



Educational Requirements Analysis

VERMICOMPOSTING: The Future of Sustainable Agriculture and Organic Waste Management in Europe

Executive Summary

2021-1-TR01-KA220-VET-000030021

Authors:

- Foundation Agro-Centre for Education www.ace.org.mk
- Malatya Turgut Ozal University (Applicant Organisation) www.ozal.edu.tr
- Malatya Apricot Research Institute <https://arastirma.tarimorman.gov.tr/kayisi>
- Ankara NaturalInnova www.naturainnova.com
- INNOPOLIS NGO www.innopolis.org
- INNOTOMIA P.C. - VET Centre : www.innotomia.com
- WOOF Espania, www.woof.es
- ILA International Labour Association, www.ilalabour.eu

November, 2023



Contents

1. SUMMARY	2
2. BACKGROUND	3
3. METHODOLOGY AND DISCUSSION QUESTIONS.....	4
4. SHARED ISSUES AND CONCERNS.....	5
5. CONCLUSIONS	6
IO.2.1. Questionnaires for VET Schools, Agricultural Centers, and HEIs.....	6
Survey Overview and Participant Demographics:	6
Educational and Professional Background:	6
Awareness and Perceptions of Vermicomposting:	7
Challenges in the Agricultural Sector:	7
Vermicomposting in Agricultural Education:	7
Barriers to Teaching Vermicomposting:.....	8
Experiences and Positive Examples:.....	8
Recommendations for Education Systems:.....	9
ICT Tools and Solutions:	9
IO.2.2.1 Questionnaires to local VET Professionals and Farmers	10
Participant Profile:.....	10
Educational Background and Training:.....	10
Knowledge on Vermicomposting:	11
Perceptions and Barriers:	12
Ecological Advantages:	12
Experience with Vermicomposting:	13
Interest in Vermicomposting:.....	13
ICT Solutions:.....	14
6. RECOMMENDATIONS.....	15
Annexes	Hata! Yer işareti tanımlanmamış.



1. SUMMARY

This document is a component of the PowerWORMS Educational Requirements Analysis (ERA) for the POWERWORMS project, which delves into vermicomposting as a sustainable avenue for agriculture and waste management in Europe.

The aim is to understand the status quo in participant countries, based on research conducted from September to December 2022.

As global population growth fuels increased agricultural demands, developing nations, notably Türkiye, are poised to meet their future nutritional requirements. However, the extensive use of chemical fertilizers in agriculture raises consumer concerns due to environmental and health detriments associated with their misuse. Controlled fertilizer use is becoming more emphasized to avoid these negative effects.

Healthy crop production is achievable through mindful and moderate input use, safeguarding nature and the environment. Current research in plant nutrition suggests that we can yield healthy agricultural products responsibly. To enhance efficiency and quality in agricultural produce, precise fertilizer needs must be ascertained, along with proper management of the type, quantity, method, frequency, and timing of application. Optimizing fertilizer use not only meets plant nutrition needs but also mitigates environmental and economic risks.

For maximum fertilizer benefits, appropriate practices must consider plant requirements, climate, soil, and growth cycles. Proper fertilizer use can avert issues like soil productivity loss, environmental harm, and resource wastage, while also preventing the pitfalls of underuse, like reduced crop quality and yield.

The Powerworms project is therefore committed to generating and sharing technical knowledge on worm manure production and use. This resource conserves natural assets, prevents pollution, and boosts productivity.

The findings in this report reflect insights from farmers, professionals, educators, and experts on the present practices of worm castings usage, bolstering organic farming and ensuring consumer access to natural, wholesome foods.



2. BACKGROUND

Population growth, economic expansion, urbanization, industrialization, and intensified agriculture have led to escalating waste challenges. Sustainable waste disposal is imperative, and methods like bio-composting and vermicomposting convert various wastes into valuable agricultural resources, offering an eco-friendly solution.

Industrial agriculture's heavy reliance on agrichemicals is a major cause of soil degradation and accounts for a significant portion of global greenhouse gas emissions. The economic and environmental toll of these chemicals, along with landfill costs, necessitates a shift in agricultural practices. Vermicomposting, the process of using earthworms to break down organic waste into high-quality organic fertilizer, is gaining traction as a sustainable approach to food production and waste management.

Europe benefits economically, environmentally, and socially from integrating vermicomposting into agricultural and waste management practices, enhancing resilience to climate change, resource scarcity, and land degradation.

The PowerWORMS project is inspired by the transformative potential of earthworms in our food system, offering a sustainable solution to organic waste management and fostering a local organic food movement. It encourages the adoption of vermicomposting in both urban and rural European farming sectors across various governance models.

Charles Darwin recognized the profound impact of earthworms on agriculture, asserting their significance to the economy. Embracing this vision, partners from five European countries have united to support sustainable soil management under the New Common Agricultural Policy (CAP) 2023-2027 and the European Soil Strategy (ESS), advocating vermicomposting as a future-oriented practice for sustainable agriculture and waste management in Europe.

The PowerWORMS consortium is committed to enhancing the response of EU agriculture to societal demands for safe, nutritious, and sustainable food. It aims to reduce food waste, foster sustainable development, and manage natural resources effectively. The consortium promotes education and training in vermicomposting for a diverse audience, including farmers, students, families, teachers, and professionals, to further these goals.



3. METHODOLOGY AND DISCUSSION QUESTIONS

The PowerWORMS Project, designed to enhance vermicomposting techniques and knowledge, plays a pivotal role in promoting sustainable agriculture by facilitating a network among researchers, academicians, public organization representatives, marketing experts, consumers, and local producers. This initiative provides a platform for sharing insights and discussing ways to innovate and improve vermicomposting production processes.

