



# TEACHING VOCATIONAL GARDENING SKILLS TO ADULTS WITH INTELLECTUAL DISABILITIES



EQUALvet Development of a vocational training program for people with intellectual disabilities in three professions: cook assistant, gardener assistant and cleaner

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EQUALvet

This Manual for “**Teaching Vocational Gardening Skills to Adults with Intellectual Disabilities**” is a result of the cooperation between the consortium of “EQUALvet” Erasmus+ Project.

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## INTRODUCTION

The purpose of this project is to enable people with intellectual disabilities to develop their skills and abilities through group and individual programs aimed at improving work skills, social and professional integration, strengthening equality and participation in integrated activities. These activities include, among others, orientation in space and time, consulting, monitoring and work practices in companies, for women and men, with intellectual disabilities. These processes are examined and achieved with the supportive work methodology, which contributes to the social and work adaptation of workers with intellectual disabilities in finding work in the free market under conditions similar to other workers.

Program trainers are a key part of this goal, however, the teaching task requires specific professional skills, based on teaching, pedagogical and methodological knowledge, and skills, as well as personal, professional principles, attitudes, and values. The work of the trainer is a complex task, but at the same time it is the great challenge to help the participants in the program to develop to the fullest their personal, social, mental, work, and emotional potential, contributing this way to the development of life skills.

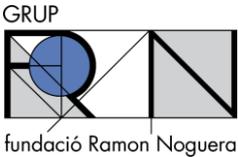
EQUALvet's aim is to provide guidance on the above-mentioned topics by developing a series of manuals for VET trainers of people with intellectual disabilities. These manuals will provide training methodology and tools for the implementation of vocational training for the professions of chef assistant, gardener assistant and cleaners. Additionally, these manuals are accompanied by an evaluation procedure that will be friendly to people with intellectual disabilities in order to lead to the validation of their vocational skills.

The manuals are accessible through EQUALvet's website: [equalvet.eu](http://equalvet.eu).

EQUALvet is a result of the cooperation between the partners of the consortium and the support of the European Commission.

## CONSORTIUM

The consortium consists of the following partners:

Organization		Website / Email
	<b>Margarita VTC (Greece)</b>	<a href="http://www.eeamargarita.gr">www.eeamargarita.gr</a> <a href="mailto:research.development@eeamargarita.gr">research.development@eeamargarita.gr</a>
	<b>Fundació Ramon Noguera</b>	<a href="https://grupfrn.cat/en">https://grupfrn.cat/en</a> <a href="mailto:comunicacio@grupfrn.cat">comunicacio@grupfrn.cat</a>
	<b>Arcil</b>	<a href="http://arcil.org.pt/">arcil.org.pt/</a> <a href="mailto:arcil@arcil.org">arcil@arcil.org</a>
	<b>Group of Research on Diversity – University of Girona</b>	<a href="http://www.udg.edu/en/grupsrecerca/diversitat/qui-som">www.udg.edu/en/grupsrecerca/diversitat/qui-som</a> <a href="mailto:judit.fullana@udg.edu">judit.fullana@udg.edu</a>
	<b>Tüv Hellas (Tüv Nord)</b>	<a href="http://www.tuv-nord.com/gr/el/home/">www.tuv-nord.com/gr/el/home/</a> <a href="mailto:vvoudouris@tuv-nord.com">vvoudouris@tuv-nord.com</a>
	<b>EASPD</b>	<a href="http://www.easpd.eu/">www.easpd.eu/</a> <a href="mailto:zoe.lardou@easpd.eu">zoe.lardou@easpd.eu</a>

# PART 1 Theoretical Background and Educational Methodology

## Training Practice in Group Sessions

### Participants

Participants in this program are people with moderate or mild intellectual disabilities, eager for vocational rehabilitation, development, and participation in society.

The teams are always different and so throughout the program we have to work in a pattern taking into account the needs of each of the teams we will work with. The educational material and methodology must be adapted according to the group and its particularities. The "easy to read" method applied in the creation of the educational material of the program, facilitates reading and comprehension, motivating the trainees for knowledge and learning.

The concept of intellectual disability refers to a disability characterized by significant limitations in both mental function and adaptive behavior, expressed in conceptual, adaptive, social and practical skills. This disability occurs before the age of 18. Adaptive skills include those skills that are needed for the learner to take care of himself or herself and develop in everyday life.

Through education, the development in the following fields is sought:

- Communication
- Personal care
- Life at home
- Social skills
- Community Participation
- Self-guidance
- Health and safety
- Academic and functional skills
- Recreation
- Work

## Before the session

Detailed preparation of the selected activities and materials is essential for the beginning of each training session. The training dynamics must obey a goal and reflect the role that the trainer and the participants in the teaching and learning process.

## At the beginning of the group session

It is important for the trainer to start the training session calmly and smoothly, as this will help the team to collaborate better. It is recommended to start the session with systematic procedures and strategies known to the participants. This gives them security, makes it easier for them to connect and prepare for work more easily. At the beginning of the session, time should be devoted to reviewing what happened in the previous sessions and reporting on what will happen in this session. The instructor must explain what he or she is going to do, why and how he/she wants to do it.

## During the group session

During the session, classroom planning must be taken into account, always with the necessary flexibility to take advantage of any situation or circumstance that favors learning.

The work unit should include strategies that facilitate understanding and promote motivation, highlighting the most important points and distinguishing them from the secondary ones. It is recommended to create links to the content of other sections.

The trainer must succeed in conveying the interest of the lesson and in giving the participants stimuli to learn, providing examples close to their reality and appropriate for the content and objectives of the training session.

It is important to show understanding, interest, and concern for the emotional, social and physical conditions of all participants.

Clear instructions should be given so that all participants are able to be guided and perform the task correctly. Both group and individual comprehension must be constantly tested, using different techniques to diagnose and measure the needs, difficulties, and progress of all participants. When giving instructions to a group, it must be ensured that all participants hear it correctly without raising their voices. If there is a lot of noise, the importance of maintaining an adequate sound level that does not interfere with the work should be understood by the participants.

Recognizing the differences between participants is essential in the practice of education, as not all participants learn in the same way. Therefore, the methodology must take into account the different learning characteristics and pace of each participant. It is necessary to use different training models and strategies, using a variety of resources and training materials. It is important to propose a variety of teaching experiences to promote active learning and to use different types of intellectual strategies that address the diversity of forms and paces of learning. There is an urgent need to include the use of communication technologies in the educational environment, so that participants can develop, on the one hand, digital competence, on the other hand, to use digital competence as a means of learning and knowledge building.

It is important to maintain an open and positive attitude towards the learner relationship. The treatment of participants must be based on mutual respect and trust, within the established standards of coexistence. Communication is not limited to speech. Almost 2/3 of the communication between people is non-verbal communication and is done through gestures, expressions and body language. It would be advisable for the instructor to be vigilant to detect stress in the participants. Illness, compulsive behavior, mood, anxiety can be a sign of stress, which can hinder learning and lead to behavioral problems.

In addition, strategies must be developed to encourage positive coexistence and an appropriate learning climate within and outside the group. Coexistence issues need to be adequately addressed and it is important for the trainer to be involved in programs or activities to support them. It is very likely that at some point in the program various conflicts will arise in the classroom. Conflict is inherent in coexistence, a common and inevitable element in all human groups. That is why it is impossible to avoid conflicts. Instead, analysis systems must be devised that make them more of a learning tool and that serve to regulate daily coexistence. Conflict situations should therefore be used as a learning opportunity focused on rehabilitating these behaviors.

## End of the group session

At the end of the training session, it is important for the instructor to take notes, making a final report. Including participation, it would be wise to review what they learned during the session, what made it difficult for them and what made it easier for them to learn, to provide them with tools to think about how they did it. Finally, the participants could be praised for the good work done, which will encourage them in later learning, as well as provide the necessary instructions for the next session.

## Methodology and Resources

Each teaching-learning process takes place in a specific context and includes a methodology. These methodological strategies must be adapted to the characteristics of the participants, their level of competence, social and cultural variables, etc. The inclusion of skills means that, while a wide variety of methodologies are appropriate depending on the different teaching and learning times, active methodologies that promote greater student participation and involvement lead to meaningful learning. The methodology developed should encourage the participation of all people in the team, the motivation, the confidence and the initiative for ideas. The basic methodology carried out is the following:

- Flexible, tailored to the needs and interests of the context in which it develops.
- Open, which allows interaction, as it is a process that enriches all participants.
- Dynamic, which allows the balanced participation of all.
- Work in groups, to share the topics discussed, reflection, exchange of views and individual work to fulfill the tasks.
- Theoretical & practical, as theory is important, but also the application of new knowledge in everyday life is important.

Activities that support this methodology:

- Role play
- Team dynamics

It is important to create work dynamics based on heterogeneous groups where motivation and constructive dialogue are strengthened.

- Brainstorm
- Job support and individual guidance
- Repetition - practice
- Support with audiovisual material
- Organization of discussions and joint work activities
- Direct / indirect observation.

- Methodological instructions.
- Interactive lessons

Passively acquired learning, based on listening or watching, does not integrate over time and is often ineffective in learning and developing skills. The burden of the interactive classes falls on the students and the instructor become the guide.

- Priority of communication and group learning.

Teamwork is essential to creating a learning environment that allows participants to discuss concepts, collaborate, tackle their cases, and share information.

## Methodological Guidelines

The choice of methodological technique is related by the goals that are to be achieved. It is important to choose those that most effectively develop competences, both disciplinary and cross-disciplinary, that adapt to the diversity of participants, motivate learning, pose real and meaningful situations, promote active participation, and encourage integrated use. Methodological tools and various sources of information, foster evaluation and promote autonomy and inclusion.

EQUALvet's "trainers' manual for inclusive education" provides description of different techniques to be used during vocational training seminars targeting the educational needs of people with intellectual disabilities.

## Teaching Resources

An educational resource is any material that has been developed in order to facilitate the teacher in his/her work. The educational material created within the project is in the form of "text for all" to provide motivation for learning and knowledge facilitating education. The trainer, however, can use material that he/she deems appropriate for the specific group and its dynamics.

Teaching resources are a guide to learning, as they help us organize the information, we want to convey so that each participant can practice and develop their skills. They stimulate motivation by arousing interest. They allow us to evaluate students' knowledge at all times and to provide the appropriate environment to promote students' expression. A wide variety of teaching resources should be used to facilitate the content of the program from different perspectives, favoring the use of different intellectual strategies adapted to the different ways of learning of the participants. Online

resources offer great potential. However, the source must always be checked for reliability and quality.

## Evaluation

The evaluation of both the participants and the educational program itself is an essential part of the learning process. The main purpose of assessment is to gather information about the achievements and difficulties of each participant (and team) in their learning process, in order to assess the degree of achievement of the goals and to help them progress further. If necessary, the learning process will be refocused. It should be clarified from the outset that the evaluation aims at the fullest possible development of the learner's skills and the achievement of the necessary learning goals.

## CURRICULUM OF THE ASSISTANT GARDENER VET WORKSHOPS

Unit and Lesson	U1: The Climate  L1: Temperature
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must understand the concept of temperature</li> <li>– learn some significant temperatures (e.g. the temperature where the water freezes, the maximum temperature that man can bear, the temperature where the water boils, the human's temperature</li> <li>– understand how the temperature distributes within a year and how it distributes within a day</li> <li>– link the extreme temperatures with safety measurements in agricultural activities</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations.</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 1.1</a>)</li> <li>– In-Vivo Read the thermometer indication</li> <li>– Task with temperature map</li> </ul>
Equipment	<p><u>Audio-visual equipment:</u></p> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U1: The Climate  L2: Precipitation
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must understand the hydrological cycle</li> <li>– understand the difference between the light rainfall, heavy rainfall, snowfall and hailstorm</li> <li>– link the extreme precipitation with safety measurements in agricultural activities</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 1.2</a>)</li> <li>– videos with the hydrological cycle</li> <li>– experiment with the saucepan and boiling water (to comprehend the hydrological cycle)</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U1: The Climate  L3: Wind
Educational Goals	<ul style="list-style-type: none"> <li>– The learners must understand the basic wind characteristics: wind speed and direction</li> <li>– understand in what speed the wind turns out to be dangerous for the human safety</li> <li>– understand in what speed some agricultural tasks are forbidden</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 1.3</a>)</li> <li>– videos with extreme wind speeds and the consequences</li> <li>– experiment with a blower fan and compass (to understand the direction of the wind)</li> <li>– task with a meteorological map</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	1,5 hours

Unit and Lesson	U2: Seasons & Time  L1: The Four Seasons
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must orient themselves into time and link the 4 seasons with the agricultural activities</li> <li>– link each season with the country's climate and understand what happens to the plants (e.g. blooming)</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 2.1</a>)</li> <li>– task of corresponding months and season</li> <li>– task of corresponding dates and season</li> </ul>
Equipment	<p><u>Audio-visual equipment:</u></p> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U2: Seasons & Time  L2: Time
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must read the time by analogical and digital clock</li> <li>– comprehend the flow of time (minute, time, day, month, year)</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 2.2</a>)</li> <li>– task of recognizing the time between 12-16.00 in the analogical and digital clock (time which the outside activities are forbidden during the summer)</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U3: The Water and Soil  L1: Water
Educational Goals	<ul style="list-style-type: none"> <li>– The learners must understand the necessity of water to plants</li> <li>– learn the different means of watering</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 3.1</a>)</li> <li>– Watering in field</li> <li>– video with the development of a plant while watering it</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	1,5 hours

Unit and Lesson	U3: The Water and Soil  L2: Soil
Educational Goals	<ul style="list-style-type: none"> <li>– The learners must understand the necessity of soil to plants</li> <li>– learn how the soil is formed</li> <li>– learn how we can improve the quality of soil, the most common soil improvers and their characteristics</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 3.2</a>)</li> <li>– in vivo observation of the soil (with the earthworms &amp; other organisms, in vivo compare the soil improvers)</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	1,5 hours

Unit and Lesson	U4: Plants  L1: The Plant's Parts
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must understand the parts of the plants</li> <li>– the learners to be able to deliver instructions dealing with the plants' parts (e.g. pull out the root)</li> <li>– link some basic functions of the plants (will be mentioned in the next unit) with the plants' parts</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 4.1</a>)</li> <li>– PowerPoint presentation</li> <li>– in vivo observation of the plants' parts (in many categories of plants)</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	1,5 hours

Unit and Lesson	U4: Plants  L2: The Plants' Functions
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must understand the parts of the plants</li> <li>– the learners to be able to deliver instructions dealing with the plants' parts (e.g. pull out the root)</li> <li>– link some basic functions of the plants (will be mentioned in the next unit) with the plants' parts</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 4.2</a>)</li> <li>– PowerPoint</li> <li>– Presentation</li> <li>– Video</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	1 hour

Unit and Lesson	U4: Plants  L3: The Biological Cycle of Plants
Educational Goals	<ul style="list-style-type: none"> <li>– The learners must understand the biological cycle of the plants</li> <li>– link the biological cycle with the necessity in water, nutrients, lighting etc.</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 4.3</a>)</li> <li>– Task of joining seasons/months with the biological cycle of the plant tomato</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U4: Plants  L4: The Basic Categories of Plants
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must understand the difference between ornamental plants and useful plants</li> <li>– understand the difference between the tree- bush-grass</li> <li>– understand the difference between annual and perennial plants</li> <li>– understand the difference between deciduous and evergreen plants</li> <li>– know at least one plant from each category</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations.</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 4.4</a>)</li> <li>– in vivo plants'' observation in the field and recognize its category</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U5: Gardening Tools & Machinery  L1: The Basic Gardening Tools & Machinery
Educational Goals	<ul style="list-style-type: none"> <li>– The learners must know the basic tools- machinery and their utility</li> <li>– Must be able to recognize the tools- machinery when needed</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations.</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 5.1</a>)</li> <li>– In-Vivo presentation of the machinery</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U5: Gardening Tools & Machinery  L2: Safety Measurements When Using Gardening Tools & Machinery
Educational Goals	<ul style="list-style-type: none"> <li>– the students must understand very well the safety measurements when using the tools or the machinery</li> <li>– know what to do in case of disfunction of the machinery/tool or in case of injury</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations.</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 5.2</a>)</li> <li>– In-Vivo presentation the situation of risk in any case</li> </ul>
Equipment	<p><u>Audio-visual equipment:</u></p> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U6: Agricultural Activities  L1: Mixture of Soil - Filling the Seedbed - Sowing
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must know how to make a mixture of soil</li> <li>– learn to fill the pots or the seedbed with the mixture of soil learn to sow with the right quantity of seeds and in the optimum depth (in the pots or in the seedbed)</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations.</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 6.1</a>)</li> <li>– In-Vivo Presentation</li> </ul>
Equipment	<p><u>Audio-visual equipment:</u></p> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U6: Agricultural Activities  L2: Leveling the Ground - Mulching - Planting the Seedlings - Transplanting
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must know how to level the soil and for what reason</li> <li>– learn several means of mulching for eliminating the weeds</li> <li>– learn the procedure of planting the seedlings into the ground &amp; transplanting into another pot</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 6.2</a>)</li> <li>– In-Vivo Presentation</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U6: Agricultural Activities L3: Weeding - Ploughing
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must know the importance of getting rid of the weeds (for healthy plants) and the right procedure (uprooting-weeding)</li> <li>– learn the different ways of weeding (by hand, by ploughing with tools or machinery)</li> <li>– to understand the reason why we must plough the soil</li> <li>– learn all the means of ploughing</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 6.3</a>)</li> <li>– In-Vivo presentation</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U6: Agricultural Activities  L4: Watering
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must understand the importance of watering</li> <li>– learn which is the time to water the plant (what indicates that the plant needs watering;)</li> <li>– learn all the means of watering</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 6.4</a>)</li> <li>– In-Vivo presentation</li> <li>– in vivo observation of plants needing water</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U6: Agricultural Activities L5: Fertilization & Plant Protection
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must understand the reason why we fertilize the soil</li> <li>– learn the different means of fertilization</li> <li>– understand the reason why we apply pesticides</li> <li>– learn to be careful when applying a fertilizer or a pesticide (know all the risk)</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 6.5</a>)</li> <li>– In-Vivo presentation</li> <li>– PowerPoint presentation dealing with the pollution of the environment when using great amounts of agrochemicals</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U6: Agricultural Activities  L6: Pruning and Dumping the Pruned Branches, Leaves and Garbage
Educational Goals	<ul style="list-style-type: none"> <li>– The learners must know the importance of pruning and the different means of pruning</li> <li>– learn the mean of cutting the grass</li> <li>– learn the procedure of getting rid of the remains of the cut branches, leaves or garbage</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 6.6</a>)</li> <li>– In vivo presentation</li> <li>– videos with different plants and different parts being harvested</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U6: Agricultural Activities  L7: Harvesting
Educational Goals	<ul style="list-style-type: none"> <li>– The learners must understand the reason why we harvest, which is the right timing and what tools do we use</li> <li>– learn that according to the plant, there are different parts to be harvested (e.g. Leaves, blooms, fruits etc.).</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 6.7</a>)</li> <li>– In vivo presentation</li> <li>– Videos with different plants and different parts being harvested</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U6: Agricultural Activities  L8: Tool Cleaning and Storage
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must understand the necessity of having the tools cleaned before storage</li> <li>– understand the necessity of storing the tools orderly and in the proper place</li> <li>– understand the necessity of disinfection after using the tools on diseased plant</li> <li>– understand the necessity of regular service</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 6.8</a>)</li> <li>– In-Vivo presentation</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U6: Agricultural Activities  L9: Agricultural Activity Sequence
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must understand which is the cultivating sequence for sowing and creating seedlings</li> <li>– understand which is the cultivating sequence from planting the seedlings until the harvest</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 6.9</a>)</li> <li>– PowerPoint presentation</li> <li>– In vivo presentation of the activities</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U7: Means of Plants Propagation  L1: Asexual Means of Plants Propagation (& Sexual)
Educational Goals	<ul style="list-style-type: none"> <li>– The learners must understand the difference between the sexual means of propagation (sowing) and the asexual means</li> <li>– learn the different means of asexual propagation</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 7</a>)</li> <li>– In-Vivo presentation</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	3 hours

Unit and Lesson	U8: Plant Protection  L1: Infectious Diseases
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must understand the difference between transmittable and non-transmittable diseases</li> <li>– recognize the diseases by bacteria/fungi/viruses and separate them by the diseases by pests</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflet (<a href="#">Lesson 8.1</a>)</li> <li>– PowerPoint presentation</li> <li>– In vivo presentation of plants suffering by transmittable diseases</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U8: Plant Protection  L2: Non-Infectious Diseases
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must understand under which physical circumstances the plants may be affected</li> <li>– learn, in any case of non-transmittable disease, what they can do to make the plant be healthy</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 8.2</a>)</li> <li>– PowerPoint presentation</li> <li>– In vivo presentation of plants suffering by non-transmittable diseases</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Unit and Lesson	U9: Safety Measurements  L1: Introduction
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must understand the importance of working in calm</li> <li>– to understand the risk in a task and assign the activity to the supervisor</li> <li>– wear the proper clothing and have the proper equipment, according to the task-activity</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 9.1</a>)</li> <li>– In-Vivo presentation</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	2 hours

Lesson and Unit	L9: Safety Measurements  U2: Safety in the Working Environment
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must understand and follow the safety measurements when using the tools or the machinery</li> <li>– the learners must understand and follow the safety measurements concerning their health and safety</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 9.2</a>)</li> <li>– In-Vivo presentation</li> </ul>
Equipment	<p><u>Audio-visual equipment:</u></p> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	4 hours

Lesson and Unit	L9: Safety Measurements  U3: Health and Safety
Educational Goals	<ul style="list-style-type: none"> <li>– the learners must understand what they must do under specific extreme weather conditions</li> <li>– understand what they must do if they are not feeling well</li> <li>– understand what they must do if they get injured</li> </ul>
Tools	<ul style="list-style-type: none"> <li>– Observation of a simulated work situation</li> <li>– Proof of professional competence based on the professional assessment situations</li> <li>– Skill tests</li> <li>– Oral questions</li> <li>– Practical and Multiple-Choice Tests</li> <li>– Objective tests</li> <li>– Easy-to-read leaflets (<a href="#">Lesson 9.3</a>)</li> <li>– In-Vivo presentation</li> </ul>
Equipment	<u>Audio-visual equipment:</u> <ul style="list-style-type: none"> <li>– Classroom material</li> <li>– PCs installed on the network, projection tube and the Internet</li> <li>– Training table and chair</li> <li>– Tables and chairs for students</li> </ul>
Duration	3 hours

## PART 2 Terminology and Basic Gardening Techniques

### UNIT 1 The Climate

The climate is defined as the average weather condition of a place. The climate of a place is determinant for its flora and fauna. Weather is the state of the atmosphere of a region for a certain time and its evolution, from the genesis to the completion of the particular atmospheric disturbances. Weather represents the ever-changing state of the atmosphere and concerns changes in heat, humidity and air movement.

The most important criterion for selecting a crop in a place is the climatic conditions. These may be unique to some plant species (e.g. Chios mastic = *Pistacia lentiscus*) or may give ideal characteristics to cultivation (e.g. Kozani crocus).

More generally, the characteristics of a climate that interest the growers are temperature, wind and humidity. All of these features depend on a number of factors such as:

- astronomical factors (e.g. the distance of the earth-sun or the height of the sun above the horizon)
- latitude (latitude & longitude, absolute altitude, topography)
- geometric factors (orientation and slope)
- constitution of the atmosphere (water vapor, oxygen, ozone, carbon dioxide, dust).

The climate in each country is different and it affects the cultural activities. For example, Greece's climate is temperate. It is characterized by mild winters, dry summers and few rains that fall mainly in winter and autumn.

The other types of climates in the world are:

- desert: it is said to be a climate whose formation depends only on the amount of solar radiation. It is predominant in desert areas (i.e. areas where rainfall is less than 13 cm per year). During the day the temperature is high (40-45°C), while at night it drops to -5°C.
- oceanic: it is found in areas near the sea and is characterized by several rains and moderate temperatures.
- continental: mainly in the interior of the continents and is characterized by very cold winters and very hot summers.

- polar: prevailing in the polar regions of the earth and characterized by very low temperatures. Summer is short and winter lasts about 11 months. Atmospheric precipitations are scarce (as in the desert as water freezes immediately on the ground).

## Lesson 1.1 Temperature

The sun's radiant energy reaches the ground (a small part is reflected) and turns to heat. The air is mainly heated through the ground (by inference). The maximum ground temperature occurs when it receives the maximum of incident radiation (around at 12.00 at noon). The maximum air temperature is reached between 15:00 and 16:00, delayed due to heat transfer resistances and high heat capacity of the air. The figure below shows how temperature affects plant growth. For all plants there is an ideal range (temperature) of optimum growth.

Some plants (especially fruit plants) require low air temperature for:

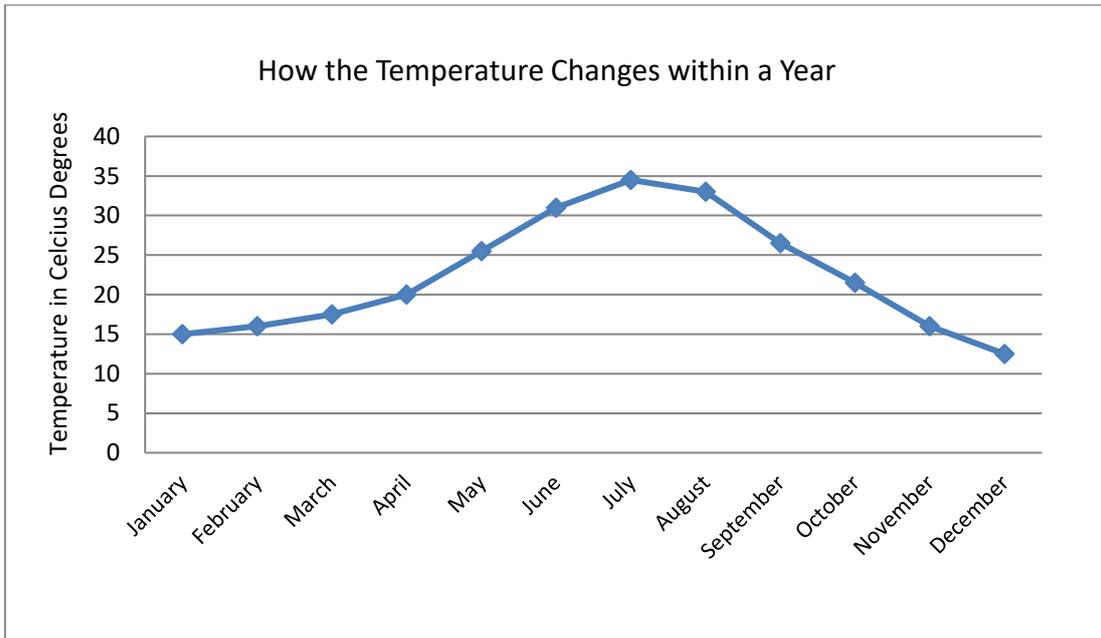
- Stopping the lethargy
- Eye development
- Fruiting

Some plants require high soil temperature for:

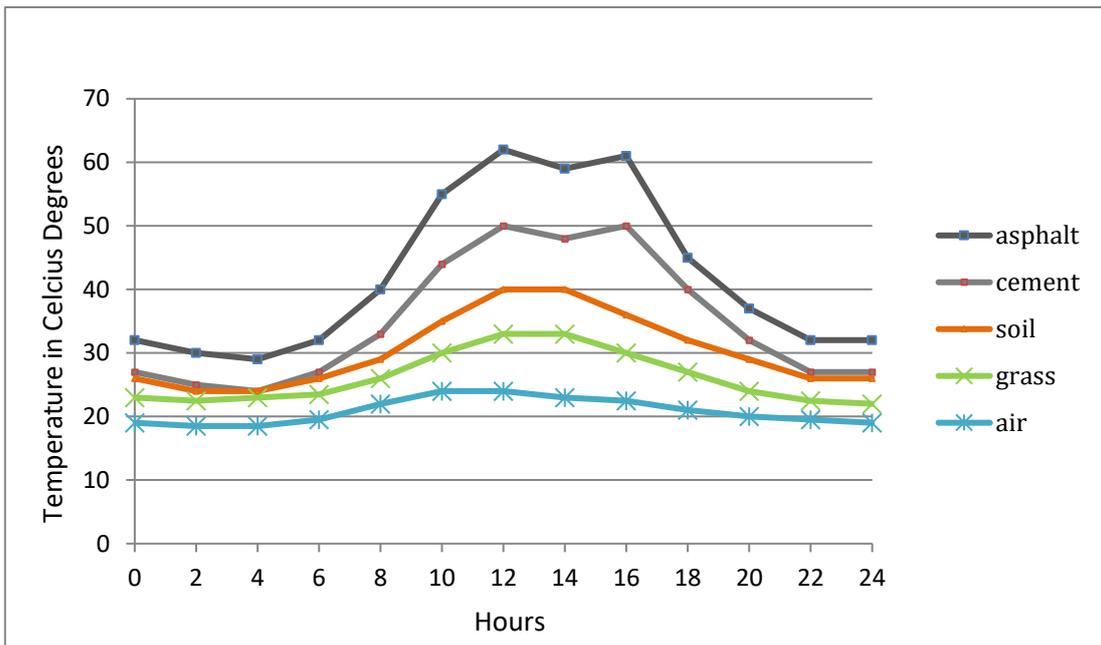
- Plant germination
- Seeds germination

Some plants require high soil temperature and high air temperature for:

- the germinative phase
- the reproductive phase (or propagation)



**Figure 1:** How the temperature changes within a year (Markopoulo station -Champidi 2012)



**Figure 2:** How the temperature changes within a day, in 5 different materials

At 0°C there is ice (frost). Any moisture becomes ice and the juices inside the plants freeze. This is undesirable for most aromatic plants, but many have developed resistance mechanisms. To prevent damage and prevent frost, the following can be applied:

- windmills (they have a high cost, so they are mainly for cultivation of fruit trees).
- greenhouse (high cost, mainly for germination stage of aromatic plants in winter)
- small seedbeds
- transparent film cover



**Figure 3:** Cultivating Practices for Avoiding the Frost

It is important for the trainee to understand the concept of temperature because in addition to better understanding the sequence of the seasons and the connection with the biological cycle of plants, it also takes appropriate protection measures in case of extreme temperatures. At very high temperatures the trainee should wear a hat, sunscreen, light long-sleeved clothing, while fertilizer or pesticide applications become prohibitive. At very low temperatures, it should be warmly dressed and freezing (if the temperature is near or below 0°C).

## Lesson 1.2 Precipitations - Humidity

The amount of water in the lower part of the atmosphere is either in a gaseous form (vapor of water) or in a liquid form (rain, fog, hydrogen droplets) or solid (snow, hail). This water is created by the evaporation of water from the various wet surfaces (lakes, rivers, seas) and by the aquatic precipitations (rain, snow, hail, etc.) with which water flows back from the atmosphere to the earth's surface.

The hydrological cycle has to do with the transmission of water from sea to atmosphere, and back to earth & sea. 2/3 of the water that falls to the earth in the form of precipitates, returns to the atmosphere through evaporation and evapotranspiration. The remaining 1/3 either flows superficially or it is leaching into the soil ending up either at sea or in the underground aquifers. Part of the surface and underground runoff returns to the sea to continue the hydrological cycle. About 10% of the annual surface runoff is used for human activities.

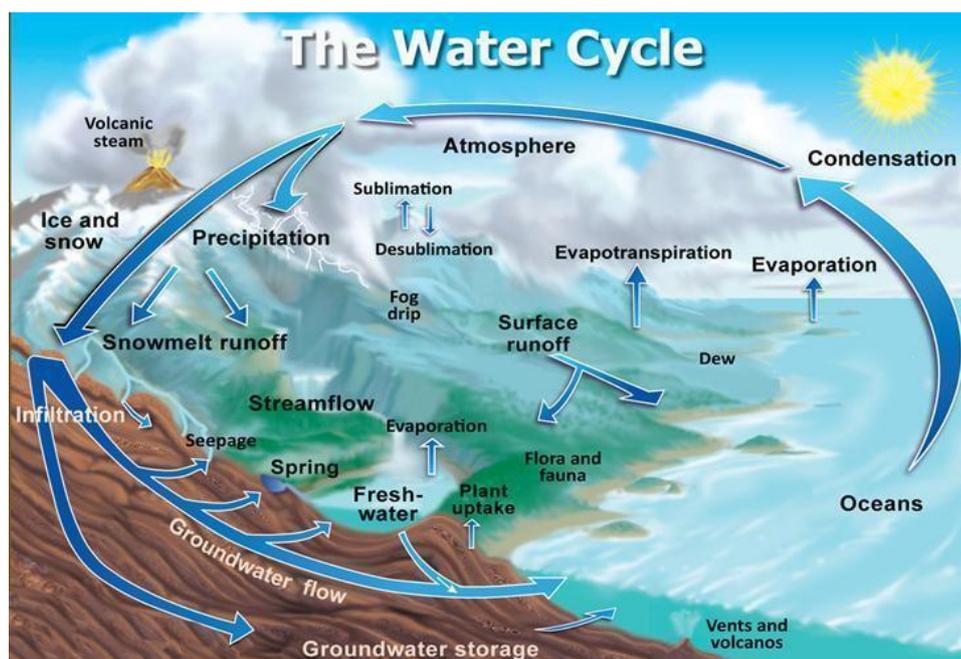


Figure 4: The Water Cycle ([www.wikipedia.com](http://www.wikipedia.com))

Relative humidity is the ratio of the partial pressure of water vapor to the equilibrium vapor pressure of water at a given temperature (at the same temperature and pressure). The saturated air has a relative humidity of 100%, while the completely dry air has a humidity of 0%. In Greece prices range between 40% and 70% on average. Coastal areas have more relative humidity than inland areas.

The cycle of water within a natural system is described by the mathematical equation:

$$P = R + ET + I + \Delta W + \Delta q + Q$$

Where:

- P is the precipitation from atmosphere retained water (rain, snow, etc.).
- R is surface run-off (rivers, lakes runoff)
- ET is the true evapotranspiration from soil and free expanses of water (the evaporation from the soil and transpiration \* by plants)
- I is the infiltration (the descending water through the soil)
- $\Delta W$  is the differential water storage on earth
- $\Delta q$  are the bids and water abstractions from anthropogenic interventions and
- Q is the external supply of the hydrological system

Considering that human interventions and changes in underground reserves are negligible, the factors of the above equation  $\Delta W$ ,  $\Delta q$  and Q tend to zero and thus the hydrological balance equation takes the form of:  $P = R + ET + I$

# The Hydrological Equation

$$P = ET + I + R$$

Precipitation = Evapotranspiration + Infiltration + Run-off

$$P = ET + I + R$$

$$ET = 2/3P$$

$$I+R = 1/3P$$

10% of R is used by human activities

Evapotranspiration accounts for 2/3 of the precipitation ( $ET = 2 / 3P$ ).

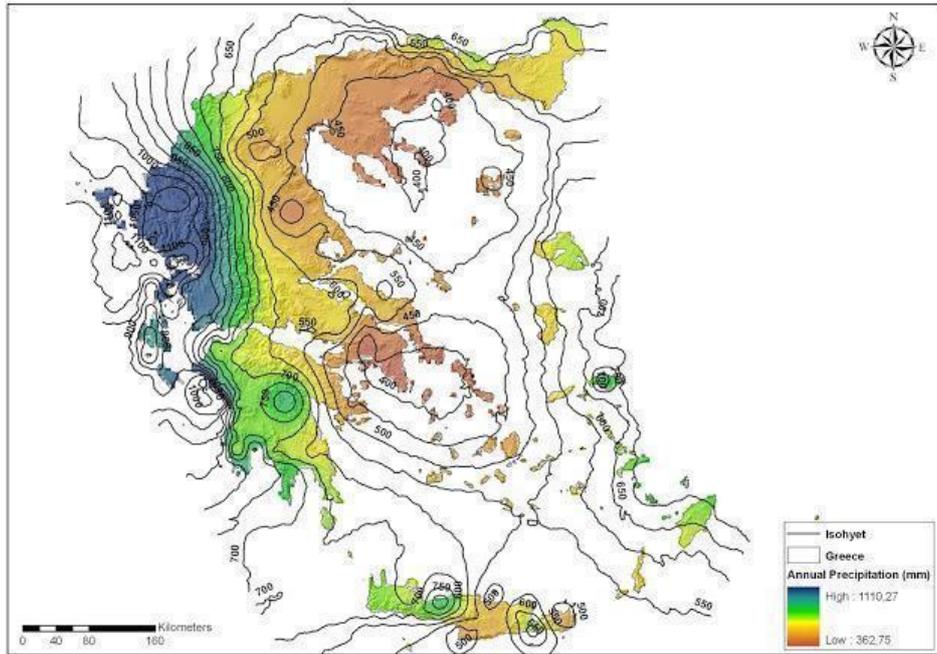
Surface runoff and infiltration account for 1/3 of the precipitation ( $I + R = 1 / 3P$ ).

