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Institute



**FRESH FRUITS AND  
VEGETABLES 2006:**  
Competitiveness  
of Serbian Economy

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Competitiveness of Serbian Economy 2006

*"No occupation is so delightful to me as the culture of the earth,  
and no culture comparable to that of the garden"*

*Thomas Jefferson*

Biljana Presnall

with:

Aleksandra Branković and Ružica Savčić

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**Fresh Fruits and Vegetables:  
Competitiveness of Serbian Economy 2006**

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Published by:  
Jefferson Institute  
Stevana Sremca 4  
11 000 Belgrade  
Serbia

Design by: Branko Otković

Typeset and prepress by: Grafodrom

ISBN: 86-905973-5-2

Print: Grafodrom

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# Summary

*This study examines the export market for fresh fruits and vegetables from Serbia: its current state, issues, and prospects of enhancing competitiveness, relative to the best practices of leading countries and firms.*

*We look deep into the agriculture market and its institutions, seeking greater understanding of its lagging development as an industry, and its competitive position in traditionally successful product markets. It is clear that the agricultural sector needs comprehensive reform.*

*We argue that the key bottleneck to export lies outside the agriculture market itself, namely the slow development of Serbia's retail market. A comparison of transition countries indicates a great correlation between the development of a competitive local retail market open to the participation of major international players and the development of agriculture for export.*

*The subject of this study is not the analysis of the reasons for the absence of world leader retail chains in Serbia, but the consequences of that absence and how such consequences influence the competitiveness of fresh fruits and vegetables exports. We highlight Poland, with its quick development of a competitive retail market, and its seizure from Serbia of the upper hand in the raspberry market worldwide, simultaneously beating out Serbia in several other agricultural product markets.*

*Serbia has a very suitable climate for production of continental fruits and vegetables of high quality, and is extremely rich in minerals that enhance the taste, but such an advantage might be detected only if products are supplied fresh.*

*When the European Union last expanded through the accession of ten new member-states, it included Hungary, which borders Serbia. Shortening delays at this border would support Serbia's export of fresh produce as opposed to frozen produce, which dominated exports for the last decade. Shifting from frozen to fresh products entails a sequence of important and necessary policy steps if the export is to have any future.*

*The study deals with agricultural policy in terms of analyzing the efforts so far of the relevant state institutions, starting with the Ministry of Agriculture and followed by others, and comparing them with patterns in the European Union and around the world.*

*The general conclusions of the study are that a competitive food retail market with the strong participation of global firms would enforce the productivity and competitiveness of the export of fruits and vegetables, that significant investments are still needed, and that the level of certified organic production must be increased. A number of other concrete transformations would greatly assist: development of unions, improvement in logistics, the real possibility of failure of big state companies, and adoption of world standards in quality, packaging, etc.*



# Introduction

## Why fresh?

Over the years, the popularity of fresh fruits and vegetables for consumption has increased all over the world. Governments of some European countries very often take part in campaigns, promoting fresh fruits and vegetables consumption (e.g., Denmark 2001).

In the United States, consumption of healthy food and food marked as organic reports growth ranging from 10-15% per year.

## The fresh is popular and healthy

Berries are prominent in terms of world-wide popularity (strawberries, raspberries, blackberries, etc.). In addition to being healthy and tasteful, this fruit is highly appreciated because they contain colored substances, antioxidants with anti-mutational and anti-cancerous features that reduce harmful materials produced in an organism. As such, production of berries generally runs at 100% capacity in order to fulfill market demand. Some of these fruits, e.g., strawberries are regularly available in supermarkets all over Western Europe and America year-round, and some are available during an extended season, lasting at least five months (raspberries).

Similar trends are seen in vegetables. Green vegetables gained popularity due to their abundance of folic acids and the presence of anti-cancerous and anti-mutational attributes. Sales of broccoli, various kinds of lettuce (iceberg, lol rosso), asparagus, artichokes, etc., have all benefited from this consumption dynamic.

*Table No.1: World aggregate, consumption denominated in US \$*

	2002	2003	2004	2005	2006	2007
<b>Consumption of fruits (kg/pc)</b>	96.10	97.20	98.40	99.50	100.6	101.7
<b>Consumption of vegetables (kg/pc)</b>	121.9	122.7	124.0	125.3	126.7	128.04

*Source: Economist Intelligence Unit*

## Serbia is not the best any more...

Up to now, Serbia concentrated on exporting frozen fruits and vegetables, with its best achievements among berries, specifically raspberries, exporting one-third of global turnover, i.e., 100 thousand tons per year. But new planting beds in Poland and China have challenged and diminished Serbia's supremacy.

Frozen raspberries (or fresh, but ready for processing), which were competitive in the market for years, are no longer so profitable.

**...but has  
delicious  
products**

Climate and soil conditions in Serbia enable fresh fruits and vegetables to retain an abundance of minerals, making them tasty and aromatic. These characteristics have their greatest value when consumed fresh.

Supplying fresh products to Europe requires considerable initiative. The supply network underlying the export of fresh vegetables consists of associations collecting small producers' output at distribution centers. Such centers should be equipped with devices for pre-freezing, cooling, calibration and packaging. These centers need to apply European standards for packaging and transportation, in addition to assuring a supply of the agreed quantities of goods of prescribed quality. Advanced production technology is also required (harmonized diversification of cultivars, combination of open air and covered surfaces, protective anti-hail nets, foil growth, etc.).

**The global and  
European  
market for  
fresh fruits is  
extremely well  
organized**

The world market for fresh fruits and vegetables is very demanding, very well organized with tough competition, but with high profits.

The Common European Union market of fresh fruits and vegetables was established by European Union Council Directive 22000/96 of October 28, 1996, regulating standards in respect to 35 products that are typically consumed fresh. Also, in conformity with Directive 2251/92 of July 29, 1992, the European Union established quality control rules regarding imports of fresh fruits and vegetables.

Breaking into such a market represents a complex endeavor, requiring much commitment, investment and initiative. Exports of fresh fruits and vegetables must start from integrated production, with the plan drafted and prepared in advance, from planting healthy seedling materials and control of pesticides to well-organized supply chain logistics and marketing. This study will show, through the example of one product, the actual situation regarding exports into the European Union in terms of their distribution and access to the market.

Exports to the European Union are the intended outcome of enhancing product competitiveness of Serbian fruits and vegetables. Therefore, this study focuses on an analysis of the industry's bottlenecks of development.

From the examples of other transitional countries, it is obvi-

ous that there is a connection between development of retail chains and development of agriculture.

The privatization of domestic retail chains in Serbia was rather slow, hampered by weak protections of property rights, followed by long court processes, and without clear regulation. The result was the absence of big international retail chains, such as Tesco, Carrefour, Wal-Mart, Billa, on the Serbian market. The reasons for that are numerous, most notably low profits and an unfair playing field for foreign firms.

Therefore, in Serbia, domestic chains dominate retail, while several international hypermarkets (Mercator, Vero, Metro) serve a low percentage of the population and cannot influence domestic consumers or, more importantly, domestic producers.

## **The main obstacles**

Without world leaders in food retail on the Serbian market, there are no local market incentives for Serbian producers to adjust to global market standards. In Poland, once local producers achieved success in selling to French retailers domestically, selling to France was a relatively easy step.

In general there are many concrete solutions to obstacles for Serbian fresh fruits and vegetables to enter the world market. Solving these bottlenecks, even gradually, would increase the competitiveness of Serbian products:

### ***1. Adequacy of product variety and extension of growing and selling season***

*1.1 Low profitability of nurseries with fruit-planting beds due to the age of planting beds and inadequacy of cultivars*

*1.2 High level of investments needed for new planting beds with low returns over the long term; shortages of credits at low interest rates for new rows of planting beds*

*1.3 Inadequate protection and technology utilized in the course of production*

*1.4 Lack of organic production in larger volume*

*1.5 Lack of cold storage with regulated atmosphere, facilitating year-round storage of fruits and vegetables, so called CA (controlled atmosphere) and storage with low level of oxygen (ULO – Ultra Low Oxygen).*

### ***2. Quality control***

*2.1 Introduction of HACCP and Eurogap certificates and over all harmonization of production standards*

*2.2 Lack of distribution centers with modern technology for selecting products and classifying them (calibrators)*



**3. Packaging and logistics**

- 3.1 Appropriate packaging according to market demands*
- 3.2 Transportation problems: essential for fresh products*

**4. Sales and marketing**

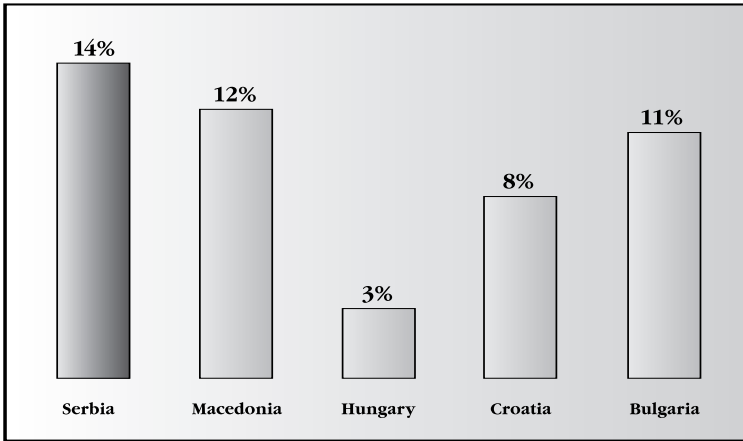
- 4.1 Inadequately informed producers/farmers*
- 4.2. Omission of links among producers (associations are not developed or do not exist)*
- 4.3 Insufficient investment in branding, which, unlike other industries, might be a trigger of exports*

# Basic data

## GDP portion

The portion of gross domestic product in Serbia generated by agriculture, hunting, and forestry has ranged from 16-17% in recent years. In 2003, these industries managed 14% of GDP, far above the countries in the region and certainly higher than the average for the European Union.

