ROMANIAN VEGETABLE GROWING – PRESENT AND PROSPECTIVE FOR 2020-2025

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Abstract:
Actually, Romanian vegetable crops field has some difficulties such are: most of farmers have small area with vegetables, where is not possible to have a good level of mechanization. Provide with necessary water is in many places very difficult or too expensive. Some farmers do not have enough money to buy the best seeds of varieties, fertilizers, crop protection chemicals, or they have not information about all of these. In addition, price of vegetables from farm are small, though quality is very good.

Researchers in vegetable field recommend for the next years a choice of proper land for vegetable, use of best varieties or hybrids, good extension network. In order to provide necessary quantity of vegetable for 19 million habitants in Romania, researchers recommend increase of area with plastic tunnels and extension of results of national and international research in the farms.

Key words: *vegetable farms; area with vegetable species; yield of vegetable in Romania and in European countries; target for 2020-2025 years in vegetable yield; crop protection; plastic tunnels*.

1. Present State of Romanian Vegetable Field

Because at present Romanian vegetable growing field has some difficulties, sometimes there are not Romanian vegetable on the market. In some periods, usually in winter period, we may find in supermarket vegetables from Turkey or from others countries, instead of Romanian products. On the other hand, the small vegetable farms in Romania have small productivity because their level of mechanization.

The main problems of vegetable farm in Romania are:

- Organization: there are too many small farms and few big farms;
- Most of farms produce their seeds of vegetables, which are not very competitive and sometimes are damaged at pest and diseases;
- In some farms there are problems with water supply;
- Most of farmers do not apply the best technology in vegetables;
- In many cases, farmers apply fertilizations and plant diseases and pest control without a scientific base;
- some of farmers have not knowledge about new varieties and they do not choose the best variety for local conditions;
- Level of mechanization is poor;
- yield of vegetable per hectare is rather small, although quality is good;
- price of vegetable products at farm door, are in many cases rather small.

In the table 1 is presented number and area of vegetable farms in the years 2007 and 2010. The data were obtained from Structural Investigation in Agriculture 2007 and General Census in Agriculture 2010.

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Table 1. Number and area of vegetable farms

Tipul exploatației	Area	Number of farms		
		2007	2010	2025
Individual farmers	under 1 ha	141.742	44.605	25.000
	1 – 5 ha	233.284	54.773	12.000
	More than 5 ha	64.502	16.373	5.000
Associations or partenerships of farmers	under 50 ha	631 (>10 ha)	1.300	2.000
	50 – 100 ha		700	900
	More than 100 ha		400	600

Romanian official statistics show a cultivated area with vegetable more than 270,000 ha, but with a small mean yield, about 14 to/ha. Researchers from Research Institute for Vegetable and Flower Growing Vidra and from Romanian Society of Horticulture estimate ,,real"cultivated area with vegetable at about 85,000 ha and a mean yield at 32.5 to/ha. According with these estimations the ,,real" situation of romanian vegetable field and struture of vegetable species is:

- Cabbage: 23,000 ha x 37 t/ha = 851,000 t
- Tomatoes: 12,250 ha x 45 t/ha = 551,250 t
- Onion: 8,000 ha x 33 t/ha = 264,000 t
- Pepper: 9,500 ha x 30 t/ha = 285,000 t
- Vegetable for roots: 10,000 ha x 27 t/ha = 270,000 t
- CucumberS: 4,500 ha x 50 t/ha = 225.000 t
- Eggplants: 5,000 ha x 36 t/ha = 180.000 t
- Green pea: 1,000 ha x 3 t/ha = 3.000 t
- Green bean: 3,000 ha x 5 t/ha = 15,000 t
- Garlic: 500 ha x 10 t/ha = 5,000 t
- Other vegetables: 5,700 x 6 t/ha = 34,200 t
- Total vegetables: 82,450 ha x 32,5463 t/ha = 2,683,450 t

We can observe a great difference between official statistics and estimations of some specialists in this field. In their opinion, cultivated area is smaller with 187,000 ha and total annual yield is smaller with 1 million t. In the same time, the mean of yield per ha is greater, and touch 32.5 t/ha instead of 14.6 t/ha.

In this estimation, the differences between mean of yield in vegetable in Romania and some developed countries are not so great, but are still importante.

