

PAST AND PRESENT OF THE SLOVAK AGRICULTURAL RESEARCH AND DEVELOPMENT

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Abstract

Modern, perspective and sustainable agriculture performance, whether it is agriculture or forestry, represents a set of multi-functional systems. They are based on complex biological processes, implemented in an open, constantly changing area of the country. They are the indispensable economic sectors that directly affect the existence of the human population. Their immense importance is not only in terms of production of material goods, but also in the creation and protection of the landscape. This fact should correspond to departmental and non-departmental scientific research base. In the context of the economic transformation, however, we have seen our future in particular in the arrival of foreign capital. We stopped using our own productive potential and we have not paid sufficient attention either the development of the national science or research. Disrespect of the objectively valid laws, inadequate share of the research and development in agriculture, improper interference, ill-conceived approach to expenses reducing and so on are just some of the reasons responsible for the current unfortunate status. The aim of this paper is not a criticism of these decisions, nor their detailed analysis, but rather finding solutions to the state through the unusual perspective of the past. In the section devoted to the history of the agricultural research there are used data drawn directly from the research of archival sources listed in the bibliography. They are adjusted from intentional or unintentional errors and distorting deposits of the recent past.

Key words

Research and development; agriculture; forestry; soil economy

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1 INTRODUCTION

Slovakia as a small country has no preconditions to carry out research on world standards in all areas. It is therefore quite natural that this fact should correspond to departmental and non-departmental scientific and research base. Soil-economic science creates an independent group of sciences, where agricultural, forestry, veterinary sciences belong to with the exception of alimentary ones, which are formally classified as natural or technical science. From the view of achieving the best results, very significant is the mutual interconnection between science (basic research), research (applied resort research), development and realisation in the practice. It is substantial to keep sequencing in the scientific-research area, as it is in each developed country and recently also in Slovakia.

In the early nineties when Slovakia was in anticipation of the arrival of the foreign capital, which should have contributed to raising the technological level through implanted technology, long term communication among science, research and practice stopped. We stopped to realize own productive potential. Draft concepts submitted by the experts were not realized from the saving reasons. Consequences of these decisions have left long in coming. Slovakia lost its food sovereignty, there are issues in the area of forestry and water management. In any area of the human activity should have not been lost continuity with the past, especially not when it is not clearly predicted in the future. If we start loosing the sense of endeavor, problems become unsolvable. Particularly they strongly come to the fore now when there is a global financial and economic crisis, which affected not only the production area. It hit the field of research and development of agriculture in all its areas , and also the area of rural development.

2 SOME FRAGMENTS FROM THE PAST OF FORESTRY

Forestry belongs to the sectors with the oldest history. Originally, they were mostly practical notes the aim of which was to utilise some woody species and their parts. Firstly as a part of investigation of the nature, just later knowledge on forestry ecosystems were gained. Specific forestry scientific disciplines were allocated and formed continually. Forestry was originally based on practical experience and knowledge, which were gradually complemented by theoretical results in the area of the science and research. Wood usability for human need was known sooner than its anatomical composition. The utilisation of forests was most important, not their renewal. Majority of gained knowledge resulted more from practical experience than from expertise. While reaching higher professional level, forests underwent big problems. First, vegetation of immense value was damaged and just subsequently how to keep forests was found out.

Experience and knowledge on forest vegetation were already transformed to the forest law in the second part of 18th century and they were very alike. The forest act was issued by the monarch Maria Theresa in 1770; it contained norms, many of which are valid until now. In the same time the institutional building of conditions for forest research started on our territory. The period when teaching of forest subjects started at the Mine Academy in Banska Stiavnica become a significant break. At the turn of centuries (1898) the Central Forest Research Station was founded in Banska Stiavnica. In the period to 1918 forestry research dealt with issues of woody plants, due to which experimental planes were based (e.g. larch and pine), in arboreta experiments with acclimatization of exotic woody plants were done and results of the research were published annually in issued almanacs of the Central Research Institute of Forestry (up to 1918 there were issued 20 of them) [1].

