



VET Curriculum for Aspiring Regenerative Farmers in Europe and Sub-Saharan Africa



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Introduction to Regenerative Agriculture

The growing pressure the world has witnessed to meet human needs has necessitated technological advancement in agriculture through innovation and invention. Conventional (modern) agriculture has made it possible for humans to intensively use available resources (land) to increase farm productivity (e.g. via mechanization, land intensification, fertilizer application, pesticide and herbicide intensification in farming). However, such advancements come with significant side effects as they leave a medium to long-term impact on; soil quality (susceptible to erosion, depletion in organic matter, salinization resulting from inorganic fertilizer intensification, and rise in soil pathogen), climate (build-up in carbon and nitrogen elements contributing to the generation of GHG elements), loss in biodiversity (clearing of vegetations, forests for new farmlands, extraction of fossils for farming nutrients creating bare lands, loss in microorganisms (intensive use in chemical pesticides), and effects on water access, availability and quality resulting from incursions in vegetative lands, water source or water-catchment areas.

With the mounting environmental impact of modern agriculture, a transformative shift to regenerative agriculture is not just a choice but a necessity. Regenerative agriculture starkly contrasts conventional farming, advocating for practices that restore soil health, enhance biodiversity, and sequester carbon from the atmosphere. This is not merely a new farming technique but a fundamental change in our relationship with the land that sustains us.

Regenerative agriculture can be explained as an approach to farming and land management that aims to restore and enhance the health of ecosystems, improve soil fertility, and promote biodiversity. Schreefel (2020) defines it as an approach to farming that uses soil conservation as the entry point to regenerate and contribute to multiple provisioning, regulating, and supporting services to enhance sustainable food production's environmental, social, and economic dimensions. At its core, regenerative agriculture embodies a philosophy of working with nature rather than against it, aiming to restore and enhance the natural systems we depend on.

It should be noted that regenerative agriculture differs slightly from organic farming (agriculture) in that it adopts a holistic philosophical approach encompassing various farming practices that aim to restore and enhance ecosystems. In contrast, Organic Farming adopts a regulated system with specification standards and guidelines for the farming system to be accepted as organic. Regenerative Agriculture follows vital principles that differentiate the farming systems with conventional and organic farming systems, and they include;

1. Maintain Soil Health – Adopt practices that help maintain healthy fertile soils through practices such as cover cropping and minimizing tillage, minimizing chemical application (herbicides)
2. Encourage Crop diversity – By encouraging the cultivation of diverse crops alternating between seasons or mixed cropping systems, we enhance crop resilience against pests and disease attacks, support biodiversity, and enrich the soil with nutrients.
3. Water Management – Optimizing the use of water to maximum efficiency (rainwater harvesting, contour ploughing) enhances water availability and access, overcoming the impact on plants associated with drought.
4. Integrated Livestock Keeping – Allowing the use of grazed livestock land on a rotational basis for farming allows improvement in soil health and strengthens the symbiotic relation existing between livestock, plants, and micro-organisms in the area
5. Encourage Agroforestry – Integrating trees and shrubs into agricultural landscapes enhances soil structure and biodiversity and meets farmers' needs
6. Minimize Application of Industrial Chemicals – Either pesticides, herbicides, or synthetic (inorganic) fertilizer should be used to allow the flourishing of symbiotic microorganisms in the ecosystem.
7. Carbon Sequestration – Enhance practices that promote the natural capture and storage of carbons in the soil. This sequentially helps mitigate the emission of carbons, as healthy soils act as carbon sinks, helping reduce the amount of carbon dioxide emitted in the air.

The advantages of regenerative agriculture are not confined to the farm. By improving soil health, these practices enhance the land's water retention capacity, making farms more resilient to droughts and reducing the risk of flooding. This is particularly vital in the face of increasingly unpredictable weather patterns driven by climate change. Furthermore, regenerative agriculture can play a significant role in combating climate change. Healthy soils, rich in organic matter, can capture and store significant amounts of carbon dioxide, effectively turning agricultural land into a powerful carbon sink.

As the global population continues to grow, the demand for food increases, putting additional pressure on our natural resources. Regenerative agriculture offers a sustainable path forward that enhances food security and preserves the planet for future generations. It challenges us to rethink our farming approach, value long-term ecological health over short-term gains, and recognize the interconnectedness of all living systems.

Moreover, regenerative agriculture aligns with broader societal goals of sustainability and environmental stewardship. It supports rural communities by promoting economically viable and ecologically sound farming practices. By fostering a deeper connection between people and the land, cultivates a sense of responsibility and care for the environment, empowering individuals to make a difference.



In this critical moment, as we grapple with the dual crises of environmental degradation and climate change, regenerative agriculture emerges as a beacon of hope. It invites us to imagine a future where agriculture is not just a means of production but a force for ecological restoration and climate resilience. It is a call to action for farmers, policymakers, and consumers alike to embrace practices that heal the land, support biodiversity, and secure a sustainable future for all.

Regenerative agriculture is not just an option; it is an urgent imperative. It represents a profound shift towards a more harmonious and sustainable relationship with our planet. It offers a blueprint for agricultural practices that nurture the earth, the climate, and all who depend on it. As we stand at the crossroads of environmental crisis and opportunity, regenerative agriculture lights the path to a healthier, more resilient, and abundant world.

The Reviver Project and Its Role in Promoting Regenerative Agriculture

The Reviver project exemplifies a comprehensive initiative promoting regenerative agriculture farmers, particularly the youth in Europe and Sub-Saharan Africa. By leveraging Technical and Vocational Education and Training (TVET) institutions, the project imparts practical skills and knowledge on regenerative agriculture. This educational framework includes integrating regenerative agriculture modules into institutional curricula, thereby equipping future generations of farmers with sustainable farming principles from the outset.

The project also demonstrates the economic viability of sustainable farming through successful case studies and leverages digital engagement to make information and training accessible. This aspect is crucial for broadening the reach and impact of regenerative practices. Additionally, the Reviver project focuses on market and financial integration, developing networks to facilitate market access and provide increased financial accessibility for young farmers.

Community engagement is another cornerstone of the Reviver project, with modules designed to foster a deeper connection between people and the land. Field-based learning and regular demonstration days showcase the practical and economic viability of regenerative practices, while ongoing educational events provide the latest insights into sustainable farming advancements.

By addressing both educational and practical needs, the Reviver project creates an ecosystem that nurtures the growth of young farmers in sustainable agriculture, ensuring the longevity and prosperity of the farming community in Europe and Sub-Saharan Africa. It tackles economic and technical barriers, providing training on market analysis, budget management, and cost-effective sustainable practices. This comprehensive approach ensures that regenerative agriculture is widely adopted and economically viable.

Regenerative agriculture in Europe



Agriculture is the backbone of rural communities and is a core activity of the global economy and plays a key role in shaping our environment. Given its mission, European agriculture faces a number of challenges that require joint action by all stakeholders to overcome.

An innovative approach that EU member states are increasingly adopting is a holistic approach through regenerative agriculture that restores ecosystems, improves soil health and improves biodiversity.

In the European area, temperate (suitable for diversified agricultural crops and seasonal cycles of agricultural crops), Mediterranean (suitable for the cultivation of olives, vines and citrus fruits), continental (due to cold winters, a choice of agricultural crops as well as frost protection is required) and oceanic climates suitable for the cultivation of cereals, potatoes and other types of vegetables, prevail. In principle, three types of soil prevail in the European area; fertile black soil (chernozem) suitable for growing cereals, podzol which is an acidic soil in the northern parts of Europe and requires fertility improvement measures, and luvisol which is a soil of good structure with a high humus content suitable for fruit and vegetable production. Heat waves, droughts and heavy rains can disrupt agricultural cycles and yields, while soil fertility, drainage and soil texture affect crop selection and necessary agrotechnical measures. The management of these factors is crucial for sustainable or regenerative agriculture in Europe.

The most important agricultural challenges relate to soil degradation, the impact of climate change and the management of water resources. Soil degradation refers to the decline in soil quality due to various factors such as erosion, compaction, nutrient depletion, and loss of organic matter. It affects crop productivity and ecosystem health. Solutions involve adopting regenerative practices like cover cropping (planting cover crops such as legumes or grasses during fallow periods helps protect soil from erosion, enhances organic matter, and promotes beneficial microbial activity), crop rotation (alternating different crops on the same land prevents nutrient depletion, reduces pests, and maintains soil fertility), reduced tillage (minimizing soil disturbance by reducing or eliminating tilling helps retain soil structure, prevents erosion, and encourages water infiltration), composting (adding organic matter through compost improves soil structure, nutrient availability, and microbial diversity) and avoiding synthetic chemicals (moving away from synthetic fertilizers, pesticides, and herbicides supports soil health and reduces environmental impact).

These methods enhance soil health and promote sustainable agriculture. Climate change poses significant challenges for agriculture. Rising temperatures, extreme weather events, and changing precipitation patterns affect crop growth, pests, and diseases. Adaptation strategies include developing heat-tolerant crop varieties, improving water-use efficiency, and implementing climate-smart practices. Mitigation efforts involve reducing greenhouse gas emissions from agriculture by optimizing fertilizer use and managing livestock. At the level of the European Union, agriculture is responsible for about 10% (438,994 MtCO₂e, 2017) of total greenhouse gas emissions, which ranks fifth, just behind the energy, transport, residential and commercial sectors. Two types of greenhouse gases are specifically attributed to agricultural practices: methane (CH₄), which is produced by livestock digestion, fertiliser management and rice cultivation, and nitrous oxide (N₂O), which is produced in agricultural soils that have been fertilised with organic fertiliser and mineral nitrogen and fertiliser management.

In the EU's agricultural sector, greenhouse gas emissions fell by 19% between 1990 and 2017. Methane emissions have decreased by 21% over the same period. Sustainable water management involves efficient irrigation techniques (drip irrigation, precision agriculture), rainwater harvesting, and water-saving technologies. Balancing water needs for agriculture, ecosystems, and human consumption is essential. The European Commission aims to use the Common Agricultural Policy (CAP) to ensure that agriculture contributes to the EU's climate policies. The CAP for 2023-2027 marks a turning point in the EU's agricultural policy.



The key aspects of the agricultural revolution and new policies are a greener structure, strategic planning, performance-based approach and greater flexibility. The European Green Deal's Farm to Fork Strategy sets out a framework for the transition to a sustainable food system where farmers can continue to meet society's food needs while protecting the climate. The CAP is a key instrument to support farmers in this transition, encompassing a range of regenerative measures, cross-compliance (cross-compliance rules protect natural resources that are under increasing pressure from climate change, and specific soil protection regulations, such as the minimum soil cover requirement under the GAEC 4 standard, contribute to carbon storage); green direct payments (for the maintenance of permanent grassland, the use of crop diversification and if they dedicate 5% of arable land to EFAs), rural development, new green architecture and other measures to mitigate the effects of climate change.

These regenerative measures have their legal basis: cross-compliance is governed by the regulations on financing, management and control of the Common Agricultural Policy (CAP) in Regulation (EU) No. 1306/2013, Implementing Regulation (EU) No 1306/2013. Regulation (EU) No 809/2014 and Delegated Regulation (EU) No 809/2014 640/2014; the rules on green direct payments are laid down in Regulation (EU) No 101/2013. Regulation (EU) No 1307/2013, Delegated Regulation (EU) No 1307/2013 Regulation (EU) No 639/2014 and Implementing Regulation (EU) No 639/2014 641/2014, while EU support for rural development comes from European Agricultural Fund for Rural Development (EAFRD) – Regulation (EU) No. 1305/2013. In addition to the CAP, there is also the European Green Deal, which focuses on sustainable food systems, and the European Commission has launched a strategic dialogue on the future of agriculture to support EU farmers and adapt agricultural policies to their needs. Sustainable agriculture, including regenerative approaches, is a key topic of this dialogue. In Europe, countries such as France, Spain, the Netherlands, Denmark, the Republic of Croatia etc. are already applying regenerative practices.

As some of the European examples, the 11-21 Canal Reach project (London, Great Britain) can be highlighted: the largest office building on London's Kings Cross Estate offers open spaces, roof gardens and indoor gardens, and the project aims to maximize natural views from the workplaces and the project 'Urban Gardens'. Urban Gardens Project was established in 2013 by the City of Zagreb to enable citizens to temporarily use small cultivable plots in the city for the production of food, spices and flowers for their own needs.

Besides the sustainable use of the land owned by the city, the project has many positive impacts like improved availability of healthy food, protection of city nature and biodiversity. Here are some other successful regenerative farming practices in Europe: a) intensive organic vegetable growing with minimal tillage, preserving the biological balance and fertility of the soil; b) polyculture fruit growing involves the cultivation of several fruit and auxiliary plant species in the same plantation, which increases the diversity and resilience of ecosystems; c) extensive livestock farming - holistically planned rotational grazing promotes soil and plant health and reduces the need for artificial fertilizers; d) inter-row farming includes the cultivation of crops between rows of permanent crops, as well as tillage without ploughing, which reduces erosion and improves soil structure; e) the use of natural fertilizers (nettle, comfrey) and compost to improve soil fertility; f) inter-row pasture in permanent crops and hedges contribute to sustainability; g) Land-based changes: Terracing, dry stone walls and reservoirs help to preserve the soil.

In sustainable agriculture in Europe, new technologies and policies play a key role in achieving the objectives of the aforementioned documents, which include: strategic dialogue on the future of agriculture; financial support for sustainable farm incomes through the Common Agricultural Policy (CAP); to increase the competitiveness; improving the position of farmers in the value chain while improving the share of farmers' added value in the food supply chain; investing in farmers' digital skills; initiatives such as the European Innovation

Partnership for Productivity and Sustainability in Agriculture (EIP-AGRI) promote sustainable practices and innovation - organic farming. By funding research and innovation, the Commission supports the development of modern agriculture and forestry systems that can contribute to climate action while remaining productive and lucrative. This year's Regenerative Agriculture Summit Europe marks a significant advancement as the focus expands beyond food systems to include textiles. EARA was founded in November 2023 with a clear mandate and vision of the European regenerative farmers' movement as an independent farmer-led coordination and political advocacy organisation. The uniqueness of EARA is that farmers of all EU contexts (young/old; big/small, organic/non-organic; pastoralist/arable; etc. The future of European regenerative agriculture is in knowledge, research and innovation etc.

Regenerative agriculture in Sub-Saharan Africa



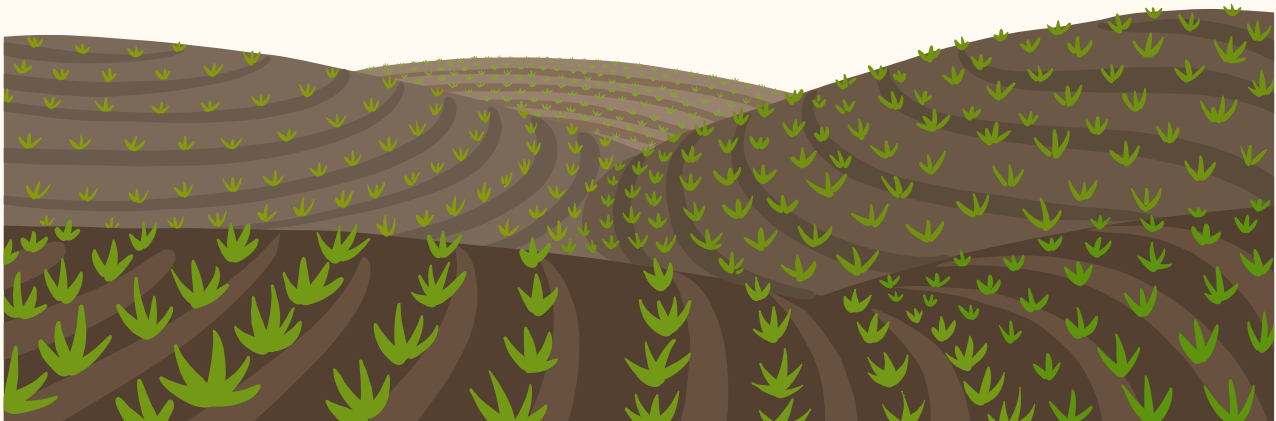
In Sub-Saharan Africa, environmental conditions greatly influence agricultural practices. The region experiences a mix of arid to humid tropical climates, affecting soil types and their agricultural potential. For example, Kenya and Tanzania have regions with rich volcanic soils that are highly fertile. Regenerative agriculture practices like agroforestry are increasingly vital for improving soil health and resilience against these varied environmental conditions. Sub-Saharan Africa faces significant agricultural challenges, including soil degradation, climate change impacts like altered precipitation patterns, increased frequency of extreme weather events, and inadequate water management systems. These challenges are exacerbated by the reliance on agriculture for livelihoods, with a high prevalence of smallholder farms.

The region's soils are often depleted of nutrients due to continuous cultivation without adequate soil management strategies. In response, regenerative practices such as reduced tillage and cover cropping are being adopted to enhance soil structure and fertility, and to reduce erosion. There are notable opportunities for innovation in regenerative agriculture across Kenya, Ghana, and Tanzania.

The introduction of technologies such as solar-powered irrigation systems addresses the challenge of water scarcity by providing a reliable water source without the high environmental cost of traditional fuel-based systems. Moreover, crop diversification and the use of drought-resistant crops contribute to greater resilience against climate variability.

Policy frameworks that support sustainable practices and offer incentives for farmers to adopt regenerative techniques are also crucial for the widespread adoption of these practices. Implementing regenerative agriculture is intrinsically linked to food security in the region. By improving soil health and water retention and reducing dependency on chemical inputs, these practices can lead to increased crop yields and more stable food supplies. Furthermore, enhancing biodiversity through practices like agroforestry provides additional food sources and income by selling tree products like fruits and timber.

In summary, regenerative agriculture in Kenya, Ghana, and Tanzania offers a pathway to address today's environmental and agricultural challenges while laying the foundation for more sustainable and resilient farming systems. The success of these practices hinges on continued innovation, supportive policies, and the scaling of practical techniques to benefit more farmers and communities across the region.



VET - Education Program



Welcome to our comprehensive training in regenerative agriculture! We are excited to have you join us on this journey toward sustainable and resilient farming. This training will provide you with the knowledge, skills, and practical experience needed to restore ecosystems, improve soil health, and promote biodiversity. Through hands-on learning and expert-led discussions, you will master regenerative practices beyond conventional farming. Our goal is to empower you to become leaders and innovators in the field, driving positive change for the planet

Curriculum Introduction



This curriculum is a non-formal curriculum, primarily intended for young people who wish to start farming or want to learn more about agriculture, especially sustainable, regenerative agriculture.

The target participants are therefore young people, regardless of their previous level of education (primary, secondary education or higher), with initial or no knowledge of regenerative agriculture.

The curriculum is planned in modules, so that it can be adapted to the climate in which the participants are, but also to the necessary knowledge they want to learn, as well as their previous knowledge.

Each lesson suggests the duration with the average time of guided learning for a group of participants. In addition, it also includes the total time that the average participant will need to master a particular lesson. The time is set for orientation, and each lecturer, if he believes that the dynamics of the group allows or requires it, is free to appropriately shorten or extend the education.

It should be noted that taking into account that several countries from Europe and Africa are involved in the creation of this curriculum, each of which may have different rules related to the duration of school hours, all the duration of lessons in the curriculum is written in minutes and regular hours (1 hour = 60 minutes).

Throughout the curriculum, various learning methods and techniques were proposed to the lecturers (such as ideas for dividing the participants into group work, questions and sub-questions that should be asked to the participants), in order to facilitate the process of both the guided learning of the participants and their independent learning in order that the average student achieves the learning outcomes contained in the program.

This curriculum aligns with the European Qualifications Framework as it incorporates both guided learning and work-based learning in the form of group exercises and individual work, ensuring comprehensive skill development for VET students. By combining structured group activities with independent study, the curriculum meets the standards for achieving defined learning outcomes and competencies.

The authors of this curriculum tried to list and include literature, teaching materials, applications or tools for additional learning and practice from free sources in order to enable easier accessibility to the widest possible population of participants.

Module Coverage

Our regenerative agriculture training program is structured into five comprehensive modules covering critical aspects of sustainable farming practices. These modules include:



Module 1: Introduction to Regenerative Agriculture



Module 2: Climate-Smart Farming Techniques



Module 3: Soil Health for Beginners



Module 4: Water and Pests in the Farm



Module 5: Starting Your Regenerative Farm

Each module combines theoretical knowledge with practical applications, ensuring that participants gain a well-rounded understanding of regenerative agriculture and can apply these practices effectively in real-world settings.

Expected Outcomes

Upon completing our regenerative agriculture training program, participants can expect to achieve the following outcomes:

- Gain a understanding of regenerative agriculture principles and practices, including soil health, biodiversity, water management, and holistic grazing.
- Acquire practical skills in implementing regenerative techniques such as composting, integrated pest management, and regenerative crop and livestock management.
- Develop the ability to design and manage farming systems that enhance soil fertility, improve water efficiency, and promote biodiversity, contributing to ecosystem restoration.
- Enhance critical thinking and problem-solving abilities to address agricultural challenges using innovative and regenerative solutions.
- Cultivate leadership skills and advocate for regenerative agriculture, capable of educating and inspiring others within their communities and networks.
- Understand the economic aspects of regenerative farming, including business planning and market strategies, to create profitable and sustainable agricultural enterprises.
- Strengthen community engagement skills, fostering collaborations and partnerships that support regenerative agricultural initiatives.
- Apply learned concepts through hands-on field practicums and case studies, gaining valuable experience that can be directly translated to participants' farming practices.
- Develop a mindset of continuous learning and adaptation, staying informed about the latest research and innovations in regenerative agriculture.



