SUMMARY

of the doctoral thesis entitled:

RESEARCH ON RISK MANAGEMENT IN THE CULTIVATION AND VALUATION OF LAVENDER IN THE CORNATELU AREA, DAMBOVITA COUNTY

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The agricultural sector can be characterized as being exposed to a high level of risk. This has always been the case, however, in the last few years this risk has tended to increase. Lavender and risk management are two fields whose association represents a challenge in itself, both constituting areas of interest in full ascension at the global and national level. Although it has been known since ancient times, in antiquity being appreciated for its healing qualities and aromatic properties, in Romania only in recent years have the activities related to the cultivation and exploitation of lavender intensified. The fields in which this plant can be successfully used cover a wide area, including: therapeutic, pharmaceutical, perfumery, cosmetic, beekeeping, gastronomic, ecological, touristic, landscaping and others.

Risk management is a discipline whose importance is proven by the attention paid by both public and private entities, constituting, at the same time, a control tool, but also a criterion for evaluating those entities. Risk management is vital to determine the payback period of the investment, as well as the usefulness of starting the business in the long term, in the present case of setting up a lavender farm, followed by the capitalization in optimal parameters of the obtained production.

In the elaboration of the paper, the proposal of indicators for risk assessment and management is considered, on two levels:

1) in lavender cultivation;
2) in the opportunities for capitalizing it.

Both were addressed in the context of sustainable agricultural development and competitive economic performance. Based on the application of the proposed set of

indicators, analyzes were carried out on the advantages of lavender cultivation and exploitation.

The doctoral thesis has a structure of chapters, being supplemented by a bibliography and appendices.

Chapter I, entitled **"Bibliographic study on risk management in agriculture"**, presents the main risks faced by agricultural activity at the beginning of the 21st century, globally, as it emerges from the specialized literature. Emphasis is placed on the fact that agricultural risks directly impact, ultimately, economic performance from the smallest level (of the farm) to the macro level (of a country or even the world), and the most important aspect is the one related to how they are managed in real time, at the time of occurrence. At the same time, at the level of each agricultural holding, regardless of its size, an integrated risk assessment is necessary, so that at least the risks with a high probability of happening can be anticipated.

The information activity was based on scientific works from many countries of the world, as detailed surveys were carried out to understand the perception of farmers on the problems they face in their current work. In terms of sources of risk, weather shocks as well as pests and diseases are the main causes of low yields. Drought was the most commonly cited source (about 79% of all farmers reporting low yields). The most frequently mentioned consequences of low harvests were reduced food availability (78% of farmers) and reduced farm income (63% of farmers).

Chapter II called **"The current state of knowledge in the field of lavender cultivation and utilization"** presents, in dynamics, the evolution of lavender culture at the global, European and national level. It starts from the areas cultivated with lavender, which are constantly increasing, as the demand for products based on this miracle plant, as it is considered by many, also increases. Of great interest, however, is the way production is capitalized, which was also identified as a potential risk, where there is no market or organizations to take over the raw material and deal with its processing. The transformation of lavender into oil is one of the most common procedures, but it is difficult to put into practice at the level of a small farm, the investment involved being much too high for a small producer. This is why, in most cases, this service is paid for separately.

The second part of this chapter focuses on the latest developments in lavender cultivation techniques, with all the links that this entails. The emphasis here is on the type of culture, the ecological one being highly appreciated abroad, for which a higher price is paid. This is not the case for Romania either, at least for the moment. Irrigation, in the first years after the establishment of the culture, plays an important role especially in recent years, against the background of climate change, with increasingly hot summers, winters without snow and, in general, an increasingly more uneven monthly precipitation.

The variety has a significant effect on the essential oil content. Lavender plants grown at higher altitudes are richer in essential oil. The selection of lavender for

essential oil continues towards the creation of new varieties with a complex set of economically important characteristics:

- → high yield and essential oil quality;
- → increased vitality;
- → resistance to adverse weather conditions;
- → suitability for mechanized harvesting.