Also after 1918 Banska Stiavnica stayed the centre of forestry research. In 1924 the Institute for Cultivation of Forests and Forestry Biology with an experimental forestry station in

Kysihybl close to Banská Stianica was linked to the original forestry research. Arboretum called also Fiestmantl garden was founded under the impulse of the professor of the Mine and Forestry Academy in Banská Stianica after whom it was also named. Forest arboretum lies in the 530 up to 563 over the sea level. It spreads over an area of 7.73 ha [2]. The average annual temperature in this area reaches 6.7°C and yearly rainfall totals is 895 mm. 282 species of wood plants from the north hemisphere were planted on the area, mainly from the North America. After repeated out-planting and adding of other trees in the arboretum there are 260 species of wood plants. A part of the arboretum is also the International Phenological Garden in which there are 30 exotic species. The arboretum was declared a protected area in 1950. Its statute was amended in 1986. At the same time as the arboretum also the new Institute for Forest Cutting and Wood Technology (1924) was founded, which nearly four years worked in rented spaces and for research activity it used laboratories of the Botanical Institute in Prague. In the frame of institutes the issues of seed growing, forest nurseries, natural recovery and breeding of vegetation, possibilities to usage of beech wood and transport and so on were solved.

After 1948 the institute underwent numerous organizational changes, including the change of the name and affiliation to superior organs. In Banská Stianica the head office of the institute was also based, where the questions related to growing of forest vegetation, gaining of seeds, genetics and wood plant breeding, forest protection, hunting and so on. The specialised workplaces which also belonged to the institute were: Oravský Podzámok – cutting, transport; Liptovský Hradok – seed growing; Gabčíkovo – fast growing woody plants, Kosice – commercial modification of forests, Bratislava – economics.

3 AGRICULTURAL RESEARCH ON THE TURN OF THE CENTURY

Since 1883, within the frame of Hungary also the first agricultural workplaces focused on control and examination were created at specialised secondary schools. In Kosice and a year later in Bratislava the first economic-chemistry station and subsequently a distilling station were founded and on the turn of the century also milk station (1901) in Zvolen. Workers of the stations controlled food, feed stuff, and artificial fertilisers and so on. The novelization of the original act (No. 46/1895) in the year 1907 significantly increased the competence of the workers in the stations of control, mills, market places and shops. High fees significantly contributed to the health protection of inhabitants not only against various food replacements, but also to improve hygiene of food. The war and subsequent dissolution of Austria-Hungary monarchy caused that the majority of employees from the stations left for Hungary, objects and station equipment were damaged and destroyed. After 1918 Slovakia lost the connection to other agricultural research workplaces which had a seat in Budapest. Kosice and Bratislava agricultural chemical research stations remained as the only ones from the original complex of workplaces, each accompanied with a seed growing institute. The ministry was delegated to create a new conception for building of a scientific-technical base with the full competence for management of Slovakia. Basically the proposal correlated with the Hungarian model and after smaller adjustments it was approved by the Ministry of Agriculture as a regulating organ. In Bratislava and Kosice state research agricultural institutes (SRAI) were built. The institutes belonging to Bratislava had the competence sphere in the area of Western and Middle Slovakia, the competence of Kosice institutes was in Eastern Slovakia and Carpatho-Ukraine. The institutes provided controlling, advisory, experimental, promotional and according to the statute also research. The workplaces were oriented mainly to requirements of the practice. The institutes built in the years 1920-1924 created the basis of agricultural research. As experimental sections of the institutes they founded experimental stations, fruit-growing and forestry nursery, wine cellars. The Ministry of Agriculture managed

the whole research complex. The only exception was the alimentary department in Kosice, which belonged to the competence of the Ministry of Public Health and Physical Education.

The ministries also decided about choice of personnel. At the beginning of twenties Slovaks still could not, as in the case of filling of forestry jobs, to fill all professional jobs by themselves. The number of university educated professionals specialised in agricultural sciences was very low, in addition in Slovakia during all inter-war period there was not any university oriented to agriculture. The original agricultural academy moved from Kosice to Hungary after the year 1918. So it is understandable that nearly all executives working in the resort were from Czech. To the oldest scientific-research institute belongs the Institute for Chemical Control, which was devoted to research of plant physiology and the Institute for seed growing control (1920) focused on the control of seed and seeds of plant cultures. A year later the Institute for agropedology and bioclimatology and the Phytopathological institute were created [3].

Workers of the Fruit-growing Institute (1924) had at disposal already well-built fruit-growing nurseries and they could immediately test new methods of fruit processing and to make experiments with improved species. Only as curiosity we would like to say that in 1918 nearly 6 million of fruit trees were planted. Fruit was exported mainly as raw to Czech and Germany. Nearly a half from 700 thousand young trees [4] grown in Slovak nurseries was exported. The alimentary and zoo technical institutes belonged to those still based at the end of the twenties.