Graph No. 1 Agriculture portion in GDP in 2003

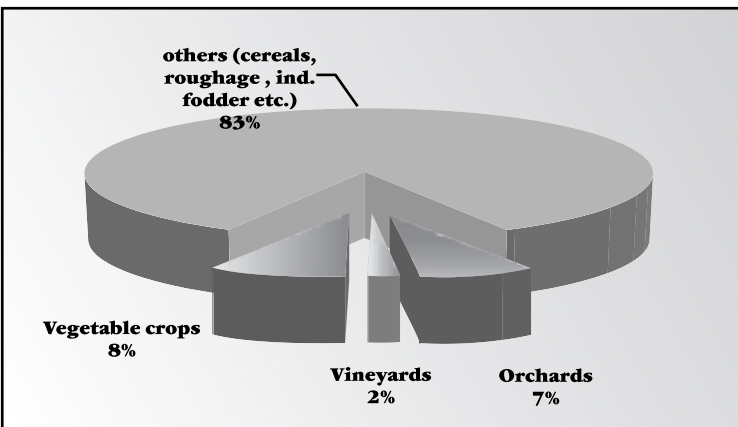


Source: RZS for Serbia, for other countries - EIU

## Structure of arable soil

Total arable soil is 5,734 thousands ha. The arable soil per capita in Serbia equals 0.65 ha and the area of the average farm totals 2.65 ha.

Graph No. 2 Structure of arable soil in 2003



Source: RZS

### **Importance of fruits and vegetables production in total agricultural production**

Although production of fruits, vegetables, and grapes accounts for barely over 1% of total agricultural production, the surface area of vineyards, orchards and vegetable crop gardens is relatively consistent, totaling a little over 14% of total arable soil. Of total arable soil, 84.4% is privately owned. In 2003, private estates encompassed 96% of the total area of orchards, 93% of the area for vineyards, and 97% of the area planted with vegetable crops.

### **Almost 85% of arable soil is privately owned**

Privatization of arable soil began with a policy of partial denationalization in 1991, pursuant to the Law on Land Conveyance to Farmers and also applicable to the restitution of land to the heirs of individuals deprived of 150,000 ha of arable soil seized after World War II. From 1991-2000, agriculture served to provide social security and to feed the population. Only recently have land-related issues attracted more attention.

Almost 15% of total arable soil belongs to enterprises, cooperatives, and the state. 90% of this non-private land is in Vojvodina. It is still not clear which property is state-owned or what is public property.

### **New Law on Agricultural Land**

Adoption of a new law on agricultural land is expected by the end of this year. The law should resolve many dilemmas. For example, considering that a large portion of arable land has not been registered with the authorities, it is projected to transfer plowed fields not registered by 2006 to the state. The State passed a Regulation on Incentives that provides for a maximum annual payment of 100 € per ha, payable to registered farmers, as well as to persons older than 60 if they are willing to lease the land they are not capable of cultivating or willing to cultivate (minimum 0.5 ha). Taking into account that the average farm in Serbia equals 2.65 ha, this regulation offers opportunities to the heirs and purchasers of denationalized farms in central Serbia, in addition to elderly households.

### **Privatization of agricultural enterprises**

Until mid-2005, one-third of the estimated 70 enterprises that produce fruits, vegetables, grapes, fruit, and grapevine seedlings underwent privatization.<sup>1</sup> All privatization methods were implemented in the course of privatizing these enterprises, but auction sales represented the most frequent method.<sup>2</sup>

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<sup>1</sup>Data include all the enterprises engaged in these activities, regardless of whether such activities represent their core business or not.

<sup>2</sup>Privatization may be facilitated by the auction type of tender sale, or by sale of company stock on capital markets (applicable to enterprises with components privatized pursuant to the 1997 Law on Privatization (since repealed).

In most cases, privatization from start to finish can take several years. A large number of initiatives calling for the beginning of privatization of enterprises took place in the course of 2002 and 2003. The majority of these enterprises have not been privatized. For those which were privatized, the process took over one year. Due to debt encumbrances, many enterprises are not attractive to prospective investors. Another problem stems from disputes in regards to property rights, mostly related to confiscated property. Privatization may be slowed due to changes in legal status. This often happens when an enterprise re-registers as a cooperative because cooperatives are exempt from ownership transformation under existing law. Arable soil, sold as part of agricultural state enterprise assets, was mainly bought by Serbian tycoons, counting on dramatic price growth (presently 350 € per hectare) as Serbia moves toward accession to the EU.

**Agricultural  
Industrial enterprise  
PIK Južni  
Banat B.Crkva**

Enterprise PIK Južni Banat represents the only completely sold enterprise, growing fruits as its core business activity. It was purchased by Oktanoil Limited (a consortium), which owns 1,135.48 ha of arable soil.

**Privatization  
and development of retail  
sector**

The slow privatization of the retail sector, followed by litigation associated with beginning the race for capturing the biggest retail chain in Serbia (C Market), resulted in very little interest on the part of leading world retail chains (Tesco, Carrefour, Bila, and others). The purchase of C Market, with its large network of retail shops (200 across Serbia), by a consortium of domestic companies led by Delta M was defended by some as supporting the strategic and economic interest of the country.

Why did leading world retail chains not show up in Serbia, reducing costs for Serbian consumers? There are many reasons, but the most likely reason is that they did not perceive the opportunity to make profits and that the playing field in the Serbian business environment and market is somehow unfair. As a result, the Serbian consumer market continues to be dominated by domestic food retail chains, while the third tier foreign firms which have entered the market via green field investments (Merkator, Metro, Veropulos (Super Vero), and Intermarse (Interex), serve a limited population and definitely do not influence habits of food producers. They have not yet established healthy competition, such that they are often even more expensive than domestic shops, and certainly more expensive than the open green market square.

**Serbia versus development of the retail sector in Poland**

Unlike Serbia, agricultural production in Poland accounts for only 3% of GDP. Arable soil in Poland has a somewhat similar structure: arable land is dominated by smaller private farms, with large farms (greater than 500 ha) much rarer. However, the average farm's surface area, totaling approximately 5.76 ha, surpasses Serbian farms at 2.65ha. On the other hand, Poland transformed into a consumers' society at a faster pace. The expansion of foreign supermarkets and the increase in spending power of the younger generations contributed to greater, more visible foreign influences in other spheres of life.

The retail sector in Poland privatized faster than any other sector. Foreign-owned supermarkets dominate Poland, accounting for over 50% of overall food sales in 2005. Major players are: Geant Casino, Carrefour and Auchant (France), Tesco (UK), Metro, Rewe, Aldi, Lidl, Netto, Penny (Germany) and Jeronimo Martins (Portugal). Estimates cite around 420 hypermarkets, double the amount estimated two years ago.

These leading retail chains influence consumers' habits to a significant degree, as well as business strategies of food producers, and consequently, of producers of fresh fruits and vegetables. These retail chains set product requirements that compel agricultural producers to adopt different attitudes towards production, hygiene, security, quality, distribution, packaging, etc. In other words, the chains offer the best way to teach small scale producers to learn the rules of the game for the global market of fresh fruits and vegetables, if the latter want to produce competitive products fit for the European market.

**Employment and productivity in agriculture in Serbia**

The proportion of the employable farming population in the overall Serbian population equals 16%,<sup>3</sup> greater than most developed countries and even some bordering countries. The European Union average, by comparison, totals 5% of total number of inhabitants. At the same time, productivity in Serbia, computed by a standard methodology, is far behind developed countries for agriculture generally, as well as for fresh fruits and vegetables by a factor of 5. Accurate data on the labor force actually employed in agriculture does not exist. Official statistics confirm only data in respect of employees of agricultural enterprises who account for 4 to 4.5% of the total number of employees in Serbia. The remaining 11.5 to 13% represent the employable population engaged in agriculture as their primary income-generating activity (private farms). However, this figure does not include persons with agriculture as their second job, nor dependents of farmers (students, housewives, elderly) who also assist with agricultural production.

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<sup>3</sup>According to the 2002 census of the Republic of Serbia (excluding Kosovo and Metohija).

**Registering of agricultural households – first step**

The ministry of agriculture thus insisted on maintaining accurate records in farming households, numbering around 700,000 according to some estimates. Out of those, only 85,000 have been registered so far, although registration brings with it eligibility for many benefits, above all access to favorable loans.

