from Ukraine in 2008-2010**

| | T | % (t) | ths $ | $/t |
|---|---|---|---|---|
| **2010** | | | | |
| **Total** | **9 939** | **100** | **2 514** | **253** |
| Russian Federation | 7 598 | 76 | 1 695 | 223 |
| Belarus | 2 183 | 22 | 778 | 356 |
| **2009** | | | | |
| **Total** | **2 633** | **100** | **794** | **302** |
| Russian Federation | 1 569 | 60 | 499 | 318 |
| Belarus | 845 | 32 | 259 | 307 |
| **2008** | | | | |
| **Total** | **2 071** | **100** | **677** | **327** |
| Russian Federation | 1 460 | 70 | 510 | 349 |
| Belarus | 559 | 27 | 151 | 270 |

*Source: State Statistics Service of Ukraine (2011)*

**Fig. 22. Dynamics of export of all types of cabbage from Ukraine in 2008-2010**




*Source: State Statistics Service of Ukraine (2011)*

Export of salads from Ukraine takes place in two periods, from March to May and from October to December. Such export peaks demonstrate that greenhouse products prevail in the export structure. Almost all Ukrainian salads are exported to Russian Federation.

**Table 24. Export of salads and lettuce vegetables from Ukraine in 2008-2010**

| | T | % (t) | ths $ | $/t |
|---|---|---|---|---|
| **2010** | | | | |
| **Total** | **151** | **100** | **138** | **917** |
| Russian Federation | 150 | 99 | 132 | 880 |
| **2009** | | | | |
| **Total** | **131** | **100** | **101** | **767** |
| Russian Federation | 131 | 100 | 98 | 747 |
| **2008** | | | | |
| **Total** | **92** | **100** | **104** | **1 135** |
| Russian Federation | 91 | 100 | 103 | 1 131 |

*Source: State Statistics Service of Ukraine (2011)*

# 2.5. Flowers, ornamental plants and nursery products

## 2.5.1. Production figures

In early 2000s, flower market in Ukraine was estimated at the level of USD 12-14 mln. The share of cut flowers accounted for 75-80%. The major supply of cut flowers came from imports; the share of import accounted for 80-85%. In the following ten years, flower market increased more than sevenfold to USD 100 mln. The proportion of flower cut remained at the level of 70%. During this period, more than a dozen of new large and medium-size enterprises have developed in Ukraine. By using the Dutch technology of cultivation of roses, modernizing old greenhouses and constructing new modern ones, Ukrainian flower growers got the major share of the market and managed to substitute imports. Currently, the share of imported flowers is 40-45%.

The use of greenhouse technology is the most popular both for growing cut flowers and flowers in pots. According to official data, more than 90% of flowers are produced in greenhouses annually. The most practical and least expensive are the greenhouses of hangar type that are widely used in Ukraine for commercial cultivation of flowers. The total area under glass greenhouses specialized in flower cultivation is estimated at the level of 115-120 ha but the actually used area is smaller. Because of post-crisis decline in purchasing power of the population and due to increase of energy costs, some areas have been reorientated towards growing of vegetables where the demand remained more or less stable. In 2010, the total area of greenhouses used for growing flowers was 90-95 ha. Flower cultivation in film greenhouses is poorly developed.

The main flower for cut-off is the rose; it has more than 95% in the production structure. Carnations, chrysanthemum, tulips, gladioli, irises, and gerbera are also popular. In general, current production capacity of domestic greenhouses accounts for 110-120 million flowers per year (mostly roses). These, according to expert estimates, can satisfy 80% of the market demand.

**Table 25. Production of flowers in 2008-2010**

| | Cut flowers, ths pcs. | | | Flower seedlings, ths pcs. | Flower nurslings, ths pcs. |
|---|---|---|---|---|---|
| | total | roses | carnations | | |
| 2008 | 74 536 | 70 668 | 81 | 4 805 | 1 587 |
| 2009 | 72 364 | 71 327 | 82 | 5 029 | 2 389 |
| 2010 | 80 135 | 78 548 | 11 | 6 240 | 1 045 |

*Source: State Statistics Service of Ukraine (2011)*

In 2010, 40 enterprises cultivated flowers for cut-off. Only 14 of them were growing flowers in greenhouses. Despite a large number of players, the major market is traditionally distributed by only five or six companies. According to official statistics, in 2008-2010, the five largest producers of cut flowers provided 90% of the total production of cut flowers. The "Askania-

Flora" company (founded in 2000) has the major share of 54.3%. In recent years, the company has consistently been a leader in production of cut flowers. Currently, the company has two modern greenhouse complexes with total area of more than 22 hectares and is the largest in Ukraine. In addition, according to the estimates, "Askania-Flora" is also the largest company in Europe by total areas used for planting roses.

**Table 26. TOP-5 largest producers of cut flowers in 2008-2010, ths pcs.**

| | 2010 | | 2008 | |
|---|---|---|---|---|
| | amount | share, % | Amount | share, % |
| "Askania-Flora" | 43 559 | 54,4% | 31 885 | 42,8% |
| "Tandem" | 10 476 | 13,1% | 7 506 | 10,1% |
| "Ukraflora-Vinnytsya" | 9 346 | 11,7% | 15 949 | 21,4% |
| "Camelia" | 7 650 | 9,5% | 5 500 | 7,4% |
| "Alyans" | 2 894 | 3,6% | - | - |
| "Viktoria" | 2 056 | 2,6% | 4 114 | 5,5% |

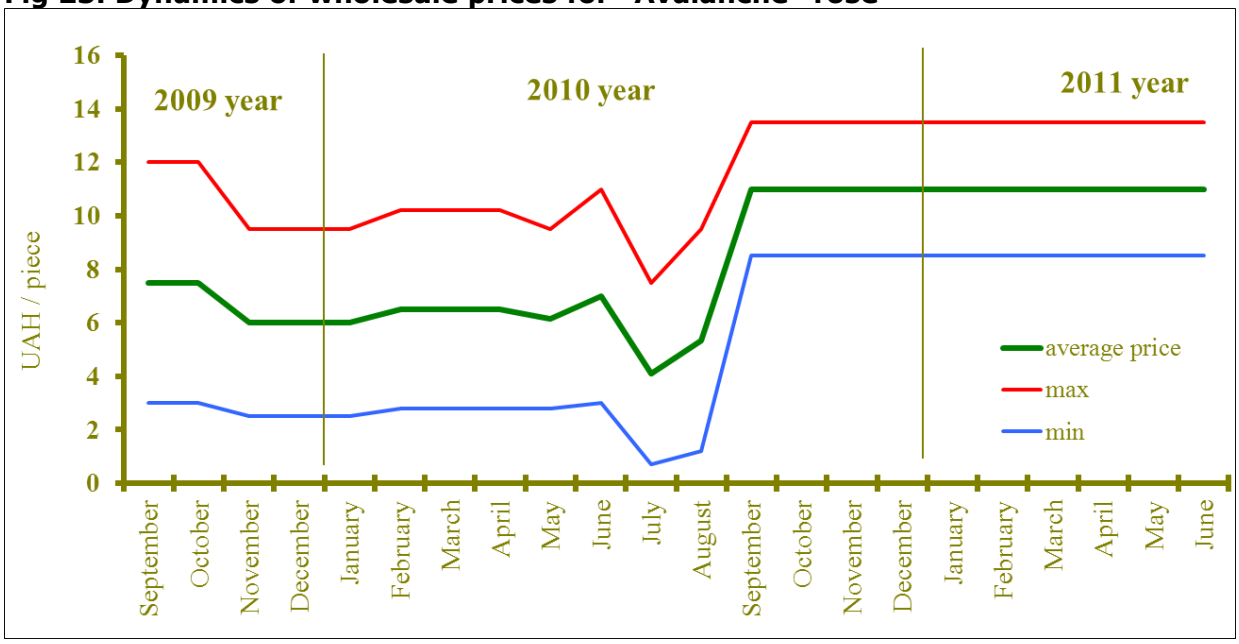
*Source: UCAB data based on estimates of market operators (2011)*

## 2.5.2. Price dynamics

The feature of the Ukrainian market of cut flowers is the absence of the purchasing habit to buy flowers regularly for aesthetic goals. Ukrainian consumers buy flowers mainly on holidays. Peak sales are on March 8, September 1, etc. This practice leads to significant price volatility in the market. The retail markup can reach 100-150% in the holiday season.

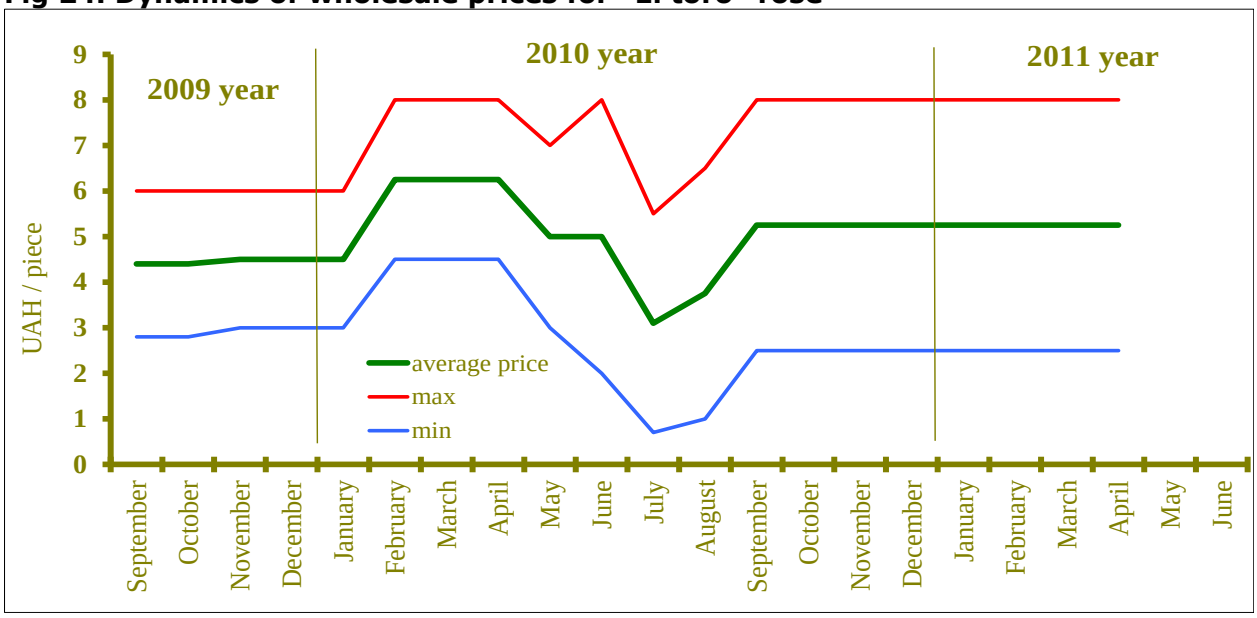
There is a significant share of imported products in this product segment and, thus, import is an indicative factor of pricing. Rose has the leading position in terms of purchasing priorities and, according to market operators, has more than 80% of all sales in the market.

**Fig 23. Dynamics of wholesale prices for "Avalanche" rose**




*Source: Shuvar market (2011), http://shuvar.com/index.php?mod=page&id=analytic_report*

**Fig 24. Dynamics of wholesale prices for "El toro" rose**




*Source: Shuvar market (2011), http://shuvar.com/index.php?mod=page&id=analytic_report*

## 2.5.3. External trade

Taking into account the fact that our research was related to the commodities market of the greenhouse sector and, thus, there is a big variety of decorative deciduous and floral products, we investigated only two groups in detail. They were:

- plants for greenhouses (Codes 06029070, 06029091, 06029099), hereafter plotted plants;
- fresh cut flowers (Codes 06031010, 06031020, 06031030, 06031040, 06031050, 06031080).

**Import**

**Plotted plants.** Decorative deciduous and floral plants are intended for planting of greenery in internal spaces (apartments, offices, salons, winter gardens, etc.). These products are mostly imported to Ukraine from the Netherlands. It is worth to mention that the share of the Netherlands in 2008-2010 was not lower than 95% and accounted for 98% in 2009-2010.

**Table 27. Import of plotted plants to Ukraine in 2008-2010**

| | 2010 | | | 2009 | | | 2008 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ths t | mln $ | $/t | ths t | mln $ | $/t | ths t | mln $ | $/t |
| plants for greenhouses | 3,88 | 10,18 | 2 626 | 5,79 | 9,67 | 1 671 | 9,02 | 13,16 | 1 460 |
| rooted cuttings and nurslings, excluding cactuses | 1,28 | 2,26 | 1 769 | 2,16 | 3,27 | 1 511 | 2,52 | 4,05 | 1 609 |
| bloomers with buds and flowers, excluding cactuses | 1,31 | 3,87 | 2 951 | 1,49 | 3,27 | 2 191 | 2,30 | 4,62 | 2 011 |
| Others | 1,29 | 4,05 | 3 147 | 2,13 | 3,13 | 1 469 | 4,20 | 4,49 | 1 069 |

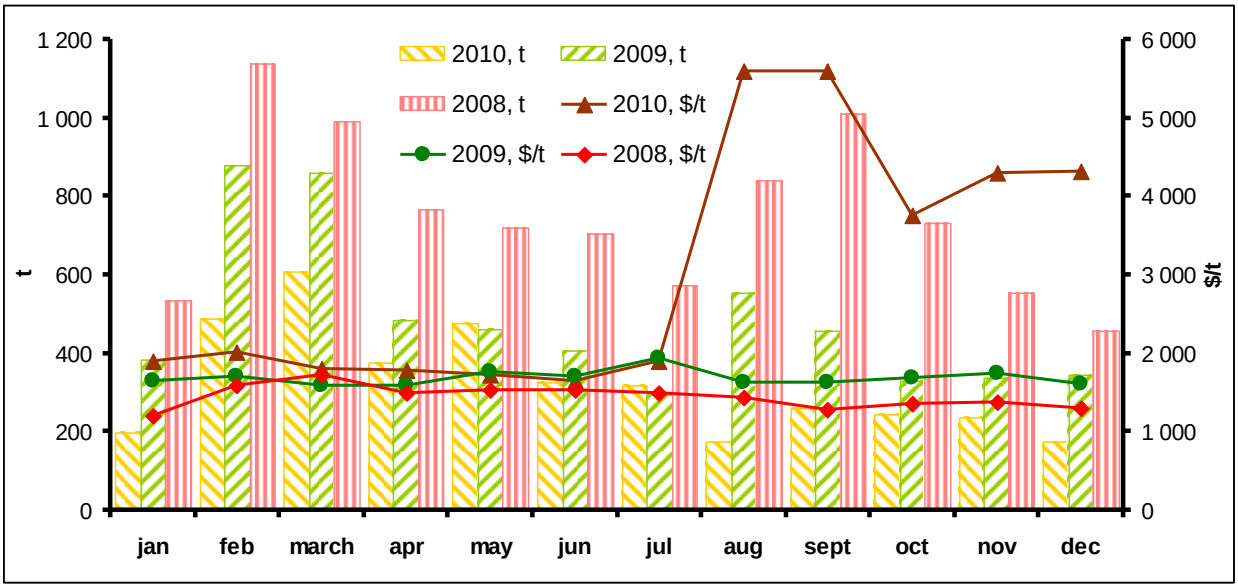
*Source: State Statistics Service of Ukraine (2011)*

**Table 28. Geographical structure of import supplies of plotted plants to Ukraine**

| 2010 | | | 2009 | | | 2008 | | |
|---|---|---|---|---|---|---|---|---|
| | mln $ | % | | mln $ | % | | mln $ | % |
| | **10,18** | **100** | | **9,67** | **100** | | **13,16** | **100** |
| Netherlands | 9,94 | 98 | Netherlands | 9,43 | 98 | Netherlands | 12,47 | 95 |
| Poland | 0,11 | 1 | Poland | 0,18 | 2 | Poland | 0,47 | 4 |

*Source: State Statistics Service of Ukraine (2011)*

**Fig. 25. Dynamics of import of plotted plants to Ukraine in 2008-2010**




*Source: State Statistics Service of Ukraine (2011)*

There is a stable downward trend in import of potted plants in kind. This can be explained by a decrease in purchasing power of the population and the development of local production.

**Fresh cut flowers.** Insufficient range of Ukrainian products, weak agricultural technology, high cost of most technological processes and insufficient supplies to meet domestic demand contribute to considerable import supplies. In 2008, comparing to the previous year, the volumes of import of fresh-cut flowers increased more than twice and reached the level of $42 mln. Despite a considerable decrease of import supplies to the level of $28-32 mln in 2009-2010, they are still significant. The main reason for reduction of imports is a decline of purchasing power of Ukrainian consumers caused by 60% devaluation of Ukrainian hryvnia.

The Netherlands is the main supplier of fresh-cut flowers to Ukraine. It supplies almost entire floral assortment. The share of the Netherlands exceeds 90% for some types of flowers, for example, orchids, gladioli, chrysanthemum and other floral products. More than half of fresh roses come from Ecuador and more than two-thirds of imported carnations come from Turkey.