4 FROM SMALL – SCALE FARMING TO COLLECTIVIZATION

The situation in the field of agricultural research and development in the second half of 20th century was distinctly influenced not only by after war situation and crop failure in 1947, but mainly political changes and geopolitical situation in Europe. The concept of state agrarian policy to an important extent contributed to re-assessment of the research base status, which subsequently led to its reorganization and also restructuring. Using nowadays vocabulary, the state in new and changed conditions had to come to innovations mainly in the frame of resort research base, not to its liquidation.

After the period of traditional small-scale farming, the conditions in the Slovak agriculture distinctly changed. The key processes were collectivization, nationalisation, and finally they led to transition of small-scale farming to a large-scale production system. This system brought the effort to increase in plant and zoological production, breeding of productive species and species more protected against diseases and pests, increased use of pesticides and industrial fertilisers, breeding of farming animals, modernization of agricultural technique. Detailed overview of agricultural soils followed, besides other activities, the soil chemistry became the field of research. In the large-scale conditions new approaches were applied. In 1960 the Laboratory of Soil Science, nowadays Institute of Soil Science and Soil Protection in Bratislava. The institute has been providing and methodologically regulating the soil research in Slovakia. Slovakia returned back to fruit-growing [5]. A significant number of fruit stations, which we lost in 1938, when the majority of them moved to Hungary were replaced by new ones. New breeding stations were built. Since the second half of the 20th century the numbers of newly-bred species of big and small fruit were created. Later the key role of the Research Institute of Fruit and Ornamental trees in Bojnice [6] was founded in 1977.

The gradual transformation and modernization of scientific-research and technical base in the whole resort of agriculture was activated not only by transition to the new large-scale system of farming, but also to changed external conditions in the frame of competitiveness in agriculture and forestry in the relation to surrounding states. All changes were planned, coordinated and financed by the state.

5 SLOVAK AGRICULTURAL RESEARCH UNDER NEW CONDITIONS

Panacea for all problems of our forestry and agriculture under changed conditions after 1989 should have been the arrival of foreign capital, which would provide increase of technological level of production on the basis of imported technology. Utilisation of own production potential was distinctly limited and attention was not paid to the development of home research [7]. Competent workers realised that in Slovakia it is not possible, but also not necessary, to realise research on the world level in all areas. But it is necessary to provide minimum basic national research.

Each country has specific natural conditions with which agriculture, water and forestry economics and their protection are directly interconnected. Possibly there is no other area of economics in which it is valid more distinctly. It is not always suitable mechanically to apply and adopt knowledge from abroad. The example might also be forestry economics. If its contributions are assessed just according cash sales and revenues, which are created for example mainly from wood sale, it gets to the edge of interest of contemporary society. Ecological and environmental services which forestry economics provides (marked as community functions of forests), are not the subject of the market and even they are not counted in the gross domestic product of this branch. In changed conditions induced by the change of the political situation and subsequently by the division of the republic the state played important and unchangeable role.

The transformation of the resort scientific-research base has been running since 1990. It was realised more due to the reduction in research organisations and number of workers caused by lowering of financial sources than by systemic provisions [8]. At present all this negatively influences functioning of agricultural science and research. Science and research in Slovakia is flatly marked by incompetent approach and decisions of officials, who do not know what they caused by their innovative provisions". Nearly complete disintegration of research resort, problem solving teams, privatisation of contributory organisations, merging of workplaces and so on. These provisions caused loss of approximately three quarters of research capacities. Dissolution of research workplaces, in some cases research institutes, is also connected with a partial liquidation of archived documents and loss of the unique professional library collection. Continuity was lost. The development in this field was marked by uncoordinated and purposive approach from the side of the Ministry of Agriculture. Financial sources are not sufficient for providing of machinery equipment for scientific development workplaces already several years. Experimental equipment and apparatus equipment of agricultural research institutes in Slovakia still more and more falls behind the level of equipment of scientific-research organizations in the developed countries, but also falls behind workplaces of V4 countries. Unfavourable situation is in top equipment technique, which significantly influences the effectiveness of research work, exactness and realisation of methodologically more demanding experiments. The problem is also overall moral worn-down technique and equipment of research workplaces which do not require innovation in shorter time intervals. This situation unfavourably influences also personal structure of research institutes, because it requires higher number of technical and assistant personnel. Especially complicated situation is in research organizations which need special administration facilities for their activities.

Financial provision of science and research from the state budget is insufficient in the long term. Research base in the field of agriculture in Slovakia is e.g. in comparison with the Czech research base only on the 60% level approximately. Each developed country has its resort scientific-research base supported from state sources. Naturally also the field of agriculture has

it. It results from its particularities which besides production of market commodities provide important ecological and social functions. Their fulfilment requires special costs, or when providing them, for owners of agricultural and mainly forest sites the damage might be originated, which is not reimbursed and they have to bear it as tolerated loss in the public interest.

