

SUMMARY

of the doctoral thesis entitled:

RESEARCH ON THE OPTIMIZATION OF CULTURE TECHNOLOGIES OF SOME HORTICULTURAL SPECIES

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The aim of this research was to find a biotype with potential from the point of view of seed material and that produces a higher amount of green mass with valuable characteristics that is stable and important. *Stevia* breeding programs should aim to improve the yield of leaf production. Until now, *stevia* plant breeding efforts have largely focused on improving leaf yield and rebaudioside-A concentration in leaves. Today it is widely cultivated as it is increasingly used as a sugar substitute in various foods, thanks to the sweet taste and low calorie intake. These properties of plant derivatives have stimulated research into their biological activities, revealing a multitude of benefits for human health. *Stevia* consumption appears to have positive results in chronic diseases such as hyperglycemia, dyslipidemia, and hypertension, while numerous studies describe its antioxidant, anti-inflammatory, and anticancer effects.

At S.C.D.L. Buzău, within the Laboratory of Physiology, Agrochemistry and Ecological Crops, together with the adaptation of the species and the registration for testing of a line of *Stevia rebaudiana*, with a view to homologation, patenting and introduction into culture, researches related to the development of an appropriate culture technology were intensified, starting with the multiplication by seeds, a fact considered until now particularly difficult, continuing with the production of seedlings and types of specific nutrient mixtures, until the multiplication by cuttings. The most effective physical and chemical seed treatment methods to improve the germination percentage were determined and several nutrient mixture recipes were optimized for the production of sweet *Stevia* seedlings. Also, determinations were made regarding the technical and environmental parameters characteristic of the species *Stevia rebaudiana* cultivated in protected spaces and open field, in the area of the Buzău vegetable basin.

The work is structured in two parts, namely:

Part I. Bibliographic study. This first part of this thesis provides a holistic overview of the importance of *Stevia* cultivation, pathogen interaction, cultivation technology, biological features, plant material production, cultivar selection and cultivation process, glycosides of *Stevia rebaudiana*, distribution of *Stevia* glycosides in organs plants etc. Part I includes 3 chapters.

Chapter I. called the **Current Stage of Research on *Stevia rebaudiana* cultivation technology**, includes four sub-chapters, being presented in detail, the history of the plant, the origin and the area of distribution, the expansion of the species at the global level, the biological peculiarities, the importance of the culture, vernalization, hanity, propagation and flowering of the plant, main pests and uses of the plant. The main pests of the species, the many uses, the culture technology, and the description of the approved variety "Daria" are also described, having in its structure ten sub-chapters.

Chapter II called **Cultivation Technology of the *Stevia rebaudiana* species is dedicated to culture technology** and is structured in three sub-chapters as follows, and the production of the plant material is shown in detail, where the main methods of propagation, the way to establish the culture, but also its care methods, harvesting methods of the *Stevia rebaudiana* species. The chapter is structured in five subchapters.

Chapter III, entitled *Stevia rebaudiana* **steviol glycosides: chemical structure and metabolism in the human body**, focuses on the latest research related to the chemical composition of the plant and includes data on steviol glycosides (GS), the mechanisms responsible for stevia cytotoxicity, and the distribution of stevia glycosides. *Stevia rebaudiana* in plant organs and market value of the species and it is structured in five sub-chapters.

Part II. Own research. This section provides information on the aims and objectives of the research, the conditions and methods used in the study, the modern techniques used and the results obtained, including the analysis of pollination behavior, phenotypic response to diseases, DNA amplification as well as conclusions and recommendations. Part II comprises 5 chapters as follows:

In **Chapter IV** called the **Purpose and objectives** of the research, the justification of the theme and the objectives of the present research are described, being structured in two sub-chapters.

Chapter V entitled **General conditions in which the research was carried out**, material and method, describes the general conditions in which the research was carried out, including aspects related to the location of the experiences, the biological material used and the methods used in the study, being structured in two sub-chapters.

In **Chapter VI** called **Plant material and working methods used**, the working methods for PCR Technology, biometric determinations, LED lighting technology, biochemical determinations, statistical calculation methods (statistical data analysis) are described. This chapter also describes the cultivation technology of the *Stevia rebaudiana* species, the propagation methods, with a total of ten subchapters.

Chapter VII named **Results obtained**, and here are centralized all the results of the research carried out during the three years of research, being detailed in detail the results regarding the biometric determinations (plant height, plant diameter; leaf dimensions, n leaf shoulder for each studied biotype, the results regarding the optimization of the culture technology for the *Daria* variety by applying illumination with different types of light (white, blue, red), results regarding the biochemical analyzes of the approved *Daria* variety, and analyzes regarding genomic DNA isolation. Chapter seven is structured in four subchapters.

In the named **Chapter VIII**, the **Conclusions** derived from the research work and the recommendations regarding the *Stevia rebaudiana* species are described.