In the table 2 is presented means of yield of vegetable in some countries of European Union.

Table 2. Means of vegetable yield in some countries of European Union-2012 (t/ha)

Country	Yield, t/ha
Netherlands	48
Spain	34
Italy	32
Romania	32, official 15!
Germany	31
Belgium	30
France	26
Hungary	19
Bulgaria	19

Between 2007-2010 years, the import of vegetable in Romania oscillates between 150,000-200,000 t/year and the export was very small, only in some years being 25-30,000 t. In these conditions, import of vegetable cost is about 80 million euro every year, while export brings only about 20 million euro.

2. Providing with Necessary Vegetable for Consumption in Romania

Providing with necessary vegetable for population consumption in Romania and a possible surplus for export, pay attention both agricultural ministry and researchers. At the level of year 2012, we have the next reference data :

Consumul mediu pe cap de locuitor:150 kg/an;

Necessary vegetable for total population (19,043 mil. inhabitants): 2.856.450 t/an;

Export: 45.000 t (this quantity is allready exported in 2011);

TOTAL necessary vegetables: 2.901.450 t/year;

From domestic farms: 2.683.450 t/year;

From import:218.000 t/year; (official statistics is 203.430 t in 2010).

The data presented here confirm as we calculated, in comparison with about 4 million tones reported in statistics.

We must underline that romanian export of vegetables in 1985 was about 600.000 t; that confirms a certain potential that can be renewed.

Targets for 2020-2025 are:

✓ Population: about 19.100.000 inhabitants;

✓ Mean vegetables consumption: about 190 kg/year;

✓ Total fresh vegetable for consumption: about 3.629.000 t/year;

✓ From import : about 200.000 t/year (fresh vegetable in the winter time);

✓ From domestic farms: about 4.400.000 t/year, from which:

- vegetables from open field: 100.000 ha x 24 t/ha = 2.400.000 t/year

- vegetables from plastic tunnels and glasshouses: 20.000 ha x 100 t/ha = 2.000.000 t/an;

Excedent for export: cca 971.000 t/year.

What we can do for touch these targets ?

In order to increase both vegetable yield and quality of products, is important to make a good choice of varieties and hybrids, like that to satisfy both the farmers and consumers expectations. First of them want to obtain good yield at low cost and good profit, and the secondes want quality products at low prices. Scientific research from România obtained and spreades in production many valuable varieties and hybrids, most of them cultivated nowaday on the large area, sometimes more than imported cultivars. In table 3 is done the weight of Romanian cultivars (%, 2012).

Table 3. Weight of Romanian cultivars (%, 2012)

Crop	Romanian	From other countries
Tomatoes (open field)	90	10
Pepper (green, long, tomato-pepper, chilli)	90	10
Eggplants	95	5
Early cabbage	0	100
Summer and autumn cabbage	85	15
Cucumbers (open field)	20	80
Bush squash (open field)	20	80
Vegetables for roots (carrot, celery, red beet, parsley, parsnip, radish)	50	50
Onion	50	50

Crop	Romanian	From other countries
Garlic	100	0
Garden pea	30	70
Garden bean	15	85
Other vegetables for open field	92	8
Total vegetables for open field	60	40
Early tomatoes (in glasshouse or plastic tunnels)	5	95
Others vegetables cultivated in glasshouse or plastic tunnels (cucumbers, pepper, eggplants , lettuce, squash, snap bean)	5	95

In order to touch these targets, we must introduce in the vegetable field the main results of research activity. Nowadays, in Romania there is a Research Institute (Vidra-Ilfov) and three research stations (Bacau, Buzau, and Iernut-Mures). Other three research stations stopped their activity after 1990 year. Romanian researchers from institutes, research stations and universities obtained new varieties of vegetable with *Romanian taste* (at tomato, pepper, eggplants, cabbage, carrot, onion, lettuce, garden pea, garden bean, radish, celery), many of them well known and appreciate by the farmers and consumers. But now it is necessary new varieties for new demands of the market, with better quality and with new characteristics.

In order to satisfy the demands of consumers, vegetable products must be:

- more healthy and sure for consumption;
- to have a Romanian traditional taste;
- the price must to be accessible, not too high;
- something new, with new quality characteristics;
- new products for Romania, but which are well known in other countries;
- new cultivars which come from wild vegetable species;
- new vegetable which are cultivated in the originate countries of some emigrants.