10% of surface runoff is used for human activities.

Relative humidity is the ratio of the partial pressure of water vapor to the equilibrium vapor pressure of water at a given temperature (at the same temperature and pressure). The saturated air has a relative humidity of 100%, while the completely dry air has a humidity of 0%. In Greece prices range between 40% and 70% on average. Coastal areas have more relative humidity than inland areas.

When fog prevails, the air is usually saturated. When the air temperature (which contains a certain amount of water vapor) decreases, its relative humidity increases inversely. High relative humidity favors the development of diseases in plants, especially fungi.

The rains are undesirable on most plants when being at the flowering stage. They are also undesirable at the fruit stage (it will restore moisture to them). Even heavy rains during the first stage of development are undesirable.



**Figure 5:** Recorded Precipitation in Greece, in mm (average values)

It is important for the learner to understand the phenomenon of rainfall - snowfall - hail and to relate these phenomena to temperature. It is also important to link these phenomena with gardening work. For example, in low intensity rain (watering rain), the learner may work wearing a raincoat, may throw solid fertilizer but not pesticides or liquid fertilizer because they will flush to the aquifer. Outdoor gardening is prohibited in the event of heavy rain or thunderstorms.

## Lesson 1.3 Wind

Atmospheric movements in the horizontal spindle are called wind. The factors that shape the movements of the wind and therefore its direction and speed are:

- the solar energy absorbed by both the atmosphere and the surface of the ground
- the heterogeneity of the earth surface
- the rotation of the earth around its axis

The wind is beneficial to plants in normal speed, as:

- Wind increases turbulence in the atmosphere and availability of CO<sub>2</sub> and thereby increased photosynthesis.
- Beyond a certain wind speed the rate of photosynthesis becomes constant.

High wind speed causes damage to plants as:

- Increase in transpiration
- Hot wind accelerates the drying of the plants by replacing humid air by dry air in the inter cellular spaces
- damages the shoots
- Lodging
- Flower and fruit shedding
- Crops and trees with shallow roots are uprooted.
- Soil erosion Strain breaks
- Crevices
- Distribution of crop production
- Changes in photosynthesis

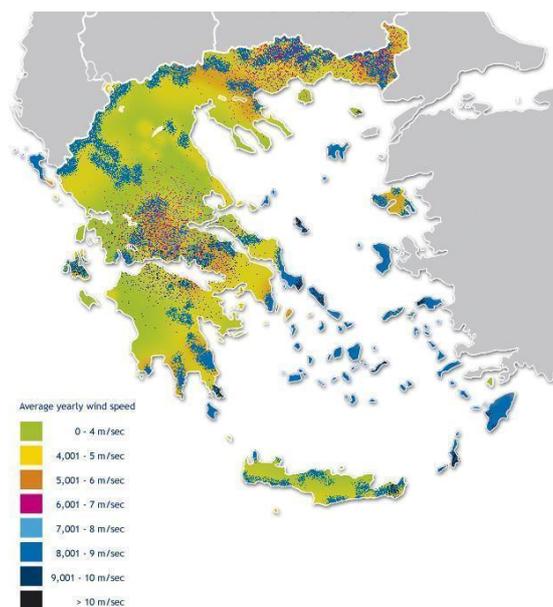
- Anomalies in reproduction
- Cooling (damage)
- Water losses (intense evapotranspiration)
- Corrosion

Many plants (e.g. grass, pine) have thin, lance shaped and strong leaves that withstand strong winds and provide less transpiration. To prevent high winds and to prevent the above damages, windbreaks are created.

The ideal windbreaks should:

- have openings to filter and reduce the momentum of the wind (the compact windbreak increases momentum, creating turbines low in plants)
- not shade the plants (the distances of the barrier from the plants are selected based on the height of the plant so the crop must not be shaded)
- not compete with the plants of our crop in nutrients & water

For amateur or small crops, we can provide temporary cover with plastic leaves - fake ivy until the natural fence grows.



**Figure 6:** The Recorded Average Wind Speeds in Greece (in m/sec)

It is important for the trainee to understand the strong winds so as to avoid applying fertilizers or pesticides. Also, in very strong winds be careful not to break branches and injure him. It is good to know the 4 points of the horizon and understand where a wind is blowing. The northern winds in Greece are colder than the south winds.

## UNIT 2 The Seasons & Time

### Lesson 2.1 The Four Seasons

In Greece where temperate climate prevails, the seasons are 4 (spring, summer, autumn, winter).

More detail:

In winter there are low temperatures, often strong northern winds, rainfall and often snowfall, especially in the mountains. The night is longer than the day. Spring begins slowly in Greece (late March - early April). The temperature has been gradually increasing since the end of March. Rainfall is decreasing. Snow has rarely been seen since April. The temperature is quite high in late spring. Most trees take new leaves and bloom. Summer is a long time. It is characterized by high temperatures peaking in July and long periods of drought and drought. The day lasts longer than the night. Autumn lasts for quite some time in Greece. Temperatures are mild and frequent rainfall is observed. Late autumn snowfall can be observed in the mountains. It is the season when the leaves fall from the deciduous trees.

The equinoxes in Greece (equal day and night) are on:

- September 23 (autumn) and on
- March 21 (spring)

From September 23<sup>rd</sup>, the night is reduced until December 22<sup>nd</sup> (winter solstice) where the maximum night (shortest day) of the year is observed. Since December 22<sup>nd</sup>, the day has grown to reach the spring equinox (March 21<sup>st</sup>) and reach June 21<sup>st</sup> (summer solstice) on the highest day of the year (shortest night). Since then, the day has narrowed, leading to the autumn equinox to reach the winter solstice.

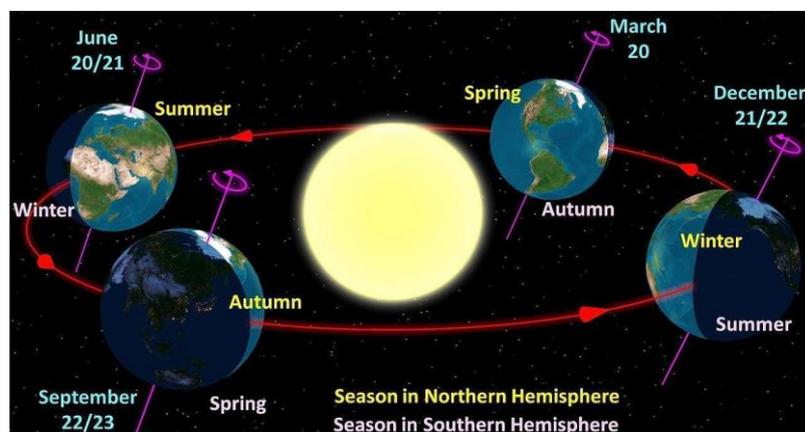


Image 7: Equinoxes and Solstices (www.wikipedia.com)

Most plants require east or south orientation to take the sun most hours of the day (making best use of the sun). They need full sun, so it's best not to be overshadowed by neighboring trees or buildings. Good photosynthesis implies good yield production and therefore good quality of the final product. The distances between the plants have to do with the up taking of the maximum of the sunshine.

The plants with the straightly branches do better photosynthesis (leaving room for sunlight to be absorbed) and therefore have higher yields and better final product quality. Plants for under-exposed areas are usually evergreen, with large leaves. Ornamental plants in need of full sun have shiny leaves that help reflect the sunlight.

## Lesson 2.2 Learning Time

The trainee must know the time for a variety of important reasons (how long he / she will work under the sun, how long he / she will do a tidy job, avoid outdoor work in the summer between 12.00-16.00 etc.).

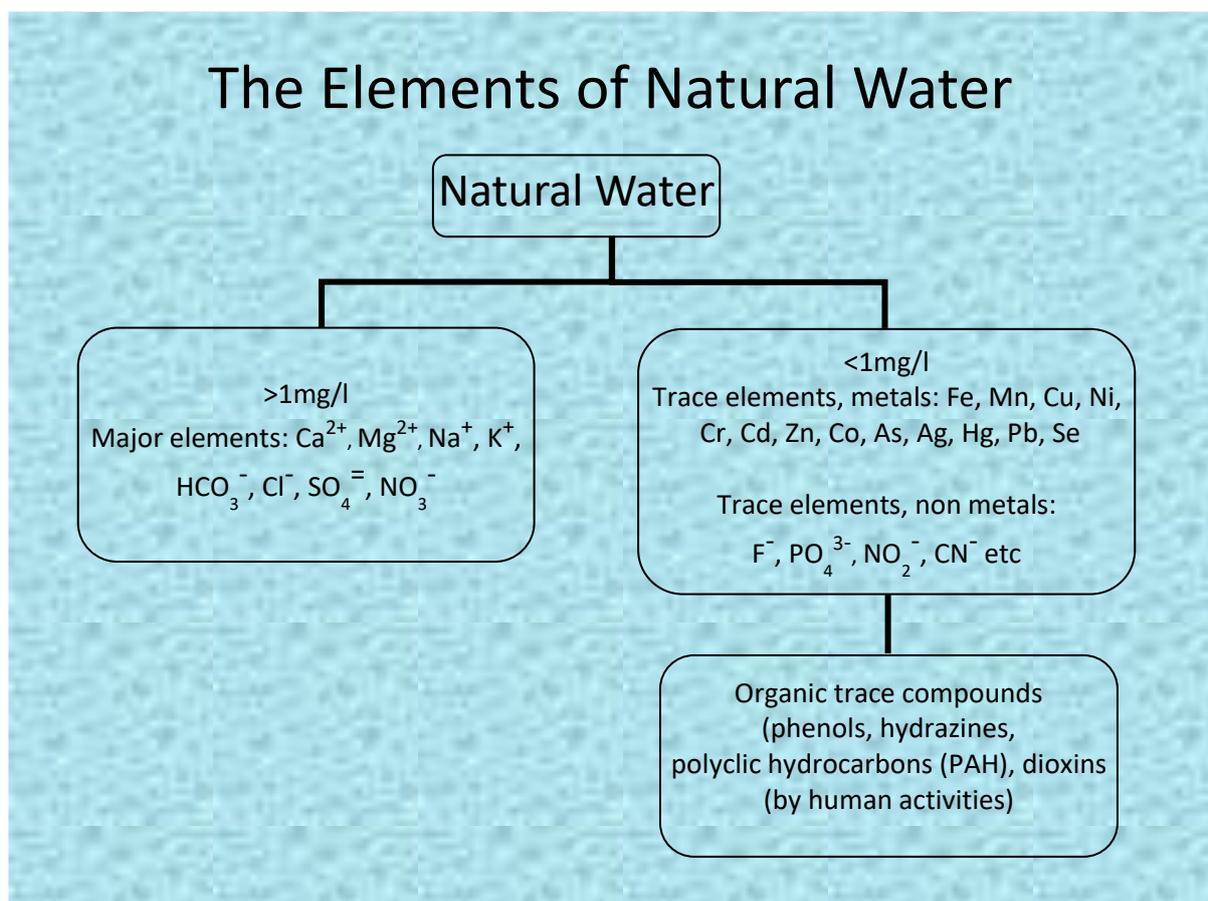
The trainee must learn to read the time from both the analog and digital clock using the training material.

## UNIT 3 The Water and Soil

### Lesson 3.1 The Water

The water is an essential element in the cultivation of vegetables. Its quantity and quality play a significant role in the organisms in the food chain, in the various human activities and of course in the final product of our crop. The nutrients come in the plant only with the contribution of water.

The constitution of natural water in major and trace elements is illustrated in the diagram above.



The main elements are less in surface water due to their direct enrichment with pure rain water, while they are much more in groundwater due to dissolution of rocks and enrichment of water with them. This results in surface waters having much less electrical conductivity than groundwater.

## EC (ELECTRICAL CONDUCTIVITY)

The electrical conductivity refers to all the soluble salts in the water and is measured in  $\mu\text{mhos/cm}$  ( $\mu\text{S/cm}$ ) at  $20^\circ\text{C}$ . EC depends on the ions' presence, their concentration and the temperature. EC in waters is measured in  $\mu\text{S/cm}$  with a special instrument (conductor).

In general, values less than  $1000 \mu\text{S/cm}$  are considered satisfactory for irrigation water. Note that irrigation with high conductivity water is prohibitive for sensitive irrigation systems such as drip irrigation because it creates clogs in the dripper.

## WATER SUITABILITY FOR IRRIGATION

The main problem in irrigation water is the salinity. Soluble salts are present in irrigated water and accumulate in the root. They cause growth retardation and reduced yields of cultivated plants. In addition, irrigation water with salts creates a crust on the ground surface that damages the soil's structure and aeration.

Cultivation manipulations aimed at creating good aeration and a good drainage network make irrigation with high salinity possible. On the contrary, in poorly drained soils, the salts from the use of a salt-rich water accumulate in the pavement creating toxicities in this zone. In addition, salt-rich irrigation creates crust in the soil that burdens its structure and aeration.

A chemical analysis of the irrigation water helps to judge whether it is suitable for our crop.

The most common method used to assess the suitability of the irrigation water, is the Richards method. However, there is no legislation for the agricultural use of water.

## RICHARDS METHOD

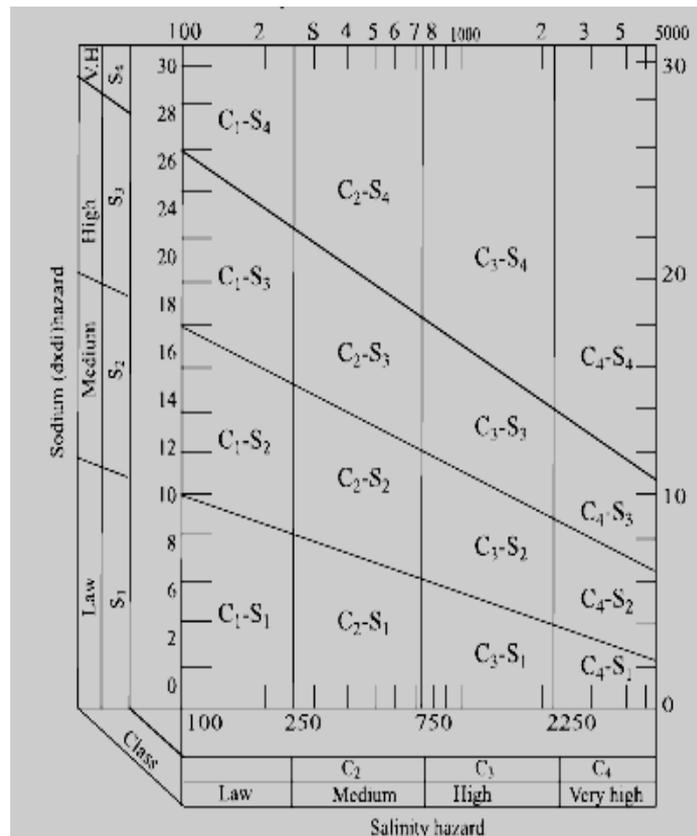
This method calculates the Sodium Absorption Ratio (SAR) based on the following ratio:

$$SAR = \frac{Na^+}{\sqrt{\frac{Ca^{2+} + Mg^{2+}}{2}}}$$

Concentrations of sodium ions Na, calcium Ca and magnesium Mg are expressed in meq/l. The water quality is classified according to the Richards System, which classifies the waters into 16 categories with different qualitative characteristics and different suitability for crop irrigation. The Richards Classification System is followed by the US Department of Agriculture. The classification is illustrated in the diagram in Figure 8, which shows the values of the electrical conductivity and the percentage

of sodium adsorbed on the irrigation water. The categories of suitability of irrigation waters according to Richard's method are detailed in Table 1.

According to this classification there are 16 water quality classes (C1-S1, C1-S2, C2-S1, C2-S2 etc.) which indicate whether the irrigated waters are suitable to be applied in cultivations.



**Figure 8:** Classification of Irrigation Water by Richards (1954)

**Table 1:** The Classes of Irrigation Water, by Richards

Type of Water		Suitability for Irrigation
1	C1-S1	Very good quality water with low salt content. Suitable for irrigation.
2	C1-S2, C2-S1	Good quality water. Suitable for irrigation of crops with the exception of extremely sensitive crops in salts or soils with bad drainage.
3	C2-S2, C1-S3, C3-S1	Medium quality water that can be used for irrigation under conditions.
4	C1-S4, C2-S3, C3-S2, C4-S1	Medium to bad quality water. It can be used for plants irrigation and in well-drained soils.
5	C2-S4, C4-S2, C3-S3	Poor water quality. It is not recommended for irrigation purposes. However, it can be used for irrigation in well-drained soils and salt-resistant plants. There is the risk of increasing salinity in the soil, therefore, the periodic leaching of the salts is recommended.
6	C3-S4, C4-S3	Bad water quality that is not recommended for use. It can be used for irrigation in exceptional cases under many restrictions.
7	C4-S4	Very bad quality water. Its application for irrigation becomes prohibitive.

## Lesson 3.2 The Soil

The soil is the product of the disintegration of the parent rock. The soil supports the plants and provides them with nutrients.

The main physicochemical parameters of the soils are:

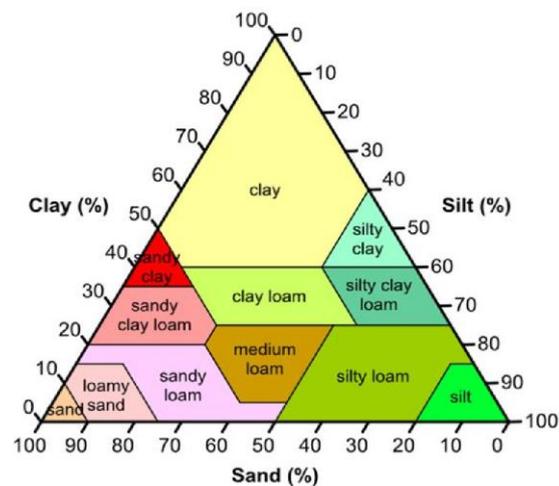
### 1. SOIL TEXTURE

The inorganic soil components are classified into three categories according to their size. These are:

**Sand** (0,05-2mm): It has reduced water and nutrient restraint capacity. It performs good aeration and drainage conditions.

**Silt** (0,002-0,05mm): It performs increased water retention capacity but reduced nutrient retention capacity. It provides bad aeration conditions. The development of diseases is enforced.

**Clay** (< 0,002mm): It has increased water and nutrient retention capacity. Due to the reduced rate of diffusion of water into the clay, it causes bad aeration conditions. The development of diseases is enforced.



The percentage of the three components sand– clay – silt, determines the soil texture. There are various soil classifications based on the soil texture. The loam soil presents a combination of the good properties of the three soils.

The percentage of sand - clay - silt gives the texture of the soil. There are several soil classifications based on the components size and are shown in the diagram above: The loamy soil has a combination of the good qualities of the three soils.

How to Manually Understand Our Soil Type:

If we rub in our hand a little wet soil, we can understand the type of our soil:

<b>SAND SOIL (fluffy soil)</b>	<b>SILT SOIL (heavy soil)</b>
It creates scruple and can slip through the fingers.	It sticks in the palm and is molded into clod.
Attribute: <ul style="list-style-type: none"> <li>– Coarse particles</li> <li>– Good drainage</li> <li>– No moisture and nutrient retention (hence the soil needs fertilization, regular irrigation and minimal ploughing)</li> </ul>	Attribute: <ul style="list-style-type: none"> <li>– Fine particles</li> <li>– Bad drainage</li> <li>– Retention of moisture and nutrients (so it does not need regularly watering or fertilization, however, the porosity will be improved by ploughing)</li> </ul>

### How can we improve the soil texture?

Most of the problems in plants' cultivations are turned up in extreme soil texture (sand or silt soils).

The sand soils must be well irrigated and must be rationally fertilized in regular and small portions.

- The silt soils must have good ploughing in order to improve the aeration and the drainage, however, the ploughing must not be deep, not exceeding the 10cm.
- In silt and loam soils, we must add river sand or perlite in the surface soil. This improves the soil structure, increases the water and nutrient retention capacity and improves the aeration and drainage.

## 2. COLOR



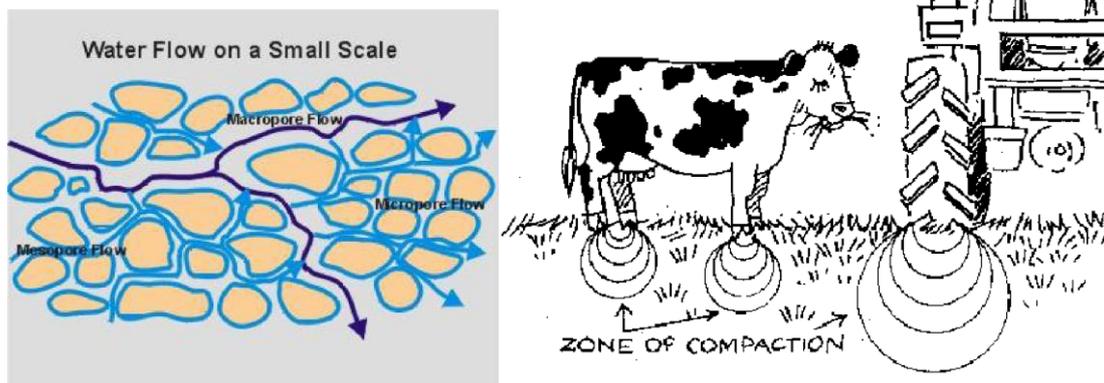
**Figure 9:** The Different Colors of a Soil ([www.pinterest.com](http://www.pinterest.com))

From Homer's era, people knew that the color of the soil plays an important role in fertility. Studies have linked soil color to organic matter as well as soil generation and evolution. Pedologists have associated the soil color with its content of organic matter, compounds and elements:

- The dark colored soils are more fertile. The black color indicates the constitution of organic matter. The red color indicates the constitution of iron or manganese oxides. The white and yellow-white colors in soils are attributed to calcium. The soils of the semi-eric areas are brown-grey.
- Cyan and green colors are present in the soils with plenty moisture, in which anaerobic biological reactions occur. In general, the wet soils are much darker than the dry ones.
- The soils' color also affects their thermal condition. Dark colored soils are getting heat, faster than fluffy soils, under the same conditions

## 3. POROSITY

It is the percentage of free water and air circulation in the soils. It depends on the volume, shape and arrangement of the soil aggregates. Porosity on sandy soils is 37-70%, in loam and clayey soils is 47-65%, while in peat soils can exceed 80%.



**Figure 10:** The Porosity and How it is Affected by the Agricultural Activities

([www.moa.gov.cy](http://www.moa.gov.cy) ccmaknowledgebase.vic.gov.au)

The soil porosity is very important for the soil micro-organisms and for retaining the fluffy soil texture. The big livestock animals and the heavy agricultural machinery compress the soil, reducing its porosity (figure 10).

#### 4. SOIL ACIDITY - pH

The soil acidity (pH), expresses the concentration of hydrogens, resulting from the hydrolysis of water-soluble salts and compounds in water and other solvent liquids. pH is very important in soil because it determines the soil processes, the absorption of nutrients and trace elements, the development and yield of different crops and the process of micro-organisms.

- High pH values are attributed to the presence of  $\text{CaCO}_3$
- Low pH values also increase bioavailability of heavy metals, while very low values (<4) cause plant toxicity, root membrane rupture, etc.
- Low pH favors the release of nutrients such as  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{K}^+$ ,  $\text{Mn}^{2+}$ ,  $\text{Cu}^{2+}$  through mineral disintegration and solubility of  $\text{CO}_3^{=}$ ,  $\text{SO}_4^{=}$ ,  $\text{PO}_4^{3-}$
- Soils formed from alkaline rocks usually have a higher pH. Soils formed from acidic rocks have a lower pH.
- Soils in areas with high rainfall are more acidic than areas with low rainfall due to leaching of  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  basic cations.
- Typical soil pH values are between 4 and 8.5.

## How can we improve the soil pH?

- Reduce the soil pH:
  - By adding 400gr mineral sulfur per 10m<sup>2</sup> (it rapidly reduces the pH per 1 unit).
  - By adding compost or pine-needle (it makes the soil fluffier and enriches it in organic matter).
- Increase the soil pH:
  - By adding 2,5kg limestone per 10m<sup>2</sup> (it gradually increases the pH per 1 unit).
  - By adding 1kg wood ash per 10m<sup>2</sup> (it rapidly increases the pH per 1 unit).
  - By adding lime or dolomite (approximately 150-700gr lime per m<sup>2</sup>).

## 5. ELECTRICAL CONDUCTIVITY - EC

The electrical conductivity refers to all the soluble salts in the soil and is measured in  $\mu\text{mhos/cm}$  ( $\mu\text{S/cm}$ ) at 25 °C. EC depends on the ions' presence, their concentration and the temperature. The coefficient of 0.7 is accepted which expresses the approximate concentrations of total salts in the ground water, that is,  $\text{TOTAL SALS} = 0.7 \times \text{EC}$

Plants that show symptoms of chlorine toxicity suspect high electrical conductivity in the soil.

A soil with high values of EC (bigger than 3.000  $\mu\text{S/cm}$ ) is problematic and is inappropriate for most crops. In case this soil is used for sensitive in salt crops, we must sanitize it by watering successively, in order to leach the salts towards the aquifer. After the watering, the soil must be enriched with soil enhancers.

EC electrical conductivity Electrical conductivity expresses all soluble salts in the soil and is expressed as in water at  $\mu\text{mhos / cm}$  ( $\mu\text{S / cm}$ ) at 25 °C. It depends on the presence of ions, their concentration, the temperature.

A soil with high electrical conductivity (greater than 3,000  $\mu\text{S / cm}$ ) is problematic and not suitable for most crops. Exceptions are plants that thrive in coastal soils (e.g. hornbeam, sea buckthorn, squirrel, etc.). If we want to use a soil with high conductivity for salt-sensitive crops we need to refine. A lot of irrigation needs to be done to flush out the salts to the aquifer and enrich it with good quality soil.

Soil conductivity can be measured with a water conductor, having mixed 2: 1 with deionized water and soil (after 5-8 hours of sedimentation to precipitate). The soil must first be sieved and dried in an oven.

## 6. ORGANIC MATTER

The organic matter is the result of chemical and biological activities on various residues of plant or animal origin. It gives great fertility to the soil. Organic matter consists of organic compounds that comprise 10-20% of known groups and 80-90% of other unknown compounds which constitute humus. Humus is a material of deep gray color, derived from the soil organic matter, amorphous, without cellular structure and high molecular weight. Humus (80-90% organic matter) is not subject to further degradation.

The organic matter includes:

- Living and dead soil micro-organisms
- plant and animal residues at various stages and degrees of decomposition and
- newly formed compounds as a result of the chemical and biological activity of soil micro-organisms.
- The organic matter:
  - Gives plants all the essential nutrients
  - Is a source of nitrogen (N) & phosphorus (P)
  - Increases the consistency of sandy soils
  - Improves porosity
  - Promotes the creation of stable aggregates
  - Increases moisture retention capacity
  - Increases cation exchange capacity
  - Protects nutrients' leaching (such as N, P, S)
  - During its decomposition contributes to the chemical solifluction of minerals as acidic substances and CO<sub>2</sub> are released

- It is a source of energy for microorganisms
- Increases soil temperature
- Increases the available moisture in the sandy soils
- Increases the advection of air and the movement of water in fine soil.

The organic matter of soil depends on many factors such as soil treatment, temperature and pH.

Ploughing the soil, leads to organic matter reduction (due to oxidation). The high temperatures also lead to organic matter reduction (they increase the rate of decomposition and oxidation of the organic substance). High pH values decrease the organic matter portion, since under alkaline conditions the activity of microorganisms is increased.

A chemical soil analysis shows us all the above parameters and helps us to select the appropriate cultivation practices (proper fertilization, soil texture improvement) for our cultivation.

#### THE KIND OF SOILS – SOIL ENHANCERS

##### **Peat**

Spongy, fluffy and fibrous physical material which is formed in the subsoil (in the bottom of lakes and meadows) from hermetically trapped and slow decomposition of plant residues. Peat directly improves the aeration and drainage of the cultivated area.



**Table 2:** Peat Forms and their Properties

The <u>blonde peat</u> is in a phase of partial decomposition.	Black peat (muck) is in a more advanced decomposition stage and is darker in color than the blond.
Properties: <ul style="list-style-type: none"><li>– good aeration</li><li>– good water retention</li><li>– relatively low nutrient content</li><li>– acidic pH</li><li>– fibrous texture</li></ul>	Properties: <ul style="list-style-type: none"><li>– higher nutrient content</li><li>– fine texture</li><li>– increased water retention</li><li>– poor aeration</li></ul>

**Table 3:** The Characteristics of Blonde and Black Peat

	Blonde Peat	Black Peat
Porosity of dry peat	90-95%	85%
Porosity after drainage	13%	4%
Restraint of humidity	10-15 times its mass	5 times its mass
Grade of decomposition	low	high
pH	2,5-4,5	4-7
Duration	high	low

### Forest Soils

They are alkaline soils (containing  $\text{Ca}^{2+}$ ) with the exception of brown soils. They are poor in nutrients so they need fertilization.

Forest soils include soils underneath

- arbutus trees (suitable for gardening for the development of leafy species)
- schin (it has resin, it is not recommended for sowing)
- heather
- chestnut trees

- Tsipouro soil (derived from products left over during the production of Tsipouro, when the "vine or ointment" is decomposed)

## **Compost**

Compost results from the mixing of decomposed organic residues with soil in a special bucket or a specially formed place in the soil. Organic residues decompose with the help of earthworms and microorganisms. It has significant advantages such as increasing soil cohesion, soil compaction, increased water retention, improved airing, pH adjustment, soil salinity and retention of heavy metals and pesticides.

It has significant advantages such as:

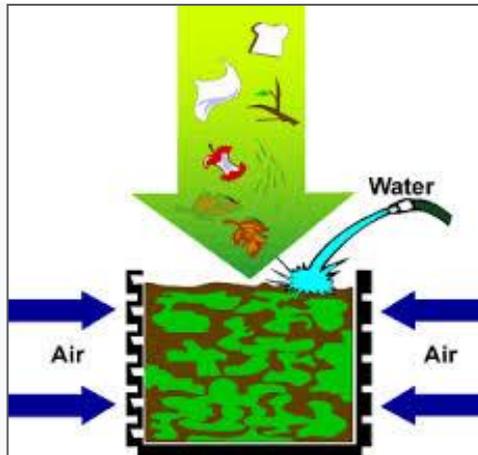
- Provides important nutrients for the plants' growth and for soil micro-organisms
- Increases the soil consistency.
- Prevents compression of soil.
- Increases water storage and improves aeration.
- Controls soil pH and salinity.
- Provides nutrients necessary for the growth of plants and soil micro-organisms.
- Holds the heavy metals and the pesticides.

### HOW CAN WE CREATE COMPOST?

In the compost bucket or the compost place on the ground, we must regularly throw organic residues as shown in Table 4. There is already soil in the place (it is good to have earthworms, if not, they appear on their own – they are attracted by organic matter). It is important for the proper degradation of the materials to have proper aeration and proper humidity (the place must not be completely dry neither the organisms to suffocate from excessive moisture). In commercial composting buckets, there are holes to aerate the material. Many times, we will have to mix the material for better aeration. Usually, compost is ready within 3-4 months from the day it was created.



<p>Composting your kitchen and garden waste is easy</p> <p>Put these in</p> <p>City of Bradford Metropolitan District Council www.bradford.gov.uk</p> <p><b>recycle</b> compost of home www.bradford.gov.uk/compost</p>	<p>Composting your kitchen and garden waste is easy</p> <p>Keep these out</p> <p>City of Bradford Metropolitan District Council www.bradford.gov.uk</p> <p><b>recycle</b> compost of home www.bradford.gov.uk/compost</p>
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**Table 4:** Residues which can be Composted

ORGANIC RESIDUES TAKING PART IN THE COMPOST BUCKET		PROHIBITED RESIDUES	
NITROGEN (N) RESIDUES	CARBON (C) RESIDUES		
lawn	paper without ink	weeds' seeds	oils - fats
fruit and peels	napkins	weeds and sick plants	cooked food
vegetables and peels	plants' leaves	leaves of eucalyptus, rose, figs & Euphorbia pulcherrima	salads with oil
poultry manure & livestock manure	straw, sawdust	pine needles	manure of cat or dog
eggs' shells		treated wood	dairy
coffee		chipboard	bread
tea		glossy paper	meat-fish-bones

SOIL ENHANCERS (IMPROVERS)

**Perlite:**



It is an inorganic aluminosilicate mineral of volcanic origin. It is considered a very lightweight material and can hold up to 4 times its weight in water.

- Used to improve aeration, drainage and moisture retention. It is durable material with no expiration date.

- The rough surface of each grain allows it to retain moisture.
- Provides good drainage.
- It is very lightweight therefore requires special attention because it is easily drained by watering.
- Adding it to heavy soils improves their soil texture.

### **Pumice:**



Pumice is a mineral soil improver.

- It is ideal for hydroponics.
- It is ideal for landscape architecture.
- It has high moisture retention capacity.
- It has stable quality and granulometry
- It has increased resistance to frost cycles compared to other porous materials.

### **Zeolite:**



- Porous mineral
- Improves porosity

- Increases moisture retention
- Improves soil texture
- In heavy soils it is added in the form of gravel (2.5-5 mm)
- In fluffy soils it is added in the form of fine gravel (0.8-2.5mm)
- It has a long life (> 10 years)

### **Vermiculite:**



Vermiculite has the form of soil and derives from the natural mineral mica. It prevents the soil from drying out during sowing and it prevents any thermal fluctuations. After sowing, covering the surface of the soil with a thin layer of vermiculite will ensure the vegetation of strong seedlings. Its benefits are important as:

- It retains water and nutrients
- It contains a large rate of  $K^+$  &  $Mg^{2+}$
- It easily yields nutrients to plants
- It prevents large changes in pH.
- In time, it is compressed (not broken), so it loses its very good characteristics.

### **Pine Bark:**



While degrading slowly, the pieces of pine bark release the nutrients.

- It is a resistant and durable material
- It retains moisture
- it protects the plants from weeds (mulching)

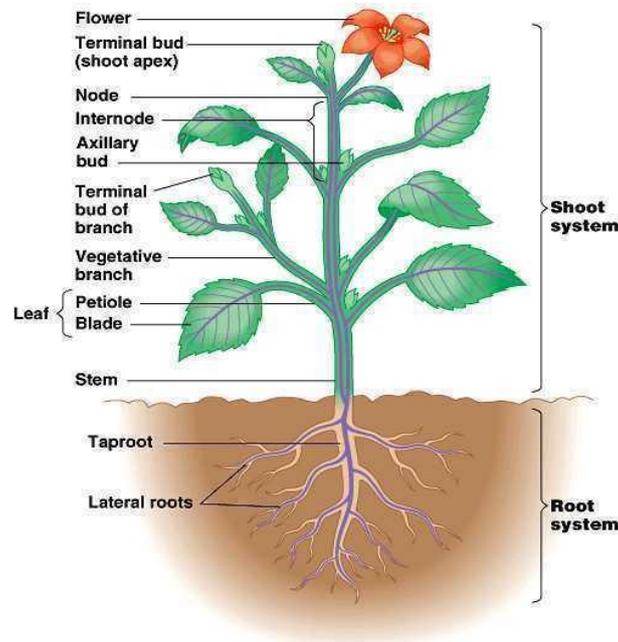
### **Manure:**



Even though, it is considered as an organic physical fertilizer, it can also be considered as a soil enhancer, since it can improve the soil texture and the ability of retaining water.

## UNIT 4 The Plants

### Lesson 4.1 The Parts of a Plant



**Figure 11:** Parts of the Plant (geocities.ws)

- A. The root is the part of the plant beneath the soil (only tropical plants have aerial roots due to the high humidity that occurs in the tropical climate). The basic function of the root is to support and supply the plant with water and dissolved salts. The root always tends to go down to the ground (positive geotropism), regardless of the location of the plant.
- B. The trunk. It is the main shoot that joins the root with the upper part of the plant. The plants, depending on the type of their trunk are divided into:
- trees (they have a large central trunk)
  - shrubs (many fine trunks start from the ground and support the plant)
  - Or pores (they have a central trunk that is very thin).

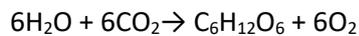
The shoots tend to go upward looking for light (negative geotropism). The shoots branch out into individual shoots which in turn branch into other shoots and so on. On the shoots appear the buds that will give either new leaves, young shoots or flowers.

C. The leaf grows on the shoot (through the stem) and is the starch preparation tool (the main plant food). The nerves of the leaf are the ducts that bring the water with the salts from the shoot to the leaf and return the nutrients produced to the shoot. On the surface of the leaf (mainly on the underside) are the mouths through which the plant discharges water into the atmosphere. The leaves can have different types of ribs, sizes and shapes. In the dry areas, thin leaf plants (for reduced transpiration) are found, while in the wet areas the leaves are large.

