

## SUMMARY

**Keywords: quality management, comparative results, efficiency of the research and development process, transfer of products and services to beneficiaries**

Agriculture is a very complex field of activity, which is expressed by the diversity of specific activity structures and the large number of work processes, unique biological connections with plant and animal development, and, the inter-conditionality of cultural systems and the adequacy of specific technologies in their adaptation to current climatic conditions.

In this context, agricultural production is the result of transformation processes through which many inputs and forms of energy (solar, chemical, biochemical, etc.) are transformed into specific material products, with the help of living organisms and under the impact of natural and financial factors, human work done for their implementation and management.

The quality of products and services has established itself as a determinant of the competitiveness of organizations. Making progress in improving the quality of products and services must be a priority concern for the whole economy.

The study carried out within the Research and Development Station for Meadows Vaslui and the Research and Development Institute for Meadows Brasov presents the quality management of products and services and the quality management of seeds of grasses and legumes perennial meadows of the two units.

The main results obtained within the two organizations were considered, namely from research and innovation activities - species and varieties created and developed - cultivation technologies, agricultural equipment, agricultural equipment, provision of services and available seed material.

The possibilities to improve the quality management of products and services within the research and agricultural development units studied involved analyzing the efficiency of the research and development process and the possibilities to improve it. There were also some possibilities to improve the transfer of products and services to beneficiaries, and finally, the main trends of the research and development process in the analyzed units and the proposal of performance indicators specific to quality management are drawn up.

**The doctoral thesis** is organized in **two parts**, comprising **seven chapters**.

**Part I - STAGE OF KNOWLEDGE**, includes **45 pages**, which represent **27.6 %** of the doctoral thesis, representing chapters 1, 2 and 3, respectively, in

which are presented generalities in the field of quality management of products and services in agricultural research and development units, purpose and objectives, the applied research methodology and the results obtained.

**Chapter 1** summarizes the conclusions of some research on the quality management of products and services in agricultural research and development units, as follows, to generate a clearer picture of the international and national situation at the level of the research topic approached.

**Chapter 2** presents some general aspects of seed quality management in agricultural research and development units, namely information related to the multiplication and certification of grain seed lots, grain, technical plants and fodder plants in Romania in the context of existing national and international standards and references on seed quality.

In the same chapter there are also some results obtained by researchers from the country and abroad, on the improvement of the management and technologies of seed production of perennial fodder gramine and legume species.

**Chapter 3** includes the purpose of the work and the three main objectives of the research, and at each objective are presented the activities to be fulfilled.

The purpose of the doctoral thesis is to study the quality management of services and products in agricultural research and development units, for the achievement of which, the objectives to be achieved are studies on the quality management of services and products in agricultural research and development units, quality management of perennial grassland gramine and legume seeds within agricultural research and development units and possibilities to improve the quality management of products and services within agricultural research and development units.

**Part II - OWN CONTRIBUTIONS, 118 pages**, representing **72.4 %** of the doctoral thesis volume, representing chapters 4, 5, 6 and 7, respectively, the natural and economic conditions of the study are presented.

**Chapter 4** describes the research areas of the Research and Development Station for Meadows Vaslui (RDSM Vaslui) and the Research Development Institute for Meadows Brasov (RDIM Brasov), cultivation technologies for seed lots of cereals, technical plants and fodder plants, products and services offered by the two units and how to carry them out to the beneficiaries.

RDSM Vaslui has in its breeding program three species of perennial grasses and legumes of grasslands: *Bromus inermis* Leyss., *Agropyron pectiniforme* Roem. & Schult. and *Onobrychis vicifolia* Scop., species with an important role in combating erosion and increasing fertility of degraded soils, species in which they multiply and trade high-quality certified seed material, from higher biological categories.

RDIM Brasov has nine species of perennial grassland grasses and legumes in

its breeding programme: *Lolium perenne* L., *Poa pratensis* L., *Festuca arundinacea* Schreb., *Phleum pratense* L., *Dactylis glomerata* L., *Festuca pratensis* Huds., *Festuca rubra* L., *Phalaris arundinacea* L., *Lotus corniculatus* L. and *Trifolium repens* L., species with an important role in the production of feed and the restoration of degraded permanent grasslands, species in which they multiply and trade high-quality certified seed material, from higher biological categories. In addition to the production of seed material, within RDM Brasov, specific agricultural equipment is also produced for the performance of works in the breeding fields of perennial species for feed and on permanent or temporary grasslands.