Central to the project is the Educational Requirements Analysis (ERA), which is part of the PowerWORMS result IO2- WP02. The ERA seeks to understand the contribution of vermicomposting to agricultural productivity, especially in rural settings, by assessing the current state of bio-composting and vermicomposting of various waste types in the agricultural sector and education systems of the participating countries.

To achieve its objectives, the project conducted a descriptive survey research to explore the level of knowledge and perceptions about vermicomposting among farmers, vocational education and training (VET) schools, universities, and agricultural centers. The research comprised three key sub-activities: a survey on the current educational curriculum related to vermicomposting at VET and university levels, a survey on VET professionals and farmers to gauge their real-world knowledge needs, and a comparison between the existing knowledge pool and the actual educational requirements.

Coordinated by the Foundation Agro-Centre for Education (FACE), the project engaged multiple partners from Türkiye, North Macedonia, Greece, Spain, and the Netherlands, each taking part in the implementation of the survey activities. To collect the necessary data, the project employed a mix of questionnaires, checklists, live interviews, and study visits, ensuring a pilot evaluation of these tools before their deployment. The research was meticulously planned to ensure consistent data collection across all partner countries for subsequent comparison.

Each country was responsible for conducting surveys on the educational curriculum in vermicomposting and assessing the knowledge needs of VET professionals and farmers. The minimum number of survey respondents was determined by country: Türkiye had 45 respondents, North Macedonia 15, Greece 30, Spain 15, and the Netherlands 15.

The questionnaires were comprehensive, covering demographics, familiarity with vermicomposting, involvement in educational curricula, challenges in agriculture, and awareness of national policies promoting vermicomposting. They also delved into respondents' personal experiences with vermicomposting, educational materials used, and perceived barriers to teaching and implementing vermicomposting practices.

After the data collection phase, which spanned from August to November 2022, each partner summarized their findings in national reports. These reports were then submitted to FACE for the creation of the combined PowerWORMS Educational Requirements Analysis (ERA), which would inform future educational strategies and support the broader goals of the project in advancing regenerative agriculture practices.



4. SHARED ISSUES AND CONCERNS

The PowerWORMS Project undertook extensive research to evaluate the current state of vermicomposting education and its practical application in the agricultural sector. Employing a two-pronged survey approach, we engaged a total of 365 respondents—147 from educational institutions (VET Schools, Agricultural Centers, and HEIs) and 218 VET professionals and farmers.

The primary goal was to identify educational gaps at secondary and university levels regarding vermicomposting. Data was collected through diverse methods, including questionnaires, phone and live interviews, and study visits, with responses recorded in Google Forms translated into the respective languages of each participating country.

Key findings revealed a significant lack of education on vermicomposting across the board. This was a common thread across responses, emphasizing the need for enhanced educational efforts.

However, the research faced several challenges:

- **Time Constraints:** Initially scheduled to conclude by November 2022, the study extended to December 2022 due to unforeseen delays.
- **Engagement Difficulties:** Particularly in Spain, there was a noted reluctance within the education sector to participate in the study, although eventually, the necessary data was collected.
- **Participant Numbers:** All countries met or surpassed the target respondent numbers, except for Greece, where the surveys fell short by 5 and 3 respondents for the educational and professional/farmer questionnaires, respectively. Nonetheless, due to the high participation rate from Türkiye and the marginal shortfall in Greece, the results were deemed valid.
- **Incomplete Data:** Some responses, particularly from Greece, were incomplete for certain questions.

Despite these obstacles, the project successfully gathered comprehensive data, offering valuable insights into the current landscape of vermicomposting education and practice, setting the stage for targeted improvements in the field.

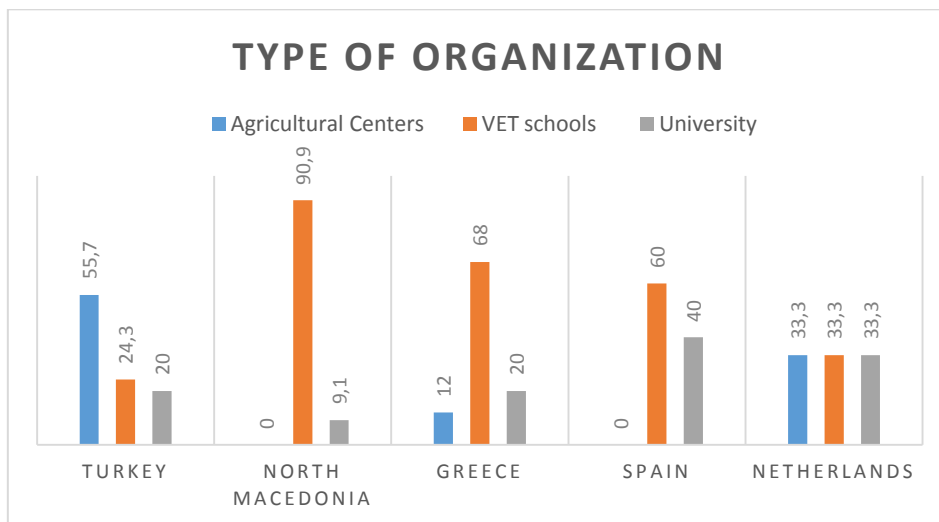


5. CONCLUSIONS

IO.2.1. Questionnaires for VET Schools, Agricultural Centers, and HEIs

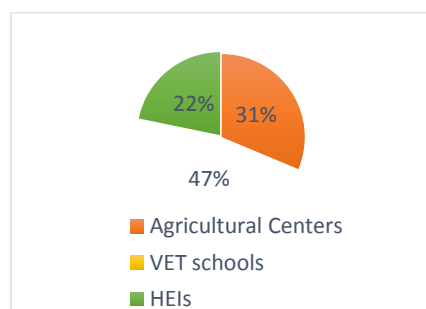
Survey Overview and Participant Demographics:

A survey conducted across five European nations—Türkiye, Greece, North Macedonia, Spain, and the Netherlands—garnered responses from 147 professionals involved in vocational education, agricultural centers, and higher education institutions. The largest group of respondents hailed from Türkiye, while the Netherlands and Spain had the fewest. Variances were observed in the respondent profiles across countries. For example, in Türkiye, more than half were from Agricultural Centers, whereas in North Macedonia, Greece, and Spain, a significant majority were educators from secondary agricultural schools. The Netherlands presented a balanced representation across all groups.



Educational and Professional Background:

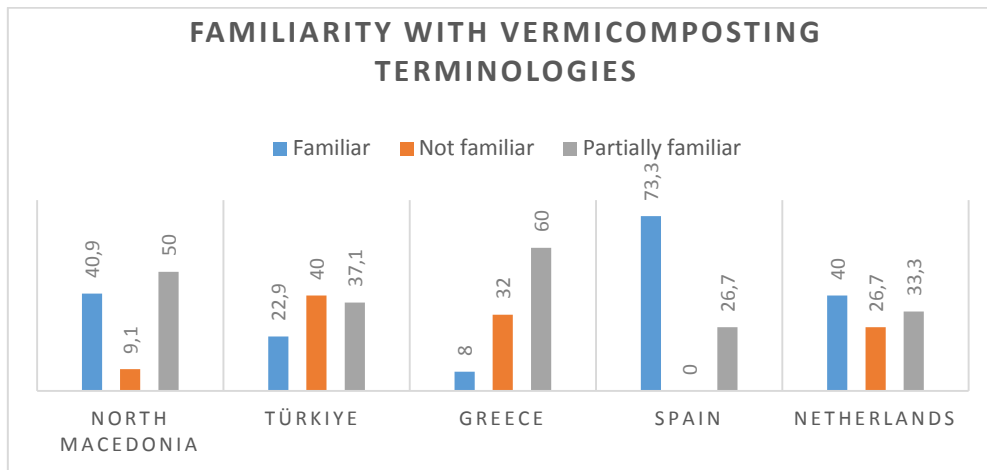
Respondents' ages ranged widely, but the bulk fell between 31 to 64 years. Educational qualifications were high, with over two-thirds holding a degree, and a diverse range of educational backgrounds was noted, with bachelor's degrees being the most common. Despite high levels of education, specific training in vermicomposting was limited to just over a third of respondents, reflecting a significant gap in this area across all surveyed countries.





Awareness and Perceptions of Vermicomposting:

Awareness and knowledge of vermicomposting technologies were mixed, with Spain showing a higher level of familiarity and positive self-assessment of knowledge. In contrast, other countries expressed a weaker understanding. The familiarity with vermicomposting terminologies and technologies varied, with Greece showing the least familiarity.

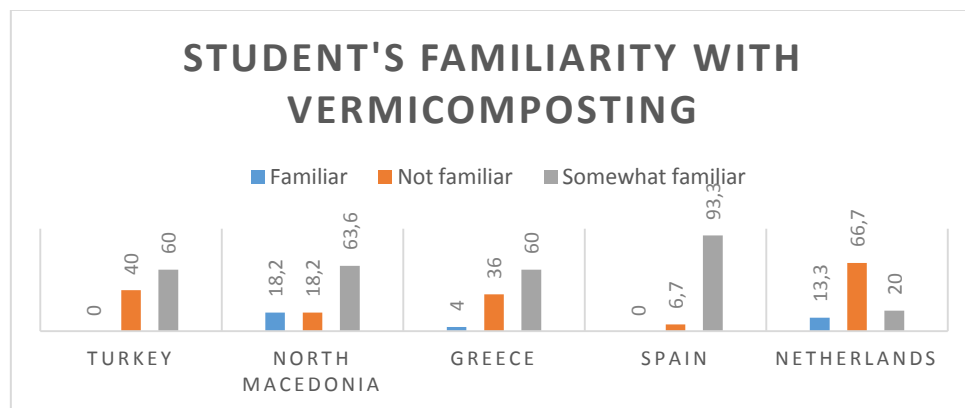


Challenges in the Agricultural Sector:

Participants identified several pressing challenges in their respective agricultural sectors, including climate change impacts, increased food demand, soil depletion, and unsustainable agricultural practices. These challenges are closely linked with the potential benefits of vermicomposting, indicating a recognition of its relevance but also hinting at missed opportunities for its application.

Vermicomposting in Agricultural Education:

The integration of vermicomposting in educational curricula is partial at best, often included within broader subjects like soil sciences or environmental programs. Practical applications and specific focus on vermicomposting are largely absent, resulting in a general lack of familiarity among students with the practice.