Module 1

Introduction to Regenerative Agriculture

This module is designed for farmers, agronomists, environmentalists, and sustainability activists, offering theoretical and practical knowledge on **regenerative agriculture**. This module, spanning 4 hours and 30 minutes, emphasizes soil health, biodiversity, and ecosystem resilience through interactive lectures, real-life case studies, and group discussions. It comprises three sessions: defining regenerative agriculture, exploring its necessity, and comparing it with other farming methods. At the end of this model, participants will gain insights into the core principles and benefits of regenerative farming, develop analytical skills to assess its impact and learn to plan farm operations incorporating these practices.



At the end of this module,
VET students will be able to:



Knowledge

1. Understand Regenerative Agriculture: Students will gain a clear understanding of what regenerative agriculture entails, including its core principles and why it is crucial for sustainable agriculture globally.
2. Benefit from Regenerative Farming: Students will be able to identify and describe the environmental and economic benefits of regenerative farming practices, such as improved soil health, increased biodiversity, and enhanced ecosystem services.
3. Do Comparative Analysis of Farming Methods: Students will learn about the differences and similarities between conventional, organic, and regenerative farming methods, highlighting the unique benefits and challenges of each approach.



Skills

1. Conceptual Understanding of Regenerative Practices: Develop a strong conceptual understanding of regenerative techniques such as cover cropping, crop rotation, and integrated livestock management.
2. Analytical Skills: Enhance analytical skills to assess the theoretical benefits of regenerative practices on farm ecosystems and identify opportunities for applying these practices.
3. Strategic Planning: Gain the ability to theoretically plan sustainable farm operations that incorporate regenerative agriculture principles, considering hypothetical environmental conditions and resources.

SESSION 1
What is Regenerative
Agriculture?

90 min

SESSION 2
Why Do We Need Regenerative
Farming?

90 min

SESSION 3
Comparing Different Farming
Methods

90 min



Teaching Methodology

- **Interactive Lectures:** These are used primarily to introduce the core concepts of regenerative agriculture. The lectures are enriched with visual aids such as diagrams, infographics, and videos to help illustrate complex ideas like soil health, biodiversity, and ecosystem services. This format allows for real-time questions and answers, fostering a dynamic learning environment.
- **Visual Aids and Real-Life Examples:** To enhance understanding, real-life case studies of farms implementing regenerative practices will be discussed. This helps students see the practical application of theoretical knowledge and understand the real-world impact of these practices.
- **Group Discussions:** After lectures or video presentations, students will engage in group discussions. This method facilitates peer learning and deeper understanding through the sharing of ideas and experiences among participants. It is particularly useful for consolidating learning and encouraging critical thinking about how regenerative practices can be applied in different agricultural settings.

- **Interactive Storytelling:** This approach will be used to share stories from real farmers who have transitioned to regenerative agriculture. Interactive storytelling helps in making the learning experience more relatable and memorable, allowing students to explore the challenges and successes faced by these farmers.
- **Comparative Analysis Activities:** Students will participate in activities that involve comparing regenerative agriculture with conventional and organic farming methods. This could include role-plays or interactive games that simulate decision-making processes in different farming scenarios, helping students understand the benefits and limitations of each approach.
- **Problem-solving Sessions:** In these sessions, students will work in teams to address hypothetical problems that could arise in regenerative farming. This hands-on approach enhances their ability to apply learned concepts to real-life scenarios and develop solutions that are both sustainable and practical.
- **Guest Lectures:** Where possible, experts in regenerative agriculture, soil science, and sustainable farming practices will be invited to speak. These guest lectures provide specialized knowledge and new perspectives, enriching the learning experience and offering networking opportunities for students.



Required Materials

Projector, Computer, Internet Connection, Presentation Materials, Whiteboard and Markers, Paper and Pencil, Worksheets, Copies of Handouts



Literature

1. LaCanne, C. E., & Lundgren, J. G. (2018). "Regenerative agriculture: merging farming and natural resource conservation profitably." PeerJ.
 - This study discusses the principles of regenerative agriculture and its benefits for both the environment and farmers, emphasizing the integration of farming practices with conservation efforts.<https://peerj.com/articles/4428/>
2. Rhodes, C. J. (2017). "The imperative for regenerative agriculture." Science Progress, 100(1), 80-129.
 - This article provides a comprehensive overview of why regenerative farming is necessary, focusing on its role in addressing soil degradation, biodiversity loss, and climate change.<https://journals.sagepub.com/doi/abs/10.3184/003685017X14876775256155>
3. Gosnell, H., Charnley, S., & Stanley, P. L. (2020). "Climate change mitigation as a co-benefit of regenerative ranching: insights from Australia and the United States." Interface Focus, 10(5), 20200027.
 - This paper compares regenerative farming practices across different regions, highlighting the potential for regenerative agriculture to serve as a climate change mitigation strategy.<https://royalsocietypublishing.org/doi/10.1098/rsfs.2020.0027>
4. Crowder, D. W., & Reganold, J. P. (2015). "Financial competitiveness of organic agriculture on a global scale." Proceedings of the National Academy of Sciences, 112(24), 7611-7616.
 - This study provides a comparative analysis of organic and regenerative farming methods, discussing the economic viability and environmental benefits of each.<https://www.pnas.org/content/112/24/7611>

5. Toensmeier, E. (2016). "The carbon farming solution: a global toolkit of perennial crops and regenerative agriculture practices for climate change mitigation and food security." Chelsea Green Publishing.

- This book offers a detailed comparison of different farming methods, including regenerative agriculture, and their potential to mitigate climate change and enhance food security.

<https://www.chelseagreen.com/product/the-carbon-farming-solution/>

6. Vamshi, M., Jagadeesan, R., Lamani, H. D., Rout, S., VijayKumar, R., Jagadesh, M., & Sachan, K. (2024). The Revolutionary Impact of Regenerative Agriculture on Ecosystem Restoration and Land Vitality: A Review. *Journal of Geography, Environment and Earth Science International*, 28(4), 1-14.

- Through a synthesis of comparative studies and case analyses, this review highlights the tangible benefits of regenerative practices, such as enhanced soil structure, fertility, and microbial health, alongside improved water infiltration and conservation, underscoring the pivotal role of biodiversity in bolstering farm resilience and ecological balance.

<https://doi.org/10.9734/jgeesi/2024/v28i4760>

7. O'Donoghue, T., Minasny, B., & McBratney, A. (2024). Digital Regenerative Agriculture. *npj Sustainable Agriculture*, 2(1), 5.

- This article considers (i) developing data on environmentally forward systems, (ii) presenting new challenges for monitoring, and (iii) by laying a foundation for the farmer-led data-driven site-specific refinement of management systems that prioritize outcomes for production through enhanced environmental function.

[Digital Regenerative Agriculture | npj Sustainable Agriculture \(nature.com\)](#).

8. Khangura, R., Ferris, D., Wagg, C., & Bowyer, J. (2023). Regenerative agriculture—A literature review on the practices and mechanisms used to improve soil health. *Sustainability*, 15(3), 2338.

- This article examined the reported benefits and mechanisms associated with RA against available scientific data. The literature suggests that agricultural practices such as minimum tillage, residue retention, and cover cropping can improve soil carbon, crop yield, and soil health in certain climatic zones and soil types. Excessive use of synthetic chemicals can lead to biodiversity loss and ecosystem degradation.

[Sustainability | Free Full-Text | Regenerative Agriculture—A Literature Review on the Practices and Mechanisms Used to Improve Soil Health \(mdpi.com\)](#)

Session 1

What is Regenerative Agriculture?

This session focuses on introducing participants to the fundamental concepts of regenerative agriculture. It aims to provide a comprehensive understanding of what regenerative agriculture is, its core principles, and why it is a critical approach to sustainable farming. The session will explore how regenerative agriculture differs from conventional agricultural methods by emphasizing soil health, biodiversity, and ecosystem restoration. Key topics include:

- The definition and goals of regenerative agriculture.
- The environmental, economic, and social benefits of regenerative practices.
- Case studies from around the world illustrating successful implementation.

By the end of this session, participants will have a solid foundation in the principles of regenerative agriculture, understanding how these practices can lead to healthier farming systems and sustainable food production.

At the end of this session, VET-students will be able to:

KNOWLEDGE

1. Define Regenerative Agriculture: Students will clearly explain what regenerative agriculture entails, including its core principles such as soil health, biodiversity, and ecosystem services.
2. Understand the Benefits: Identify and articulate the environmental, economic, and social benefits of regenerative agriculture, such as enhanced soil fertility, increased biodiversity, and improved water cycles.
3. Recognize Implementation Practices: Describe common practices used in regenerative agriculture, including no-till farming, cover cropping, crop rotation, and integrated livestock management.



Duration

90 min



Teaching Methodology

Oral presentations, discussions, demonstrations; participants will work individually, non-formal methods of learning (Group Discussions, Role-Playing Games, World Café Conversations)



Required Materials

Projector, computer, internet connection, presentation, whiteboard and markers, earplugs, paper and pencil, worksheets, copies of handouts and workshop summaries



Literature

1. The Regenerative Agriculture Manual - EIT Food (2022):

This manual is a crop-specific guidebook designed to help Mediterranean farmers transition from conventional or organic production systems to regenerative agriculture. It explains important regenerative agriculture practices such as cover crops, water management, diversification, and design.

<https://www.regeneration-academy.org/rar>

2. Regenerative Agriculture Framework - McCain (2024):

This framework outlines a pathway for farmers to support their progression toward a more regenerative model. It includes six key principles of regenerative agriculture that can be applied to the farming of potatoes, emphasizing soil health, water quality, biodiversity, and reducing the impact of synthetic inputs.

https://www.mccain.com/media/4594/mccain_regenag_framework_2024.pdf

3. Complete Guide on Regenerative Agriculture - FERVALLE:

This comprehensive guide explains the concept of regenerative agriculture and how to implement it. It covers the importance of soil, the principles of regenerative agriculture, and specific techniques like zero tillage and crop rotation.

<https://www.fervalle.com/en/complete-guide-on-regenerative-agriculture/>

4. Yadav, A., Prajapati, J., Kumar, R., & Upadhyay, A. (2023). Regenerative Agriculture-A Review. Vigyan Varta, 4(1), 107-109.

This article explains Regenerative agriculture in terms of Organic farming, Agroecology, Agroforestry, Biodiversity and its benefit

[Regenerative-Agriculture-A-Review.pdf \(researchgate.net\)](#)

5. O'donoghue, T., Minasny, B., & McBratney, A. (2022). Regenerative agriculture and its potential to improve farmscape function. Sustainability, 14(10), 5815.

The authors propose the Farmscape Function framework, to monitor the impact of change in our agricultural resources over time, and a mechanism to support further data-based innovation. These tools and the movement's intentions position regenerative agriculture as a state for rather than type of agriculture.

[Sustainability | Free Full-Text | Regenerative Agriculture and Its Potential to Improve Farmscape Function \(mdpi.com\)](#)

6. Newton, P., Civita, N., Frankel-Goldwater, L., Bartel, K., & Johns, C. (2020). What is regenerative agriculture? A review of scholar and practitioner definitions based on processes and outcomes. Frontiers in Sustainable Food Systems, 4, 577723.

Despite widespread interest in regenerative agriculture, no legal or regulatory definition of the term "regenerative agriculture" exists nor has a widely accepted definition emerged in common usage. This paper answers the research question: How have different scholars and practitioners defined regenerative agriculture? The article reviewed 229 journal articles and 25 practitioner websites to characterize the term "regenerative agriculture." Their review revealed that there were many definitions and descriptions of regenerative agriculture in usage.

[Frontiers | What Is Regenerative Agriculture? A Review of Scholar and Practitioner Definitions Based on Processes and Outcomes \(frontiersin.org\)](#)

Note for educators related to literature: In case you are unable to find the specified literature, in case of need for additional information, we suggest that you search for relevant scientific sources by searching for keywords: regenerative agriculture, organic production, soil health.

Links to relevant literature will be available on the project's website, <https://reviver-project.eu/>, and will be regularly updated.



1

INTRODUCTION



- The educator begins the session by outlining the critical relationship between sustainable farming practices and regenerative agriculture. They use visual aids such as diagrams, charts, and photos to illustrate how regenerative practices enhance soil structure, increase biodiversity, and improve water cycles.
- The educator encourages participants to share any prior knowledge or experiences related to sustainable or regenerative farming practices. This initial interaction helps to gauge the audience's existing understanding and tailor the session accordingly.
- The educator presents the key topics that will be covered in the session, including:
 - The definition and goals of regenerative agriculture.
 - The environmental, economic, and social benefits of regenerative practices.
 - An introduction to the core principles of regenerative agriculture such as minimizing soil disturbance, maintaining soil cover, and maximizing biodiversity.
- The educator emphasizes the importance of understanding these concepts as foundational to advancing sustainable agriculture and addressing global environmental challenges. This sets the stage for a deeper exploration of the topic in the main part of the session.
- Throughout the introduction, the educator facilitates a discussion, encouraging participants to ask questions and share their perspectives. This interactive approach helps to create an engaging and participatory learning environment.

Tips and Tricks for Educators:

- Employ a variety of visual aids, including diagrams of soil layers, photos of regenerative farms, and charts showing the benefits of biodiversity, to enhance understanding of complex concepts.
- Invite participants to relate their personal experiences with agriculture to the principles of regenerative farming. This can help contextualize the information and make it more relatable.
- Keep a conversational tone and be responsive to participants' questions and insights, fostering a collaborative and inclusive learning atmosphere.
- encourage participants to independently research basic terms related to regenerative agriculture, including its focus on soil health, biodiversity, and ecosystem services in order to make it easier for them to participate in classes

Learning Outcomes

Participants will grasp the basic principles of regenerative agriculture, including its focus on soil health, biodiversity, and ecosystem services.

Duration

30 min

Required Materials

Projector, Computer, Internet connection
Presentation slides,
Whiteboard and markers,
Handouts on climate change impacts, Worksheets for group discussions

MAIN PART AND CONCLUSION



Exploration of Regenerative Practices:

- The educator introduces specific regenerative practices, using detailed visual aids such as diagrams and videos to illustrate techniques like no-till farming, cover cropping, and the integration of livestock.

<https://youtu.be/ElmtlbqVwQM>

<https://youtu.be/3Knn7ZH4Tiw>

- Participants are shown case studies or video testimonials from farms that have successfully implemented these practices, highlighting the practical application and observed benefits.

<https://www.eitfood.eu/blog/farming-for-a-better-climate-five-examples-of-regenerative-farming-practices>

Group Activity:

- Participants are divided into small groups, each focusing on one regenerative practice. They are tasked with analyzing the benefits and potential challenges of their assigned practice, using guided worksheets that prompt them to consider environmental, economic, and social factors.

- Each group prepares a short presentation or poster summarizing their findings, which they will share with the larger group.

Discussion on Challenges and Solutions:

- Following the group presentations, the educator facilitates a discussion on the common challenges faced when implementing regenerative practices. This discussion also explores potential solutions and adaptations that could make these practices more viable.

- Participants are encouraged to think critically about how these practices can be adapted to different agricultural contexts and scales

Tips and Tricks for Educators:

- For group activities assign each group a different regenerative practice (e.g., crop rotation, agroforestry, holistic grazing). Provide them with a case study and ask them to identify key outcomes and potential challenges.
- Encourage groups to create a presentation or poster summarizing their findings, focusing on how these practices can be implemented in their local context.
- During discussions, prompt participants to consider both the benefits and the practical challenges of implementing regenerative practices.
- Specific Questions to Ask:

"Considering the soil composition and climate of your region, which regenerative practice would be most effective and why?"

"What are the potential barriers to implementing holistic grazing in urban-adjacent agricultural areas, and how might these be overcome?"

"How could local wildlife be affected by the introduction of agroforestry, and what measures could be taken to ensure biodiversity is not only maintained but enhanced?"

- Prepare to address common misconceptions about regenerative agriculture during a Q&A session. Provide additional resources for participants who wish to delve deeper into specific practices or case studies.
- Encourage the students to go independently through the whole suggested videos and materials to better understand the content
- If the group consists of more than 15 students, the educator can plan more time for assembling the groups, animating the work and presenting the topics of each group and the final discussion

Learning Outcomes	Duration	Required Materials
- Students will explore in-depth the specific practices and techniques that define regenerative agriculture, such as no-till farming, cover cropping, and biodiversity enhancement. - Students will critically analyze the benefits and challenges associated with implementing regenerative agriculture practices, focusing on environmental, economic, and social aspects.	35 min	Projector, Computer, Internet connection, Presentation slides, Flipchart and markers, Paper and pencil, Worksheets
The total time that the average student will spend to learn all concepts 4 hours: 90 min guided learning and 3 hours of independent learning activities of participants: watching the entire suggested videos and studying case studies independently as well as repeating key words and concepts at home.		

Session 2

Why Do We Need Regenerative Farming?

This session aims to explore the critical reasons behind the need for regenerative farming and its benefits over conventional agricultural methods. Participants will delve into how regenerative practices not only restore and enhance the health of the ecosystem but also provide substantial benefits to both the environment and the farming community. The session will cover the ecological, economic, and social advantages of regenerative farming, such as increased biodiversity, improved soil health, water retention, and resilience to climate change.

Key topics include:

- **Environmental Impact:** Discussion on how regenerative farming practices reduce carbon footprints, enhance soil structure, and increase biodiversity.
- **Economic Benefits:** Analysis of how regenerative practices can reduce costs and increase profitability for farmers through enhanced soil fertility and reduced dependency on chemical inputs.
- **Social and Health Benefits:** Exploration of how regenerative farming can lead to healthier food products and stronger, more sustainable communities.

At the end of this session, VET-students will be able to:

KNOWLEDGE

1. Explain how regenerative farming practices contribute to environmental sustainability, including enhanced biodiversity, improved soil health, and better water management.
2. Identify the economic benefits that regenerative farming offers to farmers, such as reduced input costs, enhanced crop yields, and potential premium market prices for regeneratively grown products.
3. Discuss the social and health benefits of regenerative farming, including promoting community resilience, providing nutritious food, and supporting local economies.
4. Analyze the broader implications of regenerative farming for global food security and environmental sustainability, understanding its role in combating challenges like climate change and land degradation.



Duration

90 min



Teaching Methodology

Interactive Lectures and Presentations, Group Discussions, Specific Questions for Engagement, Case Studies, Role-Playing Activities



Required Materials

Projector, Computer, Internet Connection, Presentation Materials, Whiteboard and Markers, Paper and Pencil, Worksheets, Copies of Handouts



Literature

1. Regeneration International - Why Regenerative Agriculture?
<https://regenerationinternational.org/why-regenerative-agriculture/>
2. NRDC - Regenerative Agriculture 101
<https://www.nrdc.org/stories/regenerative-agriculture-101#what-is>
3. EIT Food - Farming for a Better Climate: Five Examples of Regenerative Farming Practices
<https://www.eitfood.eu/blog/farming-for-a-better-climate-five-examples-of-regenerative-farming-practices>
4. Rehberger, E., West, P. C., Spillane, C., & McKeown, P. C. (2023). What climate and environmental benefits of regenerative agriculture practices? an evidence review. *Environmental Research Communications*.
[What climate and environmental benefits of regenerative agriculture practices? an evidence review - IOPscience](#)
5. Jaworski, C. C., Krzywoszynska, A., Leake, J. R., & Dicks, L. V. (2024). Sustainable soil management in the United Kingdom: A survey of current practices and how they relate to the principles of regenerative agriculture. *Soil Use and Management*, 40(1), e12908.
[Sustainable soil management in the United Kingdom: A survey of current practices and how they relate to the principles of regenerative agriculture - Jaworski - 2024 - Soil Use and Management - Wiley Online Library](#)



1

INTRODUCTION

- The educator starts the session by presenting a compelling question to the participants: "How can we transform agriculture to be a solution to environmental challenges rather than a contributor?" This question aims to spark curiosity and frame the session's focus on regenerative farming as a key strategy for sustainable agriculture.
- The educator briefly introduces the key topics that will be covered in the session, including the environmental impact, economic benefits, and social and health benefits of regenerative farming. This introduction aims to provide participants with a roadmap of what to expect and how each topic contributes to understanding the need for regenerative farming.
- To conclude the introduction, the educator invites participants to share their expectations for the session and any specific questions or topics they hope to explore. This open invitation encourages participant engagement and helps tailor the session to the audience's interests.

Learning Outcomes	Duration	Required Materials
Students will recognize the critical role of regenerative farming in addressing environmental challenges, understand its multifaceted benefits including environmental, economic, and social aspects, and articulate their own expectations and questions regarding the implementation and impact of regenerative practices in agriculture	30 min	Projector and computer for displaying visuals, Internet connection for live polling (if applicable). Pre-selected images and video clips showcasing regenerative farming practices and their impacts.

2

MAIN PART AND CONCLUSION

Detailed Discussion on Environmental Impact:

- The educator uses a combination of slides and short documentary clips to illustrate how regenerative farming practices like cover cropping, rotational grazing, and agroforestry contribute to reducing carbon footprints, enhancing soil structure, and increasing biodiversity.

<https://youtu.be/ljlzUcSwJxM>

<https://youtu.be/V6m-XlPnqxl>

- Participants are asked to match specific regenerative practices with the environmental benefits they promote, using a printed chart or digital tool.

Economic Benefits Analysis:

- Breakout groups are formed, and each group is given a case study of a farm that has transitioned to regenerative practices. The groups analyze the economic data provided, focusing on cost savings, yield improvements, and market benefits associated with regenerative products.
- Each group presents their findings, highlighting how regenerative practices have led to economic benefits. The educator facilitates a discussion on how these economic advantages can be a driving force for wider adoption of regenerative farming.

Exploration of Social and Health Benefits:

- The educator presents examples of communities where regenerative farming has led to improved food quality and community health. Participants are shown before-and-after scenarios regarding community health indices and local food system changes.
- A guided discussion follows, where participants explore how regenerative farming can strengthen community ties, improve public health, and support local economies.

