

## STUDY ON THE IMPLEMENTATION AN INVESTMENT AND PRODUCTION OPTIMIZATION IN A GREENHOUSE TOMATO

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### Abstract

*This study is based on the fact that the relevant market quality local vegetables and organic products is an increasing dynamic in Romania. This trend can be observed easily consumers that they are willing to spend more money on indigenous vegetables that have a superior quality of imported net.*

*In this context, the main aim of the paper is to discover the main trends in the evolution of this market segment and demonstrate that investing in a greenhouse tomato, applying new technologies can be profitable.*

**Key words:** indigenous vegetables, consumer trend, import, competitors

### INTRODUCTION

I found market by studying the relative lack of competition since there are too few local producers, local market tomato source being approximately 80% of import, which should favor local vegetable market penetration, new competitors.

The main argument to encourage investment in a greenhouse tomato is the niche market for quality Romanian vegetables. Demand is constantly increasing, while offer is growing anevios of multiple causes, such substantial investments needed to start business also old techniques combined with reluctance and inability of competitors to approach the techniques and new technologies.

### MATERIAL AND METHODS

In Romania, tomatoes are grown mainly in open ground, but there is a fairly large sector of production in protected (greenhouse). Heated greenhouse area is 317 ha and 3000 ha of greenhouses. According to Eurostat, in 2011 the tomatoes were allocated about 49 thousand hectares, production volume was 881,000 tons, an increase of 14.6% compared to 2010, when production was 769 000 tons.

In the early 2000s there has been an intense process of restructuring of agricultural activities so that lots tomatoes production volume around the house was significantly reduced, while production volume increased by professional farmers. The share of processed tomato industry is 20-30%.

During 2005-2011, the volume of imports of tomato Romania had an upward trend (+20%), reaching 70 000 tonnes (25% of annual domestic consumption of fresh tomatoes). During this period, average import prices increased 4 times. Turkey is the main supplier of tomato on the Romanian market, holding the 2/3 of the market.

An important group of suppliers are in southern EU countries (Italy and Spain), which is followed by a group of suppliers in Asia Mediterranean (Jordan and Syria). China is the main world producer (34 million tons), followed by USA, Turkey and India. These four producers hold 50% of global production of tomatoes.

Romanian imports seasonality analysis clearly shows that in the months from July to October, the market demand is mainly satisfied by local production (tomatoes in open field), while imports are carried out in the months from November to June.

Trends in EU production. In 2008 the EU tomato production volume was 16.3 million tons. Italy is the main producer (38%), followed by Spain (23%), Greece and Portugal (both 9%). In all these countries the share of tomatoes for industrialization is high (Italy - 70%, other countries - 50%). This contrasts with the situation in other countries such as France, Bulgaria and Romania, where industrialization rate is much lower (15-25%) and in countries located further north (Netherlands, Belgium, Germany), where production costs are relatively higher, all tomatoes are fresh consumption.

Should mention that 33% of the Romanian population prefer shopping in hypermarkets, supermarkets and Cash & Carry. Tomatoes sold in this area are 80% imported, because climate allows the cultivation of tomatoes in our country only in summer, resulting in the absence of local tomatoes on the market, most of the year.

Competition is represented almost totally foreign manufacturers, I believe that relatively easy penetration, given that consumer preference for domestic products is more than obvious. I think this trend towards Romanian goods is determined by much lower quality imported tomatoes, quality is directly influenced by the stage at which they are harvested these vegetables, foreign manufacturers are forced to harvest vegetables several stages before the fruit ripens entirely based on the distance to be transported tomatoes.

Presentation of investment. Opportunity to develop a business from growing tomatoes with modern technology, I noticed a visiting HAS Den Bosch University greenhouses in the Netherlands.

For some technical reasons local producers realized productions around 35-40 pounds of tomatoes per m<sup>2</sup>, while I propose to produce about 50 kg/m<sup>2</sup>. The total investment amounts to approximately 2.5 million lei, asset requirements are detailed in table 1.