**Lack of information**

Farmers are not sufficiently informed on modern technologies and practices. Professional agricultural journals are not available to the average farmer, primarily because existing monthly periodicals are expensive (over 100 dinars per issue), such that information dissemination is reduced to other media lacking expertise, especially TV reports and daily print news. Recently, the ministry of agriculture launched an effort to improve information dissemination through seminars and lectures addressed to agricultural producers.

**Education**

Serbia's education system regarding agriculture includes 27 agricultural schools, two colleges, and four faculties. However, the profile of professional training for agriculture and private farming can also be found in other high schools, designated for the training of technicians in the areas of technology and chemistry, or in general (vocational) schools. In 54 high schools during the 2004/05 school year, there were five training programs preparing students for jobs in the agricultural industry. Until recently, skills learned in school responded only to the needs of agricultural enterprises and the food industry, while neglecting the needs of private farms. Meanwhile, a new training program was introduced, designated for farming and providing training in skills that students might utilize for managing their family estates. Last year, this program was offered only in seven schools in Serbia, with 100 students graduating, but it represented a significant acknowledgment by schools of the need to educate farmers through formal study in their field.

**High education and scientific institutions**

There are 3 Faculties of Agriculture in the country, each one with a worldwide reputation, in Belgrade, Novi Sad and Čačak. The most distinguished institute in this area is the Institute for Fruits, located in Čačak, which takes an active role generating innovations in fruit cultivation for the region and beyond. Plum cultivars originating from this Institute, such as Čačanska rana, Čačanska lepotica, Čačanska rodna, etc., are world-renowned. In addition to education obtained via the formal education system, other institutions are asserting their influence and gaining more prominence. The ministry of agricul-

ture launched initiatives during 2004 and 2005 to provide a series of educational workshops, seminars, lectures, and demonstrations of various experiments all over Serbia in relation to fruit and vegetable production. These endeavors were supported by non-governmental organizations, educational institutions and local communities. The interest among producers was evaluated as exceptional, indicating a lack of current information among producers and eagerness for new knowledge.

The topics pertaining to fruit and vegetable growing spanned subjects such as: growing strawberries on foil and in low tunnels; running of fruit trees; agro- and pomo-technical measures implemented in raspberry production; advanced technologies for growing strawberries and peaches; selection of resistant cultivars and favorable locations for setting up rows of planting beds as a preventive measure; educating fruit growers from Jablanica County, the municipality of Osečina, and Podrinja and Rađevina; training of jobless persons in fruit production and sustainable development of villages; prolonging the expiration date for fresh tomatoes utilizing the LSL hybrid; year-round vegetables production indoors; green house production; brewing of blackberry wine; and opportunities for processing Oblačinska sour cherries.<sup>4</sup>

## **Vegetables**

The distinguishing feature of vegetable crops grown in Serbia consists of smaller areas designated for sowing, but on the positive side, such smaller plots do not detract from output, such that productivity remains on the same or even a higher level. Analysis of the existing state of affairs indicates that vegetable crop production so far has focused primarily on meeting domestic demand, above all for households and other consumers, as well as industrial processing facilities. With some exceptions from time to time, exported quantities of vegetables are not significant, and export unit values have been balanced over the years.

A negligible portion of total output is exported. Existing exports of produce, along with other vegetable crops, are mostly oriented towards the markets of bordering countries.

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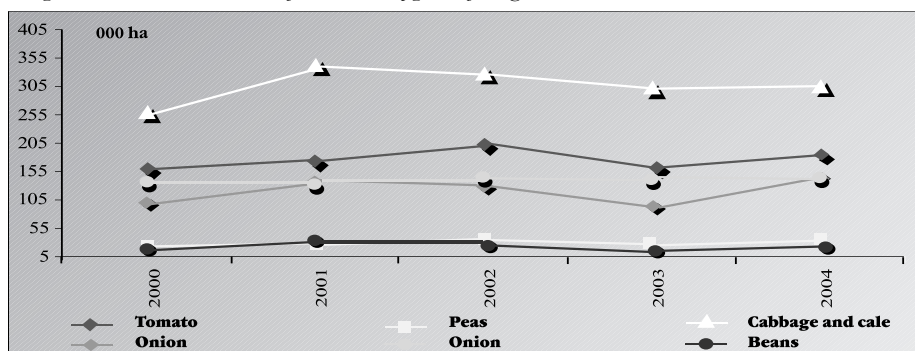
<sup>4</sup>Source: Ministry of Agriculture, Water Management, and Forestry

Table No.2: Production, consumption and export selected types of vegetables (average production 2003-2004) in 000 tons

Crop	Production	Consumption in households	Export
Potatoes*	830	270	9
Cabbage*	300	150	1
Tomatoes	185	125	0,8
Beans*	50	45	0
Peppers	140	100	4
Peas	35	15	0,2
String beans		15	0,06
Onions*	120	65	

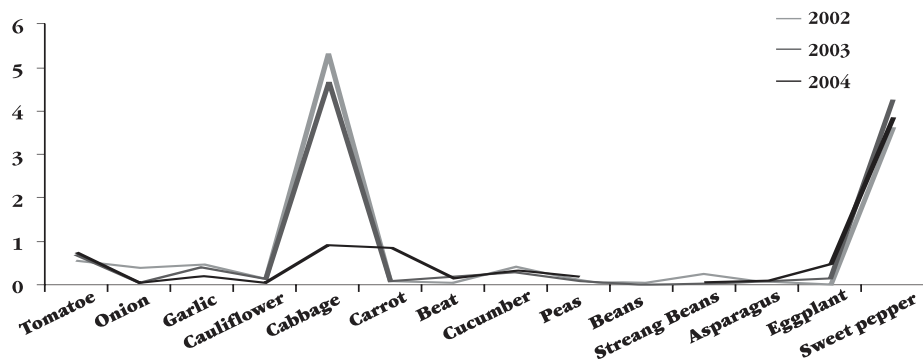
Source: RZS (various publications and data bases)

Graph No.3: Production of various types of vegetables



Graph No.4: Net mass of fresh and chilled vegetables

In thousands of tons



Source: The Customs Directorate of Serbia



**Fruits**

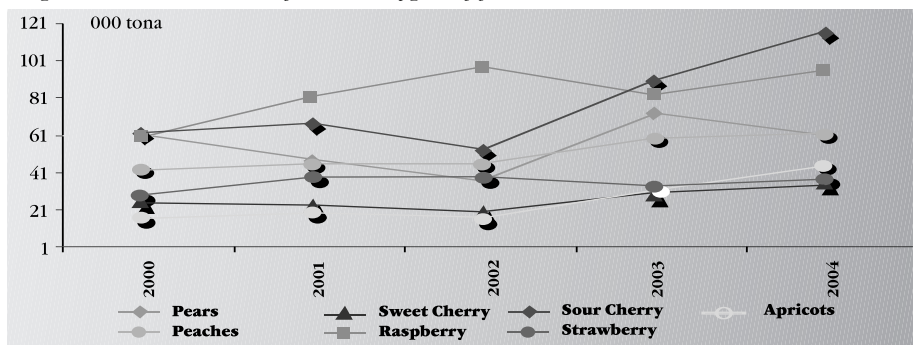
Serbian fruit production is more export-oriented, compared to vegetable production. However, the problem rests with an export structure dominated by dried, frozen, or thermally processed articles, while exports of fresh items, particularly the most significant types of fruits. Additionally, even when exported, export is carried out during the fruits' high season and producers usually lack any practice of storing the fruits

Table No.3: Production, consumption and export per selected types of fruits (average 2003-2004, in tons)

Crop	Production	Household spending (for eating)	Export
Grapes	437.339	18.439	841
Plums	566.056	12.906	11.744
Apples	214.855	91.966	10.824
Sweet and sour cherries	127.489	7.351	11.797

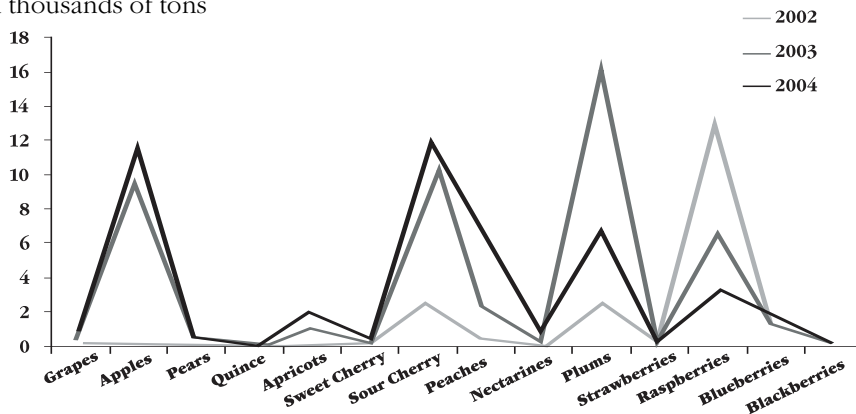
Source: RZS (various publications and data bases)

Graph No.5: Production of various types of fruits



Graph No.6: Net mass of exported fresh fruits

In thousands of tons



Source: Customs Directorate of Serbia

**Regional allocation of growers**

In the Mačva region, the outskirts of Belgrade, and sporadically, other areas of Serbia.