Tips and Tricks for Educators:

- Discuss with the participants whether there is an application like Covercrop for their climate, or perhaps there is a possibility of creating such an application, which would help the wider population in the transition to regenerative agriculture
- To divide the participants into groups, use games such as puzzle search (each participant gets one piece of the puzzle and finds their match), using pictures or concepts to discuss in their group.
- During the processing of case studies, encourage participants to actively participate, focusing on how these practices can be implemented in their local context, give them examples of economic indicators that they should think about, and encourage them to think outside the box. Ask them questions like "In what way can additional savings be made?", "Do you think there is a possibility to reuse some elements, such as recycling plastic or glass bottles?" "What do you think, would your community get involved in such an undertaking?" "Would you be able to sell the products produced by this farm?"
- During discussions, prompt participants to consider both the benefits and the practical challenges of implementing regenerative practices.
- Specific Questions to Ask: How do you think the transition to regenerative agriculture has helped the entire community? Do you think there was resistance to this way of production and life? How would you present the benefits of regenerative agriculture to your community?
- Also, encourage VET-students to research examples of regenerative agriculture in their environment and ask about the economic, social and health benefits of regenerative agriculture

Learning Outcomes	Duration	Required Materials
- Students will be able to explain how regenerative farming practices like cover cropping, rotational grazing, and agroforestry contribute to reducing carbon footprints, enhancing soil structure, and increasing biodiversity. They will understand the mechanisms behind these benefits and how they contribute to overall ecosystem health.	75 min	Projector and computer for presentations.
- Participants will explore how regenerative farming influences community well-being and public health. They will discuss examples where regenerative practices have led to improved food quality and stronger, more resilient communities. This outcome aims to highlight the broader social implications and benefits of regenerative agriculture.		Access to documentary clips and digital tools for interactive activities.
		Printed charts or handouts for group activities.
		Case studies with economic data of farms practicing regenerative agriculture.
The total time that the average student will spend to learn all concepts		
4 hours: 90 min guided learning and additional time for independent learning activities of participants: watching the entire suggested videos and studying case studies and examples provided in group work independently as well as repeating key words and concepts at home.		

Session 3

Comparing Different Farming Methods

This session aims to provide participants with a comparative analysis of different farming methods, focusing on traditional, modern (conventional), and sustainable (including regenerative and organic) practices. The session will explore the impacts of these methods on the environment, economy, and society, highlighting the advantages and challenges associated with each approach. Participants will gain insights into how different farming practices influence soil health, biodiversity, crop productivity, and resilience to climate change.

At the end of this session, VET-students will be to:

KNOWLEDGE

1. Identify the key characteristics of traditional, modern, and sustainable farming methods.
2. Analyze the environmental impacts of each farming method, including effects on soil health, water usage, and biodiversity.
3. Discuss the social and health aspects related to farming practices, including food security, nutritional value, and community well-being.
4. Compare and contrast the sustainability of each farming method



Duration

90 min



Teaching Methodology

- **Interactive Lectures:** To introduce the core concepts and provide an overview of each farming method.
- **Group Discussions:** Facilitate peer learning and deeper understanding through sharing of ideas and experiences among participants.
- **Case Studies:** Analyze real-world examples of farms that have implemented each type of farming practice.
- **Comparative Analysis Activity:** Participants work in groups to compare the farming methods based on provided criteria, using worksheets and discussion guides.



Required Materials

Projector and computer for presentations and videos, Handouts containing information on each farming method, Worksheets for comparative analysis activity, Whiteboard and markers for group discussions.



Literature

1. Sustainable Agriculture vs. Industrial Agriculture" – FoodPrint
<https://foodprint.org/issues/sustainable-agriculture-vs-industrial-agriculture/>

2. Environmental Impact of Traditional Farming: 5 Effects" - Eden Green

<https://www.edengreen.com/blog-collection/environmental-impact-of-traditional-and-vertical-farming-2021-report>

3. Traditional vs. Modern Farming Techniques: A Comparative Analysis

<https://milkandhoneyranch.com/gardening-and-farming/traditional-vs-modern-farming-techniques-a-comparative-analysis/>

4. Impact of Organic Farming on the Sustainability of European Agriculture" - European Parliament

[https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/628291/EPRS_BRI\(2018\)628291_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/628291/EPRS_BRI(2018)628291_EN.pdf)

5. The Impact of Traditional and Modern Farming Practices on European Agriculture" - European Environment Agency (EEA)

<https://www.eea.europa.eu/publications/farming-practices-in-europe>



1

INTRODUCTION

- The educator introduces the session by outlining the importance of understanding different farming methods and their impacts.
- A brief overview of traditional, modern, and sustainable farming methods is provided, using visual aids to highlight key practices.

Learning Outcomes

Duration

Required Materials

- Students will be acquainted with different farming methods

15 min

Presentation Tools
Visual aids (posters, pictures etc)

2

MAIN PART



Group Activity: Participants are divided into groups, each assigned a specific farming method (Conventional Farming, Organic Farming, Sustainable Farming, Regenerative Farming, Permaculture, etc) to analyze. Groups use worksheets to guide their analysis on environmental, economic, and social impacts.

Case Study Presentations: Each group presents a case study of a farm using their assigned farming method, discussing the benefits and challenges observed.

Comparative Discussion: The educator facilitates a discussion comparing the farming methods, encouraging participants to share insights from the group activity and case studies.

Tips and Tricks for Educators

- Use a random method like drawing names from a hat to form groups. This encourages diversity and prevents students from always choosing familiar partners. Alternatively, deliberately form groups to balance skills and knowledge, ensuring each group has a mix of strengths.
- Provide each group with a set of focused questions to guide their analysis. For example, "How does this farming method impact soil health?" or "What are the economic benefits and challenges of this method?", "Which social changes could be initiated by the application of certain farming methods", and "Do you think that the health aspects of a particular method can influence the choice of that particular farming method?" This keeps discussions on track and ensures comprehensive analysis.
- Provide clear criteria and a rubric for case study presentations. This helps groups understand what is expected in terms of content, presentation style, and time management.

- Incorporate real-world examples and current events related to farming methods to demonstrate the relevance of the topic to everyday life and global challenges.

Learning Outcomes	Duration	Required Materials
- Students will learn how each farming method affects environmental factors - Students will understand the economic benefits and challenges associated with each farming method - Students will explore the social and health implications of each farming method, considering aspects like community well-being and food quality.	60 min	Worksheets Case Studies Presentation Tools Whiteboard and Markers

3

CONCLUSION

- The educator summarizes the key points discussed, emphasizing the importance of choosing appropriate farming methods based on sustainability criteria.
- A final Q&A session allows participants to clarify doubts and reflect on their learning.

Tips and Tricks for Educators

- When summarizing the session, ensure to cover all critical aspects discussed, including environmental, economic, and social impacts of each farming method. Use visual aids like charts or diagrams to reinforce these points.
- Do not forget to emphasize the importance of long-term viability and resilience to climate change for each of the methods.
- Create an encouraging environment for participants to ask questions. Addressing doubts not only clarifies concepts but also deepens understanding. Be prepared to provide additional resources or references for participants interested in exploring specific topics further.
- Encourage participants to share their takeaways from the session and how they might apply what they've learned. This can be facilitated through a roundtable discussion or reflective writing activity.
- Inform participants about additional resources, upcoming workshops, or courses that can further their understanding of sustainable and regenerative farming practices.

Learning Outcomes	Duration	Required Materials
- Students will be able to summarize the main differences and similarities between traditional, modern, and sustainable farming methods, focusing on their impacts on the environment, economy, and society. - Students will understand the importance of selecting farming methods that align with sustainability criteria, considering the specific needs and conditions of their agricultural operations.	15 min	Prepared handouts summarizing the key points discussed in the session, including a comparative analysis of the farming methods. Q&A Cards Projector and computer

The total time that the average student will spend to learn all concepts

4 hours: 90 min guided learning and time for independent learning activities of participants: repetition of terms and research on all farming methods discussed between groups in this session, in terms of regenerative agriculture

Climate Smart Farming Techniques

The "Climate Smart Farming Techniques" module is tailored for innovative farmers, agricultural professionals, and environmental advocates, focusing on enhancing farm resilience, reducing greenhouse gas emissions, and optimizing productivity amidst climate change. Spanning 4 hours 30 minutes, the module comprises three sessions: understanding climate change impacts on European agriculture, implementing climate-resilient farming practices, and accessing climate information for decision-making. Through interactive lectures, case studies, and group discussions, participants will learn the scientific principles of climate change, its effects on European agriculture, and strategies for adaptation and mitigation. This module equips participants with practical tools and knowledge for sustainable, climate-smart farming.



At the end of this module, VET students will be able to:

This module consists of three sessions with a total duration of 7 hours, and it will cover the following sessions: *Presentation of Climate Change Impacts on Regional Agriculture; Climate-Resilient Farming Practices; Accessing Climate Information and Resources*. This layout is intended to methodically build participants' understanding of climate-smart farming, starting from the impacts of climate change on agriculture, through the practical implementation of adaptive farming techniques, to the effective use of climate-related information for better decision-making.



Knowledge

1. Understand Climate-Smart Agriculture: Clearly explain what climate-smart farming entails and why it is crucial for sustainable agriculture in a regional context, addressing its role in adaptation to and mitigation of climate change effects.
2. Understand the impact of Climate Change Impacts on Agriculture: Identify and describe how climate change specifically affects agricultural practices in different regions of Europe and/or Sub-Saharan Africa, focusing on changes in weather patterns, precipitation, and potential pest and disease outbreaks.
3. Elaborate on Adaptation Strategies and Their Importance: Elaborate on the various strategies that can be employed to adapt farming practices to changing climatic conditions, highlighting the importance of resilience in agricultural planning.



Skills

1. Implementing Climate-Smart Techniques: Develop practical skills to implement specific climate-resilient practices such as crop diversification, efficient water management, and soil conservation techniques.
2. Analyzing and Applying Climate Data: Enhance capabilities to utilize and interpret climate forecasts and real-time data to make informed farming decisions.
3. Developing Adaptation Plans: Craft and execute a climate adaptation plan for a farming operation, considering local climate threats and available resources.

SESSION 1
Presentation of Climate Change
Impacts on Regional Agriculture

90 min

SESSION 2
Climate-Resilient Farming
Practices

90 min

SESSION 3
Accessing Climate Information
and Resources

90 min



Teaching Methodology

- **Interactive Lectures:** Used primarily to introduce key concepts and theories related to climate-smart farming and the impacts of climate change on agriculture. This method allows for real-time questions and answers, fostering a dynamic learning environment.
- **Group Discussions:** Facilitate peer learning and deeper understanding through sharing of ideas and experiences among participants. This approach is especially useful after presentations and lectures to consolidate learning and encourage critical thinking.

- **Case Studies:** Participants will analyze real-world examples of farms that have successfully implemented climate-smart practices. This methodology helps bridge theory with practical application and demonstrates the tangible benefits and challenges of these practices.
- **Hands-on Activities:** Essential for teaching practical skills such as soil testing, water management techniques, and the use of climate data in farming decisions. This methodology involves field visits (where feasible), demonstrations, and the use of simulation tools.
- **Problem-solving Sessions:** Participants will work in teams to solve specific problems related to climate-resilient farming. This method enhances their ability to apply learned concepts in realistic scenarios.
- **Guest Lectures:** Experts from the field of climate science, agronomy, and sustainable farming practices will be invited to provide specialized knowledge and insights, enhancing the learning experience and providing networking opportunities.



Required Materials

Projector, Computer, Internet Connection, Presentation Materials, Whiteboard and Markers, Paper and Pencil, Worksheets, Copies of Handouts.



Literature

1. Lipper, L., McCarthy, N., & Zilberman, D. (Eds.). (2018). Climate-Smart Agriculture: Building Resilience to Climate Change. Springer.
<https://link.springer.com/book/10.1007/978-3-319-61194-5>.
2. Iglesias, A., Quiroga, S., Moneo, M., & Garrote, L. (2012). From climate change impacts to the development of adaptation strategies: challenges for agriculture in Europe. *Climatic change*, 112(1), 143-168
<https://link.springer.com/article/10.1007/s10584-011-0344-x>
3. Weiss, C., & Finger, R. (2020). The Role of Climate Change in European Agriculture: Challenges and Solutions. *European Journal of Agronomy*, 118, 126-135.
<https://link.springer.com/book/10.1007/978-3-030-03383-5>.
4. Neufeldt, H., Jahn, M., Campbell, B. M., Beddington, J. R., DeClerck, F., De Pinto, A., ... & Zougmore, R. (2013). Beyond climate-smart agriculture: toward safe operating spaces for global food systems. *Agriculture & Food Security*, 2(1), 1-6.
<https://agricultureandfoodsecurity.biomedcentral.com/articles/10.1186/2048-7010-2-12>
5. Roy, T., Kalambukattu, J. G., Sarkar, A., Rashmi, I., Pal, R., Singhal, V., ... & Kumar, S. (2024). Climate Crisis and Adoption of Climate-Smart Agriculture Technologies. In *Climate Crisis: Adaptive Approaches and Sustainability* (pp. 229-252). Cham: Springer Nature Switzerland. [Climate Crisis and Adoption of Climate-Smart Agriculture Technologies | SpringerLink](#)
6. Shofiyati, R., Habibie, M. I., Cahyana, D., & Susanti, Z. (2024). Precision Farming to Achieve Sustainable and Climate Smart Agriculture. In *Technological Approaches for Climate Smart Agriculture* (pp. 229-248). Cham: Springer International Publishing.
[Precision Farming to Achieve Sustainable and Climate Smart Agriculture | SpringerLink](#)

7. Gryshova, I., Balian, A., Antonik, I., Miniailo, V., Nehodenko, V., & Nyzhnychenko, Y. (2024). Artificial intelligence in climate smart in agricultural: toward a sustainable farming future. Access Journal, 5(1), 125-140. [artificial_intelligence_in_climate_smart_in_agricultural-toward_a_sustainable_farming_future.pdf \(access-bg.org\)](#)

8. Gemtou, M., Kakkavou, K., Anastasiou, E., Fountas, S., Pedersen, S. M., Isakhanyan, G., ... & Pazos-Vidal, S. (2024). Farmers' Transition to Climate-Smart Agriculture: A Systematic Review of the Decision-Making Factors Affecting Adoption. Sustainability, 16(7), 2828. [Sustainability | Free Full-Text | Farmers' Transition to Climate-Smart Agriculture: A Systematic Review of the Decision-Making Factors Affecting Adoption \(mdpi.com\)](#)

9. Zhao, J., Liu, D., & Huang, R. (2023). A review of climate-smart agriculture: Recent advancements, challenges, and future directions. Sustainability, 15(4), 3404. [Sustainability | Free Full-Text | A Review of Climate-Smart Agriculture: Recent Advancements, Challenges, and Future Directions \(mdpi.com\)](#)

10. Singh, J. (2023). ADVANCE TECHNIQUES IN CLIMATE SMART FARMING. [researchgate.net/profile/Parameswari-E/publication/380880523_Advance_techniques_in_climate_smart_farming/links/6652df670bod2845745b1476/Advance-techniques-in-climate-smart-farming.pdf](#)

Session 1

Presentation of Climate Change Impacts on European Agriculture

This session focuses on educating participants about the various impacts of climate change on agriculture across Europe Sub-Saharan Africa. Students will explore how rising temperatures, changing precipitation patterns, and increasing frequency of extreme weather events are affecting crop productivity, altering agricultural landscapes, and necessitating shifts in farming practices. The session will utilize a combination of interactive lectures and visual aids such as maps and graphs to demonstrate regional differences in climate impacts. Key topics include the adaptation strategies currently being implemented by European and/or Sub-Saharan Africa farmers to mitigate these challenges, with a particular emphasis on sustainable and resilient agricultural practices. Participants will gain a comprehensive understanding of the critical relationship between climate change and agricultural sustainability in the European context.

At the end of this session, VET-students will be able to:

KNOWLEDGE

1. **Understand Climate Change Fundamentals:** Grasp the basic scientific principles of climate change, focusing on how these changes are evidenced through global warming, altered weather patterns, and increased frequency of extreme weather events.
2. **Identify Specific Impacts on Agriculture:** Recognize and articulate specific ways in which climate change impacts agriculture in Europe, including temperature shifts, precipitation variability, and the proliferation of pests and diseases.
3. **Understand Regional Variability and Implications:** Analyze the differing impacts of climate change across various European and/or Sub-Saharan Africa agricultural regions, understanding how local climates and particular farming practices influence vulnerability and resilience.
4. **Identify Adaptive Strategies in Agriculture:** Learn about current strategies and innovations that European and/or Sub-Saharan Africa farmers are implementing to adapt to climate change, such as altering crop cycles, adopting water-efficient practices, and integrating climate-smart agricultural technologies.
5. **Elaborate on Implications for Policy and Practice:** Discuss the broader implications of climate change impacts for agricultural policy and practice within Europe and/or Sub-Saharan Africa, considering both mitigation and adaptation strategies.



Duration

90 min



Teaching Methodology

Oral presentations, discussions, demonstrations; participants will work individually, non-formal methods of learning (Group Discussions, Role-Playing Games, World Café Conversations)



Required Materials

Projector, computer, internet connection, presentation, whiteboard and markers, earplugs, paper and pencil, worksheets, copies of handouts and workshop summaries



Literature

1. Olesen et al. (2004): "Agricultural impacts and adaptations to climate change in Europe" - This study provides an overview of the projected impacts of climate change on European agriculture, including changes in temperature and precipitation patterns, and the potential effects on crop productivity and agricultural practices

https://www.pik-potsdam.de/avec/peyresq2005/talks/0926/bindi/literature/olesen_bindi_2004.pdf

2. European Commission (2007): "Adaptation to Climate Change in the Agricultural Sector" - This report discusses the potential impacts of climate change on European agriculture and the need for adaptive strategies, including changes in agricultural policy and practice

https://agriculture.ec.europa.eu/system/files/2020-02/ext-study-adapt-climate-change-full-text_2007_en_o.pdf

3. Haj-Amor et al. (2023): "Sustainable Agriculture: Adaptation Strategies to Address Climate Change by 2050" - This book provides a comprehensive overview of the potential impacts of climate change on European agriculture and the need for adaptive strategies, including changes in agricultural policy and practice

<https://www.routledge.com/Sustainable-Agriculture-Adaptation-Strategies-to-Address-Climate-Change-by-2050/Haj-Amor-Kim-Bouri/p/book/9781032518459>

4. Vishnoi, S., & Goel, R. K. (2024). Climate smart agriculture for sustainable productivity and healthy landscapes. *Environmental Science & Policy*, 151, 103600. [Climate smart agriculture for sustainable productivity and healthy landscapes - ScienceDirect](#)

These are the Highlights from the article: Climate-smart agriculture can help achieve many of the SDGs., Productivity needs to be balanced with environmental and social consequences judiciously., Agriculture and rural development can cope with unemployment and distress migration., Spatiotemporal data driven paradigm has been proposed for regenerative agriculture., AI-driven big data analytics and circular ecosystem underpin climate smart agriculture.

5. Mpala, T. A., & Simatele, M. D. (2024). Climate-smart agricultural practices among rural farmers in Masvingo district of Zimbabwe: perspectives on the mitigation strategies to drought and water scarcity for improved crop production. *Frontiers in Sustainable Food Systems*, 7, 1298908. [Frontiers | Climate-smart agricultural practices among rural farmers in Masvingo district of Zimbabwe: perspectives on the mitigation strategies to drought and water scarcity for improved crop production \(frontiersin.org\)](#). This paper employs participatory research methods to examine adaptive strategies adopted by rural farmers. The strategies include optimal water resource utilization, early maturing seed adoption, soil and water conservation (SWM), and nutrient management techniques (NMT). Cost-effective integration of labor and post-harvest storage facilities is also considered. Rural farmers, despite constraints, actively engage in these adaptive practices. The study assesses the effectiveness of initiatives to enhance crop production and build resilience against climate variability.

6. Swarnam, T. P., Velmurugan, A., Subramani, T., Ravisankar, N., Subash, N., Pawar, A. S., ... & Dam Roy, S. (2024). Climate smart crop-livestock integrated farming as a sustainable agricultural strategy for humid tropical islands. *International Journal of Agricultural Sustainability*, 22(1), 2298189. Full article: [Climate smart crop-livestock integrated farming as a sustainable agricultural strategy for humid tropical islands \(tandfonline.com\)](https://doi.org/10.1016/j.ijags.2024.2298189). This is evidence from a long-term (2011-2018) study undertaken to evaluate practices in a crop-livestock integrated farming system (IFS) approach as a climate-smart agricultural (CSA) strategy for enhancing agricultural production on a humid tropical island. The results showed a significant increase in on-farm productivity from 2.8 t ha⁻¹ in 2011–35.6 t ha⁻¹ in 2018 and net returns from USD 359 to more than 3500 ha⁻¹ due to the adoption of CSA practices.



1

INTRODUCTION

- The educator begins the session by highlighting the critical relationship between climate change and agriculture in European and Sub-Saharan Africa . They use visual aids such as maps, graphs, and diagrams to demonstrate the regional differences in climate impacts.
- The educator encourages participants to share their prior knowledge and experiences related to climate change and its effects on regional agriculture. This helps establish a connection with the participants' existing understanding of the topic.
- To provide a comprehensive overview, the educator presents the key topics that will be covered in the session, including:
 - Rising temperatures and their impact on crop productivity
 - Changing precipitation patterns and their influence on agricultural landscapes
 - Increased frequency of extreme weather events and their challenges for farming practices
- The educator emphasizes the importance of understanding the fundamental concepts of climate change and its implications for the sustainability of regional agriculture. This sets the stage for the more detailed exploration of the topic in the main part of the session.
- Throughout the introduction, the educator engages participants in a discussion, encouraging them to ask questions and share their perspectives. This interactive approach helps to create an engaging and participatory learning environment.