## Lesson 4.2 The Main Functions of the Plant

**Transpiration:** Water enters the plant through the roots, ascends throughout the plant through the sunny shoots of the shoots, and reaches the leaves where it is evaporated (evaporated) from the mouths mainly below them. Breathing ensures that salts are transported throughout the plant. Transpiration also regulates plant temperature. Breathing depends on the humidity of the air and the ambient temperature.

**Photosynthesis:** It is the process of producing glucose and oxygen from plants, simply by absorbing water (from the roots) and carbon dioxide (from the air), always with the help of the sun. Photosynthesis occurs only in the green parts of the plant and is described by the following equation:



**Breathing:** Breathing is mainly from the leaves and less from the shoot or root. It helps to break down starch and consequently to supply energy to the plant. During breathing the plants absorb oxygen from the environment and emit carbon dioxide. However, as photosynthesis becomes an inverse phenomenon, oxygen elimination is prevalent in the day. But at night, when the plant does not photosynthesize, the plants only emit carbon dioxide, but not in an alarming amount.

**Also, important plant functions that the trainee must know are:**

- The uptake of water and nutrients through the root. The salt water is transported from the root to the main trunk and from there through the vascular throughout the plant. This function is essential for the smooth operation of breathing, breathing and photosynthesis.
- Fruiting. The flower bud will turn into a flower, which after a while throws the sepals and petals will slowly form the fruit. The fruit contains the seeds that if planted in the soil will give a new plant, the same species as they came from.

## Lesson 4.3 The Biological Cycle of Plants

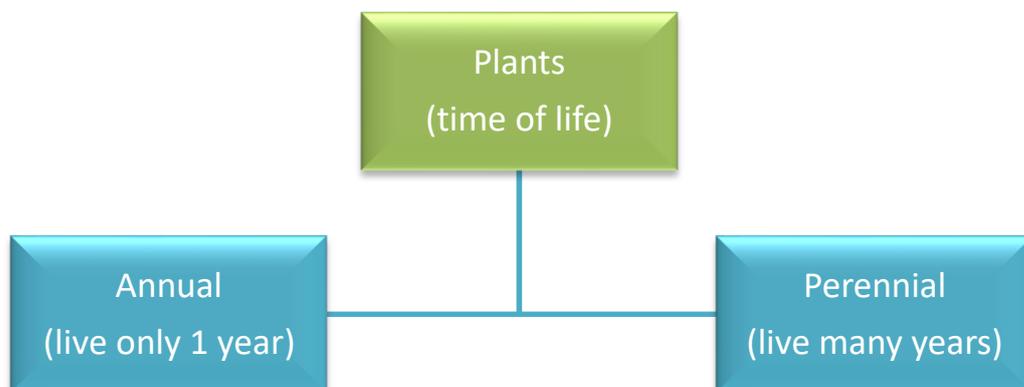
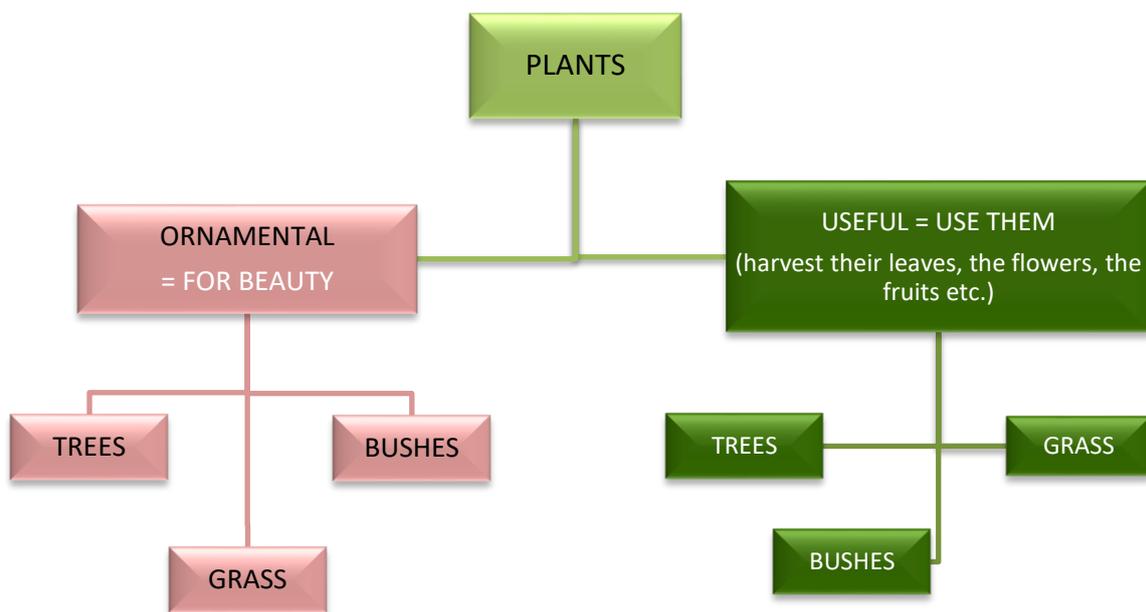
The trainee must understand that the plant undergoes a series of changes in form, returning to the starting state. The most important to take into account is to provide all the necessary factors to the plants, so that the biological cycle can be completed:

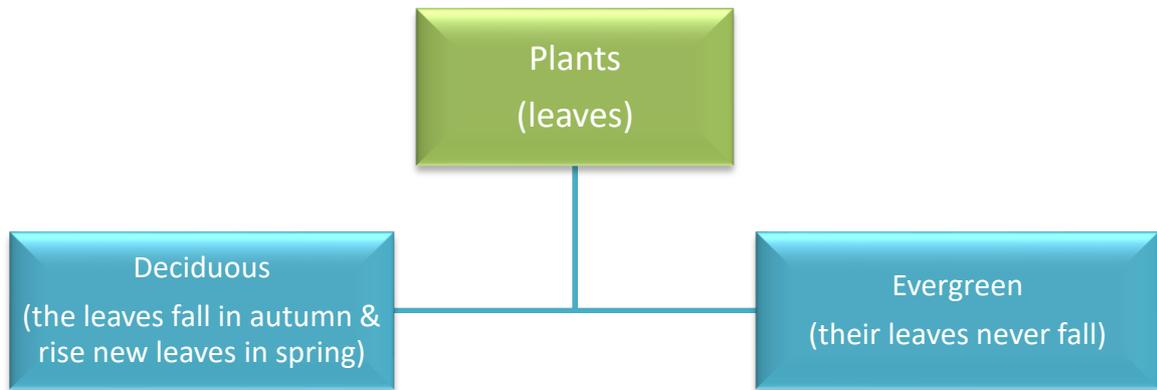
- Watering (water)
- The right temperature
- Proper lighting (avoid shady places)
- The necessary nutrients (otherwise you fertilize)
- The protection of the plant from diseases, bugs or weeds (plant protection)

## Lesson 4.4 The Basic Plants - Plant Types

The trainee must understand that the plants according to their size, their use, their time life, and their leaves (within a year) can be in types, as shown in the figures below.

- Types according to their size: grass, bush, tree
- Types according to their use: ornamental (for beauty) & useful (for usage)
- Types according to their time life: annual & perennial
- Types according to their leaves: deciduous (the leaves fall in autumn) & evergreen





## **PART 3 Specific Gardening Activities**

### **UNIT 5 Gardening, Tools and Machinery**

#### **Lesson 5.1 The Basic Tools, Machinery & Equipment**

The trainee must know all the basic agricultural tools, machinery and equipment, to recognize them and relate them with the agricultural task. It is imperative to use them following the safety measurements.

The basic tools, machines and equipment, as well as the safety measures in their use, are shown in [Unit 5](#) of the “easy to read materials for learners with intellectual disabilities “.

## UNIT 6 Agricultural Activities

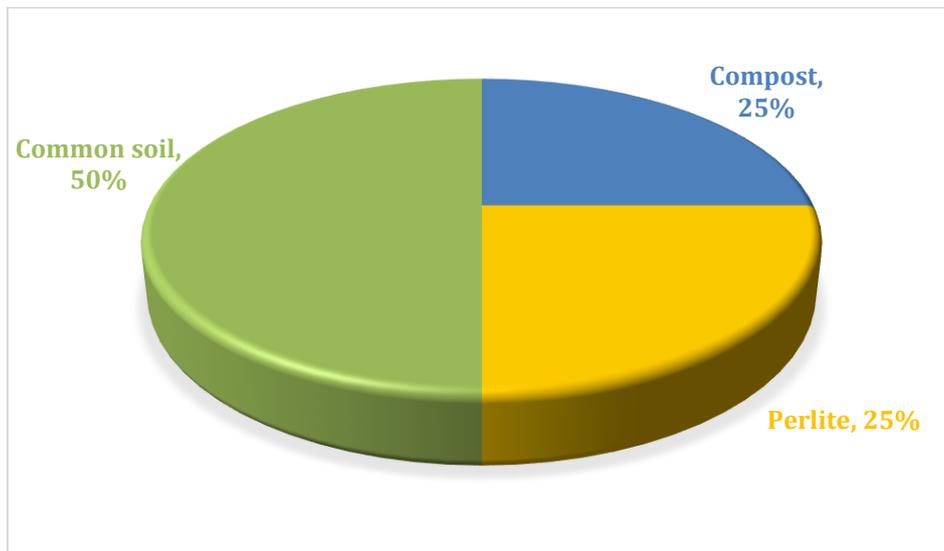
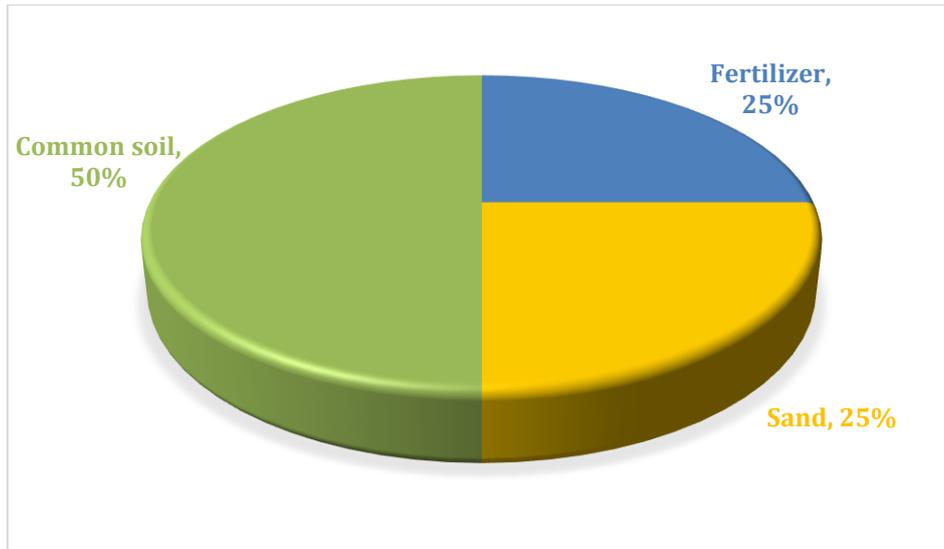
### Lesson 6.1 Soils, Mixtures & Sowing

The necessary cultivation works are:

- a. creating a mixture of soil (blend)
- b. fill pots or seedbeds with soil mixture
- c. sowing - planting of seedlings
- d. leveling the ground
- e. ground cover (mulching)
- f. transplanting
- g. weeding
- h. ploughing (soil treatment)
- i. watering
- j. fertilizing
- k. application of organic pesticides
- l. pruning - lawn cutting
- m. removal of fallen leaves & rubbish, removal of pruning materials
- n. harvesting
- o. tool cleaning and storage (done after all cultivation work)

#### CREATING SOIL MIX (BLEND)

To create new plants, either by sowing or by the method of vegetative propagation (rhizomes, cuttings, etc.) you will need the ideal soil mix. This should be fluffy, able to withstand moisture but not toxic to the seeds. In the sowing mixture avoid peat. It has a very low pH that can burn the seeds. In any other soil mixture, the peat may be about 25%.



**Figure 12:** Composition of Some Soil Mixtures

Mix in a special place with a large shovel to mix uniformly.

#### FILL POTS OR BEDS WITH SOIL MIXTURE

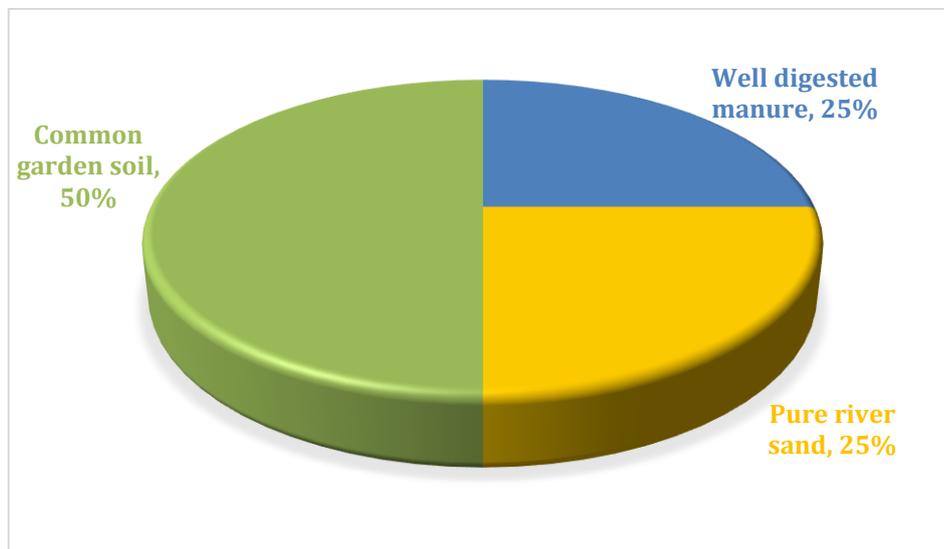
With the above mixture, we fill either the pots or the seeds in order to create new plants (in a native or vegetative way of propagation). It is helpful to use small spades.

## SOWING

### **Creating the Seedlings**

In the case of one-year or two-year plants the seedlings arise by sowing. Either we buy the seed or we harvest it from the previous crop and keep it in a dark, well- aeration place without moisture. Sowing is the sexual way of reproduction. In case we want to reproduce perennial plants on our own, the best propagation method is cuttings or dividing (the ideal way of propagating is mentioned for each aromatic - medicinal plant in the relevant chapter).

- Sowing is usually applied to one-year or two-year plants, which are easy-to-germinate plants and they don't require special germination conditions. It is first applied to a seedbed and as soon as the plants have sufficient size, they are transplanted with a special planting machine in the field. Some growers sow directly in the field to save time and labor. This way they take the risk of not germinating under extreme climatic conditions.
- The most common sowing season for most AMP is late winter with early spring while the planting season is spring (from March to May).
- A common sowing blend has the following composition:



**Figure 13:** Composition of Some Soil Mixtures

- We water the above blend to get the perfect moisture and mix afterwards
- In case the seed is small, we can mix it with sand

## Kinds of Seedbed

### 1. Cold Seedbed (it doesn't get heated)

- It needs a sunny place
- It needs south orientation
- It needs protection from low temperatures
- It needs protection from cold winds
- It needs glass or polyethylene cover
- At high temperatures we leave the cover open
- At low temperatures we have the cover closed, possibly covered with cloth or newspapers

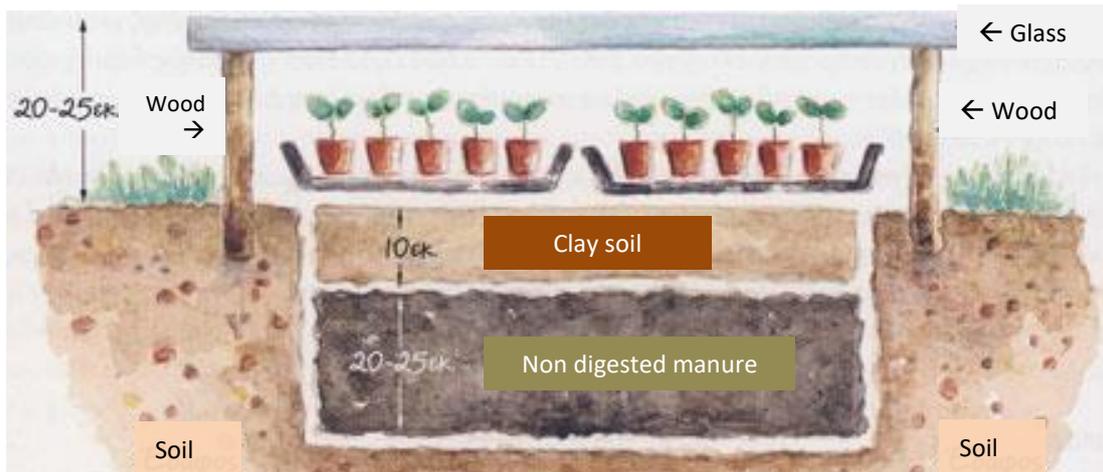


Figure 14: Profile of a Warm Seedbed

### 2. Warm Seedbed (it gets heated)

- It takes advantage of the heat released by the decomposition of organic matter (non-digested manure or non-decomposed compost)
- It needs glass or polyethylene cover
- At high temperatures we leave the cover open
- At low temperatures we have the cover closed, possibly covered with cloth or newspapers

### 3. Seedbed in Greenhouse

In a box (chest) or special crates (or amateur pots) or peat pots



#### Covering the seed

If the seed is near the surface, it is subjected to insects & birds. It has surplus illumination and lack of moisture.

If the seed gets deep enough it runs out of nutrients, so it has no strength to rise to the top

- The big seeds need to be covered 1-3 cm
- The bulbs (e.g. onions) need to be covered 3-6cm (about 3 times their length)
- The small seeds need to be slightly covered with milled soil manure

## THE PROCEDURE OF SOWING

### 1. Sowing in a Seedbed

- Creation of blend (soil mixture)
- Put the blend into the seedbed
- Press with a board - flattening
- Watering
- Drainage (for  $\approx 24$  hours)
- Sowing (mature seed, well preserved, from fine plants, mix small seeds with sand)
- Seeding depth  $\approx 3$  times the length of the seed
- Low pressure again with the board (to make contact the seed with the soil)
- Cover with the same blend (or different for seeds demanding high temperatures)
- Ensure warm temperature (not less than 10-15°C)
- Ensure semi-light (neither bright light nor dark)
- Final watering (daily & slightly as a rain)

### **Making The Plants Tough (Resistant)**

- From day 3 (after sowing) we gradually open the seedbed cover
- 2 weeks after sowing (which is the average seed germination) the flowerpots come out completely out of the seedbed, in a protected place, but return at night to the bed.
- The 3<sup>d</sup> week the flowerpots come out at day and at night (return to bed only in severe weather).
- When the seedlings get 2 leaves, we space out, meaning we keep the strongest plants by removing the smallest and most damaged.
- Shortly before transplanting we gradually reduce watering.
- When the seedlings have 4 leaves, we transplant them to the final place.

### **2. Sowing Directly in the Field**

The above sowing procedure is applied. When the seedlings are significantly high, we space out to keep the strong. This process is suitable for large areas and for seeds resistant to extreme conditions with high germination capacity in the countryside. The following link shows the field sowing with a special planting machine.

### **Requirements for Successive Germination in Seeds**

- Have a well-drained & permeable soil (not stagnant)
- Have a moderate too rich in nutrients soil
- Have a temperature of  $\approx 18-22^{\circ}\text{C}$  to ensure seed germination
- Make the right seed cover
- Sowing during the filling moon period is boosted

Vegetation is achieved in 10-20 days

## Lesson 6.2 Ground & Transplants

### FLATTENING (LEVELING) THE GROUND

It is important that the planting surface is flat in order to:

- not stagnate in water and do not create mud
- evenly water all the plants
- not drift the soil when it rains

We can use a plow, a hoe or an engraver to eliminate the uneven terrain. The final leveling is done with a rake, board or roller.

#### **Flattening**



### COVERING THE SOIL (MULCHING)

It is very important that our crop is free of weeds, especially in the early stages where our plants want to be promoted and established. Ground cover materials prevent weeds from appearing.

The plastic soil cover comes in before planting, while plant materials (shavings, compost, straw, pine bark, newspaper - cardboard) can come in after planting.

## Mulching



- with plastic
- with shavings
- with pine bark
- with compost
- with straw
- with cardboard or newspapers (tap with stones)

The plastic material is excellent for weed removal and water saving, but it is high cost and not environmentally friendly. Plant materials have a lower but satisfactory yield on weed removal, however they are much cheaper and environmentally friendly. Their characteristics are shown in Table 5.

**Table 5:** Comparing the Materials for Mulching and Plastic Covering Soil

Characteristics	Mulching	Plastic
Weeds elimination	YES	EXCEPTIONAL
Saving water	YES	EXCEPTIONAL
Upgrades soil texture	YES	NO
Heating the soil	YES	EXCEPTIONAL
Cost & labor	MODERATE	A LOT

## TRANSPLANTING

- When the plants grow (when they produce 2-4 leaves) they are diluted (spaced out) and transplanted to the final place.
- Remove the roots with the plants!!! (pay attention to the tangled roots, not to get injured)
- Remove the plants either with a special tool or by hand (in the perforated seedbeds with the finger)

### **Seedlings**



## Transplanting Steps

<p>1. We fill the pot with the mixture soil, up to the middle</p>	
<p>2. We pull out the seedling (from the seedbed) with the root</p>	
<p>3. We place the seedling into the pot &amp; add with soil (mind neither to have the roots in the surface, nor to have the plant too deep)</p>	
<p>4. We press around the plant</p>	
<p>5. We water in order to unify the soil and get in touch with the roots</p>	
<p>Afterwards:</p>	<ul style="list-style-type: none"> <li>- We put it in a hot place</li> <li>- We water regularly</li> <li>- We look after the plant protection (the seedlings are not strong yet)</li> </ul>

It might be needed a second transplant stage until the final transplantation to the field.

Throughout the sowing - transplanting process we must ensure the right conditions:

- Temperature
- Lighting
- Aeration (air contains moisture and nutrients that the plant needs. Indoor and greenhouse aeration is required)
- Air humidity
- Soil moisture (we take care to water when the plant needs it. We can control it with our finger. Sudden changes in soil moisture - root moisture cause shock to the plant and disrupt soil texture. Regular watering with smaller amounts is recommended).
- Good drainage (it is important that the soil in the root system has good aeration. We can accomplish good drainage by ploughing, and with a good mixture of soil – gravels at the bottom are helpful)
- Plant protection (regular plant control, weeding, preventive sprays, application of organic compounds in the event of an affection).

## Lesson 6.3 Weeding

### WEEDING

Before planting our crop, we preventively disinfect:

- the ground with steam
- the ground with special compounds (found in agronomic shops)
- the bulbs, seeds, tubers with special compounds
- alternatively, with chemical herbicides

When our crop has been planted, we get rid of the weeds by:

- weeding (= rooting by hand) or ploughing as regularly as possible, especially when our plants are young or turfous. Weeding is the best method for aromatic plants.
- Milling, with the milling machine on large areas (mind the perennial weeds that have underground parts: the machine has knives that spread the weeds - contamination).
- Ploughing, with the ploughing machine on large areas. The ploughing must not take place in a high depth (ideal: approximately 10 cm). Prefer lightweight machines in order not to compress the soil (they are also cheaper in the market).
- Alternatively, chemical herbicides
- Or with special soil cover materials (mulching)

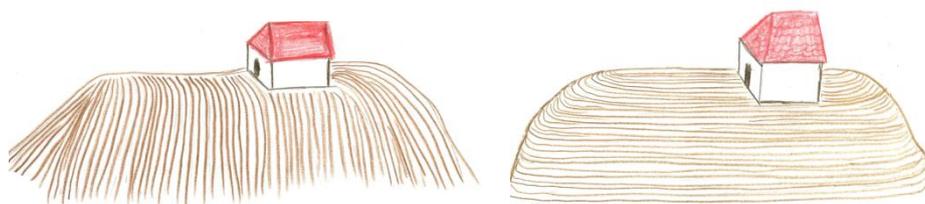


**Figure 15: Weeding Tools**

## PLOUGHING



- We upgrade the soil texture by ploughing (we do not plough deep enough in case of plants with not deep root system).
- On sloping ground, we create terraces.
- It is important that the sloping soil is ploughed parallel to the rows, that is, parallel to the terraces (figure 16).



**Figure 16: The wrong (at left) and the right way (at right) of ploughing when having sloping areas.**

## SOIL TREATMENT

- It must take place when the soil is in the best spot (we understand it when the soil is crushed by hand, then it has 50-60% of water capacity, being neither muddy nor dry).
- Ideal tillage is in autumn because then the tillage can reach 20 cm. In spring and summer treatment should be limited to 10 cm deep. Spring treatment (spring-summer) will result in loss of soil moisture. We only do this in case of perennial weeds.
- Under dry conditions in medium or fluffy soils, the depth of ploughing can be bigger. The heavier the soil and the higher the humidity (atmospheric or soil), the smaller the depth of tillage.
- In the case of heavy soil, in addition to the low depth of ploughing, we should consider improving the drainage because most AMP need well drained soils. Applying a slight slope to the plot will help in this case for better drainage.
- Mind the ploughing in an established crop: the depth of the ploughing can damage the root system.

## Lesson 6.4 Watering

### WATERING

If our crop needs watering, a chemical analysis of irrigation water will help, especially if it is groundwater in coastal areas.

- If our water contains too many salts (TDS, hardness, EC) the quality of the final product will be bad and there will be damage to the automatic irrigation system. The smaller the nozzles (e.g. drip irrigation), the greater the damage caused to the automatic irrigation system by the presence of salts in the water.
- The watering temperature should be neither too high nor too low.



**Figure 17:** Salinization of soil by the use of high-water conductivity

*NOTE: Rainwater has few salts (deionized water is very close to this composition).*

### MEANS OF IRRIGATION

The most common means of watering are:

- By hand (with hose or watering can) for amateurs
- Sprinkling irrigation
- The furrow irrigation (surface irrigation – it is not recommended for large areas due to the big amount of water being used).
- Drip irrigation
- Underground irrigation



*Means of watering: By hand (for amateurs, in the house...)*

By hand we usually water small flower beds, pots and trees.

To make it easier for the trainees to water without leaving a plant unturned, we place the pots in a row or layout them in a one-way direction.



*Means of watering: Sprinkling (recommended for lawn)*

- It is applied mainly to grassland, alfalfa, lawn etc. It is not recommended for aromatic plants and generally bushes.
- Sprinkling irrigation can cause fungal diseases in some plants due to easy spreading of fungi.
- The benefit of sprinkling irrigation is the good absorption from soil and rinsing the plant.

The ideal means of irrigation for bushy plants is drip irrigation (with drips) or underground irrigation system.



*Means of watering: Drip irrigation system*



*Means of watering: Underground irrigation*

The drip and underground irrigation system

- Significantly reduces water consumption by applying water where the plant needs it.
- Diseases and infections are reduced

In addition, the underground irrigation:

- Minimizes evaporation and leaching of the nutrients

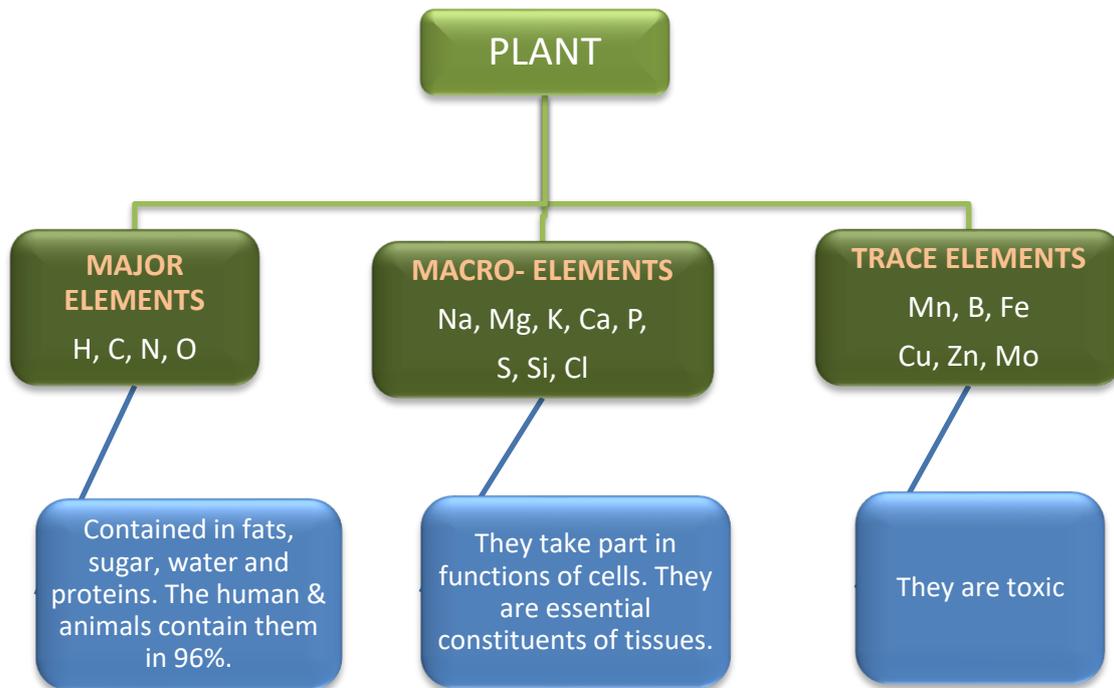
Mind the amount of the irrigation water:

- High amount of water means less oxygen to the roots which results in suffocation and decay
- A small amount of water retards the growth of the plant

In recent years, new technology equipment has been developed in Greece that informs (via ground and air sensors) the producer on his cell phone when his plant needs to be watered.

## Lesson 6.5 Fertilization & Plant Protection

### FERTILIZING



#### The major nutrients of the plants are:

- **Carbon C, O<sub>2</sub> Oxygen** and **Hydrogen H** are obtained from the atmosphere
- **Nitrogen N** is the structural component of proteins, nucleic acids (DNA and RNA) and enzymes. Nitrogen ensures timely ripening of fruit, plant growth, quality and quantity of production.

#### The macro - elements are:

- **Phosphorus P**: is a constituent of nucleic acids, essential in the early stages of plant growth. The requirements of phosphorus plants vary.
- **Potassium K** is an essential cell cation. It is one of the most moving elements. A balance between potassium and sodium (K<sup>+</sup>& Na<sup>+</sup>) and potassium and calcium / magnesium (K<sup>+</sup>& Ca<sup>2+</sup>)

/  $Mg^{2+}$ ) is required, as increasing the concentration of one decreases the concentration of the other.

- **Sulfur S** is an essential component of proteins. It is easily leaching in sandy soils to the underground aquifer. It is essential for the early stages of plant growth. The ratio of nitrogen to sulfur concentrations should be  $N / S \approx 9: 1$ .
- **Magnesium Mg** is essential for photosynthesis. Its concentration should be over 0.10%. Its absorption by plants depends on the soil pH (optimal absorption at pH values between 6.5 and 6.5). It competes with calcium as it reacts with elements such as Potassium, vitamin B6 and Boron.
- **Calcium Ca** has low motility in plant tissues and its concentration increases with age of the plant. Greece is rich in calcium-containing rocks such as limestone, conglomerate, limestone sandstones and limestone marls.
- **Chlorine Cl<sup>-</sup>** participates in carbohydrate metabolism. In nature, water is bound to  $Na^+$  (sodium). The major rocks containing chlorine are carnallite ( $KCl \cdot MgCl_2 \cdot 6H_2O$ ), chlorite and alite ( $NaCl$ ).

**The trace elements are:**

- Iron Fe
- Manganese Mn
- Boron B
- Zinc Zn
- Molybdenum Mo
- Copper Cu

They play an important role in enzymes & proteins. Particular attention should be paid to the application of micronutrient-rich fertilizers because they cause toxicities.

The lack of any of the above elements in plants leads to deficiencies with symptoms:

- Leaf chlorination
- Necrosis of leaves or parts of the laminate
- Developmental abnormalities
- Transfigurations

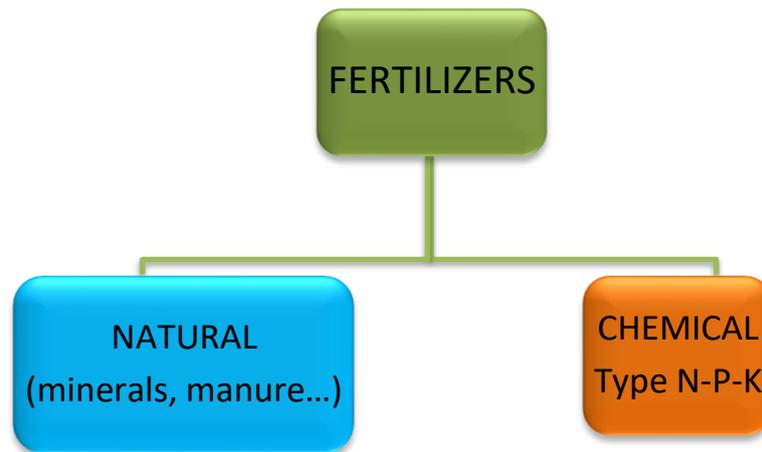
When nutrients are absent in our crop, providing the necessary nutrients to a plant can be done by **fertilizing**.

#### **Defining the Fertilization:**

- **Basic fertilization:** It is the fertilization that is given to a crop for a short time before sowing or planting the seedlings or during sowing or planting. Its purpose is to provide favorable initial conditions for the success of the crop (high seed germination and rapid growth of young plants).
- **Basic fertilization:** It is mainly made in ammonia form (and usually in autumn). Nitrogen will slowly release to the plants (it will meet low temperatures). The chemical fertilizers applied are mainly in granular form.
- **Surface fertilization:** It is the fertilization dispersed on the soil surface which is done in one or more doses after the plants have been installed in the crop area. The goal is to replenish the nutrients absorbed by the plants during their growth.
- **Surface fertilization:** It is either nitrate or ammonium, dependent on the type of plant (mainly in spring). Nitrogen becomes readily assimilated.

Fertilizers can be natural (such as manure, compost, some minerals, etc.) or chemicals typically of the N-P-R type.

Fertilizers may also be carbon-containing organic (C) in their composition (e.g., manure) or minerals that contain no carbon at all.



## MANURE



It is a mixture of farm animals and their mattress (bedding). Its composition varies and depends on:

- The type of the animal
- The animal feeding materials
- The method of preservation (of manure)
- The degree of its zymolysis

Always used digested!

It shall be applied in the autumn or spring in a quantity as indicated for each AMP in the relevant chapter.

The manure has a lot of nitrogen (N), so the soil may need reinforcement with phosphorus (P) & potassium (K).

## NUTRITIONAL SOLUTION



- it is a mix of nutrients (in a solid form) with water.
- It can be either chemical or organic or manure.
- In case of seedlings or small plants, the nutritional solution is recommended.

### Nutritional solution of manure (serbetia)

- It is applied at the later stages of the plant
- Soaked in a barrel
- Use either digested or non-digested manure
- Leave on for 2-3 days
- In order not to smell bad, we can add 32gr of  $\text{FeSO}_4$  (in 10lit of liquid)

The Table 6 shows the proportion of water and the amount of different types of manure in kilograms to create nutrients.

**Table 6:** The Ratio of Making Different Nutritional Solutions by Different Kinds of Manure:

Horse manure without straw	1kg	10 kg water
Cow manure	3 kg	10 kg water
Poultry manure	0, 65 –0,95 kg	10 kg water
Mixture of manures	0, 65 –0,95 kg	10 kg water

## CHEMICAL FERTILIZERS

- They are found in specific agricultural shops.
- It is imperative for the cultivator consult an expertise agronomist. It is also important for both the health of the cultivator and the protection of the environment that the rules for the application of agrochemicals will be followed and the necessary protective measures (special clothing, gloves, masks etc.) will be taken. After application, lighter and more frequent watering is needed.

Just after the soil treatment, the basic fertilizing takes place (depending on the crop). With a soil analysis we get a picture of the soil we use and we intervene accordingly. Basic lubrication will provide favorable initial conditions for successful establishment of the crop (high seed germination and smooth growth of young plants).

NOTE: In the case of cultivated plants, we do not want very rich soil because it will give our plant growth at the expense of its aromatic components. We just want to boost the growth of the plant.

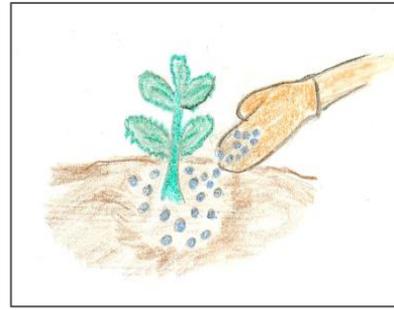
Ensuring the supply of the necessary nutrients to a plant is done by fertilizing.