6 CAUSES OF AN UNFAVOURABLE SITUATION, POSSIBLE SOLUTIONS

If we evaluate the stage of scientific and research base in the agricultural resort and forestry economics we can say that up to the end of 90ties it came to distinct reduction of research workplaces and also the number of workers. Research capacities were reduced to one third. The changes touched not only basic research, but also the institutes of the Slovak Academy of Science. On the other hand, which is a paradox, research and development capacities of the Slovak universities were considerably extended. At present some universities are also devoted to the research in agriculture even they do not have any experience. New faculties, study branches and institutes were founded. Outcomes of their scientific-research activity do not correspond with the need of practice. They are not personally technically equipped for the serious research. Concerning the extent of the article it is not possible to analyse the situation in more details. At still stronger critique of the conditions and the level of students' education at some universities, the outcomes of research tasks (often purpose-made grants) cannot be a distinct contribution for a certain resort. Many from grant tasks are short-time, isolated and the gained financial sources serve for financing of conference fees, purchase of professional literature or computer equipment. Research and development has its place on university ground, but it has to be connected directly to relevant professional team of scientific-research workers, who know the methods and methodology of research work have real imagination about possible outcomes and are devoted to solving of the issues full-time. Also technical equipment of workplaces is not negligible.

The change of approach to research and development from the side of the state or resort would also lead to gathering of financial sources and their more effective utilisation. The solution of the present stand-off is clear and factual defining of the position and determination of basic tasks of the research and development, which must be related to national economic priorities. It is not naming of the areas which the scientist would like to solve, but spotting of the most serious tasks, outcomes of which will positively influence development of agriculture in Slovakia. Conceptual, systemic approach should be preferred and not spontaneity. But it does not mean that scientific-developmental base should not solve also such tasks and requirements which result from current need or requirements of practice. Just conceptual, mutually coordinated approach has the biggest chance to solve them.

One of the key tools for increase of added value of outcomes which each branch of national economics generates is for example the innovation. To keep the competitiveness via adjustments of overheads on research and development, or extension of scientific capacities each economic branch had, including agriculture, to keep high level of innovative performance [9]. Innovative performance does not have to be expressed just by the number of registered patents and utility models. Often it is enough to have good idea. Building of research and innovative centre might be a key to entering to a new dimension of integrated and inter institutionally solved applied research. The centre of applied research should be related to three areas:

- *agrobiology*,
- *biotechnology*,
- *technology*

in agriculture and bioenergetics, completion of the centre for the Slovak agriculture will gain complex research innovative and competent regional workplace. The pilot workplace Agrobiotech in Nitra will serve to applied research in an integrated form. In the centre applied research will develop in the field of agrobiology, biotechnology, technology in agriculture, food production and bioenergetics. The centre will concentrate knowledge in the field of agricultural and biotechnological technologies in agriculture and it helps transit them to practice. The concentration of professional capacities is related to it and to the possibility of interconnection of scientific workplaces with business sector. One of the aims of the built project is also to increase attractiveness of agricultural research in Slovakia and to extend scientific-research cooperation in the region and in the international space.

Tab. 1: Structure of GERD in % by field of science [10]

	2007	2008	2009	2010	2011
Structure of Gross domestic expenditures on R&D (GERD) in % by field of science					
Natural sciences	29.3	25.9	23.2	19.9	20.7
Technological sciences	40.7	46.6	50.8	53.6	47.7
Medical and pharm. sciences	9.7	8.0	7.7	7.1	7.9
Agricultural sciences	9.1	8.6	6.7	8.2	7.6
Social sciences	8.4	7.8	6.8	7.0	8.5
Humanities	2.8	3.1	4.8	4.2	7.6

As from the listed overview results (*Tab. 1*), also after reduction of resort research there are the institutions in Slovakia which deal with the development in the particular branches of the industry. Despite that the situation in agriculture, forestry economics, but also in related branches in the country is unfavourable. At present research and development would not sufficiently and in the positive meaning, change the situation. Where the fault is: in the research and development, in the direction of the research and development, or in the economic policy of the state or somewhere else? In the shortest time it will be needed to find the answer to this question.

Basic strategic intentions and aims of agriculture, food processing and forestry in medium-term horizon were formed in "the Conception of agriculture development in the years 2007-2013" [11]. In the field of agricultural science and development the submitted conception was oriented to three priorities:

- more effective utilisation, protection, regeneration and permanent reproduction of Slovakia natural sources at taking ecological requirements into consideration,
- increase of competitiveness and effectiveness of agricultural production,
- analysis and monitoring of productive potential of Slovakia from the view of expected changes in real possibilities of its economic utilisation, social and environmental functions.