Table 1

Asset balance starting

Assets	Unintate measurement	Units	Price per Unit	Total
land	m2	10000	8,00 lei	80.000,00 lei
Greenhouse	m2	5000	300,00lei	1.500.000,00 lei
Heating	unit	1	100.000,00 lei	100.000,00 lei
Equipment	unit	8	500,00 lei	4000,00 lei
Plants	pieces	13000	0,80 lei	10.400,00 lei
money	lei	x	x	600.000,00 lei
other expenses	x	x	x	161.440,00 lei
Total				2.455.840,00 lei

To start investing, investors need assets as follows:

- A land area of 1ha,
- The amount of 600,000 lei

Other items required to start this business will be acquired through a loan obtained from a bank investment with a repayment period of 84 months, the loan with an interest rate of approximately 6.19%. For example BRD offers a grace period of 6 months to be reimbursed only the interest rate, not the rate of the loan. Method for calculating this credit is linear which is manifested by a steady decrease of the amount to be paid monthly bank. For a better illustration summarizes assets and liabilities for 2013 in table 2.2.

Table 2

Balance sheet assets and liabilities 2013

Assets		Liabilities	
Land	80.000,00 lei	credit Bank	1.770.000,00 lei
Greenhouse	1.500.000,00 lei	Net Value	685,840.00 lei
Heating	100.000,00 lei		
Equipment	4.000,00 lei		
Plants	10.400,00 lei		
Money	600.000,00 lei		
other expenses	161.440,00 lei		
total assets	2.455.840,00 lei	Total Liabilities	2,455,840.00 lei

## RESULTS AND DISCUSSION

Production estimated at approximately 50 kg/m<sup>2</sup>, is obtained over a period of nine months, at a rate approximately constant without CO<sub>2</sub> dosing. But in this greenhouse tomato will be given CO<sub>2</sub>, resulting in heating of the greenhouse gas, heating system that produces CO<sub>2</sub>. So CO<sub>2</sub> is a waste

product, but is used to accelerate the process of photosynthesis. Normally CO2 concentration in the atmosphere is 300 ppm, allowing normal growth of plants.

Production increases relatively fast pace to a level of 800 ppm CO2 concentration, but this concentration is difficult to maintain due to greenhouse ventilation losses. With all the losses caused by ventilation can maintain a CO2 concentration of 500 ppm. Increase of CO2 emissions level of 500 ppm will increase production by about 26.1%.

Calculation is done using the formula of output growth depending on the concentration of CO2:

$$\left. \begin{array}{l} \left(\frac{1000}{300}\right)^2 \times 1,5 = 16,66\% \\ \left(\frac{1000}{400}\right)^2 \times 1,5 = 9,37\% \end{array} \right\} = 26,035\%$$

Following this lying down, production will be approximately:

$$\frac{50\text{kg}}{\text{m}^2} + 26,035\% = 63, \frac{01\text{kg}}{\text{m}^2}$$

Production will remain relatively constant throughout the 9 months of production. Which is a monthly production of approximately:

Break-even Point firm at an average price per pound of tomatoes about 3.5 RON, is performed for the years 2013, 2014, 2015 according to the following table:

*Table 3*

Year	Price	total expenses	output
2013	3,5 ron	393.598,70 lei	112457 kg
2014	3,5 ron	368.222,80 lei	105207 kg
2015	3,5 ron	369.542,80 lei	105584 kg

But according to current market trends in the field and weather conditions, the price of a kilo of tomatoes can vary greatly from 2 ron/ kg to values above 8 ron.

For further details of the company's profits and losses, we've compiled the following tables include expenses or revenues for 2013, structured monthly.

Table 3

## Profit and loss January 2013 - June 2013

Cheltuieli	iulie-2013	august-2013	septembrie-2013	octombrie-2013	noiembrie-2013	decembrie-2013
Nr. Muncitori	5	5	5	5	5	5
Remuneratie	1.000,00 lei	1.000,00 lei	1.000,00 lei	1.000,00 lei	1.000,00 lei	1.000,00 lei
Nr. Actionari	4	4	4	4	4	4
Remuneratie	3.000,00 lei	3.000,00 lei	3.000,00 lei	3.000,00 lei	3.000,00 lei	3.000,00 lei
Utilitati (Gaz, Fertilizator, Curent, Apa)	10.000,00 lei	10.000,00 lei	10.000,00 lei	10.000,00 lei	10.000,00 lei	10.000,00 lei
Bondari	600,00 lei	600,00 lei	600,00 lei	600,00 lei	600,00 lei	600,00 lei
Rasaduri					10.400,00 lei	
Protectia plantelor (Solutii, Capcane )	372,00 lei	372,00 lei	372,00 lei	372,00 lei	372,00 lei	372,00 lei
Echipament pentru palisarea plantelor					2.520,00 lei	
Rambursare credit	27.875,40 lei	27.857,76 lei	27.839,70 lei	27.821,92 lei	27.804,07 lei	27.786,22 lei
Alte cheltuieli (10% din total)	4.285,64 lei	4.283,88 lei	4.282,07 lei	4.280,29 lei	5.570,51 lei	4.276,72 lei
Total	60.133,04 lei	60.113,64 lei	60.093,77 lei	60.074,21 lei	74.266,58 lei	60.034,94 lei
Cheltuieli restante						
Venituri	70.020,00 lei	87.525,00 lei	122.535,00 lei	175.050,00 lei	175.050,00 lei	- lei
Profit Brut	9.886,96 lei	27.411,36 lei	62.441,23 lei	114.975,79 lei	100.783,42 lei	- lei
Profit Net	8.305,05 lei	23.025,55 lei	52.450,63 lei	96.579,66 lei	84.658,08 lei	- lei
Capital social	252.659,95 lei	275.685,50 lei	328.136,13 lei	424.715,80 lei	509.373,87 lei	449.338,93 lei