## Means of Fertilizing

a. By spraying



b. In solid form



c. Through watering



d. Hydroponics



## Hydroponics



Hydroponics is mainly applied to horticultural and ornamental plants. It is not recommended for aromatic - medicinal plants. It is a very demanding crop because it needs:

- Cleaning and sterilizing the whole system before each crop.
- "Quarantine" for two weeks after planting
- Equipment - professional three-component hydroponic nutrition product (N-P-K). (nitrogen - phosphorus - potassium)
- Knowledge of the nutritional requirements of plants.
- Knowledge of the requirements of our plants in illumination and photoperiod.
- Have the plants at the optimum temperature.
- Avoid exposing the nutrient solution to the sun.
- Regular change of water and nutrients.
- Forbidden for pets
- Entrance to the hydroponics unit with clean clothes.

### **Organic Medicines' Application**

Recall that diseases can be divided into 2 categories:

- Due to pathological diseases or bugs
- Due to natural conditions (non-infectious diseases)

For diseases, either biological or chemical preparations are applied. Their application is usually in liquid form, either foliage (spraying on the leaf) or systematic (watering for being absorbed by the root). For AMP cultivations, the organic medicines are recommended.



### **In Case of Applying Agrochemicals:**

- We consult the agronomist - we strictly follow the instructions & precautions
- We make a test before the application
- The application is forbidden during the blooming period
- The application is forbidden on hot sunny days (the agrochemical evaporates causing damage to the environment, to our health and to our money)
- The application is forbidden on rainy days or days with humidity (the agrochemical is washed off (leaching through the soil to the underground aquifers)
- The application is forbidden on windy days (the agrochemical is dispersed into the environment)

### ORGANIC FARM – ORGANIC FERTILIZERS

Organic fertilizers can be:

- Peat
- Manure product of organic farming
- Products and by-products of animal origin: Blood meal, bone meal, fish meal, skin, scrubs etc.
- Algae of *Ascophyllum Nodosum* and *Fucus vesiculosus* (Extracted Solutions & zymolysis)
- Nettle (extracted solutions & zymolysis)
- Mushroom crop residues
- Earthworm feces
- Sawdust - haystacks - wood chips - wood chips in decomposition
- Compost
- Green manure

Table 7 shows the content (%) of the most known organic biological fertilizers in nitrogen, phosphorus, potassium and calcium.

**Table 7:** Organic Fertilizers' Constitution in Organic Matter, N, P, K & Ca (%)

Organic Fertilizer	Organic Matter	N	P	K	Ca
Cow manure	50	0,06	0,005	0,005	0,6
Sheep manure	62	2,4	0,7	1,9	-
Mixture of manure (sheep & horse)	84	4,5	0,8	2,6	2,9
Green manure (alfalfa)	17	0,6	0,1	0,3	-
Nettle	50	23,3	1,07	7	8,76
Alga	60	0,9	0,14	1,9	1,2
Sawdust	90	0,2	-	-	-
Rye straw	77	0,6	0,55	0,25	0,36
Barley straw	75	0,51	0,25	0,94	0,4
Corn stock	85	0,24	0,02	0,25	0,03
Blond peat	90	0,5-2	0,01	0,04	-
Mushroom crop residues	60	0,7	0,2	0,6	-
Blood meal	60-70	12	1,5	0,8	1
Meat meal	65-75	10-12	-	-	-
Bone meal	30	4-5	8	0,2	27
Potato leaf	22	0,4	0,16	0,83	0,78

### Green Manure

- It regards the sowing and subsequent cutting and incorporation around our crop of the plants in the families: Gramineae, Leguminosae and Cruciferae. Green manure supplies the soil with an organic substance that decomposes, supplying the soil with the essential nutrients for the plants.

Advantages of green manure:

- Creates natural shelters for beneficial insects and pests of the crop
- Improves soil texture
- Reduces the risk of corrosion (from strong winds and rainfall)
- Avoids nutrients leaching
- Fights off the weeds, through competition
- It acts as a heat-insulating material during periods of low temperatures

Characteristics of green manure:

- Ability to capture and utilize atmospheric nitrogen (such as legumes)
- Ability to rapidly grow and produce large amounts of green vegetable mass (properties of Gramineae, Leguminosae and Cruciferae)

The green manure is indicated for tree crops. In Greece it is mainly applied to olive trees.

## CREATING ORGANIC MEDICINES AND FERTILIZERS

### EXTRACTS



Nettle



Fern



Artemisia glacialis



Symphytum officinale



Onion



Garlic

*Mind the plants: they must not have seeds*

Put in a bin

- 1-part plant + 20 parts water
- Leave in a sunny place
- In a month the compound will be done

- Application: 1:10 dilution
- In addition to fertilization, they can kill the pathogenic insects or pests (on target application)

Extract can be created from many weeds as long as they are not seedy!

Another extract

Chamomilla

- 1 part of plant + 20 parts of water
- We lay aside for 24 hours
- We boil for 20 minutes
- We strain
- We dilute (1:10)
- We apply

## **COMPOST**

Advantages:

- Provides nutrients necessary for the growth of plants and soil micro-organisms
- Increases the retention of the soil
- Prevents soil compression
- Increases water store and improves aeration
- Regulates the soil pH and salinity
- Holds heavy metals and pesticides

Disadvantages:

- Slow degradation
- Relatively small production

- Unpleasant odor
- Relatively higher cost than chemical fertilizers

Organic fertilizers are also found in agricultural stores.

### INORGANIC FERTILIZERS

- Minerals (raw)
- Rock dust
- Steelwork rust
- Ash (ash of various trees)
- Various compounds such as potassium sulfate, magnesium sulfate, calcium sulfate, aluminum phosphate, calcium phosphate

The most common ORGANIC MEDICINES

- **Extract** for fungal diseases and insects
  - In 10 liters of water
  - 200gr. alcohol
  - 100gr. olive soap
  - 1 teaspoon soda
- **Sulfur**: to control mildew
- **Copper**: apply on fungal diseases such as Septoria, rust, etc. (in roots: watering with copper solution)

Seed impregnation (for disinfection)

- in a smash of pounded root of wild fig (Ficus Aurea)

- in ash of wild fig
- in a smash of Amaranthus

The seeds become resistant to bug infections

### **Fighting the Grasshoppers**

- Cultivation of the bacillus “Grasshopper Bacillus” on green, where grasshoppers pass through: causes grasshopper disease and death.
- In addition, some fly species (e.g. **Idiafasciata**), & the plant pest **Laclinodium macridiorum**.
- In addition, the following birds:
  - turkey
  - hill myna
  - sparrow
  - finch
  - redbreast
  - skylark
  - owl
  - partridge
  - mistle thrush (*Turdus philomelos*)
  - wallow (martlet)

Large grasshopper raids are difficult to face.

## Fighting Snails



- Putting ash around the plants (on the ground)
- Placing coffee around the plants (on the ground)
- Beer traps

## Fighting Ants



- Placing absinthe leaves on the major branch of our plant

## Fighting Insects



- Bactocera oleae traps
- Traps for insects (with glue and intensive color)

## Beneficial Insects



*Ladybug*



*White Fly*



*Lacewing*



*Beetle*



*Praying Mantis*



*Bee*

### Co- cultivation of plants:

- Next to the cucumbers: oregano (no insects approaching)
- Next to cabbage: Vicia ervilia & Diplotaxis tenuifolia (no insects approaching)
- Next to the radishes: Vicia ervilia & Diplotaxis tenuifolia (no insects approaching)
- Next to turnip: Vicia ervilia & Diplotaxis tenuifolia (no insects approaching)
- Next to the vineyard: roses (mildew index)
- Apgar: insectifuge and attractive caterpillar.

### Summing up the benefits of organic farming are many:

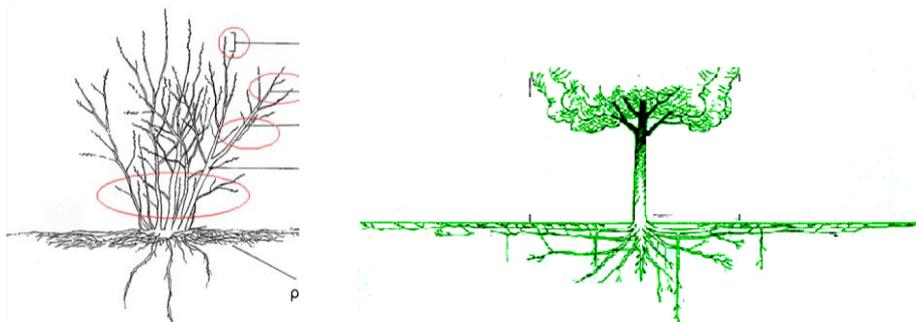
- Avoid the entry of chemicals and toxic substances into the food chain
- Avoid direct contact (& inhalation) of chemicals
- Avoid contamination of the neighbor fields with agrochemicals
- Avoid chemicals entering the soil and water resources
- Improves pH, microorganism activity, and soil aeration
- It is **considered essential to subsidize the cultivation of aromatic and medicinal plants.**

## Lesson 6.6 Pruning & Cleaning

### PRUNING – CUTTING THE LAWN

Pruning is the removal of shoots or parts of them with special tools. Proper pruning ensures vigorous and healthy plants, beautiful and functional tree shape, proper plant growth, production of new blossoms and fruits.

The shrubs are small, usually short plants, whose shoots start mainly from the ground. In these plants, pruning is combined with harvesting. The trees, on the other hand, have a main log that starts from the ground and then ramifies into individual branches and shoots.



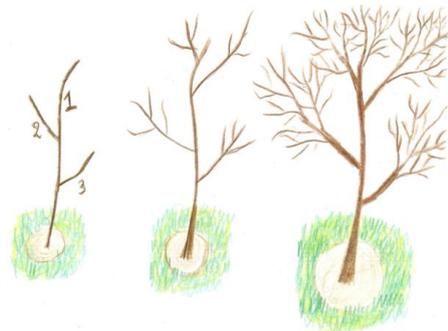
Rarely, pruning can take place beyond the harvest season. Some shrubs such as e.g. the laurel, can take such height that with the proper pruning can have a tree shape.

#### Pruning timing:

It takes place in winter with early spring (from December to March). At this time the plants are in lethargy (growth functions are minimized).

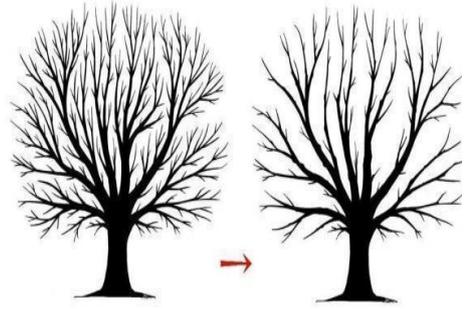
#### Shaping the plant:

To form a beautiful shape on our plants we start by leaving 3 branches, trying to have an angle of about 120° between them. Next year we leave about 3 individual shoots in each branch. Following the same pattern every year, the plant gets a beautiful and functional shape. This pruning mode allows good aeration and lighting of the plant and ensures its robust growth.



## Refreshing the plant:

We remove all the withered branches and shoots, those that bear yellow leaves or have diseases, and those who make don't let the light and aeration to the plant. Pruning also helps regenerate plants that have been damaged by frost, fires, and perhaps diseases.

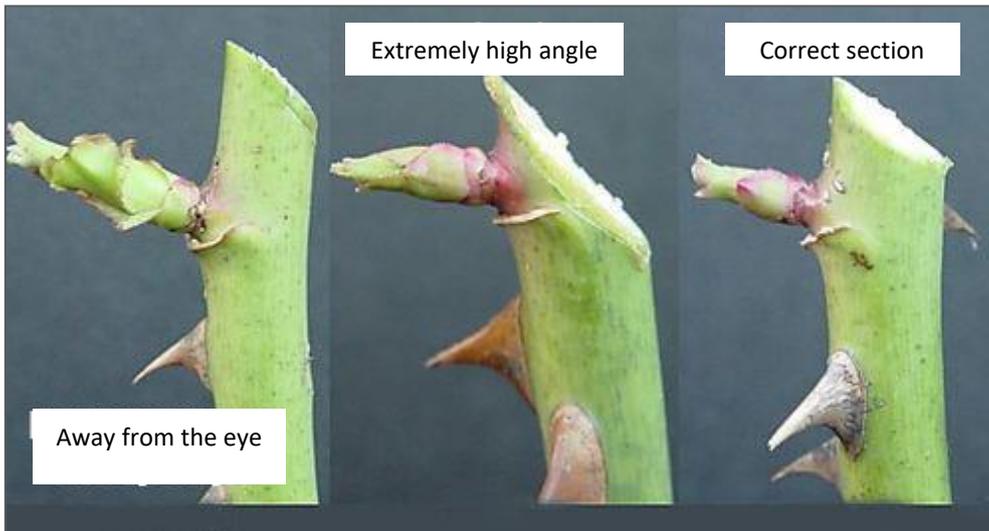


## PRUNING PRINCIPLES:

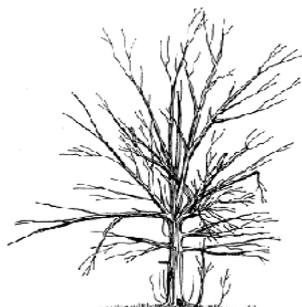
1. We use the right pruning tools, well sharpened, disinfected (especially if pruning has been done on diseased plants). We never cut the branches or the shoots with our hands because we will injure the plant and the wound can easily be a source of infection or pathogen entry.
2. Cutting points should be smooth in order to reduce the chance of contamination. This is ensured by the good sharpening of pruning tools.
3. The section is made above the point where the new shoot comes out with an ideal cutting angle of 45 ° and at an ideal distance from the eyes.

## Pruning Tools





4. We remove the diseased branches just below their base to ensure that all contamination is removed. We regularly remove dried flowers and any sick fruits.
5. We always remove offshoots from the tree log.



6. We do not prune in days with bad weather (heavy rain, strong wind, high temperature or frost). The sections created by pruning increase the evaporation of water, so we make sure that after pruning we increase the watering (in case of watering crops).
7. We always disinfect pruning tools at the end.

### TOP PRUNING

- Cut the top shoots or branches so that at the point of intersection the plant gives new woody buds, consequently new growth (more bushy plants) and new blooming.
- In climbing plants, leave one or more main shoots to grow and cut the secondary shoots.
- The top-pruning is done during the spring.

### CUTTING THE LAWN

Mowing the lawn is a very easy task. With the mowing machine (lawnmower) we follow a specific direction, e.g. from the center following a circular path outwards or from right to left and back to left in the next row. A blueprint will help the learner to follow the right course.

At each filling of the machine, we must empty the cut leaves (in the appropriate space), for the machine to work better.

When finishing, we cut the end points with the special tool or machine (trimmer).

### Removal of fallen leaves & garbage, removal of pruning offcuts

After pruning or mowing the lawn it is necessary to remove the remains. The branches can get into the wood chipper and the resulting materials along with the lawn can get into the composter. It is reminded that we should not throw pine needles, leaves of *Euphorbia pulcherrima*, rose, eucalyptus and fig in the composter.

In case we do not have a composter, we collect the fallen leaves and pruning offcuts, put them in big bags and take them to the appropriate place. Do not throw them in the trash. After collecting the garbage, we put it in bags and then in the trash. For all the above work, it is necessary to wear the necessary equipment (long-sleeved overalls, wellies, gloves, etc.) for health and safety reasons.

## Lesson 6.7 Harvesting

### HARVEST

Harvest is a cultivation work that requires special attention. A failure (not proper tools, not proper harvesting time and season, not proper means of harvest) can ruin the annual production, even the plants.

The following images show harvesting operations with the special harvesting tools or machinery.



Chamomilla



Lavender



Oregano



Basil



In Mediterranean countries, there are many aromatic and medicinal plants, the cultivation of which is suitable for the education of people with mental retardation. Thus, it must be mentioned which parts of these plant are collected, what time and what season the harvest takes place and how the final product is harvested, dried and stored.

#### THE PARTS OF AROMATIC - MEDICINAL PLANTS BEING HARVESTED

The harvest is defined as the collection of the desired final product. The final product can be: flowers, leaves, shoots, whole plant (mainly for annual or biennial herbaceous plants), fruits, seeds, bark or basement (root, tuber, bulb). Depending on the part of the plant being collected (harvested) of each AMP, the appropriate season or part of the day is also defined. The appropriate harvest season for each amp is stated in the relevant chapter.

It is very important for the harvest:

- the correct harvest time
- the right harvest season
- respect for nature (do not injure - destroy the plants)
- the right harvesting tools

Harvesting tools can be simple pruning tools (different from common pruners) or bulk harvesters.

Mechanical harvesting is indicated for large area harvesting (time saving). The harvest by hand:

- is suitable for high gradient fields or terraces
- gives a much better image to the final product

- gives better quality to the final product (does not break flowers)
- helps ensuring next flowering (as long as the top blooming collection allows the underlying flowering parts to bloom)
- does not destroy the plant
- requires time and labor

## 1. Flowers

Carpels, which produce ovules containing female gametophytes

Stamens, which produce pollen grains containing male gametophytes

Petals, forming the corolla

Sepals, forming the calyx



- Flowers are the reproductive organs of the plant
- Bear male & female gametes. They are planted either on the same plant (single plants) or on different plants (diagonal plants). In order to bear a crop of indigenous plants, it is mainly the female plants and at least one male plant whose flowers will carry the male reproductive organs. The greater the area of cultivation, the more the male plants will be planted and arranged so that the pollen of the stamens reaches all the female trees.
- For the perpetuation of the species, the flowers are in obvious and accessible places.
- They usually carry colors perceptible to humans rather than insects.
- Their pigments that have antioxidant and other medicinal properties for humans are attractive to insects.

- They have an aroma - smell (attractive or repulsive depending on the purpose they serve) thanks to volatile substances with medicinal properties for humans.
- The flowers are usually harvested shortly before blooming (to get the flowers) or open to full bloom (to get the essential oil).

## 2. Leaves

- The best harvest season for the leaves is usually the season of full bloom (then the maximum concentration of metabolism products in the leaves is also observed)
- The best harvesting time in the day is the afternoon (then the maximum concentration of substances in the leaves is observed due to the previous photosynthesis period). Leaves are not harvested at night because stocks of these substances will begin to be consumed.



## 3. Shoots (Stems)

- The shoots are harvested only on annual or biennial plants.
- The shoots we are interested in carry leaves, buds and possibly flowers
- They are collected when juices are at their maximum (spring or full flowering season)



#### 4. Fruits

Fruits are the protective shells of the seeds that supply the seeds with the proper nutrients

- The proper harvest season is when they are in full development (usually late spring - early summer)
- Fruit seeds are poor in active substances



#### 5. Seeds

- The proper time to harvest seeds is when the fruits are in full growth.
- The fruits are usually harvested and then the seeds are extracted from within.



#### 6. Shell-Wood

- The bark is the main shoot envelope, rich in fiber, antioxidants and metabolism products.
- The bark and wood, in contrast to the leaves, are harvested after full bloom and deciduous so that valuable ingredients are transported there.



## 7. Whole Plant

- An entire or annual plant is usually harvested when we are interested in the substances produced in many organs of the plant.
- The best harvesting season is the full blooming season.



## 8. Basement - Root

- The underground part of our interest is usually harvested with care.
- Underground parts, due to exposure to many enemies have strong chemical means to repel them. Their high concentration of therapeutic substances is therein.
- The most appropriate harvest season is in late summer when more components will be transported to the basements after flowering.



## MEANS OF HARVEST – DRYING - STORAGE

It is very important to ensure good quality in the final product for sale, that means it is properly harvested, dried and stored. In the case of essential oils, good distillation is achieved by direct distillation.

### **Proper Harvest**

Rules we must follow when harvesting:

- We use the proper tools
- Harvest at the proper time of day
- We harvest the proper season
- Harvest with respect to nature (do not injure - destroy the plant)
- We also cut strains to help us when drying (e.g. in the lavender, the strains help to hang it upside down in the dryer)
- We have the correct order in the collection basket (it helps the collection to catch the stalks on the backside quickly)

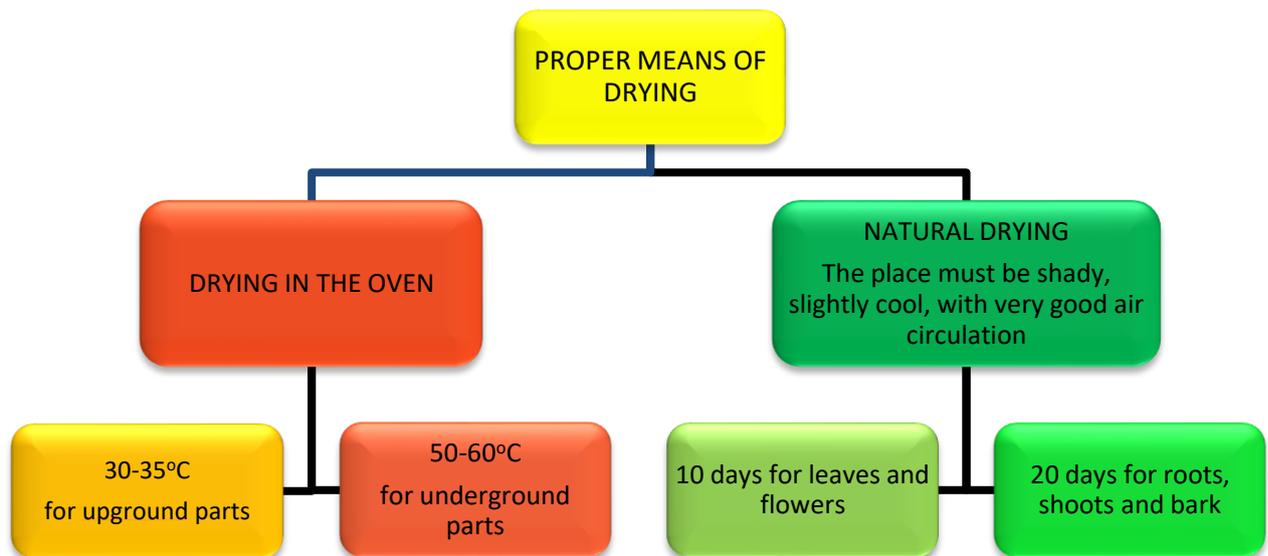
### **Proper Drying**

- The proper drying plays a very important role because the aroma and taste of the aromatic plants and the quality of the active substances depend on it.
- The drying area has to be shady, slightly cool with very good air circulation.
- To avoid any pathogenic invasion, drying should be done within 10 days for leaves and flowers and within 20 days for roots, shoots and barks.

### **After Harvest**

- If we want the plants to dry in the sun, we do not leave for more than one hour because the active substances will deteriorate, the essential oils will dry out and the leaves will fade. In the sun, we can dry fruits like Aronia for many hours.

- Remove any unwanted materials, weeds or parts of the plant that we do not need.
- Cut the underground parts (roots or roots) into 4-5cm pieces for better drainage.
- NEVER use the kitchen as a drying place (vapors dampen plants, fragrances deteriorate).
- To maintain a constant temperature, we can use a fan or electric fan (for cold or humid weather) and a ventilator.
- Professional dryers (ovens) are recommended for large vertical units due to time and space saving. The plant material is placed in special pans that have small holes for the circulation of hot air. This dries the drogue to the ideal temperatures (30-35oC for up ground parts & 50-60oC for underground parts) without altering the active substances.



### When is the drying complete?

When the herbs become crisp. Then they have 7-10% moisture, their active substance content has stabilized, and biological mechanisms have been suspended:

- Stems are easily rubbed between the fingers.
- Flowers dissolve easily.
- The bark and roots become hard and break easily.

The seeds are not sure to be dried after the fruits have dried. So, after removing them by hitting them on paper sheets, we dry them for another week.

### PROPER STORAGE

- After drying and before preservation, some plants need to be treated immediately (e.g. lavender, oregano)
- After the 1st year of preservation, the herbs lose their aroma and active substances.
- The storage area (preservation area) has to be shady and cool but NOT airy.

### Storage packages

- Ideal packages are airtight jars if the space is glassy or otherwise clayey. Plastic jars should be avoided because they cause condensation.
- Paper bags, cartons and cans are also good maintenance packages. But in this case, avoid dust!
- Freeze preservation
- Some aromatic herbs used in cooking do not follow the previous drying method but the herbs come directly after harvest in the freezer. They are placed either in sachets such as fresh, plain on ice cubes, or in oil ice cubes

### Preservation in oil

- Add the herbs to good quality olive oil. Leave in the sun for 2 weeks, with regular shakes. After filtering, hold the aromatic oil. The same process can be done in vinegar as well.

## Lesson 6.8 Tool Cleaning and Storage

After the cultivation work, it is necessary, all the tools, machines and equipment to be stored, clean and for some tools sterile.

The tools should be cleaned with water or by using gloves. During the cleaning of the tools, the handler should be especially careful not to cut themselves. Tools that have been used to prune diseased plants must be disinfected either using steam or alcohol.

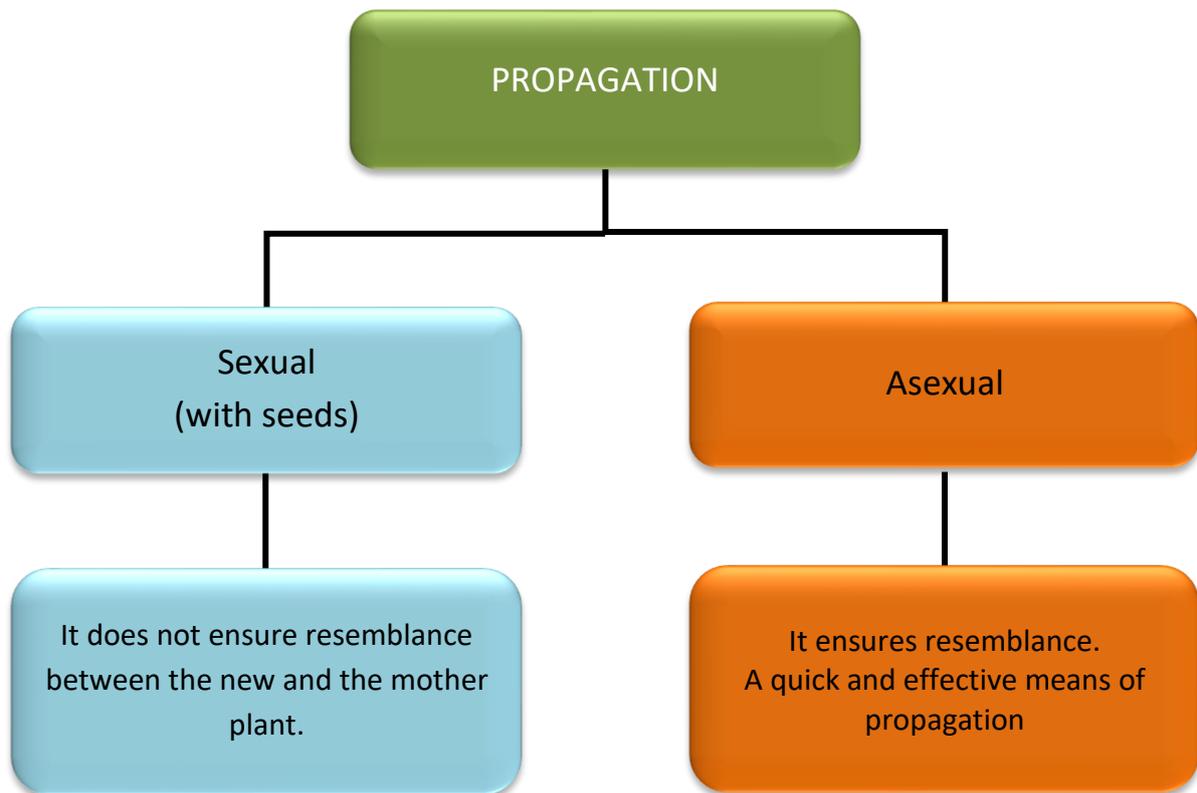
Tools should be stored in a closed space in order to be protected from bright sunlight, rain and wind, in other words elements that can damage the tools and machines over time. It is important that they are stored neatly so that we can easily find them whenever we need them and they do not become entangled with each other.

Finally, we take care of the proper operation of the tools and machines. We sharpen them often and lubricate the necessary points. We take the machines for service at the predetermined time.

## UNIT 7 Plant Propagation

### Lesson 7.1 Means of Plant Propagation

Propagation in plants is divided into sexual and asexual propagation.



*Sexual Propagation*

The asexual means of propagation is applied to all perennial aromatic plants. In the annual and biennial plants, the sexual way (sowing) is applied. The asexual means of propagation ensures

uniformity of the propagating material with the mother plant, which is not guaranteed by the sexual. The asexual method of propagation has also the advantage of the fast growth of the plant which may lead to blooming in the same year. The asexual means of propagation includes:

### 1) THE CUTTINGS METHOD (The Most Common Method of Asexual Propagation)

These are top (usually) 3-4-leaf shoots (we leave the top leaves at 1/3 of the lower shoot). Non top cuttings (at the middle) are not successful for all plants. There are also leaf cuttings & root cuttings. Propagation in most AMP is done by the cutting's method, usually top shoot pieces.

Categories of cuttings:

- Leafy stick (for trees & shrubs)
- Semi-woody stick (for non-trees)
- Green section (for turfs and shrubs)



According to the plant, there is differentiation between:

- the cuttings length from 5 to 25cm (cuttings in shrubs are smaller than trees):
- the place where the cutting is taken (top or intermediate)

## The Procedure of Planting the Cuttings

- Plant the cutting (dip it in water and then in rooting hormone) directly or within 3 days after cutting (if not used immediately the cutting should be left in a shady place for a maximum of 3 days).
- Plant the cuttings either individually in flowerpots, in pots or in the seedbed or in the final place (e.g. mint)

## The Procedure of Planting the Cuttings



1. We place the cutting into the water



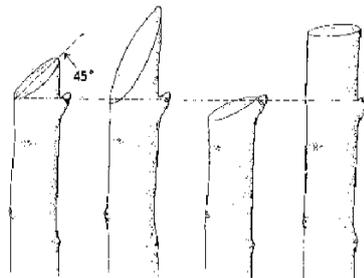
2. Then we place the cutting into the hormone



3. We place the cutting into the pot

For the cuttings to make roots it **IS NECESSARY**:

Correct wrong wrong wrong



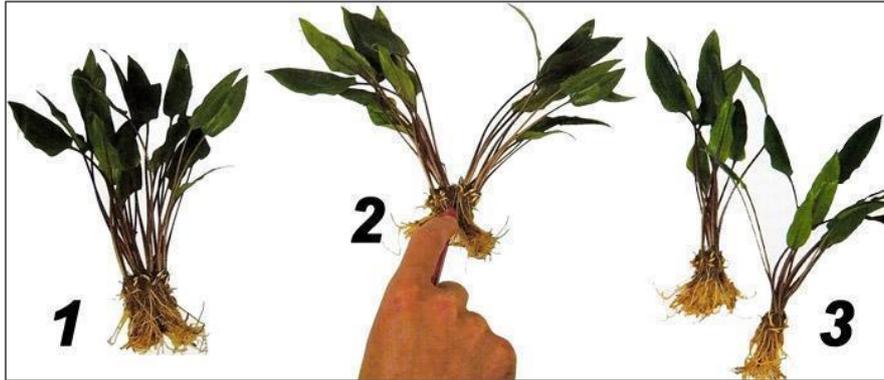
- the cutting must have leaves in the upper 1/3 of its segment
- the air temperature should be 18-28°C (15°C night)
- The soil temperature during planting should be 20-24°C
- Light or fluffy soil (e.g. peat)

- Depth of planting (usual): 2-3cm
- good physiological state of the mother plant
- youth (transplant)
- harvest season (depends on the plant)
- oblique section
- humidity (in greenhouses mist is often applied)
- light
- rooting enhancers such as hormone (= auxin), cytokinin for bud initiation, ethylene etc.
- good support material condition (soil pH, Ca, aeration, humidity)
- CO<sub>2</sub> in the atmosphere, N in the plant (favor rooting & vegetation)
- absence of phytopathogens

## II) THE DIVISION

In some species we can create new plants simply by dividing the roots (e.g. arnica).

- We mind not to injure the root
- The most appropriate time is autumn, or from February to March.



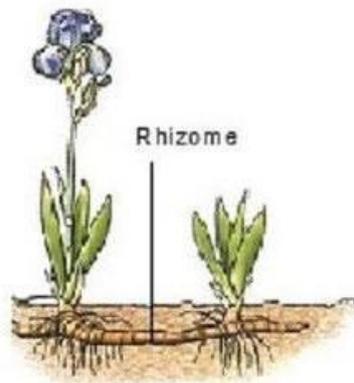
### III) THE BABY BULBS

The bulbs produce near the bottom the baby bulbs, which can be pulled away and create a new plant.



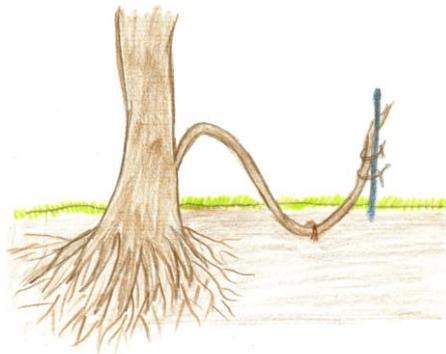
### IV) THE RHIZOME

On the root, there is a rhizome like tuber from which new plants (e.g. iris) are created. When cutting the rhizome, we must ensure that there is a root.



## V) THE STOLONS

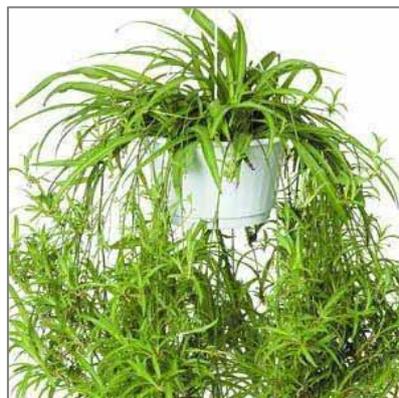
- This is the artificial creation of new plants.
- We place a flexible branch into the ground.
- After 3 months it will be rooted and can be cut as a standalone plant.



## VI) THE RUNNERS

They are side shoots that are thrown away from the mother plant. In many AMP these side shoots enter the soil and create roots (laurel, rosemary, dithorium, thymus, oregano, siderites etc.) These runners can be removed from the mother plant and create new seedlings.

- If our new plants have excessive growth, we remove from the top with a pruner so that it has the power to grow.





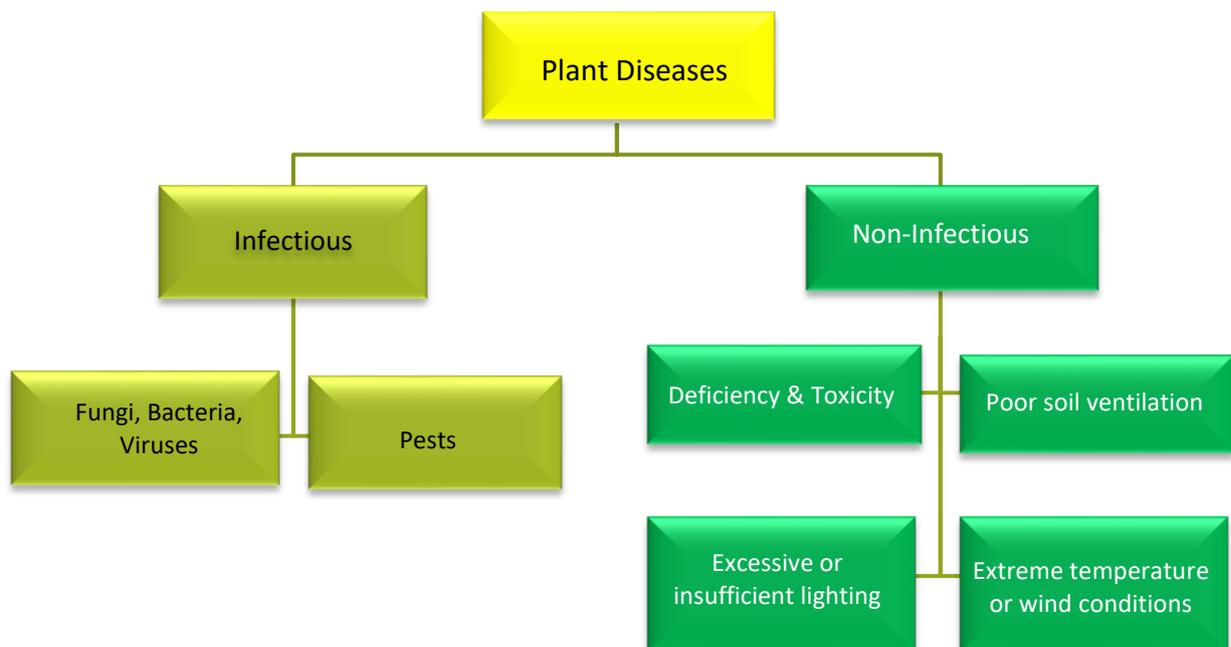
## UNIT 8 Plant Protection

### Lesson 8.1 Plant Diseases

Plant protection ensures the protection of the plant from various pests (e.g. insects), diseases and weeds (weeds that compete with the plant's nutrients).