**Vegetables**

Carrots – mostly grown in the vicinity of industrial processing centers and large marketplaces

Cabbage – Futok

Beet, peas, string beans, cucumber and mini cucumbers – Bačka (Bečej, Srbobran, Ruski Krstur)

Beans – Zaječar region

Asparagus – Požarevac, Petrovac na Mlavi

Sweet pepper – Leskovac and Aleksinac region

**Fruits**

Grapes are grown on Fruška gora, in the area of Subotica and Vršac, the region surrounding Bela Crkva, in certain parts of eastern Serbia (Negotin and Kruševac), and in the southern part of Serbia (Vranje and Leskovac).

Apples and pears are grown in Vojvodina (south of the Banat, north of Bačka, part of Srem, around Ruma), central Serbia (Topola), along Podunavlje and in southern Serbia (outskirts of Vladičin Han).

Apricots can be found in Vojvodina (northern Bačka and the northern part of the Banat) and Podunavlje (mostly around Belgrade).

Peaches and nectarines orchards are located in the Belgrade region, the southern Banat (Bela Crkva) and the vicinity of Subotica.

Sour cherries are found in southern Serbia, namely Merošina, and between Niš and Prokuplje.

Šumadija is famous for plum exports.

Western Serbia practices raspberry growing (Užice, Čačak, Valjevo, Šabac, Loznica, Arilje and Ivanjica).

Strawberries are grown in Podunavlje (i.e., the Belgrade region – Rušanj and Ripanj) and central Serbia, with blackberries in flatland areas.<sup>5</sup>

**Fresh fruits and vegetables exporters**

There are very few fresh fruits and vegetables exporters, and firms that export fresh fruits and vegetables as their main activity are almost unique. Export of fresh fruits and vegetables mainly represents a supplementary activity for companies engaged in exporting frozen and processed products, as well as fresh mushrooms. Among these companies are Atle, Flora, Frigonais, Libertas Ltd., Malina Product Ltd., and ML Fruit of Valjevo. The example of a company whose sole activity consists of exporting fresh fruits and vegetables is Agroidual (however, its exports go to Russia).

<sup>5</sup>Source: Chamber of Commerce of Serbia, Department of Fruits and Vegetables  
<http://www.siepa.sr.gov.yu/attach/FruitIndustryInSerbia.pd>

## **Earnings**

Profitability from production of fruits and vegetables is low, requiring immense long-term investments. It costs ten thousand euros per hectare to ensure high-end quality of plant beds, and it takes at least three years to harvest the fruits of such labor. Setting up a new vineyard requires investment totaling 12 000 - 15 000 euros per hectare, and the first high-quality yield cannot be expected earlier than the fifth year of ripening. However, experiences by some individuals confirm that the situation is changing. New technologies applied in growing berries (greenhouses with possibility of three harvests per year) provide faster return on investment, after the seventh or eighth picking of the fruits, and generate even 50% of profit relative to input. One example of such inventiveness is the strawberry-growing firm Miletić from Subotica, which does not have any serious problems in marketing its produce or obtaining earnings, considering the advanced technology they apply in the course of business operations.

## **Technics of cultivating**

However, advanced techniques do not usually prevail in Serbia. Only 2% of total agricultural land is irrigated, using dripping<sup>6</sup> irrigation systems in most cases. Hotbeds and greenhouses are utilized to a meager extent, mostly for production of vegetables. Hotbeds are implemented in an area totaling 100,000 ha of land, and greenhouses occupy only 60 to 70 hectares.<sup>7</sup> They are mostly utilized for tomato-growing (up to 70% of produced quantities), followed by cucumbers (15 - 20%) and peppers (10 - 15%), as well as lettuce. The majority of hotbeds are located on the outskirts of Subotica (Horgoš), in addition to the regions of Mačva (nearby Šabac) and Leskovac, on the outskirts of Čačak (the valley of Morava), Trstenik and Kruševac, and only sporadically in the rest of Serbia. The use of hotbeds and greenhouses represents the most challenging part of the investments. The hotbed system in Debrč (near Šabac), to illustrate one example of an alternative heating method), manages to warm up 4.3 ha of hotbeds with thermal waters. Considering that thermal waters are fairly widespread in Serbia (more in central Serbia than Vojvodina), this method of heating hot beds represents an exceptional opportunity.

## **Subsidies**

The government financially supports procurement of machinery and irrigation systems with the goal of improving production. Support entails refunding a portion of funds spent for procurement of equipment, ranging from 20-40% and depending on the purpose of the purchased machinery. The 2005 government budget allocated 745 million dinars for such support purposes.

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<sup>6</sup>The "drop-by-drop" system of irrigation entails pipe-watering of each plant separately.

<sup>7</sup>These are mainly Bulgarian, low-rise block-greenhouses.

Table No.4: Amount of non-returnable subsidies designated for production improvement

<b>Equipment</b>	<b>Amount of non-refundable funds, in %</b>
<b>Irrigation</b>	
Dripping	30%
Tifon	30%
Others	30%
<b>Production of fruits</b>	
Atomizer	30%
Milling machine	30%
Anti-hail net	30%
<b>Production of vegetables</b>	
Seed-sowing, planting machines for vegetables	30%
Root crop diggers/Extraction machines for vegetables	30%
Hotbeds / greenhouses	20%
Foil for hotbed production	30%
Sprinklers under pressure	30%
<b>Advancements in marketing products</b>	
Packing line	40%
Calibrators	30%
Others	30%

Source: Ministry of agriculture, water management and forestry

## **Prices in Serbia and the region**

The state used to control the purchase price of agricultural products. That practice is now outdated; prices are now freely determined at the market as a result of negotiations between the middleman or wholesaler and the producers.

Due to the significant impact of climate factors on agricultural production, production quantities vary from year to year, thereby affecting the bulk purchase price of the products.

The following table presents prices of fruits and vegetables based on data provided by enterprises (agricultural, industrial, retail, etc.) and cooperatives purchasing products directly from producers, either for sale or for processing.

Bulk purchase prices in Serbia are valid only during the course of the season and they were quoted in net values for producers and compared with prices on representative European terminals in 2005.

Table no.5: Unit value of agricultural products bulks purchase in Serbia and wholesale prices at the terminals in Western Europe, denominated in Euros

	<b>2000</b>				<b>2001</b>				<b>2002</b>				<b>2003</b>				<b>2004</b>				<b>Prices in effect at representative European terminals in 2005</b>												
	2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016
	Unit	Price	Unit	Price	Unit	Price	Unit	Price	Unit	Price	Unit	Price	Unit	Price	Unit	Price	Unit	Price	Unit	Price	Unit	Price	Unit	Price	Unit	Price	Unit	Price	Unit	Price	Unit	Price	
Potatoes	kg	0,21	0,16	0,11	0,11	0,23	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	
Beans	cca 1 kg	0,54	1,14	1,17	1,13	0,95	0,95	1,13	0,95	1,13	0,95	1,13	0,95	1,13	0,95	1,13	0,95	1,13	0,95	1,13	0,95	1,13	0,95	1,13	0,95	1,13	0,95	1,13	0,95	1,13	0,95	1,13	
Peas	cca 1 kg	0,24	0,50	0,41	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	
Onion	cca 1 kg	0,00	0,00	0,12	0,21	0,12	0,12	0,21	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12	
Garlic	kg	0,14	0,12	0,12	1,03	0,73	0,73	1,03	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	0,73	
Cabbage	kg	0,63	0,89	0,89	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	0,11	0,08	
Carrots	kg	0,12	0,14	0,18	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	
Tomatoes	kg	0,10	0,08	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	0,13	0,14	
Peppers	kg	0,09	0,13	0,11	0,2	0,19	0,19	0,2	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	0,19	
Cucumbers	kg	0,25	0,21	0,19	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	
Watermelons and melons	kg	0,17	0,20	0,19	0,1	0,07	0,07	0,1	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	
Plums	cca 1 kg	0,12	0,18	0,07	0,15	0,11	0,11	0,15	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11	
Apples	kg	0,13	0,13	0,26	0,3	0,29	0,29	0,3	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	
Pears	kg	0,25	0,34	0,46	0,37	0,5	0,5	0,37	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	
Sweet cherries	kg	0,25	0,35	0,42	0,24	0,39	0,39	0,24	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	
Apricots	kg	0,30	0,33	0,34	0,29	0,2	0,2	0,29	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	
Peaches	kg	0,44	0,34	0,33	0,16	0,15	0,15	0,16	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	
Strawberries	kg	0,29	0,27	0,35	0,41	0,48	0,48	0,41	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	0,48	
Raspberries	kg	0,15	0,20	0,24	0,9	0,77	0,77	0,9	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	
Blackberries	korpa	0,73	0,70	0,37	0,36	0,31	0,31	0,36	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	
Blueberries	korpa	0,73	0,70	0,72	0,48	1,17	1,17	0,48	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	1,17	
Grapes	kg	0,00	0,33	0,23	0,46	0,52	0,52	0,46	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	0,52	

Source: RZS for Serbia, for other countries <http://www.todaymarket.com>

# Bottleneck analysis

**Because the larger world leaders in food retail have not entered the Serbian market to pay Serbian farmers the equivalent of the adjustment to European and world markets through simple supply and demand, there are many additional obstacles to successful export development of fresh fruits and vegetables. The most important obstacles will be presented here. The exceptional efforts of individuals, different firms, and the Ministry of Agriculture should be recognized as achieving the nearly impossible, because the market has progressed much further than expected.**

## ***1. Adequacy of cultivars and extension of growing and selling season***

### **Healthy cultivars and planting materials**

The Law on Seeds<sup>8</sup> and the Law on Seedlings of Fruits, Grapevines and Hops<sup>9</sup> were adopted in 2005. They provided for setting up registries of seed and seedling producers, such that only registered entities would be entitled to carry out production, distribution, and import. Additionally, production of seeds and seedlings is subject to strict rules, such that only cultivars filed with the registry may be produced, along with observance of certain conditions and featuring prescribed attributes. Enforcement of this legislation would finally establish the system of standardization and control of planting beds rows, therefore only the cultivars of verified quality, springing from quality seeds and seedlings and subject to strict production supervision, could be produced and sold in Serbia. This constitutes the main condition for enhancing the quality of fruits and vegetables under production, in addition to creating the opportunity to extend the duration of production season through the availability of certified seeds and seedlings with confirmed production value.