**Table 29. Import of fresh cut flowers into Ukraine in 2008-2010**

| | 2010 | | | | 2009 | | | | 2008 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ths t | mln pcs | mln $ | $/pcs | ths t | mln pcs | mln $ | $/pcs | ths t | mln pcs | mln $ | $/pcs |
| Fresh cut flowers | 6,2 | 99,8 | 32,4 | 0,32 | 6,2 | 94,2 | 28,4 | 0,30 | 9,3 | 123,4 | 42,3 | 0,34 |
| roses | 2,1 | 24,8 | 13,8 | 0,56 | 1,8 | 18,8 | 10,2 | 0,54 | 3,3 | 32,1 | 17,7 | 0,55 |
| carnations | 2,1 | 58,1 | 7,0 | 0,12 | 2,7 | 63,9 | 8,1 | 0,13 | 3,7 | 79,7 | 11,6 | 0,15 |
| orchids | 0,0 | 0,2 | 1,1 | 4,92 | 0,0 | 0,2 | 0,8 | 3,90 | 0,1 | 0,3 | 0,9 | 3,34 |
| gladioli | 0,0 | 0,1 | 0,1 | 1,27 | 0,0 | 0,0 | 0,0 | 1,08 | 0,0 | 0,0 | 0,0 | 0,92 |
| chrysantemum | 1,4 | 16,6 | 6,6 | 0,40 | 1,0 | 11,3 | 5,2 | 0,47 | 1,1 | 11,2 | 5,6 | 0,49 |
| others | 0,6 | | 3,8 | | 0,6 | | 4,1 | | 1,2 | | 6,6 | |

*Source: State Statistics Service of Ukraine (2011)*

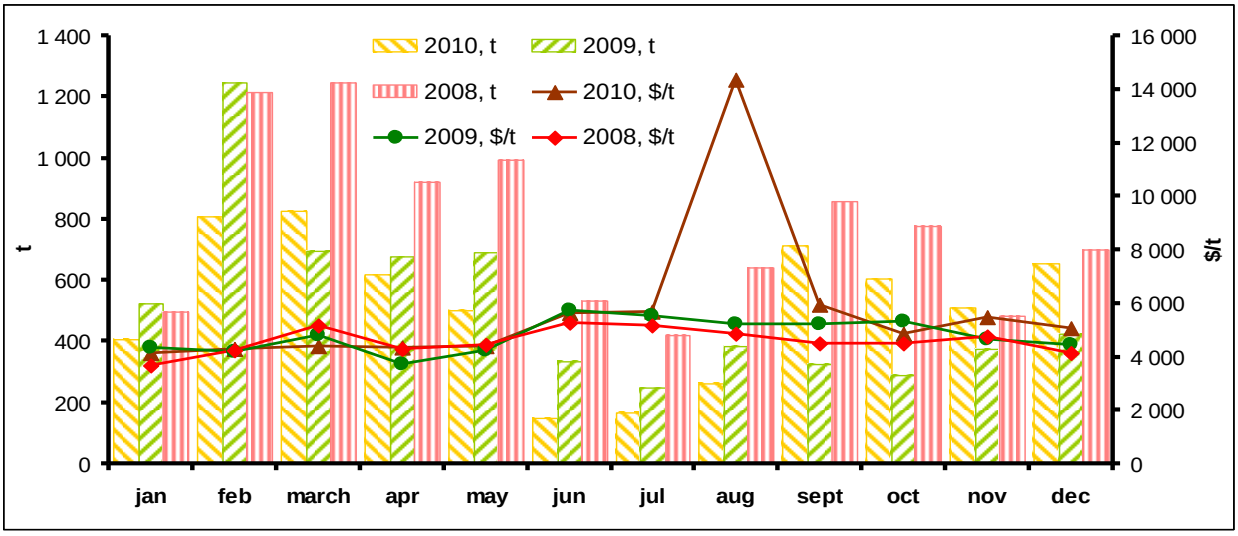
**Table 30. Geographical structure of import of fresh cut flowers to Ukraine in 2008-2010, calculated by price indicator**

| | 2010 | | 2009 | | 2008 | |
|---|---|---|---|---|---|---|
| commodity | Country | % | country | % | country | % |
| Fresh cut flowers, total | Netherlands | 38 | Netherlands | 38 | Netherlands | 37 |
| | Ecuador | 24 | Ecuador | 26 | Ecuador | 29 |
| | Colombia | 18 | Turkey | 21 | Turkey | 15 |
| Roses | Ecuador | 51 | Ecuador | 54 | Ecuador | 51 |
| | Colombia | 30 | Netherlands | 20 | Netherlands | 29 |
| | Netherlands | 14 | Colombia | 19 | Colombia | 16 |
| Carnations | Turkey | 75 | Turkey | 69 | Turkey | 50 |

| | 2010 | | 2009 | | 2008 | |
|---|---|---|---|---|---|---|
| **commodity** | **Country** | **%** | **country** | **%** | **country** | **%** |
| | Colombia | 20 | Colombia | 14 | Colombia | 26 |
| | Ecuador | 3 | Ecuador | 13 | Ecuador | 19 |
| Orchids | Netherlands | 96 | Netherlands | 97 | Netherlands | 93 |
| | Israel | 4 | Thailand | 3 | Thailand | 6 |
| Gladioli | Netherlands | 100 | Netherlands | 97 | Netherlands | 98 |
| Chrysanthemum | Netherlands | 95 | Netherlands | 93 | Netherlands | 92 |
| others | Netherlands | 79 | Netherlands | 70 | Netherlands | 66 |
| | Ecuador | 8 | Ecuador | 12 | Ecuador | 14 |
| | Israel | 4 | Turkey | 7 | Turkey | 7 |

*Source: State Statistics Service of Ukraine (2011)*

**Fig. 26. Dynamics of import of fresh cut flowers into Ukraine in 2008-2010**




*Source: State Statistics Service of Ukraine (2011)*

**Export**

Export of potted plants and fresh cut flowers from Ukraine are very rare. In 2010, total exports of both potted plants and fresh cut flowers amounted to USD15.6 ths.

## 2.6. Prospects for development of greenhouse production in Ukraine

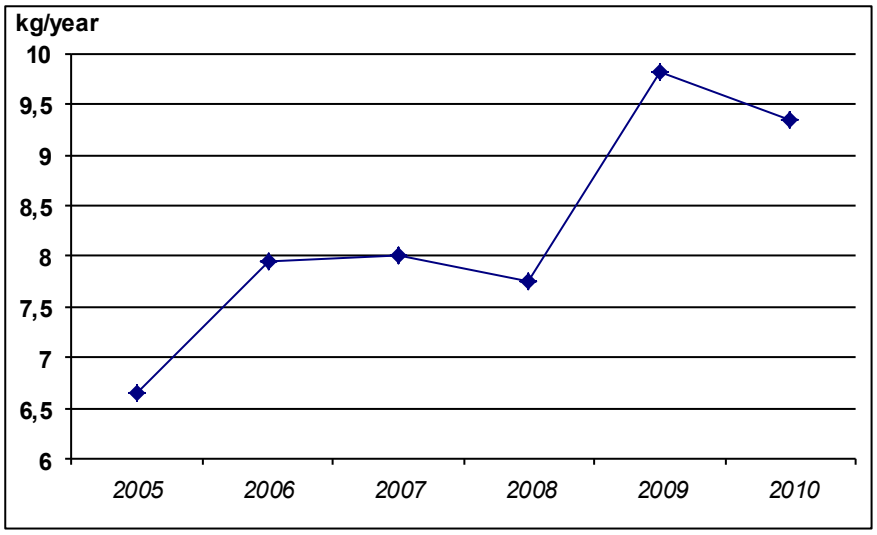
*Tomatoes and cucumbers*

In the medium-term perspective, the development of greenhouse tomato sector will be influenced by two main trends: changes of consumption patterns and external trade. According to our estimates based on official statistics and market survey, annual consumption of greenhouse tomatoes in 2005-2010 has grown by 40% from 6,7 kg to 9,35 kg per capita. Just to compare, the average level of fresh tomatoes consumption in the USA is about 9 kg/per capita/year and in Turkey 20 kg/per capita/year. Taking into account the development of food patterns in Ukraine, one can assume that there will be an increase in consumption of greenhouse tomatoes and it will be covered partly by the increase of production volumes in the plastic tunnels of small and medium size enterprises – the direction which is actively being developed in Ukraine and is quite competitive. The reasons of such development are as follows: small and medium size producers are often not registered officially, so they do not pay any taxes; they often use free energy resources such as wood from the nearby forest; they do not pay any fees for the use of water; they are located close to the target markets and do not spend much on logistics. As soon as this small-size "unofficial" production is legalized, the situation on the market will change dramatically and large-scale producers of greenhouse

tomatoes will obtain an additional considerable share of the market. However, in the short-term perspective, legalization is unlikely.

As for the large glass greenhouses, they will continue exploring the ways of tomato export increase, mainly to Russia, where Ukrainian share in the whole Russian import of tomatoes is only about 5%. Also, modernization and increase of efficiency of domestic greenhouses will facilitate import substitution by Ukrainian greenhouse tomatoes. Overall, it is estimated that the domestic producers of greenhouse tomatoes might count on about 15 thousand tons of additional demand on their products in the medium term-perspective. For production of these volumes, about 30 ha of glass greenhouses or 150[6] ha of plastic ones should be used.

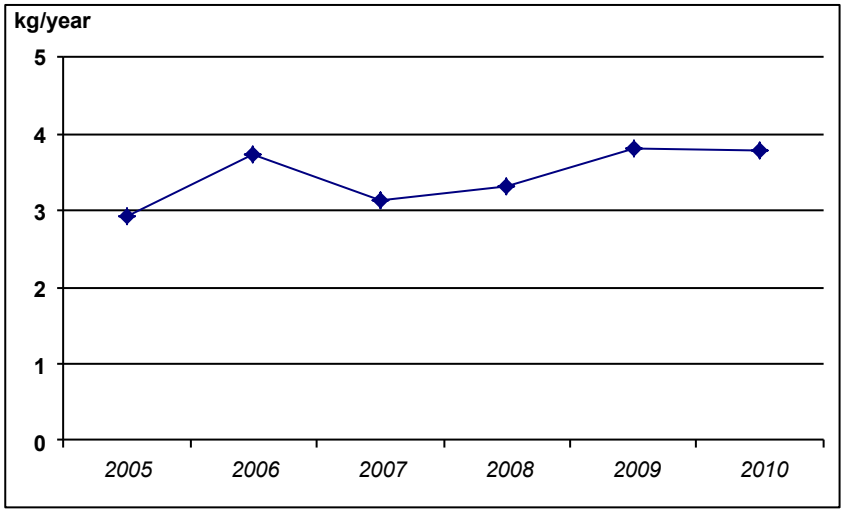
**Fig. 27. Consumption of greenhouse tomatoes in Ukraine, kg/year**




*Source: State Statistics Service of Ukraine (2011)*

Annual consumption of greenhouse cucumbers in Ukraine has been slightly changing in the range between 3 and 4 kg per capita recently (Fig. 28). Taking into account that Ukrainians already consume much more cucumbers than the world average, absence of increasing trend in the consumption patterns and the fact that growing cucumbers in small and medium-size plastic greenhouses is more profitable, it is estimated that the slight increase of demand for greenhouse cucumbers will be mainly covered by the enhancement of its production in plastic tunnels (small enterprises and households) in the short run. However, the development of the retail sector and gradual increase of purchasing power can lead to expansion of large producers in the mid-term prospective.

**Fig. 28. Consumption of greenhouse cucumbers in Ukraine, kg/year**




*Source: State Statistics Service of Ukraine (2011)*

[6] Calculation are based on the average yield level mentioned in paragraph 2.1

*Dill and green onion*

Due to various reasons such as consumer "indifference" towards greenhouse green onion, "unfavorable" position of Ukraine compared to Georgia for organizing greenhouse dill production, low profitability of growing of the mentioned products in greenhouses and absence of long-term successful history of their production in Ukraine, we assume that there will be no increase of greenhouse production of green onion and dill in Ukraine in short-term perspective. However, in the medium and long term, the perspectives are good, especially for the development of greenhouse dill production. The main driver behind is the constant domestic demand for this product that is currently covered by imports.

*Cabbages and salad*

Currently, the production volumes of greenhouse cabbages and salads are small, primarily due to the absence of whole year consumption culture. As a result, greenhouse enterprises have not been interested in investing into the development of this segment. However, as the consumption patterns have been changing recently (that is proved by a moderate but stable import of greenhouse cabbages and salads, especially lettuce), it is assumed that, at least in the mid term, the production of greenhouse cabbages and lettuce will increase in Ukraine.

*Flowers, ornamental plants and nursery products*

The market of greenhouse flowers in Ukraine has grown by more than seven times since 2000. According to our estimates, the demand is fully satisfied at the moment and there will be no large increase in the mid-term perspective. At the same time, most producers of the greenhouse flowers have modernized their old facilities or constructed completely new production facilities. As a result, the market shares of import and domestic producers do not fluctuate significantly anymore. The export possibilities for greenhouse flowers from Ukraine are quite limited due to tough competition in the world market. That is why the slight increase of production area under greenhouse flowers might be expected in the mid term as a result of growing population incomes and the establishment of all-year demand.

Considering current trends, market experts expect that producers of tomatoes, cucumbers and roses that want to enhance their production and market share will invest in construction of glass greenhouses because these plants require much light and glass fits best as it is the most transparent material. According to the estimates of market players, it is not rational to build a glass greenhouse smaller than 1 ha because construction of a glass greenhouse requires higher investments than other types of greenhouse constructions. For production of other plants like cabbages, salads, dill and green onion, construction of a polycarbonate greenhouse is more feasible because these plants are not light demanding and polycarbonate construction is less expensive.

# 3. Input markets for greenhouse production in Ukraine, 2008-2010

The level of technologies in Ukrainian greenhouses is far from that of the modern European greenhouses. Only 7-8 key players at the market of greenhouse vegetabes and flowers (OJSC "Teplychnyy", "Uman Greenhouse Complex", "Krymteplytsya", Askaniya-Flora, etc.) apply modern technologies. They use sunscreen shields, CO2 dosage, ventilation, heating, air humidifying and other systems to provide favourable microclimate for plants and higher resource efficiency.

This chapter reports on inputs of greenhouse production such as construction materials and interior equipment for glass greenhouses and plastic tunnels, fertilizers, plant protection agents, planting materials and seeds.

## 3.1. Construction materials and interior equipment for glass greenhouses

### 3.1.1. Production of construction materials and interior equipment

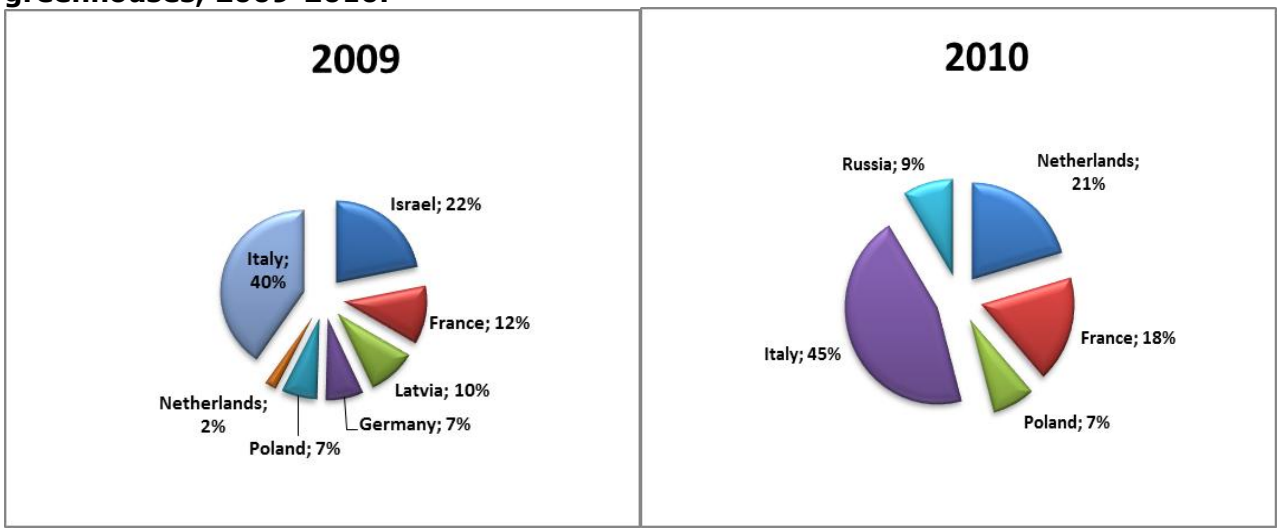
Construction materials and interior equipment for glass greenhouses are supplied by both local and foreign suppliers. Among Ukrainian companies that produce interior equipment for greenhouses, one should mention LLC "Tehnoservis" that produces components for drip irrigation systems and is also a dealer of the imported equipment for greenhouses. LLC "PPC Electrosvit" supplies lighting systems for the horticultural industry. The company is distinguished for modern energy saving technologies, innovative engineering decisions, and individual approach to each project and integrated adjustment of lighting systems to the plants. Among their customers, there are largest greenhouse complexes like Uman Greenhouse Complex, Complex "Teplychnyi", "Krymteplytsia", LLC "Camelia" and others. Glass and pipes for construction are also provided by Ukrainian producers. Public Corporation "Lysychansk glass works "Proletariy" has the largest share on the market of glass. According to market players, the company is not able to cover the entire demand; there are also supplies of glass from Russia and Belarus.

The number of glass greenhouses that are built in Ukraine is very small because of high construction costs – about USD 140/$m^2$. Of about 460 ha of glass greenhouses that operate in Ukraine, 60 ha are new ones, the rest are either old or modernized. In particular, large greenhouse complexes such as "Krymteplytsya" and "Teplychnyi" have modernized the largest part of their old greenhouses.

### 3.1.2. Import figures

In the last years, main imports of construction materials came to Ukraine from Italy (see Fig. 29). The share of Italy in total import comprised 40% in 2009 and 45% in 2010.

**Fig. 29. Geographical distribution of import of construction materials for glass greenhouses, 2009-2010.**




*Source: UCAB data based on estimates of market operators (2011)*

The Netherlands were the second largest importer of construction materials for glass greenhouses in 2010. Import of these goods from the Netherlands increased by USD 347.2 ths in 2010 compared to 2009 (see Table 31). This was the largest increase among all importers. Also, import from France and Poland increased in the analyzed period by 125% and 183%, respectively. In 2010, the shares of these countries in import of construction materials for glass greenhouses accounted for 18% and 7%, respectively. It should be mentioned also that suppliers from Israel, Latvia and Germany disappeared from the Ukrainian market in 2010. At the same time, the enterprises from Russia entered the market and occupied a share of 9%.

According to official data, total import of construction materials for glass greenhouses accounted for about USD 1.8 mln and increased by 57% in 2010 compared to 2009. Import growth against the shortage of total greenhouse area indicates that construction materials were mainly used for modernization of old greenhouses.