Tips and Tricks for Educators:

- Use a variety of visual aids, such as maps, graphs, and diagrams, to enhance the participants' understanding of the regional differences in climate impacts.
- Encourage participants to share their personal experiences and knowledge related to climate change and agriculture, as this can help to contextualize the information and make it more relatable.
- Maintain a conversational tone and be responsive to participants' questions and concerns, as this can help to build trust and foster a collaborative learning atmosphere.
- Provide clear learning objectives and an overview of the session's structure to help participants understand the scope and focus of the presentation.

Learning Outcomes**Duration****Required Materials**

- Understand the importance of climate change in the context of European and/or Sub-Saharan Africa agriculture.

- Recognize the potential impacts of climate change on European and/or Sub-Saharan Africa agriculture.

30 min

Projector, Computer, Internet connection, Presentation slides, Whiteboard and markers, Handouts on climate change impacts, Worksheets for group discussions

MAIN PART

- Presentation on Specific Impacts of Climate Change on Agriculture:

The educator presents detailed information on the specific impacts of climate change on European agriculture, including:

- Temperature shifts and their effects on crop productivity
- Changes in precipitation patterns and their influence on water availability for agriculture
- Increased frequency and intensity of extreme weather events, such as droughts, floods, and heatwaves, and their challenges for farming practices
- Proliferation of pests and diseases and their impact on crop health

The educator uses visual aids, such as graphs, charts, and case studies, to illustrate these impacts and make the information more engaging and accessible for the participants.

- Group Discussions on Regional Variability:

The educator divides the students into smaller groups and assigns them different agricultural regions to discuss.

Each group is tasked with analyzing the differing impacts of climate change on their assigned region, considering factors such as local climates, farming practices, and the vulnerability and resilience of the agricultural systems.

Participants are encouraged to draw on the information presented earlier and their own knowledge to identify the unique challenges and opportunities faced by their assigned region.

The groups then present their findings to the larger group, fostering a collaborative learning environment and allowing for the exchange of ideas and perspectives.

- Case Studies and Real-Life Examples:

The educator incorporates case studies and real-life examples to further illustrate the effects of climate change on crop productivity and farming practices in different regions.

These examples help participants contextualize the information and better understand the practical implications of climate change on European agriculture.

Students are encouraged to engage with the case studies, asking questions and sharing their own experiences or insights related to the topics presented.

Tips and Tricks for Educators:

- **Group Formation** - Divide participants into smaller groups based on the different European agricultural regions they will analyze. Ensure a mix of participants in each group to capture diverse perspectives and insights. As a way of putting people into groups, you can make the game "flag puzzle search", where you will divide the flag of each country into several parts, and the participants will search for each other and combine the parts into one flag
- Pose questions like: How do temperature shifts affect crop productivity in your region? What challenges do extreme weather events like droughts pose for farming practices in your region? How can changes in precipitation patterns influence water availability for agriculture in your region?
- Use graphs, charts, and maps to visually represent the impacts of climate change on European agriculture. Incorporate case studies and real-life examples to provide practical insights and enhance understanding.
- Foster a collaborative learning environment where participants can share findings and exchange ideas. Encourage groups to present their analyses to the larger group, promoting discussion and knowledge sharing.
- **Encourage Critical Thinking** - Prompt participants to think critically about the unique challenges and opportunities faced by their assigned regions. Ask them to consider adaptation strategies and potential solutions to mitigate the impacts of climate change on agriculture.

Learning Outcomes	Duration	Required Materials
- Identify specific ways in which climate change affects agriculture in Europe and/or Sub-Saharan Africa - Analyze the regional variability in climate change impacts on agricultural regions.	60 min	Projector, Computer, Internet connection, Presentation slides, Flipchart and markers, Paper and pencil, Worksheets

CONCLUSION

- The educator leads a final discussion summarizing the key concepts covered in the session, including the effects of temperature shifts, precipitation changes, extreme weather events, and pest/disease proliferation on crop productivity and farming practices.
- Students reflect on the adaptation strategies discussed throughout the session and share their insights on how to build resilience in European agriculture.
- The session concludes with students discussing the practical skills they have gained in interpreting climate data and incorporating it into their farming operations

Tips and Tricks for Educators:

- **Summarize Key Points** - Briefly recap the main concepts discussed, such as the effects of temperature shifts, precipitation changes, and extreme weather on agriculture. This helps reinforce the learning objectives and ensures clarity.
- **Group Reflection** - Invite participants to share their takeaways. Ask questions like, "What is one adaptation strategy you found most applicable?" or "How might you apply today's discussion to your own agricultural practices?" This promotes personal engagement and helps participants internalize the information.
- **Apply Knowledge** - Encourage participants to think about how they can integrate the climate data and strategies discussed into their farming practices. This could be through a quick activity where they draft a simple plan on what they might change or focus on in their operations.
- **Feedback and Questions** - Allow time for participants to ask questions or provide feedback on the session. This not only clears up any doubts but also gives you insights into how to improve future sessions.
- **Provide Resources** - End by offering additional resources, such as links to further reading, online tools for climate analysis, or contacts for local agricultural advisors. This supports ongoing learning and application of the session's content.

Learning Outcomes

Duration

Required Materials

Reinforce the understanding of climate-smart agriculture and its significance in sustainable farming practices

15 min

Projector, Computer, Internet connection, Presentation slides, Flipchart and markers, Paper and pencil, Worksheets

The total time that the average student will spend to learn all concepts

4 hours: 90 min guided learning and time for independent learning activities of participants: watching the entire suggested links and climate of all countries mentioned in lecture and group work, as well searching and contacting local agricultural advisors, as well as repeating key words and concepts at home.

Session 2

Climate-Resilient Farming Practices

This session focuses on educating VET-students about the various strategies that can be employed to adapt farming practices to changing climatic conditions, highlighting the importance of resilience in agricultural planning. Students will explore the practical implementation of climate-resilient practices such as crop diversification, efficient water management, and soil conservation techniques. The session will utilize a combination of interactive lectures, group discussions, and hands-on activities to enhance participants' understanding of climate-resilient farming practices.

At the end of this session, VET-students will be able to:

KNOWLEDGE

1. Understand the importance of climate-resilient practices in agriculture.
2. Implement strategies such as crop diversification, efficient water management, and soil conservation.
3. Develop adaptation strategies to enhance resilience against climatic change.
4. Students will be able to assess their local farming environment to identify specific climate risks and vulnerabilities. This includes understanding how different climate scenarios could impact their agricultural practices and productivity.
5. Acquire the ability to select and cultivate crops that are more resilient to climate variability, including drought-tolerant and heat-resistant varieties, and understand the genetic and physiological basis of crop resilience.



Duration

90 min



Teaching Methodology

Interactive Lectures, presentations on the importance of climate resilience in agriculture, group discussions: Facilitate peer learning and deeper understanding through sharing of ideas and experiences among participants, hands-on activities: students will engage in practical activities that involve implementing climate-resilient practices like soil testing and water management techniques



Required Materials

Projector, Computer, Internet Connection, Presentation Materials, Whiteboard and Markers, Soil testing kits, irrigation components, cover crop seeds.



Literature

1. FAO Climate-Smart Agriculture Sourcebook

<https://cgspace.cgiar.org/bitstream/handle/10568/111199/CSA%20Training%20Manual-2020.pdf>

2. Climate-Smart Agriculture Training Manual by CGIAR

<https://cgspace.cgiar.org/bitstream/handle/10568/111199/CSA%20Training%20Manual-2020.pdf>

3. Climate-Smart Agriculture: Policies, Practices and Financing for Food Security, Adaptation and Mitigation

<https://www.fao.org/3/i1881e/i1881e00.pdf>

4. Training Manual on Climate Smart Agriculture by UNDP

[https://erc.undp.org/api/download?](https://erc.undp.org/api/download?filePath=%2Fdocuments%2F9654%2Fmgmtresponse%2Fkeyaction%2Fdoc__2145393322953593300TRAININGMANUALONCLIMATESMARTAGRICULTUREJun2.pdf)

[filePath=%2Fdocuments%2F9654%2Fmgmtresponse%2Fkeyaction%2Fdoc__2145393322953593300TRAININGMANUALONCLIMATESMARTAGRICULTUREJun2.pdf](https://erc.undp.org/api/download?filePath=%2Fdocuments%2F9654%2Fmgmtresponse%2Fkeyaction%2Fdoc__2145393322953593300TRAININGMANUALONCLIMATESMARTAGRICULTUREJun2.pdf)

5. <https://www.youtube.com/watch?v=bOgaVkMDRnQ>

6. <https://www.youtube.com/watch?v=-onQwyJNsUw>

7. <https://www.youtube.com/watch?v=gowkT3mf8oU>



1

INTRODUCTION

- The session begins with an overview of climate change impacts on agriculture, using visual aids like maps and graphs to illustrate regional effects.
- The educator introduces the concept of climate resilience and its critical role in sustainable farming.
- Students are encouraged to share their experiences and observations related to climate impacts on agriculture.

Tips and Tricks for Educators

- Use Engaging Visual Aids: Start the session with compelling visual aids such as video that illustrate the impacts of climate change on agriculture.
- Interactive Engagement: Encourage participants to actively engage by sharing their personal experiences and observations related to climate impacts on agriculture.
- Contextualize Information: Tailor the discussion to the geographic and cultural context of the participants. If the session includes farmers from diverse regions, highlight examples that are relevant to each area. This approach helps in making the information more applicable and actionable for the participants.

Learning Outcomes**Duration****Required Materials**

- Understand the importance of climate-resilient practices in agriculture.
- Recognize the potential impacts of climate change on farming.

15 min

Projector and computer for presentation, Internet connection, Presentation slides, Whiteboard and markers, Handouts detailing climate change impacts

2

MAIN PART

- Presentation on Climate-Resilient Farming Practices - Use a projector and computer to present slides on crop diversification, water-saving irrigation techniques, and soil conservation methods. Highlight the benefits and challenges of each practice.
- To teach students how to assess soil health and understand its importance in climate-resilient farming do Hands-On Activity: Soil Testing for Conservation -Demonstrate how to use a soil testing kit to measure pH, moisture, and nutrient levels. Allow participants to conduct soil tests on provided soil samples.
- To encourage students to think about how they can adapt the learned practices to their own farming environments, do a group discussion Facilitate a discussion where participants share their thoughts on adapting the demonstrated practices to their local conditions. Encourage sharing of ideas and collaborative problem-solving.

Tips and Tricks for Educators

- Before introducing the kit to students, take the time to familiarize yourself with all its components and functionalities. Understand how each part contributes to the learning objectives and prepare to demonstrate its use to the student.
- When introducing the kit, provide clear and concise instructions. Demonstrate each step of the activity before allowing students to handle the materials. This helps prevent confusion and ensures that students use the kits effectively.

- Divide students into small groups and assign tasks that require collaboration. This not only helps in learning from peers but also enhances soft skills such as teamwork and communication.
- After the activity, hold a discussion or a reflective session where students can share their observations and insights. This helps consolidate their learning and allows them to express any challenges they faced and how they overcame them.
- If it is possible, prior to the lecture, instruct the participants to bring a soil sample from their farm (for example, if the curriculum is carried out continuously)

Learning Outcomes	Duration	Required Materials
- Implement strategies such as crop diversification, efficient water management, and soil conservation. - Develop adaptation strategies to enhance resilience against climatic changes.	60 min	Projector and computer for presentation, Soil testing kits and soil samples, Flipcharts and markers for group discussions

3

CONCLUSION

- Recap of the session's key points, emphasizing the importance of integrating climate resilience into farming practices.
- Students share their plans on how they might implement these strategies in their own operations.
- Q&A session to address any remaining questions and clarify complex points
- As an incentive and introduction to the next learning modules, encourage participants to think about what crops can be grown in their climate and soil, especially if they already know or assume what the soil is like on their farms, or what alternative agricultural crops could be grown on the existing soil, and it would be sustainable and regenerative. Encourage them to observe the plants, flowers, weeds, or wild plants and trees that grow in their surroundings, and research what kind of soil certain plants (even weeds) like, so that they can get a glance of the type and quality of the soil.

Learning Outcomes	Duration	Required Materials
- Summarize the key concepts learned about climate-resilient farming practices. - Reflect on how to apply these practices in their own agricultural contexts.	15 min	Feedback forms for participants to fill out, List of additional resources for further reading and learning (provide URLs or handouts)

The total time that the average student will spend to learn all concepts

6 hours: 90 min guided learning and time for independent learning activities of participants: research the how to purchase available soil test kits for their own use and how applicable they would be on their farm, to investigate which soil would be ideal for growing their target crops, or what alternative could be grown on the existing soil, as well as repeating key words and concepts at home.

Session 3

Accessing Climate Information and Resources

This session delves into the critical aspect of accessing and utilizing climate information and resources to enhance agricultural practices. Participants will learn about various climate data sources, how to interpret climate forecasts, and the application of this information in planning and implementing climate-resilient farming strategies. The session combines theoretical knowledge with practical exercises, ensuring participants can navigate climate information platforms and apply this knowledge to their agricultural practices.

At the end of this session, VET-students will be to:

KNOWLEDGE

1. Identify key sources of climate information relevant to agriculture.
2. Interpret climate forecasts and understand their implications for farming.
3. Utilize climate data to make informed decisions in agricultural planning and operations.
4. Develop strategies to integrate climate information into farming practices for enhanced resilience.



Duration

90 min



Teaching Methodology

Interactive Lectures: Introduction to various climate information sources, including satellite data, weather stations, and online climate data portals.

Hands-on Activities: Participants will engage in exercises to access and interpret climate data using online tools and mobile applications.

Group Discussions: Sharing experiences and strategies on how climate information can be integrated into farming practices.

Case Studies: Analysis of real-life scenarios where access to climate information led to improved agricultural outcomes.



Required Materials

Computers or tablets with internet access, Access to climate information portals and apps (with emphasis on free sources and apps with the aim that participants can use them in everyday life), Projector and screen for demonstrations, Handouts with guides on accessing and using climate data sources



Literature

1. Beyond climate-smart agriculture: toward safe operating spaces for global food systems - By Neufeldt, H., Jahn, M., Campbell, B. M., Beddington, J. R., DeClerck, F., De Pinto, A., ... & Zougmore, R. (2013)
<https://agricultureandfoodsecurity.biomedcentral.com/articles/10.1186/2048-7010-2-12>

2. The Role of Climate Change in European Agriculture: Challenges and Solutions - By Weiss, C., & Finger, R. (2020)
<https://link.springer.com/book/10.1007/978-3-030-03383-5>

3. From climate change impacts to the development of adaptation strategies: challenges for agriculture in Europe - By Iglesias, A., Quiroga, S., Moneo, M., & Garrote, L. (2012)
<https://link.springer.com/article/10.1007/s10584-011-0344-x>

4. <https://africaclimate.opendataforafrica.org/>

5. <https://www.euronews.com/green/2022/12/05/real-time-climate-information-in-africa>

6. <http://www.clipc.eu/home>

7. <https://climate-adapt.eea.europa.eu/en/knowledge/european-climate-data-explorer>

8. Magesa, B. A., Mohan, G., Matsuda, H., Melts, I., Kefi, M., & Fukushi, K. (2023). Understanding the farmers' choices and adoption of adaptation strategies, and plans to climate change impact in Africa: A systematic review. *Climate Services*, 30, 100362.
[Understanding the farmers' choices and adoption of adaptation strategies, and plans to climate change impact in Africa: A systematic review - ScienceDirect.](#)

9. Rezaei, E. E., Webber, H., Asseng, S., Boote, K., Durand, J. L., Ewert, F., ... & MacCarthy, D. S. (2023). Climate change impacts on crop yields. *Nature Reviews Earth & Environment*, 4(12), 831-846.
[Climate change impacts on crop yields | Nature Reviews Earth & Environment.](#)

10. Rodrigues, C. I. D., Brito, L. M., & Nunes, L. J. (2023). Soil carbon sequestration in the context of climate change mitigation: A review. *Soil Systems*, 7(3), 64.
[Soil Systems | Free Full-Text | Soil Carbon Sequestration in the Context of Climate Change Mitigation: A Review \(mdpi.com\).](#)

11. Leal Filho, W., Nagy, G. J., Setti, A. F. F., Sharifi, A., Donkor, F. K., Batista, K., & Djekic, I. (2023). Handling the impacts of climate change on soil biodiversity. *Science of The Total Environment*, 869, 161671. [Handling the impacts of climate change on soil biodiversity - ScienceDirect.](#)

12. Semeraro, T., Scarano, A., Leggieri, A., Calisi, A., & De Caroli, M. (2023). Impact of climate change on agroecosystems and potential adaptation strategies. *Land*, 12(6), 1117.
[Land | Free Full-Text | Impact of Climate Change on Agroecosystems and Potential Adaptation Strategies \(mdpi.com\).](#)

13. Awuni, S., Adarkwah, F., Ofori, B. D., Purwestri, R. C., Bernal, D. C. H., & Hajek, M. (2023). Managing the challenges of climate change mitigation and adaptation strategies in Ghana. *Heliyon*. [Managing the challenges of climate change mitigation and adaptation strategies in Ghana: Heliyon \(cell.com\)](#)



1

INTRODUCTION

- The educator begins with a presentation explaining the significance of climate information for agricultural decision-making. This includes an introduction to different types of climate data (e.g., weather forecasts, long-term climate models, satellite imagery).
- After the presentation, the educator engages participants in a discussion about their current practices of accessing climate information and the challenges they face.
- Educators show a quick demonstration on how to access a basic climate information portal.

Learning Outcomes

Duration

Required Materials

- Understand the importance of climate-resilient practices in agriculture.
- Recognize the potential impacts of climate change on farming.

15 min

Projector and computer for presentation, Internet connection to demonstrate real-time data access, Handouts summarizing key climate information sources

2

MAIN PART

- Students will use tablets or computers to access specified climate information portals. The educator guides them through the process of finding and interpreting data relevant to their local farming conditions.
- In small groups, participants analyze a case study where climate information was used to make critical farming decisions. This helps illustrate the practical application of data.
- Each group creates a brief plan on how they could use climate data to improve an aspect of their farming practice, focusing on issues like planting dates, irrigation, or pest management.
- Each group presents their plan on how they would use climate data in their farming operations.

Tips and Tricks for Educators

- Before the session, ensure that all websites and apps are fully functional and that you have backups in case of technical issues. Familiarize yourself with the interfaces of each tool to provide effective guidance.
- When introducing climate information portals and apps, use a projector to display the process on a screen as you navigate. This visual guide will help participants understand the steps more clearly.
- Select case studies that are relevant to the regions or agricultural contexts of the participants. This relevance helps in better understanding and stimulates more meaningful discussions.
- At the end of the hands-on activities, summarize the main points and takeaways. This helps reinforce learning and ensures that participants can recall and apply the information after the session.
- Do not forget to ask questions during group work such as: Do You think it is important to follow the climate information in order to efficiently plan planting dates? Could You plan and prepare tools and water for irrigation based on long-term climate information? Could you use climate information to create a rainwater harvesting system? How do you think climate information can be used for pest management?

Learning Outcomes	Duration	Required Materials
- Navigate and utilize specific climate information portals and apps. - Apply climate data to make informed decisions in farming practices.	60 min	Computers or tablets with internet access, Access to specific climate information portals and apps, Case studies printouts, Flipcharts and markers for group work

3

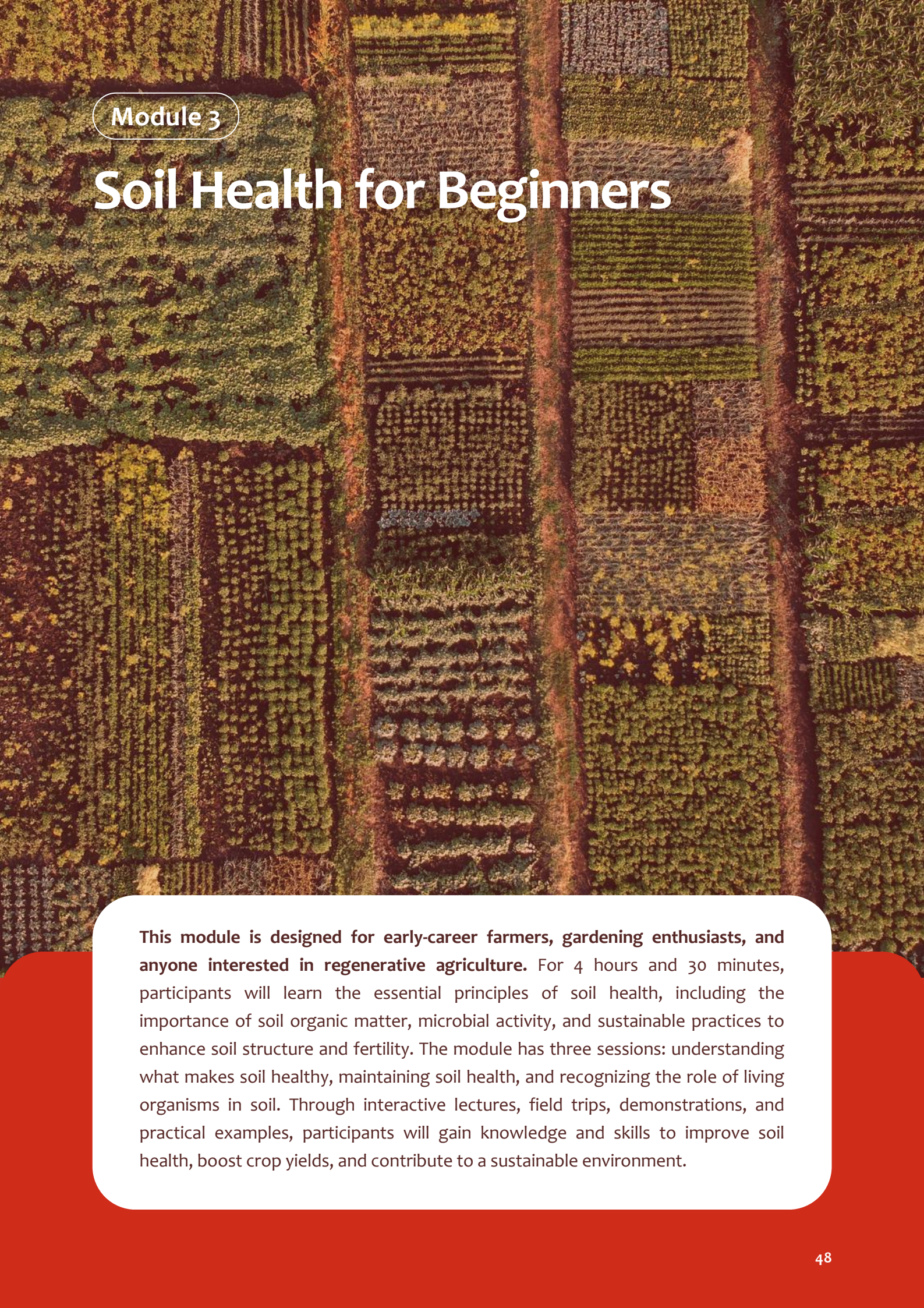
CONCLUSION

- Open the floor for any questions, allowing participants to clarify doubts and deepen their understanding (Q&A Session)
- The educator summarizes the session, emphasizing the importance of continual learning and adaptation in the use of climate information.
- Encourage the participants to research climate information for the last few years, and suggest that they check whether there have been significant climate changes and whether, due to climate change, there has been a rotation or change in the cultivation methods of certain crops in their area.