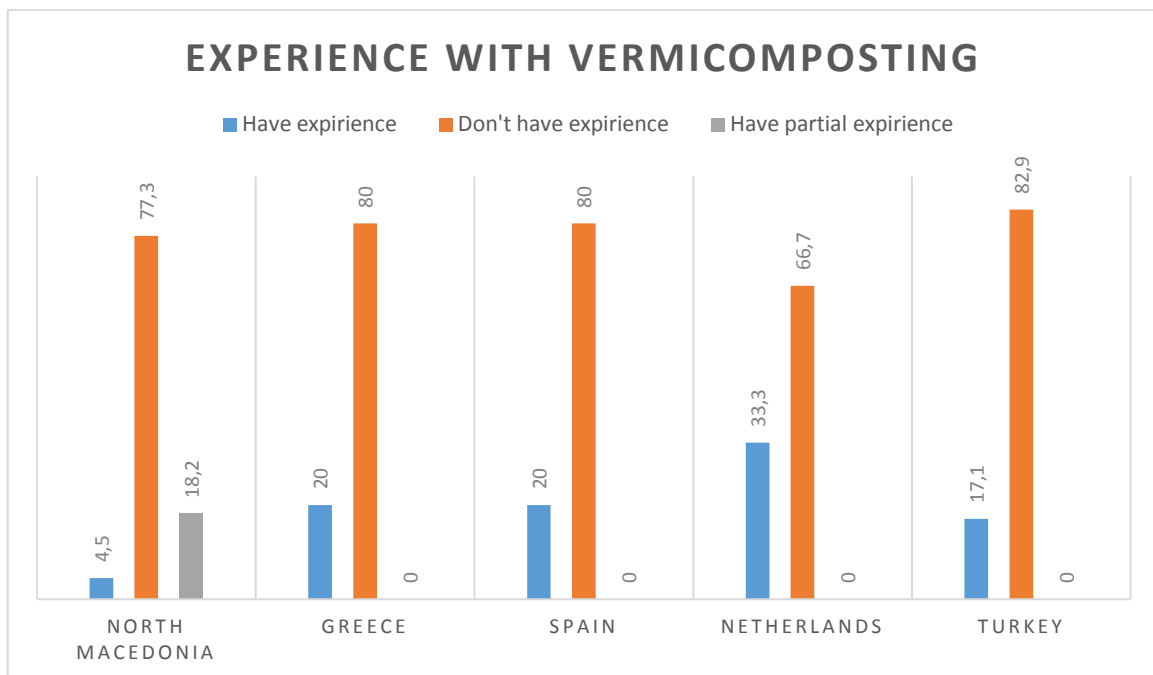


Barriers to Teaching Vermicomposting:

Instructors cited various barriers to teaching vermicomposting, such as insufficient materials, lack of practical opportunities, and a general lack of awareness and interest. These barriers suggest a need for enhanced resources and infrastructure to support vermicomposting education.

Experiences and Positive Examples:

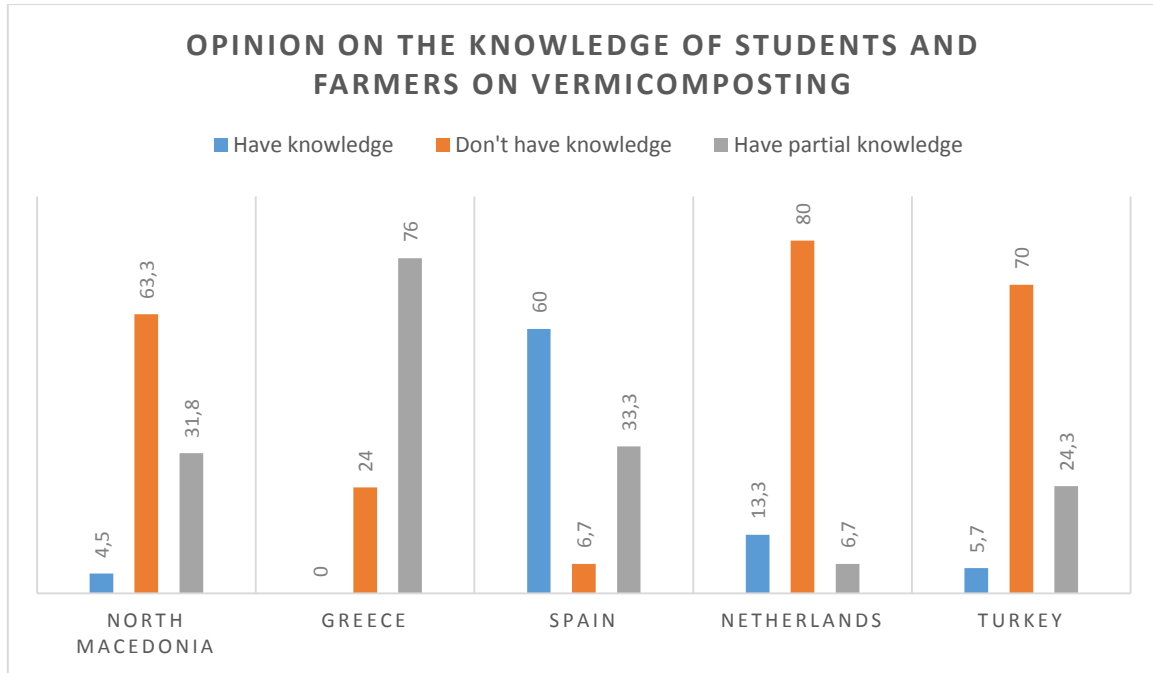
While most respondents lacked direct experience with vermicomposting, there were some positive examples of its application, from organic fertilizer production to innovative urban composting projects. These examples, however, were not widespread, highlighting the nascent stage of vermicomposting in these countries.