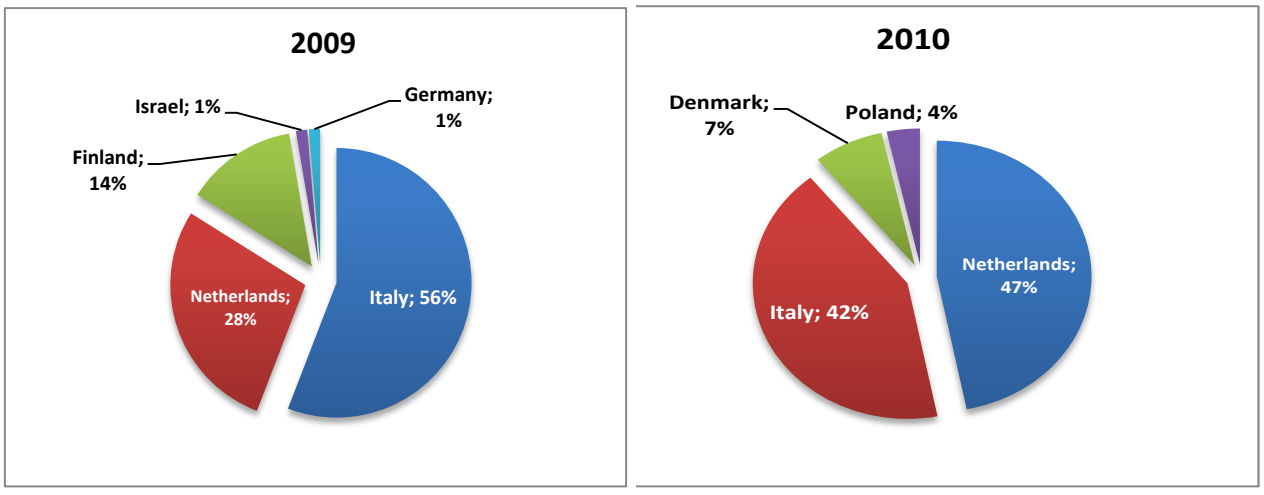
**Table 31. Geographical distribution of import of construction materials for glass greenhouses, 2009-2010**

| *Country* | *2009, thousand $* | *2010, thousand $* | *Change of import (2009-10), %* |
|---|---|---|---|
| Italy | 504,4 | 829,7 | 64% |
| Netherlands | 28,2 | 375,4 | 1231% |
| France | 145,0 | 326,2 | 125% |
| Poland | 48,0 | 136,0 | 183% |
| Russia | - | 160,4 | - |
| Israel | 229,2 | - | - |
| Latvia | 119,6 | - | - |
| Germany | 91,9 | - | - |
| **Total** | 1166,3 | 1827,7 | 57% |

*Source: UCAB data based on estimates of market operators (2011)*

The firms from Italy and the Netherlands are the main players in the market of irrigation equipment for glass greenhouses. The common shares of these enterprises were 85% in 2009 and 90% in 2010 (see Fig. 30).

**Fig. 30. Geographical distribution of import of irrigation equipment for glass greenhouses, 2009-2010**




*Source: UCAB data based on estimates of market operators (2011)*

In 2010, the first place in import of irrigation equipment for glass greenhouses belonged to the Netherlands. The increase of import from this country was 58% in 2010 compared to 2009. The import of irrigation equipment from Italy grew by 4%. In 2010, the newcomers on the market of irrigation equipment of Ukraine were the enterprises from Denmark and Poland but the volumes of their supplies were not significant.

**Table 32. Geographical distribution of import of irrigation equipment for glass greenhouses, 2009-2010**

| *Country* | *2009, thousand $* | *2010, thousand $* | *Change of import (2009-10), %* |
|---|---|---|---|
| Netherlands | 156,4 | 247,8 | 58% |
| Italy | 214,5 | 223,6 | 4% |
| Denmark | - | 38,8 | - |
| Poland | - | 18,3 | - |
| Finland | 51,4 | - | - |
| Israel | 5,2 | - | - |
| Germany | 5,1 | - | - |
| **Total** | 432,7 | 528,4 | 22% |

*Source: UCAB data based on estimates of market operators (2011)*

In total, import of irrigation equipment accounted for about USD 0.5 mln and increased by 22% in 2010 compared to 2009.

The only country from which the lighting equipment for glass greenhouses is imported into Ukraine is the Netherlands (see Table 33). The volume of import accounted for USD 256.1 ths and increased by 55% in 2010 compared to 2009.

The import of $CO_2$ control equipment for the use in glass greenhouses was large in 2009. This equipment was imported from three countries – Poland, Italy and the Netherlands – and amounted to USD 3.29 mln in total. Such equipment is actively used in the greenhouse sectors of the EU countries and is mainly targeted towards receiving significant increase in the yields of greenhouse crops.

**Table 33. Import of equipment used in glass greenhouses, 2009-2010**

| **Equipment** | **Country** | **Value, thousand $** | |
|---|---|---|---|
| | | *2009* | *2010* |
| *Lighting* | Netherlands | 165,5 | 256,1 |
| *CO2 control equipment* | Poland | 2671,5 | - |
| | Italy | 504,4 | - |
| | Netherlands | 115,9 | - |

*Source: UCAB data based on estimates of market operators (2011)*

With respect to imports of biological plant protection products into Ukraine, once again the Dutch industry is the leader. 100% of biological flower protection means (value of USD 423 ths.) was imported from the Netherlands into Ukraine in 2010 and the increase of import was 286% compared to 2009 (see Table 34). The same situation is with biological greenhouse plants protection means – the whole import is from the Netherlands, although the import of 2010 accounted for only 80% of that of 2009.

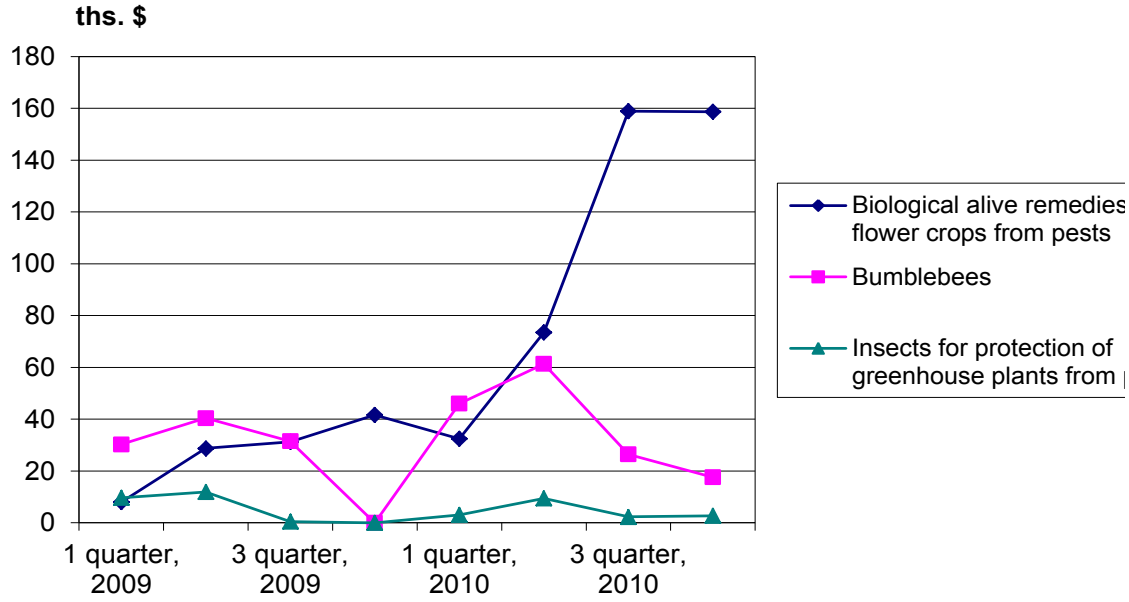
**Table 34. Import of "insects" used in glass greenhouses, 2009-2010**

| **Biological plant protection agent** | **Country** | **Value, thousand $** | | |
|---|---|---|---|---|
| | | *2009* | *2010* | *Change 2009-2010, %* |
| *Biological means of flower protection from pests* | Netherlands | 109,6 | 423,6 | 286% |
| | USA | 4,8 | - | - |
| *Bumblebees* | Netherlands | 61,1 | 76,2 | 25% |
| | Israel | 41,1 | 75,0 | 82% |
| *Insects for protection of greenhouse plants from pests* | Netherlands | 21,9 | 17,5 | -20% |
| | USA | 0,6 | - | - |

*Source: UCAB data based on estimates of market operators (2011)*

The import market of bumblebees in Ukraine is equivalently divided between the businesses from Israel and the Netherlands (Table 34). Although their shares were almost the same in 2010, the import of bumblebees from Israel (growth rate 82%) increased more rapidly than the one from the Netherlands (growth rate 25%) in 2009-2010. It should be mentioned that there is a visible seasonality. Import of bumblebees usually decreases by the end of the "hot" greenhouse season (second half of the year) (see Fig. 31).

**Fig. 31. Seasonal import of "insects" used in glass greenhouses, 2009-2010**




*Source: UCAB data based on estimates of market operators (2011)*

The most stable imports of auxiliary components for glass greenhouses (hanging hook, twine, mineral wool) to Ukraine are from Poland and the Netherlands. 90% of hanging hooks were imported from Poland in 2010 and the increase of import was 66% compared to 2009 (see Table 35). Also, the import of twine from Poland grew by 89% in the same period. The import of hanging hook and mineral wool from the Netherlands decreased by 93% and 47%, respectively, in 2010 compared to 2009. Such fluctuations are caused by discrete, one-time supplies for very few Ukrainian buyers who had different preferences towards suppliers in different years. This also demonstrates unsustainability of contacts between Ukrainian buyers and foreign suppliers.

**Table 35. Import of auxiliary components used in glass greenhouses, 2009-2010**

| Auxiliary component | Country | Value, thousand $ | | |
|---|---|---|---|---|
| | | *2009* | *2010* | *Change of import (2009-10), %* |
| *Hanging hook* | Netherlands | 27,8 | 2,0 | -93% |
| | Poland | 24,8 | 41,1 | 66% |
| | Italy | - | 2,6 | - |
| *Twine* | Netherlands | 9,5 | - | - |
| | Poland | 34,8 | 65,6 | 89% |
| | Russia | - | 2,1 | - |
| *Mineral wool* | Netherlands | 91,7 | 48,9 | -47% |
| | Poland | - | 6,9 | - |
| | Czech Republic | 18,5 | - | - |

*Source: UCAB data based on estimates of market operators (2011)*

## 3.1.3. Analysis of demand growth

According to the data provided by market players, 3-4 ha of glass greenhouses were built in Ukraine in 2010. In 2011, this figure was about 6-8 ha. However, only three enterprises increase areas under glass greenhouses – Uman Greenhouse Complex, Krymteplytsya and Teplychnyy Complex (Kalynivka). Among glass greenhouses, about 400 hectares are old greenhouses, whereas 60 hectares are new. According to market players, it is necessary to have at least 6 ha of greenhouse areas to make profit while the cost of constructing 1 $m^2$ is

USD 140. Given that the majority of greenhouse producers have limited access to finance, market players claim that the expansion rates will slow down in the nearest future. Construction of new greenhouses can be partly stimulated by the state budget programs (if there is enough support) described in chapter 6 of this report.

Further trends in construction of greenhouses in Ukraine will be driven mainly by the prices for gas and other energy sources. Construction of new glass greenhouses is likely primarily due to expansion of the areas by existing greenhouse complexes. Also, large agricultural companies consider investments in greenhouse production as a means of diversification. Particular interest is in construction of greenhouses next to large livestock complexes where conventional energy resources can be substituted by biogas**.**

## 3.2. Construction materials and interior equipment for plastic tunnels

### 3.2.1. Production of construction materials and interior equipment

In the last years, areas under plastic greenhouses increased. Thus, the demand for construction materials and interior equipment was also growing. At first hand, this can be explained by the low construction costs. The average construction costs are USD 14/$m^2$ (excluding interior equipment).

The carcasses of the plastic greenhouses are made of wood and metal. Wood and pipes for greenhouses are mainly supplied from Ukraine. There are no permanent leaders among the suppliers of wood and metal. Greenhouses choose suppliers based on market tendencies.

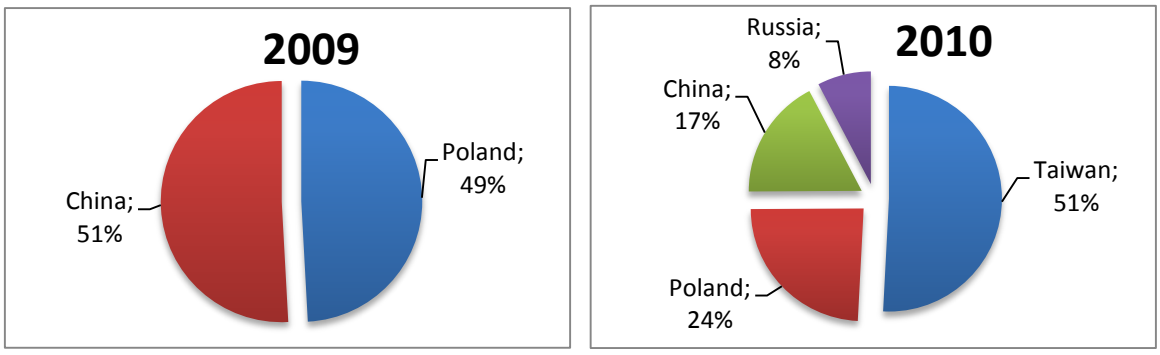
According to market operators, LLC "Soyuz" is the leading Ukrainian producer and supplier of film for greenhouses. Its market share is estimated at the level of 30-40%. The company produces film of 12 m width and 120-150 microns thick, which is used for the old-style greenhouses. For modern greenhouses, film is supplied from Hungary mainly (18 m width, 150 microns thick).

As in the case with glass greenhouses, the main producers of interior equipment for plastic greenhouses are LLC "Tehnoservis" (irrigation equipment) and LLC "PPC Electrosvit" (lighting systems).

### 3.2.2. Import figures

While in 2009 the import market of construction materials for plastic tunnels was equally divided between the enterprises from two countries, China (51%) and Poland (49%), in 2010 the business from two additional destinations, Russia and Taiwan, entered the market (see Fig. 32). The products of Taiwanese firms accounted for 51% of the import in 2010. Their appearance in Ukrainian market was so successful because of demand from sub-urban households (mainly in the West of Ukraine). The products supplied by these firms were carcasses (1.8m x 0.9m x 0.9m) and film imported by an Odessa-based company which actively imports agricultural products and equipment from the Far East countries.

**Figure 32. Geographical distribution of import of construction materials for plastic tunnels, 2009-2010**




*Source: UCAB data based on estimates of market operators (2011)*

At the same time, the import of construction materials from Poland decreased by 30% and from China – by 51%. Total import of construction materials for plastic tunnels increased by 42% in 2010 compared with the preceding year.

**Table 36. Geographical distribution of import of construction materials for plastic tunnels, 2009-2010**

| *Country* | *2009, thousand $* | *2010, thousand $* | *Change of import (2009-10), %* |
|---|---|---|---|
| Taiwan | - | 56,2 | - |
| Poland | 38,3 | 26,7 | -30% |
| China | 39,6 | 19,3 | -51% |
| Russia | - | 8,5 | - |
| **Total** | 77,9 | 110,7 | 42% |

*Source: UCAB data based on estimates of market operators (2011)*

### 3.2.3. Analysis of demand growth

Over the last three years, areas under plastic greenhouses in Ukraine have been growing by 2-3% annually. Starting from 2009, the annual growth in Zakarpattya region equaled to 10-12%. Areas under plastic greenhouses in Lviv, Zhytomyr, Vinnytsia, Odesa, Kiev regions and Crimea grew at a lower rate (3-5% annually). Old-style plastic greenhouses were modernized in Zaporizhzhya, Dnipropetrovsk, Luhansk, and Ternopil regions. However, the majority of plastic greenhouses still have to be modernized. Consequently, increase of demand for construction materials and interior equipment for plastic tunnels will be further observed in these regions.

Further development of the plastic segment of greenhouse production can be delineated as follows. On the one hand, the expansion rates will slow down in the next two or three years because of lack of available areas and limited access to finance (the majority of producers are rural households). On the other hand, expansion of plastic greenhouses will probably take place at agricultural enterprises which are able to diversify their energy sources, e.g. via burning of pellets, use of biogas, etc. Also, agricultural enterprises will tend to improve the existing technologies. One of the repondents mentioned there will be a demand for irrigation equipment in Zaporizhya and Kherson regions.

## 3.3. Markets of fertilizers and plant protection products

### 3.3.1. Mineral fertilizer use

In the last three years, most of the TOP-10 largest producers of greenhouse vegetables increased their spendings on mineral fertilizers, partly due to the increase of prices for mineral fertilizers and because of the intensification of greenhouse production.

According to the survey conducted in terms of this research, mineral fertilizers used in the greenhouses are mostly of Russian and Chinese origin. Calcium nitrate is supplied by Yara company (Russia) and Chinese companies. Magnesium sulfate comes also from Russia and China. Greenhouses use monophosphate produced by Yara, other Russian as well as Chinese producers. Potassium nitrate is of Ukrainian, Russian and Chinese production. Among the suppliers of nitrogen fertilizers, Cherkasy and Dniprodzerzhynsk plants have the leading positions. The leader among the suppliers of complex fertilizers is SQM which is the worldwide leader in Specialty Plant Nutrition. The main factor that impacts buying preferences is the price of a fertilizer.