Despite many difficults (small number of researchers, laboratories weak equipped, few funds), romanian researchers obtained many vegetable varieties, as we show in the table 4.

Table 4. Number of vegetable varieties and hybrids obtained and entered in National list between 1990-2012

Crop	Number of cultivars	Observation
Brussels chicory	2	-
Pepper	37	Tomato-pepper – 13 Bell pepper – 12 Long pepper – 11 Chili pepper – 1
Okra	2	-
Basilique	1	-
Cucumber	20	Hybrids– 7
Onion	17	Hybrids- 2 Red onion – 3
Chicory	2	-
Savory	3	

Crop	Number of cultivars	Observation
Cauliflower	2	For autumn
Bush squash	6	Hybrids- 2
Tomato	28	Hybrids– 3 Cherry type – 2 For processing – 8 For fresh consumption – 15
White cabbage	12	Hybrids – 2 For autumn – 9 For summer – 1
Dwarf bean	17	

At others vegetable species, romanian researchers obtained varieties and hybrids which are allready in the farms or they are in multiplication for introduction in production. We may count: climbing bean (5 varieties), garden peas (10), carrot (5, from which 2 hybrids), water melon (2) melon (3), eggplants (11, from which one variey with white colour and two hybrids), radish (6), lettuce (8) and so on. There are many romanian vegetable varieties which are agreed both farmers and consumers. In the table 5, we selected a part of these cultivars.

Table 5. Example of vegetable varieties and hybrids which are agreed both farmers and consumers

Crop	Cultivar
Tomato	Siriana F1*, Pontica 102, Viorica, Darsirius, Buzău 47, Kristinica, Carisma*, Coralina*;
Tomato-pepper	Cornel 209, Asteroid 204
Bell pepper	Bârsan, Galben Superior, Ceres, Arum, Buzău 10*, Vidra 9*
Long pepper	Siret
Chilly pepper	Iute Delicios
Eggplants	Andra F1*, Luiza, Contesa, Daniela, Belona* Drăgaica* Şi Ultimele Creații, Buzău H1* Şi Eleonora;
Carrot	Triumf F1, Bucovina F1
Celery	Bistrița
Onion	De Buzău
Autumn cabbage	Buzoiana, Mocira, Poiana;
Garden bean	Auria Bacăului*, Menuet, Ioana*;
Garden peas	Vidra 187, Armonia, Diana, Işalnița 60;
Cucumber	Sirius F1*, Ierprem*;
Bush squash	Compact F1*, Perfect;
Melon	Fondant*;

*The cultivars marcated whith a litlle star are recomended for open field and for plastic tunnels, too

The network of vegetable research institute and stations produce every year important quantity of base and cerificate seeds from their own varieties, despite limitation of area of nettwork. Together with private farms, vegetable research units can assure integral all the necessary quantity of

certificate seeds. In the year 2013, vegetable research nettwork will produce about 20,5 tones, and prospects for the future are 52 t in 2020 and over 60 t in 2025.

Une other importante field of vegetable researh is dedicated of new technics in crops production and testing of level of soil fertility in the vegetable cultivated areas. On this base, on establish fertilisation programme. Researchers worked a great number of tests and they established best limits of some soil parameters (organic matter, pH, field capacity for water, soluble salts, phosphorus, potassium and magnezium soluble in water, ammonium and nitric forms of nitrogen, and so on) in order to obtain a great yield with a good qulality. Vegetable farmers can ask for testing soil quality and plant analysis at agrochemical laboratory from Institute and research stations. In the same time, researchers can offer recipe of fertilisation for any vegetable crop and any crop type :open field, plastic tunnels or glasshouse; producion for fresh consumption or for canning, surgelation, and so on.

Integrate control of pathogens and pests is also very importante because there are many vegetable species and each of them can be damaged by many pathogens and pests. Vegetable farmers must know that are the best solutions for control patogens and pests. Most of these solutions are studied by Romanian researchers and a few solutions come from abroad. Every solution is based by chemical or biological methods of control, but the metods frequently are integrated. In the last two decades are multiplicated methods of control pathogens and pests by utilisation of some parasitesand predators which exclude or limite use of chemical products.