Recommendations for Education Systems:

Suggestions for improving the state of vermicomposting education included the need for more practical training, development of specialized curricula, incorporation of vermicomposting into more subjects, and the creation of demonstration sites to provide hands-on experience.



ICT Tools and Solutions:

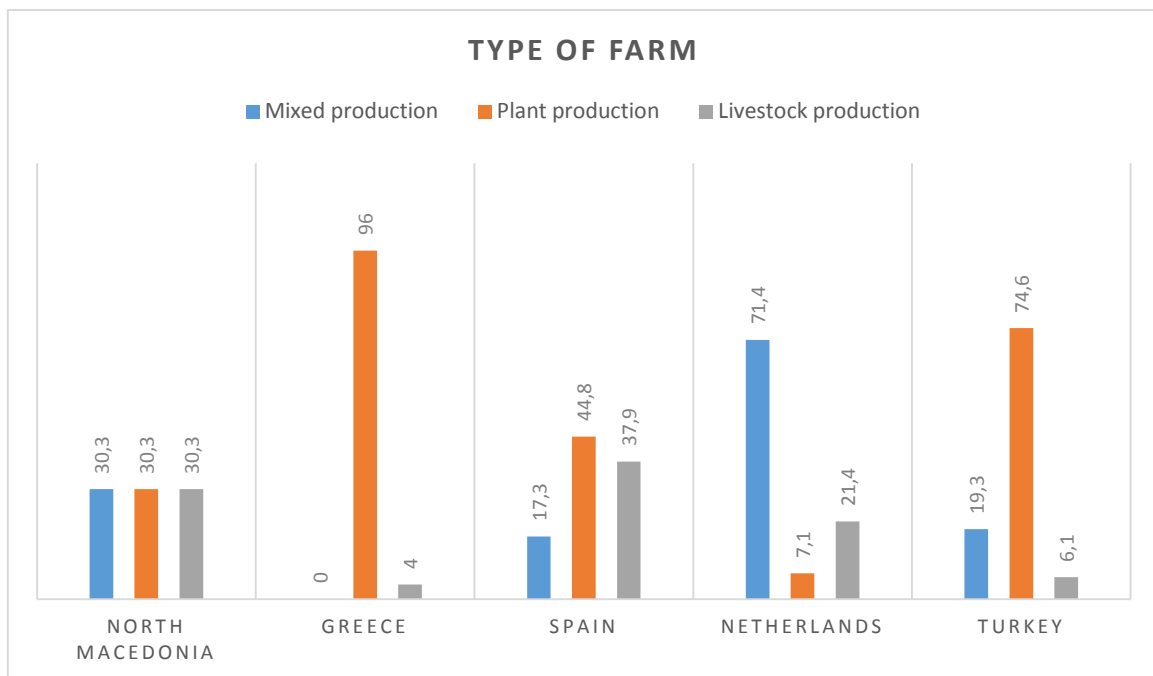
The survey revealed limited familiarity with ICT tools for vermicomposting. A few examples from the Netherlands included sensors and digital kits for monitoring vermicomposting conditions, indicating an area ripe for development and integration into educational programs.



IO.2.2.1 Questionnaires to local VET Professionals and Farmers

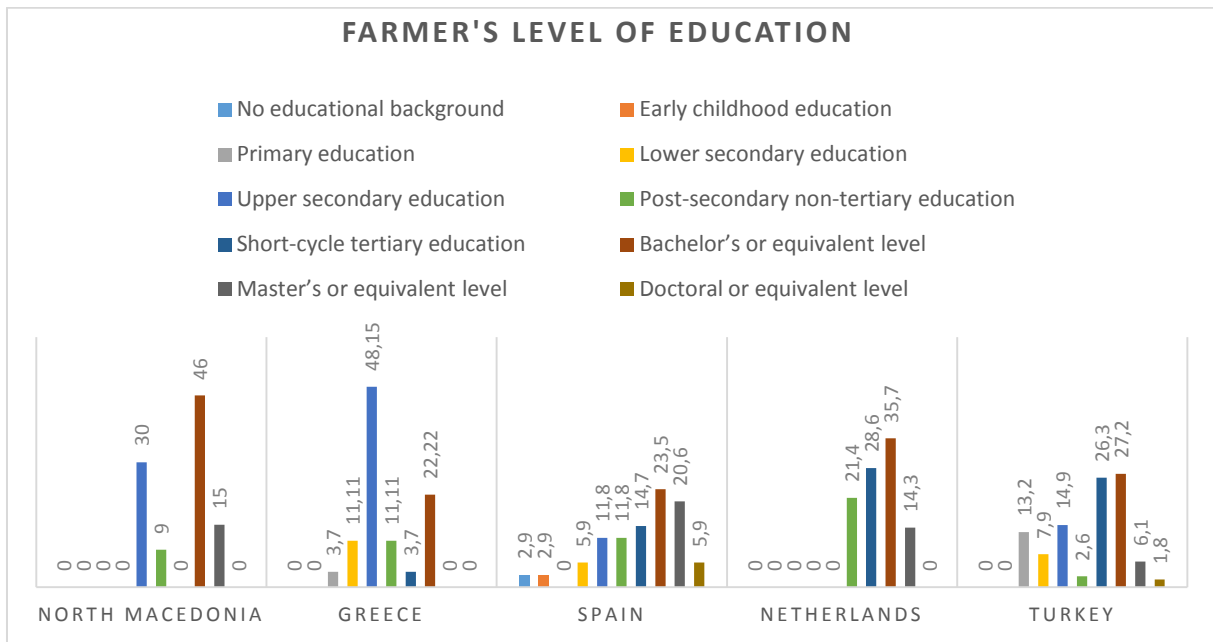
Participant Profile:

The survey collected responses from 218 professionals across Türkiye, Greece, North Macedonia, Spain, and the Netherlands, with Türkiye contributing the majority (114). Respondents varied in production type, with a noteworthy 9.1% in North Macedonia exclusively producing bio humus. Small farm owners were prevalent among respondents, who ranged in age from 18 to over 65, the most common bracket being 45 to 64 years old. A significant majority operated family-owned farms, with varying years of experience in agriculture.