Learning Outcomes	Duration	Required Materials
- Summarize the key points learned about accessing and using climate information. - Reflect on the application of this knowledge to their agricultural practices.	15 min	Use materials already listed

The total time that the average student will spend to learn all concepts

4 hours: 90 min guided learning and time for independent learning activities of participants: climate information research and impact on agriculture in their area, as well as repeating key words and concepts at home.

An aerial photograph of a field divided into numerous small, irregular patches of different colors and textures, resembling a patchwork quilt. The colors range from dark browns and greys to vibrant greens and yellows. The patches are separated by thin, reddish-brown lines, likely paths or furrows in the soil. The overall pattern is complex and organic, suggesting a diverse agricultural or ecological landscape.

Module 3

Soil Health for Beginners

This module is designed for early-career farmers, gardening enthusiasts, and anyone interested in regenerative agriculture. For 4 hours and 30 minutes, participants will learn the essential principles of soil health, including the importance of soil organic matter, microbial activity, and sustainable practices to enhance soil structure and fertility. The module has three sessions: understanding what makes soil healthy, maintaining soil health, and recognizing the role of living organisms in soil. Through interactive lectures, field trips, demonstrations, and practical examples, participants will gain knowledge and skills to improve soil health, boost crop yields, and contribute to a sustainable environment.



At the end of this module, VET students will be able to:

This module consists of three sessions with a total duration of 4 hours and 30 minutes, and it will cover the following sessions: *What Makes Soil Healthy?*; *Keeping Our Soil Healthy*; *The Living Soil*. This layout is intended to methodically build participants' understanding on the physical and chemical properties of a healthy soil, through ways and techniques to keep the soil healthy, to recognize the role of organisms in the soil.



Knowledge

1. Understand basic soil properties and their importance: Explain the physical and chemical properties of a good soil, and why such properties are environmentally and economically beneficial for agricultural practices.
2. Implement simple techniques to maintain soil health: Identify environmentally benign techniques to conserve and improve soil health, focusing on soil health management techniques that support sustainable agriculture, ecosystem functioning, climate resilience, biodiversity conservation and food production.
3. Recognize the role of organisms in the soil: Elaborate the agricultural and environmental benefits of organisms in the soil, highlighting the eco services they render, including contribution to soil fertility, soil structure and nutrient cycle.



Skills

1. Develop scientific understanding of soil health: Develop adequate fundamental literacy on properties of a good soil, such as structure, texture, pH and nutrient cycles.
2. Demonstrate critical thinking skills : Critical thinking skills to analyze and understand soil properties data, and provide ingenious techniques to improve soil health, so it can support plant growth, yield economic outcome and become environmentally resilient.
3. Develop a systems thinking skills: Systems thinking skills to understand the interrelatedness of the various components of the soil to regulate soil fertility and nutrient cycle.

SESSION 1 What Makes Soil Healthy?	SESSION 2 Keeping Our Soil Healthy	SESSION 3 The Living Soil
90 min	90 min	90 min



Teaching Methodology

At the beginning, the educator will choose one of the proposed methods depending on the student group.

Talk for learning: Talk for learning will initiate a dialogue between instructor and learner through verbal communication. Active discussion, questioning and verbal reflections will be employed to understand from learners' perspective the necessary things that make soil healthy. This will help to explore their ideas, develop and organize it for further learning.

Interactive lectures: Interactive lectures are used to deepen understanding on soil health. This will encompass the use of diagrams, multimedia presentation, and infographics to illustrate basic properties of a healthy soil such as porosity, structure, texture, compaction and permeability. The interactive lectures accompanied with a systematic questioning and answers section will foster deeper understanding, retention and application of the concept.

Field trips: To enhance understanding, field trips are employed for learners to observe, feel and appreciate a healthy soil. This will enable learners to have firsthand or real-world experience, and offer them the opportunity to observe, explore and interact with the subject matter. The field trip will spark curiosity and enthusiasm thus, intensifying their interest to learn through questions and answers. This will enhance their critical thinking and problem solving skills. Moreover, it will contextualize learning and help the understanding and retention of abstract concepts learnt in the classroom.

Demonstration: Through experimental, demonstration gardens or laboratories, learners will be equipped with the basic techniques of analyzing the components of a healthy soil. In addition, techniques that can be employed to keep a soil healthy will be demonstrated to give learners essential practical skills. This will foster positive learning, serve as motivation, promote memorable learning and clarify learners misconception.

Experiential learning: This will be used to enable students to interact and manipulate materials firsthand. Through experiential learning learners will be guided to have hands-on experience in methods to determine certain physical or chemical properties of a soil as previously demonstrated with soil test kits, so as to deepen their understanding and promote the development of skills.

Simulation and modeling: This approach will be used to establish the interconnectedness of the various parameters of a good soil. Simulations and modeling will help learners observe how changes in one parameter of a good soil impact the others over time. This approach will help learners develop intuition, learn system thinking skills and promote understanding of complex systems.

Collaborative learning: This approach allows learners to team up and work on tasks such as projects or case studies based on subject matter learnt. With peer level discussion learners are able to share ideas and perspectives, clarify concepts, and reinforce understanding through peer teaching. As learners understand things from different perspectives it fosters creativity, critical thinking and problem-solving skills on the content taught.

Problem based learning: Learners will be tasked after lessons to tackle real-world problems such as identifying some basic properties of a good soil through experimentation. Learners will engage in both open-ended and closed ended problems to demonstrate understanding on soil health and how to conserve it.

Interactive storytelling: This approach will be employed to narrate to students stories from real farmers who use a host of approaches, and apply environmentally friendly techniques to keep their soil healthy. This session will enable students to gain memorable experiences from the lesson and properly relate to the subject matter and its relevance in real-world farming.

Guest lecture: Experts from the field on soil science and sustainable farming practices will be invited to provide specialized knowledge on healthy soil to conserve it. This will enhance learning experience and provide an avenue for networking.



Required Materials

Projector, Computer, Internet Connection, Presentation Materials, Whiteboard and Markers, Paper and Pencil, Worksheets, Copies of Handouts, Soil testing kits and laboratory glassware, microscope and prepared slides.



Literature

- Magdoff, F., & Van Es, H. (2021). "Building Soils for Better Crops: Ecological management for healthy soils." Sustainable Agriculture Research and Education Program.

This book provides a comprehensive overview of soil fertility and management practices that promote healthy soil, with a focus on organic and sustainable methods.

<http://hdl.handle.net/1903/29524>

- Montanarella, L., Badraoui, M., Chude, V., Costa, I. D. S. B., Mamo, T., Yemefack, M., ... & MCKENZIE, N. (2015). Status of the world's soil resources: main report.

This report offers a global perspective on the importance of soil health and outlines an action framework for policymakers and stakeholders to address soil degradation challenges.

<https://www.alice.cnptia.embrapa.br/alice/handle/doc/1034770>

- Kichko, A. A., Sergaliev, N. K., Ivanova, E. A., Chernov, T. I., Kimeklis, A. K., Orlova, O. V., ... & Andronov, E. E. (2023). The microbiome of buried soils demonstrates significant shifts in taxonomic structure and a general trend towards mineral horizons. *Heliyon*, 9(6).

This scientific article explores the vast and diverse microbial community within soil, highlighting its crucial role in nutrient cycling, plant health, and overall soil function.

<https://www.sciencedirect.com/science/article/pii/S240584402304416X>

- Granjou, C., & Phillips, C. (2019). Living and labouring soils: Metagenomic ecology and a new agricultural revolution?. *BioSocieties*, 14(3), 393-415.

This online resource provides an accessible explanation of earthworm functions in soil aeration, organic matter decomposition, and nutrient mobilization.

<https://link.springer.com/article/10.1057/s41292-018-0133-0>

- Holzer, M., Dere, A., Lindbo, D., Robinson, C., Wilson, T., Wyatt, B., & Engelmann, C. (2020). Soil: More than the Dirt under your Feet!. *Earth Scientist*, 36(1).

This comprehensive online resource from a leading soil science organization offers a detailed overview of various soil organisms (from microbes to macrofauna) and their ecological roles.

<https://www.soils.org/about-soils>

- Gosnell, H. (2022). Regenerating soil, regenerating soul: an integral approach to understanding agricultural transformation. *Sustainability Science*, 17(2), 603-620.

This article from a renowned organic farming research center features a section on soil biology, explaining the importance of diverse soil biota and practices that promote it.

<https://link.springer.com/article/10.1007/s11625-021-00993-0>

Session 1

What Makes Soil Healthy?

This section deals with soil health with emphasis on the fundamental features of a healthy soil. It seeks to enable students to understand physical properties of a healthy soil such as structure, texture, porosity, and permeability. Chemical properties such as pH and nutrient content will also be explored. The section will be climaxed with simple experiments that will enable students to investigate whether a soil is healthy or not.

At the end of this session, VET-students will be able to:

KNOWLEDGE

1. Identify the physical and chemical properties of a healthy soil.
2. Explain the relevance of the properties and how they influence the health of the soil, as well as how they differ from those of unhealthy soil.
3. Perform simple experiments to determine the properties of a soil: Students will develop practical skills of measuring the properties of a healthy soil.



Duration

90 min



Teaching Methodology

Discussion, Demonstration, Hands-on activity, experiential learning, project based learning, presentation, Guest lecture.



Required Materials

Soil samples, Soil testing kits, basic laboratory glassware, Projector, computer, internet connection, whiteboard and markers, loud speakers, paper and pencil, worksheets, copies of handout.



Literature

- What makes up a healthy soil

<https://extension.sdstate.edu/what-makes-healthy-soil>

- Healthy soils: 'Property of a healthy soil' -Extension

<https://www.aces.edu/blog/topics/healthy-soils/watch-properties-of-a-healthy-soil/>

- How to Test Soil Health on Your Farm: 10 Key Methods

<https://cropscience.bayer.co.uk/blog/articles/2020/02/test-soil-health>

- Tools for Evaluating Soil Health

<https://edis.ifas.ufl.edu/publication/SS657>



1

INTRODUCTION

-The educator begins by using the Talk for Learning approach to initiate a dialogue between learners. Students are encouraged to come up with things that enable soil to ensure crop production. The educator creates an enabling environment for brainstorming and itemizes student responses.

-Students are encouraged to share prior experiences of approaches and techniques themselves, or someone in their environment implemented to ensure their soil yields good produce and why they chose such methods.

This interaction enables educators to have knowledge on learners' conceptual level of soil health, and be able to direct them on necessary sustainable and regenerative methods.

-Student responses are directed and linked to introduce the topic 'what makes a soil healthy'. Instructional materials such as charts, diagrams, photos and videos are used to introduce properties of a healthy soil such as texture, structure, porosity, permeability, organic matter, nutrient and soil organisms as well as native plants and weeds, and ground covers that also affect soil health.

-The educator presents the lesson in a systematic order covering aspects such as:

- The definition of a healthy soil.
- The physical properties of a healthy soil.
- The chemical properties of a healthy soil.

-The educator draws students attention to the relevance of knowing the properties of a healthy soil as it will broaden their understanding on the complexity of the soil ecosystem. This will, in turn, direct their choice of approach, and appeal to them to adopt sustainable and regenerative approaches to make their soil healthy.

-Throughout the introduction, the educator engages students in thought provoking questions, simulates, motivates and heightens learners interest in the subject matter through rehearsed contextualized story telling.

Tip and Tricks for Educator:

- Use adequate, visual and audio-visual aids to illustrate the properties of a healthy soil.
- Interaction sessions: Create adequate moments for interactions so as to identify and clarify learners misconception to foster holistic understanding of soil health. For instance, misconceptions such as dark color equals healthy soil, etc., need to be clarified.
- Adopt Content First teaching Approach in the introduction session and refrain from using vocabularies beyond students comprehension level.

Learning Outcomes**Duration****Required Materials**

Identify the physical and chemical properties of a healthy soil.

15 min

Projector, computer, internet connection, whiteboard and markers, speakers, worksheets, copies of handout the properties of soil.

Explanation of the properties of the a healthy soil:

-The educator introduces the individual properties of a healthy soil. Both physical and chemical properties such as structure, texture, pH, porosity, permeability, organic matter, nutrient content and soil organisms are covered. The educator also relates how these properties contribute to crop production ability of the soil. Comparison is also made between clay and sandy soil using multimedia teaching aids such as video and infographics, as well as, diagrams and photos.

<https://www.youtube.com/watch?v=JjEmxgroTR8>

<https://www.youtube.com/watch?v=UeyPWC71qIY>

-The educator leads students to perform simple experiments on soil properties such as porosity, permeability and retention. The educator demonstrates the method, highlighting the relevance of the experiments and guides students through it. Experimental and demonstration gardens or laboratories are used for such practical activities. Students are shown case studies or video on the procedures for deeper understanding.

<https://www.youtube.com/watch?v=TmpsJOZBZOU>

<https://www.youtube.com/watch?v=PPzsBKnxj3g>

<https://www.youtube.com/watch?v=o78MB7R4EbE>

Collaborative Activity:

-After demonstrating to students how to analyze soil samples for various properties. They are grouped and tasked to experimentally determine certain properties of a soil, each group focusing on one parameter. Students are clearly guided and provided with concised worksheets. Each group prepares a summary presentation of their findings.

-As the final segment on soil health, the educator encourages the participants to discuss the various ground covers, wild plants, weeds and trees that grow in their climate, and leads them to the instigate influence of these plants on the health and recovery of soil components

-Project session: Students are tasked to collect samples from their local farms and perform analyses to identify the soil properties studied in class. Also encourage them to find at least 5 ground covers, wild plants or weeds in the area, and research what soil each plant likes and how it affects soil health (eg neem tree is a natural repellent for some insects, clover plant as a honey-bearing plant attracts bees and also affects the health of the soil, because of the bacterias that live in symbiosis on the roots of the clover and enrich the soil with nitrogen, show them a hydrangea flower as a natural indicator of soil acidity/alkalinity.

- This will be done outside the regular class session and presented as a project on a date and time set by the educator.

Tips and Tricks for Educators:

- Allow students to have a feel of a healthy soil. This will allow them to have first hand experience on the structure, texture and compaction of a healthy soil.
- In the collaborative activity session, provide students with soil samples whose properties are already determined, so as to easily assess the group's result. This will also help in identifying areas of challenge and help them develop correct analytical skills.
- Encourage students to ask questions during presentations. Use the opportunity to help other students better understand the concepts they did not work on.
- Prepare clear instructions for students about independent work, necessary material and procedures, as well as deadlines for submission and methods and techniques for evaluating submitted work.

Learning Outcomes	Duration	Required Materials
-Explain the relevance of the properties and how they influence the health of the soil, as well as how they differ from those of unhealthy soil. -Perform simple experiments to determine the properties of a soil: Students will develop practical skills of measuring the properties of a healthy soil.	60 min	Soil samples, Soil testing kits, Projector, computer, internet connection, whiteboard and markers, speakers paper and pencil, worksheets, copies of handout , laboratory apparatus.

CONCLUSION

- Recap the key concepts discussed in the session by highlighting the properties of a healthy soil
- Allows students to summarize the experimental session focusing on a description on how to determine one property of a healthy soil with samples collected from their own farmland.
- Q & A sessions to address students concerns, clarify concepts and misconceptions
- Distribute and explain to students the instructions for independent work

Learning Outcomes

Duration

Required Materials

-Summarize key concepts learned on what makes soil healthy?

-Reflect on the importance of the subject learned and its significance to regenerative farmers.

15 min

List of supplementary materials for students to read for deeper understanding. Feedback and Feed forward forms.

The total time that the average student will spend to learn all concepts

6 hours: 90 min guided learning and time for independent learning activities of participants: watching suggested videos and individual project assignments as well as repeating key words and concepts at home.

Session 2

Keeping Our Soil Healthy

This session focuses on the proactive measures necessary to maintain soil health and prevent degradation. It exposes participants to various soil conservation techniques. The session also emphasizes the importance of soil conservation in preserving soil structure, fertility, and overall ecosystem health.

At the end of this session, VET-students will be able to:

KNOWLEDGE

1. Understand common threats to soil health.
2. Identify sustainable soil management practices.
3. Apply strategies to prevent soil degradation.



Duration

90 min



Teaching Methodology

- **Case Studies:** Analyze real-life examples of soil degradation and successful soil management practices.
- **Field Trips:** Visit local farms or agricultural research centers to observe sustainable soil management techniques.
- **Role-Playing Exercises:** Simulate scenarios where students must make decisions to protect soil health.
- **Video presentation** on different agricultural practices and their impact on soil health.



Required Materials

Projector and computer for presentations and Video clips showcasing positive and negative agricultural practices for soil health, Printed or digital copies of case studies on soil degradation, Case study analysis worksheets or discussion guides, Observation worksheets or journals, Reflection worksheets for students to document their decisions, Action planning templates or guides



Literature

- Finding and Sharing Solution to protect our soils
<https://recare-hub.eu/12-soil-threats>
- Top 10 Threats to Soil Health
<https://www.holganix.com/blog/top-10-threats-to-soil-health>

- Sustainable Soil management & Agricultural production
<https://ejpsoil.eu/sustainable-soil-management-agricultural-production#:~:text=It%20includes%20controlling%20traffic%2C%20avoiding,irrigation%20efficiently%2C%20adding%20organic%20matter.>
- Sustainable soil use and management: An interdisciplinary and systematic approach
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7182530/>
- Soil Degradation: Types, Causes, Effects, and Solutions
<https://www.nextias.com/blog/soil-degradation/#:~:text=Addressing%20soil%20degradation%20requires%20implementing,and%20education%20about%20soil%20conservation.>
- Soil Degradation: Harmful Effects & Promising Solutions
<https://eos.com/blog/soil-degradation/>



1

INTRODUCTION

The educator will show a short video clip depicting different agricultural practices (e.g., tilling, cover cropping). Ask students to discuss the potential impact of these practices on soil health.

<http://www.youtube.com/watch?v=AzboSo8M5oQ>

<http://www.youtube.com/watch?v=Kxjy4GgGic>

<http://www.youtube.com/watch?v=7-Tyz7fGeZo>

<http://www.youtube.com/watch?v=L14woJZEJnk>

Students will be presented with case studies of soil degradation and asked to identify the factors contributing to soil health decline.

Tips and Tricks for Educators:

- Choose a video that showcases both conventional practices (e.g., tilling) and sustainable practices (e.g., cover cropping)
- Present real-world case studies of soil degradation and guide students to identify the factors contributing to the decline (e.g., overuse of chemicals, deforestation, unsustainable land use practices).
- Encourage the students to watch all the videos independently to become more familiar with the topic

Learning Outcomes**Duration****Required Materials**

Students will recognize common threats to soil health and understand the importance of sustainable soil management practices.

15 min

Short video clip showcasing different agricultural practices (e.g., tilling, cover cropping). Projector and screen to display the video.

Printed or digital copies of case studies on soil degradation

Case study analysis worksheets or discussion guides.

2

MAIN PART

Field Trip to Local Farm: Students will visit a local farm practicing sustainable soil management technique. If the same is not possible, prepare a case study of local or nationally known farms and the ways in which they implement sustainable soil management.

Role-Playing Exercise: Students will role-play scenarios where they must make decisions to prevent soil degradation and promote soil health.

Tips and Tricks for Educators:

- Before the trip, discuss key sustainable soil management techniques (e.g., cover cropping, mulching, crop rotation) and what students should look for during the visit.

- During the trip, have students take notes, ask questions of the farmer, and document observations (photos, videos) of sustainable practices in action.
- If it is not possible to organize a field trip, show them case studies of local or nationally known farms and the ways in which they use sustainable practices
- Create realistic role-playing scenarios based on the region's agricultural context (e.g., a farmer in Europe considering switching from tilling to no-till practices, a community in Sub-Saharan Africa facing deforestation for short-term gain).
- Divide students into groups and assign each group a scenario.
- Have them role-play the decision-making process, considering the potential impact on soil health and long-term agricultural sustainability. Encourage them to present their solutions and reasoning to the class.
- Ensure the role-play scenarios are relevant to the students' age and experience level.

Learning Outcomes	Duration	Required Materials
Students will observe sustainable soil management practices in real-life settings and develop strategies to prevent soil degradation.	60 min	Observation worksheets or journals for students to record their observations
Also Students will be able to describe common agricultural practices that can harm or improve soil health, and explain the benefits of maintaining healthy soil.		Reflection worksheets for students to document their decisions and thoughts.