The diseases are distinguished in:

- these who occur due to pathological diseases or bugs (infectious diseases)
- these who occur by physical conditions (non- infectious diseases) such as lack of nutrients, frost, strong wind, etc.



## THE FOLLOWING ARE THE MOST WELL-KNOWN DISEASES IN PLANTS FOR GREECE:

### – **Fungal Diseases**

- Anthracnose
- Black leg
- Black root rot
- Botrytis rots
- Cavity spot
- Cercospora leaf spot
- Clubroot
- Damping-off
- Downy mildews
- Fusarium wilts and rots
- Leaf blight
- Powdery mildews
- Pythium species
- Rhizoctonia rots
- Ring spot
- Rusts
- Sclerotinia rots
- Tuber diseases
- White blister / White rust

### – **Prokaryotic Diseases**

Bacteria are microscopic, single celled prokaryotic organisms. Most plant pathogenic bacteria belong to the following genera:

- Acidovorax
- Agrobacterium
- Burkholderia
- Clavibacter
- Erwinia
- Pantoea
- Phytoplasma
- Pectobacterium
- Pseudomonas
- Ralstonia
- Spiroplasma
- Streptomyces
- Xanthomonas
- Xylella

The most known prokaryotic disease in Greece is *Pseudomonas savastanoi*.

#### – **Viral Diseases**

Viruses are intracellular (inside cells) pathogenic particles that infect other living organisms.

- Ring spot
- Mosaic
- Barley yellow dwarf
- Potato mop top
- Tristeza
- Sugar beet curly top

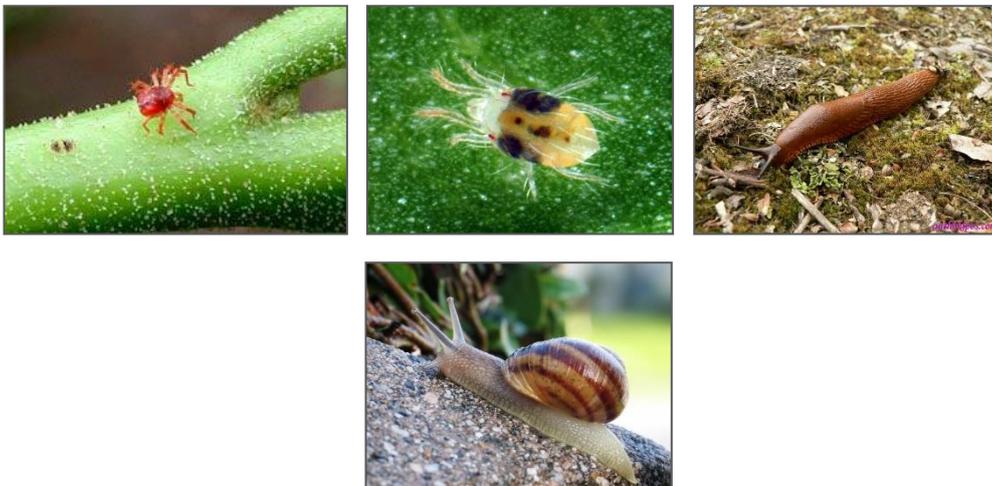
- Potato leaf roll
- Peach yellow bud mosaic
- Sharka

The virus is not transmitted by wind, rain or by the deposition of infected juice on another plant. Prevention is necessary: no smoking, good hand washing of cultivators before work, immediate destruction of infected plants.

– **Insects Infection**



– **Mite Infection**



To protect the plants from the above enemies either chemical or biological preparations are applied. For AMP the organic formulas or physical extracts application is recommended. Their application usually takes place in liquid form, either foliar (spreading) or inter-systemic (irrigation for absorption by the root).

- **Non-Infectious Diseases due to**
  - Bad soil aeration (heavy soil)
  - Nutrients leaching (in loose and fluffy soils) → deficiency
  - Toxicity
  - Intense lux (illumination)
  - Extreme values of temperature
  - Excessive humidity
  - Wind (high speed)

#### HOW WE TREAT NON-INFECTIOUS DISEASES

- In heavy soil where the roots are not well aerated, we can intervene with soil conditioners to improve its structure and porosity.
- A light soil (for example sandy) can also be made more fertile by adding fertilizers, perhaps even fertilizers.
- Toxicities are treated with good watering and regular watering.
- Intense lighting burns are treated either with curtains or shades, or by moving sensitive plants to shady places.
- Frost (extreme low temperature) is treated with toilets, greenhouses, transparent covering material or wind blowers.
- The heatwave (extreme high temperature) is treated with shade coverings, with more frequent watering and perhaps transferring sensitive plants to shady and cooler places.

- Strong air can cause strains to break, slips, dispersal of crop production, changes in photosynthesis, reproductive abnormalities, cooling (damage), water loss and erosion. It is treated proactively by creating a windshield on the side where the strong wind blows. It is recalled how important it is for the windshield to leave openings to filter and reduce the momentum of the wind, not shading the plants and not competing the plants in nutrients and water.

In order to fight the diseases, we either apply agrochemicals (pesticides, fungicides, weedkillers etc. (Organic Medicine's Application) or we follow the Organic Farm's principles.

## ORGANIC FARM

The Organic Farm refers to all the cultivation practices, based exclusively on the natural reinforcement of the biological processes of plants and micro-organisms (soil and air) that contribute to their growth.

Organic farm perceives the cultivated land as a single living organism. As a closed self-regulating controlled input-output system where many microorganisms coexist. The goal of organic farm is to keep the soil sustainable so that it can deliver maximum nutrients to each crop.

Ecological agriculture consciously rejects the advanced new technology tools, offered by the modern chemical industry and genetic engineering, aiming at maximum yields (inorganic fertilizers, pesticides, genetically modified organisms).

Organic farming products are products that have followed all the steps that the European Community and national legislation for organic farming command, aiming at:

- environmental protection
- maintaining or even increasing soil fertility and biological activity
- maintaining correlation between the soil and plants, plants and animals & animals and soil.
- all the above, without using external factors.

In simple terms organic farm is:

- A crop cultivation without the application of agrochemicals (chemical fertilizers and pesticides).
- Alternatives to fertilizers apply plant extracts or manure - organic farming product or products deriving from nature.
- Alternatives to pesticides apply herbal extracts or beneficial insects to fight disease.

#### WHEN AGROCHEMICALS USED:

The formulations are found in special agronomic shops.

The right steps for the proper application of pesticides are:

- We consult the agronomist - we strictly follow the instructions & precautions
- Make a test before the application
- application forbidden during the blooming period
- application forbidden on hot sunny days (the agrochemical evaporates causing damage to the environment, to our health and to our money)
- application forbidden on rainy days or days with humidity (the agrochemical is washed off (leaching through the soil to the underground aquifers)
- application forbidden on windy days (the agrochemical is dispersed into the environment)

#### **Toxicities by using agrochemicals**

The most common cause of toxicity in a plant is the application of excessive amount of fertilizer or pesticide. To sanitize a toxic crop, the soil must be changed immediately and watered frequently with good quality water.

Consulting an agronomist is the best way to confirm the disease and update the correct treatment.

<b>Agrochemicals</b>	
<b>Advantages</b>	<b>Disadvantages</b>
– Instant and effective fighting off diseases	– Inflow in the environment & the food chain
– Better quality in the final product	– Instant human contact
– Increased production	– Inhalation toxicity in humans and animals

<b>Agrochemical Characteristics</b>	
<b>Pesticides</b>	<b>Fertilizers</b>
– High solubility	– Residual
– Small absorption	– Toxicity
– Volatility	– Effect on soil acidity
– Residual	

## UNIT 9 Safety During Agriculture Activities

### Lesson 9.1 Safety Measures

#### WHEN APPLYING BIOLOGICAL MEDICINES OR FERTILIZERS:

- We always wear a mask
- We always wear gloves
- We wear clothes that cover our entire body
- We wear appropriate shoes
- We spray on the plant and not towards people (or ourselves)
- We faithfully follow the instructions of the medicine and the advice of the agronomist
- We do not apply during the blooming period
- We do not apply on hot sunny days
- We do not apply with humidity or rain
- We do not apply on strong winds
- We only spray our plant, not the neighbor plants
- We do not apply too much fertilizer or pesticide
- We do not eat or drink when applying the medicine or the fertilizer
- we must wash our hands and our face after the application

#### WHEN AGRICULTURAL MACHINERY IS USED:

- We carefully read the machine manual for all details
- We do not place objects on the machines
- We keep safety distances

WE DO NOT USE THE MACHINE IF:

- We take medication
- We have consumed alcohol
- We feel dizzy

WHEN AGRICULTURAL TOOLS ARE USED:

- We hold the tools from the specific handles
- We do not approach the sharp parts close to our body or clothing
- We do not work all together in the same place (especially when ploughing or pruning)

## PART 4 TRAINING MATERIALS

### CHECK LIST

A. SOWING – PLANTING THE SEEDLINGS	B. WATERING (in case of absence of automatic irrigation system)	C. WEEDING	D. PLANT PROTECTION	E. HARVEST
1. Wear uniform with long sleeves and boots	1. Wear uniform with long sleeves and boots	1. Wear uniform with long sleeves, gloves and boots	1. Wear uniform with long sleeves and boots	1. Wear uniform and boots
2. Check if you have the proper seeds – seedlings	2. Check whether the plants or the planted seeds need watering	2. Check if the weather conditions are proper for outside agricultural activities	2. Check if the weather conditions are proper for outside agricultural activities	2. Check whether is the proper time for harvest
3. Check whether is the proper time for sowing or for planting the seedlings	3. Check if the weather conditions are proper for watering	3. Check whether you have the proper agricultural tools (small hoe or ploughing tool, weeding tool, collecting bag for weeds)	3. Wear a mask in case of using copper–sulfate or similar biological medicines	3. Check if the weather conditions are proper for harvest
4. Check if the weather conditions are proper for sowing or for planting the seedlings outside	4. Check whether you have the proper equipment (hose, watering can)	4. Mind the plants, not to uproot or injure them	4. Check whether you have the proper agricultural tools (spraying tool, watering can, sieve)	4. Check whether you have the proper agricultural tools (pruning hook, harvest scissors or knife), being sterilized.
5. Check whether you have the proper agricultural tools (seedbed, small flower pots, mini - large greenhouse, small or large ploughing tool, rake shovels, mulching material)	5. Mind not to leave any plants not watered	5. Gather all the removed weeds and throw them away	5. In case of biological medicines’ application, mind the plant not to be in a blooming period	
6. Check whether you have the proper soil mixture (mixing soil with manure and sand, maybe adding scolecite or vermiculite)	6. In case of having automatic irrigation system, check whether it works properly and all the plants are watered.			

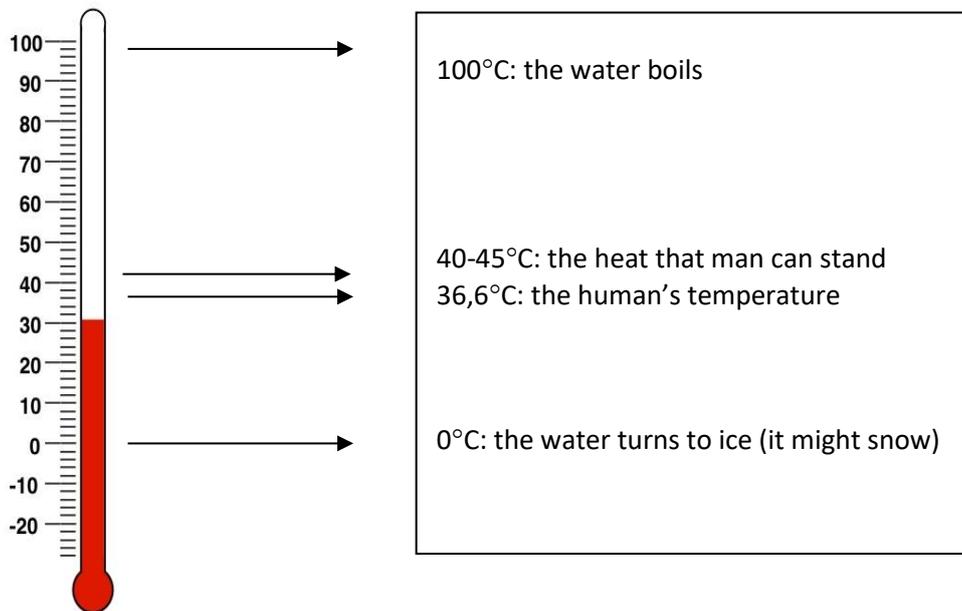
# EASY TO READ Materials for Learners with Intellectual Disabilities

## UNIT 1 The Climate

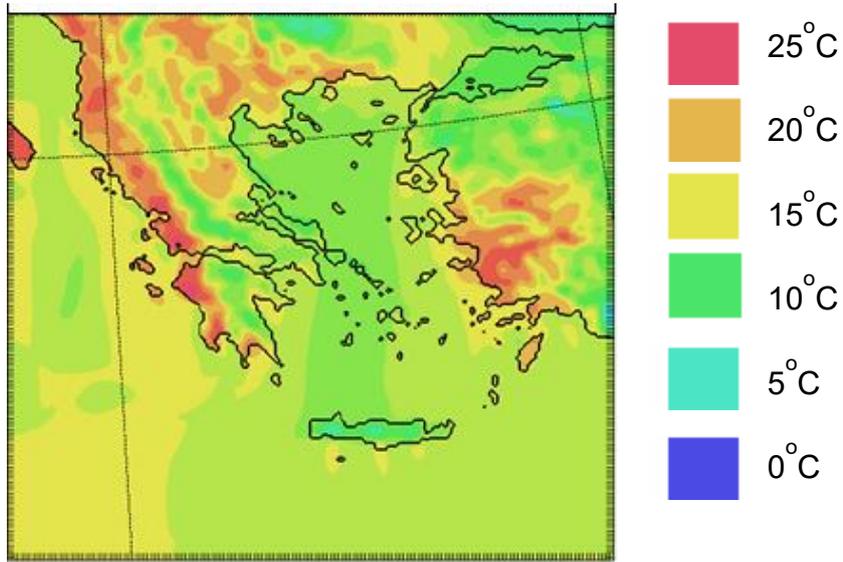
### Lesson 1.1 Temperature

The temperature is an indicator of how cold or hot is an object.

The temperature is measured with the thermometer in Cesium degrees ( $^{\circ}\text{C}$ )

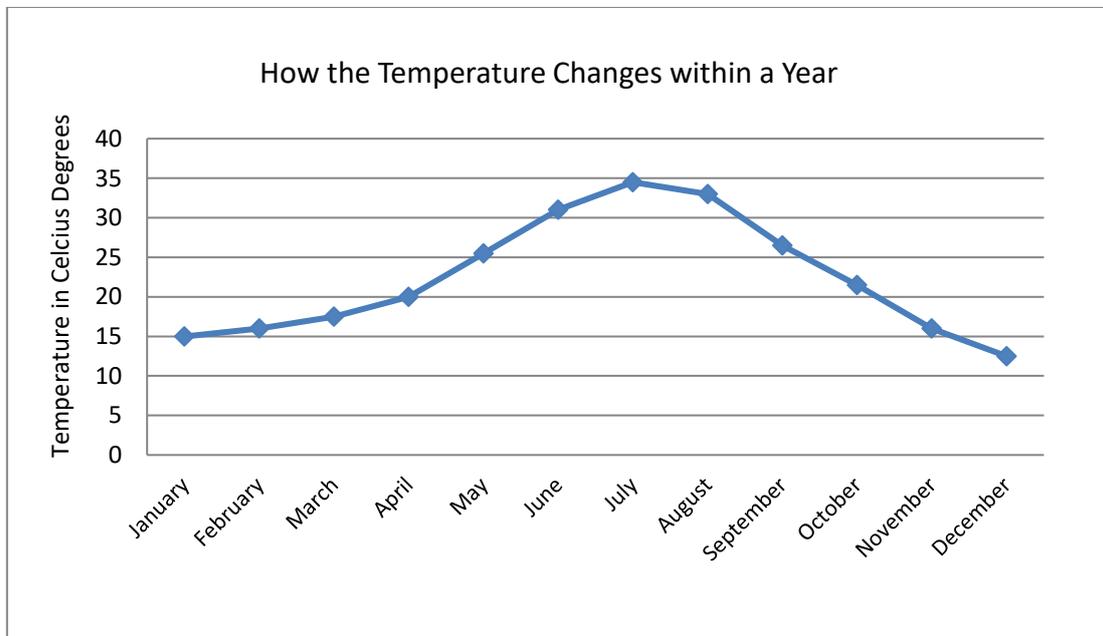


### INTERPRETATION OF TEMPERATURE MAP

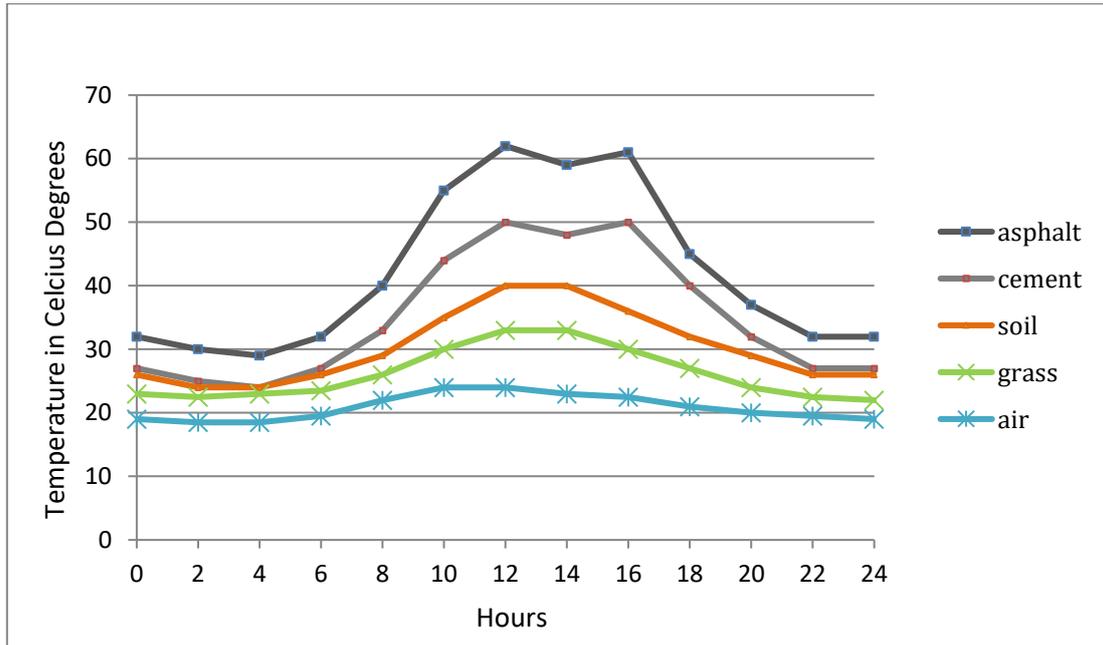


*Air temperature at 2 meters (from the ground)*

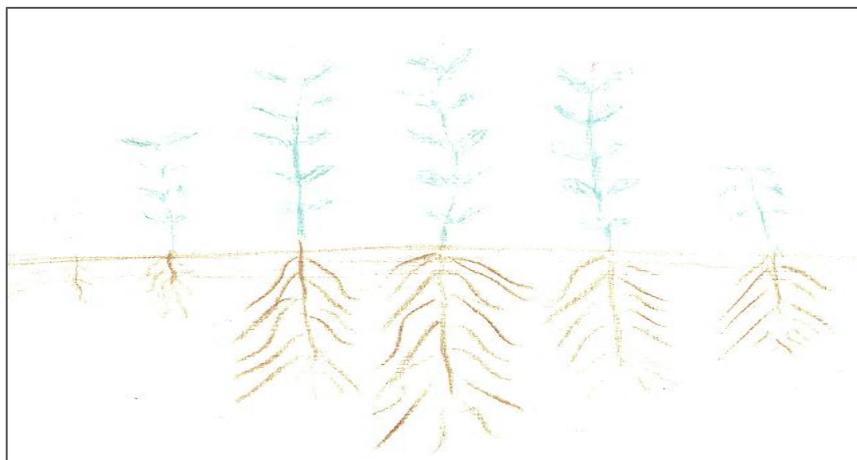
### DISTRIBUTION OF TEMPERATURE IN THE DURATION OF YEARS



### DISTRIBUTION OF TEMPERATURE IN THE DURATION OF A DAY



### HOW DOES TEMPERATURE AFFECT PLANT GROWTH?



5°C    10°C    20°C    25°C    30°C    40°C

## TEMPERATURE AND SAFETY IN GARDENING ACTIVITIES



When the temperature is higher than 30°C

- You put on sunscreen
- You wear a hat
- You wear thin long-sleeved & light-colored clothes (to avoid burns)
- YOU DO NOT APPLY PHYTOPHARMS or FERTILIZERS



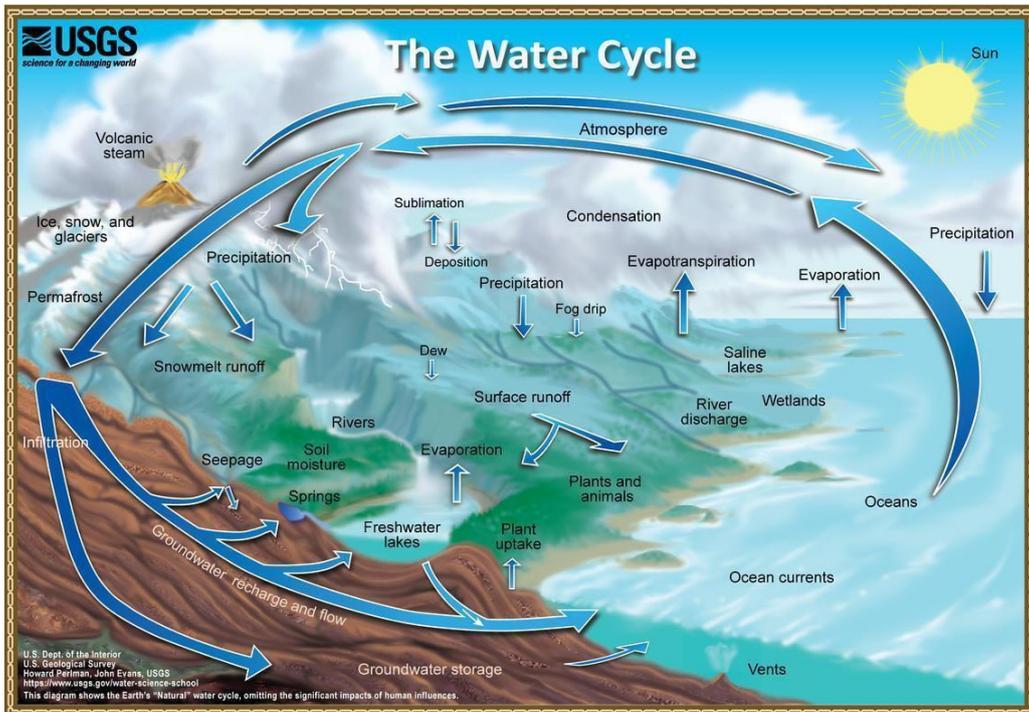
When the temperature is less than 10-15°C

- You dress warmly
- Be careful not to slip on the ice if the temperature is near or below 0 °C

## Lesson 1.2 Precipitation

### PRECIPITATION (Rain - Snow - Hail)

#### How Clouds are Created



#### Water Balance Equation

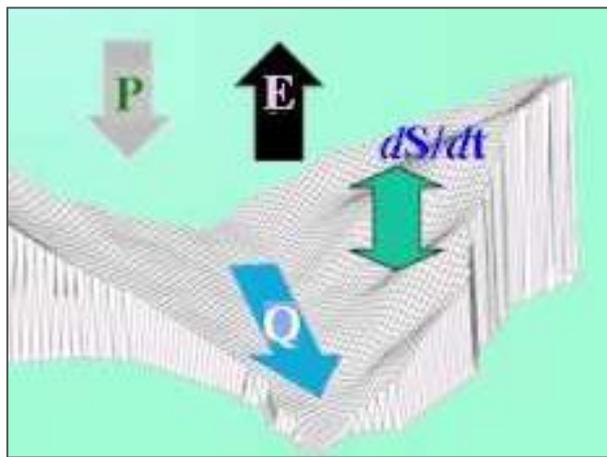
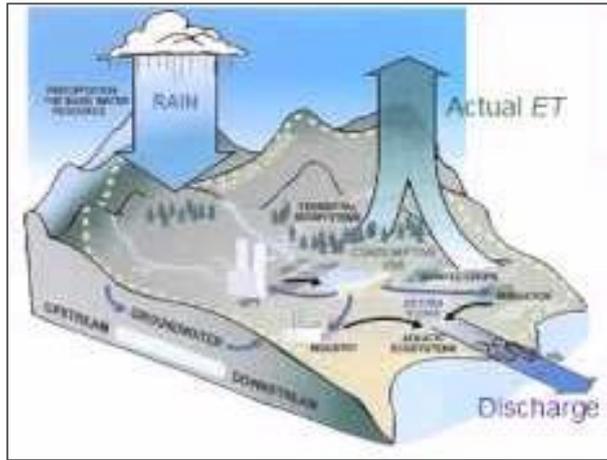
$$P = Q + E + dS/dt$$

$$P = \text{Precipitation [mm a}^{-1}\text{]}$$

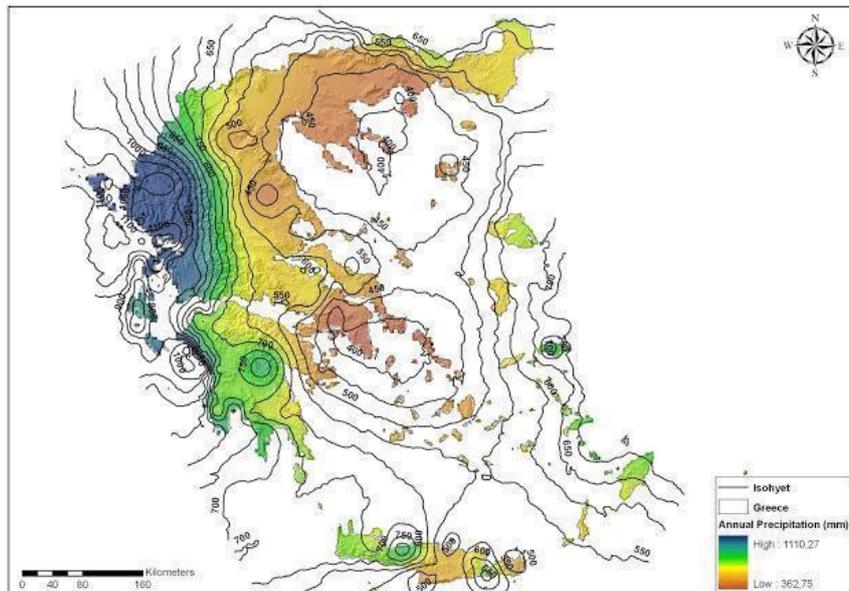
$$Q = \text{Discharge [mm a}^{-1}\text{]}$$

$$E = \text{Evaporation [mm a}^{-1}\text{]}$$

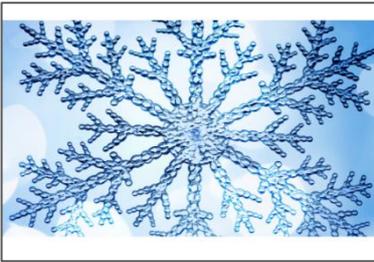
$$dS/dt = \text{Storage changes per time step [mm a}^{-1}\text{]}$$

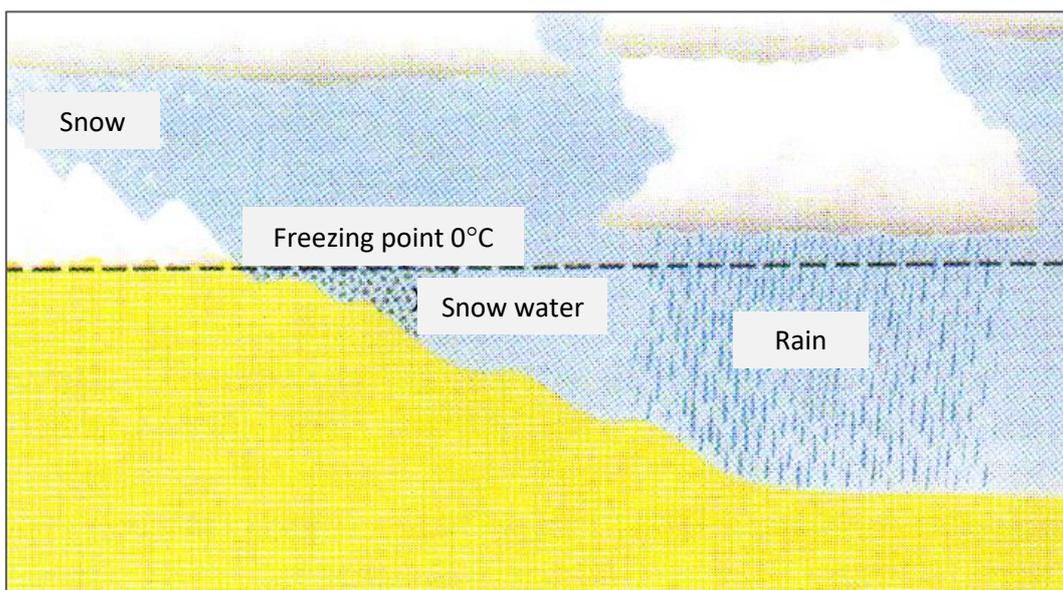


INTERPRETATION MAP OF ANNUAL PRECIPITATION IN GREECE



PRECIPITATION (RAIN, SNOW, HAIL)

		
		
		
<p><b>RAIN</b> Earth temperature <math>&gt;0^{\circ}</math></p>	<p><b>SNOW</b> Earth temperature <math>&lt;0^{\circ}\text{C}</math></p>	<p><b>HAIL</b> Cloud temperature <math>&lt;0^{\circ}\text{C}</math></p>



## WHEN RAINING

 <p>The top-left panel shows a cloud with light rain falling. Below it is an illustration of an umbrella. To the right, a hand is shown sowing seeds into the soil, marked with a green checkmark. Below that, a person in a hat and backpack is spraying pesticides, marked with a red X.</p>	 <p>The top-right panel shows a cloud with heavy rain falling. Below it is an illustration of an umbrella. To the right, a hand is shown sowing seeds, marked with a red X. Below that, a person in a hat and backpack is spraying pesticides, also marked with a red X.</p>
<p><b>Watering rain:</b> you can work outside wearing waterproof clothes.</p> <p>You can apply fertilizer in solid form (not in liquid form because it will flush to the groundwater aquifer).</p> <p>You should not spray pesticides because they will be washed away by the rain!</p>	<p><b>Heavy rain or storm: DO NOT WORK OUTDOORS!!</b></p> <p>You should not add fertilizers or pesticides!</p> <p>Risk of lightning and storm!</p>

## Lesson 1.3 Wind



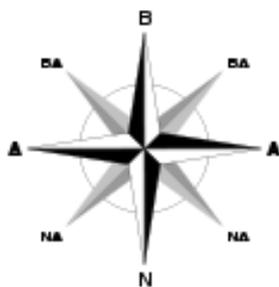
Wind is called the air in a natural motion.

When the wind blows, we can observe:

- From where comes the wind (direction)
- How forceful is the wind (wind intensity)?

### WIND CHARACTERISTICS

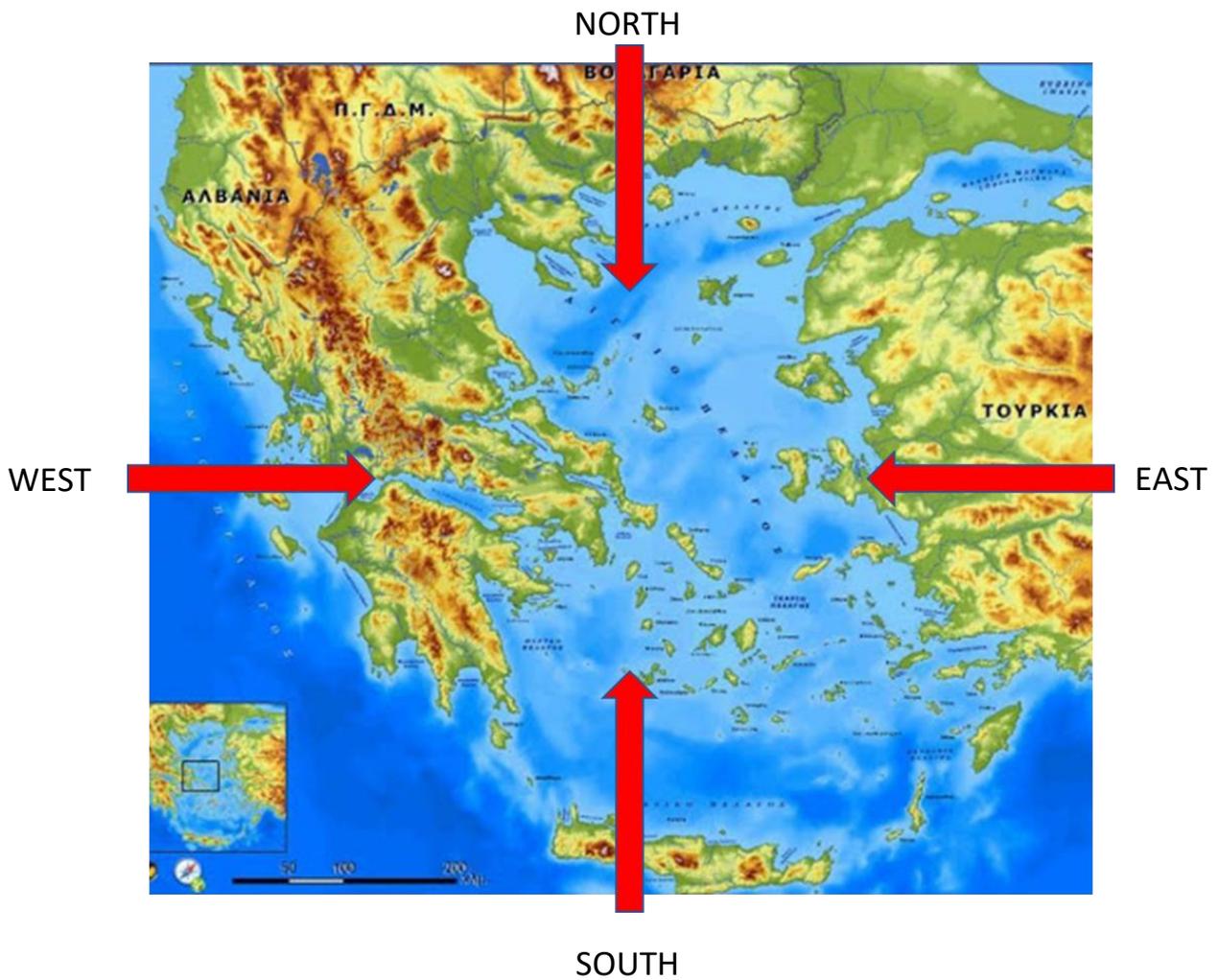
#### 1. DIRECTION



The north winds in Greece are colder than the south.

The wind might blow from any direction. In order to determine the direction of the wind we use the four (4) points of the compass. These 4 points are North, South, West and East.

Let's see the 4 points of the compass in the map of Greece.