**Table 37. Use and spendings on mineral fertilizers in 2008-2010 at TOP-10 largest producers of greenhouse vegetables**

| **Name** | | **Spendings on mineral fertilizers, ths USD** | | | | **Use of mineral fertilizers, kg/sq.m*** | | |
|---|---|---|---|---|---|---|---|---|
| | | **2008** | **2009** | **2010** | **2010/ 2008, %** | **2008** | **2009** | **2010** |
| 1 | OJSC "Teplychnyy" | 305,8 | 491,0 | 749,9 | 145,2% | 1,8 | 5,1 | 6,5 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2 | "Uman Greenhouse Complex" | 865,8 | 760,3 | 1 203,3 | 39,0% | 5,6 | 8,6 | 11,5 |
| 3 | LLC "Krymteplytsya" | 328,0 | 201,5 | 465,1 | 41,8% | 4,0 | 4,3 | 8,4 |
| 4 | State Complex "Pushcha-Vodytsya" | 419,0 | 519,7 | 291,0 | -30,5% | 5,2 | 11,4 | 5,4 |
| 5 | CJSC "Zmiivska Vegetable Factory" | 518,2 | 274,3 | 594,4 | 14,7% | 6,8 | 6,3 | 11,5 |
| 6 | LLC "Greenhouse Complex Dniprovskyy" | 370,1 | 141,5 | 375,5 | 1,4% | 6,1 | 4,1 | 9,1 |
| 7 | LLC "Perspektiva" | 211,4 | 306,8 | 165,6 | -21,7% | 3,4 | 8,5 | 3,9 |
| 8 | LLC "Soteko" | 124,8 | 130,6 | 198,7 | 59,3% | 5,2 | 9,6 | 12,3 |
| 9 | CJSC "Agroconcern" | 119,7 | 102,3 | 147,9 | 23,5% | 4,1 | 6,1 | 7,5 |
| 10 | JSC "Teplychnyy Complex" | 588,4 | 237,3 | 161,2 | -72,6% | 17,5 | 12,3 | 7,0 |

**own calculations*

*Source: UCAB data based on estimates of market operators (2011)*

### 3.3.2. Import figures for mineral fertilizers

In 2009 and 2010, Russian Federation was the leader in the Ukrainian import of mineral fertilizers. Most of the complex mineral fertilizers[7] imported to Ukraine come from two main destinations: Russian Federation and Belarus. The share of the former decreased by 2.8% in 2010 compared with the preceding year and comprised 78,3% of the whole import (see Table 38). The share of the second largest importer of complex mineral fertilizers also slightly decreased and comprised 12.5% in 2010. The third biggest supplier of complex mineral fertilizers to Ukraine is Uzbekistan with the share of 2.7%. Among the EU countries, the biggest volumes are imported from Poland and Italy – 1.3% each.

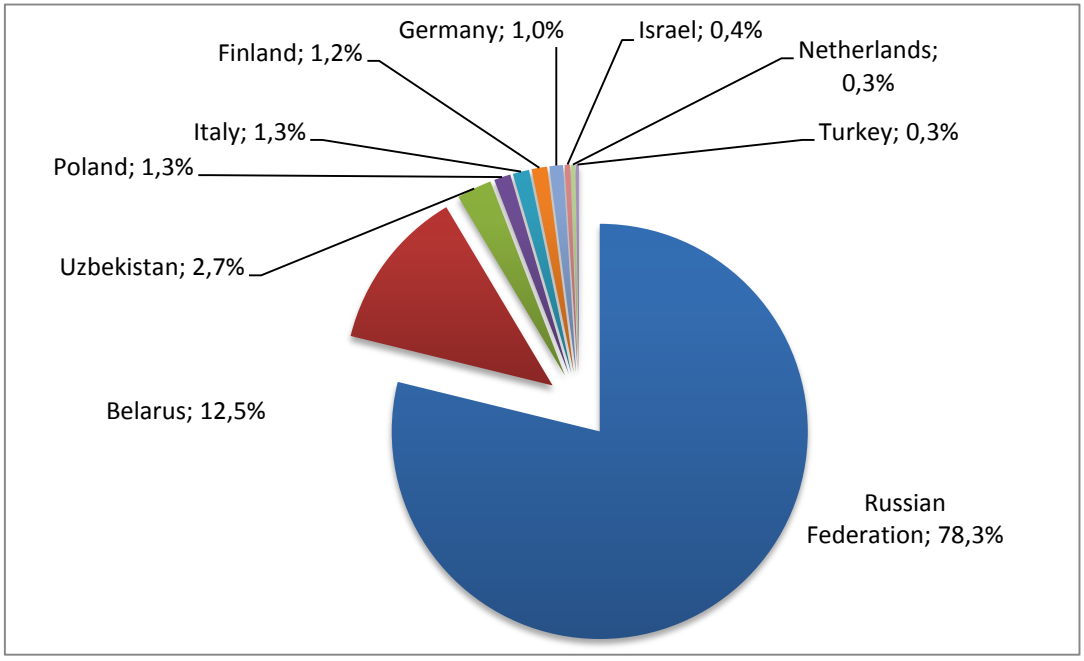
**Table 38. Geographical distribution of import of complex mineral fertilizers to Ukraine, 2008-2010**

| Country/year | 2008 | 2009 | 2010 |
|---|---|---|---|
| Russian Federation | 76,9% | 81,1% | 78,3% |
| Belarus | 8,7% | 13,0% | 12,5% |
| Belgium | 2,3% | 0,0% | 0,1% |
| Uzbekistan | 2,0% | 1,0% | 2,7% |
| Kazakhstan | 2,0% | 0,0% | 0,0% |
| Lithuania | 1,9% | 0,0% | 0,1% |
| Poland | 1,4% | 0,8% | 1,3% |
| Netherlands | 1,4% | 0,3% | 0,3% |
| Germany | 1,2% | 0,6% | 1,0% |
| Italy | 0,8% | 1,2% | 1,3% |

*Source: UCAB data based on estimates of market operators (2011)*

[7] Complex mineral fertilizers include two or more nutrients.

**Fig 33. Geographical distribution of import of complex mineral fertilizers to Ukraine, 2010**




*Source: UCAB data based on estimates of market operators (2011)*

### 3.3.3. Analysis of demand growth

In 2008-2010, an upward trend in the use of mineral fertilizers by greenhouse enterprises was observed. However, as the producers of greenhouse products already use intensive technologies, it is expected that the tendency towards enhancement of use of mineral fertilizers will remain but the growth rate will considerably slow down. At the same time, organic-based growth regulators become popular today.

## 3.4. Markets of plant protection products

### 3.4.1. Use of plant protection agents

In general, leaders on the market of plant protection agents in Ukraine are well-known international companies. Their market shares are as follows:

- Bayer 30%
- Syngenta 30%
- DuPont 15-20%
- Others 20%

Of these, only DuPont does not supply agrochemicals to Ukrainian greenhouses. According to the results of our expert interviews, market shares of the leading producers of plant protection agents in the greenhouse market look as follows:

- Bayer 30%
- Syngenta 30%
- BASF 10%
- Others 30%

The position of "Others" involves many producers of generic plant protection agents.

Major producers of agrochemicals have their own networks of dealers through which they distribute their products. Distribution of packed plant protection products (or, as defined by one of our interviewees, "retail distribution") is made also via dealers. The main target audience of these products is rural households that produce vegetables in plastic greenhouses and hotbeds. Thus, the demand for packed agrochemicals is high in the period from March to July.

Main plant protection products for greenhouses include insecticides (55%), fungicides (35%) and herbicides (10%). Incecticides are used mainly against pests such as whitefly, mite and lice.

### 3.4.2. Import figures for plant protection agents

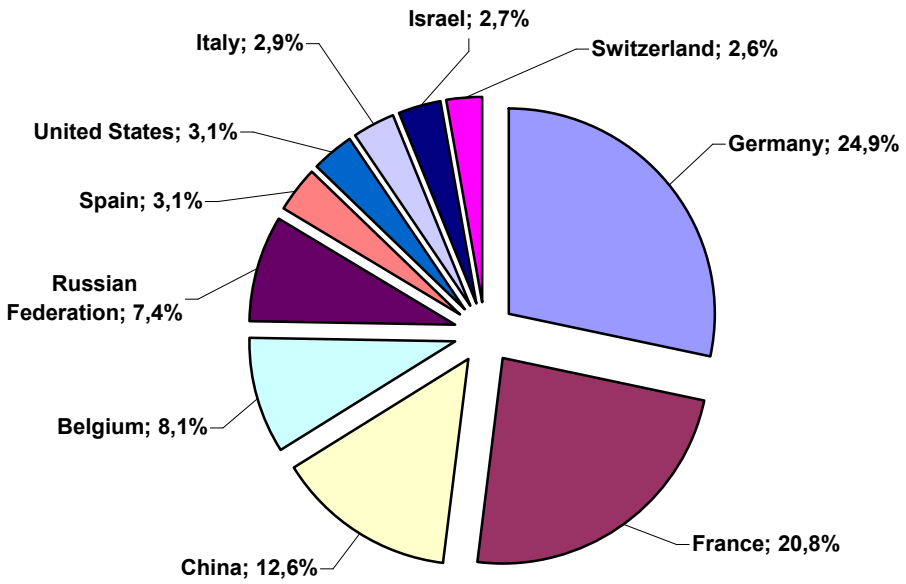
The leadership in total import of plant protection agents into Ukraine belonged to France and Germany in 2008-2010. In 2008, the largest share of plant protection agents was imported from France (27%), while in 2009 and 2010 the major part of import came from Germany – 25.1% and 24.9%, respectively (see Table 39). The third place in the analyzed period was occupied by China. The share of this country has been growing constantly comprising 12.6% in 2010 (see Fig. 34). Most of the other plant protection agents are imported into Ukraine from the EU countries and only 3.1% from the United States, 2.7% from Israel and 1.1% from Japan.

**Table 39. Geographical distribution of import of plant protection agents to Ukraine, 2008-2010**

| Country/year | 2008 | 2009 | 2010 |
|---|---|---|---|
| Germany | 20,5% | 25,1% | 24,9% |
| France | 27,0% | 21,3% | 20,8% |
| China | 9,3% | 10,6% | 12,6% |
| Belgium | 7,5% | 7,0% | 8,1% |
| Russian Federation | 6,0% | 6,6% | 7,4% |
| Spain | 1,1% | 3,5% | 3,1% |
| United States | 6,0% | 3,3% | 3,1% |
| Italy | 3,2% | 2,9% | 2,9% |
| Israel | 2,8% | 1,8% | 2,7% |
| Switzerland | 3,0% | 2,0% | 2,6% |
| United Kingdom | 2,4% | 3,1% | 2,5% |
| Austria | 2,4% | 2,0% | 2,1% |
| Denmark | 2,0% | 1,8% | 1,1% |
| Netherlands | 1,1% | 2,1% | 1,1% |
| Japan | 1,1% | 1,1% | 1,1% |

*Source: UCAB data based on estimates of market operators (2011)*

**Fig. 34. Geographical distribution of import of plant protection agents to Ukraine, 2010**




*Source: UCAB data based on estimates of market operators (2011)*

### 3.4.3. Analysis of demand growth

According to the estimates of market operators, Ukrainian market of plant protection agents grew by 40-45% in 2011 compared to 2010. However, according to one of the experts interviewed in terms of this study, the sector of plant protection products "is in anxiety at the moment, anticipating a new wave of economic crisis" that can substantially affect the market. Additionally, managers of big agrochemical companies avoid forecasting the market development in the next years maintaining that they are unable to talk even about exact market size. They name the greenhouse market "grey" as there are a lot of uncontrolled supplies of generic products going on, especially in the regions that are situated close to the state borders.

## 3.5. Planting: analysis of demand for seeds, bulbs and seedlings

### 3.5.1. Tomatoes

In terms of this study, the survey of greenhouse producers concerning their preferences towards types and hybrids of greenhouse vegetables was conducted. Noteworthy, producers make most of their decisions based on either personal experience or experience of their colleagues; they rarely ask professional consultants for advice.

Based on the results of the survey, the most used sorts of greenhouse tomato seeds by rural households are the following: President, Solerosso, Raissa, Alfa, VP F1, Aurelius, Bagira, Berberana, Belle, Olga F1, Rally, Mechta, Rio Grande, Sunrise and Julia.

At the same time, the main suppliers of seeds and planting material were inquired about the effectiveness of use of different hybrids. The sorts of greenhouse tomatoes that are recommended by seed companies are as follows: Bagira, KS1140F1, KS7500F1, VP F1, Axioma F1, Arfa F1, Astona F1, Volna F1, Hektor, Calista F1, Cartier, Cristal F1, Lyra, Madonna, Olga F1, Orfey, Pablo, Tyler, Tasha F1, Testy, Tolstoi, Topkapi F1, Forsage and Yana.

Enza Zaden, Syngenta, Monsanto, Rijk Zwaan and Seminis have the largest market shares in the market of tomato seeds. Some other companies such as Nasko, Sakata, Agrimatco, Kristensen, Plos, Plantiko, Taki Seeds, Nickerson Zwaan, Vilmorin and Derauter have smaller market shares.

The rating of tomato seed suppliers by sales and their shares[8] in 2010-2011 looks as follows:

- Enza Zaden 30%
- Syngenta 30%
- Monsanto 15%
- Rijk Zwaan 15%
- Seminis 5%
- Others 5%

In the nearest future, stable demand for seeds of greenhouse tomatoes can be forecasted although the second wave of financial crisis can cause wide use of low quality seeds.

### 3.5.2. Cucumbers

The survey involved also producers of greenhouse cucumbers. Based on their answers, the most popular sorts of greenhouse cucumber seeds cultivated by rural households are: Aphina, Angelika, Galina, Kybria, Masha, Merenque, Nastasja, Crispina and Korolek.

The sorts of greenhouse cucumbers that are recommended by seed companies are as follows: Artist, Royal, Regal, Amour, Barvina F1, Bettina F1, Merengue, Mamay, Zubrenok (Cucumis sativus L. / Cucumber F1 Little Aurochs) and Nezhensky.

The main suppliers of cucumber seeds are Enza Zaden, Rijk Zwaan, Gavrish, Seminis and Syngenta.

[8] In-depth market surveys were not planned in terms of this study. Therefore, the results of expert interviews have to be considered rather as approximate evaluation of the market.

The leader by sales among the cucumber seed suppliers in 2010-2011 is Seminis; its share in total cucumber seeds sales is 40% followed by Rijk Zwaan (25%), Syngenta (10%), Bejo (10%) and others (15%).

According to the experts from seed companies, the demand for the seeds of greenhouse cucumbers will be high. However, similarly to the situation with tomato seeds, the demand for cucumber seeds can be affected by the second wave of financial crisis.

### 3.5.3. Dill and green onion

Future demand for the plantings of dill and green onion will depend on development of this direction of greenhouse production. Until recently, large-scale commercial production of greens has been unpopular. The major risk was the lack of sustainable market. However, the situation changed in the last 5-8 years with the development of large retail chains. In the medium and long-term, the perspectives for production of these crops, especially, greenhouse dill are positive as the constant domestic demand for this product has been formed. Although it is currently covered by imports, market operators argue that there is a potential of import substitution by domestic production. Accordingly, this may increase the demand for the seeds of dill and green onion.

### 3.5.4. Cabbage and salads

Current leaders among the cabbage seeds suppliers and their sales shares in 2010-2011 are as follows:

- Rijk Zwaan 40%
- Baccata 15%
- Syngenta 15%
- Others 30%

At the market of salad seeds Rijk Zwaan has a 90% share.

Greenhouse production of cabbage and salads is currently underdeveloped in Ukraine. Production volumes of these crops are low due to underdeveloped habits of all-year consumption. However, moderate but stable import of greenhouse cabbage and salads, especially salads, to Ukraine shows that the consumption patterns are changing. Therefore, it is expected that, in the medium term, the production of cabbages and salads will increase and the demand for cabbage and salad seeds will grow.

### 3.5.5. Flowers, ornamental plants and nursery products

Future demand for planting material for greenhouse flowers will depend on the development of greenhouse flower production. This, in turn, depends on the prices for gas and other energy sources. Given double increase of gas prices in 2011 (from USD 285/1.000$m^3$ to USD 575/1.000$m^3$), expansion of greenhouse flower production is unlikely. Also, the development of the flower market depends on changes of consumption patterns based primarily on population incomes. In this context, high gas prices are also an important factor as they lead to higher utility payments of population. Some additional opportunities for local producers can originate from market protection through further complication of the import procedure by the customs.

# 4. Logistics in the greenhouse sector

## 4.1. Storage facilities: construction, investment dynamics and demand

In terms of this research, interviews with several suppliers of construction materials for greenhouses were conducted. The finding of the interviews was that the large greenhouse producers of vegetables invest in building storage facilities or distribution centres. However, respondents could not indicate whether those storage facilities are determined for greenhouse production because large companies usually cultivate both open ground and greenhouse vegetables.

Among the largest market players in the greenhouse sector, Olvita has storage facilities for 5 ths tons of vegetables. Currently, the company rents cold storages and provides services for storage of frozen and chilled products. Cold storages have the area of more than 17 ths $m^2$ and can simultaneously place more than 17 ths tons of production at temperatures from -25°C to +10°C. Storage capacities consist of (a) cold storage 1500 $m^2$, storage capacity up to 2000 tons of production at temperature from -10 to -25°C; (b) cold storage 9 ths $m^2$ with built-in office areas, storage capacity up to 15 ths tons of production at temperature from -10 to -25°C; (c) logistics terminal for storaging and distribution of fresh products, 6500 $m^2$ with built-in office areas, nominal daily turnover more than 200 tons of products.

Uman Greenhouse Complex has their own modern logistic centre where products are sorted and packed. Agrofirm "Prolisok LTD" has modernized and reequipped its storage facilities with a total capacity of 500 tons. Usually, greenhouses have dry storages where the products are sorted and packed.

It is expected that greenhouse complexes will continue to invest in construction of modern storage facilities with sorting and packaging equipment due to the higher requirements from supermarkets, wholesale markets and retail chains which demand products in marketable condition. Additionally, the government of Ukraine supports construction of modern storage facilities. In December 2011, the largest vegetable storage in Europe was launched in Boryspil rayon of Kyiv region under the patronate of the government. Its capacity is about 55 ths tons.

## 4.2. Availability of sorting and grading equipment

Because of cheap labor, most greenhouse complexes use manual labour for sorting and grading of vegetables.

Only four greenhouse complexes (Complex "Teplychnyy", Uman Greenhouse Complex, Krymteplytsya, and Askania-Flora) have sorting and packing equipment. They use sorting facilities of the Dutch companies. Askania-Flora is also planning to purchase additional volumes of sorting equipment.

## 4.3. Packaging in the greenhouse sector

Due to higher requirements posed by retail chains, it is becoming a necessary precondition that vegetables are supplied in different packages. Packaging materials for greenhouse vegetables differ depending on the market they are supplied to. If the products are oriented towards export, greenhouse companies use packages made of corrugated cardboard (6 kg). Packaging is supplied by Ukrainian companies; there are more than 100 producers of packages in Ukraine. If the products are sold in the local market, then companies use plastic reusable packages. Schoeller Arca Systems has 70% share at the market of reusable packaging.