### **License is the matter in importer's discretion Simplified procedures**

The major novelty in this respect constitutes the fact that, in the future, importers will have the option to obtain a license. Registering cultivars on the list of approved cultivars should no longer take years as before, since the procedure has been dramatically simplified to allow availability of planting material in Serbia. However, an action plan to implement these laws is necessary because importers (i.e., registered producers of planting material) are not obliged to buy the license for cultivars. Experts from domestic institutions also suggest licensing in order to plan balanced production.

<sup>8</sup> Official Gazette RS, 45/2005.

<sup>9</sup> Official Gazette RS, 45/2005.

The assortment of cultivars in Serbia does not follow global market dynamics pertaining to the creation of new cultivars of fruits and vegetables, cultivars that would enhance product quality, resistance against diseases and parasites, and extension of the season.

Note the cultivars of peaches and nectarines. *“One fruit-growing recommendation implies apportioning one-third of planting beds to nursing, one-third to full ripening, and the remaining one-third to area chiseling. Peaches and nectarines should cover the season commencing in early summer (June) and expiring in late autumn (October). Serbia has adequate weather conditions to support such production.*

•Peaches

*Growing peaches of medium-late ripening is carried out in our environment, including the Redhaven, Glohaven, Suncrest, Cresthaven, and Fayette varieties. This results in a season lasting only two months, with very little exposure of cultivars ripening later or sooner. Vojvodina grows very few early cultivars, such as Earlycrest and Goldcrest (at Bela Crkva and Podunavlje).*

*In order to cover the entire season, the following cultivars should be grown:*

- 1. early, colored peaches, recognized world wide, such as Spring Lady or Spring Belle*
- 2. successive varieties in regards to ripening: Sentry, Royal Gem, Royal Glory, Lisbeth, and the domestics such as Maja, and Pontina.*
- 3. in September, the void is filled by O’Henry, Autumn Glow, and Fairtime*
- 4. White pulp cultivar, with distinguished cultivars of Starlite or Maria Bianca.*

•Assorted nectarines

*Nectarines are grown to a meager extent, with only five varieties: Early Sungrand, Independence, Flavortop, Stark Redgold and Fantasy, all ripening during a three-week interval, commencing in early August.*

*To prolong the season, the following cultivars are recommended:*

- 1. Early ripening: Muylfire (yellow pulp) and Silver King (white pulp)*
- 2. Late cultivars: Rita Star, Supercrimson, Springred, Antaress, Maria Aurelia, Orion, and others representing the highest degree of cultivation world wide.*

3. *Late white pulp cultivars, such as Superqueen and White Glory.*

*For both peaches and nectarines, producers should pay more attention to cultivars that can be stored in refrigerated warehouses. There are examples of attempting to extend the season of peach sales by storing the Summerset variety of that fruit. Considering that Summerset's pulp comes off the mesocarp if stored for longer than two weeks, it results in the mesocarp's degradation around the pit.*

*The longest stored are the fruits of cultivars that ripen late and whose pulp does not come off the pit. In that light, the old nectarine cultivar Flamekist takes a prominent place. Elimination of viruses should precede a massive expansion of aforesaid variety in order to produce virus-free and virus-tested planting material".<sup>10</sup>*

## **Assorted other fruits**

### **Apples**

There are numerous examples of inadequate cultivars, grown in Serbian orchards. A prevailing apple variety is "idared," although European markets favor "golden and red delicious" or "Granny Smith" while "idared" ranks 11<sup>th</sup> among consumer preferences. Only new and young planting bed rows are permeated with more contemporary cultivars, like "Granny Smith" (named after an Australian woman who discovered it in the 19<sup>th</sup> century), the popularity of which is increasing.

### **Raspberries**

The most famous variety of raspberry grown inland is the "Willamette," despite having a short season and not holding its freshness for long. Still, one of the positive examples is the 4.5 ha area in urdevo, in the vicinity of Novi Sad, where producers grow the wild variety "polana," created by grafting "Heritage" and "zene jesenje." That new variety holds its freshness for several days, bearing fruits even in the course of the first year of growing, from July until the first frost (when mown), and then cropping up next spring once again. The planting beds were set up by Mr. Stanojević, Mr. Kuhar, and Mr. Pakulski.

## **Vegetables**

### **Broccoli**

Other fruits and vegetables are grown and consumed in Serbia to a lesser degree, and, almost without exception, are imported, such as: broccoli, artichokes, various types of lettuce (lolo rosso, iceberg), field salad, rucicola salad, cocktail tomato, etc. Serbia's weather conditions are absolutely suitable for growing these vegetables. Therefore, in addition to avoiding imports of these items through domestic production and lower prices, they also represent export potential, since their world consumption is on

<sup>10</sup> The author cited here is Prof. Dr. Vladislav Ognjanov, Faculty of Agriculture, Novi Sad.



the rise, especially if marked as organic production. Organic production is highly feasible for a number of these products, taking into account, for example, that cocktail tomatoes are sensitive to pesticides and ripen better without the latter thanks to natural resistance against disease.

### **Blueberries instead of raspberries**

Recently, many are discussing market growth for cultivated blueberries, possibly capable of taking the lead over raspberries in the market for berries. The Arilje Municipality is making an interesting effort to test that position: thanks to donations and funds available through the local government budget, and professional assistance provided by Institute for fruit growing from Čačak, officials set up new planting beds of blueberries covering ten-plus hectares of municipal soil.

The Arilje municipality used to be a leader in raspberry production, and blueberries stood out as an alternative, considering the botanical proximity of these two fruit species. The results will take some time to manifest: three year old seedlings are going to be planted next spring, and the first yield, projected to be 15 or so tons, will come in July to August in negligible quantities that will promptly be consumed in the domestic economy.

Moreover, despite great demand for blueberries in Europe, this strategy entails competing with countries that have a long history in the blueberry business: Germany manages 5,500 tons output per year, and Poland produces 4,000 tons.

### **Techniques of growing**

Generally speaking, greater Serbian competitiveness with fruit and vegetable exports requires changes in the nature of growing and the implementation of new techniques and machinery in production, irrespective of the types applied.

- Extension of the fruit season not only by using new fruit cultivars, but also by means of various techniques of implementation (hotbeds, growing on substrate, etc.)
- Setting up anti-hail nets above orchards and plantations to ensure less dependence upon weather conditions (net prices range from € 8,000 to 15,000 per hectare, but one seasonal output destroyed justifies the investment)
- Introduction of advanced machinery into fruit growing, such as mulch for tree pruning, rotating tills, narrow platforms for box palletes, and similar technology.<sup>11</sup>

### **Organic production**

Special growing techniques include so-called "ecological production," or "organic" or "biological" production, which encompasses growing plants by utilizing the fertility of land, availability

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<sup>11</sup> Professor dr. Zoran Keserović, Faculty of Agriculture, Novi Sad.

ty of water, natural traits of plants and animals, and improvement of yield and plants' resistance by means of natural forces and laws of nature, in addition to prescribed application of fertilizers and devices for protection of plants and animals in compliance with internationally recognized norms and principles. Through a certificate, a producer offers warrants to the purchaser for the following quality commitments and assurances:

- 1) Synthetic or chemical substances have not been utilized to treat the land for at least the past three years, computed as of the packaging date on the product;
- 2) Farmer's households and the technological process employed in production are tested at least once a year by an independent agency authorized to issue certificates;
- 3) only non-toxic, ecological methods and substances are used in the course of production;
- 4) Mixing of organic and conventional additives is not allowed during production;
- 5) Non-toxic substances have to be used in the course of cleaning and sanitizing the equipment
- 6) The product has not been exposed to other prohibited chemical substances during the production and manipulation phase (Organic Food Certification Program, Dept. Of Agriculture, U.S.A.).<sup>12</sup>

It goes without saying that organic produce is gaining more popularity domestically and abroad.

In Serbia, there exists no firm or laboratory that examines biological means of plant protection. More information about plant protection can be found on the web site of the leading laboratory for plant protection in the Central European region, namely the Czech laboratory "Biocont" ([www.biocont.cz](http://www.biocont.cz)).

