

DO WE NEED A ROMANIAN RESEARCH IN VEGETABLE GROWING?

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Abstract

Since 1967, research in the field of vegetable growing was conducted in Research Institute for Vegetable and Flower Vidra and six vegetable research stations. These units have obtained vegetable varieties and hybrids adapted to conditions in our country, which occupied the largest area planted in field research. Research units have obtained significant quantities of seeds with high biological and cultural value and realized production technologies, specifying aspects of soil management, plant protection, fertilization, mechanization and others. After 1990, reducing funds for research in vegetable led to the closing of three of the six research stations and the institute activity was significantly reduced. To increase the current level of production of vegetables in our country, top quality and competitive prices with those of vegetable farmers in developed countries, it requires higher levels of financing and reorganization of the research sector. In the last year, MADR has launched and lead a new Sectoral Plan which will give farmers sustainable solution for increased competitiveness.

Keywords: research stations, vegetable growing, breeding achievements, research funds

1. INTRODUCTION: GOVERNMENT POLICY RESEARCH, DEVELOPMENT AND INNOVATION IN ROMANIA

„Romania has fewer researchers than the EU average, and the number is decreasing. In Romania, Rand D expenditure per capita are nearly 20 times lower than the European average. Demand for research and innovation is low, it is not stimulated, nor sufficiently stimulates other economic sectors” (Ministry of Education: Government policies research, development and innovation in Romania, Raport 2014).

In our country, after 1990 years, scientific research in almost all branches entered into a deep and serious crisis due to the sharp drop in budget funds from 1,400 mil .USD in 1989 to 150 mil. USD in 2000 which led to leaving 135,000 system employees (3/4 of the total in 2000), of which 40,000 with higher education (2/3 of total). After a revival began in the years 2004-2008, it followed the 2008-2011 crises, and research activity has deepened the decline.

In terms of research, technological development and innovation (RDI) in 2009, Romania spent 2,357 billion lei for research and development, or approximately \$ 601 million or 43% compared to the year 1989 or 0,48% of GDP.

In 2010, the economic crisis has profoundly affected research in Romania, total allocations of public funds for research being approximately 1,64 billion, well below the planned launch of the National Plan for Research and Development and Innovation 2007-2013 (about 4 billion). From the total amount, the Ministry of Agriculture and Rural Development has received for research activities only 8.8%. The number of researchers in agricultural research activity was decreased continuously from approx. 10.1% of the total number of researchers in 2007 to 6.9% in 2012 (Table 1).

In 2012, funds for agricultural research accounted for approx. 7.5%, while the number of ongoing projects had a share of 10.3%, which means that the average value of a research project in agricultural sciences was lower than projects in other scientific fields (Table 2).

Table 1. The evolution of number of researchers- 2007-2012

Year	Number of persons in full-time equivalent					
	2007	2008	2009	2010	2011	2012
Total researchers nationwide, of which:	18808	19394	19271	19271	16080	18016
Researchers in the government sector, as follows:	5818	6169	5744	5590	5846	6372
Researchers in agricultural sciences	1907	2059	2043	2154	1293	1252
Share of total agricultural researchers	10,1	10,6	10,6	11,1	8,0	6,9

Table 2. Research activity in 2012 in the government sector

Total funding for RDI	Agricultural research funds	Share funds for agricultural research (% of total)	Total funded projects	Agricultural research funded projects	Share agricultural funded research projects in total (%)
1741903	131032	7,5	8394	868	10,3

In 2014, State Authority for Research and Development has established strategic objectives and specific policies required to achieve these objectives. In the same year research budget was 1.809 billion lei, namely 407 million euros or \$ 461 million, down 70% compared to 1989 levels! Government Decision no. 929/2014 approved the National Strategy for Research, Development and Innovation 2014-2020 (SN 2020), which establish the following priorities related with social utility of research and innovation system:

a. Priorities for smart specialization:

- Bio-economy.
- Information and communications technologies, space and security.
- Energy, Environment and climate change.
- Eco, Nano-technologies and advanced materials.

b. Priorities of public relevance, aimed at allocating resources to areas where research and technological development respond to concrete and pressing social needs (fundamental research, health, heritage and cultural identity, new and emerging technologies).