With **Chapter III**, named **"Presentation of the natural framework in which the research was carried out - Cornățelu Commune, Dâmbovița County, 2017-2019"** begins the second part of the thesis, the one in which the own results are presented, resulting from the requests between field and laboratories. To begin with, a spatial identification of the location of the research field is made, without emphasizing the typical zonal characterization. In this sense, the climatic parameters were monitored in their own regime, and the pedological ones from the moment the study began were determined by performing soil analyses. In this way, it was possible to establish the particular technologies to be tested in the lavender farm in the Cornățelu commune.

Also in this chapter, the statistical data on the existing demographic, social and agro-economic situations at the level of Dâmbovița county were processed, by comparison with those existing on the average of the country, in the interval 2015-2020, which also includes the years of development of own research (2017-2019). Emphasis was placed on indicators such as the share of the population involved in agriculture, the income of those active in this field, the cultivated areas (ha), the value of production (thousands of lei) and the number of animals (pieces), all in dynamics for the mentioned period.

Chapter IV, entitled **"Research material and methods"**, began by presenting the purpose and clearly delimiting the proposed objectives for the current research structure.

The purpose of this paper is to analyze the production data obtained from a small lavender plantation in the south of Romania, maintained and exploited in three different ways - classic, ecological and intensive, to see what are the risks involved in each of the technologies tested. In parallel, the utility of irrigation and the health of the shrubs were monitored, which will ensure a longer exploitation period and the durability of the entire plantation, against the background of a shorter amortization period of the initial investment. The research aims to develop a model for assessing and treating risks in the field of lavender cultivation and exploitation, with the aim of contributing scientifically based elements to the knowledge of how the effective exploitation of lavender can be approached, from the perspective of risk management, creating, at the same time , a starting point for further research on this vast, topical topic with important practical implications.

In the continuation of this chapter, the stages of research and how they were put into practice during the three years (2017-2019), along with the equipment used and the method of processing the results, were detailed.

Two large groups of risks have been identified and delimited that can affect lavender cultivation and valorization farms and that definitely need a specific treatment - enterprise and financial risks. The risks related to the running of the business can be generated by a faulty management (marketing, human resources, etc.) and are subjective, easily corrected by improving the management of human resources. Political and legal risks are subjectively external to the company and they can negatively influence the activity, especially if the decisions taken are unfavorable to farms and farmers. The risks generated by the climatic conditions can bring great damage to movable and immovable assets, to the production activity and, finally, it is reflected in the level of harvests and their quality. Financial risks are related to investments and the management of the financing of the holding.

In **Chapter V**, entitled **"Results of lavender production parameters – measurements in vegetation, in the experimental field from Cornățelu, in the years 2017-2019"**, to trace the influence of each of the analyzed factors (year, variety, technology and irrigation), annual measurements of some reference parameters were carried out during the lavender vegetation period. The order of making the determinations is as follows:

- → diameter of the bushes (cm);
- → chlorophyll existing in lavender leaves (index);
- → number of inflorescences/plant (pieces);
- → length of floral stems (cm);
- → weight of flowers/plant (g);
- → degree of attack (GA%) of diseases and pests (GD%) – carried out during the whole year.

Immediately after the delimitation of the experimental plots, the activity of assessing their state of health began, lavender being a crop that does not have many pathogens specifically, but infections can occur under certain conditions, and against the background of excessive humidity at a given time, they can be fatal to the whole culture. During the testing period (2017-2019), within the research batches, three pathogens were identified, respectively two fungi and one pest:

1) *Alternaria* spp. – which causes the appearance of alternariosis;
2) *Septoria lavandulae* – which causes septoriosis;
3) *Philaenus spumarius* – the cicada popularly known as cuckoo spit, as it generates a foam on the plants.