3

CONCLUSION

Reflection and Action Planning: the educator will guide students to reflect on their field trip experience and develop action plans for promoting soil health in their own communities.

Tips and Tricks for Educators:

- Guide students through a reflection activity on their field trip experience. Use questions like: "What surprised you the most about the farm visit?", "How do the sustainable practices you saw contribute to soil health?"
- Provide resources and support to help students develop their action plans.
- They could interview local farmers, research online resources, or contact environmental organizations for guidance.

Learning Outcomes	Duration	Required Materials
Students will be able to articulate the importance of sustainable soil management practices and develop plans for implementing them.	15 min	Worksheets or reflection journals for students. Action planning templates or guides

Session 3

The Living Soil

This session delves into the dynamic ecosystem of soil organisms and their critical role in soil health. This section emphasizes understanding the living components of soil and how they interact to create a healthy soil environment.

At the end of this session, VET-students will be able to:

KNOWLEDGE

1. Identify different types of soil organisms (e.g., earthworms, microbes).
2. Explain the roles of soil organisms in maintaining a healthy soil ecosystem.
3. Explain the roles of native plants in maintaining a healthy soil ecosystem.
4. Describe practices that encourage beneficial soil life.



Duration

90 min



Teaching Methodology

- **Interactive lecture with visuals (pictures, videos)** showcasing how soil organisms interact with each other and the environment.).
- **Hands-on activity:** Observe soil samples under microscopes to identify different organisms.
- **Guest Lectures:** Invite experts in soil biology to give talks on the importance of biodiversity in soil health.



Required Materials

Projector and computer for presentations and videos, Microscopes and prepared slides., Soil organism identification guides. Writing implements such as pens, pencils, and markers.



Literature

- The Living soil

<https://www.sare.org/publications/building-soils-for-better-crops/the-living-soil/>

- Bringing Life to Your Soil: How to Improve Soil Quality Naturally

<https://orchardpeople.com/improve-soil-quality-naturally/>

- How Beneficial Microbes Can Help Healthy Farms

<https://biomemakers.com/blog/how-beneficial-microbes-can-help-healthy-farms>



1

INTRODUCTION

The educator shows videos and pictures of soil teeming with life (earthworms, microbes). Ask the students to brainstorm what kind of living organisms might be present in healthy soil.

<http://www.youtube.com/watch?v=8JXOP9Xrzd4>

http://www.youtube.com/watch?v=kT_1y-PG1ss

<http://www.youtube.com/watch?v=jwIXPjwhyOI>

Tips and Tricks for Educators:

- Instead of directly naming soil organisms, ask intriguing questions like "What kind of creatures might live in healthy soil?" or "Do you think anything is alive under our feet?"
- Briefly review what students learned about soil health in previous sections.
- Use a captivating picture or poster showcasing a variety of soil organisms to grab students' attention.

Learning Outcomes**Duration****Required Materials**

Students will recognize the importance of soil organisms in maintaining soil health and understand the concept of soil biodiversity.

15 min

Large picture or poster showcasing a variety of soil organisms (earthworms, microbes) in their habitat.

Observation worksheets for students to record their observations

Computer and projector to show a video of activities of microorganism in the soil

2

MAIN PART



Interactive lecture with visuals (pictures, videos) showcasing different types of soil organisms (earthworms, microbes) and their functions, as well as the role of native plants and groundcovers in maintaining a healthy soil ecosystem.

Soil organisms:

http://www.youtube.com/watch?v=_C9RIhyIYow

<http://www.youtube.com/watch?v=SxIBIAZmeal>

<https://www.youtube.com/watch?v=m20-t7bnsVw>

Groundcovers:

<https://www.youtube.com/watch?v=i3FI8w2HALc>

<https://www.youtube.com/watch?v=5wZG93jI88A>

<https://www.youtube.com/watch?v=CBGyPtY2JYw>

Hands on Activity: Microscope Session

Students will observe soil samples under microscopes to identify different soil organisms.

Students are guided to create a mini model of a soil ecosystem using construction paper, soil samples, and beans.

Guest Lecture: An expert in soil biology will give a talk on the importance of biodiversity in soil health.

Tips and Tricks for Educators:

- Incorporate audience participation through questions and short quizzes throughout the lecture.
- Relate the functions of soil organisms to plant growth and agricultural practices. For example, explain how earthworms create good drainage for crops.
- Offer a mix of visuals, explanations, and optional hands-on activities to cater to diverse learning styles.
- If choosing the soil ecosystem model activity, provide clear instructions and ensure students have all the necessary materials.

Learning Outcomes	Duration	Required Materials
Students will be able to identify different soil organisms and understand their roles in maintaining a healthy soil ecosystem.	60 min	Note-taking materials such as notebooks or worksheets. Writing implements such as pens, pencils, and markers. Projector, screen, presentation slides with pictures and descriptions of different soil organisms (earthworms, microbes, nematodes, etc.) and their functions in the soil ecosystem. Microscope construction paper, soil samples, and beans.

3

CONCLUSION

Students will discuss the implications of soil biodiversity for agricultural practices and brainstorm ways to promote soil biodiversity. The educator summarizes the key points discussed laying emphasis on implications of soil biodiversity for agricultural practices and ways to promote soil biodiversity.

Tips and Tricks for Educators:

- Discuss how promoting beneficial soil life can be integrated into practices learned in Session 2 (e.g., reduced tillage promoting earthworm populations).
- Encourage students to ask questions and share their thoughts on the importance of soil life.
- Challenge students to brainstorm ways to promote healthy soil life in their own backyards or communities.

Learning Outcomes	Duration	Required Materials
Students will be able to apply their knowledge of soil biodiversity to real-world agricultural contexts and develop strategies for enhancing soil health through biodiversity conservation.	15 min	Whiteboard or flipchart, Markers

The total time that the average student will spend to learn all concepts

4 hours: 90 min guided learning and time for independent learning activities of participants: watching the entire suggested videos and brainstorming independently as well as repeating key words and concepts at home.



Module 4

Water and Pests in the Farm

The "Water and Pests in the Farm" module is tailored for farmers, agricultural students, and sustainability advocates, focusing on effective farm management. This module consists of three sessions: managing water on the farm, dealing with pests naturally, and keeping crops healthy. Participants will learn innovative irrigation techniques, water conservation strategies, and integrated pest management practices that minimize chemical use. Through interactive lectures, group discussions, hands-on activities, and case studies, the module aims to enhance participants' comprehension of managing water and pests sustainably. This module equips participants with practical skills to maintain a balanced and productive farm ecosystem, addressing water flow measurement, water management strategies, and pest control techniques.



At the end of this module, VET students will be able to:

This course focuses on water management, natural control of pests, how to keep crops healthy and its critical role in climate-smart agriculture. It analyzes the impacts of climate change on the availability of freshwater resources for agriculture and considers possible water management options for adaptation to climate change and for climate change mitigation.

This module consists of three sessions with a total duration of 3 hours and 30 minutes, and it will cover the following sessions: *Managing Water on Your Farm*; *Dealing with Pests Naturally*; and *Keeping Your Crops Healthy*, which is intended to methodically enhance participants' comprehension on managing water on a regenerative farm, commencing from the impacts of climate change on water resources for regenerative agriculture, the measures pertaining to water management to mitigate greenhouse gas emissions regenerative agriculture, to understanding, and developing practical skills in measuring and assessing how water flows around the farm and the practical implementation of specific water management techniques for effective for better decision-making.



Knowledge

1. Apply basic water conservation methods: Understand how water can be properly managed and the techniques to conserve water in the farm.
2. Use natural techniques for pest control: Understand and apply environmental benign ways of controlling pests in the farm.
3. Combine water and pest management for healthier crops: Understand how water management practices can influence pest populations and vice versa.



Skills

1. Understand, and develop practical skills in measuring and assessing how water flows around the farm and recognizing how farming practices affect flows to help farmers to manage water efficiently and reduce pollution risks.
2. Develop practical skills to implement specific effective water management strategies such as rainwater harvesting, drip irrigation, and the use of drought-resistant crops can help optimize water use efficiency and ensure water availability for regenerative agriculture including pest control strategies.
3. Practically craft and implement a comprehensive pest-water-climate adaptation plan for water management for regenerative agriculture operation, taking cognizance of the local climate threats and available water resources.

SESSION 1 Managing Water on Your Farm	SESSION 2 Dealing with Pests Naturally	SESSION 3 Keeping Your Crops Healthy
60 min	90 min	60 min



Teaching Methodology

- **Interactive Lectures:** Used primarily to introduce key concepts and theories related to managing water on the farm and the challenges associated with it. Interactive lectures allow for real-time questions and answers, fostering a dynamic learning environment.
- **Group discussions** are a powerful tool in teaching, fostering a collaborative learning environment that enhances understanding, develops essential skills, and promotes active engagement. When well-facilitated, group discussions can significantly enrich the educational experience and prepare young farmers for future collaborative endeavors.
- **Case Studies:** Participants will analyze real-world examples of farms that have successfully implemented specific effective water management strategies to optimize water use efficiency and ensure water availability for regenerative agriculture. Case studies are a dynamic and effective teaching method that enhances students' learning experiences by connecting theoretical knowledge with practical application, fostering critical thinking, problem-solving and communication skills.
- **Hands-on Activities:** Essential for teaching practical skills such as rainwater harvesting, drip irrigation, and the use of drought-resistant crops in regenerative agriculture. These activities include but are not limited to demonstration sites, field trips, and the use of simulation tools and equipment.
- **Problem-solving Sessions:** Participants will work in teams to solve specific problems related to water and pests management on the farm. Problem-solving segments re-enforces young farmers' ability to apply learned concepts in realistic scenarios on the farm.
- **Guest Lectures:** Subject specific fields experts in will be invited to provide specialized knowledge and insights, enhancing the learning experience, and providing networking opportunities.



Required Materials

Projector, Computer, Internet Connection, Whiteboard and Markers, Paper and Pencil, Worksheets, Copies of Handouts, irrigation components, and other materials such as: Water Cycle Diagrams, Irrigation Methods Charts, Pest Identification Posters, Models and Simulations (Scale Models of Irrigation Systems, Pest Management Simulation Kits), Water and Pest Management Videos, Irrigation Planning Apps, Pest Identification Apps, Water Management Manuals, Pest Management Guides, Water Quality Testing Fact Sheets, Natural Pesticide Recipes, Soil Moisture Meters, Water Quality Test, Pheromone Traps, Insect Identification Kits, Irrigation Setup Kits, Drip Irrigation Kits, Sprinkler System Kits.



Literature

1. Goyal, M. R., & Ayars, J. E. (2020). Sustainable Micro Irrigation Management for Trees and Vines. Apple Academic Press.

[Sustainable Micro Irrigation Management for Trees and Vines - Google Books](#)

This book covers sustainable irrigation practices, including the use of micro-irrigation systems for trees and vines, focusing on efficient water use.

2. Uddin, M. N., & Ullah, H. (2021). Precision Agriculture: Applications and Opportunities. Springer. [Evaluation of Machine Learning Approaches for Precision Farming in Smart Agriculture System: A Comprehensive Review | IEEE Journals & Magazine | IEEE Xplore](#)

Provides insights into precision agriculture technologies, including water management systems that optimize irrigation efficiency and pest control methods.

3. Bandyopadhyay, S., & Bhattacharya, A. (2022). *Climate Change and Agricultural Ecosystems: Current Challenges and Adaptation*. Springer.
[Climate change and agricultural ecosystems : current challenges and adaptation | CiNii Research](#). Discusses the impacts of climate change on agriculture, including water management and pest control strategies to adapt to changing environmental conditions.

4. Gopalakrishnan, S., & Chinnusamy, C. (2023). *Integrated Pest Management: Principles and Applications*. Academic Press.
[Biology and Biotechnology of Environmental Stress Tolerance in Plants ... - Google Books](#). A comprehensive resource on Integrated Pest Management (IPM) principles and their practical applications in various agricultural systems.

5. Qin, W., & Rodriguez, L. F. (2024). *Smart Agriculture: Technology and Applications*. CRC Press.
[Applied Sciences | Free Full-Text | Applications of Artificial Neural Networks in Greenhouse Technology and Overview for Smart Agriculture Development \(mdpi.com\)](#). Explores the use of smart technologies in agriculture, including automated irrigation systems and advanced pest monitoring and control methods.

6. Smith, R., & Brown, T. (2020). "The Role of Drip Irrigation in Sustainable Agriculture." *Agricultural Water Management*, 231, 105996.
[The Role of Drip Irrigation in Sustainable Agriculture - DripWorks](#) Examines the benefits of drip irrigation systems in reducing water use and improving crop yields.

7. Martínez-Fernández, J., & Herrera, M. (2021). "Innovative Approaches to Pest Control in Organic Farming." *Crop Protection*, 143, 105562.
https://www.researchgate.net/publication/358047206_PEST_MANAGEMENT_STRATEGIES_IN_ORGANIC_FARMING
 Reviews new pest control methods suitable for organic farming, emphasizing natural and biological controls.

8. Chen, Y., & Li, J. (2022). "Impact of Climate Variability on Irrigation Water Demand." *Irrigation Science*, 40(2), 233-245.
https://www.researchgate.net/publication/225441401_Impact_of_climate_change_on_irrigation_water_demand_of_dry_season_Boro_rice_in_northwest_Bangladesh
 Analyzes how climate variability affects irrigation water demand and suggests adaptive strategies for farmers.

9. Lopez, D., & Wang, S. (2023). "Advances in Remote Sensing for Precision Agriculture." *Journal of Precision Agriculture*, 18(3), 567-589.
https://www.researchgate.net/publication/372766466_Precision_Agriculture_Reviewing_the_Advancements_Technologies_and_Applications_in_Precision_Agriculture_for_Improved_Crop_Productivity_and_Resource_Management
 Discusses the use of remote sensing technologies for monitoring crop health, soil moisture, and pest populations.

10. Patel, A., & Kumar, V. (2024). "Sustainable Pest Management Strategies in Horticulture." *Horticultural Science*, 59(1), 45-61.
https://www.researchgate.net/publication/361275662_Sustainable_Management_of_Diseases_in_Horticulture_Conventional_and_New_Options

Highlights sustainable pest management practices in horticulture, including the use of natural predators and organic pesticides.

11. Food and Agriculture Organization (FAO). (2020). The State of Food and Agriculture 2020: Overcoming Water Challenges in Agriculture. FAO.

[The State of Food and Agriculture 2020: Overcoming water challenges in agriculture - World | ReliefWeb](#)

A detailed report on global water challenges in agriculture and recommended strategies for sustainable water management.

12. United Nations Environment Programme (UNEP). (2021). Integrated Pest Management: A Global Perspective. UNEP. [UNEP - UN Environment Programme](#)

Provides an overview of IPM practices and their global implementation, with case studies and policy recommendations.

13. World Bank. (2022). Water Security and Climate Resilience in Agriculture. World Bank Publications. [Climate-Smart Agriculture \(worldbank.org\)](#)

Discusses the intersection of water security and climate resilience in agriculture, offering strategies for managing water resources sustainably.

14. International Water Management Institute (IWMI). (2023). Innovations in Irrigation for Sustainable Agriculture. IWMI.

[Innovative water solutions for sustainable development \(cgiar.org\)](#)Explores innovative irrigation technologies and practices that promote water conservation and sustainable agriculture.

15. National Institute of Agricultural Research (INRA). (2024). Advances in Biological Pest Control: Research and Applications. INRA.

https://www.researchgate.net/publication/380464935_ADVANCES_IN_BIOLOGICAL_CONTROL_OF_AGRICULTURAL_PESTS

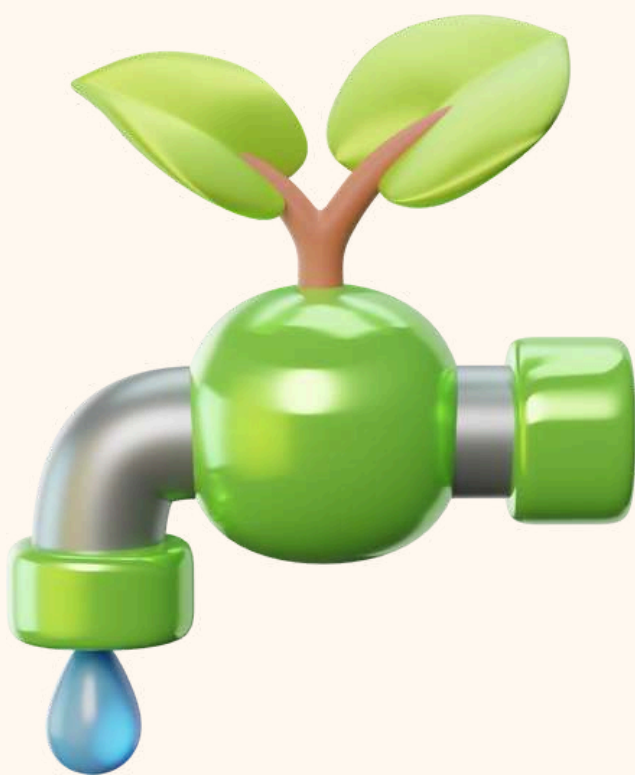
A comprehensive report on the latest research and applications in biological pest control, including case studies from various agricultural regions. These resources cover a broad range of topics related to water and pest management in agriculture, providing valuable information for students, researchers, and practitioners in the field.

Session 1

Managing Water on Your Farm

This session focuses on educating participants about the various impacts of climate change on agriculture across Europe and Africa. Learners will explore how rising temperatures, changing precipitation patterns, and increasing frequency of extreme weather events are affecting crop productivity, altering agricultural landscapes, and necessitating shifts in farming practices. The session will utilize a combination of interactive lectures and visual aids such as maps and graphs to demonstrate regional differences in climate impacts.

This session focuses on water management and its critical role in climate-smart agriculture. It analyzes the impacts of climate change on the availability of freshwater resources for agriculture and considers possible water management options for adaptation to climate change and for climate change mitigation. Key topics include Water management; Water management options for improving adaptation and building resilience to climate change; Water management and climate change mitigations; and Basic water conservation techniques and a particular emphasis will be made in relation to regenerative agriculture. Participants will gain a comprehensive understanding of the critical role water plays in agriculture in any context, region or geographical location.



At the end of this session, VET-students will be able to:
KNOWLEDGE

1. **Understand Water Sources and Cycle:** Explain the different sources of water for farming (rainwater, groundwater, surface water).
2. **Identify Efficient Irrigation Techniques:** Identify and describe various irrigation methods (drip, sprinkler, surface irrigation).
3. **Apply Water Conservation Practices:** Implement practices such as mulching, rainwater harvesting, and soil moisture retention techniques to conserve water on the farm.
4. **Soil-Water Relationship:** Explain the relationship between soil properties and water retention, focusing on experiments to determine the moisture content of soil.
5. **Monitoring and Managing Water Quality:** Identify factors affecting water quality and their impact on crop health.



Duration

60 min



Teaching Methodology

1. **Lectures and Presentations:** Provide foundational knowledge and theoretical understanding.
2. **Interactive Discussions:** Encourage critical thinking and exchange of ideas.
3. **Field Visits and Demonstrations:** Observe and learn from real-world applications.



Required Materials

Soil and water test kits, Water Cycle Diagram, Rainwater Harvesting Models, Water Quality Test Kits, Irrigation Methods Chart, Projector, computer, internet connection, presentation, whiteboard and markers, earplugs, paper and pencil, worksheets, copies of handouts and workshop summaries



Literature

1. Goyal, M. R., & Ayars, J. E. (2020). Sustainable Micro Irrigation Management for Trees and Vines. Apple Academic Press. This book covers sustainable irrigation practices, including the use of micro-irrigation systems for trees and vines, focusing on efficient water use.
2. Smith, R., & Brown, T. (2020). "The Role of Drip Irrigation in Sustainable Agriculture." Agricultural Water Management, 231, 105996. Examines the benefits of drip irrigation systems in reducing water use and improving crop yields.
3. Food and Agriculture Organization (FAO). (2020). The State of Food and Agriculture 2020: Overcoming Water Challenges in Agriculture. FAO. A detailed report on global water challenges in agriculture and recommended strategies for sustainable water management.
4. International Water Management Institute (IWMI). (2023). Innovations in Irrigation for Sustainable Agriculture. IWMI. Explores innovative irrigation technologies and practices that promote water conservation and sustainable agriculture.



1

INTRODUCTION

To effectively teach young farmers about managing water on their farms, it's important to employ a variety of teaching methodologies that engage students, provide hands-on experience, and reinforce theoretical knowledge. Here's a comprehensive approach:

- 1. Introduction Lectures:** Cover the basics of water management, including sources of water, the water cycle, and the importance of water management in agriculture.
- 2. Infographics and Videos:** Supplement lectures with educational videos and infographics to enhance understanding.
- 3. Group Discussions:** Facilitate discussions best practices for water management.
<https://www.youtube.com/watch?v=G6d4PKEEyCo>

Learning Outcomes

Duration

Required Materials

-Understand the relevance of water management and the required

15 min

Projector, Computer, Handouts/impacts, Worksheets for group discussions, videos

-Recognize the tools resources management in different settings.

2

MAIN PART

- Managing Water on Your Farm:

-The educator starts by identifying and explaining different sources of water for agricultural purposes such as groundwater, surface water drainage pond, rain and municipal water. This can be illustrated with visual aids for learners to comprehend.

-The educator uses weather Apps and multimedia aids, to cover concepts such as;

- Water cycle (evaporation, condensation, precipitation and rain).
- The consequences of poor water management, such as soil erosion, waterlogging, and salinization and how it affects water availability on farms.