Flower producers use film for packaging of flowers and plants. The film packaging is supplied from the Netherlands. Camelia, one of the largest producers of greenhouse flowers uses Dutch packaging equipment.

## 4.4. Quality assurance in the sector

According to expert interviews, the situation with the quality assurance in the sector can be described as follows. Certification of producers according to GlobalGAP is not widespread in Ukraine. The main reason is unwillingness of consumers to pay more for certified products. The greenhouse producer that is GlobalGAP certified is the Agrofirm "Prolisok LTD".

Currently, there is no demand for high-quality analysis because customers are not willing to pay for expensive reagents and amortization of expensive laboratory equipment in order to make proper analysis.

Small households do not make soil analysis for the residues of pesticides. Their use of pesticides often violates the norms. Producers of vegetables are not willing to conduct soil analysis because it is expensive for them. Cost of soil analysis is UAH 300 (EUR 27,05) per ha to check for residues of a fertilizer while price for a bag of fertilizer is UAH 200 (EUR 18,03).

If products are supplied to large retail chains such as Metro, greenhouses go through the quality testing of products. Metro conducts proper analysis of vegetables at the level of production as well as during the transportation process. Other retail chains check the content of nitrates and nitrites and one or two heavy metals. The cost of such analysis is UAH 120 (EUR 10,82) per sample.

According to the information from Auchan, they conduct proper quality analysis of the supplied products and check the temperature of the products and the temperature inside the vehicles that bring the products. They also check necessary veterinary and sanitary certificates when receiving the goods.

Obviously, it is not possible to check the content of all pesticides because about 1500 pesticides are registered every year in Ukraine and there is no methodology to check their content.

Vegetable producers usually do not order detailed quality analysis. Only in the emergency cases, if there is accuse of bad quality that led to health problems of consumers, a greenhouse producer may order a detailed quality analysis of the products.

There is a practice of conducting rapid quality analysis of vegetables in the open markets. Such tests do not show accurate results because temperature and humidity requirements towards analysis are not met. One more reason for low accuracy is the conduct of rapid tests after their expiration date. Rapid tests are used as a control measurement abroad while in Ukraine they are commonly used as the main method of quality analysis for vegetables.

# 5. Some specific investment and business opportunities

## 5.1. SWOT-analysis of the greenhouse sector

**Table 44. SWOT-analysis of the greenhouse sector of Ukraine**

| Strengths | Weaknesses |
|---|---|
| • Expansion of greenhouse areas<br>• Long experience of growing greenhouse vegetables<br>• State support program for construction of storage facilities<br>• Availability of capacity to process vegetables, sufficient market demand for greenhouse products<br>• Cheap labor | • Shortage of qualified personnel<br>• High demand for manual labor (harvesting, etc.)<br>• The need to improve technology and increase the level of productivity of greenhouse vegetables, flowers, etc.<br>• Lack of operating capital to comply with technology requirements<br>• Lack of marketing associations of farms, insufficient amount of logistic-distribution centers and civilized wholesale markets<br>• Seasonal sales<br>• Lack of access to long-term financing under satisfactory conditions (long-term loans with deferred repayment of the loan, etc.)<br>• Insufficient capacities for storing greenhouse vegetables<br>• Practically no capacities to implement postharvest handling of products (sorting, packaging, etc.)<br>• Lack of laboratories to assure the quality of the products |
| **Opportunities** | **Threats** |
| • Potential growth of purchasing power of population<br>• Growth of greenhouse production due to demand growth, gradual substitution of imports with domestic products, fulfillment of export potential<br>• Growth of global demand for (organic) products<br>• A possible free trade with the EU and Russian Federarion<br>• Possibility to grow a wide range of products<br>• Increase of efficiency due to:<br>- Improvement of existing and use of new technologies<br>- Introduction of new crop varieties<br>- Improvement of management efficiency<br>• Expansion and improvement of crop varieties and introduction of new promising crops<br>• Increase of creditworthiness of enterprises by allowing to use the land and land rent rights as a pledge after lifting of the moratorium on farmland sale<br>• Further development of retail chains | • Rising prices for gas (especially for that imported from Russia) and other energy sources<br>• Rising prices for main inputs due to currency fluctuations, which can lead to growth of production costs<br>• Labor shortages and increase of labour costs<br>• Increased competition in foreign markets, import growth<br>• Unpredicted changes in the import regulations for greenhouse products<br>• Unpredicted increase of the budget deficit that may lead to lack of funding and state support of the sector |

## 5.2. Regional aspects

There are some regional specifics in production technologies used in Ukrainian greenhouses. Large glass greenhouses are located near Kyiv, Kharkiv, Cherkasy, and Dnipropetrovsk and at the Crimean peninsula (see Annex I for production and size indicators of the largest greenhouses). In terms of the expert interviews, managers and owners of these greenhouses expressed rather distant interest in immediate improvement of their technologies. Their general statement was "we have already installed the best equipment and made possible technological improvements." Nevertheless, we argue that further investments in the sector of large-scale glass greenhouses can be stipulated by the following factors:

- Expansion of production capacities. Currently, the biggest market players that are located in Kyiv and Cherkasy oblasts and Republic of Crimea are expanding their areas. This process can be stimulated by the state. Recently, the Minister of Agricultural Policy and Food pronounced that "450 hectares of greenhouses are definitely not enough" and the Ministry is currently preparing the plan of provision with greenhouse vegetables for 2012. This plan will involve measures that aim to increase production and storage capacities as well as to improve the functioning of wholesale markets.
- Modernization of old production capacities. Despite managers of some large greenhouse complexes claim that they are well equipped, there is still a need for further improvements. Especially, the issue of modernization will become vital in the view of a) growing competition among producers; b) creation of wholesale markets and the development of retail sector which place higher requirements towards quality.

Film greenhouses and plastic tunnels are prevailing in small farms and households rather than in large enterprises. The highest concentration of production in film greenhouses and plastic tunnels is observed in Zakarpattya and south of Ternopil region, Dnipropetrovsk and Kherson regions and Crimea. The demand for inputs such as seeds, planting materials, agrochemicals and film is stable in some of these regions, e.g. Ternopil. In other regions, e.g. Zakarpattya, there has been a bursting demand for film and agrochemicals in the last three years as the area under greenhouses tripled, according to the estimates of some experts. Proximity to the European border was not the least factor that enabled such development.

In some regions, investors have to consider also the involvement of local authorities. For example, in Dnipropetrovk region, local agricultural administration is highly interested in attracting investments, both domestic and foreign, in the greenhouse supply chain. According to the State Statictics Agency of Ukraine, Dnipropetrovsk region is currently the most attractive for foreign investors with the cumulative volume of foreign direct investments of about USD 8.0 mln. The Agricultural Department of the region attracts foreign investments due to a cluster approach to its development.

## 5.3. Future expectations

It is expected that the greenhouse sector in Ukraine will grow in the nearest future. Although the biggest market players claim they are not going to expand, the investments are coming to the sector. In particular, this concerns the areas where greenhouse production has a long-lasting history. For example, in the south of Ternopil region where greenhouse products (primarily, tomatoes) are produced at a large scale by households, a huge 10-ha greenhouse complex is being constructed nowadays. Total amount of investments will exceed USD 100 mln. It is expected that the complex will annually produce 4 thousand tons of tomatoes and 1.5 thousand tons of pepper. Production of pepper is rather non-traditional for Ukrainian greenhouse producers but, at the same time, underscores one of the opportunities mentioned in Table 44, i.e. that there is a possibility to grow a wide range of products in Ukraine. Not least of all, construction of such huge greenhouse complex was enabled by availability of demand. Growth in the retail sector, construction of modern warehouses as well as initiation of some projects in the sector of frozen vegetables will stipulate the development of greenhouse production with regard to both quantity and quality supplies.

Further modernization of greenhouses in Central and Southern Ukraine is related to growing competition in the sector. This modernization requires the use of new technologies (to reduce

dependence on natural gas as an expensive energy source) and crop varieties. On the one hand, technological improvements are possible due to ability to economize on cheap labor resources. On the other hand, shortage of qualified labor can be one of the major obstacles on the way to modernization.

Overall, the expansion rates will stay positive in the nearest future but, most probably, they will slow down in comparison with the last three years as there are time-consuming infrastructural problems. These problems will primarily affect small-scale producers who have lack of operating capital and little access to finance. The weaknesses of the sector can be transformed into its strengths based primarily on technological improvements as the current situation requires such improvements: input prices are high, competition in foreign and domestic markets is growing, and seasonality of sales persists while the demand for products is growing.

# 6. Legal framework

## 6.1. Key legislative requirements

The foundation of agrarian legislation of Ukraine, besides general rules of civil, economic and land legislation, is laid by the Laws of Ukraine "On Farming", "On Priority of Social Development of Countryside and Agro-Industrial Complex of Ukraine", "On State Support to Agriculture of Ukraine", "On Agricultural Cooperation", "On Grain and Grain Market of Ukraine", "On State Regulation of Production and Realization of Sugar", "On Pesticides and Agrochemicals", "On Personal Peasant Farm", "On Seed", "On Pedigree Cattle Breeding", "On Plant Quarantine", «On Quality and Safety of Foodstuffs and Food Raw Materials" and some others.

Besides this legislation that regulates all relations in the agricultural sector of Ukraine, there are some specific normative documents that focus exclusively on the greenhouse sector. They are as follows:

- State Construction Standard. Buildings. Greenhouses DBN B.2.2-2-95. This normative document prescribes all the conditions which have to be fulfilled in the process of greenhouse construction and its further exploitation;
- Health Rules and Requirements during Transportation, Storage and Use of Pesticides[9]. Chapter: The Use of Pesticides in the Greenhouses. This normative document was developed according to the provisions of the Law of Ukraine "On Pesticides and Agrochemicals" (#86/95 from 02.03.1995) and regulates the conditions of pesticides application in the greenhouses.

It is necessary to mention that the amount and conditions of state support are definied in the legislative documents but, in fact, they can change significantly from year to year as the amount of state support for each specific measure is definied every year with the adoption of Law of Ukraine "On State Budget".

## 6.2. Quality standardization and regulation

According to the Law of Ukraine "On pesticides and agrochemicals"[10] it is possible to use a limited number of pesticides at the greenhouses with permission from specially authorized central executive body for environmental protection. The use of pesticides in greenhouses is allowed only after finishing all plants care works and without persons who are not related to treatment.

According to State Sanitary Rules 8.8.1.2.001-98 "Transportation, storage and use of pesticides in national economy", fumigation of greenhouses is conducted in compliance with all safety measures provided for fumigation operations. Fumigation (aeration) is conducted in the whole block of greenhouses simultaneously. Fumigation is forbidden during harvesting period.

[9] Adopted by the Order of the Ministry of Health of Ukraine #1 of 03.08.1998.
[10] Law of Ukraine "On psticides and agrochemicals" of 02.03.1995 #87/95-BP with amendments.

Working solutions are prepared in the solutions site located in the assigned place that has exhaust ventilation, sewage system and isolated entrance (exit). Exposure time should correspond to the type of pesticide and its purpose according to the "List of pesticides and agrochemicals allowed for use in Ukraine", Appendices to the "List of pesticides and agrochemicals allowed for use in Ukraine" and instructions for the safe use of pesticides.

In summer, soil steaming at the greenhouses should be conducted only when transoms are completely open. All prevention measures provided in rules should be performed. The width of sanitary protection zone of greenhouse farms must be at least 300 m from residential, industrial facilities and water sources.

Use of aerosol generator for the treatment is allowed only if consumption of pesticides during such treatment does not exceed the norms of expenses that are recommended by the "List of pesticides and agrochemicals allowed for use in Ukraine" for this product and crop. Also measures to prevent release of aerosols into the atmosphere have to be taken.

It is strictly forbidden to plan combining of washing, drainage and rain sewer of greenhouses during designing and construction of greenhouses. And it is forbidden to throw those flows into the basins or canalization without prior decontamination.

Drain flow and rinse water generated during cleaning and disinfection of premises, vehicles, containers, equipment and clothing are collected in a concreted reservoir and are processed with chlorinated lime (600 g per 10 l of flows). Discharge of drainage flows into canalization is allowed only after exposure defined by the project organization. If appropriate project developments are not available, exposure time is determined experimentally during negotiation of the obtained results with sanitary inspection and environmental protection authorities.

In the absence of a centralized canalization installation of a local sewage system should be provided according to Building Regulations (SNiP II-Г, 6-62) "Sewage system" and "Interim guidance on the design of wastewater treatment plant of the local sewage system" (SN 387-65). Soil contaminated with pesticides and plants residues are removed by special transport to the fields and are decontaminated in compost.

Greenhouse products, including floral, that are distributed to the trading network, should have certificates indicating the farm, the number of the greenhouse, data about the latest treatment (a name of the pesticide, date and method of treatment, date of harvest, residuals). The certificate is signed by the head of the farm. It is forbidden to distribute the products without certificates to the trading network. Sale of products originated from experimental plots is allowed only with permission of sanitary-epidemiological service.

Selective control of content of pesticides in greenhouse products and flowers, inspection and registration of certificates has to be held by sanitary epidemiological service at least once a month.

Inspection of pesticide contamination at workplaces in establishments for floral products selling (facilities for storage and selling of bouquets, etc.) is held by sanitaryepidemiological service at least once a quarter. At the same time the level of air pollution at the premises and open skin of workers are inspected.

According to the Law of Ukraine "About Plant Protection", 1998, #50-51 control over the content of pesticide residues in plants and agricultural products is conducted by specially authorized executive bodies in plant protection.

Post-Soviet system of standards is still effective in Ukraine. After accession of the WTO, standards in Ukraine are officially optional but some regulations require complying with those standards. In particular, the Law of Ukraine "On Consumer Protection" requires indication of the normative document that regulates product development and production (Standard or Specifications). The list of the main standards relevant to the sector and their short description can be found in Addendum 5.

## 6.3. Import regulation

Import of agricultural products into Ukraine is regulated by the Law of Ukraine "About state regulation of import of agricultural products" # 468/97, adopted on July 17, 1997 with the

subsequent amendments. It is declared in this law that the import duties and tariffs on agricultural products can be set and changed only by the Parliament of Ukraine and are defined in the Customs Tariff of Ukraine. All the agricultural products which are imported in Ukraine have to be certified according to the international standards and pass, if necessary, sanitary-epidemiological, radiological and veterinary control which is conducted by the official authorities.

Before entering the WTO, Ukraine applied specific duties to most vegetables imported into the country. After joining WTO, Ukraine had to switch to the system of ad valorem duties with respect to the imported vegetables. This led to the decrease of protection of domestic producers and enhancement of the competition from the side of foreign producers.

Currently, ad valorem duties have to be paid while importing the greenhouse products (Table 45).

**Table 45. Ad valorem duties for import of the greenhouse products**

| Product | Ad valorem duty, % of customs value |
|---|---|
| Tomatoes | 10.0 |
| Cucumbers | 10.0 |
| Cabbages: cauliflower and broccoli | 10.0 |
| Brussels sprouts, white and red cabbage | 20.0 |
| Leek (green onion) | 20.0 |
| Salad | 20.0 |

*Source: Customs Tariff of Ukraine (2011)*

Also, Cabinet of Ministers of Ukraine has the authority to introduce seasonal duties with respect to the above mentioned products for the period from 60 to 120 days per year. The seasonal duties are twice as high as the normal ones. In the last three years, the seasonal duties for the greenhouse products have not been introduced in Ukraine.

There are also regulations in force[11] that set up the import duties for the inputs of greenhouse production (Table 46).

**Table 46. Ad valorem duties for import of the inputs of greenhouse production**

| Product | Ad valorem duty, % of customs value |
|---|---|
| Plant protection agents | 0 - 6.5 (based on content) |
| Mineral fertilizers (complex) | 5.0 |
| Construction materials for greenhouses | 5.0 |

*Source: Customs Tariff of Ukraine (2011)*

Control over imported products is conducted by the State Veterinary and Phytosanitary Service of Ukraine which was created by integration of the State Veterinary Service and the State Phytosanitary Sevice, according to the Decree of the President of Ukraine #464/2011 "About adoption of the regulations on State Veterinary and Phytosanitary Service of Ukraine. Currently, the negotiation process is going about the amendments to the Law "About food quality and safety". Those amendments imply that a customs office at the country border will take over control of imported products instead of the State Veterinary and Phytosanitary Service of Ukraine.

It is expected that the Decree that resigns authority of the State Veterinary and Phytosanitary Service of Ukraine at the state border will be published soon. It will provide for a regulation that appropriate control at the borders will be carried out by the representatives of the customs service.

Certification of imported commodities is regulated by the Article 18 of the Decree of the Cabinet of Ministers of Ukraine "About standartization and certification" adopted on 10.05.1993 #46-93 with consequent amendments. The List of the products that are subject to the obligatory certification in Ukraine was approved on 01.02.1005 by the Decree #28 of the State Committee of Ukraine in Technical Regulation and Consumer Policy.

[11] Law of Ukraine "On customs tariff of Ukraine" #2371-14, adopted on April 5, 2011 with further amendments

In Ukraine, only a few inputs of greenhouse production are subject to obligatory certification, namely, lighting equipment (code 9405) and heating equipment for greenhouses (code 8516 21 00 00 and 8516 29).

Ukraine concluded bilateral agreements with the CIS countries on mutual recognition of certification results. These are Russian Federation, Belarus, Uzbekistan, Armenia, Kyrgyzstan, Georgia, Azerbaijan, Kazakhstan, Turkmenistan, Moldova and Tajikistan.

Ukrainian Government also plans to synchronize the accreditation system of Ukraine with the EU system. Negotiation on mutual recognition of certification documents with the European Commission is planned for 2012.

## 6.4. Taxation system, benefits for producers

In order to support the agrarian sector and to reduce the tax pressure upon agricultural producers, legislation established special regimes of taxation for enterprises of the sector:

alternative system of taxation – fixed agricultural tax (FAT) which is built upon specifics of agricultural business; and

special regime of VAT application.