Linked to set priorities, there are two courses of action for public policy research:

-Increase economic competitiveness through research-based innovation, which mainly addresses the economic effects of investment in research and

-Developing the ability of scientific teams for dissemination of research results. Research and development budget for 2016 provides for an increase by 32.17% to 2.21 billion lei, compared with 1.67 billion lei in 2015. On a GDP of 746.6 billion lei in 2016 budgeted amount represents 0.29% of GDP, well below the 1% target that would be reached only in 2020. In other words, in 2016, we have nearly the same budget as in 2009. The funds for subsequent years will decrease, according to estimates in the draft budget (1.6-1.9 billion). The total amounts for research in the 2016 budget could cover 62.43%, own funds will be at 35.9% and revenues from external grants cover 1.67%.

2. THE IMPORTANCE OF RESEARCH IN VEGETABLE GROWING AND NEED FINANCING

Vegetable sector is an important part of Romanian horticulture. Cultivated area is maintained at 200,000 ha, according to official data, and total production exceeding 3.8 million to in good years, as they were in 2010 or 2014 (Lăcătus et al., 2013). This branch is a good source of income for farmers specialized in growing vegetables and vegetable products are indispensable for daily consumption of the population. For these reasons, local research must contribute, on the one hand to provide solutions to increase economic efficiency of large and small vegetable farms, and, on the other hand, increase nutritional quality and food safety for consumer products.

In vegetable research objectives should take account of global developments and research trends in vegetable growing technique and change of consumption habits of the population, which wants fresh vegetable products, showy, palatable and high nutritional qualities (Prohens et al., 2008). The strategy for developing agri-food sector in the medium and long horizon 2020-2030, prepared by the Ministry of Agriculture and Rural Development states that it is of great necessity to modernize the system of education, research and consultancy services in rural areas.

There are many objectives research in vegetable growing, from creating new varieties and hybrids, producing seed base, modernizing culture technologies including recipes and techniques of fertilization and irrigation, controlling pathogens, pests and weeds, mechanization maintenance and weeds, mechanization maintenance and harvesting and so on.

Table 3 shows data areas and production of vegetables nationwide, resulting in a very weak yield per ha. As a result of this in Romania were imported relatively large amounts of vegetables, as shown in Table 4. One of the solutions to correct this shortcoming would be better funded agricultural research and consultancy for farmers in order to access to scientific results.

Table 3. Areas and yield of vegetables in the period 1990-2014

Year 1990			Year 2014		
Area. -ha-	Total production -thousand to.-	Average yield -Kg/ha-	Area-ha-	Total production- thousand to.-	Average yield- Kg/ha-
249,500	2,739	10,968	229,585	3,060.8	13,332

In fresh vegetables category, the biggest imports were tomatoes, onions and garlic, carrots and other root vegetables, lettuce, cabbage and cauliflower. Except that produce greenhouse vegetables in winter, which cannot provide all the quantities needed for domestic consumption, all other vegetables can be produced in our country.

Table 4. Romanian vegetable imports and exports in 2014

Vegetable	Imports (I)		Exports (E)		Differences ($\pm I-E$)	
	tones	mil. euro	tones	mil. euro	tones	mil. euro
Fresh vegetables, of which:	240,938	136.4	38,462	47.7	+202,476	+88.7
- Melons and watermelons	27,682	5.7	1,287	0.2	+26,395	+5.5
Canned and frozen vegetables	162,745	135.1	21,338	45.6	+141,407	+89.5

3. ACHIEVEMENTS IN BREEDING OF VEGETABLE SPECIES AND IMPROVING GROWING TECHNOLOGY IN OUR COUNTRY

Research and Development Institute for Vegetable and Flower Vidra and R & D stations in Bacau, Buzau, Iernut and Vegetable Laboratory Dăbuleni have complex research topics include genetics and creating new varieties and hybrids, diversifying assortment through acclimatization of new species and varieties, integrated control of pathogens, pests and weeds, base seed production for own cultivars and modernization of cultivation technology. These units have obtained many valuable results that have been transferred into production and contributed to increased production, quality and diversification of vegetable production.

Among the most important results of the research include the creation of numerous cultivars tastefully Romanian (tomatoes, peppers, eggplants, cucumbers, cabbage, carrot, onion, lettuce, peas, beans, radishes, celery) and their share in production ranges from 5% at cultivars for greenhouses and plastic tunnels to 90% for vegetable crops cultivated in open field such as autumn, eggplants or peppers (Scurtu, 2014).

Table 5 shows a selection of Romanian cultivars to some major vegetable species, noting that the number of species and cultivars obtained is much higher. These creations have contributed greatly to the progress of Romanian vegetable growing, both in increasing overall production and in terms of nutritional quality and diversification of production. Creating new varieties and hybrids of vegetable is needed to meet market requirements, which must be of superior quality, to supply the market throughout the year and to prevent saturation of the market through diversification. It should be noted that at present the share of F1 hybrids is still very low compared to that recorded in countries with advanced vegetable (Scurtu, 2015). The research also Romanian won too few cultivars suitable for growing in greenhouses, although experienced researchers warn that the area cultivated with vegetables in greenhouses must increase substantially in order to be sure of obtaining high yields and stable from year to year.