<https://www.youtube.com/watch?v=V5WiD8ZPSNk>

<https://www.youtube.com/watch?v=JrDxPWZSE2U>

-The educator then describes different irrigation methods such as drip irrigation, sprinkler irrigation, centre pivot irrigation, furrow irrigation and terraced irrigation. The significance of each of the irrigation methods is also covered. Using water management software, weather Apps, irrigation method charts, these concepts can be efficiently conveyed to learners.

-The educator also covers how water can be managed in the farm through intercropping, cover cropping and agroforestry. Also, how rainwater harvesting, soil conservation, use of technology can help manage water in the farm

-The educator can also use other visual aids, such as graphs, charts, and case studies, to illustrate water management on the farm and make the information more engaging and accessible for the participants.

- Group Discussions on Regional Variability:

The educator divides the participants into smaller groups and assigns them different agricultural regions to discuss. Each group is tasked with analysing the different ways and methods of managing water on the farm in their assigned region, considering factors such as local climates, farming practices, and the vulnerability and resilience of the agricultural systems. Participants are encouraged to draw on the information presented earlier and their own knowledge to identify the unique challenges and opportunities faced by their assigned region. The groups then present their findings to the larger group, fostering a collaborative learning environment and allowing for the exchange of ideas and perspectives with respect for each other.

- Case Studies and Real-Life Examples:

The educator incorporates case studies and real-life examples to further illustrate the effects of poor water management on crop productivity and farming practices in different agricultural regions.

These examples help participants contextualize the information and better understand the practical implications of managing water on farms.

Participants are encouraged to engage with the case studies, asking questions and sharing their own experiences or insights related to the topics presented.

Tips and Tricks for Educators:

-When presenting and using the apps and software, be sure that all participants have access to them, and when possible, name the free resources for students to use later in their business.

- Divide participants into smaller groups based on the different agricultural regions they will analyse. Ensure a mix of participants in each group to capture diverse perspectives and insights.

-Pose questions like:

-What is water management in agriculture, and why is it important?

-How does efficient water management impact crop yield and quality?

-What are the main sources of water for irrigation on farms?

-What are the different methods of irrigation, and how do they compare in terms of efficiency and suitability for different crops?

-How can mulching help in conserving water on a farm?

-What roles do soil moisture sensors play in water management, and how do they work?

-Can you describe the steps involved in setting up a drip irrigation system?

-How would you plan an irrigation schedule for a farm that grows a variety of crops?

-What factors would you consider when choosing an irrigation method for a specific type of crop and soil?

-What are some common challenges faced in water management on farms, and how can they be addressed?



Learning Outcomes

Duration

Required Materials

-Explain different sources of water for agriculture.

-Describe the water cycle and its significance in agriculture.

-Identify and describe various irrigation methods

60 min

Projector, Computer, Internet connection, Presentation slides, Flipchart and markers, Paper and pencil, Worksheets

CONCLUSION

- The educator leads a final discussion summarising the key concepts covered in the session, including the challenges associated with managing water on crop productivity and farming practices.
- Participants reflect on the adaptation strategies discussed throughout the session and share their insights on how to ensure sustainable agriculture.
- The session concludes with participants discussing the practical skills they have gained in managing water on the farm and incorporating it into their farming operations

Tips and Tricks for Educators:

- Briefly recap the main concepts discussed, such as techniques and practices managing water and dealing with the challenges associated with it. This helps reinforce the learning objectives and ensures clarity.
- Invite participants to share their takeaways. Ask questions like, "What factors would you consider when choosing an irrigation method for a specific type of crop and soil?" or "How would you apply today's discussion to your own agricultural practices?" This promotes personal engagement and helps participants internalise the information.
- Encourage participants to think about how they can integrate the strategies discussed into their farming practices. This could be through a quick activity where they draft a simple plan on what they might change or focus on in their operations.
- Allow time for participants to ask questions or provide feedback on the session. This not only clears up any doubts but also gives you insights into how to improve future sessions.
- End by offering additional resources, such as links to further reading, online tools, or contacts for local agricultural advisors. This supports ongoing learning and application of the session's content.

Learning Outcomes

Duration

Required Materials

Reinforce the understanding managing water in agriculture and its significance in sustainable farming practices

15 min

Use materials provided

The total time that the average student will spend to learn all concepts

2 hours: 60 min guided learning and time for independent learning activities of participants: exploring the suggested apps and websites videos as well as repeating key words and concepts at home.

Session 2

Dealing with Pests Naturally

This is a module designed to educate young farmers about sustainable and environmentally friendly methods of pest management. This approach emphasizes the use of biological controls, cultural practices, and natural substances to control pest populations, thereby minimizing the use of synthetic pesticides and reducing their negative impact on the environment and human health.

At the end of this session, VET-students will be able to:

KNOWLEDGE

1. **Understand the Principles of Pest Management:** Explain the basic principles of natural pest management and its benefits over conventional methods.
2. **Identify Natural Methods of Controlling Pest:** Identify various natural pest control methods, including biological control, cultural practices, mechanical controls, and natural pesticides.
3. **Implement Strategies for Pest Management:** Develop and implement integrated pest management (IPM) plans tailored to specific crops and local conditions.
4. **Monitor and Evaluate Pest Management Strategies:** Monitor pest populations and evaluate the effectiveness of natural pest management strategies.



Duration

90 min



Teaching Methodology

1. **Lectures and Presentations:** Provide foundational knowledge and theoretical understanding.
2. **Interactive Discussions:** Encourage critical thinking and exchange of ideas.
3. **Field Visits and Demonstrations:** Observe and learn from real-world applications.



Required Materials

Projector, Computer, Internet Connection, Presentation Materials, Whiteboard and Markers, and other innovative teaching and learning aids such as:

- Posters and Charts:** Visual aids showing different beneficial insects, pest identification, and natural pest management techniques.
- Infographics:** Infographics explaining the life cycle of pests and how natural pest management methods interrupt these cycles.
- Educational Videos:** Videos demonstrating natural pest management techniques and success stories from around the world.
- Interactive Apps:** Apps for identifying pests and beneficial insects, and for planning and tracking IPM strategies.

-Insect Identification Kits: Kits containing tools for identifying pests and beneficial insects, such as magnifying glasses and identification charts.

-Monitoring Tools: Tools for monitoring pest populations, such as sticky traps, pheromone traps, and field notebooks for recording observations.



Literature

1. Bandyopadhyay, S., & Bhattacharya, A. (2022). *Climate Change and Agricultural Ecosystems: Current Challenges and Adaptation*. Springer. Discusses the impacts of climate change on agriculture, including water management and pest control strategies to adapt to changing environmental conditions.
2. Gopalakrishnan, S., & Chinnusamy, C. (2023). *Integrated Pest Management: Principles and Applications*. Academic Press. A comprehensive resource on Integrated Pest Management (IPM) principles and their practical applications in various agricultural systems.
3. Martínez-Fernández, J., & Herrera, M. (2021). "Innovative Approaches to Pest Control in Organic Farming." *Crop Protection*, 143, 105562. This document reviews new pest control methods suitable for organic farming, emphasising natural and biological controls.
4. Lopez, D., & Wang, S. (2023). "Advances in Remote Sensing in Precision Agriculture." *Journal of Precision Agriculture*, 18(3), 567-589. This document discusses the use of remote sensing technologies for monitoring crop health, soil moisture, and pest populations.
5. Patel, A., & Kumar, V. (2024). "Sustainable Pest Management Strategies in Horticulture." *Horticultural Science*, 59(1), 45-61. This document highlights sustainable pest management practices in horticulture, including the use of natural predators and organic pesticides.
6. United Nations Environment Programme (UNEP). (2021). *Integrated Pest Management: A Global Perspective*. UNEP. This document provides an overview of IPM practices and their global implementation, with case studies and policy recommendations.
7. National Institute of Agricultural Research (INRA). (2024). *Advances in Biological Pest Control: Research and Applications*. INRA. A comprehensive report on research and applications in biological pest control, including case studies from various agricultural regions. These resources cover a broad range of topics related to water and pest management in agriculture, providing valuable information for students, researchers, and practitioners in the field.
8. https://ec.europa.eu/commission/presscorner/api/files/attachment/855260/Pesticides_factsheet.pdf
This document provides comprehensive guidelines on the sustainable use of pesticides, including natural alternatives. It aims to reduce the risks and impacts of pesticide use on human health and the environment by promoting Integrated Pest Management (IPM) and non-chemical alternatives.



1

INTRODUCTION

-The educator starts by helping learners define pests. Through active discussion, learners are directed to mention common pests found in the farm and the damages they do to crops.

-The educator then elicits ways young farmers (learners) manage pests in their farm through active class discussion. Learners' responses on various farming practices are outlined by the educator, who then helps learners to understand the benefit and harm of those practices. This background information helps the educator to introduce the topic of pest management in farms. The educator covers various topics such as;

- Definition of pest
- Common pests in the farm
- Harmful effect of pests
- Pest management

<https://www.youtube.com/watch?v=YJ9UILJW53M>

https://www.youtube.com/watch?v=_RoMy-2ag94

Tips and Tricks for Educators

-**Use Engaging Visual Aids:** Start the session with compelling visual aids such as video that illustrate the pests and their damaging effect on the farm.

-**Interactive Engagement:** Encourage participants to actively engage by sharing their personal experiences and observations related to farm pests.

-**Contextualise Information:** Tailor the discussion to the geographic and cultural context of the participants. If the session includes farmers from diverse regions, highlight examples that are relevant to each area. This approach helps in making the information more applicable and actionable for the participants.

Learning Outcomes

Duration

Required Materials

- Understand the principles of pest management.

20 min

Projector and computer for presentation, Internet connection, Presentation slides, Whiteboard and markers, Handouts detailing climate change impacts

2

MAIN PART

- From the various ways young farmers (learners) use to address pest issues in their farm, the educator identifies approaches that are considered natural and those that are conventional.

-The educator focuses lesson on natural methods for controlling pests in the farm and cover topics such as;

- Natural pest control.
- Common natural methods used for pest control such as using plants like garlic and onions, predators, natural pesticides (essential oils), and physical control methods like erecting barriers to keep out pests.

- Difference between natural and conventional pest management.
- How to monitor and evaluate pest management strategies.

The educator employs variety of teaching strategies such as:

- Case studies on successful natural pest management farms and regions for learners to understand ways to manage pests.
- Group discussions to engage learners in active dialogue on challenges and benefits of natural pest management.
- Hands-On Workshops for learners to develop real-world experience on biological pest control using beneficial insects, such as ladybugs, parasitoid wasps, and predatory mites. This approach can also help learners apply how to also use physical pest control methods.
- Field visits and demonstrations to illustrate various strategies to manage pests in the farm. Educator helps students to develop integrated pest management plans for a specific crop or farm scenario.
- Demonstration and farm visits to practice natural pest management, and observe how techniques such as crop rotation and intercropping can serve as a natural way of pest control.
- Practical activities to help students learn how to develop integrated pest management (IPM) plan and implement it for a specific crop or farm scenario, as well as, to monitor pest population using trap, visual inspection, and other methods.



Tips and Tricks for Educators

- Before introducing the kit to students, take the time to familiarise yourself with all its components and functionalities. Understand how each part contributes to the learning objectives and prepare to demonstrate its use to the learners.
- When introducing the insect identification kits or natural pesticides provide clear and concise instructions. Demonstrate each step of the activity before allowing students to handle the materials. This helps prevent confusion and ensures that students use the kits effectively.
- Divide students into small groups and assign tasks that require collaboration. This not only helps in learning from peers but also enhances soft skills such as teamwork and communication.
- After the activity, hold a discussion or a reflective session where students can share their observations and insights. This helps consolidate their learning and allows them to express any challenges they faced and how they overcame them.

Learning Outcomes	Duration	Required Materials
-Identify natural methods of controlling pests. -Implement Strategies for Pest Management. -Monitor and Evaluate Pest Management Strategies.	50 min	Projector and computer for presentation, Soil testing kits and soil samples, Flipcharts and markers for group discussions

CONCLUSION

- Recap of the session's key points, emphasizing the importance of pest management in farming.
- Students share their plans on how they might implement these strategies in their own operations.
- Q&A session to address any remaining questions and clarify complex points.

Learning Outcomes

Duration

Required Materials

Summarise the key concepts learned
and **Reflect** on their application

20 min

Use the listed materials

**The total time that the
average student will spend
to learn all concepts**

4 hours: 90 min guided learning and time for independent learning activities of participants: studying ways of implementing pest rejection strategies and ways of integrating climate resilience on their own farm, as well as repeating key words and concepts at home.

Session 3

Keeping Your Crops Healthy

This section looks at various ways by which students will learn and practice strategies that keep crops healthy despite the challenges posed by climate change. The module covers a range of topics such as disease management, crop nutrition, and sustainable farming practices. The goal is to provide farmers with the knowledge and skills necessary to ensure their crops thrive, resulting in better yields and sustainability.



At the end of this session, VET-students will be able to:

KNOWLEDGE:

1. **Enhance Crop Nutrition:** Understand crop nutrient requirements and apply appropriate fertilization methods.
2. **Implement Sustainable Practices for Maintain Healthy Crops:** Incorporate sustainable farming practices that promote long-term crop health and environmental stewardship.
3. **Monitor Crop Health:** Use tools and techniques to regularly monitor and assess the health of crops.



Duration

60 min



Teaching Methodology

Interactive Lectures: Introduction to various climate information sources, including satellite data, weather stations, and online climate data portals.

Case Study Analysis: Analysing real-world examples of successful crop health management to draw lessons and best practices.

Hands-On Workshops: Soil Testing and Amendment: Workshops on testing soil pH, nutrient levels, and making necessary amendments.

Field Visits and Demonstrations: Visits to farms practising exemplary crop health management to observe techniques in action.



Required Materials

Computers or tablets with internet access, and apps, Projector and screen for demonstrations, Handouts with guides and other teaching and learning aids such as: Posters and Charts, Infographics, Educational Videos, Interactive Apps, Fact Sheets, Soil Testing Kits, Irrigation Kits, Composting Kits.



Literature

1. Li, H., & Zhang, X. (2023). "Advances in Precision Agriculture: Monitoring Crop Health." *Precision Agriculture*, 24(1), 89-104. Reviews the latest technologies in precision agriculture for monitoring and maintaining crop health.
2. Wang, L., & Liu, Y. (2024). "Climate Change and Crop Health: Challenges and Mitigation Strategies." *Climate and Agriculture*, 12(2), 142-158. Analyzes the impact of climate change on crop health and suggests mitigation strategies.



1

INTRODUCTION

- The educator begins with a presentation explaining crop health and the significance of soil nutrients, pest and water management. Afterwards, the educator engages participants in a discussion about their current practices of accessing information and the challenges they face in keeping their crops healthy.

Educators show through a quick educational video cover topic such as;

- activities of pests in the farm
- loss of soil nutrients
- managing soil nutrient in the farm.

Learning Outcomes

Duration

Required Materials

-Understand the effect of soil-water-nutrients and its influence on crop health.

15 min

Interactive apps, educational videos, Projector, Handouts summarising

2

MAIN PART

Through active discussion and Q&A sessions, the educator directs learners to come up with practices they will adopt to ensure their crops remain healthy. From learners' responses the educator focuses lesson on sustainable practices to maintain healthy crops and discuss various areas including;

- Various approaches that help to maintain healthy crops in the farm.
- How to implement practices that ensure healthy crops in the farm.
- Various approaches to that can be used to monitor crop health.
- Challenges and solutions for maintaining crop health.

<https://www.youtube.com/watch?v=wUBxcXSM6wc>

<https://www.youtube.com/watch?v=myVcct1mZM4>

Learners are assisted to understand the lesson through the use of educational approaches such as;

- Lecture and presentation to understand how practices such as weeding, irrigation, pest and disease control and proper pruning can maintain healthy crops.
- Guest Speakers with expertise in soil science, entomology, etc. to help learners understand various sustainable agriculture practices to maintain soil health.
- Interactive Discussions to facilitate active conversation among learners on the challenges and solutions for maintaining crop health in different farming contexts.
- Case Study Analysis to analyze real-world examples of successful crop health management to draw lessons and best practices.

Tips and Tricks for Educators

-Prior to the session, ensure that all websites and interactive apps are fully functional and that you have backups in case of technical issues. Familiarise yourself with the interfaces of each tool to provide effective guidance.

- When introducing interactive apps, use a projector to display the process on a screen as you navigate. This visual guide will help participants understand the steps more clearly.
- Select case studies that are relevant to the agricultural contexts of the participants.
- At the end of the hands-on activities, summarise the main points and takeaways.

Learning Outcomes	Duration	Required Materials
- Implement sustainable Practices for maintaining healthy crops. -Monitor crop health.	30 min	Computers or tablets with internet access. Access to specific soil, nutrient and water information portals and apps, Case studies printouts, Flipcharts and markers for group work

3

CONCLUSION

Open the floor for any questions, allowing participants to clarify doubts and deepen their understanding (Q&A Session) and summarize the session, emphasising the importance of continual learning and adaptation in keeping the crops healthy.

Learning Outcomes	Duration	Required Materials
- Summarize the key points learned and reflect on the application.	15 min	-

The total time that the average student will spend to learn all concepts

4 hours: 90 min guided learning and time for independent learning activities of participants: becoming familiar with suggested apps independently as well as repeating key words and concepts at home.

A woman wearing a blue turtleneck sweater, a blue headwrap, and brown overalls is crouching in a field, holding a small orange pumpkin. In the background, other people are visible working in the field. The scene is set in a lush green field with large leaves.

Module 5

Starting Your Regenerative Farm

The "Starting Your Regenerative Farm" module is designed for aspiring farmers, agricultural students, and anyone interested in sustainable agriculture, focusing on the foundational steps of starting a regenerative farm. This module consists of three sessions: Planning Your Farm, Finding Your Market, and Making It Official. Participants will be guided through the initial stages of farm planning, conducting market research, and understanding the legal and certification requirements for farm operation. Through interactive lectures, group discussions, hands-on activities, and case studies, the module aims to provide a comprehensive understanding of the essential elements needed to start a regenerative farm. This module equips participants with the knowledge and practical skills to establish a successful and sustainable farming business, ensuring they are well-prepared to navigate the complexities of the agricultural industry.



At the end of this module, VET students will be able to:

This module consists of three sessions with a total duration of 3 hours and 30 minutes. It will cover the following sessions: *Planning Your Farm*, *Finding Your Market*, and *Making It Official*. This layout is intended to guide students through the fundamental steps of starting a regenerative farm, from initial planning and market research to understanding the legal and certification requirements necessary for successful farm operation.



Knowledge

1. Understand the essential components of planning a regenerative farm, including land selection, soil health, water management, crop selection, and livestock integration.
2. Identify the key factors in finding and accessing markets for farm products.
3. Comprehend the basic legal requirements and certification processes necessary to establish a regenerative farm.



Skills

1. Develop a preliminary layout and operational plan for a small regenerative farm.
2. Conduct basic market research to identify potential markets and customers for farm products.
3. Navigate the legal and certification processes required to start and operate a regenerative farm.

SESSION 1 Planning Your Farm	SESSION 2 Finding Your Market	SESSION 3 Finding Your Market
60 min	90 min	60 min



Teaching Methodology

- **Interactive Lectures:** Used primarily to introduce the core concepts of starting a regenerative farm. The lectures are enriched with visual aids such as diagrams, infographics, and videos to help illustrate complex ideas like farm planning, market analysis, and legal requirements. This format allows for real-time questions and answers, fostering a dynamic learning environment.
- **Visual Aids and Real-Life Examples:** To enhance understanding, real-life case studies of regenerative farms will be discussed. This helps students see the practical application of theoretical knowledge and understand the real-world impact of these practices.
- **Group Discussions:** After lectures or video presentations, students will engage in group discussions. This method facilitates peer learning and deeper understanding through the sharing of ideas and experiences among participants. It is particularly useful for consolidating learning and encouraging critical thinking about how regenerative practices can be applied in different agricultural settings.
- **Hands-on Activities and Planning Exercises:** Students will participate in activities such as planning the layout of a farm and conducting market research. These exercises are designed to be practical and hands-on, allowing students to apply what they have learned in a realistic context. This hands-on approach enhances their ability to apply learned concepts to real-life scenarios and develop solutions that are both sustainable and practical.

- **Guest Lectures:** Where possible, experts in farm planning, market analysis, and agricultural law will be invited to speak. These guest lectures provide specialized knowledge and new perspectives, enriching the learning experience and offering networking opportunities for students.