FAT is a tax which is calculated and paid in relation to the area of agricultural land in use (ownership) of a taxpayer as a percentage of normative monetary value of land. Normative monetary value is determined by the Government. FAT replaces the following taxes and contributions:

- corporate profit tax including advance payment in the process of dividend distribution;
- land tax for land used for agricultural production;
- fee for special use of water resources; and
- fee for undertaking of some kinds of entrepreneurial activities (including trade activities).

All other taxes and fees are paid by payers of FAT on the usual terms according to the Tax Code of Ukraine[12]; single social contribution for social insurance is paid on the basis of the Law of Ukraine "On Collection and Accounting of Single Contribution for Mandatory State Social Insurance"[13] and other legislative documents.

As it can be seen from the table below, the sole producers of greenhouse vegetables may be qualified for FAT, but the sole producers of ornamental plants may not.

**Table 47. Payers of fixed agricultural tax**

| **Who is qualified for FAT?** | **Enterprises meeting the following criteria:**<br>▪ produce agricultural products and/or grow and catch fish in lakes, ponds and artificial water reservoirs, process the said products with use of own or leased facilities and equipment, including tolling schemes, supply agricultural products and/or fish;<br>▪ hold farmland (own or leased);<br>▪ share of agricultural production is equal or exceeding 75%.<br>▪ Share of agricultural production – specific weight of proceeds from realization of agricultural products and products derived from the latter in the overall income of an enterprise |
|---|---|

[12] Adopted by Ukrainian Parliament on 02.12.2010 # 2755-VI
[13] Adopted by Ukrainian Parliament on 08.07.2010 # 2464-VI

| | |
|---|---|
| **Who is not qualified for FAT?** | ▪ Enterprises earning over 50% of income from selling of ornamental plants, wild animals and birds, furs;<br>▪ Enterprises producing and/or selling items subject to excise tax (except for sale of grape wine-making materials by enterprises of initial wine-making);<br>▪ Enterprises having tax debt on the date of application for acquiring status of FAT payer, except for bad debts appeared as a result of force-majeur |

The basis for calculation of FAT is the normative monetary value of agricultural land completed by July 1, 1995.[14] Rates of FAT are defined in per cent to the tax basis for 1 ha of agricultural land or land of water fund depending on their category (type) and location: *in the case of greenhouses, this rate is 1% per year*.

Tax payers estimate the sum of tax on their own as of January 1 of the current year. Estimated sum of FAT is divided by quarters as follows:

- I and II quarters – 10%;
- III quarter – 50%;
- IV quarter – 30%.

Sums of FAT falling upon a respective quarter are divided into three equal parts and paid on a monthly basis to a special account of a budget of the administrative district where the taxed land parcel is located.

An enterprise operating in the field of agriculture, forestry or fisheries may choose special regime of VAT taxation (applicable till January 1, 2018) in the case that:

- activities of the enterprise are mostly consisting of supply of own agricultural goods
- (services) produced at own (leased) production facilities (including tolling schemes); and
- specific weight of agricultural goods (services) accounts for no less than 75% of the overall value of goods (services) produced (provided) in 12 preceding months.

The enterprise which has chosen special regime of VAT taxation shall open a special account in the bank (current account with special regime of use); the account shall be open within one reporting (tax) period upon issue (by tax authorities) of the certificate of registration of the enterprise as a subject of special regime of VAT.

The sum of VAT accrued in transactions of supply of agricultural goods produced on own facilities (as well as goods produced in tolling schemes) is remitted by agricultural enterprises from their current accounts to their special VAT account.

This sum of VAT is used for compensation of VAT paid by the enterprise from the value of production factors; if there is a leftover, it may be used for other production purposes.

## 6.5. Budget support programs for producers

Besides tax benefits, there is also a special law "On State Support of Agriculture" adopted in 2004 under No. 1877 and amended on several occasions afterwards. This law provides for the main tools and measures of state support to production of agricultural commodities and development of agrarian market of Ukraine. Also, some support instruments are stated in the State Program of Development of Ukrainian Rural Areas till 2015[15].

Measures of state support of agricultural producers are financed from two budgetary funds: general and special. General fund is formed from common budget incomes and is used to finance annual support measures. Resources from special fund are used to finance target state programs. State support of agriculture, among other programs, includes measures such as partial compensation of cost of construction of new greenhouse complexes; allocation of

[14] Tax Code does not provide for annual indexation of normative monetary value for the purposes of taxation. However, in practice, indexation is conducted as soon as inflation rate exceeds 10%.
[15] Adopted by Decree of the Cabinet of Ministers of Ukraine on 19.09.2007, # 1158

budget subsidies in relation to a unit of cultivated area; subsidies to breeding institutes and enterprises; state programs for improvement of soil fertility, elimination of pests and diseases of agricultural crops and animals, carrying out agricultural production in contaminated areas; state interventions in the markets of grains, sugar and products of animal origin (the prices of vegetables and flowers are not regulated by the state).

The Cabinet of Ministers of Ukraine pronounced intentions to support the development of vegetable sector including production of vegetables in greenhouses and to reach production level of 10 mln ton of vegetables by 2015. The implementation of the program may include building, reconstruction and modernization of greenhouse complexes and storages, applying energy saving technologies, microclimate regulation, vegetable post-harvest handling and treatment before sale. Another condition for sector development is quality control through the introduction of certification of all technologies along the supply chain. The role of the government may include support of the cooperatives involved in post-harvest handling, storage and sale of vegetables; promotion of vertical integration in the sector to attract capital; allocation of land plots for construction of vegetable storages and greenhouse complexes.

Measures which are actually funded in the current year state budget and can be related to the greenhouse sector are described below.

Partial compensation of cost of construction of new greenhouse complexes (general fund of state budget)

State budget for 2011 provides for allocation of UAH 50 mln (about EUR 4.5 mln) for partial compensation of expenses incurred by agricultural producers when building new greenhouse complexes. The procedure for distribution of this subsidy was adapted by the Order of the Cabinet of Ministers of Ukraine #305 of March 2, 2011. According to the Order, up to 50% (excluding VAT) of construction cost of new greenhouses could be compensated from the state budget. An important precondition to receive this support is the use of modern energy saving technologies while constructing new greenhouses. However, the draft law "On State Budget 2012" does not provide for support of this measure, although theoretically it could be financed in the framework of programs focused on general state support in agriculture.

Programs funded from a special fund of state budget

State support of development of viticulture and horticulture is enshrined in the Tax Code and will be financed till January 1, 2015 under the Law of Ukraine "On the assembly on the development of viticulture, horticulture and hop" and "Resolution of charges collection and use of the funds for the development of viticulture, horticulture and hop" approved by Cabinet Ministers of Ukraine on 15.07.05 under #587. In the special fund[16] of the current state budget, financial support is planned by the following directions: support for planting of new gardens, vineyards and berry-fields (UAH 556.75 mln or about EUR 50 mln) and also support for hop-growing (up to UAH 98.25 mln or about EUR 9.0 mln). In the draft state budget for the upcoming year, financial support is planned for support of planting of new gardens, vineyards, berry-fields and hop-growing in the amount of UAH 1075 mln or about EUR 100 mln. In accordance with paragraph 4 of the Resolution, these budget funds are available to business entities, regardless legal form and ownership involved in viticulture or horticulture to offset their costs of design, soil preparation and planting, taking care for perennial plants, structures, trellises and drip irrigation according to standard cost for 1 hectare.

It is likely that state support for planting of new gardens, vineyards and berry-fields will not have much success as long as administration of special fee for the purpose is still leaving much to be desired. In general, in view of the practice of collection and drawing of funds of special fund of the state budget, distribution of the above sums is questionable.

Reduction of credit costs for agricultural enterprises

Agricultural producers[17] may count on partial compensation of interest rates on loans and borrowings in national and foreign currencies; the state budget for 2011 allocated for the purpose up to UAH 531.4 mln (or about EUR 48.0 mln). The procedure for use of this money is

[16] Special fund is financed through 1.5% tax on retail sale of alcohol and beer.
[17] If the criteria mentioned in section 5.2 are met.

provided for by the Resolution of the Cabinet of Ministers No. 794 of August 11, 2010 (with subsequent changes). This Resolution is limiting the compensation of interest rates by the following thresholds (higher rates are not compensated):

- no more than doubled NBU[18] discount rate effective at the moment of interest rate calculation (for loans in national currency). Starting from August 2010, NBU discount rate has been set at the level of 7.75%; and
- no more than 10% on loans issued in foreign currency.

It is necessary to point out that compensation of interest rates on loans issued in 2007-2009 is performed regardless of effective interest rates, and only loans issued in 2010-2011 are supported within the limits described above.

Decision on compensation is taken by the commission of the Ministry of Agrarian Policy and Food of Ukraine, and preliminary selection of enterprises qualified for compensation is performed by tender commissions at regional level (in Oblasts, Autonomous Republic of Crimea, cities of Sevastopol and Kyiv).

In recent years, state budget has been allocating funds insufficiently for complete satisfaction of all submitted claims of agricultural producers. Currently, the situation in the financial market in Ukraine is complicated. Overnight rates are often between 20 and 30%. Outside the context of state support, the lack of credit resources can become one of the main factors that slow down capital-intensive projects.

Compensation of cost of agricultural machinery

The budget for 2011 has allocated UAH 10 mln (or EUR 0.9 mln) for this purpose (budgets of 2007 and 2008 provided for allocation of UAH 100 mln or EUR 9.0 mln and more). Resolution of the Cabinet of Ministers of Ukraine #647 of July 28, 2010 (with amendments) sets up the procedure for distribution of this sum and use thereof for partial compensation of expenses incurred in view of procurement of complex agricultural machines (of domestic origin). At that, the sum of compensation may cover up to 30% of the value of machinery (VAT excl.). The list of agricultural equipment the purchase of which is supported by this measure is adopted every year by the Special Council[19]. In 2011, greenhouse equipment is not included in this list. However, it could be added in the following years. Enterprises entitled to compensation are chosen by special commissions on a competitive basis.

## 6.6. Land market regulation and possible prospects

Upon declaration of independence of Ukraine, land reform became one of the most important reforms in the country. The reform has practically eliminated state and collective ownership to arable land. Today, virtually all farmland is owned by former members and employees of kolkhozes (collective farms) and sovkhozes ("soviet" farms) and their heirs. It is necessary to note that land reform took the fast track, but it has remained incomplete.

It is important to understand that a land share (pai) is not identical to a land parcel; a land share is only a right to be allocated a piece of land of a certain area. Conversion of land shares into real land parcels with registered ownership is currently going on, but not every owner has already completed necessary procedures, and that often brings about conflicts and disputes. Significant areas of farmland in the beginning of 90ies were divided among former employees of kolkhozes, and nowadays about 40% of farmland is owned by people who inherited it and have nothing to do with agriculture (mainly successors). The situation is further complicated due to incomplete legal regulation of issues of succession in case of land shares.

Most citizens who became landowners in the course of land reform were not prepared to farm their land; they were also reluctant to make any associations for joint cultivation of their plots.

Therefore, in most cases, farmland is cultivated by enterprises that lease land (parcels or land shares) from citizens. In some cases, tenants are foreign investors.

The existing legislation sets moratorium on sale of farmland and its inclusion into the share capital of the legal entities. According to the current reading of the law on moratorium, the

[18] National Bank of Ukraine.
[19] The last protocol of this Council meeting is of 08.04.2011 # 34.

latter shall be lifted with adoption and entering into force of two laws, "On land market" and "On land cadastre", but not earlier than January 1, 2012. At the moment, the law "On land cadastre" was adapted by the Parliament of Ukraine on the 7th of July 2011 # 3613; and the law "On land market", while being actively debated by experts and public at large, was submitted to the Parliament #9001.

Establishment of a farmland market is one of the principal directions of economic reforms announced by the President of Ukraine and the Government.

Expectations on a lifting of the moratorium in the nearest future are also supported by statements of high ranking officials and Members of Parliament belonging to the ruling Party of Regions.

Draft law of Ukraine "On land market" provides for several restrictions related to farmland ownership. The draft, similar to effective Land Code of Ukraine, explicitly forbids foreign companies as well as joint ventures and foreign citizens to own farmland in Ukraine. Only citizens of Ukraine, family type farms, established according to the Law of Ukraine "On Farm Enterprises"[20] and state represented by central authority bodies or local communities will be allowed to own farmland. According to this draft any corporate landownership except for farmers will be banned. Land market is going to be actively regulated through specialized state establishment.

At the same time, the rule that limits the list of potential owners of farmland by citizens of Ukraine is not clear enough and may give rise to ambiguity and inconsistency. The draft says that only those citizens of Ukraine are entitled to own farmland who posses agricultural education or carry out agricultural commodity production. However, the draft does not specify how these facts shall be confirmed or checked. But the keynote of the draft is clear: to protect Ukrainian farmland from being acquired by foreigners for very cheap starting price in order to ensure food security of Ukraine.

The draft also provides for a limit on the area of farmland to be owned by one person. Maximum area of farmland to be owned by one person is defined in relation of so-called natural agricultural zones (and mountain areas) and equals to:

- Polissya (Forest) - 1500 ha;
- Forest Steppe – 1750 ha;
- Steppe, Arid Steppe, Dry Steppe – 2100 ha;
- Carpathian Mountain Oblast – 900ha;
- Crimean Mountain Oblast – 1100 ha.

Another issue of top importance for agricultural producers is the pre-emption right provided for by the draft. Currently effective laws establish such right for tenants, and most agricultural enterprises are tenants, not owners of the land they cultivate. Draft, upon testing different variants, was amended with the rule providing for the first pre-emption right of the State Agency for Land Resouces.

Other subjects of pre-emption right (if the first right is waived) are local communities (i.e. in fact to local – village, town, city – councils (Radas)), current user (tenant) of land parcel (but not the legal entity), and owners of adjacent plots (neighbors)[21].

Pre-emption right tool is not triggered if land is sold to members of owner's family.

The draft also defines how the owner of a land plot who is willing to dispose of his land informs potential buyers and holders of their pre-emption right. The owner shall inform holders of pre-emption rights and publish in local press an advertisement specifying the price of land.

Open and predictable farmland market shall support development of agriculture of Ukraine and attract investors, though the latter may have limited options. It is possible that variations of leasehold will become the last ditch for foreign investments. We expect that the moratorium on sale of farmland will be lifted, but, most likely, starting only from January 1, 2013. The introduction of farmland market in 2012 would be more political than economic decision, as the national state agencies responsible for the proper functioning of this market (state electronic

[20] Adopted by Ukrainian Parliament on 19.06.2003 # 973-IV

[21] Exhaustive information on key players of the Ukrainian land market can be found in UCAB study "Market value of arable land" (2011).

cadastre, registration system, etc.) are not prepared. In general, there is a tandency of forming the legislation in such a way as to provide the state institutions with the possibility of buying agricultural land at low prices with the purpose of further redistribution by the means of rent or sell.

Despite some imperfections of the draft law "On Land Market", its adoption and implementation can create additional stimuli for the investors to develop capital-intensive projects such as construction or modernization of greenhouses. It would be much safer to invest large resources in Ukraine if the land was owned.

## 6.7. Free trade agreements with the EU and CIS: challenges and opportunities

EU

Ukraine has already gained some experience regarding WTO accession when considerable reduction of customs duties led to significant increase of volumes of import. Only massive 60-percent devaluation of Hrivniya (UAH) in autumn of 2008 managed to stop these trends and restore competitiveness of national producers.

Tariff protection for most of the vegetables, including greenhouse vegetables and flowers, is relatively moderate in Ukraine. Therefore, negotiation process on vegetable and greenhouse products in terms of negotitations on Free Trade Area (FTA) with the EU resulted mainly in the possibilities of Ukrainian products to access the EU market.

Expected conditions for free trade regime for greenhouse (fruit and vegetable) products are described below (conditions of accession to the EU market).

**Table 48. Expected conditions of accession to the EU market for Ukrainian vegetables in terms of FTA**

| Products | Classification code | Concessions |
|---|---|---|
| Tomatoes | 0702.00.(00) | Exemption of ad valorem component of the MFN tax, no quantity restrictions. The EU preserves the right to use entry prices. |
| Cucumbers | 0707.00.(05) | |
| Vegetable marrows | 0709.90.(70) | |

Thereafter, the Ukrainian party according to the request from the EU additionnaly liberalized accession of separate commodities to Ukrainian market (see table below).

**Table 49. Some conditions of accession to Ukrainian market for EU vegetables in terms of FTA**

| | | |
|---|---|---|
| 0702.00.00.00 | Tomatoes, fresh or chilled | -50% of the current rate of import duty during 5 years |
| 0707.00.05.00 | Cucumbers | -50% of the current rate of import duty during 5 years |

The free trade agreement between Ukraine and the EU will become effective not earlier than 2013, i.e. after ratification by the Parliament of Ukraine and the parliaments of the EU Member States.

CIS

In October 2011, Ukraine signed a Free Trade Agreement with the CIS countries. It is expected that this Agreement will come into force starting from 2012. According to the Agreement, parties do not apply export duties to the products intended to be supplied to the customs area of the other parties or import duties to the products supplied from the customs territory of the other parties. The exceptions with regard to abolishment of export duties include a number of products that the parties perceive as important for their self-sufficiency. However, the major point is that the price of natural gas exported to Ukraine from Russian Federation will be further calculated based on a special formula, i.e. it will remain on the same high level. The parties also deny import duties except for the products provided in the Annex 1 to the Agreement (mainly alcohol, cigarettes, sugar and syrups).

The parties also agreed to review export duties from time to time and lower them until they are abolished completely. This Agreement also foresees that, if the party that applies export duties mentioned in the Annex lowers or abolishes them for the third countries, the same change in tariffs applies for the parties.

According to the Agreement, Ukraine can supply vegetables to the CIS countries without any tariffs, quotas or other restrictions and Ukraine does not apply any tariff protection from the import supplies of vegetables from the CIS countries. Under the conditions of the Agreement, inputs for greenhouse production within the CIS countries are supplied on the free trade basis[22]. The only exception is Tajikistan; it reserves the right to apply import duties at the level of 5% to the mineral fertilizers supplied from the other parties that apply export duties to Tajikistan Republic. Also Tajikistan has the right to apply export duties to the supplies of vegetables and roots at the level of 7%, if the party applies export duties to Tajikistan Republic.