Table 4

## Profit and loss account in July 2013-December 2013

Cheltuieli	iulie-2013	august-2013	septembrie-2013	octombrie-2013	noiembrie-2013	decembrie-2013
Nr. Muncitori	5	5	5	5	5	5
Remuneratie	1.000,00 lei	1.000,00 lei	1.000,00 lei	1.000,00 lei	1.000,00 lei	1.000,00 lei
Nr. Actionari	4	4	4	4	4	4
Remuneratie	3.000,00 lei	3.000,00 lei	3.000,00 lei	3.000,00 lei	3.000,00 lei	3.000,00 lei
Utilitati (Gaz, Fertilizator, Curent, Apa)	10.000,00 lei	10.000,00 lei	10.000,00 lei	10.000,00 lei	10.000,00 lei	10.000,00 lei
Bondari	600,00 lei	600,00 lei	600,00 lei	600,00 lei	600,00 lei	600,00 lei
Rasaduri					10.400,00 lei	
Protectia plantelor (Solutii, Capcane )	372,00 lei	372,00 lei	372,00 lei	372,00 lei	372,00 lei	372,00 lei
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Capital social	252.659,95 lei	275.685,50 lei	328.136,13 lei	424.715,80 lei	509.373,87 lei	449.338,93 lei

## CONCLUSIONS

Why tomatoes are top quality Romanian those imported? Because imported tomatoes should be collected in an earlier stage of ripening stage and due process of respiration and other biological processes, which no ceases when the fruit is picked, they ripen while being transported to the point of sale. Stage are harvested tomatoes is directly proportional to the distance to be transported.

This difference is due to the production of greenhouse climate control techniques to provide an environment inflorescences to capitalize on a rate of almost 100%. And to achieve this environment should be given attention first 3 hours of the day, exactly 2 hours before sunrise and one hour after sunrise. During this time of greenhouse temperature must reach at

16-17oC to 22oC. At this time, there are a few points and a critical operation that directly impacts the production of tomatoes.

Control and plant protection is through new techniques, cheap and very effective methods that are 100% natural. Combating harmful microorganisms will be made by treating plants with so-called "compost tea". Flying insect control will be done by pheromone traps and power, and for other insect species to be used anagonismul.

Storage space. To prevent weight loss products, they will be stored in a special storage area. Storage space has a capacity of about 10,000 pounds, where tomatoes will be stored for 24 hours, within 48 hours storage capacity sufficient to grant all of the tomatoes collected over a week.

This storage area must meet certain technical characteristics order to be efficient, such as maintaining a certain temperature and relative humidity.

To prevent these losses, we must understand the breath of tomatoes after harvest, that fruit does not stop breathing after they are collected. They continue the process of photosynthesis, but in the absence of external nutrients, use their own reserves of nutrients and water, leading to losses of their initial mass, affecting company earnings.

To prevent these losses have created certain environmental conditions to slow the breath and sweat of tomatoes, process which removes water from the tomatoes. To prevent the removal of water from fruit transpiration process, you must create environmental conditions with a relative humidity higher than the equilibrium relative humidity of the fruit, which is about 97-98%. The easiest way to reach such values of relative humidity, is by lowering the temperature in the enclosure, but this process is also dangerous, because it creates an environment for pathogens, so the storage should be carefully monitored.

Air temperature of 100 ° C and a relative humidity of 70% weight loss of tomatoes amounts to aproximativ 6 Kg to each 1000 Kg of tomatoes every 24 hours. If we report these data to the total harvest obtained, we find that annual losses are about 20,000 kg tomatoes, only through the process of sweating for a storage period of 24 hours of tomatoes harvested as planned.

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