Required Materials

Projector, Computer, Internet Connection, Presentation Materials, Whiteboard and Markers, Paper and Pencil, Guided worksheets for planning exercises and market research activities, Printed materials on farm planning, market analysis, and legal requirements, Guest Speaker Information



Literature

1. LaCanne, C. E., & Lundgren, J. G. (2018). "Regenerative agriculture: merging farming and natural resource conservation profitably." PeerJ.
<https://peerj.com/articles/4428/>
2. Crowder, D. W., & Reganold, J. P. (2015). "Financial competitiveness of organic agriculture on a global scale." Proceedings of the National Academy of Sciences.
<https://www.pnas.org/doi/10.1073/pnas.1423674112>
3. Khangura, R. K., Ferris, D., Wagg, C., & Bowyer, J. (2023). "Regenerative Agriculture—A Literature Review on the Practices and Mechanisms Used to Improve Soil Health." Sustainability
<https://www.semanticscholar.org/paper/Regenerative-Agriculture%E2%80%94A-Literature-Review-on-the-Khangura-Ferris/724cd486bdbccod08f96da543c4e3fb76b85ec5e>
4. Reddy, A. A., Melts, I., Mohan, G., Rani, C. R., Pawar, V., Singh, V., ... & Bhattarai, M. (2022). Economic impact of organic agriculture: evidence from a Pan-India survey. Sustainability, 14(22), 15057.
[Sustainability | Free Full-Text | Economic Impact of Organic Agriculture: Evidence from a Pan-India Survey \(mdpi.com\)](https://www.mdpi.com/Free Full-Text/Economic Impact of Organic Agriculture: Evidence from a Pan-India Survey)
5. Ume, C. (2023). The role of improved market access for small-scale organic farming transition: Implications for food security. Journal of Cleaner Production, 387, 135889. [The role of improved market access for small-scale organic farming transition: Implications for food security - ScienceDirect](https://www.sciencedirect.com/journal/journal-of-cleaner-production)
6. Gordon, E., Davila, F., & Riedy, C. (2023). Regenerative agriculture: a potentially transformative storyline shared by nine discourses. Sustainability Science, 18(4), 1833-1849. [Regenerative agriculture: a potentially transformative storyline shared by nine discourses | Sustainability Science \(springer.com\)](https://www.springer.com/journal/11245)
7. Tiftonell, P., El Mujtar, V., Felix, G., Kebede, Y., Laborda, L., Luján Soto, R., & de Vente, J. (2022). Regenerative agriculture—agroecology without politics?. Frontiers in Sustainable Food Systems, 6, 844261. [Frontiers | Regenerative agriculture—agroecology without politics? \(frontiersin.org\)](https://www.frontiersin.org/journal/10.3389/fsufs.2022.844261)
8. Brozovic, J. (2024). COMPREHENSIVE RESEARCH REPORT: Regenerative Agriculture EUROPE-AFRICA. reviver-project.eu/wp-content/uploads/2024/03/COMPREHENSIVE-RESEARCH-REPORT-Regenerative-Agriculture-EUROPE-AFRICA.pdf

Session 1

Planning Your Farm

This session focuses on teaching participants the fundamental elements of planning a regenerative farm. It aims to provide a comprehensive understanding of the critical components involved in farm planning, including land selection, soil health, water management, crop selection, and livestock integration. Participants will engage in interactive activities and planning exercises to design a basic layout for a regenerative farm, considering ecological principles and sustainable practices. By the end of this session, students will have a foundational understanding of how to plan the layout and operations of a small farm, ensuring it aligns with regenerative agriculture principles.



At the end of this session, VET-students will be able to:

KNOWLEDGE

1. **Understand the essential components of a farm plan and learn basic elements of farm planning:** Grasp the critical elements involved in planning a farm, including land selection, soil health, water management, crop selection, and livestock integration.
2. **Identify key resources and inputs:** Recognize the necessary resources and inputs required to start and sustain a regenerative farm, such as seeds, equipment, water sources, and soil amendments.
3. **Develop a preliminary farm layout:** Create a basic layout for a small regenerative farm, considering the placement of crops, livestock areas, water management systems, and infrastructure.
4. **Learn operational planning:** Outline an operational plan that integrates ecological principles and sustainable practices into farm management.



Duration

60 min



Teaching Methodology

Oral presentations, discussions, demonstrations; participants will work individually, non-formal methods of learning (Group Discussions, Role-Playing Games, World Café Conversations)



Required Materials

Projector, computer, internet connection, presentation, whiteboard and markers, large sheets of paper, markers, pens, reference materials on farm planning



Literature

1. A Greener World (2023): "Regenerative Planning"
<https://agreenerworld.org/a-greener-world/regenerative-planning/>
2. Haj-Amor et al. (2023): "Sustainable Agriculture: Adaptation Strategies to Address Climate Change by 2050" - This book provides a comprehensive overview of the potential impacts of climate change on European agriculture and the need for adaptive strategies, including changes in agricultural policy and practice.
<https://www.routledge.com/Sustainable-Agriculture-Adaptation-Strategies-to-Address-Climate-Change-by-2050/Haj-Amor-Kim-Bouri/p/book/9781032518459>
3. Regenerative Agriculture: A Manual - EIT Food
https://www.agrana.com/fileadmin/inhalte/agrana_public_files/pdfs/RegenerativeAgricultureFramework_Agrana_Metabolic_20220915.pdf
4. Regenerative Agriculture Framework for Fruit – AGRANA
https://www.agrana.com/fileadmin/inhalte/agrana_public_files/pdfs/RegenerativeAgricultureFramework_Agrana_Metabolic_20220915.pdf



1

INTRODUCTION

- The educator introduces the session by outlining the critical relationship between successful farm management and comprehensive planning.
- Visual aids such as diagrams, charts, and infographics are used to illustrate the basic elements of farm planning, including land assessment, soil health, water sources, crop selection, and livestock integration.

<https://www.youtube.com/watch?v=b3So3olsnxg>

- The educator emphasizes the importance of understanding the land's natural ecosystem and aligning farm practices with regenerative agriculture principles.

Participants are encouraged to share their prior knowledge and experiences related to farm planning, which helps to gauge the audience's existing understanding and tailor the session accordingly.

<https://www.youtube.com/watch?v=npu6GBbB-Oc>

Learning Outcomes

Duration

Required Materials

- Participants will grasp the basic principles of farm planning.

15 min

Projector, compute, presentation slides, whiteboard, markers

2

MAIN PART

- Group Formation:

Participants are divided into smaller groups, each consisting of 4-5 members. This setup encourages collaboration and ensures a diverse range of ideas and perspectives.

- Hypothetical Land Assignment:

Each group is provided with a hypothetical piece of land characterized by specific attributes, including:

- Soil Type: Information on soil fertility, pH level, and organic matter content.
- Water Availability: Details on water sources such as rainfall patterns, nearby water bodies, and potential for irrigation.
- Existing Vegetation: Information on current plant cover, trees, and natural flora.

- Task Overview:

Each group is tasked with designing a basic layout for a regenerative farm. The layout must incorporate key components such as:

- Crop Placement: Determining areas for different crops based on soil suitability and water availability.
- Livestock Areas: Identifying spaces for livestock that support integrated livestock management and enhance soil health.
- Water Management Systems: Planning for irrigation, rainwater harvesting, and drainage systems to optimize water use and minimize runoff.
- Infrastructure: Allocating areas for essential farm infrastructure, including barns, storage sheds, composting facilities, and pathways.

- Ecological Principles and Sustainable Practices:

Groups are instructed to ensure that their farm layouts adhere to ecological principles, such as minimizing soil disturbance, maintaining biodiversity, and enhancing ecosystem services. They should also integrate sustainable practices like crop rotation, cover cropping, and agroforestry.

- Drawing the Layout:

Groups use large sheets of paper to draw their farm layouts. They are encouraged to be detailed and creative, using markers and pens to illustrate different elements clearly.

- Guidance and Support:

Throughout the activity, the educator circulates among the groups to provide guidance, answer questions, and offer feedback. This helps keep the groups on track and ensures they are considering all relevant factors in their planning.

Tips and Tricks for Educators:

- Group Formation: Ensure a mix of participants in each group to capture diverse perspectives and insights.
- Prompting Questions: Use questions to stimulate discussion, such as:
 - How will you manage water resources sustainably?
 - What practices will you implement to enhance soil health?
 - How will you integrate livestock into your farm layout?
- Visual Aids: Provide examples of farm layouts for inspiration but encourage original ideas.
- Facilitation: Foster a supportive environment where students feel comfortable sharing and discussing their ideas.
- Encourage students to watch the videos and think about what they can apply on their farm
- Encourage students to design a basic layout of their ideal regenerative farm and, if desired, later share with the lecturer or other members of the group



Learning Outcomes

- Develop a farm layout, considering all discussed elements.

Duration

40 min

Required Materials

Large sheets of paper, Markers, Pens, reference materials on farm planning, handouts with hypothetical land attributes

CONCLUSION

- Educator's Recap:

The educator will provide a brief summary of the session, emphasizing the importance of comprehensive planning in regenerative farming.

Key points to highlight include:

- The essential components of farm planning: land selection, soil health, water management, crop selection, and livestock integration.
- The critical resources and inputs required for a regenerative farm.
- The principles of developing a preliminary farm layout and operational planning.

- Group Feedback:

Each group will briefly present their farm layout. The educator and peers will provide constructive feedback, encouraging a supportive and collaborative environment.

- Introduction to Upcoming Sessions:

The educator will introduce the next sessions, "Finding Your Market" and "Making It Official," explaining how these will build on the knowledge gained in Session 1.

Participants will be encouraged to think about how their farm plans will evolve with the new information they will learn about market research and legal requirements.

Learning Outcomes

Duration

Required Materials

- Participants will summarize their learning and reflect on the key concepts and activities.

10 min

Projector, Computer, Whiteboard and markers, Participants' farm layout drawings, Reference materials on farm planning

The total time that the average student will spend to learn all concepts

3 hours: 60 min guided learning and time for independent learning activities of participants repeating key words and concepts at home, as well as designing its ideal regenerative farm plan.

Session 2

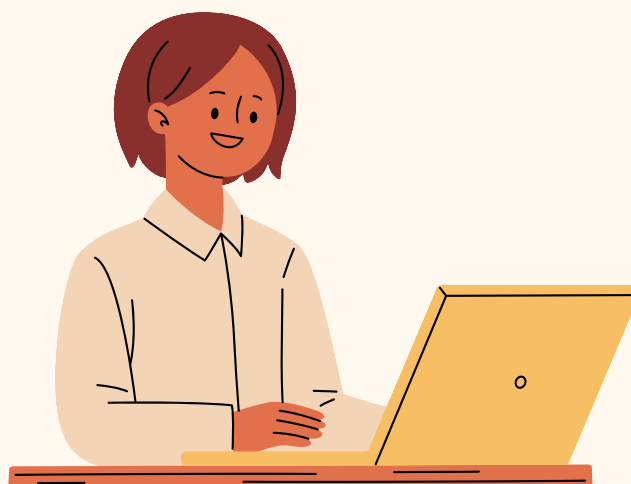
Finding Your Market

This session focuses on teaching students and young farmers how to identify and access markets for their regenerative farm products. It aims to provide a comprehensive understanding of market research, customer segmentation, and effective marketing strategies. Participants will engage in hands-on activities to conduct basic market research and develop strategies for reaching their target markets, ensuring their products meet market demand and achieve profitability.

At the end of this session, VET-students will be able to:

KNOWLEDGE

1. Identify and understand the key factors in finding and accessing markets for farm products.
2. Conduct basic market research to identify potential markets and customers for farm products.
3. Develop micro-strategies for marketing and selling regenerative farm products effectively.



Duration

90 min



Teaching Methodology

- **Interactive Lectures:** To introduce core concepts of market research and market segmentation, enriched with visual aids such as slides and infographics.
- **Group Discussions:** After the lecture, students will discuss real-life case studies of successful market strategies employed by regenerative farms.
- **Hands-on Activities:** Participants will engage in group activities to conduct market research, analyze the competitive landscape, and develop marketing strategies for hypothetical farm products.
- **Presentations:** Groups will present their market research findings and marketing strategies, followed by a feedback session.



Required Materials

Projector, Computer, Internet Connection, Presentation Materials, Whiteboard and Markers, Paper and Pencil, Guided worksheets for market research activities, Printed materials on market analysis and customer research



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1

INTRODUCTION

- **Welcome and Session Overview**

The educator welcomes participants and provides a brief overview of the session, emphasizing the role of market research in establishing a successful regenerative farm.

- **Importance of Market Research**

Using a projector and presentation slides, the educator explains why understanding market demand, customer preferences, and the competitive landscape is crucial for profitability and sustainability.

- **Key Concepts Introduction**

- Market Segmentation: The educator introduces the concept of market segmentation, explaining how it helps target specific groups of customers effectively.
- Target Markets: The concept of target markets is discussed, emphasizing the need to focus on the most promising segments for regenerative farm products.
- Value Propositions: The educator briefly explains how value propositions communicate the unique benefits of farm products to potential customers.

Learning Outcomes

Duration

Required Materials

- Participants will understand the importance of market research in the success of a regenerative farm

10 min

Projector, Computer, Presentation slides, Whiteboard and markers

2

MAIN PART

Market Research Activity:

- Each group is tasked with conducting market research for a hypothetical farm product. This involves identifying potential markets, analyzing the competitive landscape, and segmenting the market based on various factors such as demographics, psychographics, and behavioral characteristics.
- Groups use guided worksheets provided by the educator to gather information on market trends, customer preferences, and competitors. These worksheets help structure the research process and ensure all relevant aspects are covered.
- Participants are encouraged to use online resources and the provided literature to support their research. They will look into current market trends, identify potential customer segments, and understand the competitive environment.
- Groups will collect data on potential market size, customer demographics, purchasing behaviors, and preferences for regenerative farm products. They will also analyze competitors' strengths and weaknesses to identify opportunities and threats.

Marketing Strategy Development:

- Each group develops a comprehensive marketing strategy for their hypothetical farm product. This strategy should focus on pricing, promotion, distribution, and the unique selling points of the product.

Strategy Creation:

- Pricing Strategy: Groups determine the appropriate pricing strategy for their product, considering production costs, market demand, and competitor pricing.
- Promotional Strategy: Groups develop a plan to promote their product effectively. This includes identifying the most suitable channels (e.g., social media, local markets, online platforms) and creating compelling messages that highlight the benefits of their regenerative farm products.
- Distribution Strategy: Groups outline how they will distribute their product to reach their target market. This involves selecting the best distribution channels, whether direct-to-consumer sales, partnerships with local stores, or online sales.
- Unique Selling Proposition (USP): Groups define the unique selling points of their product. This includes the product's benefits, such as being organically grown, sustainably produced, or having superior nutritional value.

Drawing the Marketing Plan:

Groups use large sheets of paper to create detailed marketing plans. They are encouraged to be creative and thorough, using markers and pens to illustrate different elements clearly. These plans should visually represent their strategies and key market insights.

- Throughout the activity, the educator circulates among the groups to provide guidance, answer questions, and offer feedback. This helps ensure that the groups are considering all relevant factors in their market research and strategy development.

Group Presentations:

- Each group presents their market research findings and marketing strategies to the rest of the participants. This presentation should cover their research process, key insights, and detailed marketing plans.
- After each presentation, the educator and peers provide constructive feedback. This feedback focuses on the strengths of the research and strategy, as well as areas for improvement. The aim is to foster a supportive and collaborative environment where students can learn from each other's work.

Tips and Tricks for Educators:

- Group Formation: Ensure a mix of participants in each group to capture diverse perspectives.
- Prompting Questions: Use questions to stimulate discussion, such as:
 - What are the key market trends affecting your product?
 - Who are your main competitors, and what are their strengths and weaknesses?
 - How will you position your product to stand out in the market?
- Visual Aids: Provide examples of marketing strategies for inspiration but encourage original ideas.
- Facilitation: Foster a supportive environment where students feel comfortable sharing and discussing their ideas.

By the end of this main part, participants will have a practical understanding of how to conduct market research and develop effective marketing strategies for their regenerative farm products, preparing them for real-world application.

Learning Outcomes

Duration

Required Materials

- Conduct basic market research to identify potential markets and customers for farm products.

- Develop strategies for marketing and selling regenerative farm products effectively.

70 min

Projector, Computer, Internet Connection, Presentation Materials, Whiteboard and Markers, Paper and Pencil, Guided Worksheets for Market Research Activities, Printed Materials on Market Analysis and Customer Research, Large Sheets of Paper, Markers and Pens

CONCLUSION

The educator provides a summary of the session, highlighting the following key points:

- The importance of market research in identifying potential markets and understanding customer needs.
- The concepts of market segmentation and target markets, and how they help in focusing marketing efforts effectively.
- The development of value propositions to communicate the unique benefits of regenerative farm products.
- Strategies for marketing and selling farm products to ensure they meet market demand and achieve profitability.

The educator and peers provide constructive feedback on the presentations. This feedback should focus on the strengths of the research and strategies, as well as suggestions for improvement. The aim is to foster a supportive and collaborative environment where students can learn from each other's work.

Learning Outcomes

Duration

Required Materials

- Participants will summarize their learning and reflect on the key concepts and activities covered during the session

10 min

Whiteboard and Markers,
Participants, Projector, Computer

The total time that the average student will spend to learn all concepts

6 hours: 90 min guided learning and time for independent learning activities of participants: repeating key words and concepts related to marketing, marketing of agricultural products and other related terms.

Session 2

Making It Official



This session focuses on teaching participants the essential legal requirements and certification processes necessary to establish and operate a regenerative farm in Europe and Sub-Saharan Africa. It aims to provide a comprehensive understanding of the legal framework, necessary permits, and certifications required to ensure compliance with local, national, and international standards. Participants will engage in hands-on activities to navigate the legal landscape and prepare the necessary documentation to make their farm operations official.

At the end of this session, VET-students will be able to:

KNOWLEDGE

- Comprehend the basic legal requirements for starting and operating a regenerative farm. (Croatia, Estonia, Germany, Kenya, Ghana and Tanzania)
- Identify necessary permits and certifications for various aspects of farm operations.
- Navigate the legal and certification processes to ensure compliance with relevant regulations. (Croatia, Estonia, Germany, Kenya, Ghana and Tanzania)



Duration

60 min



Teaching Methodology

- **Interactive Lectures:** To introduce core concepts of legal requirements and certification processes, enriched with visual aids such as slides and infographics.
- **Group Discussions:** After the lecture, students will discuss real-life case studies of farms navigating legal and certification challenges.
- **Hands-on Activities:** Participants will engage in group activities to identify necessary permits and certifications, complete sample application forms, and develop a compliance checklist.
- **Presentations:** Groups will present their findings and strategies for ensuring legal compliance, followed by a feedback session.



Required Materials

Projector, computer, internet connection, presentation materials, whiteboard and markers, paper and pencil, guided worksheets for legal and certification activities, printed materials on legal requirements and certification processes.



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1

INTRODUCTION

The educator welcomes participants and provides a brief overview of the session, emphasizing the role of legal compliance and certification in establishing a successful regenerative farm.

- **Importance of Legal Compliance:** Using a projector and presentation slides, the educator explains why understanding and complying with legal requirements is crucial for farm sustainability and profitability.

Key Concepts Introduction:

- **Legal Requirements:** The educator introduces the basic legal requirements (for specific country) for starting a farm, including land use regulations, environmental regulations, and business registration.
- **Permits and Certifications:** The concept of permits and certifications is discussed, emphasizing the need to obtain necessary approvals for organic certification, water usage, animal welfare, and other relevant areas.

Learning Outcomes

Duration

Required Materials

- Participants will understand the importance of legal compliance and certification in the success of a regenerative farm.

10 min

Whiteboard and Markers, Participants, Projector, Computer

2

MAIN PART

Participants are divided into smaller groups of 4-5 members. This setup encourages collaboration and ensures a diverse range of ideas and perspectives.

Legal and Certification Activity:

Each group is tasked with identifying the necessary legal requirements and certifications for a hypothetical regenerative farm. They will complete sample application forms and develop a compliance checklist to ensure all legal aspects are covered.

Research and Analysis:

Groups use guided worksheets provided by the educator to gather information on legal requirements and certifications. These worksheets help structure the research process and ensure all relevant aspects are covered. Participants are encouraged to use online resources and the provided literature to support their research. They will look into local regulations, necessary permits, and certification processes for various aspects of farm operations.

Groups will collect data on the specific legal requirements and certification processes relevant to their hypothetical farm, including application procedures, required documentation, and timelines.

Developing a Compliance Checklist:

Each group develops a comprehensive compliance checklist for their hypothetical farm, detailing the steps needed to obtain necessary permits and certifications.

Groups use large sheets of paper to outline their compliance checklist, ensuring they include all relevant legal requirements and certification processes. They should consider aspects such as environmental impact assessments, organic certification, water usage permits, and animal welfare standards.

The educator circulates among the groups to provide guidance, answer questions, and offer feedback. This helps ensure that the groups are considering all relevant factors in their legal and certification processes.

Group Presentations:

Each group presents their compliance checklist and discusses the steps they identified for obtaining necessary permits and certifications.

This presentation should cover their research process, key findings, and the strategies they developed.

After each presentation, the educator and peers provide constructive feedback. This feedback focuses on the thoroughness of the compliance checklist, the clarity of the steps identified, and suggestions for improvement.

The aim is to foster a supportive and collaborative environment where students can learn from each other's work.

Tips and Tricks for Educators:

- **Group Formation:** Ensure a mix of participants in each group to capture diverse perspectives.
- **Prompting Questions:** Use questions to stimulate discussion, such as:
 - What are the most critical legal requirements for your farm?
 - How will you ensure compliance with environmental regulations?
 - What steps are necessary to obtain organic certification?
- **Visual Aids:** Provide examples of compliance checklists for inspiration but encourage original ideas.
- **Facilitation:** Foster a supportive environment where students feel comfortable sharing and discussing their ideas.

By the end of this main part, participants will have a practical understanding of the legal and certification processes necessary to establish and operate a regenerative farm, preparing them for real-world application.



Learning Outcomes	Duration	Required Materials
- Identify necessary permits and certifications for farm operations (in specific country) - Navigate the legal and certification processe (in specific country)	40 min	Whiteboard and Markers, Participants, Projector, Computer

CONCLUSION

The educator provides a brief summary of the session, highlighting the following key points:

- The importance of understanding and complying with legal requirements for starting and operating a regenerative farm.
- Key legal requirements, including land use regulations, environmental regulations, and business registration.
- The process of obtaining necessary permits and certifications for various aspects of farm operations, such as organic certification, water usage, and animal welfare.
- The development of a comprehensive compliance checklist to ensure all legal aspects are covered.

Learning Outcomes

Duration

Required Materials

- Participants will summarize their learning and reflect on the key concepts and activities covered during the session

10 min

Projector, Computer, Presentation slides, Whiteboard and markers

The total time that the average student will spend to learn all concepts

6 hours: 60 min guided learning and time for independent learning activities of participants: repeating key words and concepts at home, researching the legislation and getting to know the forms and procedures necessary to establish a farm in accordance with legal norms.

IMPRESSUM

Title: VET Curriculum for Aspiring Regenerative Farmers in Europe and Sub-Saharan Africa

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