SUMMARY

of the doctoral thesis entitled:

ORGANIC RECYCLING AT HOME USING COMPOST WORMS, THE CALIFORNIA RED HYBRID

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This PhD thesis, "Home Organic Recycling Using Compost Worms, California Red Hybrid," brings valuable scientific results regarding the effect of using vermicompost produced by nature's energy on an important vegetable species for growers: lettuce (Lactuca sativa). Several of these studies have been published in specialized journals and can be consulted in the volumes of international conferences.

This thesis is written on 150 pages, includes 17 tables and 53 figures and is divided into two parts. Part I includes a single chapter and Part II, structured in 4 chapters. This also includes the Bibliography consulted, composed of 106 references, 5 Annexes, as well as the List of publications.

The work is structured in two parts: Part I, which consists of a bibliographic study (one chapter), and Part II, which includes my own research (four chapters).

PART I of the PhD thesis includes a bibliographic study analyzing previous research on vermicomposting and also using compost worms, with a particular focus on the species Eisenia fetida. This section emphasizes the importance of biological and ecological knowledge of the species involved, as well as the mechanisms by which they contribute to the transformation of organic waste into natural fertilizer. The study details both the benefits of vermicompost for soil and agriculture, as well as the effectiveness of earthworms in recycling nutrients at the source.

CHAPTER I, "The current stage of research on worms and vermicompost," presents the studies carried out by numerous researchers on different ways of producing vermicompost and the effect of using it as a fertilizer.

The chapter addresses a topic of global interest, namely the management and recycling of nutrients at source. The study focused on the use of earthworms from the species Eisenia fetida, known as the Red Hybrid of California, for the recycling of organic food waste at the household level and obtaining a natural fertilizer, vermicompost. Through the process of vermicomposting, organic vegetable waste from the kitchen was bioconverted into a high-quality fertilizer in less than four months.

The origin and history of the species are presented, along with detailed descriptions of the genus, family, and systematic classification. The chapter also covers the morphological characteristics, vermicomposting techniques, meaning and production of vermicompost along with its effect on soil and plants, but also economic role.

PART II presents my own research, structured in 4 chapters, Bibliography, List of publications of the doctoral student and Annexes.

This part presents the purpose and objectives of the research, the context and the relevance. The aim of the PhD thesis was to obtain vermicompost and evaluate its impact on the growth of seedlings and lettuce plants, as well as to analyse the effect on the biochemical composition of the resulting product.

To achieve the goal of this doctoral thesis, the following objectives were pursued:

Objectives

1. Production of two types of vermicompost under laboratory conditions, for these experiments
2. Testing the chemical composition of the obtained vermicompost

3. Identifying the most efficient method of applying vermicompost in the cultivation of lettuce seedlings.
4. Determination of the growth of lettuce plants using different percentages of vermicompost in the substrate
5. Analysis of the mineral content of salad.

CHAPTER II, named "Production of vermicompost under laboratory conditions and its chemical analysis", controlled experiments were carried out to produce vermicompost from two types of organic matter: cattle manure (Variant 1) and food waste (Variant 2). The aim of this experiment was to assess how two different types of substrates affect the growth and development of earthworms and the quality of the resulting vermicompost..

The experiments were carried out in the laboratory of the University of Agronomic Sciences and Veterinary Medicine in Bucharest, under strictly controlled conditions, which allowed the monitoring of essential parameters such as temperature and humidity. Each experimental variant had three repetitions, using 100 compost earthworms per repetition, with average starting weights of 52 g (Variant 1) and 50 g (Variant 2), respectively. In Variant 1, compost worms were fed cattle manure. In Variant 2, compost worms were fed with food scraps collected from the household. These residues are rich in essential plant nutrients. Experiments were repeated three times to ensure consistency of results.

The data collected showed that earthworms had a higher reproductive rate and a higher body mass in Variant 1 (cattle manure) compared to Variant 2 (food scraps). This suggests that manure may provide a richer source of nutrients needed for optimal earthworm development.

CHAPTER III, entitled "*The effect of vermicompost on the growth of lettuce in the greenhouse" analyzes the effect of vermicompost obtained on the growth of plants, especially lettuce (Lactuca sativa)*". This experiment was carried out under greenhouse conditions, using 12 substrate variants for lettuce with 3 repetitions for each variant. Each substrate variant included different proportions of vermicompost, originating from both experimental sources described previously.

The results of greenhouse experiments have shown that vermicompost has a positive impact on lettuce growth. Plants grown on substrates with vermicompost showed faster development and higher green mass compared to those grown on the control substrate (without vermicompost). Also, the root system of lettuce plants was considerably better developed in the presence of vermicompost, which shows a better capacity to absorb nutrients and water.

CHAPTER IV named "Biochemical analyzes performed on lettuce plants". The analysis of the biochemical content of lettuce, grown on different types of substrate from the experimental variants, is presented. The content in the dry matter of carbohydrates, as well as macro and micronutrients, was determined.

Laboratory analyses showed that lettuce grown on vermicompost substrates present a higher content of chlorophyll and sugars compared to those grown on the control peat substrate. The results highlight that using vermicompost as a fertilizer not only enhances plant growth but also boosts its nutritional value, making it more suitable for consumption.

Chapter V, "Conclusions and recommendations," summarizes the results obtained and offers recommendations for the practical application of research in the field of vermicomposting. Following the experimental studies carried out, the conclusions highlight the relevance and potential of this technique for sustainable management of organic waste and improvement of soil health.

The PhD thesis titled "*Home Organic Recycling with Compost Worms, California Red Hybrid*" illustrates that vermicomposting is an effective and sustainable approach to managing organic waste at home. This process not only minimizes the amount of waste sent to landfills but also yields a high-quality organic fertilizer that enhances soil and boosts plant productivity.