### **Shortage of refrigerated warehouses with controlled atmosphere conditions and ULO cold storage facilities**

Prolonging the production season is primarily constrained by storage opportunities. Out of 220 refrigerated warehouses in Serbia, only two of them possess contemporary storage conditions. That implies controlled atmosphere technology, as well as so-called ULO (ultra-low oxygen) cold storage facilities. Neither of these two ULO-equipped facilities is used for storage of fresh fruits and vegetables that could be used for export.

### **Optimal storage conditions and average longevity**

Annex no. 1 provides an overview of optimal conditions for the most basic kinds of fruits and vegetables, as well as the average longevity of freshness per item, according to research conducted by the University of Nebraska, USA.

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<sup>12</sup> Source: [www.poljoprivreda.info](http://www.poljoprivreda.info)

## **2. Quality control and standardization**

### **General overview of standardization and quality control**

Standards provide a common language for the industry. They facilitate clearer communication and more successful marketing. Standardization helps producers to supply viable products in demand by the market, while assisting purchasers in obtaining the product quality they seek. An association of large supermarkets can introduce the quality standards with which producers are supposed to comply. These standards refer to bio-chemical characteristics, appearance, and other qualities (mass, color, diameter of the fruit), in addition to signaling or avoiding the presence of hazardous substances (nitrates, heavy metals, pesticide residuals, phytohormones). The most important international systems of standards are EUREGAP<sup>13</sup> for agricultural production and HACCP for processing industries. These standards emerged as a response to consumer reaction against the phenomena of unhealthy food appearance during the spread of animal disease epidemics (mad cow disease, foot-and-mouth disease), as well as stemming from fears caused by the introduction of genetically modified food. EUREGAP represents the set of standards covering all important aspects of production, such as land management, crop growing and harvesting. It also deals with issues regarding pollution, labor force treatment and protection of the environment. It follows production, starting from planting (the origin of seeds and the history of the soil are examined), through growing (usage of herbicides, pesticides and fertilizers is traced in terms of quantity, type, quality, application manner, and location), irrigation and harvesting (hygiene level and storage), and finishing with packaging, transportation, and placement of products on store shelves.

### **Chile**

Chile, the leader in the fresh fruits and vegetables industry, has established its own system of good agricultural practices (GAP), namely, an entire control system over growing, packaging, handling, and transportation. These standards are even stricter than world standards, but they ensure that Chile manages to sell fresh produce in over 70 countries worldwide. Since January 1, 2006, HACCP has become the quality control standard of the European Union for international trade of

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<sup>13</sup> EUREP (Euro-Retailer Produce Working Group) prescribes a development framework for the best agricultural practices (GAP - Good Agricultural Policy) for plant production (fruits, vegetables, potatoes, salad, ornamental flowers, and planting facilities). The framework represents the minimum standards accepted by European retail merchants, established on integral management of crops (ICM- Integral Crop Management) and stipulating observance of both economic and ecological sustainability of crop production.

agricultural food products, and countries outside the EU have to implement this quality control system if they wish to market their products in the EU.

Legislation in force in every developed EU country obliges producers and processors of food to implement HACCP as a comprehensive concept of food quality assurance all the way from the farm to the dining table.

### **Standards in force in Serbia**

HACCP standards (essentially, risk analysis that monitors critical points of production) have been adopted by 12 enterprises in Serbia dealing with processing of fruits and vegetables (including Malina Produkt, Mondi Food, Sirogojno, Hibrid, Libertas, Flora, Vulić Vulić, Jevremovac ABD, Zadrugar), while the first EUREGAP certificate in Serbia was awarded to the firm Libertas from Šabac, engaged in growing and processing of fruits and vegetables. The Regulation on Utilizing Incentives for Implementation and Certification of Food Safety System in 2005<sup>14</sup> provided for financial aid designated for enforcement of the HACCP program in the amount of 800,000 dinars per applicant or 180 million dinars total. The program was projected to subsidize 200 firms beginning in 2006, and will include the EUREGAP standard.

### **European Union - standards**

Nevertheless, 85% of Serbian food producers and food processors are either not familiar at all, or insufficiently familiar with the standards applicable to food safety, although the Government of Serbia enacted the Regulation precisely to govern food safety in that industry.

In conjunction with the previous Decision promulgated in 1996, European Commission (EC) Decision 1148/2000 requires fresh fruits and vegetables designated for consumption to comply with marketing standardization and to obtain a “certificate of conformity” prior to entering the market. It refers to the produce listed below, although the list is modifiable and in fact is periodically amended to meet the varying needs of the European market:

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<sup>14</sup> Source: official Gazette RS, number 44/2005.

Fruits	Vegetables and salads	Nuts
Apples	Artichokes	Hazelnuts, in shell
Apricots	Asparagus	Walnuts, in shell
Avocado Pears	Aubergines	
Cherries	Beans	
Grapes	Brussels Sprouts	
Kiwi fruit	Cabbage	
Lemons	Carrots	
Mandarins	Cauliflower	
Melons	Courgettes	
Nektarines	Garlic	
Oranges	Leeks	
Peaehes	Zucchini	
Pears	Onion	
Plums	Peas	
Clementine and other citrus	Spinach	
Strawberries	Celery	
Water melons	Cucumbers	
Bananas	Iceberg lettuce	
	Lettuce and endives	
	Mushroom (cultivated)	
	Sweet Peppers	
	Tomatoes	

Tabela br.6: Fresh fruits and vegetables in EU

Under European Commission Decision number 48/2003, even combined packs of products that contain at least one item from the above list must comply with standardization. Among other things, these standards accurately define classes of produce, packaging, and labeling. Product classes include an extra class (applicable only to certain products), followed by first and second class.

### Quality control

Pursuant to Directive 2251/92 of July 29, 1992, the European Union established rules pertaining to the quality control of fresh fruits and vegetables coming from countries outside EU borders.

Quality control encompasses the following in particular :

- 1) review of packaging and presentation
- 2) double-checking of markings' conformity
- 3) verification of product compatibility to EU marketing standards.

For more detailed explanations regarding quality control standards and rules, refer to the web site of the country currently holding the EU presidency, the UK: <http://www.defra.gov.uk/hort/hmi.htm>.

### 3. Packaging and logistics

#### **Packaging of the whole product, including an example relating to the EU and transportation**

Packaging is doubly important when it comes to trade in fresh fruits and vegetables. First, it has to be adequate to ensure that produce can withstand transport while preserving it from rotting. Second, taking into account relatively low unit value per product (especially in regards to certain kinds of vegetables), packaging cost takes up a significant portion of sale price. Taking these factors into account, adequate packaging is very important to the competitiveness of these products.

Serbia is accustomed to wooden and cardboard packaging. Plastic wrapping is also available in the country with a portion of it imported. Glass packaging is exclusively imported.

Proper packaging and labeling is the next important step in the whole chain. Improperly packed fruits and vegetables decay faster.

There are several common components to packaging:

1. Purchasers require packaging that is not harmful to health, but also recyclable. This attitude is becoming more prominent worldwide because the largest retailers of fresh fruits and vegetables are the most concerned about environmental protection.
2. Variability is another feature of packaging because there are no packaging standards in force around the world and there are many varieties to it, ranging from packaging designated for wholesalers to that for consumers. By contrast, shipping companies prefer uniformity.
3. Colorful packaging with a visible logo is used more often in retail in order to attract consumers and connect them to a local producer's brands.
4. The structure and composition of modern packaging have to suit each kind of fruit or vegetable specifically to prolong product freshness and mitigate losses, as well as to adjust to needs and demands.
5. Packaging is supposed to be practical, with very little unoccupied room inside the box or a bag, while also protecting the product from mechanical blows and strikes during shipping.

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<sup>15</sup> For example, a plastic crate containing 8 kg of vegetables costs 150-160 dinars. That means that out of a 20 Dinar cost per kilogram of the vegetables in question, production expenses are allotted 12-13 dinars (seeds, growing, protection, fertilizers), and the rest is apportioned to the cost of packaging.

<sup>16</sup> Numerous small enterprises produce wooden crates, and certain large state agricultural firms fulfill their own needs by producing them themselves.

## **Fresh pears in Europe**

Packaging should at least make visible the country of origin, the date of production, and the name of the producer, but EU marketing standards introduced some additional requirements. The following example shows the guidelines for packaging and labeling fresh pears imported by European Union:

### A) uniformity

One package must contain pears of the same origin, variety, quality, size, and degree of ripening, and if belonging to the extra quality class, they should be of same color.

### B) packaging

Pears must be packed in such a manner as to protect the product. Wrapping material should be new and of such quality as to protect the product from internal and external damage. Non-toxic glue and print must be used for labeling.

### C) presentation

Produce of extra class must be packed in rows.

### Labeling:

#### A) identification

Name and address of the packer

#### B) product

“pears” on the outside, if the inside does not show sideways

Name of cultivar: Conference

#### C) country of origin

In addition to name of the country, one might add region or local brand

#### D) commercial specification

Class (regarding pears, it could be extra, first or second class), size, or number of items if packed in rows.

If identification is performed by size, the following must be stated:

- If the concrete product complies with the uniformity rule, a minimum and maximum diameter must be stated

- If the concrete product does not comply with uniformity rule, a minimum diameter in the package must be stated in the context «from», adding either «to» the greatest diameter or a denomination of value.