**Chapter 5**, presents the research methodology, working methods and a broad description of the existing research infrastructure within the RDSM Vaslui and RDIM Brasov.

In order to carry out the research process in agriculture, land, infrastructure, financial resources and, most importantly, human resources are indispensable.

Within the RDSM Vaslui and RDIM Brasov, due to current socio-economic conditions the above mentioned resources are limited, some insufficient and others are missing.

In the RDSM Vaslui, during the study period, 2020-2023, the RDI staff was represented by 3-5 people with higher education (10-16.67 % of the total organizational chart), and, of which 0-2 (0-3.33 %) people with SR grade, 0-2 (0-3.33 %) people with SR III grade, etc, 0 People with SR II grade and 0-1 (0-3.33 %) people with SR I grade.

The area available to the research sector was 7.04 ha in 2020, 3.50 ha in 2021, 3.50 ha in 2022 and 3.80 ha in 2023.

In the RDIM Brasov, during the study period, 2020-2023, the RDI personal was represented by 10-12 people with higher education (6.13-7.36 % of the total organigram), of which 1-3 (0.61-1.84 %) people with SR grade, 3-4 (1.84-2.45 %) people with SR III grade, 0-1 (0-0.61 %) persons with SR II grade and 1 (0.61 %) person with SR I grade.

The area available to the research sector was 1.00 ha in 2020, 1.40 ha in 2021, 1.80 ha in 2022 and 1.60 ha in 2023.

**Chapter 6** presents, for the RDSM Vaslui and RDIM Brasov, the innovation process, the systemic and process approach of quality management of perennial grassland grasses and legumes and the comparative results on seed quality management produced within the two units.

The most significant quantities of seed material available for marketing, within the RDSM Vaslui, during the study period, respectively 2020-2023, the main species and varieties cultivated for this purpose were made in *Onobrychis vicifolia* Scop. species, between 4580 kg and 33225 kg and *Bromus inermis* Leyss.,

between 1830 kg and 5564 kg.

The most significant quantities of seed material available for marketing, within RDIM Brasov, in the period 2020-2023, the main species and varieties cultivated for this purpose were produced in *Phleum pratense* L. species, between 3200 kg and 5375 kg and *Festuca arundinacea* Schreb., between 300 kg and 2982 kg.

The purity and germination of the seed material produced in the research and development units studied are analyzed by Territorial Inspectorates for Seed Quality and Propagating Material (TISQPM) which, based on Order no. 155/2010, is analyzed, issue a certificate attesting that the seed complies with the required standard, in which case the batch of seed analysed is certified or the seed has at least one of the two indicators analysed below the minimum value, in which case the batch of seed analysed is not certified but may be marketed as non-certified seed.

In order to obtain high quality seed material within the RDSM Vaslui and RDIM Brasov, the following steps are taken: (1) the cultivation technology for each species is established, depending on the literature and the experiments carried out within the research units, for each species; (2) requests are sent to the Territorial Inspectorates for Seed Quality and Propagating Material, for each species, by which seed lots are highlighted; (3) TISQPM inspectors carry out verification visits in the field; (4) after harvesting the seed material is transported to protected areas, placed in spaces and processed in order to bring quality parameters to values above those regulated by standards; (5) from seed lots, TISQPM inspectors take samples, in order to certify the seed material, samples analyzed in a stream of operational processes (FPO); (6) TISQPM issues analysis bulletins for each batch, being analyzed as main physical and biological parameters: seed humidity (U), seed purity (P), mass of 1000 grains (seeds or fruit) (MMB), seed germination (G), viability and health status; (7) the seed material is weighed and packaged in bags, which are sealed and labelled, with labels varying in colour and information transmitted, depending on the biological category of the seed.

Average production, purity, germination, germination energy, abnormal germs, hard seeds, seed, dead seeds and mass of 1000 grains obtained from perennial fodder gramine species and varieties grown within the RDSM Vaslui and RDIM Brasov, they varied according to species and year of cultivation.