[22] This does not apply to energy resources. In particular, Russian Federation has the right to apply export duites to oil and oil products.

# 7. Key players and trade associations in the sector

## 7.1. Key governmental agricultural contacts

| Name | Contacts |
|---|---|
| The Ministry of Agrarian Policy and Food of Ukraine | Address: 24 Khreshchatyk str., Kyiv, 01001<br>Phone: +38-044-2798474<br>http://www.minagro.kiev.ua/ |
| The State Customs Service of Ukraine | Address: 11-g, Dehtiarivska str., Kyiv, 04119<br>Phone:+38 (044) 2472836; +38 (044) 4890224; +38 (044) 4811881<br>Fax: +38 (044) 4811889; +38 (044) 4811838<br>http://www.customs.gov.ua |
| The State Veterinary and Phytosanitary Service of Ukraine | Address: 1 B.Hrinchenka str., Kyiv, 01001<br>Phone: +38 (044) 2791270<br>Fax: +38 (044) 2794883<br>http://vet.gov.ua/ |
| Ukrainian Academy of Agricultural Sciences | Address: 37, Vasylkivska str., Kyiv, 03022<br>Phone: 257-71-00, 281-06-78<br>E-mail: prezid@ukr.net<br>http://uaan.gov.ua/viddilennya.php?id=2 |

## 7.2. Main associations/business groups and their contacts

| Name | Contacts |
|---|---|
| Association "Greenhouses of Ukraine" | Phone:+380 (44) 383-1932;<br>+380(44) 383-0796<br>e-mail:as@s-team.kiev.ua;<br>erniyazova@s-team.kiev.ua<br>http://greenhouse.in.ua |
| Flower Council of Ukraine | Address: App.3, 13 Gmyri Street, Kyiv, 02140<br>Tel: +380 44 577 04 25; +380 44 577 04 28<br>Fax: +380 44 577 04 26<br>E-mail: info@cityofdreams.com.ua<br>www.cityofdreams.com.ua |
| Association Ukrainian Agribusiness Club | Address: Velyka Zhytomyrska str., 20 A, office 53, Kiev, 01034<br>Phone: +380 44 201-4950<br>Fax: +380 44 201-4951<br>E-mail: info@agribusiness.kiev.ua<br>www.agribusiness.kiev.ua |

## 7.3. Major exhibitions relevant for the sector

| Name | Time and Place | Contacts |
|---|---|---|
| Greenhouse Industry | 29 February–<br>2 March, 2012<br>KyivExpoPlaza (2B Salyutna str., Kyiv) | Phone:+380 (44) 383-1932;<br>+380(44) 383-0796<br>e-mail:as@s-team.kiev.ua;<br>erniyazova @s-team.kiev.ua<br>http://greenhouse.in.ua |
| Fruit Vegetables Logistics | Date to be confirmed (anticipated in early November 2012)<br>KyivExpoPlaza (2B Salyutna str., Kyiv) | Address: 01001, Kyiv, p.o. box "B-13"<br>Tel/fax: +38 (044) 461- 9342<br>E-mail: info@kmkya.kiev.ua;<br>sergei@kmkya.kiev.ua<br>http://www.kmkya.kiev.ua |

| | | |
|---|---|---|
| | | http://www.freshexpo.kiev.ua/ |
| Flowers & Hortech Ukraine | 3-5 April, 2012 International Exhibition Center (15 Brovarskyi Prospect, Kyiv) | Address: App.3, 13 Gmyri Street, Kyiv, 02140<br>Tel: +380 44 577 04 25<br>Fax: +380 44 577 04 26<br>E-mail: info@cityofdreams.com.ua<br>www.cityofdreams.com.ua<br>http://www.flowers-hortech.com/en/exhibition-next_general.aspx |
| Fresh Produce Ukraine | 28-30 November, 2012 International Exhibition Center (15 Brovarskyi Prospect, Kyiv) | Address: App.3, 13 Gmyri Street, Kyiv, 02140<br>Tel: +380 44 577 04 25<br>Fax: +380 44 577 04 26<br>E-mail: freshproduce@cityofdreams.com.ua<br>www.cityofdreams.com.ua<br>http://www.freshproduce-expo.com/en/exhibition-next_general.aspx |
| InterAGRO | 7-10 February, 2012 KyivExpoPlaza (2B Salyutna str., Kyiv) | Phone: +38 044 461 93 68;<br>+38 044 490 64 69<br>http://www.interagro.in.ua/ |
| Agroindustrial fair „Agro" | 6-9 June, 2012 International Exhibition Center (15 Brovarskyi Prospect, Kyiv) | Phone /fax: +38 (044) 287 68 63<br>http://www.agroexpo.com.ua/Eng/Main.php |
| „Ukraine Agrarian" | 14-17 March, 2012 Expocenter of Ukraine (1 Glushkov Avenue, Kyiv) | Address: 1, Glushkov Ave., Kyiv, 03680, Pavilion №5, office №6<br>Tel. (044) 596-91-08;<br>Tel./Fax: (044) 596-98-01<br>E-mail: agro@expocenter.com.ua<br>web-site**:** http://www.expocenter.com.ua/en/ |
| Vegetables and Fruit of Ukraine | Date to be confirmed (anticipated end of November 2012) Expocenter of Ukraine (1 Glushkov Avenue, Kyiv) | Tel./fax: (044) 596 91 44<br>e-mail: expo13@expocenter.com.ua<br>http://www.expocenter.com.ua/en/ |
| Garden. Vegetable Garden. Harvest | Date to be confirmed (anticipated mid-October 2012) Expocenter of Ukraine (1 Glushkov Avenue, Kyiv) | Address: 1, Glushkov Ave., Kyiv, 03680, Pavilion №5, office №6<br>Tel./Fax: (044) 596-98-01<br>E-mail: agro@expocenter.com.ua<br>web-site**:** http://www.expocenter.com.ua/en/ |

# Addenda

## Addendum 1. TOP-40 producers of greenhouse crops 2010 in Ukraine

| Name | Total physical area used, sq m | Vegetables produced in all types of greenhouses – total, dt | Production structure | | | Productivity, kg/sq m | | | Share in production | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | tomatoes | cucumbers | other | tomatoes | cucumbers | other | tomatoes | cucumbers | other |
| **TOTAL** | **4 664 608** | **1 407 596** | **52,5%** | **46,9%** | **0,6%** | **37,6** | **22,2** | **4,9** | **100,0%** | **100,0%** | **100,0%** |
| Public Corporation "KOMBINAT "TEPLYCHNYY" | 484 200 | 229 618 | 78,6% | 21,4% | 0,1% | 51,2 | 37,7 | 12,5 | 24,4% | 7,4% | 2,2% |
| Private Agricultural Enterprise "UMANS'KYY TEPLYCHNYY KOMBINAT" | 439 600 | 219 540 | 82,3% | 17,7% | | 59,5 | 28,6 | | 24,4% | 5,9% | |
| Agricultural Limited Liability Company "KRYMTEPLYCYA" | 233 000 | 91 839 | 80,9% | 17,6% | 1,5% | 45,5 | 28,2 | 11,0 | 10,0% | 2,5% | 17,6% |
| State Enterprise "AGROKOMBINAT NAUKOVO-DOSLIDNYY, VYROBNYCHYY "PUSHCHA-VODYCYA" | 228 132 | 75 258 | 52,7% | 44,1% | 3,2% | 35,0 | 31,8 | 23,1 | 5,4% | 5,0% | 31,2% |
| Closed Corporation TM "ZMIIVS'KA OVOCHEVA FABRYKA" | 216 500 | 68 189 | 8,9% | 90,9% | 0,2% | 28,3 | 32,0 | 12,0 | 0,8% | 9,4% | 1,5% |
| Limited Liability Company "TEPLYChNYY KOMBINAT "DNIPROVS'KYY" | 172 224 | 58 203 | 39,5% | 60,5% | | 21,8 | 52,6 | | 3,1% | 5,3% | |
| LLC "PERSPEKTYVA" | 180 000 | 58 036 | 21,7% | 78,3% | | 42,0 | 21,1 | | 1,7% | 6,9% | |
| Limited Liability Company "SOTEKO" | 68 000 | 42 998 | 57,5% | 42,5% | 0,0% | 68,7 | 58,9 | 0,7 | 3,3% | 2,8% | 0,1% |
| Closed Corporation "AGROKONCERN" | 83 000 | 35 974 | 68,3% | 31,7% | | 46,4 | 38,0 | | 3,3% | 1,7% | |
| Joint-Stock Company "TEPLYCHNYY KOMBINAT" | 96 000 | 28 724 | 37,3% | 62,7% | | 35,7 | 27,3 | | 1,4% | 2,7% | |
| Closed Corporation CHERKAS'KYY AGROTEPLYCHNYY KOMBINAT | 120 000 | 26 723 | 45,0% | 55,0% | | 20,1 | 24,5 | | 1,6% | 2,2% | |
| Limited Liability Company "KRASNOGRADS'KA OVOCHEVA FABRYKA" | 60 000 | 26 613 | 49,1% | 50,9% | | 43,6 | 22,6 | | 1,8% | 2,1% | |
| Private Agricultural Enterprise "DOLYNS'KYY TEPLYCHNO-OVOCHEVYY KOMBINAT" | 72 000 | 24 842 | 69,9% | 29,5% | 0,7% | 38,6 | 28,1 | 16,3 | 2,3% | 1,1% | 2,1% |
| Limited Liability Company "UKRAFLORA-VINNYCYA" | 40 000 | 23 730 | | 100,0% | | | 59,3 | | | 3,6% | |
| Agro-Industrial Limited Liability Company "RADYANS'KA UKRAINA" | 65 800 | 21 180 | 52,4% | 47,6% | | 43,0 | 14,4 | | 1,5% | 1,5% | |
| Limited Liability Company "AGROFIRMA "UKRAINA" | 60 000 | 19 746 | 100,0% | | | 32,9 | | | 2,7% | | |
| Closed Corporation "AL'YANS" | 90 000 | 19 497 | | 100,0% | | | 21,7 | | | 3,0% | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Private Enterprise "FANELS-TT" | 60 000 | 18 483 | 42,6% | 57,4% | | 26,3 | 35,3 | | 1,1% | 1,6% | |
| Closed Agricultural Corporation "NADIYA" | 60 000 | 18 379 | 57,5% | 42,5% | | 35,2 | 26,1 | | 1,4% | 1,2% | |
| BOGORODCHANS'KYY TEPLYCHNO-OVOCHEVYY KOMBINAT | 92 041 | 17 032 | 44,1% | 55,9% | | 20,6 | 17,1 | | 1,0% | 1,4% | |
| Private Enterprise "STRYYTEPLYCYA" | 60 000 | 16 855 | 46,8% | 53,2% | | 26,3 | 29,9 | | 1,1% | 1,4% | |
| Closed Corporation "TEPLYCHNYY" | 60 000 | 16 701 | | 100,0% | | | 27,8 | | | 2,5% | |
| Limited Liability Company "LITA" | 86 000 | 16 649 | 42,3% | 57,7% | | 17,6 | 20,9 | | 1,0% | 1,5% | |
| Private Enterprise "AGROFIRMA KATERYNIVS'KA 1" | 60 000 | 16 218 | | 100,0% | | | 27,0 | | | 2,5% | |
| YUZHNOUKRAI'NS'KYY SEPARATE UNIT OF COLLECTIVE AGRICULTURAL ENTERPRISE "TEPLYCHNYJ KOMBINAT" | 60 000 | 15 237 | | 100,0% | | | 25,4 | | | 2,3% | |
| Limited Liability Company "IZA-B.A.T.E." | 60 000 | 14 459 | | 100,0% | | | 24,1 | | | 2,2% | |
| ENERGODARS'KYY VP KSP "TEPLYCHNYJ KOMBINAT" | 70 000 | 14 409 | 13,7% | 86,3% | | 9,8 | 12,4 | | 0,3% | 1,9% | |
| Limited Liability Company "DNIPROVS'KYY TEPLYCHNYY KOMBINAT" | 60 000 | 14 310 | | 100,0% | | | 23,9 | | | 2,2% | |
| Limited Liability Company "TEPLYCHNYY" | 43 600 | 13 138 | 92,1% | 7,9% | | 30,3 | 28,8 | | 1,6% | 0,2% | |
| Limited Liability Company "AGROFIRMA "PRYGORODNE" | 63 000 | 12 246 | 22,3% | 75,6% | 2,1% | 13,7 | 10,9 | 8,6 | 0,4% | 1,4% | 3,3% |
| Limited Liability Company "OVOCHEVYY KOMBINAT STANYSHIVKA" | 60 000 | 11 917 | 26,1% | 73,9% | | 15,5 | 22,0 | | 0,4% | 1,3% | |
| Limited Liability Company "TEK" | 60 000 | 11 086 | 68,8% | 31,2% | | 8,5 | 11,5 | | 1,0% | 0,5% | |
| KUZNECOVS'KYJ VP DP "TEPLYCHNYJ KOMBINAT" | 60 000 | 10 526 | 20,4% | 79,6% | | 10,8 | 20,9 | | 0,3% | 1,3% | |
| Private Enterprise "PEKTORAL'"" | 100 000 | 9 901 | | 100,0% | | | 9,9 | | | 1,5% | |
| Private Enterprise FIRMA "YAVSON" | 40 000 | 9 725 | | 100,0% | | | 24,3 | | | 1,5% | |
| Limited Liability Company AGROFIRMA "PROLISOK LTD" | 25 000 | 9 101 | 61,0% | 39,0% | | 44,4 | 28,4 | | 0,8% | 0,5% | |
| Limited Liability Company "FAKT" | 50 000 | 8 543 | 38,8% | 61,2% | | 16,6 | 17,4 | | 0,4% | 0,8% | |
| Limited Liability Company "AGROFIRMA "OVOCHIVNYK" | 63 120 | 8 420 | | 100,0% | | | 6,7 | | | 1,3% | |
| Limited Liability Company "KREMENCHUC'KA OVOCHEVA FABRYKA" | 40 000 | 8 135 | 53,7% | 29,4% | 16,8 % | 21,9 | 4,0 | 2,7 | 0,6% | 0,4% | 17,5% |
| Agricultural LLC "TEHNOVA" | 20 010 | 6 487 | | 100,0% | | | 32,4 | | | 1,0% | |
| NETISHYNS'KYY PRODUCTION DIVISION of Collective Agricultural Enterprise "TEPLYCHNYJ KOMBINAT" | 20 100 | 4 566 | 0,0% | 99,9% | 0,1% | 0,4 | 23,9 | 0,8 | 0,0% | 0,7% | 0,1% |

## Addendum 2. TOP-producers of greenhouse flowers 2010 in Ukraine*

| Name | Production of roses, ths pcs | Greenhouse area, ha** |
|---|---|---|
| TOV "ASKANIYA-FLORA" | 43 559,0 | 22,0 |
| TOVARYSTVO Z OBMEZHENOYU VIDPOVIDAL'NISTYU "TANDEM" | 10 476,1 | 9,0 |
| TOVARYSTVO Z OBMEZHENOYU VIDPOVIDAL'NISTYU "UKRAFLORA-VINNYTSYA" | 9 346,0 | 4,0 |
| TOV "Kameliya -PR" | 7 649,7 | 11,0 |
| TOVARYSTVO Z OBMEZHENOYU VIDPOVIDAL'NISTYU "AL'YANS" | 2 893,9 | n/a |
| TOVARYSTVO Z OBMEZHENOYU VIDPOVIDAL'NISTYU "VIKTORIYA" | 2 055,5 | 4,5 |
| TOVARYSTVO Z OBMEZHENOYU VIDPOVIDAL'NISTYU "FLORA-VEST" | 1 032,0 | n/a |
| PRYVATNE PIDPRYYEMSTVO "FANELS-TT" | 847,8 | n/a |
| INOZEMNE PIDPRYYEMSTVO "KRYMS'KA ROZA" | 327,5 | n/a |
| TOVARYSTVO Z OBMEZHENOYU VIDPOVIDAL'NISTYU "INTERKOM LTD" | 142,7 | n/a |
| PRYVATNE PIDPRYYEMSTVO "AHROTEKS" | 80,3 | n/a |

** Contact details are provided in Addendum 4.*

*** Public data or data obtained from interviews with experts. Areas are not recorded in official statistics.*

## Addendum 3. TOP-importers of inputs 2010 in Ukraine

**Table 1. TOP-20 importers of vegetable seeds in Ukraine**

| Name | Share in imports |
|---|---|
| BAYER | 18% |
| AGRIKULTURA CONSULTING | 14% |
| BEJO | 11% |
| RIJK ZWAAN | 10% |
| SYNGENTA | 10% |
| VLADAM-YUG | 7% |
| NICKERSON-ZWAAN | 5% |
| AGRIMATCO | 4% |
| SV-IMPEKS | 4% |
| SVYTYAZ' | 3% |
| ARAMIS | 2% |
| LARK SEEDS | 2% |
| ANTARIA | 1% |
| AGROFIRMA-ELITSORTNASINNYA | 1% |
| INTEGROVANI AGROSYSTEMY | 1% |
| AGROSVIT | 1% |
| NAUKOVO-VYROBNYCHA FIRMA "TYRAS" | 1% |
| KOMPANIYA NASINNYEVOI TORGIVLI | 1% |
| POLTAVASORTNASINNYEOVOCH | 1% |
| SPECFORMULA | 1% |

**Table 2. TOP-30 importers of plant protection agents in Ukraine**

| Name | Share in imports |
|---|---|
| SYNGENTA | 18% |
| BAYER | 13% |
| BASF | 12% |
| ERIDON | 6% |
| RISE | 6% |
| AVGUST-UKRAINA | 5% |
| DUPONT | 4% |
| GREEN EXPRESS | 3% |
| SUMMIT-AGRO UKRAINE | 2% |
| GABEN | 2% |
| MAKTESHIM-AGAN | 2% |
| AGROSVIT | 2% |
| MARGO | 2% |
| SHCHOLKOVO AGROHIM UKRAINA | 1% |
| ARNEST UKRAINA | 1% |
| UKRAGROSERVIS | 1% |
| NUFARM UKRAINA | 1% |
| AGROFARMAHIM | 1% |
| AGROSKOP UKRAINA | 1% |
| MONSANTO | 1% |
| SC JOHNSON | 1% |
| COM.UA | 1% |
| A.P.K.-SERVIS | 1% |
| TRANS OIL | 1% |
| RIKA PLUS | 1% |
| ASTARTA-KYIV | 1% |
| VERTYKAL' | 1% |
| AGROROS' | 1% |
| AKRUA | 1% |
| UKRAI'NS'KYY NAUKOVO-VYROBNYCHYY CENTR PROBLEM DEZINFEKCII | 0% |