#### E) official control sign (not mandatory)

## **Logistics**

### **Products remain in trucks and refrigerated trucks up to 36 hours**

Considering fresh fruits and vegetables, shipping is of a great importance. Transportation of fruit and vegetable goods by vessels is widespread all over the world and every European port has terminals with controlled temperatures for fruits.

Land shipping (trucks and refrigerated trucks) is used for transportation of produce that can endure on average 36 hours of travel to European destinations.

The cost of transportation by refrigerated trucks with regulated temperatures is not uniform, differing from shipper to shipper. At best, the cost could vary from 0.09 € per kg for well-packed goods (potatoes, plums, watermelons, etc) to 0.57 € for sensitive berries. Still, in business this price can increase by as much as three times if trucks of small volume are used, but they are the most in demand by small scale exporters, along with the practice of shippers to charge roundtrip fares when delivering the goods. The absence of vertical linking is evident since it is rare that firms exporting fresh fruits and vegetables also possess their own means of transportation. This segment is not considered a part of the production chain in respect of improving exports of fresh fruits and vegetables, and therefore is not eligible for subsidies.

Although a reliable and competitive manner of transportation, ground shipping falls under the category of environmental pollutants, such that Switzerland and EU have enforced restrictive measures regarding trucks in transit.

### **Shipping by air**

Products are shipped either on regular flights or by special cargo planes. Opportunities vary depending on the air company, the actual make and model of the plane, destination, number of passengers (if shipped by regular flight), season, competition, etc.

### **JAT does not possess cargo planes**

The national air carrier JAT Airways offers shipping of goods on their flights to regular destinations at very competitive prices. The staff at JAT tries their best to accommodate the needs of domestic entrepreneurs and provide the best possible shipping conditions. Prices of cargo flights are set at the beginning of the season (in May) and are forwarded to shippers and other interested parties dealing in export/import. Last year charges ranged roughly from €0.87 to 0.98 per kg for closer destinations: Vienna, Munich, Frankfurt, Berlin, Milan, Rome, Zurich, and Düsseldorf, and from €1.10 to 1.17 per kg for longer distances, such as Amsterdam, Copenhagen, and Stockholm. Prices include fuel and insurance.<sup>17</sup>

<sup>17</sup> Charges supplied by Dragan Đurović, supervisor of JAT Belgrade Market department.



In Serbia, air transportation is used only for exporting fresh mushrooms. The price of an airlift includes the cost of handling goods at the airport during departure as well as receipt of shipments from abroad, and occasionally additional expenses incurred, such as handling charges at the destination that, even though they are incurred by receiver of goods, should still be computed in the price.

Additional challenges may force a division of labor between two companies in charge of goods and passengers at the Belgrade airport: JP Aerodrom Belgrade and Support (a subsidiary of JP JAT Airways), considering the latter does not have the necessary premises to handle customs. Shortcomings of air shipping include restrictions on the quantity allowed per flight, limited on average to 2.5 tons (the total encumbrance of a DC-10/30 is 14 tons, between 4 and 6 tons for Airbus 300, and for Airbus 310/320 the range limit is 2-4 tons. Second, the shipping organization must be top notch, because any kind of complications and delay would generate enormous losses.

### **Other airlines**

The shipping price structures of other air carriers are compatible with those charged by JAT. For destinations to which JAT does not fly, such as America, Middle East, etc., shipping is mostly overpriced, affordable only for shipments of pricy items that can offset the cost by their own prices: for example, airlift to destination such as New York costs € 3 per kg or € 1.75 to 2.25 per kg for the Middle East (Dubai, Raid etc.). With direct flights, air shipping might last only a few hours, which is a great advantage, but otherwise, shipping can last up to 24 hours with stopovers.

Belgrade Airport is the largest airport in Serbia and Montenegro, facilitating over 75% of domestic passenger travel and 90% of goods transportation. The goods (cargo) terminal for domestic and international travel at the Belgrade Airport possesses a storage area of 5,500 m<sup>2</sup> capacity and premises of 2,500 m<sup>2</sup> designated to accommodate operational services, shipping organizations and Customs, for a total of 19 business units. With its available space and equipment, the cargo terminal can service 35,000 tons of goods and materials per year. Through an international tender, JP Airport "Belgrade" selected the company Dyn Corp International LLC as a strategic partner, jointly establishing a new enterprise (joint venture) on the basis of mutual capital investments (public private partnership). The newly established company will provide construction and development of a cargo logis-

tics center at the Belgrade airport, valued at 60.6 million dollars. It is projected that the construction of a cargo terminal and logistics center should increase turnover volume by seven times as early as its first year of operations.

The cargo terminal will be equipped with the most contemporary technical devices for servicing various kinds of goods, including fruits and vegetables.

However, negotiations with the selected strategic partner are still ongoing, and the contract establishing the joint venture company was supposed to have been signed at the beginning of October 2005, followed by construction of cargo terminal and logistics center.<sup>18</sup>

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<sup>18</sup> Source: <http://www.airport-belgrade.co.yu>

## **4. Sales and marketing**

### **Information deprivation**

The issue of insufficiently informed producers impedes development and tends to cause mistrust. The lack of information contributes to the absence of crucial connections among producers in terms of founding a producers' association that would have greater prospects of breaking through to international markets. In the Serbian environment, the organization of producers' associations is still in its infancy. The most diligent have been associations of apple growers, modeled upon Slovenian and Austrian organizations.

Although still at the beginning, associations have a clear vision of their development and great potential. Financing remains the biggest challenge because everything depends on the inclinations of local governments, some of which are generous and understanding (e.g., in Arilje towards the Apple Growers' Association Arinova), while others frequently exhibit the opposite attitude.

### **Entering the market**

The globalized world market is used to consuming almost any kind of fruits and vegetables, regardless of the season, compensating for seasonal market shortages by obtaining products from the other hemisphere.

The leading European importers are the Netherlands (thanks to numerous ports) and Germany (magnitude of market size). The list of largest European trade fairs that specialize in fruits and vegetables is:

Fruit Logistica – Berlin, Germany, [www.messe.de](http://www.messe.de); the most recent fair took place on February 2-4, 2006.

Sial - Paris, France, [www.sial.fr](http://www.sial.fr); occurs every other year

AGF – Rotterdam, the Netherlands, [www.agftotaa.nl](http://www.agftotaa.nl); occurs every other year

BioFach – Nürnberg, Germany, next fair on February 15-18, 2007

### **State will sponsor some business entities' participation at trade fairs**

Every firm in possession of a HACCP certificate or due for an award of one by January 1, 2006, will be given an opportunity to promote Serbian produce at international fairs with associated expenses borne by the state.

### **Food identity – brand**

In addition to a quality product, firms have to establish excellent branding. Brand names that incorporate local character in their marking appear to be more important in the food industry as opposed to other industries. The globalized market seeks to know the identity of food products, defining their origin, techniques of growing, and associated risks.

### **Affiliation with other industries**

Local brands would also contribute to the overall profile improvement of Serbian agriculture. Agricultural producers

**Patriotism  
related to  
brand and  
product  
quality**

should read the minds of businessmen, not the other way round.

In that sense, the biggest tasks ahead are facilitating and establishing close relationships with brand makers in other industries, above all tourism, as practiced all over the world. Another important role branding is supposed to fulfill entails raising the self-confidence and pride of farmers regarding their jobs, products of labor, and nationality. Good brands possess features attributable to sincere patriotism.

## ***Agricultural policy***

### **European Union**

The Common Agricultural Policy (CAP) frequently generates problems in the course of EU budget negotiations, currently planning the 2007-2013 period. In subsidizing agricultural production, the EU has accomplished self-sufficiency in terms of food supplies, disturbing the balance of demand and supply, and consequently has resorted to subsidizing food exporters. Pursuant to CAP, European farmers receive roughly 50 billion euros, equaling almost one half of the EU budget.

Since May 2004, an additional ten countries joined EU, making up 4 million farmers on top of the previously existing farming population of 7 million farmers.

Because the amount of funds designated as direct financial aid allotted to farmers has decreased over time, the EU has undertaken a new course of action in supporting rural area development, especially job creation programs in villages.

During the Summit of June 2003, the then-fifteen EU member states agreed to change the manner of apportioning subsidies. Beginning with 2005, farmers are now granted lump sums, determined by each member state separately within their jurisdiction, that designate incentives for farmers to become concerned about the condition of the environment, food quality, and the well-being of animals, as opposed to focusing only on production quantities. Initial plans to terminate subsidies that support production did not take effect because of France's dissent, but the possibility of implementing that plan still exists if member states wish to enforce it, along with the option of sticking to the old ways if farmers refuse to cultivate their land because of withdrawn subsidies.

### **Agricultural policy in Serbia**

In 2005, the Serbian government adopted a Strategy on Development of Agriculture that defined activities and timeframes for implementation in support of restructuring and modernization of the agricultural sector, as well as strategies for joining the WTO and the EU.

