SUMMARY

of the doctoral thesis entitled:

THE EFFECT OF USING STRUCTURED WATER WITH THE HELP OF ELECTROMAGNETIC FIELDS ON THE GROWTH, DEVELOPMENT AND PRODUCTIVITY OF SOME VEGETABLE SPECIES

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The doctoral thesis *„The effect of using structured water with the help of electromagnetic fields on the growth, development and productivity of some vegetable species "* has *a*imed at conducting of some medicinal value due to the antioxidant and nutritious compounds contained in the edible parts, namely lettuce leaves and storage roots from sweet potatoes. The sweet potato leaves are **a**lso eaten by some domestic animals.
The thesis is written on a number of 174 pages and is divided into two parts, Part I and Part II, structured in 5 chapters. This also includes the consulted Bibliography, composed of 161 references, the List of works of the doctoral student and 3 Annexes.
PART I of the doctoral thesis presents a bibliographic study of research carried out on the use of structured water, as well as the need to know the species under study.
In **CHAPTER I**, "The current stage of research on the use of structured water on the growth, development and productivity of some vegetable species", the studies carried out by numerous researchers on different ways of producing structured water and the effect of its use on the irrigation of agricultural crops are presented. At the same time, the effect on the production of some vegetable and flower species.
PART II presents the own research, structured in 4 chapters, Bibliography, List of works of the doctoral student and Annexes (lists with tables and figures).
This section presents the relevance of the topic, highlighting the importance of using structured water in human consumption and horticultural practices, as well as aspects related to the concept of "water memory." according to theory and scientific studies, numerous researchers specialized in water studies claim that water has the ability to retain information about the substances dissolved in it. The quality of the water used for crop irrigation can directly influence their health and development. The use of structured water in horticultural practice can contribute to aligning agricultural production with the european Community directives regarding environmental pollution reduction. Intensive horticultural practices can have a significant impact on the environment and food security. The use of structured water can be a solution to reduce this impact and promote sustainable agricultural practices.
The aim of the research was to evaluate the impact of using structured water on the growth, development, and productivity processes of various horticultural species, with the purpose of recommending this practice to horticultural producers in Romania. This approach has a dual objective: to promote a more efficient and rational use of water resources and to contribute to the optimization of cultivation technologies, ensuring quality and sustainable production within the food security system.

The research objectives specifically targeted the evaluation of the effect of using structured water on the growth, development, and productivity of various horticultural species, with the purpose of recommending this practice to horticultural producers in Romania.
To achieve the main objective, the following steps were considered:

- Analyzing and characterizing structured water produced by a proprietary method;
- Assessing the impact of structured water on seed germination and seedling growth;
- Evaluating the impact of applying structured water, individually and in combination with chemical and organic fertilizers, on some vegetable species (Lactuca sativa, Cucumis sativus L., Lycopersicon esculentum);
- Investigating the specific response of plants to the application of treatments;
- The effect of using structured water on beneficial microorganisms developing in the growth substrate;

- The effect of applying structured water in vermicompost production.

The novelty of this research lies in the technology for obtaining structured water and its influence on the growth, development, and quality of certain vegetable plants.
CHAPTER II, "Results on the Characterization of Structured Water and Water analysis by Terahertz (THz) Spectroscopy, " refers to the analysis of water samples using THz (terahertz) spectroscopy. This is an analytical method used to investigate the properties of materials in the terahertz frequency range, between radio waves and infrared radiation. The technology has immense potential because it allows the detection and analysis of specific characteristics of water that are difficult to obtain with other techniques. For the physicochemical and structural characterization of undiluted structured water samples, diluted structured water, as well as control water, analyses were performed for each of these. The physicochemical and structural characterization of water samples was performed. Zeta potential and conductivity were determined using the Dynamic Light Scattering method and the ZetasizerNanoZS equipment, produced by Malvern Instruments. The pH of the control water was also determined, which was 7.33, indicating alkalinity, as well as the pH of undiluted structured water, identified as 7.43, and diluted structured water with a pH of 6.87. This chapter also characterized structured water in the presence of the redox couple K3Fe(CN)6/K4Fe(CN)6. The influence of structured water on the antioxidant activity of ascorbic acid was determined. Additionally, water samples were analyzed at the Wasserstudio Bodensee laboratory in Germany under the guidance of Dr. W. Höfer, a water testing specialist, using two imaging methods: spagyric crystal analysis and microscopic water analysis according to Kübler.
In CHAPTER III, "Research on the Impact of Using Structured Water on Growth Parameters of Seedlings of Certain Vegetable Species in Controlled environments, " studies and analyses conducted in a controlled climate chamber are presented. Based on water analysis and visible differences regarding the structure of structured water, experiments were conducted to evaluate its influence on seed germination and seedling growth. Experiments studied the effect of structured water and its dilutions on the germination of seeds and growth of seedlings of cucumbers, tomatoes, basil, and lettuce.
Another experiment was conducted in greenhouse conditions on cucumber, tomato, and lettuce seedlings using water, structured water, and 11 dilutions of structured water. For

seedling watering, variants using organic fertilizer and a chemical fertilizer were chosen. Another experiment involved applying structured water irrigation at an interval of 8 days, showing a noticeable effect on plant growth parameters. To assess the efficiency of treatments, the amount of water used for irrigation was determined, and it was found that the efficiency of variants using structured water and organic fertilizer was lower.

To highlight microbiological activity, determinations were made, showing that in both the controlled climate chamber and greenhouse conditions, the appearance of a beneficial microflora was identified.

CHAPTER IV, titled "Study on the Use of Structured Water for Moistening to Obtain Vermicompost, " presents the results of experiments in which structured water was used for moistening the substrate. The aim of the study was to see how structured water influences the quality of vermicompost. Regarding vermicompost quality and based on its chemical analysis for each watering variant, it was found that there were differences in chemical composition. It was concluded that the watering variants contributed to the quality characteristics of the vermicompost. Using structured water, both concentrated and diluted, for vermicompost preparation seems to have benefits by reducing levels of sodium, calcium, magnesium, ammonium, iron, manganese, zinc, copper, and chlorides. These changes could contribute to better vermicompost quality by reducing the risk of salinization and toxicity and ensuring a better balance of nutrients for plants. Comparing the values of water samples with standards for vermicompost, it was observed that most values are within acceptable ranges for vermicompost or are below toxicity limits. At the same time, the high levels of sodium and chlorides found in the vermicompost content could be a concern as they are not specified in vermicompost standards. Based on the obtained results, it can be appreciated that structured water seems to bring benefits by reducing concentrations of heavy metals and other compounds, which could improve vermicompost quality.

In CHAPTER V, brief conclusions and recommendations for each type of experiment are presented.

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