**Table 3. TOP-25 importers of combined fertilizers in Ukraine**

| Name | Share in imports |
|---|---|
| UKRAGROKOM | 15% |
| AGROCENTR EVROHIM-UKRAINA | 13% |
| UKRAGRO NPK | 10% |
| AGROPARTNER | 10% |
| FOSAGRO-UKRAINA | 5% |
| TORGOVYJ DIM "AGROIMPORT LTD" | 5% |
| MARVIK | 4% |
| "TASMAN" TOV "MARIS-2005" | 4% |
| GALNAFTOHIM | 3% |
| AGRON | 3% |
| SUMYHIMPROM | 2% |
| NIKAS-UKRAINA | 2% |
| AGROPOLIS UKRAINA | 2% |
| KOMPANIYA UKRBIZNES | 2% |
| ROSAPATITINVEST | 2% |
| BI. KOM. | 1% |
| RISE | 1% |
| AGROTRADE ND | 1% |
| STRABIS-AGRO | 1% |
| BNH UKRAINA | 1% |
| UKRPRODTORG | 1% |
| AGRISOL | 1% |
| AGROMIKS-UKRAINA | 1% |
| VBR-BESTEN | 1% |
| HIMKOMPLEKT | 1% |

## Addendum 4. Contact details of greenhouse producers in Ukraine

| Name | Contacts |
|---|---|
| Public Corporation "KOMBINAT "TEPLYCHNYY" | Kyiv region, Brovary district, Kalynivka village, 2 Teplychna str.<br>Phone: +38 (04494) 5-02-37 |
| Private Agricultural Enterprise "UMANS'KYY TEPLYCHNYY KOMBINAT" | Cherkasy region, Uman city, 26 Derevyanka str.<br>Phone: +38 (04744) 4-64-52, +38 (04744) 4-87-88<br>e-mail: greenhouse@utk.org.ua<br>http://utk.org.ua/ |
| Agricultural Limited Liability Company "KRYMTEPLYCYA" | Autonomous Republic of Crimea, Simferopol district, Molodizhne village, 11 km of Moscow route<br>Phone: +38 (0652) 613545; +38 (0652) 228643; +38 (0652) 228497<br>e-mail: KRIMTEPLICA@POLUOSTROV.NET<br>http://www.krimteplica.com/ |
| State Enterprise "AGROKOMBINAT NAUKOVO-DOSLIDNYY, VYROBNYCHYY "PUSHCHA-VODYCYA" | Kyiv region, Kyyevo-Svyatoshyns'kyy district, Sofiyivska Borshchahivka village, 63 LEnina str.<br>Phone: +38 (044) 4349436 |
| Closed Corporation TM "ZMIIVS'KA OVOCHEVA FABRYKA" | Kharkiv region, Zmiyivskyy district, Komsomolske village<br>Phone:+38 (05747) 53335 |
| Limited Liability Company "TEPLYChNYY KOMBINAT "DNIPROVS'KYY" | Dnipropetrovs'k region, Petrykivs'kyy district, Elyzavetivka village, 1 Teplychna str.<br>Phone: +38 (05692) 92136 |
| LLC "PERSPEKTYVA" | Donets'k region, Kostyantynivskyy district, Illicha village, 45 Dorozhna str.<br>Phone: +38 (0272) 20121 |
| Limited Liability Company "SOTEKO" | L'viv region, Sokalskyy district, Volytsya village, 1 Zarichna str.<br>Phone: +38 (03257) 55154; +38 (03257) 55155 |
| Closed Corporation "AGROKONCERN" | Rivne region, Rivne district, Zorya village, 1 Pol'ova str.<br>Phone: +38 (0362) 279347; +38 (0362) 279564 |
| Joint-Stock Company "TEPLYCHNYY KOMBINAT" | Sumy region, Okhtyrka district, Chernechchyna village, 69 Gotelyaka str.<br>Phone: +38 (05446) 42958; +38 (05446) 95419 |
| Closed Corporation CHERKAS'KYY AGROTEPLYCHNYY KOMBINAT | Cherkasy region, Cherkasy district, Geronymivka village, 1 Geronymivska str.<br>Phone: +38 (0472) 550977; +38 (0472) 550978 |
| Limited Liability Company "KRASNOGRADS'KA OVOCHEVA FABRYKA" | Kharkiv region, Krasnograd district, Natalyne village, 39-A Radyans'ka str.<br>Phone: +38 (05744) 76811 |
| Private Agricultural Enterprise "DOLYNS'KYY TEPLYCHNO-OVOCHEVYY KOMBINAT" | Ivano-Frankivs'k region, Dolynskyy district, Novoselytsya village<br>Phone: +38 (03477) 92220 |
| | |
| Limited Liability Company "AGROFIRMA "UKRAINA" | Autonomous Republic of Crimea, Bahchysaray district, Krasnyy Mak village, 16 Kirova str.<br>Phone: +38 (06554) 50965 |
| Closed Corporation"AL'YANS" | Kharkiv region, Pervomayskyy city, 1 Myru str.<br>Phone: +38 (057) 7753143; +38 (057) 7753139 |
| | |
| Closed Agricultural Corporation "NADIYA" | Kirovograd region, Kirovograd district, Velyka Severynka village, 1 Teplychnyy lane<br>Phone: +38 (0522) 312132 |
| Private Enterprise "STRYYTEPLYCYA" | L'viv region, Stryy district, Stankiv village, 79 Sichovyh Striltciv str. |

| | |
|---|---|
| | Phone: +38 (03245) 65617 |
| Closed Corporation "TEPLYCHNYY" | Kharkiv region, Chuguyivskyy district, Eshar village, 5V Ostrovs'kogo str.<br>Phone: +38 (05746) 30590 |
| Limited Liability Company "LITA" | Kherson region, Kherson city, Komsomol's'kyy district, Geologiv village, 11 Slov'yans'kyy lane<br>Phone: +38 (0552) 297126 |
| Private Enterprise "AGROFIRMA KATERYNIVS'KA 1" | Dnipropetrovs'k region, Nikopol'skyy district, Katerynivka village, 11-A Kyivs'ka str.<br>Phone: +38 (05667) 43990 |
| Limited Liability Company "IZA-B.A.T.E." | Zakarpats'ka region, Khusts'kyy district, Iza village, 88 Nankivs'ka str.<br>Phone: +38 (03142) 56118 |
| Limited Liability Company AGROFIRMA "PROLISOK LTD" | Kyiv region, Baryshivs'kyy district, Baryshivka village<br>Phone: +38 (04476) 52705<br>e-mail: prolisok-agro@gala.net; prolisok2006@ukr.net<br>http://www.prolisok-agro.com.ua |
| LLC "ASCANIYA- FLORA" | Kyiv region, Brovary district, Zalissya village, 28 Central'na str.<br>Phone: +38 (04594) 68142; +38 (044) 5930809<br>e-mail: office@ascania-flora.com.ua<br>http://www.ascania.ua |
| Limited Liability Company "TANDEM" | L'viv region, Drogobych city, 87 Sambirs'ka str.<br>Phone: +38 (03236) 21430; +38 (03236) 35437<br>e-mail: tzovtandem@mail.lviv.ua<br>http://tandem-ua.com/ |
| "Camellia -PR" | Kyiv region, Brovary district, Knyazhychi village, 25 Slavy str.<br>Phone: +38 (04594) 55438; +38 (04594) 62343 e-mail: camellia@camellia.com.ua |
| Limited Liability Company "AL'YANS" | Dnipropetrovs'k region, Dnipropetrovs'k district, Brats'ke village, 1B Zaporiz'ke shose |
| Limited Liability Company "UKRAFLORA-VINNYTSYA" | Vinnytsya region, Vinnytsya district, Dorozhne village, 2-A Kyivs'ka str.<br>Phone: +38 (0432) 393921 |
| Limited Liability Company "VIKTORIYA" | Dnipropetrovs'k region, Novomoskovsk district, Pishchanka village<br>Phone: +38 (056) 7800290 |
| Limited Liability Company "FLORA-WEST" | L'viv region, Mykolaiv district, Rozdil village, 1 Promyslova str.<br>Phone: +38 (03241) 21430 |
| Private Enterprise "FANELS-TT" | Autonomous Republic of Crimea, Bahchysaray district, Tankove village, Yaltyns'ke shose<br>Phone: +38 (06554) 43797 |
| Foreign Enterprise "KRYMS'KA ROZA" | Autonomous Republic of Crimea, Bahchysaray district, Kashtany village, 3 Vynogradna str.<br>Phone: +38 (05623) 99864 |
| Limited Liability Company "INTERKOM LTD" | Ivano-Frankivs'k region, Ivano-Frankivs'k city, Vovchynets' village, 28 Misyachna str.<br>Phone: +38 (03422) 69807; +38 (068) 1440656<br>http://roses.at.ua/ |
| Private Enterprise "AHROTEKS" | Ivano-Frankivs'k, 11 Zrazkova str.<br>Phone: +38 (0342) 774927 |

## Addendum 5. Overview of quality standards of Ukraine

| Standard of Ukraine | Main requirements |
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| **Fresh Tomatoes Specifications**<br><br>**DSTU 3246 - 95** | **Requirements Specifications**<br><br>This standard has requirements to the size, colour, and appearance, level of ripening, smell and taste of tomatoes. The standard also requires that pesticide residues, nitrates, heavy metals and arsenic in fresh tomatoes should not exceed allowed levels.<br><br>**Packing**<br><br>Fresh tomatoes prepared to be packed should not be wet. Packages for fresh tomatoes should be intact, strong, dry, clean and without any extraneous smell.<br><br>During transportation within one oblast (region) it is allowed to transport tomatoes in bulk if it is agreed with a customer.<br><br>**Marking**<br><br>For transportation every package of tomatoes should have a mark with a name of the product and variety, a name of supplier, batch number; date of harvesting, packing and shipment; packer number and mark of this standard.<br><br>**Rules of receipt**<br><br>Fresh tomatoes are received in batches. Batch of fresh tomatoes should have a document about quality and certificate about the content of toxicants in plant products and in compliance with the regulations of pesticides application.<br><br>The document about quality should contain: number of the document and date of issue; number of the certificate about the content of toxicants and date of its issue; batch number; name and address of supplier; name and address of recipient; name of the product and breed; product quality indicators; number of packages; gross weight and net weight; date of the last treatment with pesticides and their names; date of harvesting, packing and shipment; number and type of the vehicle and mark of this standard.<br><br>The standard also describes the procedure of the quality check.<br><br>**Transportation and Storage**<br><br>Fresh tomatoes are transported by all types of transport according to the rules of transportation of perishable products.<br><br>Fresh tomatoes should be stored indoors in clean and ventilated premises.<br><br>This standard also has requirements to the safety of production process and environment protection. |
| **Fresh cucumbers Specifications**<br><br>**DSTU 3247 - 95** | **Requirements Specifications**<br><br>This standard has requirements to the size, appearance, smell and taste of cucumbers. The standard also requires that pesticide residues, nitrates, heavy metals and arsenic in fresh cucumbers should not exceed allowed levels.<br><br>Fresh cucumbers are divided into short-, middle-, and long ones.<br><br>**Packing** |

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| | Fresh cucumbers prepared to be packed should not be wet.<br><br>Packages for fresh cucumbers should be intact, strong, dry, clean and without any extraneous smell.<br><br>**Marking**<br><br>For transportation every package of cucumbers should have a mark with a name of the product, specification of the variety and size, a name of supplier, batch number; date of harvesting, packing and shipment; packer number and mark of this standard.<br><br>**Rules of receipt**<br><br>Fresh cucumbers are received in batches. Batch of fresh cucumbers should have a document about quality and certificate about the content of plant products and compliance with the regulations of pesticides application.<br><br>Document about quality should contain: number of the document and date of issue; number of the certificate about the content of toxicants and date of its issue; batch number; name and address of supplier; name and address of recipient; name of the product, breed and size; product quality indicators; number of packages; gross weight and net weight; date of the last treatment with pesticides and their names; date of harvesting, packing and shipment; number and type of the vehicle and mark of this standard.<br><br>The standard also describes the procedure of the quality check.<br><br>**Transportation and Storage**<br><br>Fresh cucumbers are transported by all types of transport according to the rules of transportation of perishable products. During transportation the temperature in refrigerators should be at the level 5 to 10 °C.<br><br>Shelf-life of fresh cucumbers grown in greenhouses is not more than 15 days at the temperature 10 to 14 °C and relative humidity 85-95%.<br><br>This standard also has requirements to the safety of production process and environment protection. |
| **Fresh lettuce Specifications**<br><br>**RST USSR 305-89** | **Requirements Specifications**<br><br>This standard has requirements to the size, colour, appearance and shape of lettuce. Total number of deviations from the required norms should not exceed 8% of the batch weight.<br><br>The standard also requires that pesticide residues, nitrates, heavy metals and arsenic in fresh lettuce should not exceed allowed levels.<br><br>**Packing**<br><br>Fresh lettuce prepared to be packed should not be wet.<br><br>Each package of the lettuce should contain lettuce of one variety.<br><br>Packages for fresh lettuce should be strong, dry, clean and without any extraneous smell.<br><br>**Marking**<br><br>For transportation every package of lettuce should have a mark with a name of the product, specification of the variety, batch number; time of harvesting and date of packing; packer number, gross and net weight, expiration date and mark of this standard.<br><br>**Rules of receipt** |

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| | Fresh lettuce is received in batches. Batch of fresh lettuce should have a document about quality that contains: number of the document and date of issue; number of the certificate about the content of toxicants and date of its issue; batch number; name and address of supplier; name and address of recipient; name of the product and breed; number of packages; gross weight and net weight; date of harvesting, packing and shipment; time of transportation (in hours); name of the person responsible for product quality and packaging; and mark of this standard.<br><br>The standard also describes the procedure of the quality check.<br><br>**Transportation and Storage**<br><br>Fresh lettuce is transported by automobile transport according to the rules of transportation of perishable products.<br><br>Fresh lettuce is stored in packages indoors in clean premises at the temperature lower than 12 °C and relative humidity not less than 85% or refrigerator compartments at the temperature 0-1 °C and relative humidity 90-95%. |
| **Fresh white cabbage Specifications**<br><br>**DSTU 7037: 2009** | **Requirements Specifications**<br><br>This standard has requirements to the size, colour, appearance, smell and shape of white cabbage.<br><br>The standard also requires that pesticide residues, radionuclides, Cs-137 and Sr-90, toxic elements, and nitrates in fresh white cabbage should not exceed allowed levels.<br><br>**Packing**<br><br>Fresh white cabbage can be packed in boxes, pallets or not packed.<br><br>Each package should contain white cabbage of one variety and commercial grade.<br><br>Packages should be intact, strong, dry, clean and without any extraneous smell and disinfect if used for the second time.<br><br>**Marking**<br><br>For transportation every package should have a mark with a name of the product and commercial grade; name, address and contacts of producer or supplier; amount of products; calorie content and nutritive value of 100 g; batch number; date of harvesting and packing; expiration date and conditions of storage; and mark of this standard.<br><br>**Rules of receipt**<br><br>Fresh white cabbage is received in batches. Batch of fresh white cabbage should have a document about quality that contains: number of the document and date of issue; number of the certificate about the content of toxicants and date of its issue; batch number; name and address of supplier; name and address of recipient; name of the product and commercial grade; product quality indicators; number of packages; net weight; date of the last treatment by pesticides and their names; date of harvesting, packing and shipment; type of transport; and mark of this standard.<br><br>The standard also describes the procedure of the quality check.<br><br>**Transportation and Storage**<br><br>Fresh white cabbage is transported by all types of transport according to the rules of transportation of perishable products.<br><br>For winter storage late ripening variety of cabbage is used. Cabbage is |

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| | stored in piles, containers, pallets or boxes.<br><br>Cabbage of mid- and late ripening variety is stored at the temperature 0-1 °C and relative humidity 90-98% not more than 7 months.<br><br>Cabbage of early-season variety is stored at the temperature 5-10 °C and relative humidity 85-90% for not more than 2 days; in refrigerator compartments at the temperature 0-0,5°C and relative humidity 90-95% for not more than 30 days.<br><br>This standard also has requirements to the safety of production process and environment protection. |
| **Fresh dill Specifications**<br><br>**RST USSR 304-89** | **Requirements Specifications**<br><br>This standard has requirements to the length and appearance of plants. Total number of deviations from the required norms should not exceed 10% of the fresh dill batch weight.<br><br>The standard also requires that pesticide residues, nitrates, heavy metals and arsenic in fresh dill should not exceed allowed levels.<br><br>**Packing**<br><br>Fresh table dill is packed in bunches or in plastic bags. Packages for fresh dill should be strong, dry, clean and without any extraneous smell.<br><br>**Marking**<br><br>For transportation every package of fresh dill should have a mark with a name of supplier; product name, specification of the variety; batch number; time of harvesting and date of packing; packer number, gross and net weight, and mark of this standard.<br><br>**Rules of receipt**<br><br>Fresh dill is received in batches. Batch of fresh dill should have a document about quality that contains: number of the document and date of issue; number of the certificate about the content of toxicants and date of its issue; batch number; name and address of supplier; name and address of recipient; name of the product and variety; number of packages; gross weight and net weight; date of harvesting, packing and shipment; time of transportation (in hours); name of the person responsible for product quality and packaging; and mark of this standard.<br><br>The standard also describes the procedure of the quality check.<br><br>**Transportation and Storage**<br><br>Fresh dill is transported by automobile transport according to the rules of transportation of perishable products.<br><br>Fresh dill is stored in packages indoors in clean premises at the temperature not higher than 12 °C and relative humidity not less than 85% or refrigerator compartments at the temperature 0 °C and relative humidity 90-95%. |