**Chapter 7** presents some possibilities to improve the quality management of products and services within agricultural research and development units, based on the case study within the RDSM Vaslui and RDIM Brasov.

In both units are present internal regulations and procedures for the quality management of the products and services offered, but are not grouped in the form of manuals, and some of the stages of this process are carried out by service

operators in the external environment of the unit (TISQPM, analysis laboratories, etc.)

Both RDSM Vaslui and RDIM Brasov operate within an old research infrastructure, administrative buildings, laboratories and production halls having minimal interventions for modernization, as well as, some of them are in different phases of some modernization projects.

In both units, an innovation management is present and implemented, focused on solving the requirements imposed by the agricultural environment to the activities specific to the two organizations, namely new species taken in the breeding program, new varieties created, improvement of cultivation technologies, new agricultural equipment and seed made available.

Within the RDSM Vaslui, the activities that meet this criterion are represented, for the period of study 2020-2023, only by a limited number of books, scientific papers and patents (5 ISI indexed papers, 14 IDB indexed papers, 1 newly patented variety).

Within RDIM Brasov, in the same period, there are a greater number of publications, scientific papers and patents (2 ISI indexed papers, 81 IDB indexed papers, 2 new patented varieties).

Both units have accessed and won projects, as a project leader or partner, within the Sectoral Plan - ADER (Agriculture and Rural Development), but they did not actively participate in accessing available funds through international research programs.

By the specificity of the field of activity, the activity of both research and development and innovation units has a unique character.

Both RDSM Vaslui and RDIM Brasov have prepared a long-term development plan, the fulfillment of each of its activities being presented in the Manager's Annual Activity Report/ the director general manager of the unit.

Perennial grassland gramine and legume seeds created in the breeding laboratories of the RDSM Vaslui and RDIM Brasov are nationally approved and patented and internationally recognized.

#### **Originality and innovative contributions of the thesis**

By the purpose of the doctoral thesis, to study the quality management of services and products in agricultural research and development units, based on the analysis of the political context, the, economic and social in which agricultural research and development is carried out in our country, by presenting the products and services offered by RDSM Vaslui and RDIM Brasov and how the transfer of products and services to beneficiaries is carried out, there were outlined some possibilities to improve the quality management of products and services within agricultural research and development units, such as the efficiency of the research and development process improving the quality management of products and



services offered, and, a transfer of products and services to beneficiaries, as well as tracing the trends of the research and development process from the analyzed units.

Indicators have been proposed to characterize the performance of the RDI units and through which a fair comparison between them can be made, as well as the number of varieties created and the number of publications (ISI indexed papers and IDB indexed papers) related to the average number of researchers, average own revenues (average turnover) reported to the average number of employees in the development and administration sector, average earnings from grants reported to the average number of employees in the research sector, and, the total average income reported to the total average number of employees (in the research, development and administration sector) and the average value of material resources (land, buildings and machinery) related to average own income (average turnover).

#### **Recommendations**

Infrastructure needs improvement, because administrative buildings, production processing and storage buildings, laboratories and other existing annexes, with very few exceptions, they have not benefited from repair or modernization works since the establishment of the organizations, and the endowment with analytical equipment, equipment and machinery for the experimental fields is at a lower level.

In order to improve the transfer of products and services to beneficiaries, information actions (via the media, demonstration lots, demonstration works, etc.) which brings to the fore all the advantages.

Development of the research sector, by aligning the research direction with national and international (EU) trends, such as reducing pollution (carbon fixation using prairie ecosystems), biodiversity conservation and continuous improvement of the management applied to grasslands and extension of the improvement process by creating new varieties in breeding species, taking into study and improving new fodder species and taking into study and breeding of species with other destinations (lawns, medicinal plants, etc.) are priority.

The development of collaborative relationships must be improved by working with farmers, territorial administrative units, grassland owners, expanding collaboration with academia and other educational establishments, by conducting internships and conducting study visits and opening up to collaboration with units in other research areas.

For the RDSM Vaslui and RDIM Brasov the rise of prestige, through better visibility at national and international level must be the most important priority.