Regarding the pest, once its appearance was noticed, the culture was checked and the foam formations were removed (early June 2018). The checks continued in the following days, but no more traces were found, and no damage to the vegetation was

noticed, so it was not considered necessary to apply an insecticide, even a biological one, especially as the harvest period approached. Over the years, the diseases identified and combated by phytosanitary measures, but which represented a risk for the lavender culture, were:

- → 2017 – septoriosis, the first signs of which were found at the beginning of May, also when the treatments and curative measures were carried out, the impact on production being minimal (maximum 3% losses);
- → 2018 – septoriosis, which reappeared in August, being important to combat especially in order not to produce negative effects on the shrubs and the following year's production;
- → 2019 – alternarioza, found at the end of April, when the flower buds had already formed and which presented a high risk for that year's production.

All statistical processing of the data, for the three repetitions of each variant, with 10 shrubs monitored during one year (30 plants/variant x 12 variants = 360 shrubs), were carried out in parallel for the non-irrigated and the irrigated system, after which the obtained results were compared.

The data were filled in predefined tables, and then managed in the Excel program, from where they could later be transferred to Anova. All the tables and graphs emerged as a result of the interaction of the factors involved in the technological scheme, based on monofactorial, bifactorial and trifactorial analyses, including the values of the limit differences, the calculated Fisher factor, the corrected dispersion and those of the possible errors.

Chapter VI, whose title is **"The economic efficiency of the lavender farm in the Cornățelu commune and the risks identified in the period 2017-2019, depending on the capitalization method"**, tracked the economic efficiency of a farm with only 9000 sqm where lavender was cultivated. This was, through the lens of the proposed research factors, prepared similar to that of the other monitored parameters. To make the calculations easier, the production was calculated as for one hectare, the data being thus useful for anyone interested in such an operation, making the conversion to the area at their disposal.

Therefore, it can be stated that the total profit of the holding where the researches were carried out depended a lot on the factors involved in the formation of the technological scheme, but to the greatest extent it was influenced by the exploitation of the obtained production. To calculate the profit, the following parameters were calculated:

- → average production (kg/ha);
- → selling price (lei/kg);
- → total expenses (thousand lei/ha);
- → total income (thousand lei/ha).

Several calculation scenarios were tried, depending on the production utilization, on several considerations:

- → the full sale of production immediately after harvesting (fresh flowers) - due to the lack of space necessary to dry and store such a large and voluminous quantity;
- → full transformation of the production into essential oil – operation carried out in the county, by third parties who owned the necessary equipment, involving additional costs;
- → mixed system – 50% green + 50% oil or various other combinations.

At the end of the chapter, a complete SWOT analysis was drawn up, on the three risk categories considered to prevail for an operation similar to the one in which the researches were carried out - climatic, phytosanitary, economic.

Chapter VII – "Conclusions and recommendations" is a review of the concrete results obtained as a result of conducting research in a family farm for the production and exploitation of lavender. The involvement of all identified risks has an economic purpose, which is the point of maximum interest of the activity itself. On a general level, it can be said that the entire ecological system is more viable in the long term when all aspects are taken into account. The increase in expenses per surface unit does not necessarily imply obtaining productions that ensure the coverage of cost differences, while they may sensitize the shrubs to the phytosanitary risk. After the fourth year after the establishment of the crop, irrigation is no longer necessary, generating an increase in production, but which does not cover the expenses, nor the risk of increasing the occurrence of diseases in the crop.

Regarding the valorization part, it is found that there is no optimal option and, in general, selling the production immediately after harvesting (fresh flowers) remains the best option. This aspect can be worked on to the greatest extent, the economic risks being major in the context where there are no professional associations or cooperatives to deal with taking over the production and processing it.

In **Chapter VIII**, those new elements that ensure the originality of the thesis, as it was developed, are identified and detailed.

The doctoral thesis is divided into two large parts – the literature study and the personal research part, having a total of 202 pages. The first part is divided into two chapters and contains the citation of a number of 158 sources of information, mainly scientific articles. The second part has six chapters, representing more than 75% of the total works. The 8 chapters contain 52 tables, of which 46 are original, and 48 figures, of which 41 are original.