These findings lead us to the idea that research in breeding must be supported by national budget to succeed to compete with the best creations of traditional companies. For this it is necessary to develop a realistic program of development of vegetable research and be granted the necessary funds so that this sector contributes significantly to the progress of Romanian vegetable. Experience and genetic resources that still exist in the research units us to say that despite the current difficulties, adequate funding would lead to obtaining vegetable varieties and hybrids with superior performance as desired by growers and consumers.

To meet the demands of consumers, the products must be healthier and safer, have taste traditional Romanian, affordable retail price; products with different qualitative characteristics, or which are widespread in other geographical areas.

Network R & D units annually produce large quantities of vegetable base and certified seed of own varieties, despite severe curtailment of areas administered. Together with the private sector, research establishments can provide fully certified seed farmers needed. For 2016, the amount of

seed estimated to occur in the network is about 20.5 ton and forecasts for the future are 50 to in 2020 (Scurtu et al., 2014).

Table 5. Romanian cultivars in some important vegetable species

Round pepper	Creola, Asteroid 204, Cornel 209, Splendens
Bell pepper	Dariana Bac, Dariochea, Vidra 9, Bârsan, Arum, Buzău 10, Galben Superior
Long pepper	Ionel, Cosmin, Bogdan, Lung de Ișalnița, Ișalnița 85 V, Oranj, SiIșalnița
Chilli pepper	Jovial, Vladimir
Tomatoes determined	Unibac, Romec 554j, Pontica 102, Vipon, Viorica, Roxirom, Minerva, Buzău 22, Buzău 47, Chihlimbar, Darsirius, Florina 44, Kristinica
Tomatoes andeterminat	Buzău 1600, Nectaria, Siriana F1
Cherry tomatoes	Carisma, Coralina, Ema de Buzău, Sonia de Buzău
Aubergines	Luiza, Belona, Eleonora, Virginia F1, Drăgaica, Zaraza
White autumn cabbage	Silviana, Andrei, Mocira, Poiana, Laredia, Buzoiana, De Buzău, De Ișalnița
Radishes	Early: Roșioară, Redo, Antița; For summer: Țepușă, Roșie de Iernut, Iulia
Onion	White: Orizont, De Buzău; Red: Arieșana, Rubiniu, Roșie de Arieș, Chibed
Climbing beans	Auria Bacăului, Verdana, Mădărășeni, Alina
Dwarf beans	Mileniu, Ișalnița 43, Iuliana, Lechința, Anisia, Clarisa, Ioana, Menuet
Garden peas	Armonia, Adela, Diana, Getica, Ișalnița 60
Cucumbers	Mapamond, Ierprem, Triumf F1, Slănic

Other areas in which researchers from the institute and research stations can help vegetable farmers: -testing fertility status of soils planted with vegetables and development fertigare programs. Researchers have made a large number of measurements and set within the optimum parameters of the soil (organic matter, pH, field capacity for water-soluble salts, phosphorus, potassium and magnesium water-soluble, ammonia and nitrate, etc.) that will produce the superior production quality and quantity. Vegetable producers can call Laboratories agrochemical of the institute and vegetables stations for analysis of soil and plant for fertilization recommendations to any species of vegetables and type of culture:

- the open field, plastic tunnels or greenhouse production, for fresh consumption or industrialization;
- integrated control of pathogens and pests is extremely important given both the large number of vegetable species as well as the great diversity of pests. Vegetable growers should know that there are solutions being developed by Romanian researchers or in some cases taken abroad. Most often, control technologies are integrated. The last two decades have escalated methods of combating using parasites and predators, which exclude or limit the use of chemicals.

Romanian researchers have developed:

- modern technologies of cultivation in open field for the most important species; technologies vegetables growing, on active and inert substrates in greenhouses and plastic tunnels;
- programs of calculation and distribution of organic and mineral fertilizers for the main vegetable crops;
- software to optimize nutrient mixtures for the production of seedlings;
- technologies for the production of seedlings;
- environment-friendly technologies for field crops and for plastic tunnels;

4. THE NEEDFOR SPECIFIC POLICIES TO SUPPORT DEVELOPMENT OF RESEARCH IN VEGETABLE

In order to reach mentioned parameters need to be developed a set of policies for vegetable growing which take into account:

- climate change globally and regionally;
- the actual situation of irrigation systems and methods;
- the current organization of farmers;
- economic strength of small and medium enterprises;
- medium-low level information and providing advice to growers;
- low consumption of fertilizers and pesticides.