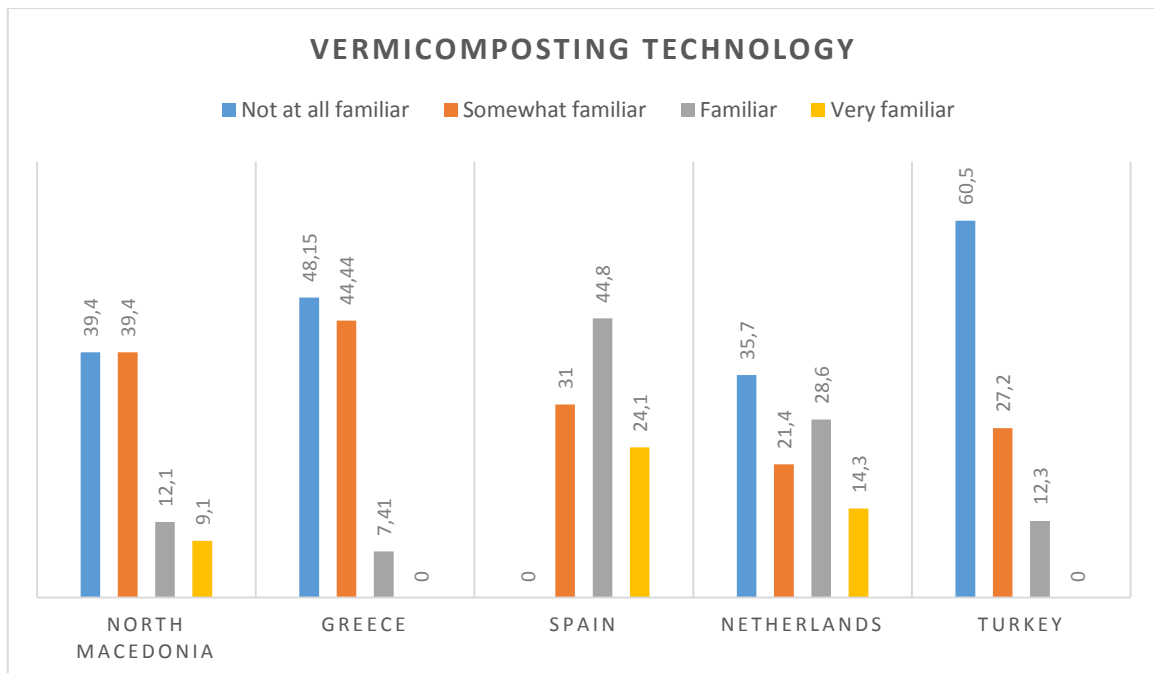
Educational Background and Training:

Most participants had some level of formal education, though a small percentage in Spain had minimal to no educational background. About half had not participated in any agricultural training, and a substantial 77% had not received training in vermicomposting.



Knowledge on Vermicomposting:

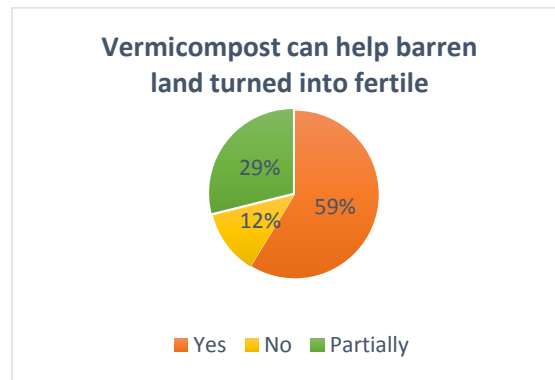
While 69.63% were familiar with the term "vermicomposting," actual familiarity with the technology was low, except in Spain where it was significantly higher. Approximately half of the respondents had organic waste from farming, but only 22.48% composted this waste. A strong belief existed among 55.5% that farmers could produce vermicompost themselves efficiently.