## 2. INTENSITY - FORCE (on Beaufort scale)

- calm, 0 Beaufort(apnea)
- hypopnea, 1 Beaufort
- weak, 2 - 3 Beaufort
- moderate, 4 - 5 Beaufort
- strong, 6 Beaufort
- fierce (very strong), 7 Beaufort
- stormy, 8 - 9 Beaufort (storm)



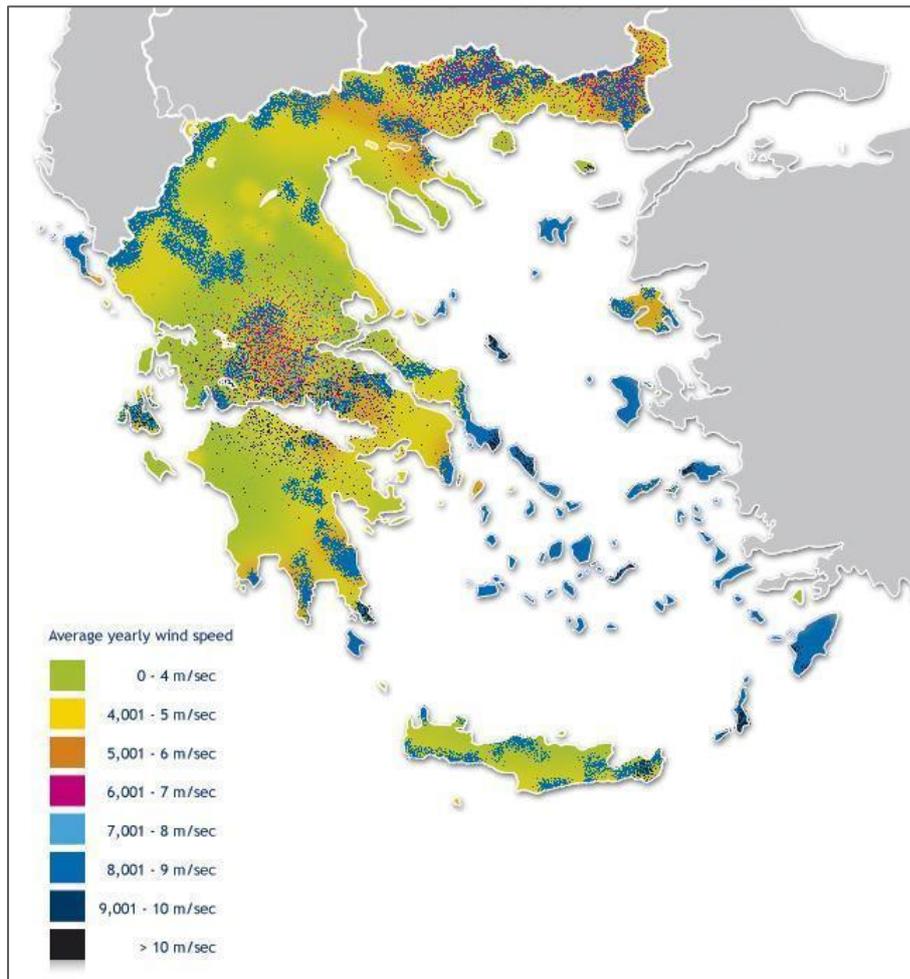
When there is a strong wind (greater than 4-5 Beaufort), avoid spraying fertilizers or pesticides (they will be carried away by the wind).



When the wind has force be careful, for the cut branches!



**EXERCISE 1:** Find in the map of Greece, which places have force winds (bigger than 7 m/sec)



<https://medilab.pme.duth.gr>

# UNIT 2 The Seasons & Time

## Lesson 2.1 Seasons

### SEASONS & WORKS



## SEASON CHARACTERISTICS IN GREECE

<p><b>WINTER (December 21 to March 21):</b></p> <p>At this time there are:</p> <ul style="list-style-type: none"> <li>– Low temperature</li> <li>– Often strong north winds</li> <li>– Rainfall</li> <li>– Frequent snowfalls, especially on the mountains</li> <li>– More hours of darkness, the night is longer than the day</li> </ul>	<p><b>SPRING (March 21 to June 21):</b></p> <ul style="list-style-type: none"> <li>– The temperature gradually rises in the end of March</li> <li>– Rainfall decreases and by April the snowfall is becoming rare</li> <li>– In late Spring the temperature is quite high</li> <li>– Trees produce new leaves</li> </ul>
 <p>The diagram illustrates the seasonal cycle in Greece. It features a central circular arrangement of four images, each representing a season, connected by arrows pointing clockwise. At the top left is 'WINTER' with a snowy mountain scene. At the top right is 'SPRING' with a field of purple flowers. At the bottom right is 'SUMMER' with a lush green landscape. At the bottom left is 'AUTUMN' with trees having yellow and orange leaves. The arrows indicate the progression from Winter to Spring, Spring to Summer, Summer to Autumn, and Autumn back to Winter.</p>	
<p><b>AUTUMN (September 21 to December 21):</b></p> <ul style="list-style-type: none"> <li>– In Greece it lasts a long time</li> <li>– Frequent rainfall begins</li> <li>– Snowfall on the mountains begins in late Autumn</li> <li>– The leaves fall from the trees</li> </ul>	<p><b>SUMMER (June 21 to September 21):</b></p> <p>It lasts long. It is characterized by:</p> <ul style="list-style-type: none"> <li>– High temperatures that peak in July</li> <li>– Long periods of drought (no rain, relative symbol)</li> <li>– More hours of light and the day is longer than night</li> </ul>

**EXERCISE 2:** Write down the months in each season

<b>WINTER</b>		<b>SPRING</b>	
<b>AUTUMN</b>			<b>SUMMER</b>

**EXERCISE 3:** Match the following dates with the right season

21 of March ●

2 of February ●

15 of August ●

25 of March ●

23 of September ●

7 of May ●

19 of July ●

● Spring

● Summer

● Autumn

● Winter

**EXERCISE 4:** With the help of your trainer, draw the duration of the day and night next to the relevant month.

MONTH	DAY	NIGHT	COMMENTS	
SEPTEMBER			23th of September (day=night)	Autumn equinox
OCOTBER			The day is getting shorter	
NOVEMBER			The day is getting shorter	
DECEMBER			22th of December (longest night)	Winter solstice
JANUARY			The day is getting longer	
FEBRUARY			The day is getting longer	
MARCH			21 <sup>st</sup> of March (day = night)	Spring equinox
APRIL			The day is getting longer	
MAY			The day is getting longer	
JUNE			21 <sup>st</sup> of June (the longest day)	Summer solstice
JULY			The day is getting shorter	
AUGUST			The day is getting shorter	
SEPTEMBER			23th of September (day=night)	Autumn equinox
OCOTBER			The day is getting shorter	
NOVEMBER			The day is getting shorter	
DECEMBER			22th of December (longest night)	Winter solstice

**ANSWER OF THE EXERCISE 4**

<b>MONTH</b>	<b>DAY</b>	<b>NIGHT</b>
SEPTEMBER		
OCTOBER		
NOVEMBER		
DECEMBER		
JANUARY		
FEBRUARY		
MARCH		
APRIL		
MAY		
JUNE		
JULY		
AUGUST		
SEPTEMBER		
OCTOBER		
NOVEMBER		
DECEMBER		

## Lesson 2.2 Learn the Time

<p style="text-align: center;"><b>WINTER</b></p> <p style="text-align: center;">DECEMBER: 31 DAYS</p> <p style="text-align: center;">JANUARY: 31 DAYS</p> <p style="text-align: center;">FEBRUARY: 28 DAYS</p>	<p style="text-align: center;"><b>SPRING</b></p> <p style="text-align: center;">MARCH: 31 DAYS</p> <p style="text-align: center;">APRIL: 30 DAYS</p> <p style="text-align: center;">MAY: 31 DAYS</p>
	
<p style="text-align: center;"><b>AUTUMN</b></p> <p style="text-align: center;">SEPTEMBER: 30 DAYS</p> <p style="text-align: center;">OCTOBER: 31 DAYS</p> <p style="text-align: center;">NOVEMBER: 30 DAYS</p>	<p style="text-align: center;"><b>SUMMER</b></p> <p style="text-align: center;">JUNE: 30 DAYS</p> <p style="text-align: center;">JULY: 31 DAYS</p> <p style="text-align: center;">AUGUST: 31 DAYS</p>

## TIME UNITS

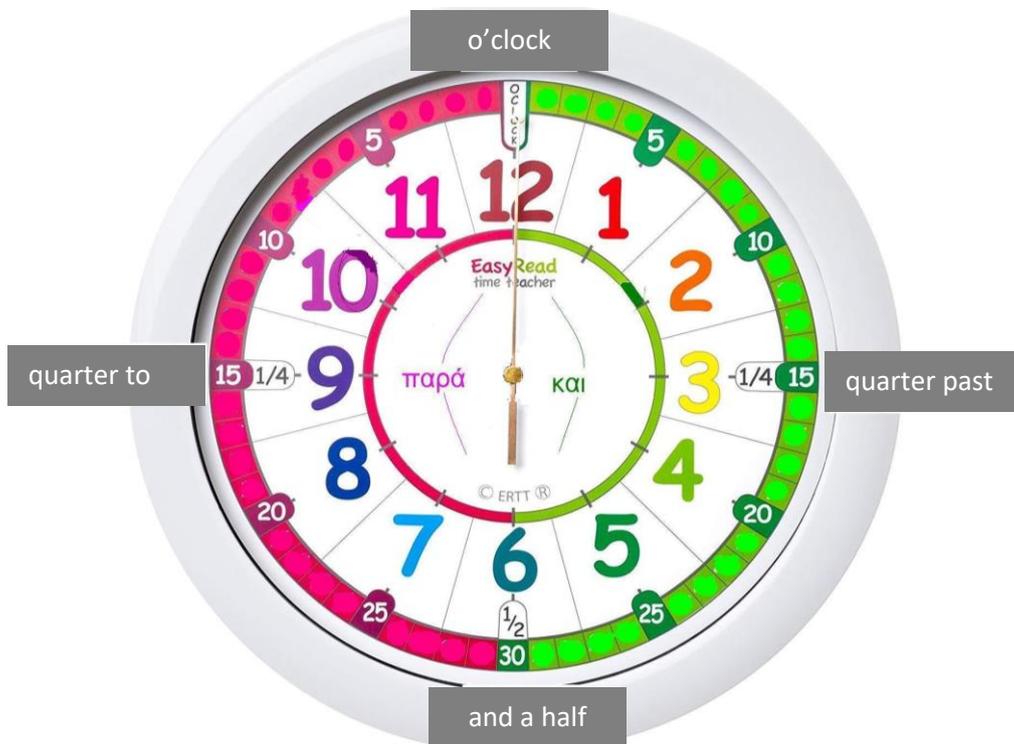
1 YEARS = 365 DAYS

1 DAY = 24 HOURS

1 HOUR = 60 MINUTES

1 MINUTE = 60 SECONDS

## ANALOGICAL CLOCK



## DIGITAL CLOCK



The time in the digital clock has a sequence from 00.00 (midnight) up to 23.59 (1 minute before midnight).

The two first digits get numbers from 00 up to 23 (the 24 hours of a day)

The next two digits get numbers from 00 up to 59 (the 60 minutes of an hour)

00.01, 00.02, ..., ..., 00.59, 01.00, 01.01 ..., 01.59, 02.00... We describe the sequence

The significant time are 12.00 (twelve o'clock at noon) up to 16.00 (four o'clock in the afternoon) where you must avoid the agricultural activities during the hot days of the summer.

**EXERCISE 5:** Find in the analogical clock the time:

- twelve o'clock (12 at noon)
- one o'clock (1 after noon)
- two o'clock (2 after noon)
- three o'clock (3 after noon) and
- four o'clock (4 after noon)

(time where you must avoid the agricultural activities during the hot days of the summer)

**EXERCISE 6:** Find the numbers in the digital clock for the time:

- twelve o'clock (12 at noon) =
- one o'clock (1 after noon) =
- two o'clock (2 after noon) =
- three o'clock (3 after noon) and =
- four o'clock (4 after noon) =

## UNIT 3 The WATER & SOIL

### Lesson 3.1 Water

#### WATER: IRREPLACEABLE IN NATURE AND PLANTS

#### **Why do we water plants?**

Plants need water because it is their food. The nutrients enter the plant only with the help of water.

#### **Ways to water plants**

##### 1. With Watering Can



With this method, you can water:

- small flower beds
- pots
- spores

It helps to throw as much water as you need so you don't throw away too much water.

Mention the two different nozzles

The nozzle helps prevent water pressure from falling on the plants.

## 2. With Hose



You can use this method to water the big flower beds and the trees. It is important to have a nozzle that reduces / controls the pressure so that the plants are not injured.

## 3. Automatic Watering



You need to check regularly that automatic watering works properly:

- check the indicators at the base
- check if the battery is working
- check if the plants are watered with the right amount
- Check if the tap connected to the automatic watering is open

It is better to reverse the order in the checks, so that we go from the basics to the "details".

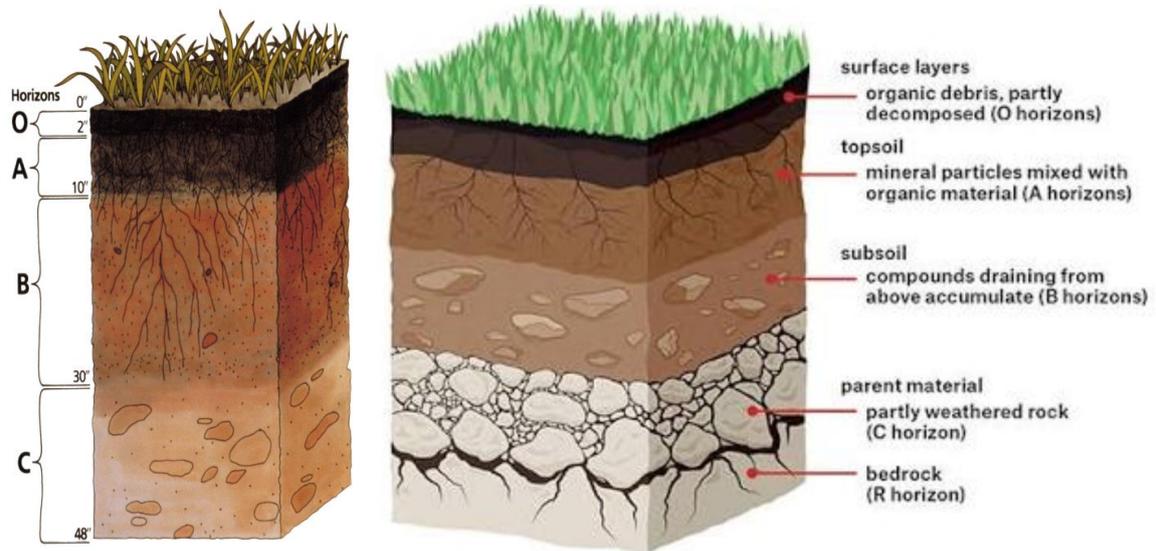
## Lesson 3.2 Soil

### SOIL: IMPORTANT IN NATURE AND IN PLANTS

The roots of the plants lean on the soil



What is soil?



The soil is formed after many, many years, from the decomposition (dissolution) of the parent rock (the rock that lies deep under the soil)

## Life inside soil



Animals (mainly worms) that live in the soil are important because they provide the plants with proper aeration at the roots and many nutrients.

The plants rest on the ground with their roots.

The soil is necessary both for the support of the plant and for the absorption of nutrients through watering (plant food).

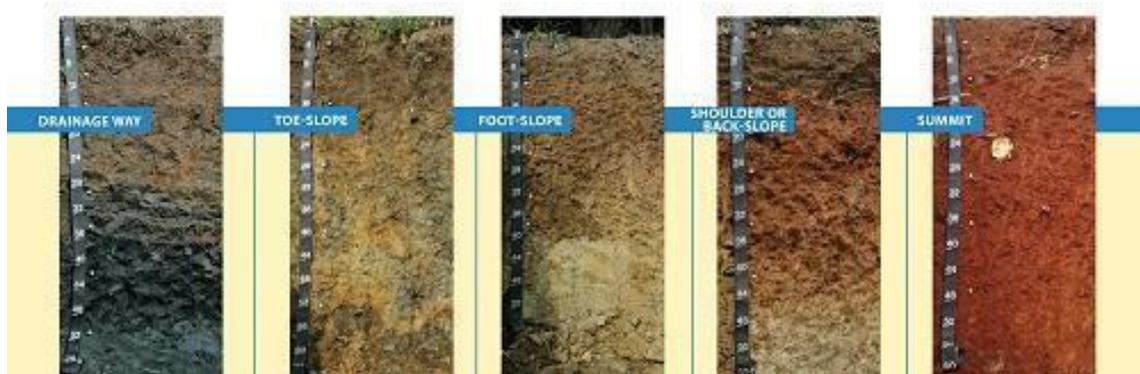
Different types of soils offer plants different conditions of humidity and aeration (and many other physicochemical factors).

**The main improvement components you can put in the soil are:**

<p>Pearlite (natural volcanic material)</p>	
<p>Peat (organic material comes from the slow decomposition / dissolution of plant residues. We find it in wet places)</p>	
<p>Manure (natural organic fertilizer created by the decomposition of animal feces)</p>	
<p>Compost (fertile soil resulting from the decomposition of organic materials)</p>	
<p>Sand (soil with big particles. Improves the soil aeration)</p>	
<p>Pumice (porous mineral, with high moisture retention capacity)</p>	

<p>Peat</p> <p>(organic material derived from the slow decomposition / dissolution of plant residues. We find it in wet places)</p>	
<p>Vermiculite</p> <p>(porous mineral, with high moisture retention capacity, often participates in the soil mix for seedbed)</p>	
<p>Pine bark in pieces</p> <p>(retains moisture and prevents the growing of weeds)</p>	

## Why the soils have different colors?



The color of the soil gives information about the nutrients it contains.

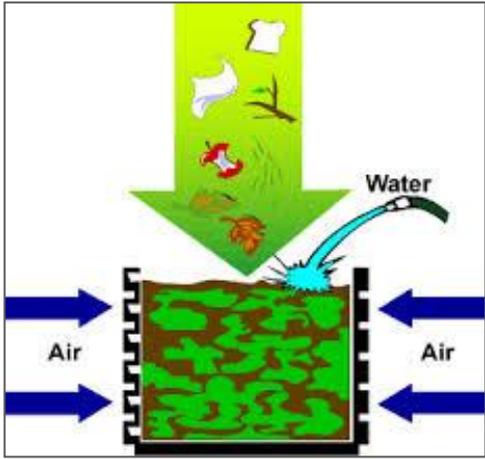
- Dark soils are more fertile, black indicates the presence of organic matter.
- Red indicates the presence of iron or manganese.
- White and yellowish white are due to calcium.
- The soils of the semi-desert areas are usually gray.
- Subsoils that have a lot of moisture are blue and green.

## How we can produce the compost

In the composter or in the specially designed space in the garden you regularly throw organic waste as shown in table below. There is already soil in the area (it is good to have earthworms, if not, they appear alone along the way - they are attracted to organic matter). It is important for the proper decomposition of the materials to have the proper aeration and the appropriate humidity (not to be completely dry soil but the living organisms must not suffocate from excessive moisture). Composters in the trade have holes to aerate the material. In the homemade (improvised) composters it is important to create aeration gaps. Many times, you will need to mix the material for the best aeration.

Usually, the compost is ready in 3-4 months from the day of its creation.

<p>Composting your kitchen and garden waste is easy</p> <p>Put these in</p>  <p>City of Bradford Metropolitan District Council www.bradford.gov.uk</p> <p><b>recycle</b> compost of home www.bradford.gov.uk/compost</p>	<p>Composting your kitchen and garden waste is easy</p> <p>Keep these out</p>  <p>City of Bradford Metropolitan District Council www.bradford.gov.uk</p> <p><b>recycle</b> compost of home www.bradford.gov.uk/compost</p>
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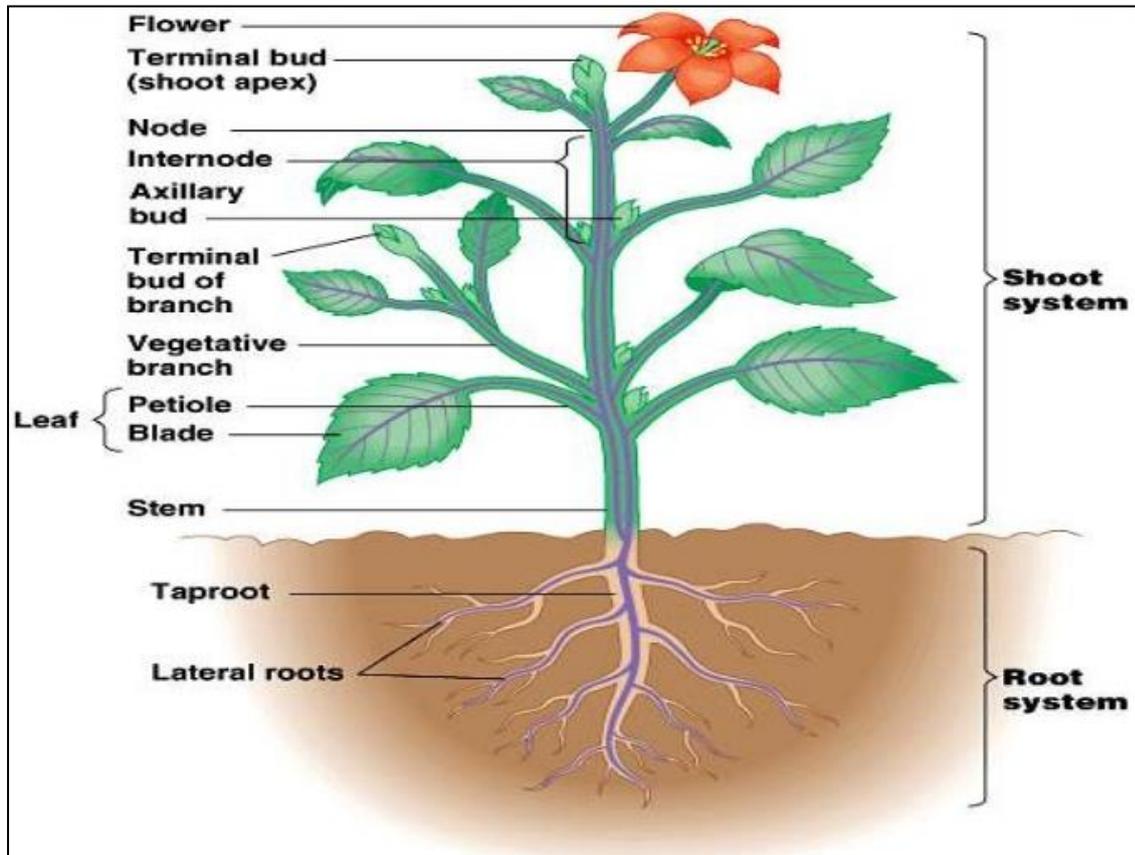


### Residues Which Can Be Composted

ORGANIC RESIDUES TAKING PART IN THE COMPOST BUCKET		PROHIBITED RESIDUES	
NITROGEN (N) RESIDUES	CARBON (C) RESIDUES		
lawn	paper without ink	weeds' seeds	oils - fats
fruit and peels	napkins	weeds and sick plants	cooked food
vegetables and peels	plants' leaves	leaves of eucalyptus, rose, figs & Euphorbia pulcherrima	salads with oil
poultry manure & livestock manure	straw, sawdust	pine needles	manure of cat or dog
eggs' shells		treated wood	dairy
coffee		chipboard	bread
tea		glossy paper	meat-fish-bones

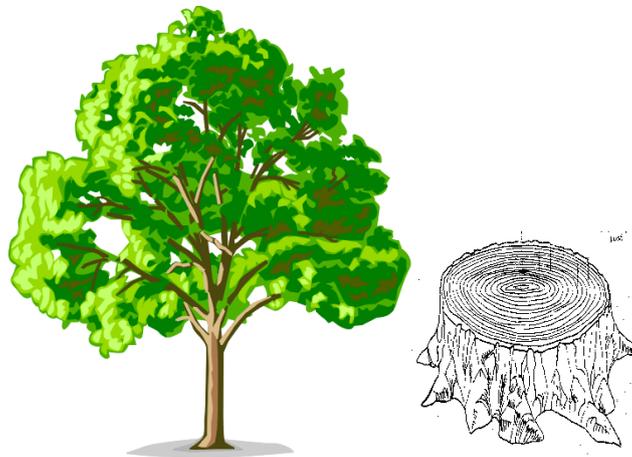
## UNIT 4 The Plants

### Lesson 4.1 The Plant Parts



### TRUNK

It is the central branch that supports the plant and unites it with the soil



## Types of Plants



Tree



Bush



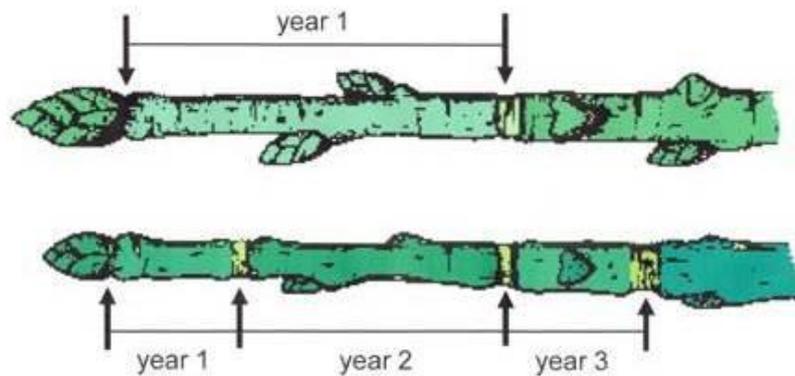
Grass

The plants, depending on the type of their trunk are divided into:

- trees (they have a large central trunk)
- bushes (they have many slender trunks that start from the ground and support the plant)
- grass (they have a thin-small central trunk that is thinner than the shoots).

## BRUNCH

It has leaves and buds (eyes) that will become either flowers or new branches.



FLOWER AND WOOD BUDS



Flower Bud (it will become a flower)

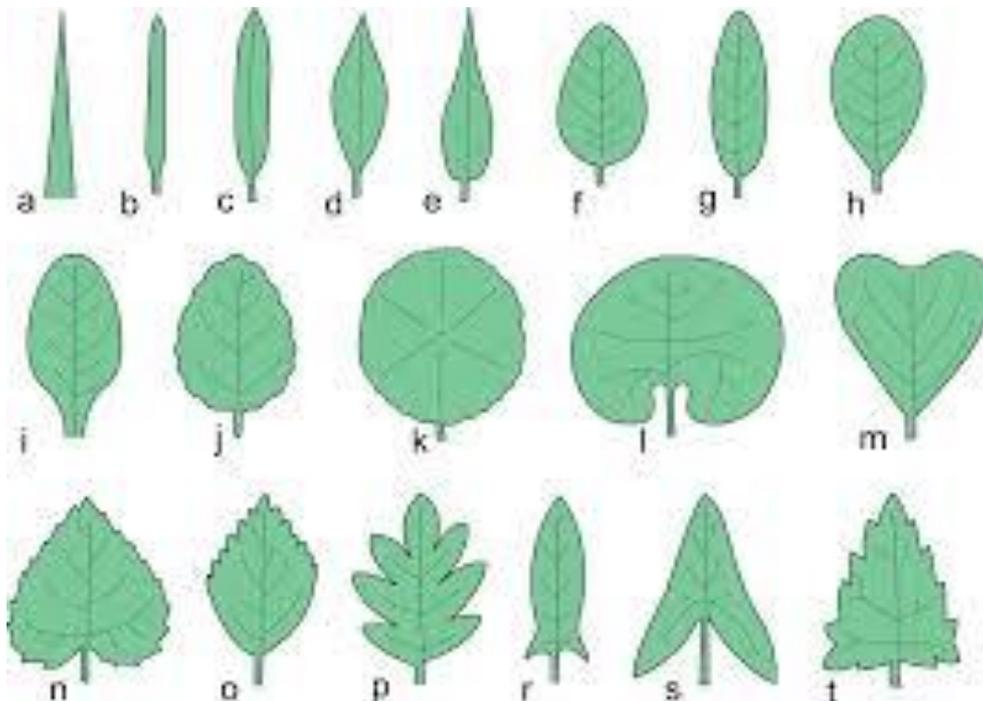
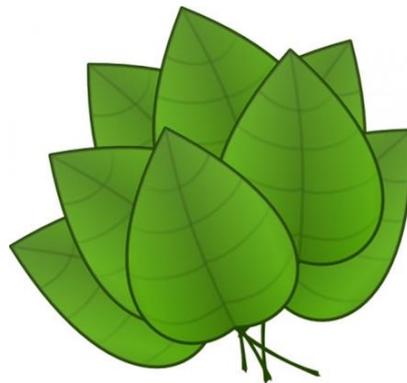


Wood Bud (it will develop into a brunch)

Source: [www.Wikipedia.gr](http://www.Wikipedia.gr)

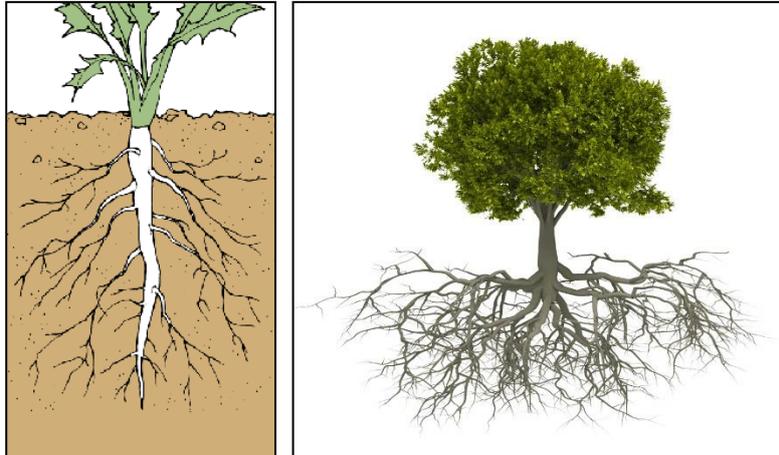
## LEAVES

- The leaves vary in shape and size depending on the plant.
- Drought-resistant plants (e.g. pines) have thin leaves (to expel as little water as possible) while plants that thrive in wet places (e.g. plane trees) have wide leaves
- The leaves collect sunlight to photosynthesize
- The leaves contribute to the respiration and respiration of the plant

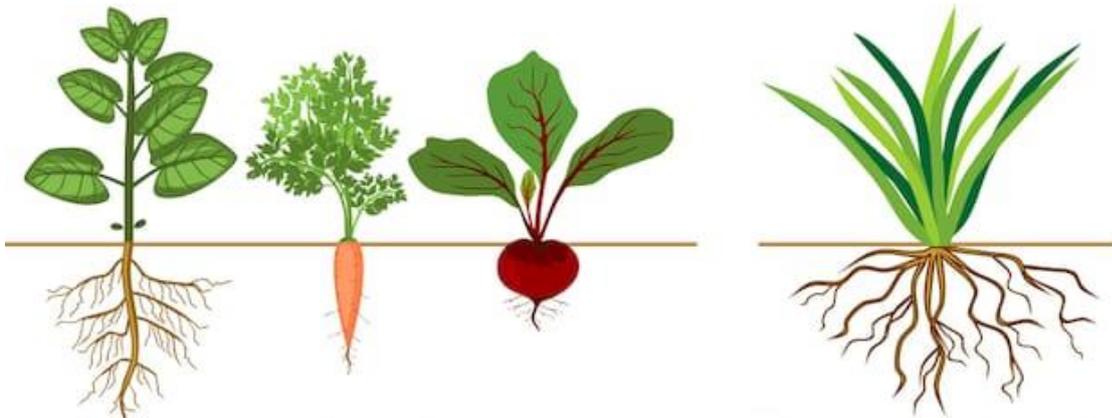


Source: <https://cdn.thetreecenter.com>

## ROOTS



### Types of Roots



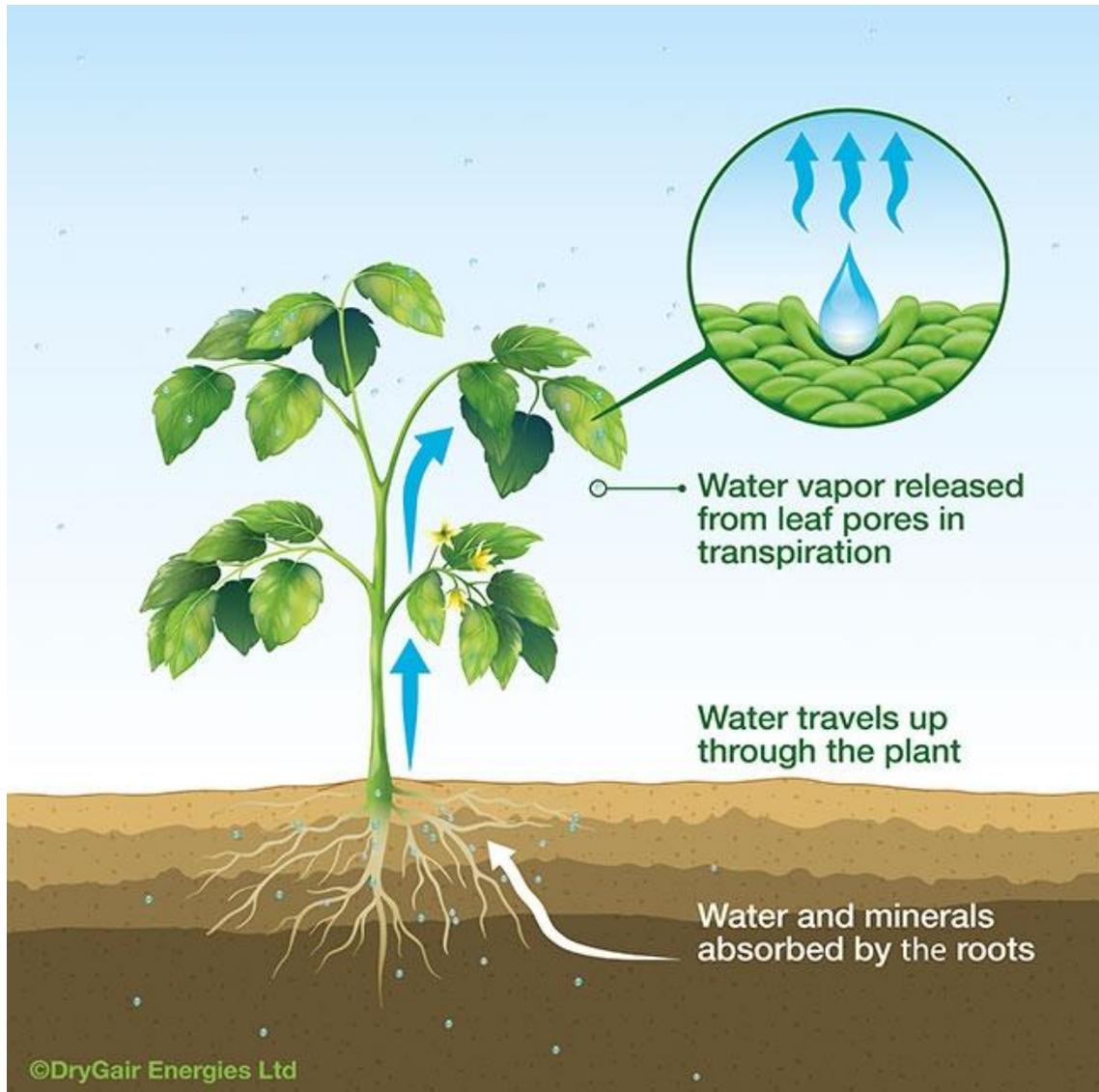
Source: <https://image.shutterstock.com>

The roots come in many forms. Their role:

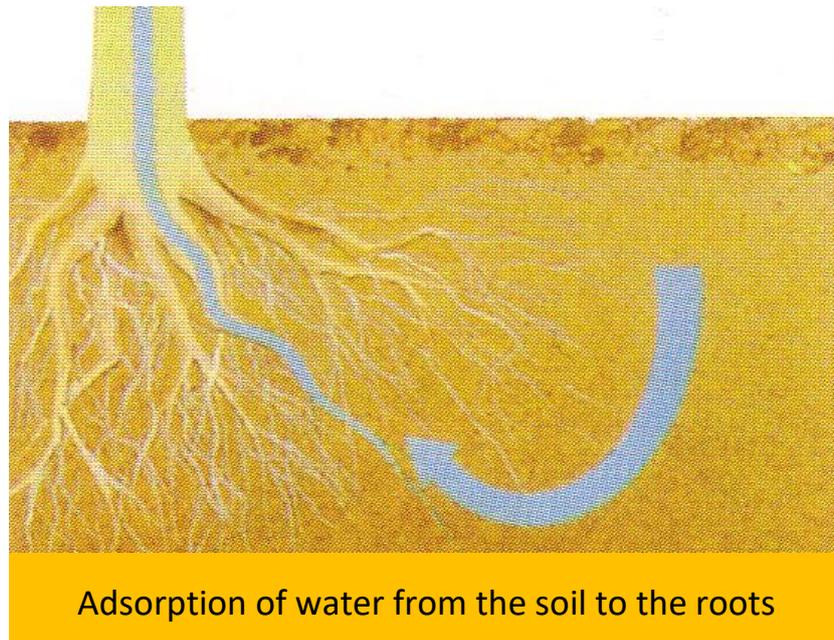
- Support plants
- They absorb nutrients and water
- Some store nutrients (e.g. carrot, radish, iris, etc.)