Sustainable development of protected crops is considered a real alternative to farming for Romania. Can be used for crop protection, mulch, temporary protection, especially low tunnels and greenhouses. Researchers plan to increase areas under plastic from approx. 7,500 ha currently to 20,000 ha by 2020, with a growth rate of 1500-1700 ha / year. This is recognized in the agri-food sector development strategy for the medium to long term horizon 2020-2030 which shows that „existing surfaces of greenhouses and solariums providing only a small part of the necessary domestic consumption during the production season . Climate change due to global warming, especially at regional level, requires a rethinking of recovery, consolidation and development of vegetable growing in protected areas in Romania".

World population growing larger, increasing pressure on natural resources, global warming and an aging European population, are all challenges to which research must find solutions. While global demand for food is rising, increased urbanization, the increasing prices on inputs, pressure on water resources and increased vulnerability of crops and livestock, food production will be limited. But as even recognize MARD document, in the past 20 years agricultural research Romanian lost much of the agricultural land needed both for experiments and production of biological material. Received funds for research and decreased investment by making it uncompetitive in Europe. This is true for vegetable research, which cannot fully meet the needs of farmers. Farmers benefit only marginally research results due to insufficient dissemination efforts and channels. Ministry believes that agricultural research network must be modernized and aligned with European development trends. The strategic priorities for 2020-2030 aimed at reorganizing agricultural research system to a more sustainable from a financial standpoint and pursuing closer integration into European research networks. These efforts will be aligned with the commitments assumed in the National Reform Plan (which translates into national priorities EU 2020 Strategy) which provides funding for 2% of GDP (1% from national budget + 1% private) for research.

MARD manage R & D Sectoral Plan envisages integration and component research, development and innovation consulting services as well as promoting and supporting research required by farmers. In drafting the National Strategy 2014-2020 CDI has been identified as a priority intervention area of the horticultural research by harnessing local horticultural Genetic Resources and the use of sustainable technologies throughout the horticultural production chain.

5. STATEMENT OF VEGETABLE RESEARCH FUNDING

If this is the national context, it is very clear what can be expected from research institutes and resorts coordinated by the Academy of Agricultural and Forestry Sciences.

Funds for these units may come from core programs that are available only national institutes (no vegetable research unit falls into this category) or managed by MARD Sectoral Plan, which remains almost the only source of competitive funding. In 2015 appeared the Minister of MARD nr.708

regarding the approval of the Sectoral Plan for research and development in agriculture and rural development. the years 2015-2018, "Agriculture and Rural Development - ADER 2020.

ADER budget for the 2020 sector plan is 82,162,242 lei, of which:

2016 - 21.395 million lei; within the Sectoral Plan were approved and funding research projects vegetable in Table 6. From the annual budget of the Sectoral Plan ADER, research in vegetable receives 6.77% of the total, or 1.45 million lei.

Things have moved unfavorably for vegetable research units through the fall in the number of researchers and cultivated area. If in 1990 year, the research in vegetable was done in a institute and six research stations, who administered an area of 2569 ha, in 2016 working only three stations and the institute, with a total area reduced to about 900 ha. The number of researchers has diminished from 141 in 1990 to 34 in 2016. Add to this the lack of investment in equipment, machinery and specific buildings.

Table 6. Vegetable research projects financed by the program ADER 2015-2018

Project Code ADER	Project name	Main Beneficiary
3.1.4.	Regeneration, reproduction and characterization of local vegetable varieties with unique character	Suceava Gene Bank
3.2.3	Obtaining new F1 hybrid and varieties of vegetables for the main species grown under shelter	VRDS Buzău
3.2.4.	Vegetable assortment diversification by creating varieties and hybrids F1 for traditional culture and ecological field	VRDS Bacău
3.2.6.	Maintaining the genetic integrity of varieties and hybrids of vegetable seed	VRDS Iernut
3.3.4.	Develop technologies for cultivation of two species of mushroom - Pleurotus eryngii and Lentinus edodes, on substrates made from waste products / agroforestry renewable	RIVFG Vidra
3.3.5.	Develop an integrated pest control vegetable crops and conventional and organic, for plastic tunnels and open field	RIVFG Vidra
3.3.6.	Assessment and conservation of germplasm vegetable sources tolerant to heat and drought stress for use in breeding programs	RIVFG Vidra

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