According to "the Strategy of the Slovak Society Development," the unilateral increase of the technological level of production on the basis of imported technology significantly contributed to the decline in expenditure on home research and development. From overall expenditure on technological development up to 89% is spent on import of technology, while on own home research only 7%. In the countries of the European Union this ratio is 36:21 (%) [12]. The Slovak research is handicapped by its obsolete infrastructure and continually also by the lack of qualified scientists caused by distinct lagging of salaries in research not only compared to other developed countries, but also in comparison with V4 states. The average number of scientific-technical publications and the average citation index per a scientist is in Slovakia four times lower than in the countries of the European Union [13].

7 CONCLUSION

Direction of agricultural research in Slovakia was established along with the basis of the Czechoslovak state. The inter-war period is characterized by big help from Czech professionals, who participated and significantly contributed to the foundation of the whole complex of institutes and workplaces, which belonged to workplaces of the basic research. In relation to the past, Slovakia has in the given branch still adequate number of professionally efficient scientific-research workers [14]. At present scientific-research base is formed by resort and out of resort institutions. However if they should fulfil meaningfully their basic mission, effective division of activities among them is inevitable, similarly as it is in the developed countries.

REFERENCES

- [1] Štátny ústredný archív SR (Central State Archive of the Slovak Republic) fond Ministerstvo s plnou mocou pre správu Slovenska, kr. 55, č. Sp. 6381.
- [2] Jurkovič, M. (1979). *Poľnohospodárske a lesnícke výskumníctvo na Slovensku 1918 – 1945*. Věda v Československu 1918 – 1945. Práce z dějin přírodních věd, 11. S. 449 -450. Praha, VĚDA.
- [3] *Správa o činnosti štátnych výskumných ústavov zemedelských v Bratislave za r. 1922*. (1922). Štátny ústredný archív SR (Central State Archive of the Slovak Republic) fond Expozitúra ministerstva zemědělství, kr. 105, č. Sp. 11435.
- [4] Reich, E. (1929). *Zemědělské školy a vědecké instituce*. Soudobá českoslovenká věda zemědělská, její budoucí vývoj a úkoly. Praha.
- [5] *Hospodársky obraz Slovenska*. (1942). Bratislava, pp. 84 – 88.
- [6] Demo, M. (2001). *Dejiny poľnohospodárstva na Slovensku*. Nitra, SPU. 662 p. ISBN 80-7137-894-1.
- [7] Bezemer, D. J., (2002). De-collectivization in Czech and Slovak Agriculture: An Institutional Explanation. *Journal of Economic Issues*. **36**(3), pp. 723–745.
- [8] Joosse, S. (2007). Talking about cooperation: continuity and change in rural community in Slovakia. *Sociológia, Slovak sociological review*, **39**(3), pp. 245-258. ISSN 0049-1225.
- [9] Houšková, B. (2013). Oint research centre - JRC of European commission ascooperation partner for slovak soil science and research. *Slovak Agriecultural Research in the programming period of 2014 – 2020 in terms of the EU funds use*. **73**. Bratislava, Výskumný ústav pôdoznalectva a chrany pôdy. ISBN 978-80-89162-50-5.
- [10] Ročenka vedy a techniky v Slovenskej republike 2012. (2012). Bratislava, ŠÚ SR. ISBN 978-80-8121-1553.

- [11] Koncepcia a priority pôdohospodárskej vedy, aplikovaného výskumu a vývoja na Slovensku. Concept and priorities of land management sciences. Nitra: Agentúra Slovenskej akadémie pôdohospodárskych vied, 2011. ISBN 978-80-89162-47-5
- [12] Moravčík, M., Konôpka, J., Tutka, J., Kovalčík, M., Sarvašová, Z., Schwarz, M., Svitok, R. a kol. (2008). Správa o lesnom hospodárstve v Slovenskej republike 2008 (Zelená správa). Bratislava, MP SR a NLC – LVÚ Zvolen. 166 p.
- [13] Šikula, M. et al. (2010). *Stratégia rozvoja slovenskej spoločnosti*. Bratislava, VEDA, vydavateľstvo Slovenskej akadémie vied, 695 p.
- [14] Fialová, I., Tvrdoňová, D. (2012). *Pôdohospodárstvo v dejinách Slovenska. Tradície, inovácie a kultúrne dedičstvo*. Bratislava, Slovenský národný archív, 467 p. ISBN 978-80-970-666-5-9.