## Lesson 4.2 Plant Functions

### CORE FUNCTIONS OF A PLANT



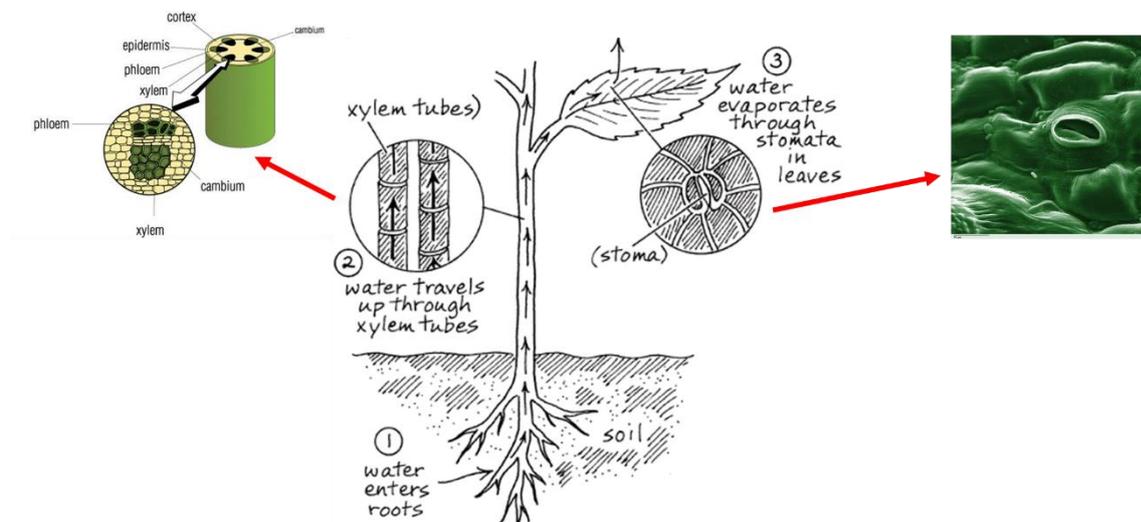
## 1. Adsorption Production of Water and Nutritional Elements



The adsorption is made from the roots. The water in the soil has nutrients.

The plant absorbs water and absorbs nutrients.

## 2. Transpiration

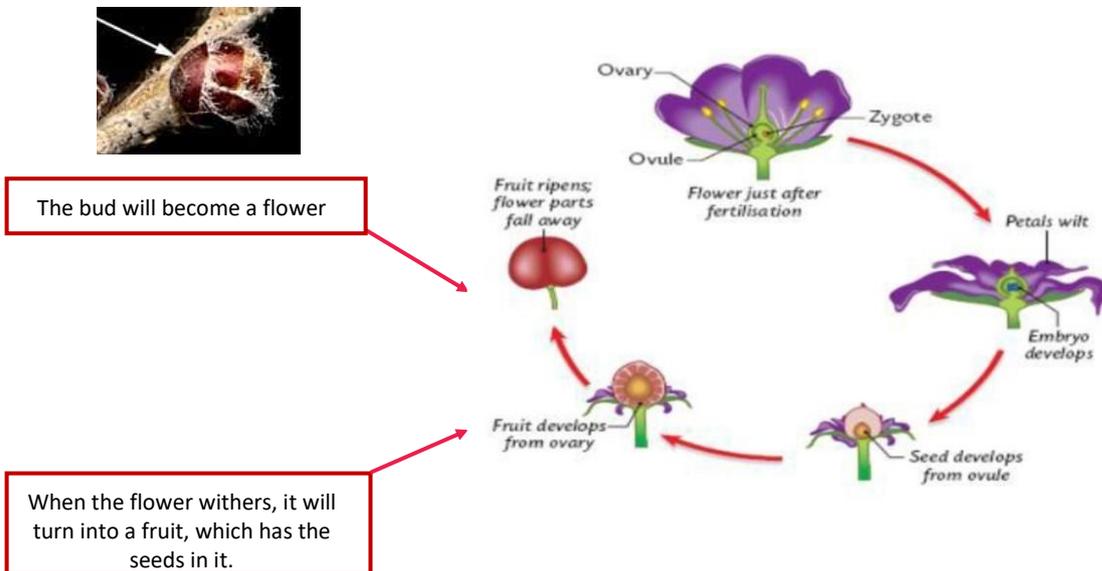


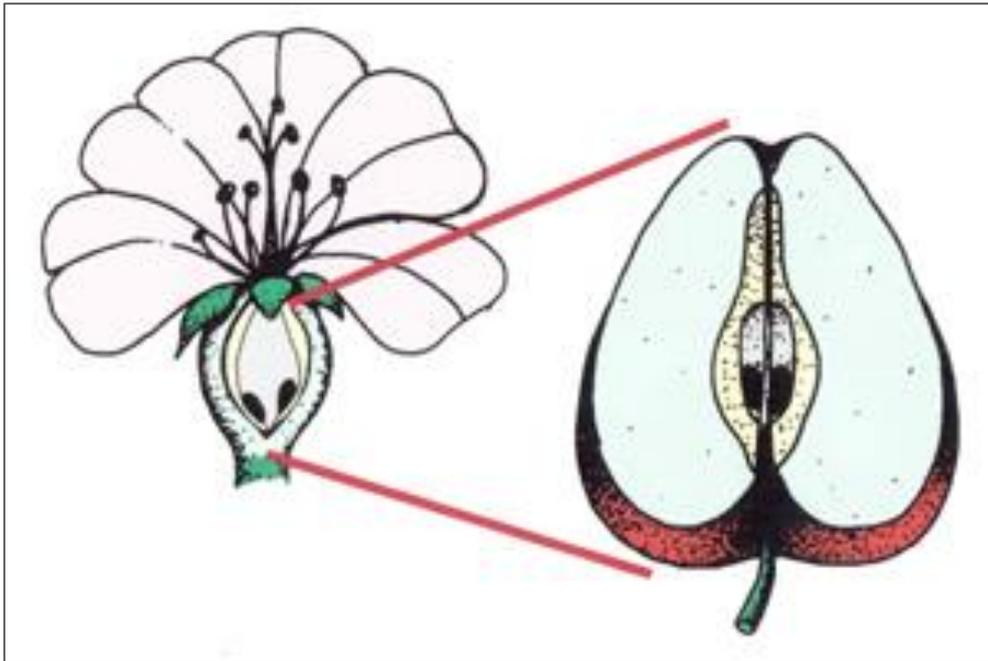
The water enters the plant through the roots, rises throughout the plant inside the shoots and reaches the leaves from where it evaporates from the stomata at the bottom.

### 3. Fruiting



The bud will become a flower

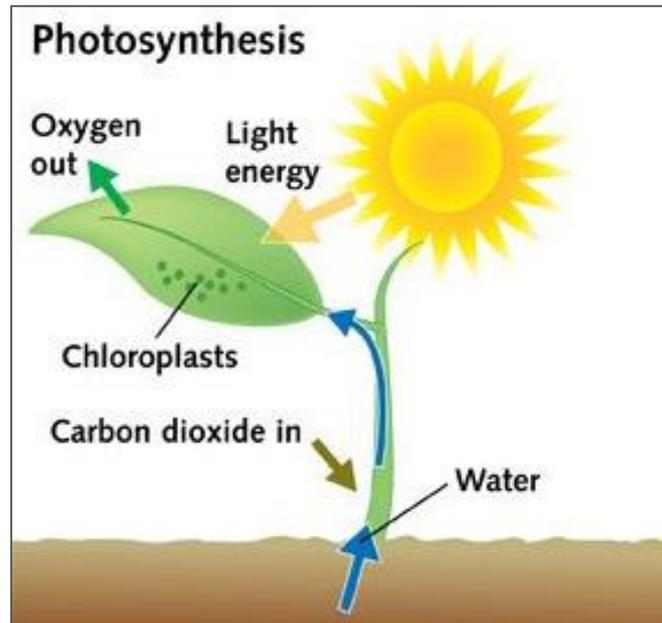




**Type of fruits**

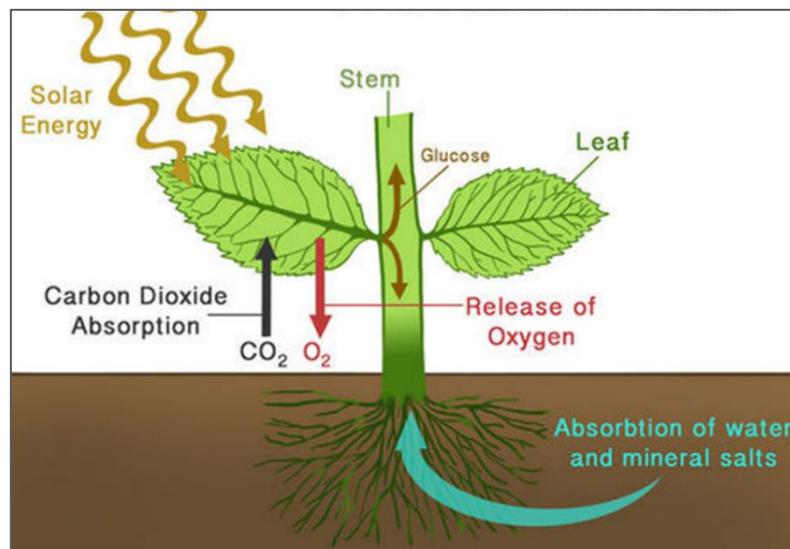


#### 4. Photosynthesis



It is the process of producing glucose and oxygen from plants (simply by absorbing water from the roots) and carbon dioxide (from the air), always with the help of the sun.

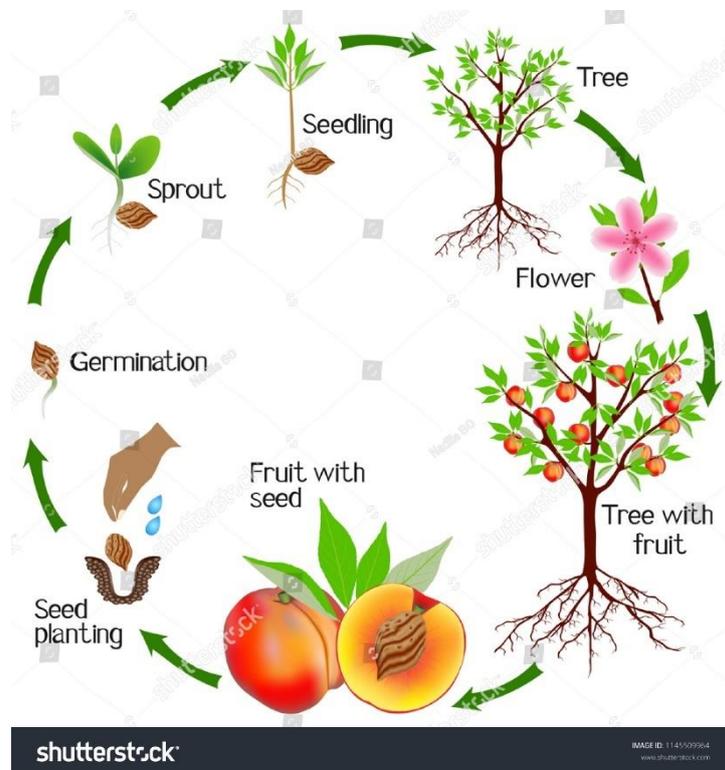
#### 5. Respiration



During the day, the plants breathe by absorbing carbon dioxide and at the same time they photosynthesize, releasing much more oxygen than they absorb. To emphasize the importance of this function for life on earth

At night, the plants do not photosynthesize, that is, they absorb oxygen without expelling it.

## Lesson 4.3 Biological Cycle of Plants



Source: [Shutterstock](#)

- A plant is born from a seed planted in soil.
- Watering the seed regularly, in 10-20 days the small plant will grow (a tiny plant that has 3-4 leaves).
- The small plant will grow, produce more leaves and become a seedling.
- The seedling will gain more height, will produce more leaves and its stem will branch into individual shoots.
- Shortly before the flowering season, it will produce buds that will soon turn into new leaves, new shoots and flowers.
- The flowers will turn into fruits.
- The fruits contain the seeds, which if are replanted, new plants will be created following the above procedure.



Source: <https://image.shutterstock.com>

The biological cycle of plants, in order to be completed, the necessary factors are:

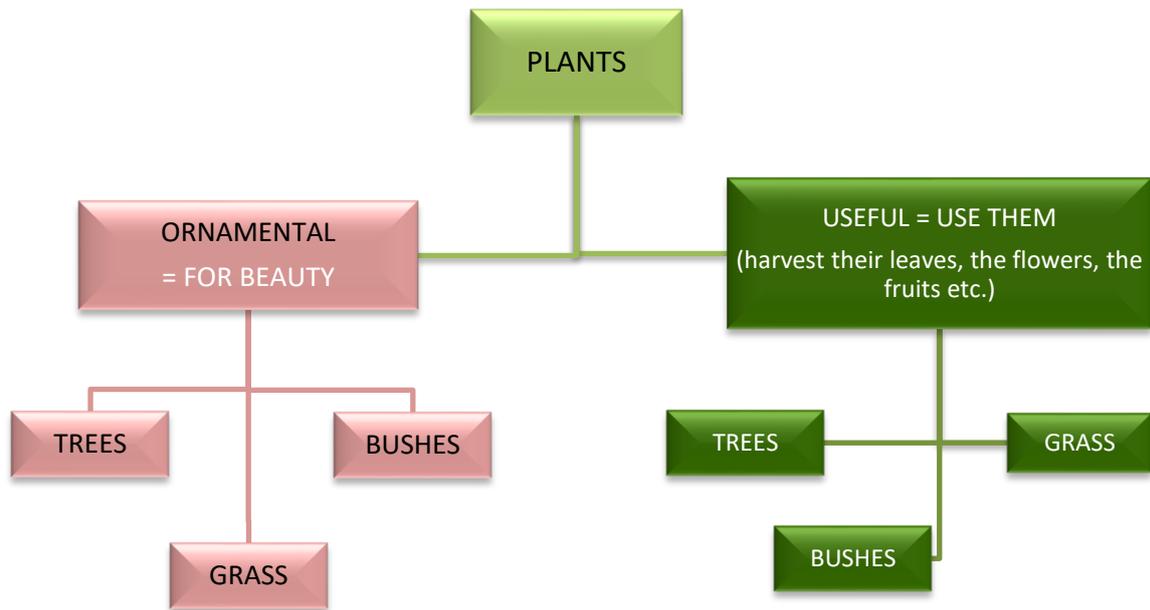
1. Watering (water)
2. The right temperature
3. Proper lighting (avoid shady places)
4. The necessary nutrients (otherwise you fertilize)
5. The protection of the plant from diseases, bugs or weeds (plant protection)

**EXERCISE 7:** Cut each image of the tomato biological cycle and put it (match it) to the proper month



MARCH	
APRIL	
MAY	
JUNE	
JULY	
AUGUST	

## Lesson 4.4 The Basic Plants



Some Examples

Ornamental Trees

Acacia



Magnolias



Ornamental Bushes

Viburnum



Photinia



Ornamental Grass

Lawn



Pelargonium



## Useful Trees

Olive trees



Rutaceae (orange tree)



## Useful Bushes

Oregano



Lavender



## Useful Grass

Strawberry



Parsley

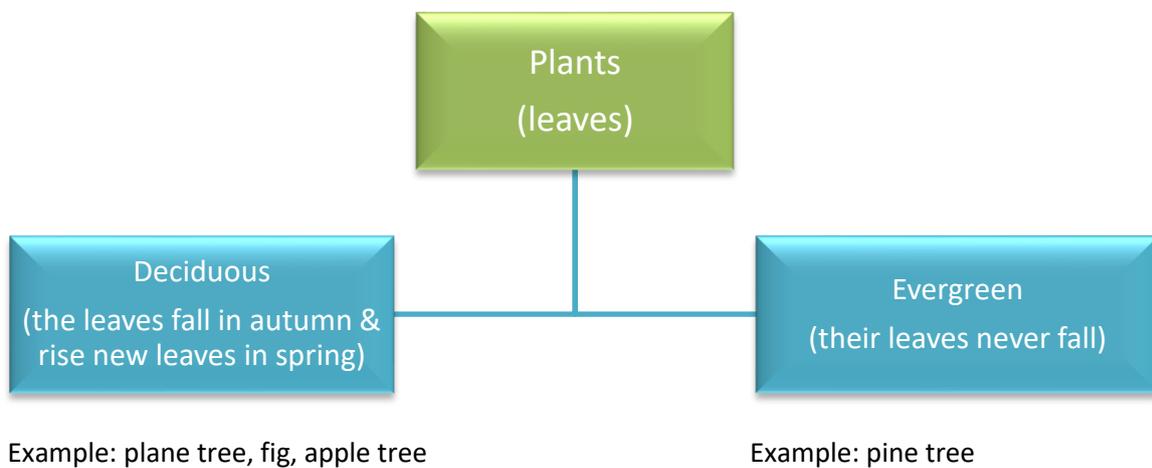
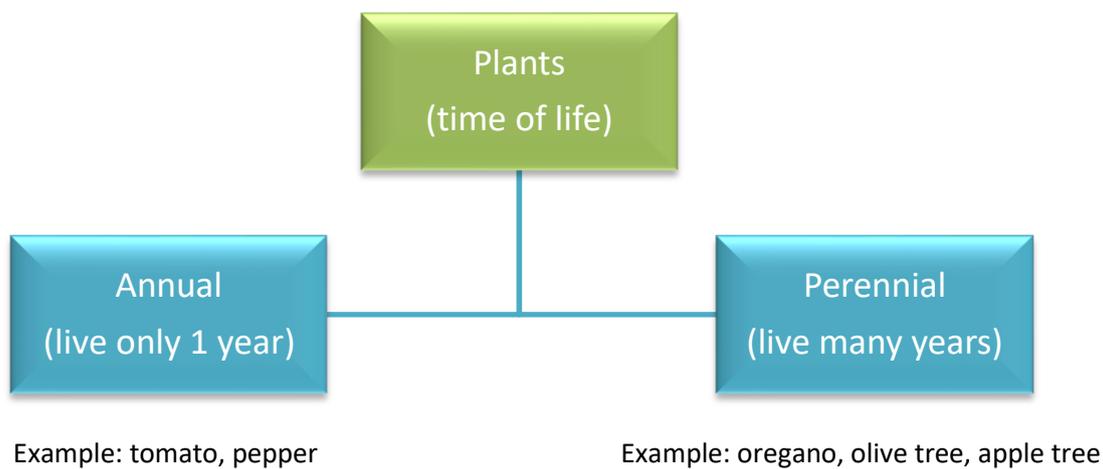


Source:

- <https://ae01.alicdn.com/kf/HTB19DyQhqagSKJy0Fhg6ArbFXaz/Buy-Real-Magnolia-Grandiflora-Tree-Semente-240pcs-Plant-White-Magnoliaceae-Flower-Grow-Sweet-Guang-Yu-Lan.jpg>
- [https://static8.depositphotos.com/1006087/965/i/950/depositphotos\\_9652776-stock-photo-ornamental-shrub.jpg](https://static8.depositphotos.com/1006087/965/i/950/depositphotos_9652776-stock-photo-ornamental-shrub.jpg)
- [www.basf.com](http://www.basf.com)
- [www.geoponiko-parko.gr](http://www.geoponiko-parko.gr)

Plants can be divided beyond their use (ornamental - useful) and the main stem (trees-shrubs-plants) into other categories depending on:

- lifespan
- if they drop the leaves



## UNIT 5 THE BASIC TOOLS AND MACHINERY

### Lesson 5.1 The Basic Tools - Machinery & Equipment

Tool	Photograph	Use
Dibber		To dig holes in the ground to plant the bulbs.
Hole digger		To dig bigger holes in the ground to plant the seedlings.
Ploughing tools		To dig the ground to make it fluffy and remove the weeds. <ul style="list-style-type: none"> <li>– The farming hoe (jembe) is for large surfaces</li> <li>– the hoe fork head is for flower beds</li> </ul>
Pickaxe		To dig heavy soils with stones.
Weeding tools		To remove weeds with deep roots.



Tool	Photograph	Use
Watering Can		To water plants
Pruning hook & harvest hook		For pruning or harvesting
Garden shears		<ul style="list-style-type: none"> <li>- prune the bushes</li> <li>- form shapes in the plants</li> <li>- form shapes on the fence</li> </ul>
Pruning saw	 <a href="http://www.xtools.gr">www.xtools.gr</a>	<ul style="list-style-type: none"> <li>- prune the hard branches</li> <li>- remove the sick branches</li> </ul>
Trimmer	 <a href="http://www.dhresource.com">www.dhresource.com</a>	To cut the lawn at the corners and at the edges
Spray tool / Small sprayer		<ul style="list-style-type: none"> <li>- Spray the plants with (organic) pesticides</li> <li>- Spray the plants with foliar fertilizers</li> </ul>
Backpack sprayer	 Pinterest	You put the sprayer on the back: <ul style="list-style-type: none"> <li>- you spray the plants with pesticides</li> <li>- you spray the plants with foliar fertilizers</li> </ul>

Machine	Photograph	Use
Lawn mower		Used to cut the lawn
Mechanical pruner	 <p data-bbox="667 842 863 869">www.alibaba.com</p>	Easily prune even the hard branches
Plow machine		Dig the ground quickly and without much effort.
Hole digger machine	 <ul style="list-style-type: none"> <li>✓ Drills a perfect hole for planting bushes at the right depth</li> <li>✓ Digs effortlessly through all soil types including compacted clay</li> <li>✓ Works effectively as a soil cultivator up to 12 inches deep</li> <li>✓ Attaches to a standard Australian Drill</li> </ul>	Drill holes in the ground to plant the seedlings.
Cordless hedge trimmer		Prune the bushes <ul style="list-style-type: none"> <li>– form shapes in the plants</li> <li>– form shapes on the fence</li> </ul>

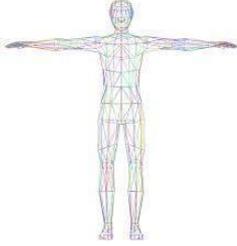
Machine	Photograph	Use
Electric saw		<ul style="list-style-type: none"> <li>- prune the hard branches</li> <li>- remove the sick branches</li> </ul>
Electric leaf blower		<ul style="list-style-type: none"> <li>- you push the leaves in one direction in order to collect them all together</li> <li>- it sucks the leaves/ then you must empty the bag</li> </ul>
Brush cutter	 <p data-bbox="644 1144 791 1173">es.123rf.com</p>	<p>You cut the grass and the weeds on a ground without rocks</p>
Wood chipper	 <p data-bbox="620 1491 815 1520">www.bestprice.gr</p>	<p>You put inside the cut branches in order to be frittered (chipped)</p>

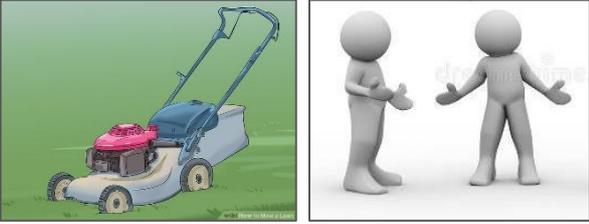
Equipment	Photograph	Use
Greenhouse		To ensure the desired climatic conditions for our plants, especially during the sowing period and the first stages of plant growth.
Seedbed / nursery		The pots and the seedbed are used for the sowing (the seeds are placed inside). The seedbeds and the small pots don't take too much space.
Flowerpots		For planting or transplanting the seedlings.
Gardening uniform		For human protection against dirt.

Equipment	Photograph	Use
Gardening boots		<p>To protect man against dust, mud and water dust, water, soil.</p>
Gardening gloves		<p>To protect humans from any allergic reactions to weeds or soils. Or protect from:</p> <ul style="list-style-type: none"> <li>– The thorns</li> <li>– Any allergic reactions to weeds</li> <li>– Injuries</li> </ul>
Hat		<p>You wear it</p> <ul style="list-style-type: none"> <li>– to be protected by the heat</li> <li>– to be protected by the sunlight</li> </ul>
Soil cover material		<p>To cover the soil, especially in the early stages of plant growth, so as to avoid the growth / presence of weeds.</p>
Watering hose		<p>The watering hose is used for hand watering. In large areas we use hoses of many meters to pour water.</p>
Nozzles (for watering cans & hoses)		<p>Put it at the end of:</p> <ul style="list-style-type: none"> <li>– the watering can</li> <li>– the hose</li> </ul> <p>The nozzle ensures low water pressure</p>

Equipment	Photograph	Use
Mask		You wear it when you apply agrochemicals
Earing protectors		You wear it to protect your ears when using loud machines
Goggles		You wear it to protect your eyes when pruning or cut the grass
Ladder		Use it in order to reach the top of tall trees (for pruning or harvest)

## Lesson 5.2 Safety Rules when Using Gardening Tools and Machines

<p>You work calmly, never in a hurry!</p>	
<p>Take care of your limbs (hands-feet-head) do not injure them!</p>	
<p>You do not neglect the tools in the workplace because someone can be injured.</p>	 <p>www.123RF.com</p>
<p>Make sure you keep a safe distance when using tools or machines (at least 1.5 meters away from colleagues - people).</p>	
<p>Before using any machine:</p> <ul style="list-style-type: none"><li>- read / read the instructions well or</li><li>- you ask them to explain or</li><li>- you are watching a relevant video</li></ul>	

<p>Make sure the machine-tool works properly.</p> <p>If you notice any disfunction, report it immediately.</p>	
<p>In case of a minor injury, you invite your supervisor to treat your:</p> <ul style="list-style-type: none"> <li>- trauma</li> <li>- bruise or</li> <li>- insect bites</li> </ul>	 <p style="text-align: center;">Wikipedia</p>
<p>In the event of a serious injury, call your supervisor or ambulance immediately.</p>	
<p>You assign the tasks that happen in a sloping space to your special colleagues.</p>	 <p style="text-align: center;"><a href="https://images.squarespace-cdn.com">https://images.squarespace-cdn.com</a></p>
<p>When you work with dangerous plants (with thorns or sharp leaves):</p> <ul style="list-style-type: none"> <li>- you should ask help from your colleagues</li> <li>- You need to be very careful</li> </ul>	 <p style="text-align: center;">Source: <a href="http://www.edcmag.com/best-gardening-gloves-for-thorns/">www.edcmag.com/best-gardening-gloves-for-thorns/</a></p>

Always clean the tools and equipment after using them.



Always store tools and machinery safely after using them.

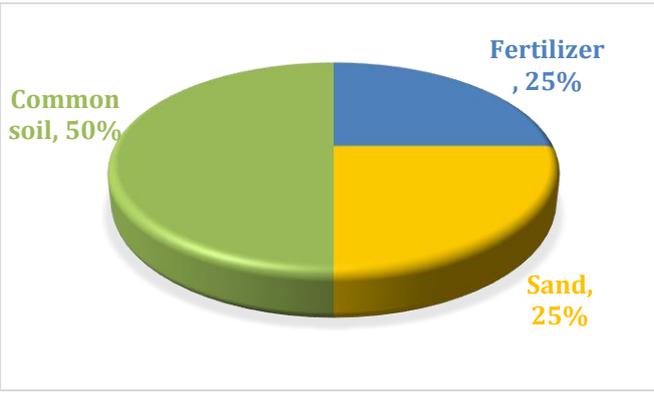
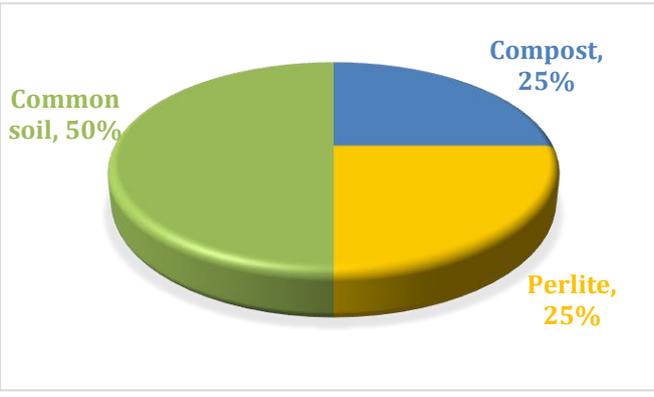


# UNIT 6 Agricultural Activities

## Lesson 6.1 Soils, Mixtures & Sowing

### 1. Create a soil blend

Mix with the shovel various types of soil as shown below to make a soil suitable for sowing or planting.

 <p>A 3D pie chart divided into three equal quadrants. The top-left quadrant is green and labeled 'Common soil, 50%'. The top-right quadrant is blue and labeled 'Fertilizer, 25%'. The bottom-right quadrant is yellow and labeled 'Sand, 25%'. The bottom-left quadrant is unlabelled.</p> <table border="1"><thead><tr><th>Component</th><th>Percentage</th></tr></thead><tbody><tr><td>Common soil</td><td>50%</td></tr><tr><td>Fertilizer</td><td>25%</td></tr><tr><td>Sand</td><td>25%</td></tr></tbody></table>	Component	Percentage	Common soil	50%	Fertilizer	25%	Sand	25%	 <p>A photograph showing a shovel with a wooden handle digging into a pile of dark brown, rich soil. The background is a blurred green, suggesting an outdoor garden setting.</p>
Component	Percentage								
Common soil	50%								
Fertilizer	25%								
Sand	25%								
 <p>A 3D pie chart divided into three equal quadrants. The top-left quadrant is green and labeled 'Common soil, 50%'. The top-right quadrant is blue and labeled 'Compost, 25%'. The bottom-right quadrant is yellow and labeled 'Perlite, 25%'. The bottom-left quadrant is unlabelled.</p> <table border="1"><thead><tr><th>Component</th><th>Percentage</th></tr></thead><tbody><tr><td>Common soil</td><td>50%</td></tr><tr><td>Compost</td><td>25%</td></tr><tr><td>Perlite</td><td>25%</td></tr></tbody></table>	Component	Percentage	Common soil	50%	Compost	25%	Perlite	25%	 <p>A photograph showing a shovel mixing three different soil components on a flat surface. From left to right, there is dark brown soil, a pile of white perlite granules, and a pile of brown compost. The shovel is positioned over the perlite pile.</p>
Component	Percentage								
Common soil	50%								
Compost	25%								
Perlite	25%								

## 2. Filling pots or the seedbed

Fill the bed or pots with the above soil mixture



## 3. Sowing

You sow:

<p>either in a bed (1 seed per hole)</p>	
<p>either directly in the field thrown by hand (bulk)</p>	
<p>either directly in the field in rows</p>	

The seed should be covered with soil (or pressed) to a depth of 3 times its size. If not covered with soil, the seed can be damaged by birds, insects, bugs or the sun. On the contrary, if it is buried too deep, it will struggle to rise to the surface and grow.

## Lesson 6.2 Ground & Transplants

### 1. Ground leveling



It is important that the planting or sowing surface is flat so that:

- the water is not stagnant to create in molds (mud formation)
- all plants are watered evenly.
- the soil won't drag when it is raining heavily

The optimum tool for leveling the ground and potentially removing rocks is the rake.

## 2. Mulching (cover the soil)



- with plastic
- with shavings
- with pine bark
- with compost
- with straw
- with cardboard or newspapers (tap with stones)

The soil-cover with one of the above materials prevents weeds from appearing in the place where our plants will be grown. Using a plastic soil-cover is expensive and the soil is not well aerated (poor aeration in the roots of our plants, the beneficial microorganisms of the soil do not grow properly).

It is better to choose biological soil-cover materials (woodchips, bark, straw, cardboard - newspapers, etc.), we prefer them because:

- They are cheap
- Weeds make it difficult to grow
- Allow the soil to be well aerated
- They are environmentally friendly

### 3. Transplant or planting the seedlings

#### Transplant

1



2



3



4



1. Cut any roots that protrude from the pot
2. Remove the plant along with its soil (soil ball)
3. Place the plant in a larger pot in the center (which you have filled to the middle with soil)
4. Add soil
5. You press the soil
6. You water

## Planting the seedlings into the ground



1. Dig the hole



2. Place the seedling into the hole



3. Cover with soil and push

## Lesson 6.3 Weeding

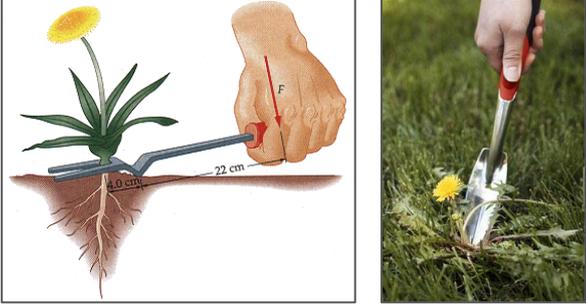
### 1. Weeding

Weeds are quite hard / resistant plants that grow next to the plants of our cultivation. You need to remove them because:

- they take the nutrients from our plants leaving them cachectic.
- They may drown the cultivated plants.

You should uproot them carefully without leaving any residue from their root (otherwise they redevelop).

You can remove weeds using the following ways:

With the hands wearing the special gardening gloves (weeding).	
With the small or large weeder or shovel.	
With special weeding tools.	

<p>With the tractor.</p>	
--------------------------	--

## 2. Ploughing

The soil needs frequent ploughing in order to:

- Aerate better
- Have good structure
- Absorb better the water
- Get rid of the weeds

This way, you can offer better aeration conditions in the roots and soil microorganisms.

You can dig the soil using the following ways:

<p>With the small weeder in pots or small flower beds.</p>	
<p>With the hoe or the big weeder in small cultivated areas.</p>	 <p><a href="https://st2.depositphotos.com">https://st2.depositphotos.com</a></p>
<p>With the pickaxe when the ground is heavy and has stones.</p>	 <p><a href="https://static4.depositphotos.com">https://static4.depositphotos.com</a></p>

With the mechanical plow for larger areas.



## Lesson 6.4 Watering

### 1. Watering

Plants need water because it is their main food. It is necessary for all the basic plant functions accomplishment (respiration, transpiration, photosynthesis, fruiting). Plants receive water either through rain (and snow) or from watering.

You may water the plants using one of the following ways:

<p><b>With the watering can</b></p> <p>Water the small flower beds or pots with the watering can.</p> <p>It helps not to spill too much water.</p> <p>The nozzle helps prevent water pressure from falling on the plants.</p>	
<p><b>With the hose</b></p> <p>Water the large flower beds or several pots with the hose. It is important to have a nozzle that lowers the pressure so that the plants are not injured.</p>	
<p><b>With automatic watering</b></p> <p>This method is indicated when there are large cultivated areas or a large number of pots.</p> <p>You need to check regularly that the automatic watering works properly:</p> <ul style="list-style-type: none"><li>– Check the indicators at the base, if the watering time is correct (what do we mean?)</li><li>– Check if the battery is working</li><li>– Check if the plants are watered with the right amount</li><li>– Check if the tap connected to the automatic watering is open.</li></ul>	

How do you know if the plant needs watering?

- Using your finger, you touch the soil and
  - o If you feel the soil dry then you water
  - o If you feel the soil wet then you don't water it
- You keep a watering diary like the example below

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Watering	√		√		√		

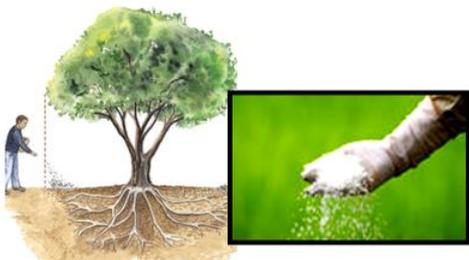
- You never water when it rains or immediately after because the rain has already watered the plant.
- You water more often in the summer

## Lesson 6.5 Fertilization & Plant Protection

### 1. Fertilization

Plants need the nutrients they get from the soil through watering.

Some soils are poor in nutrients, while other plants are more demanding in nutrients. The supervisor can judge for which reason the soil may need further fertilization. To fertilize the soil, you can use the following ways:

<p>With application to the roots (in the ground).</p> <ul style="list-style-type: none"><li>- Dissolve the fertilizer in water (liquid form)</li><li>- Or you throw it in solid form.</li></ul>	
<p>Foliar fertilization with application to the leaves</p> <ul style="list-style-type: none"><li>- Dissolve the fertilizer in water, according to instructions</li><li>- Spray the leaves / plant</li><li>- Foliage fertilization.</li></ul>	
<p>Combine it with the watering.</p>	

## 2. Application of (organic) pesticides

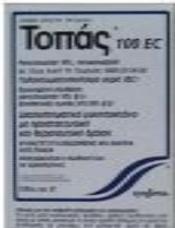
Many times, our plants are affected by:

- Diseases
- Pests
- Bugs
- Weeds

You use pesticides to protect them.

You avoid the use of chemical pesticides and in their place, you can use organic pesticides.

For applying organic pesticides and fertilizers:

<p>Follow the instructions written on the container.</p> <p>You should be very careful with the ratio of medicine and water.</p>	
<p>As a precaution you should wear:</p> <ul style="list-style-type: none"><li>- long-sleeved clothes</li><li>- boots</li><li>- gloves</li><li>- mask and</li><li>- hat</li></ul>	

You never apply during the flowering period of the plant.