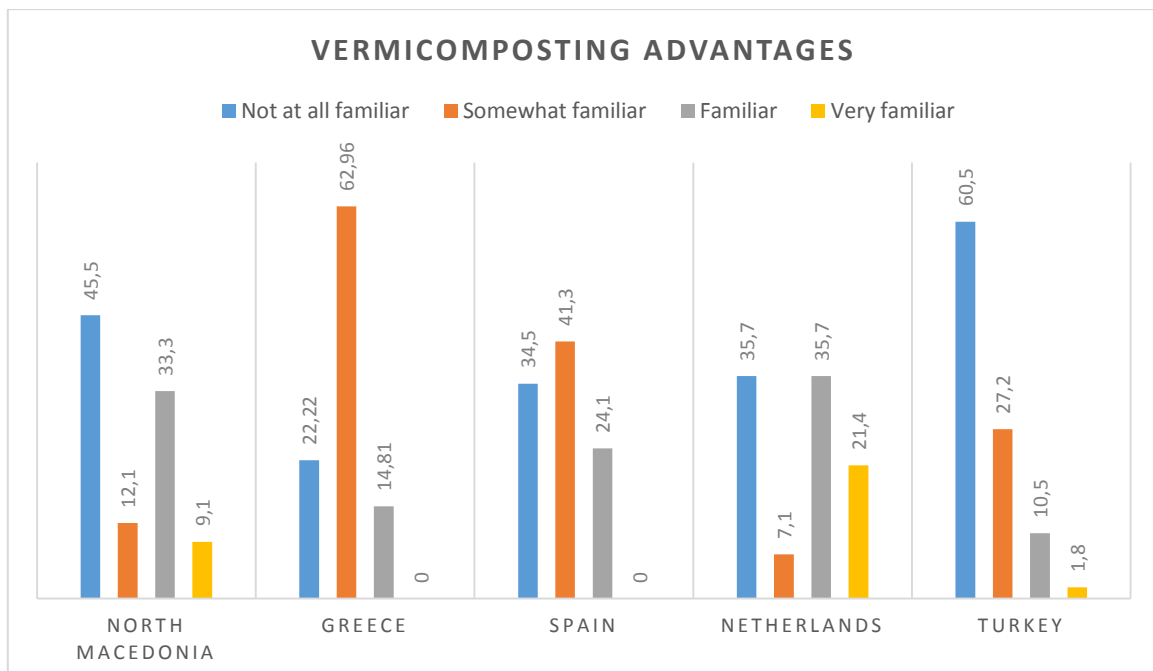
Perceptions and Barriers:

Most respondents lacked familiarity with the advantages and costs associated with vermicomposting. However, a robust 72.7% concurred that vermicompost could revitalize barren land. Challenges identified included issues such as insufficient equipment, crab infestation, lack of knowledge, concerns about pests, and various infrastructural deficiencies.



Ecological Advantages:

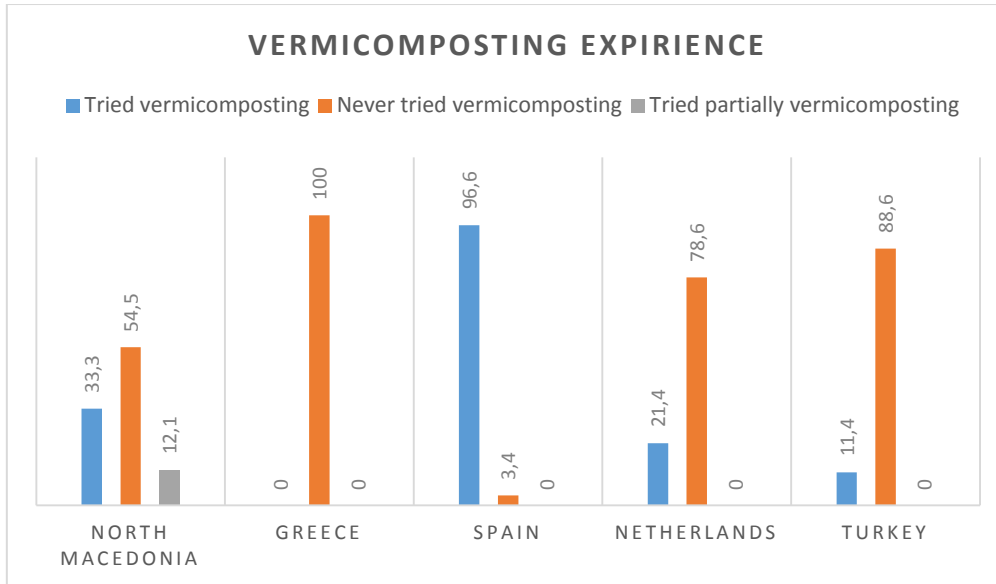
Respondents acknowledged several ecological benefits, such as waste management, soil quality improvement, reduction of chemical inputs, and sustainable practices. Specific advantages varied by country, with many emphasizing reduced pollution and improved soil health.





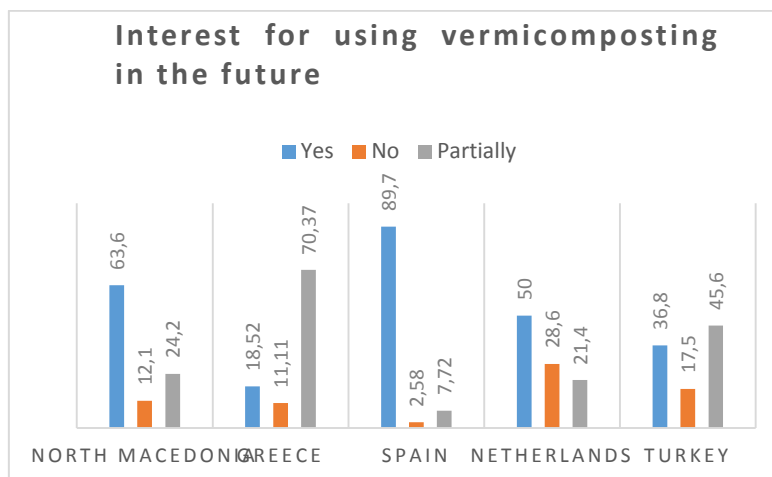
Experience with Vermicomposting:

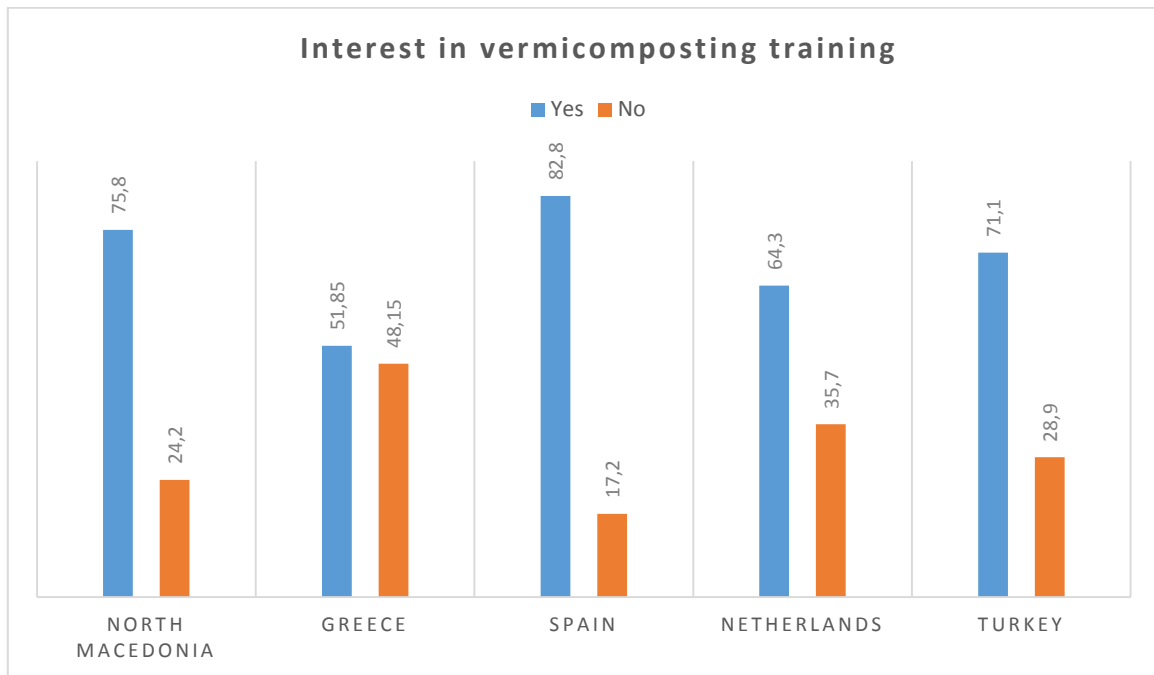
A majority (73%) had never attempted composting on their farms, though a few had utilized systems like worm houses, bins, and piles. Methods of colonizing compost systems with worms ranged from natural migration to intentional introduction.



Interest in Vermicomposting:

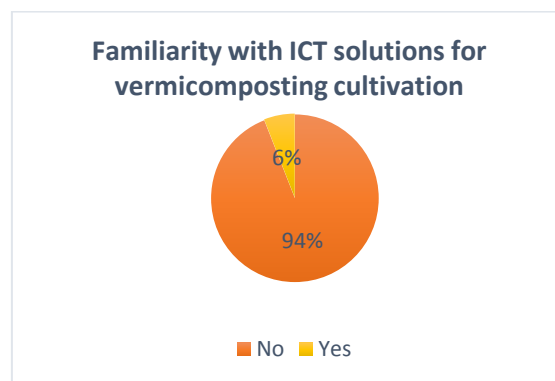
Interest in vermicomposting differed by country, with the highest in Spain. Most respondents expressed confidence in their ability to implement vermicomposting in the future and showed interest in relevant training.





ICT Solutions:

A small percentage (6%) were familiar with ICT solutions for vermicomposting, citing examples such as automation via sensors, mobile applications, data management systems, and remote monitoring.





6. RECOMMENDATIONS

The study conclusively demonstrates the effective administration of questionnaires, capturing a diverse group of participants well-suited for the research's aim. The VET Schools, Agricultural Centers, and HEIs survey respondents, while experienced and trained, display a significant lack of knowledge in vermicomposting, minimal non-formal learning experiences on the topic, and are not well-versed with relevant terminologies, technologies, or national vermicomposting initiatives. They also show limited exposure to vermicomposting in their communities and few know of any ICT solutions for it.

Educational curricula are deficient in incorporating vermicomposting, with educators facing a dearth of comprehensive teaching materials and practical application opportunities, leading to a gap in vermicomposting knowledge among students and farmers.

The survey of VET Professionals and Farmers also reveals a predominant unfamiliarity with vermicomposting techniques, benefits, and costs, despite a general awareness of its ecological advantages and an interest in vermicomposting training and implementation.

Based on these insights, the project's training materials must include comprehensive vermicomposting information, detailing techniques, earthworm roles, investment requirements, economic returns, ecological benefits, and market insights, alongside practical implementation guides and ICT solutions. These materials should feature visual aids for clarity and be multilingual to improve the cooperation between farmers and educational institutions and to enhance vermicomposting education.



Based on the results from both surveys the training materials produced in this project should include:

- Detailed information about the vermicomposting technique by steps and the utilization of vermicompost;
- Nutrient composition of vermicompost;
- Detailed information for Earthworms for Vermicomposting;
- Detailed information for needed investments for vermicomposting;
- Good practice examples of farmers that are practicing vermicomposting;
- Detailed information about the economic returns of vermicomposting;
- Detailed information of the benefits of vermicomposting;
- Detailed Information and Communication Technology (ICT) solutions for vermicomposting cultivation;
- Detailed information for Practical implementation of the vermicomposting process;
- Detailed market related information for vermicompost;
- Detailed information for improvement of cooperation between farmers and the educational institutions in regards to vermicomposting;

The training materials should be produced with more visual aspects and should be available in all languages of the project.