Romanian vegetable researchers establish:

- Modern techologies for most importante vegetable crops in the open field;
- Technologies for cultivation of vegetables, in glasshouse and plastic tunnels on active and inerte substratum;
- Calculation softwere for establish and distribution in the different periods of organic and minerale fertilizers for the main vegetable species;
- Softwere optimization for nutritional mixture in seedlings production;
- Tehnologies for seedlings production;
- Ecological technologies for open field crops and for crops in covered spaces;

3. Developement of Policy for Vegetable Crops

In order to vegetable crops to reach the parameters as has been stated above, they must be elaborated a set of policies what to keep in mind :

- climate change at regional and global level;
- real state of irigation sistems ;
- current level of organisation of farmers and their economic power;
- farmers low or medium level of information and consulting;
- Low consumption of fertilizers and pesticides.
- **Sustainable development of vegetable crops grown in coverd spaces is a real alternative for Romanian vegetable branch.** Researchers suggest increasing of ocupied surface with solariums from 7.500 ha nowadays, up to **20.000 ha in 2020, with a growth rate of 1.500 – 1.700 ha/year.**

"Vegetables grown in protected area is the best and the cheapest solution in order to insure production against climate damage" –said repeatedly the researcher in vegetable field V. Lăcătuş.

The proposal of growth rate of protected area cultivated with vegetable is presented in table 6.

Table 6. Developing of vegetable crops in covered spaces (ha)

VEGETABLE CROP	YEAR		
	2013	**2017**	**2020**
Tomato first cycle	4.000	8.000	12.000
Tomato second cycle	2.500	5.000	7.500
Cucumbers first cycle	500	1.000	1.500
Cucumbers second cycle	1750	3.500	5.250
Bush squash first cycle	500	1.000	1.500
Snap bean first cycle	500	1.000	1.500
Bell pepper extended cycle	750	1.500	2.250
Eggplant extended cycle	750	1.500	2.250
Cabbage and cauliflower first cycle	500	1.000	1.500
Varză şi conopidă second cycle	750	1.500	2.250
Others vegetable crops extended cycle	500	1.000	1.500
TOTAL, from which	**13.000**	**25.500**	**39.000**
Vegetable first cicle	8.000	15.500	24.100
Legume second cycle	5.000	10.000	14.900

The specific buildings and modern technologies in protected vegetable crops can ensure:

- fresh vegetable throughout the year;
- **i**ncrese early production (100-300%) and the total yeald (100%);
- on can obtain the good quality of products;
- improvement of thermal and hydric regime;
- low loss of water and soil nutrients;
- low pressure of disease and pests;
- there are more possibilities to introduce new vegetable species in order to diversify production;
- energy consumption is reduced with 30-50%;
- is easier to put in the practice industrial machines for sorting, sizing, packing, cooling and competitive delivery of products;

We need also others facilities (tax and customs arrangements, purchases contracts, improvement of marketing, stimulating producers association, trade promotion, and so on). In order to stimulate producers association, on estimate it would be necessary about 125.000 €/3 years for each new cooperative (association).

It is necessary to renewal the work of zonation and microzonation of areas suitable to vegetable production and concentration of production, too. In the same time it is necessary to introduce new cultivars, which to answer better to climate changes. Other measures are also necessary: ensuring water supplies for irigation together with increasing of coefficient of water use; new irigation sistems and restorating of some old sistems;extending of drip irigation.

But progress of growing vegetable depends alsoon other measures:

- choosing the best area of land for growing vegetables and leaving the land that is not suitable for;
- the use of mulch for covering soil;

- increasing of protective curtains with trees;
- new softwere for daily irigation programme for the main vegetable species;
- allocationof funds for research in this field;
- specialized warehouse;
- ensure of free consultancy for fertilization and control of diseases and pests.

4. Conclusions on Developing Romanian Growing Vegetable Field during the Period 2020-2025

As a result of the application of government agricultural policies and increase the role of scientific research, Romanian growing vegetable will have the following dynamic:

- the surface with vegetables grown in covered spaces will increase by 286%;
- the surface with vegetables in open field will remain constant, at about 100.000 ha;
- number of Romanian cultivars will increase;
- total vegetable yeald will increase with 64%;
- import of vegetable will decrease by 8%;
- export of vegetable will increase by 20 times, and will compared to the average of past years and exceed 500.000 t;
- vegetable consumption per capita will increase by 27 %;

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