You do not apply when it is very hot over 25/30 °C because:

- the medicine will evaporate.
- It can destroy (burn) the plant / leaves



Do not apply when there are strong winds (the pesticide will drift and scatter on neighboring plants).



Do not apply when it is raining (the medicine will be rinsed off and will end up in the soil and groundwater).



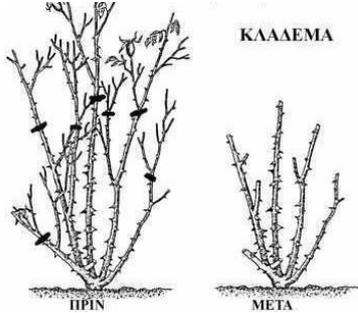
Apply on the plants (on target) that your supervisor has indicated to you and not on the neighbor plants.



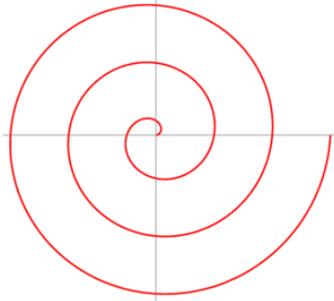
## Lesson 6.6 Pruning & Cleaning

### 1. Lawn pruning / mowing

You prune for better plant growth, better fruiting, shape formation, treatment of diseases, etc. You can prune the following parts of the plant:

<p>The branches that are dry (which have no leaves).</p> <p>The infected branches.</p>	
<p>The branches where your supervisor has marked you.</p>	 <p>Pinterest</p>
<p>You cut the lawn with the machine following the same direction.</p>	
<p>Or up and down</p>	 <p><a href="https://www.scag.com">https://www.scag.com</a></p>

Either circularly starting from the center of the circle



[www.wikipedia.com](http://www.wikipedia.com)



<https://hips.hearstapps.com>

## 2. Removal of fallen leaves & garbage, removal of pruning offcuts

You wear gloves before removing the following objects at the place your supervisor has indicated to you:

<p>The fallen leaves from the lawn or soil.</p> <p>You use:</p> <p>The special rake</p> <p>The blower</p> <p>You place the leaves in the special garden bags.</p>	
<p>Garbage</p> <p>You put them in special bags and throw them in the trash</p>	
<p>Pruning products</p> <p>The small branches, you place them in the special garden bags.</p> <p>The large branches, you remove them with the stroller or hands.</p> <p>You throw them in special storage places</p>	 <p><a href="https://www.cliffordcontainers.com">https://www.cliffordcontainers.com</a></p>
<p>The pruning offcuts can be put in the wood chipper and then in the composter</p>	 <p>bestprice.gr</p>

## Lesson 6.7 Harvesting

### 1. Harvesting

Many plants bloom and bear fruits. Harvest is called the collection of some parts of plants that are intended for food. These parts can be flowers (e.g. oregano), fruits (e.g. olive), leaves (e.g. laurel), roots (e.g. carrot), bulbs (e.g. onion), the whole plant (e.g. chives) etc.

There are special tools (depending on the plant) for harvesting flowers or fruits. In any case, you can do it by hand.

The harvest takes place at a specific time (e.g. olives are harvested in November-December, chamomile in April-May, etc.).



[www.gustabruzzo.com](http://www.gustabruzzo.com)

## Lesson 6.8 Tool Cleaning & Storage

### Cleaning tools after use and storage

<p>After use, the tools must be cleaned.</p>	
<p>After cleaning, you need to store them.</p> <p>It is important to store them neatly so that you can easily find them next time.</p> <p>You store them indoors to protect them from bright sunlight, rain, wind.</p> <p>It is important to store them neatly so that you can easily find them next time and not let them get entangled with each other.</p>	 <p>VectorStock® VectorStock.com/18802580</p>
<p>In case you have pruned diseased plants, it is advisable to disinfect the tools (steam or alcohol cleaning)</p>	
<p>If the tools are not sharp, you can sharpen them carefully.</p>	

## Lesson 6.9 Agricultural Activities Sequence

### SOWING

<p>1. You make a mixture of soil</p>	 A small shovel with a wooden handle is shown next to a mixture of soil, white perlite, and organic matter.
<p>2. You fill the seedbed with this mixture</p>	 A person is using a small shovel to fill a seedbed tray with soil mixture.
<p>3. You place the seed in each hole, in a depth 3 times its size</p>	 A seedbed tray with seeds placed in each hole.
<p>4. You water afterwards</p> <p>5. You regularly water until the transplanting takes place</p>	 A person is watering a seedbed tray.
<p>6. You remove the weeds</p>	 A person is removing weeds from a seedbed tray.

**After each activity you clean the tools and storage.**

SEEDLING PLANTING – UP TO HARVEST

<p>7. You level the ground</p>	
<p>8. You plough the ground</p>	
<p>9. You dig holes to place the seedlings</p>	
<p>10. You place the seedlings inside the holes</p>	
<p>11. You cover with soil and push</p>	
<p>12. You place the mulching, prefer the natural materials</p>	

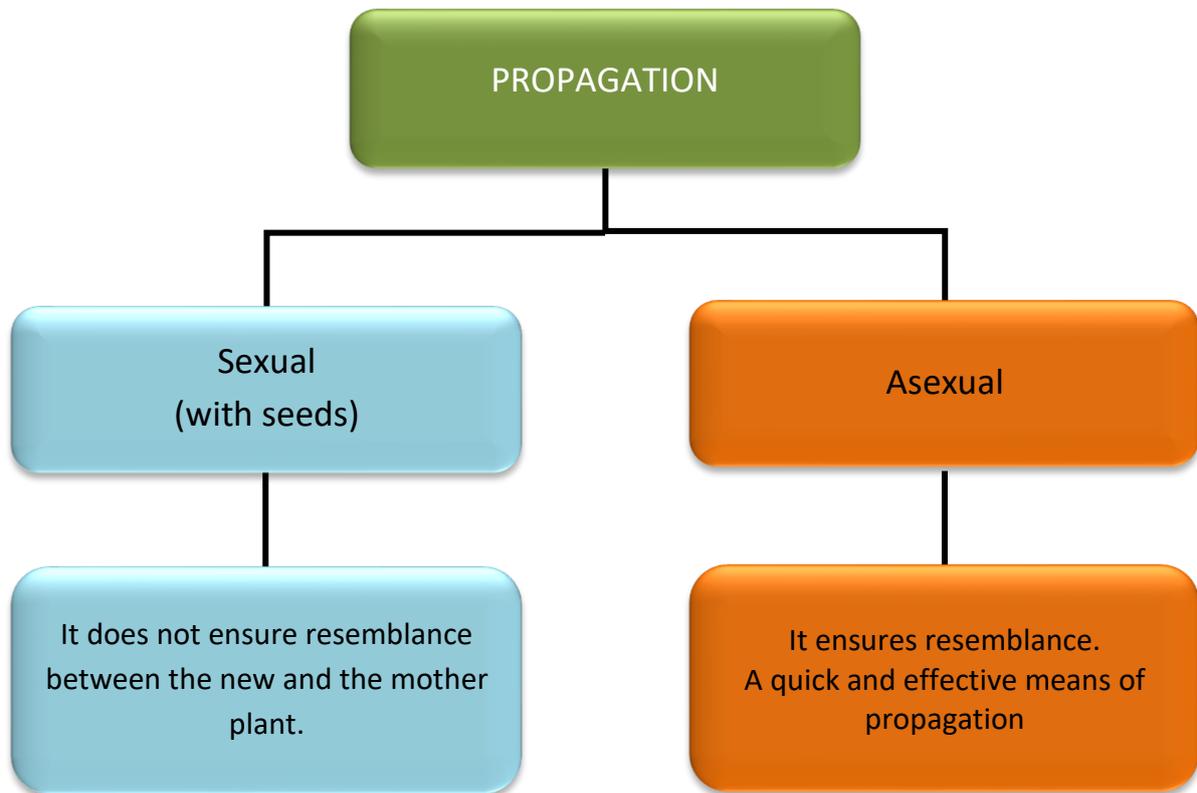
<p>13. Water (either by hand, either by automatic irrigation system)</p>	
<p>14. You observe the health condition of the plants</p> <ul style="list-style-type: none"> <li>– in case of lack of nutrients, you fertilize, after consulting the agronomist</li> </ul>	
<ul style="list-style-type: none"> <li>– In case of disease, you apply the pesticide after consulting the agronomist</li> </ul>	
<p>15. You mind the weeds. If they appear you uproot them by any means (weeding, ploughing, using the weeding tools)</p>	
<p>16. As the plant grows up, it might need pruning. You follow your supervisor's instructions.</p>	
<p>17. You gather the pruning offcuts and take them to the proper place.</p>	
<ul style="list-style-type: none"> <li>– to the place indicated by your supervisor</li> <li>– to the wood chipper</li> </ul>	 <p style="text-align: center;">bestprice.gr</p>

<p>18. You keep the place around the plants clean. You remove any garbage or leaves.</p>	
<p>19. When it's the harvest time you collect the part of the plant needed.</p>	

**After each activity you clean the tools and storage.**

## UNIT 7 Plant Propagation

### Lesson 7 Means of Plants Propagation



*Sexual Propagation*

## 1. Unrooted Cuttings



- This is the most common application of asexual propagation.
- Top sprouts with 3-4 leaves.
- The intermediate cuttings do not always work on the plants.
- A rooting booster (e.g. rooting hormone) may also be needed for a successful cutting.

### The procedure of planting the cuttings



1. We place the cutting into the water



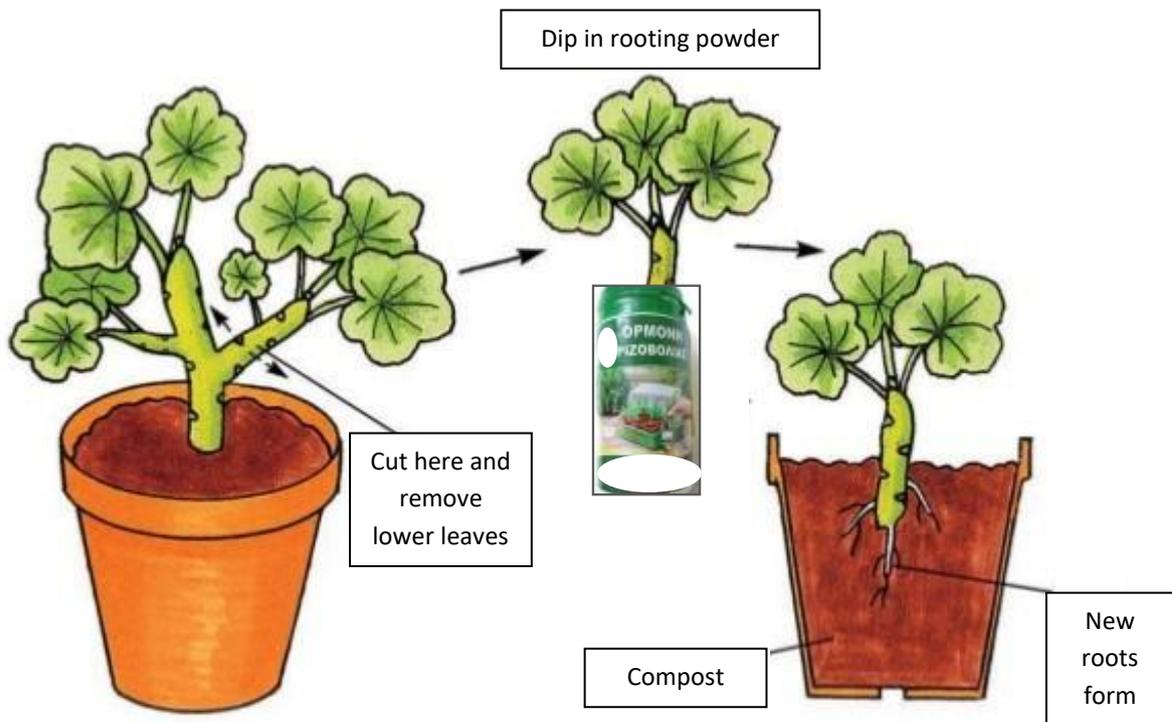
2. Then we place the cutting into the hormone



3. We place the cutting into the pot

## 2. Artificial Propagation

### Cuttings (Geranium)



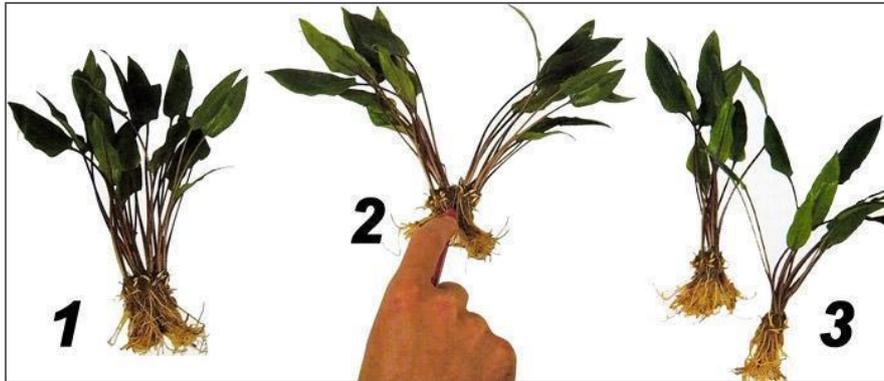
### 3. Baby Bulbs

The bulbs produce near the bottom the baby bulbs, which can be pulled away and create a new plant.



#### 4. Division

In some species we can create new plants simply by dividing the roots (e.g. *Spatiphyllum*).

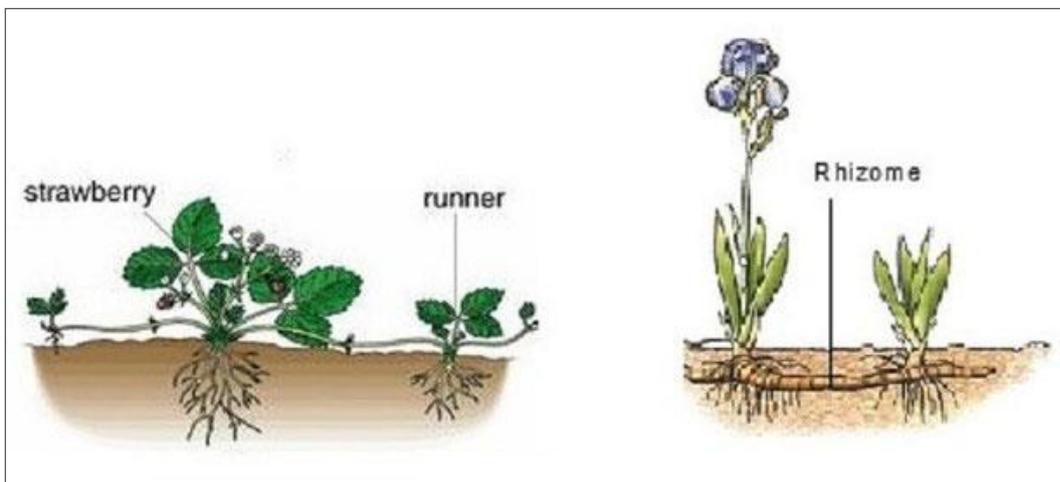


- Be careful not to injure the root.



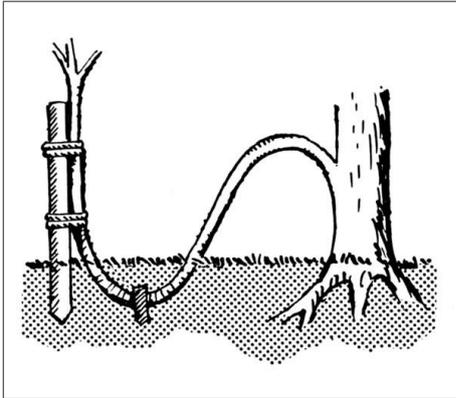
- Suitable season Autumn or February-March.

## 5. Rhizomes



- On the root appears a rhizome like a tuber from which new plants are created (iris, strawberry...)
- When cutting the rhizome make sure there is a root.

## 6. Runners



- Artificial creation of new plants.
- You dig a flexible branch in the ground.
- After 3 months the branch will have developed roots and it can be cut off as an autonomous plant.

## 7. Offshoots

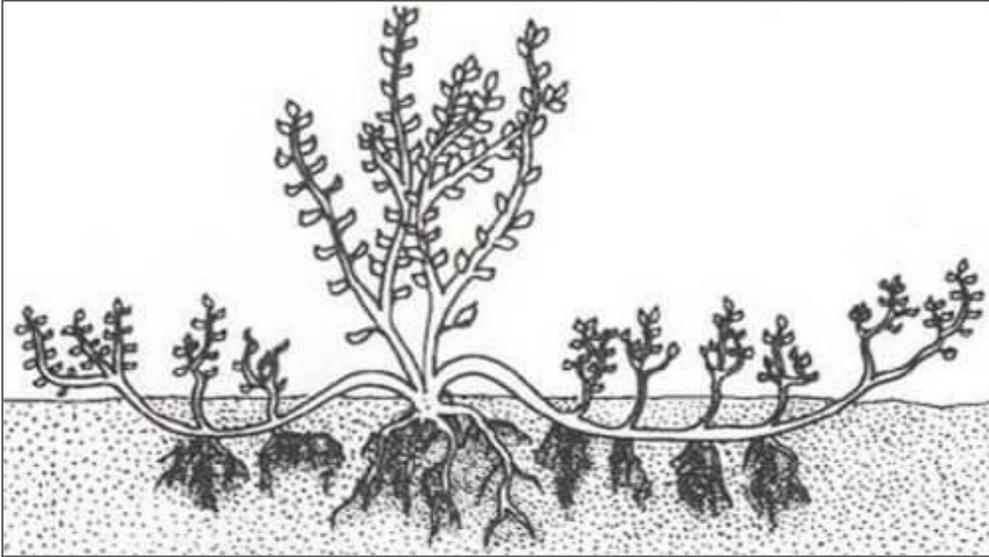


They are lateral shoots that fly from the mother plant.

You cut a branch and plant it, thus creating a new plant.

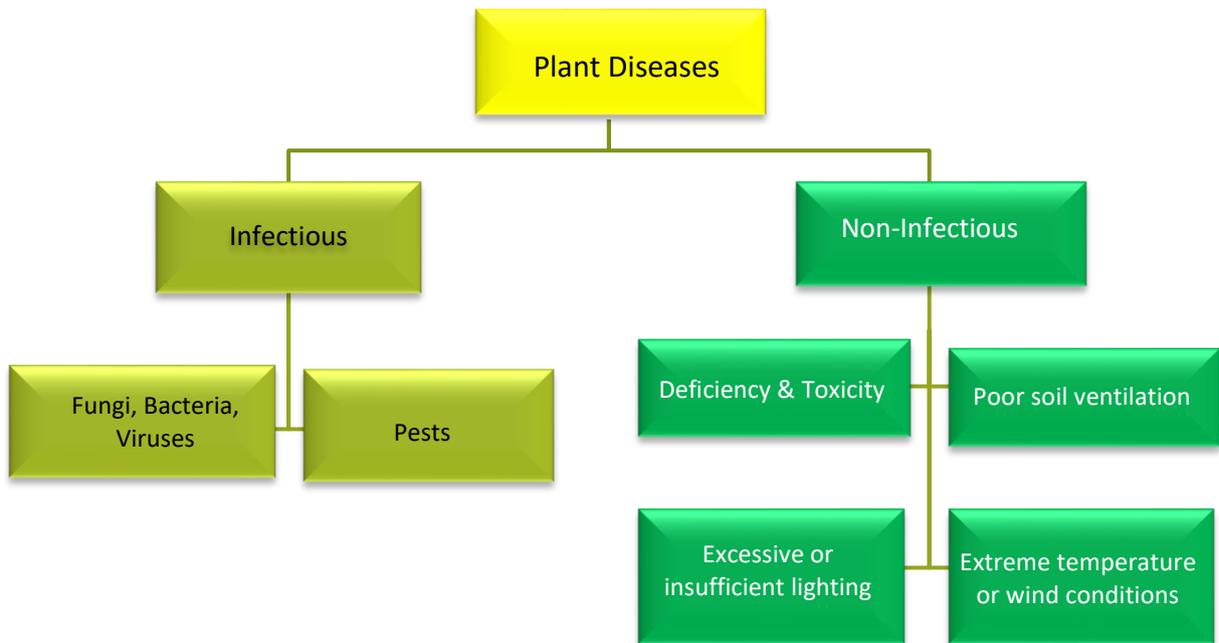
(chloroplast, strawberry)





# UNIT 8 Plant Diseases

## Lesson 8.1 Infectious Diseases

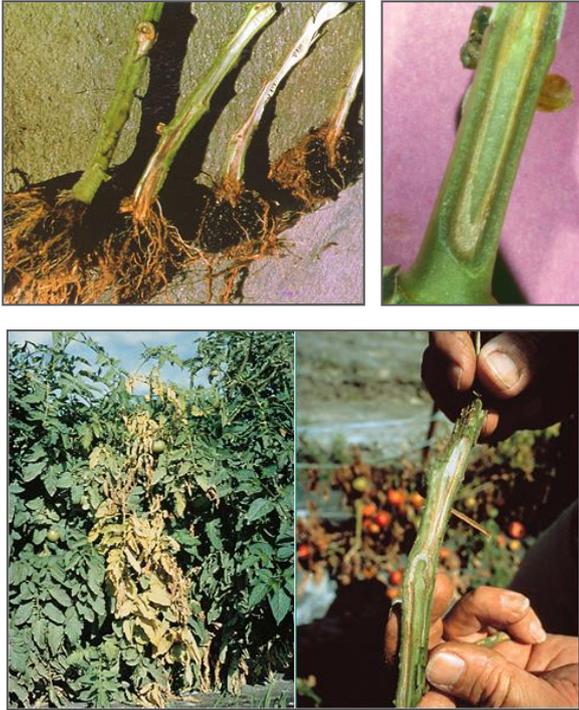


### INFECTIOUS PLANT DISEASES

#### 1. Fungal Diseases



Coal	Rust
	
Smoke	
	
Mildew	
	
Powdery Mildew	
	

Microfungi	Rust
	
Fusarium	
	

## 2. Prokaryotic Diseases

Bacteria entering the plant from wounds



Bacteria that cause in plants:

- Hyperplasia
- Sudden drying
- Adrobacteria (infestation of wood vessels)
- Stains
- Liquid rot
- The most well-known prokaryotic disease is olive carcinoma

### 3. Virological

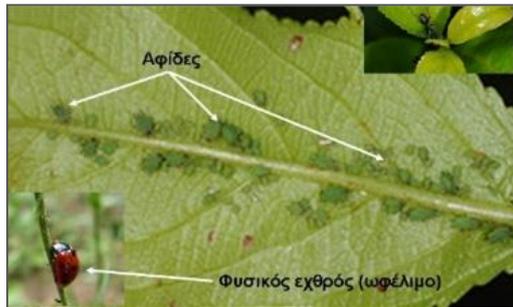


- Mosaic
- Tristeza
- Vine trunk fusion
- Stone Fruit

The virus is not transmitted by wind, rain or by depositing contaminated juice on another plant.

It needs good prevention: no smoking, good hand washing before work, immediate destruction of infected plants.

#### 4. Pests



#### Meligres



#### Caterpillars



Cicadas



Scabies



Insects & Soil Nematodes



Snails and Slugs



Tetranychoi, Thripes, Meligres



## 5. Weeds



- Weeds are the plants that develop on their own, next to the plants we grow, without us wanting them to.
- Weeds take the water and nutrients from our plants and for this reason we need to clear them off.
- We get rid of weeds either by uprooting them (by hand, with tools or with machines) or by throwing special medicines called herbicides.

### **Treatment of infectious diseases**

- For all infectious diseases there are medicines, chemical or biological to fight the source of the disease (fungus, insect, etc.).
- For insects and bugs there are also traps or other beneficial insects that eat the harmful ones (eg ladybug).
- When you are going to apply a pesticide, follow the instructions of your supervisor and the instructions for use of the medicine. Observe all safety measures mentioned in the relevant chapter.

## Lesson 8.2 Non-Infectious Diseases

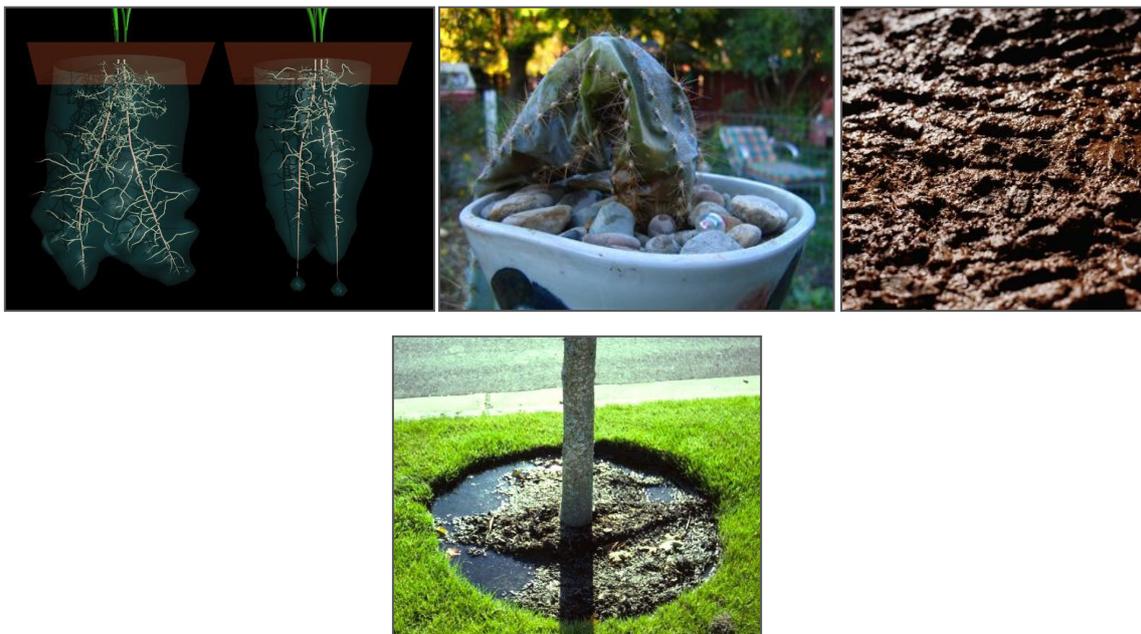
### NON-INFECTIOUS DISEASES

Noninfectious diseases are due to natural conditions. They occur because of:

- Poor soil aeration (heavy soil)
- Nutrient leaching (very light soil) => deficiency
- Toxicities
- Bright Light
- Extreme Temperature
- Excessive Humidity
- Strong wind

#### 1. Poor soil aeration (heavy soil)

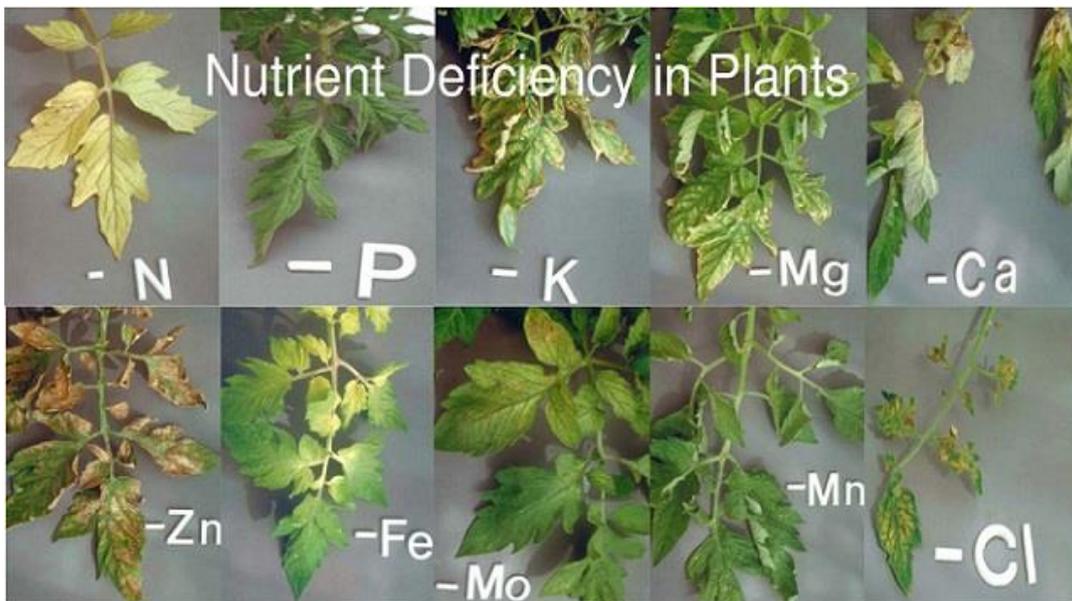
**Treatment: soil change or soil improvement**



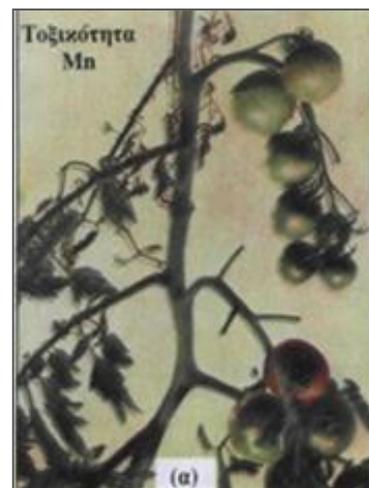
2. Deficiency (lack of nutrients in the plant)



**Treatment: Add the missing element (like fertilizer)**



3. Toxicity (an excessive amount of a nutrient)
- They can occur from excessive addition of fertilizer or pesticide
  - In some extreme cases from a polluted atmosphere



**Treatment: Immediate change of soil & good rinsing (watering)**



*Figure 1. Symptoms of sodium toxicity in maple*



*Figure 2. Symptoms of chloride toxicity in grape*

Salt or hard irrigation water

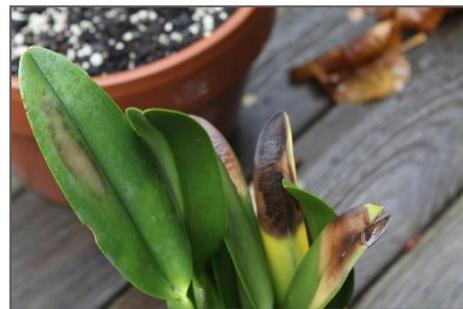
- Creates chlorine toxicity in plants
- Damage is also caused to the automatic irrigation systems

**Treatment: Watering with good quality water**



#### 4. Bright Light

**Treatment: Creating shade for the light sensitive plants**



#### 5. Insufficient Lighting

**Treatment: Moving plants to brighter places**



## 6. Extreme Temperatures



**Freezing:** Strange Symptoms, Overnight Death



**Too Hot:** Slow Growth, Leaves Cupping

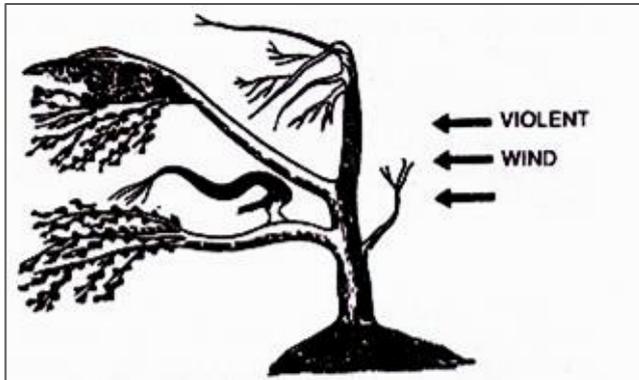
### Frost Treatment: Cover with transparent nylon



Source: [Ebingjie.com](http://Ebingjie.com)

## 7. Strong Wind

Treatment: Creation of windbreaks



## Wind can cause

- Strain fractures
- Slopes
- Dispersion of crop production
- Changes in photosynthesis
- Reproductive abnormalities
- Freezing
- Water losses
- Erosion



# UNIT 9 Safety in Agriculture Activities

## Lesson 9.1 Safety Rules in General

<p>1. You work calmly, never in a hurry!</p>	
<p>2. You follow the proper dress code</p>	
<p>i. You wear proper clothing such as gardening uniforms.</p> <p>You avoid clothing that can be potentially get caught by the tools or machinery.</p>	
<p>ii. You wear the proper equipment, depending on the agricultural activity.</p>	

3. You assign to your special colleagues' difficult tasks such as:

1. Activities in sloping areas



Source: <https://images.squarespace-cdn.com>

2. Applying agrochemicals

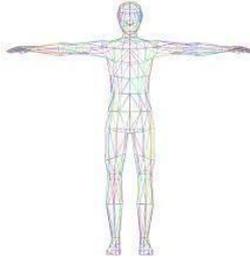


Source: Pinterest

i. Activities with plants having thorns or sharp edges.



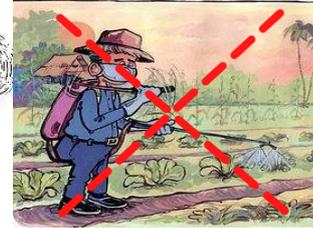
## Lesson 9.2 Safety in the Working Environment

When you use the agricultural tools & machinery	
<p>1. Mind your limbs (hands-feet-head) do not injure them!</p>	
<p>2. You do not neglect the tools in the workplace because someone can be injured.</p>	 <p>Source: <a href="http://www.123RF.com">www.123RF.com</a></p>
<p>3. Make sure you keep a safe distance when using tools or machines (at least 1.5 meters away from colleagues - people).</p>	
<p>4. Before using any machine:</p> <ul style="list-style-type: none"> <li>– read / read the instructions well or</li> <li>– you ask them to explain or</li> <li>– you are watching a relevant video</li> </ul>	
<p>5. Make sure the machine-tool works properly. If you notice any disfunction, report it immediately.</p>	

<p>6. You don't touch the hot parts of the machinery.</p>	
<p>7. You don't touch the sharp edges of the tools or the machinery.</p> <p>8. You hold the tools by the handle.</p>	
<p>9. Wear special ear protection when using noisy machinery.</p>	
<p>10. Wear special goggles when pruning.</p>	
<p>11. On rainy days, wear raincoats and wellies.</p> <p>Wear the wellies even if the rain has stopped because the ground is full of mud.</p>	

In case of applying organic pesticides and fertilizers

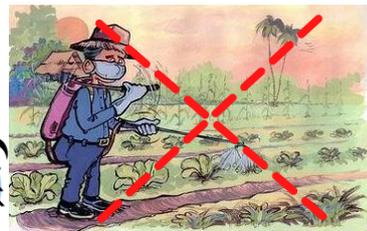
1. Don't apply on hot days.



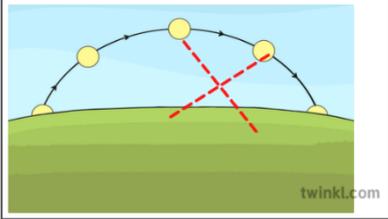
2. Don't apply on windy days.

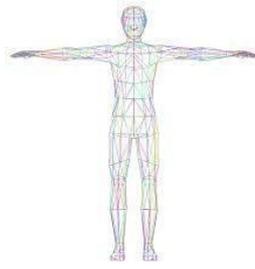


3. Don't apply on rainy days.



## Lesson 9.3 Health and Safety

Health and Safety	
<p>1. When it's too hot you</p> <ul style="list-style-type: none"><li>– put on sunscreen</li><li>– wear a hat</li><li>– wear thin long-sleeved &amp; light-colored clothes (to avoid burns)</li></ul>	
<p>2. In the hot summer days avoid outside activities from 12.00 up to 16.00.</p>	
<p>3. When wearing short sleeves, put on mosquito repellent to avoid insect bites.</p>	
<p>4. When it is too cold you get dressed warmly.</p>	
<p>5. When the temperature is near or below 0°C mind the ice (it might be slippery).</p>	

<p>6. In case you feel tired, nausea, headache, dizziness, fever, etc. rest in a shady place.</p>	
<p>7. If you are taking medication, do not do dangerous tasks, thus:</p> <ul style="list-style-type: none"> <li>– do not use machines</li> <li>– do not climb stairs</li> <li>– do not prune etc.</li> </ul>	
<p>8. Get a tetanus vaccine every 10 years.</p>	
<p>9. Mind your limbs (hands-feet-head) do not injure them!</p>	
<p>10. In case of a minor injury, you invite your supervisor to treat your:</p> <ul style="list-style-type: none"> <li>– trauma</li> <li>– bruise or</li> <li>– insect bites</li> </ul>	 <p style="text-align: center;">Wikipedia</p>

11. In the event of a serious injury, call your supervisor or ambulance immediately.



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