- Price control policy with respect to agricultural produce is not enforced, but replaced by liberalization of prices, directed at programs assisting rural areas' development.
- Agricultural subsidies surpass the amounts granted in preceding years, and are designated for development of modern, highly productive, and market-oriented agricultural production by encouraging the formation of certain planting beds, as well as financial aid for procurement of agricultural machinery.

However, numerous programs implemented by the Ministry of Agriculture in the course of year 2004 have not been fully utilized by the entities for which they were created, i.e., primary food production factors.

### **Foreign trade regime**

Considering fresh fruits and vegetables,<sup>19</sup> the current Serbian foreign trade regime focuses above all on protecting the domestic market from potential harm from importers. That is to say, such a system is rooted in the attempt to protect agricultural production from import competition during the season of harvesting and marketing products so as to obtain higher sale prices. Such measures favor producers.

However, with a view toward enhancing competitiveness, this system is not quite adequate since many protected tariff items do not require protection as existing significant net exports, or products not even grown in Serbia. Also, additional protective measures include particular duties payable upon import of fresh fruits and vegetables. Duties on fresh fruits and vegetables range from 4 dinars per kilogram for melons and watermelons to 18 dinars per kilogram for peas, beans, and string beans. The existing incentives system does not acknowledge measures to encourage export of fresh agricultural produce. In other words, some export subsidies are available, calculated as a relevant percentage per export price, but they apply to frozen or thermally processed fruits and vegetables. Indirect subsidies are also available through refunding already paid taxes and portions of transportation costs incurred, but these measures are valid only for products falling under the category of processing industry.<sup>20</sup>

A significant aspect in terms of export opportunities relates to duty free access to the European Union market as the most attractive export market for all kinds of fruit and vegetable crops.

### **Projected undertakings of the Ministry**

Most of the legislative enactments necessary for duty free access to the EU market should be concluded by the end of year 2006. This includes enactment of the Law on Seeds and Seedlings, and laws regulating agriculture, soil management, farming cooperatives, plant protection, fertilizers, and the protection of plant cultivars. Afterwards, implementation activities should take place, most notably the establishment of a registry of agricultural estates, producers, wholesalers and

<sup>19</sup> Regulation on Incentives Designated to Support Export of Agricultural and Food Articles in 2005, Official Gazette RS, no. 71/2005.

<sup>20</sup> Decision on Refunding Duty and Other Export Dues and Other Incentives in Support of Export, Official Gazette RS, 37/2004, 78/2004, and 54/2005.

importers of seeds and seedlings, as well as a registry of plant cultivars. Finally, legislative strategies for the upcoming short term period call for organization and institutionalization of various services that provide advice and consulting to farmers and perform supervisory and controlling functions.

## **Conclusions**

### **1. Foreign competition in food retail strengthens productivity and competitiveness of fruits and vegetables**

The market domination of domestic retail chains eliminates the fastest path to enhanced competitiveness of Serbia's agriculture. It is advisable to follow the clear example of Poland, Serbia's biggest competitor on the market of fresh fruit and vegetable products, especially berries. Healthy competition between foreign-owned and domestic retail chains brings changes that can teach Serbian producers to be more efficient. Higher and more stable product prices, balance between supply and demand, incorporating production standards, and reducing the number of mediators in the producer-consumer chain increase prices (raspberries, for example) paid to direct producers, thereby producing market incentives to shape products according to the demands of the modern global market.

### **2. Investing in science**

Each year, Chile, the leading producer and exporter of fresh fruits and vegetables world wide, invests an enormous amount of funds in technology and scientific research. Chile engages in continuous research and advancement in packaging techniques, bio-chemical treatment in production, logistics, and scientifically supported selection of adequate cultivars.

### **3. Associations and centers for distribution**

Networking and establishing associations are necessary for further advancement of the industry because:

1. they represent the only solution for facilitating small scale producers' entrance into the developed market of the EU;
2. only associations can obtain necessary agricultural inputs, required for productivity growth and breaking into developed markets, such as centers for distribution equipped with calibrators, adequate packaging, and other technologies;
3. associations can actively participate in information channels providing information flowing back and forth between consumers and producers; and
4. associations can retain experts assisting with production, and network with domestic and foreign partners in other relevant industries, such as the processing industry.

### **4. Advancement of logistics**

Exporting fresh fruits requires logistics that mesh perfectly with the producer-to-European-consumer distribution chain. The world's biggest producers, such as Driscolls or Dole, even developed special vehicles designed for harvesting and delivery of crops to distribution centers. Numerous airports worldwide provide special conditions in support of storage and handling of fresh products.

### **5. Organic production**

The percentage of Serbian organic fruit and vegetable production is negligible at the moment, virtually non-existent with



respect to fresh fruits and vegetables. Serbia possesses enormous untapped potential for organic production. Since the 1990s, and including the year 2000, the use of pesticides has decreased by 90%, which represents an accomplishment in itself, and a precondition for entering the EU market.

Note that environmentally friendly products often sell for prices that are as much as 50% higher on global markets, compared to conventional fruits and vegetables.

## **6. Playing by the market rules**

Playing by the market rules means attuning crop growing to market demands, regardless of Serbian producer habits, and including the planting of new kinds and cultivars if the climate permits it.

## **7. Unavoidable insolvency of state-owned enterprises**

As confirmed by the experiences of all Central and Eastern Europe countries, undergoing the transition process, large state enterprises endured the most severe hardships,<sup>21</sup> resulting in inevitable sale or further deterioration of firms with delays of sale.

## **8. Transformation of small farms**

However, the largest transformations are pending for small farms that are expected to enlarge and adjust thoroughly to advanced production methods and quality control, and to reunite with urban environments by means of infrastructure and overall development of rural areas.

## **9. Responsibilities of the state**

The responsibilities of the state include:

- drastic improvement of information dissemination, targeting small farmers and covering topics such as legislative amendments, global market trends, new technologies, and availability of subsidy and credit opportunities
- development of the state's own standards in compliance with global and European fresh fruits and vegetables standards
- protection of minimum wages payable in agriculture in favor of registered farming households
- a more active role in marketing by establishing an official body entrusted with the promotion of fresh fruits and vegetables and modeled upon the largest global exporters of fresh fruits and vegetables (for example, Chile has branches on all meridians, developing constantly according to consumer's demands)
- encouragement of the development of various associations and other forms of networking in order to advance exports of fresh fruits and vegetables
- bolstering the market chances and access of fresh fruits and vegetables, so that Serbian farmers can enjoy their work and be proud of their products and their land.

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<sup>21</sup> CEE Regional Summary Regoverning Markets 2004.

**Annex 1. Storage of relevant kinds of fresh fruits and vegetables - conditions**

<i>Item</i>	<i>Storage Temperature (°C)</i>	<i>Humidity of air (%)</i>	<i>Average storage time</i>
Artichoke	-0.5 - 0	90-95%	2-5 months
Asparagus	0 - 2.2	95-100%	2-3 months
Beans	0 - 4.5	65-70%	1 year
String beans and peas	4.5 - 7.2	90-95%	7-10 days
Broccola	0	90-95%	10-14 days
Brussel Sprout	0	90-95%	3-5 weeks
Late cabbage	0	90-95%	3-4 months
Chinese cabbage	0	90-95%	1-2 months
Carrots	0	90-95%	4-5 months
Cauliflower	0	90-95%	2-4 weeks
Celery	0	90-95%	2-3 months
Sweet corn	0	90-95%	4-8 days
Cucumber	10 - 12.8	90-95%	10-14 days
Eggplant	7.2 - 12.8	90-95%	1 week
Endive	0	90-95%	2-3 weeks
Garlic	0	65-70%	6-7 months
Horseradish	-1.1 - 0	90-95%	10-12 months
Kohlrabi	0	90-95%	2-4 weeks
Leek	0	90-95%	1-3 months
Lettuce	0	95%	2-3 weeks
Quince, variety like cantaloupe	0 - 4.5	85-90%	5-14 days
Watermelon	4.5 - 10	80-85%	2-3 weeks
Onion	0	65-70%	1-8 months
Sweet pepper	7.2 - 10	90-95%	2-3 weeks
Potatoes	4.5 - 7.2	90%	2-9 months
Pumpkin	10 - 12.8	70-75%	2-3 months
Spinach	0	90-95%	1-14 days
Tomato	7.8 - 10	85-90%	4-10 days
Apple	-1.1 - 4.4	90%	3-8 months
Apricot	-0.5 - 0	90%	1-2 weeks
Blackberry	-0.5 - 0	90-95%	2-3 days
Bilberry	-0.5 - 0	90-95%	2 weeks
Sour cherry	0	90-95%	3-7 days
Sweet cherry	-1.1 - 0.5	90-95%	2-3 weeks
Peach	-0.5 - 0	90%	2-4 weeks
Pear	-1.7 - 0.5	90-95%	2-4 months
Plum	-0.5 - 0	90-95%	2-4 weeks
Raspberry	-0.5 - 0	90-95%	2-5 days
Strawberry	0	90-95%	5-7 days

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Stevana Sremca 4 • 11 000 Belgrade • Serbia & Montenegro  
t +381 11 305 3456 • f +381 11 334 5350

1514 N. Longfellow Street • Arlington, Va 22205 • US  
t +1 571 594-2063

[info@jeffersoninst.org](mailto:info@jeffersoninst.org)